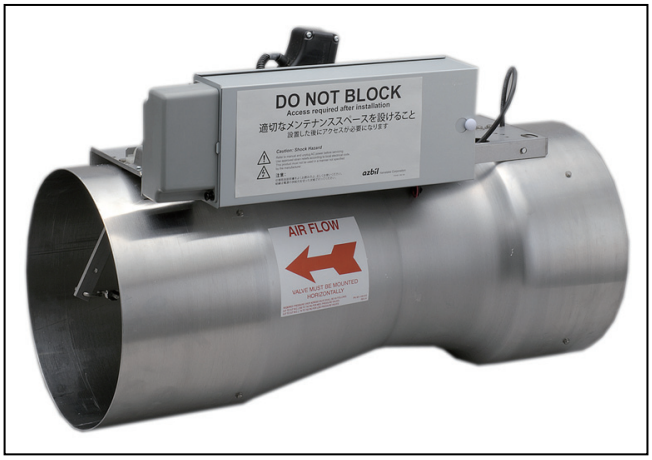
Infilex™ VN
Venturi Valve for Variable Air Volume (High-speed Actuation)

General

Infilex™ VN is a venturi valve combined with an airflow controller, designed to control airflow rate/room pressure in research facilities, fabrication facilities, and hospitals.

Infilex VN directly communicates with our building management system (BMS) *savic-net™ FX* via LonTalk® protocol. This enables you to supervise airflow volume and status of fume hood exhaust, general exhaust, and supply air from savic-net FX center unit (client PC).

- Pressure-independent mechanism:
  The valve performs self-balancing operation to maintain a fixed flow of air by adjusting to changes in duct static pressure.
- Quick response:
  High-speed electric actuator mounted onto the valve quickly responds to the changes in airflow command.



Features

- High speed of response: 1 second or less.
- Airflow control not affected by duct static pressure fluctuation*.
- Airflow control not affected by ductwork*.
- No additional straight duct runs needed*.
- Installable in horizontal/vertical duct runs (depending on the models).
- Low noise.
- Characterized (calibrated) at factory and no field adjustment required.
- Fail-safe operation in the event of power failure (optional).

Note:
* See the flow control accuracy in the sections **Specifications: Valve specifications** and **Performance Curves of Pressure-Independent Control**.
Note that the pressure across the valve must be in the following range for the specified accuracy:
150-750 Pa (medium differential pressure)

Safety Instructions

Please read instructions carefully and use the product as specified in this manual. Be sure to keep this manual nearby for quick reference.

Usage Restrictions

Usage Restrictions

This product is developed, designed, and manufactured for special airflow control. Do not use this product in a situation where human life may be affected. This product can meet stringent requirements of research facility laboratories, bio-hazard/chemical hazard clean rooms, rodent animal holding facilities, infectious disease hospitals, where reliability or control accuracy is particularly required. If this product is used in a place where safety and reliability are required, implementation of fail-safe design, redundant design, and regular maintenance should be considered. Since a whole system for airflow control must be considered to provide this product to your application, be sure to contact specialized Azbil Corporation personnel for system design, application design, usage, and purpose of this product.

This product is supposed to be continuously powered once it is turned on except during power failure. Do not turn off the product at the end of everyday operation.

Azbil Corporation will not bear any responsibility for the results produced by the operators.

Product Life

It is recommended that this product be used within its product life.

The product life is the period of service in which you can use the product safely and reliably based on the design specifications.

When you use the product beyond its product life, its failure ratio may increase due to deterioration of parts, etc.

The product life is estimated scientifically based on the results of acceleration tests, endurance tests, etc., taking into consideration the operating environment, conditions, and frequency of use as basic parameter. We can then recommend the product life during which the product can operate reliably with the lowest failure ratio and least deterioration over time.

The life of this product is 10 years.

The product life is defined assuming that maintenance work, such as replacement of the limited life parts, is carried out properly.

Warnings and Cautions

⚠ WARNING	Alerts users that improper handling may cause death or serious injury.
⚠ CAUTION	Alerts users that improper handling may cause minor injury or material loss.

Signs

	Alerts users possible hazardous conditions caused by erroneous operation or erroneous use. The symbol inside △ indicates the specific type of danger. (For example, the sign on the left warns of the risk of electric shock.)
	Notifies users that specific actions are prohibited to prevent possible danger. The symbol inside ⃠ graphically indicates the prohibited action. (For example, the sign on the left notifies that disassembly is prohibited.)
	Instructs users to carry out a specific obligatory action to prevent possible danger. The symbol inside ● graphically indicates the actual action to be carried out. (For example, the sign on the left indicates general instructions.)

⚠ WARNING	
	The product weighs more than 18 kg. Carefully move the product with a vehicle or enough manpower in an appropriate manner. Careless lift or accidental drop of the product might cause injury or product damage.

⚠ CAUTION (1/2)	
	Use the product under the operating conditions (temperature, humidity, power, vibration, shock, mounting direction, atmospheric condition, etc.) as listed in the specifications. Failure to do so might cause fire or device failure.
	Installation and wiring must be performed by qualified personnel in accordance with all applicable safety standards.
	All wiring must comply with applicable codes and ordinances.
	Install the product in the proper position as specified in this manual. Excessively tight connection to a duct or improper installation position might damage the product.
	Do not put load or weight on the actuator of the product. Doing so might damage the product.
	Keep the product in the package for storage. Failure to do so might damage or stain the products.

⚠ CAUTION (2/2)	
	Do not disassemble the product. Doing so might cause electric shock or device failure.
	Do not touch the moving parts of the product. Doing so might cause injury.
	Dispose of the product as industrial waste in accordance with your local regulations. Do not reuse all or part of this product.

IMPORTANT:

- Do not stuck too many cardboard package in which the products are packed.
- Do not use the product (the actuator, valve controller, and other components) in an atmosphere containing corrosive gas or explosive gas.
- Do not loosen the bolt that fixes the pivot arm position. Predetermined airflow may not be assured.
- Substances attached inside the valve may be toxic to the human body. When performing maintenance or disposing of the product, do not touch the attached substances. Do not let the substances touch outside, either.

Model Numbers

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	Description
VN										Base model number
	1									Standard valve (high-speed actuation)
	2									Shut-off valve (high-speed actuation)*1
		1								VAV control for fume hood exhaust (EXV-H-v/EXV-H-vMain)
		2								VAV control for general exhaust (LAB-H/GEX-H/GEX-H-Main)
		3								VAV control for supply air*7 (LAB-H/MAV-H/MAV-H-Main)
		4								Two-position control of fume hood exhaust*2 (EXV-H-t/ EXV-H-tMain) Booster valve for exhaust air (BST-H)
		5								Booster valve for supply air*7 (BST-H)
			0							Medium working differential pressure: 150 to 750 Pa
				0						Horizontal
				1						Vertical upflow
				2						Vertical downflow
					C					24 V AC
						0				Single valve body without flanges (slip-in-duct)
						2				Dual valve bodies fastened with rectangular frames without flanges*6
						3				Single valve body fastened with rectangular frames without flanges**6
						4				Single valve body with welded circular ANSI flanges
							20			200 mm (8 inches)*4
							25			250 mm (10 inches)
							30			300 mm (12 inches)
							35			350 mm (14 inches)*2, *4
								A		Uncoated
								B		Coated for general hood
								C		Coated for high corrosion-resistant hood
								D		PVDF coated for special hood*2, *4, *5
									blank	No fail-safe operation (standard model) (Valve keeps the position right before the shutdown.)
									-H	Valve fully opens in the event of power failure.*3
									-S	Valve fully closes in the event of power failure.*3

[1] Base model number
[2] Valve type
[3] Control type
[4] Differential pressure across valve
[5] Valve orientation
[6] Power
[7] Number of valve bodies, end connection
[8] Valve size (nominal)
[9] Valve coating
[10] Fail-safe operation in the event of power failure

ANSI: American National Standards Institute
VAV: Variable air volume
PVDF: Polyvinylidene difluoride

Notes:
*1 For 200 mm shut-off valve, "uncoated" type ("A" for [9]) is only selectable.
*2 "Standard valve" type ("1" for [2]) is only selectable.
*3 Install the super capacitor unit if operation should be enabled in case of power failure.
*4 "Single slip-in-duct" and "single flanged" (ANSI flange) types ("0" and "4" for [7]) are selectable.
*5 200 mm, 250 mm, and 300 mm valves ("20," "25," and "30" for [8]) are selectable.
*6 Can be configured to triple or quad valves.
*7 With thermal insulator

IMPORTANT:
Do not select the model with '-S' suffix for local exhaust devices. Valve will fully close in the event of power failure and gas may flow backwards.

Replacement part

Item	Part number	Note
Super capacitor unit	83170507-001	Replacement period: 10 years

IMPORTANT:
Super capacitor unit is the power to open or close the valve (to the safe direction) in the event of power failure. Replace it every 10 years or less.

Specifications

Item	Specification		
Power supply	24 V AC, 50 Hz/60 Hz		
Power consumption	Refer to Tables 1 and 2.		
Environmental operating conditions		Rated operating conditions	Transport/storage conditions (in packaged state)
	Ambient temperature	0 °C to 50 °C	-20 °C to 60 °C
	Ambient humidity	10 %RH to 90 %RH (Non-condensing)	5 %RH to 95 %RH (Non-condensing)
	Vibration	5.9 m/s^2, 10 Hz to 150 Hz	Transport: 5.9 m/s^2, 10 Hz to 150 Hz Storage: 9.8 m/s^2, 10 Hz to 150 Hz

Table 1. Power consumption: Infilex VN with 2 Fume Hood Monitors

Model number	With no fail-safe operation	With fail-safe operation*
VNXXXXC (24 V AC power type)	43 VA	100 VA

Note:

* Power consumption of 'with fail-safe operation' type in the table above shows the power consumed in 15 seconds after the power is turned ON. Then, the power consumption becomes the same as that of "with no fail-safe operation' type.

Table 2. Power consumption: Infilex VN with
2 Fume Hood Monitors, 2 Zone Presence Sensors, 2 Combination Sash Sensors (H/V interface units)

Model number	With no fail-safe operation	With fail-safe operation*
VNXXXXC (24 V AC power type)	55 VA	100 VA

Note:

* Power consumption of 'with fail-safe operation' type in the table above shows the power consumed in 15 seconds after the power is turned ON. Then, the power consumption becomes the same as that of "with no fail-safe operation' type.

Valve specifications

(1/2)

Item		Specification						
Type		Standard valve, shut-off valve						
Differential pressure across the valve		Medium differential pressure: 150 Pa to 750 Pa						
End connection (to duct)		Slip-in-duct / rectangular-framed (single, dual) / welded circular-flanged (ANSI flange)						
Nominal size		200 mm (8 inches), 250 mm (10 inches), 300 mm (12 inches), or 350 mm (14 inches)						
Flow control accuracy (of standard air*1)		Valve size (nominal)	Flow range				Accuracy	Note
	Standard valve (single)	200 mm	60	–	200	m^3/h	±20 m^3/h	
			200	–	1015	m^3/h	±10 %rdg	
			1015	–	1185	m^3/h	±12.5 %rdg	
		250 mm	85	–	200	m^3/h	±20 m^3/h	-20 m^3/h / +15 %rdg for 135 – 200 m^3/h flow range
			200	–	1695	m^3/h	-10 / +15 %rdg	
		300 mm	155	–	200	m^3/h	±20 m^3/h	
			200	–	2375	m^3/h	±10 %rdg	
			2375	–	2545	m^3/h	±12.5 %rdg	
		350 mm	340	–	4075	m^3/h	±10 %rdg	
			4075	–	4245	m^3/h	±12.5 %rdg	
	Standard valve (dual)	250 mm	170	–	400	m^3/h	±40 m^3/h	-40 m^3/h / +15 %rdg for 270 – 400 m^3/h flow range
			400	–	3390	m^3/h	-10 / +15 %rdg	
		300 mm	310	–	400	m^3/h	±40 m^3/h	
			400	–	4750	m^3/h	±10 %rdg	
			4750	–	5090	m^3/h	±12.5 %rdg	
	Shut-off valve (single)	200 mm	60	–	200	m^3/h	±20 m^3/h	
			200	–	850	m^3/h	±10 %rdg	
			850	–	1015	m^3/h	±12.5 %rdg	
		250 mm	85	–	200	m^3/h	±20 m^3/h	-20 m^3/h / +15 %rdg for 135 – 200 m^3/h flow range
			200	–	1440	m^3/h	-10 / +15 %rdg	
		300 mm	155	–	200	m^3/h	±20 m^3/h	
			200	–	2040	m^3/h	±10 %rdg	
			2040	–	2205	m^3/h	±12.5 %rdg	
	Shut-off valve (dual)	250 mm	170	–	400	m^3/h	±40 m^3/h	-40 m^3/h / +15 %rdg for 270 – 400 m^3/h flow range
			400	–	2880	m^3/h	-10 / +15 %rdg	
		300 mm	310	–	400	m^3/h	±40 m^3/h	
			400	–	4080	m^3/h	±10 %rdg	
			4080	–	4410	m^3/h	±12.5 %rdg	

Note:

*1 Standard air: 20 °C temperature and 101.325 kPa (abs) pressure

Item		Specification			
Installation orientation		Horizontal, vertical upflow, or vertical downflow			
Material		Model VN...A	Model VN...B	Model VN...C	Model VN...D
		Uncoated	Coated for general hood	Coated for high corrosion-resistant hood	PVDF coated body for special hood
	Body	Aluminum	Aluminum with phenolic coating	Aluminum with phenolic coating	Aluminum with PVDF coating
	Shaft	316 stainless steel	316 stainless steel with PFA coating	316 stainless steel with PFA coating	316 stainless steel with PFA coating
	Spring	302/304 stainless steel	302/304 stainless steel	302/304 stainless steel with PFA coating	302/304 stainless steel with PFA coating
	Bracket	Galvanized steel (standard valve) 316 stainless steel (shut-off valve)	316 stainless steel	316 stainless steel with phenolic coating Connection part: titanium	316 stainless steel with PVDF coating
	Cotter pin	18-8 stainless steel	18-8 stainless steel	18-8 stainless steel with phenolic coating	18-8 stainless steel with phenolic coating
	S-link	316 stainless steel	316 stainless steel	316 stainless steel with phenolic coating	316 stainless steel with PVDF coating
	Pivot arm	Aluminum (200A, 250A, 300A standard valve) Galvanized steel (350A standard valve) 316/303 stainless steel (shut-off valve)	316/303 stainless steel	316/303 stainless steel with phenolic coating	316/303 stainless steel with PVDF coating
	Slider assembly	PPS (polyphenylene sulfide)			
	Insulation*2	Supply valve is wrapped with 10 mm thick polyethylene sheet for thermal insulation.			
Sound*3		Valves are designed to reduce sound over all frequencies, significantly targeting the lower sound.			

PFA: Perfluoroalkoxy alkane
PPS: Polyphenylene sulfide
PVDF: Polyvinylidene difluoride

Notes:
*2 Insulation described above will not prevent condensation. Additionally insulate the valve depending on the installation and operating environment.
*3 Sound data is available upon request. Ask our sales person for details. Note that the sound data is not the certified value but the measured data.

IMPORTANT:

Check conditions of a facility where Infilex VN is to be installed. Infilex VN will work properly when the differential pressure across the valve remains within the specified range. If the differential pressure is out of the range, Infilex VN may not ensure the set airflow.

Control unit specifications

Item			Specification	
Mechanical specifications	Installation location		Indoors	
	Installation orientation		In accordance with valve orientation	
	Fail-safe operation in the event of power failure*1		Maintains the position right before the power failure. / Fully opens. / Fully closes.	
	Material		Housing and cover: Cold rolled steel*2 Base channel: Cold rolled steel*2	
	Paint		Housing and cover: Unpainted*2 Base channel: Unpainted*2	
Electrical specifications	Input*3 signal	Digital input (DI)	Number of inputs	2
			Current	5 mA typ.
			Voltage	24 V DC typ.
			Input type	Dry contact
		Temperature input	Number of input	1
			Input signal	Pt RTD (Pt100)
			Measuring range	0 °C to 50 °C
		Voltage input	Number of input	Max. 2 (one is used commonly with the resistor input) AI2: voltage AI3: voltage (or resistor)
			Input voltage range	0 V DC to 10 V DC
			Input impedance	500 kΩ
		Resistance input	Number of input	Max. 1 (used commonly with the voltage input) AI3: resistor (or voltage)
			Measuring range	0 kΩ to 10 kΩ
	Output*3 signal	Relay output	Number of output	1
			Output type	Dry N.O. contact
			Contact rating	Max. 24 V AC, 0.5 A (inductive load: cosϕ = 0.4 or more) Max. 24 V DC, 0.5 A
			Min. applicable load	5 V, 10 mA
		Voltage output	Number of outputs	2
			Output voltage range	0 V DC to 10 V DC
			Load resistance	10 kΩ or higher
	Communi-cation	LC-bus	Transmission system	LonTalk® protocol, TP/FT-10 transceiver
			Transmission speed	78 kbps
			Transmission distance	900 m per 1 channel (bus topology network)
			Number of connectable units	50
		Monitor-bus (between the fume hood monitors)	Transmission system	Start/stop synchronization, half duplex
			Transmission speed	9.6 kbps
			Transmission distance	10 m
			Number of connectable units	2

Notes:

*1 Fail-safe operation corresponds to the model numbers and thus is not changeable once you order.

*2 The housing, case, and base channel may become rusty depending on the environmental conditions and operating period. Rusting on the product except its sliding surface or moving parts will not affect the performance of the product. If a rusty part easy to recognize (such as on a corner of the control unit cover or of the base channel) is not preferable, the model with the antirust paint partially applied to the control unit and the base channel is also available.

*3 Usage for inputting or outputting is fixed according to the application of valve.

Wires specifications

Item	Specification*1			Note
	Type	Size	Length*2	
Power line*8	JIS CVV or equivalent	2.0 mm^2 or larger	—	—
Ground line*8	JIS CVV or equivalent	2.0 mm^2 or larger	—	Separate ground with 100 Ω or lower ground resistance
LC-bus line	TIA/EIA-568 Category 5	—	900 m	Bus topology For communication to Infilex VN or to SCS for LonTalk protocol
LC-bus line (between Infilex VN and Fume Hood Monitor)	Model LO-NC*4	22 AWG (0.65 mm, 1 pair)	3 m	For access of the engineering tool (PC-MMI). (3 m cable is supplied with the Fume Hood Monitor.)
Monitor-bus*3 (between Infilex VN and Fume Hood Monitor)	JIS VCTF or equivalent	0.3 mm^2 (4 cores)	10 m	For communication and power supply to Fume Hood Monitor (Monitor-bus and 24 V supply line are included in a cable. 3 m cable is supplied with the Fume Hood Monitor)
Fume Hood Monitor power*3				
Digital input	Model 9421*5 or equivalent	22 AWG (Stranded, 8 cores, unshielded)	10 m	These cable models are recommended to use when this line and other signal lines from equipment are aggregated (at an external terminal block, for example).
	Model UL2464-SD 8x22AWG(7/0.26)LF*6 or equivalent	22 AWG (Stranded, 8 cores, shielded)	10 m	
	JIS CVV or equivalent	1.25 mm^2 (2 cores)	50 m	—
	KPEV®*7 or equivalent	0.9 mm^2, 1.25 mm^2 (2 cores)	50 m	
Relay output	JIS CVV or equivalent	1.25 mm^2	50 m	Lower than 30 V AC/DC
	KPEV® or equivalent			
Resistance input	Model 9421 or equivalent	22 AWG (Stranded, 8 cores, unshielded)	10 m	For signal input from Sash Sensor or humidity measuring These cable models are recommended to use when this line and other signal lines from equipment are aggregated (at an external terminal block, for example).
	Model UL2464-SD 8x22AWG(7/0.26)LF or equivalent	22 AWG (Stranded, 8 cores, shielded)	10 m	
	JIS CVV or equivalent	1.25 mm^2 (2 cores)	10 m	—
	KPEV® or equivalent			
Temperature input	JIS CVV or equivalent	1.25 mm^2 (3 cores)	50 m	—
	KPEV® or equivalent			
Voltage input	Model 9421 or equivalent	22 AWG (Stranded, 8 cores, unshielded)	10 m	For signal input from Sash Sensor/Zone Presence Sensor These cable models are recommended to use when this line and other signal lines from equipment are aggregated (at an external terminal block, for example).
	Model UL2464-SD 8x22AWG(7/0.26)LF or equivalent	22 AWG (Stranded, 8 cores, shielded)	10 m	
	JIS CVV or equivalent	1.25 mm^2 (2 cores)	50 m	For signal input from Sash Sensor/Zone Presence Sensor (3.5 m PVC-jacketed cable for Vertical Sash Sensor and 4.5 m FEP-jacketed cable for Horizontal Sash Sensor are factory-wired.)
	KPEV® or equivalent	0.9 mm^2, 1.25 mm^2 (2 cores)		
Voltage output	JCS CVV-S or equivalent	1.25 mm^2 (2 cores)	20 m	Inverter output
	JIS CVV or equivalent			Valve actuator, damper actuator, etc.
	KPEV® or equivalent			

AWG: American Wire Gauge
JCS: Japanese Electric Wire & Cable Makers' Association Standard
JIS: Japanese Industrial Standards
TIA/EIA: Telecommunications Industry Association/Electronic Industries Alliance

Notes:
*1 Pin terminals are not connectable.
*2 Wiring length in the table above is the total length from the product to the load (e.g., device) in connection including the relay terminal block.
*3 Monitor-bus and 24 V supply line for Fume Hood Monitor and signal lines for other fume hood devices can be aggregated in a eight-core cable.
*4 LO-NC: Cable provided by Nihon Electric Wire & Cable Co., Ltd.
*5 Model 9421: Cable provided by Belden Inc.
*6 Model UL2464-SD 8x22AWG(7/0.26)LF: Cable provided by Hitachi Cable, Ltd.
*7 KPEV: Cable standard provided by Furukawa Electric Co., Ltd.
*8 Power cable, 3 m, 3-pin plug, is attached.

Wiring

Power supply wiring

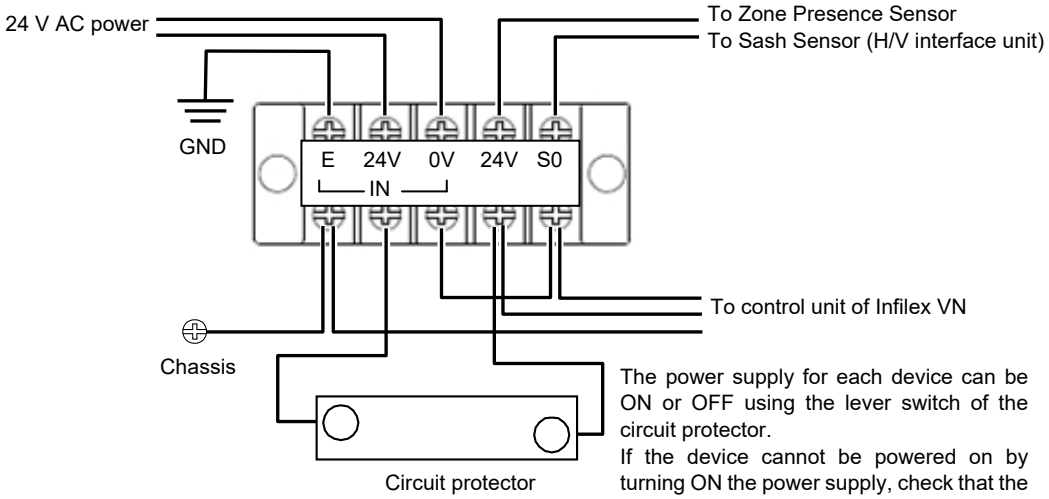


Figure 1. Connection of power supply terminals: 24 V AC power model

Communication and signal wiring

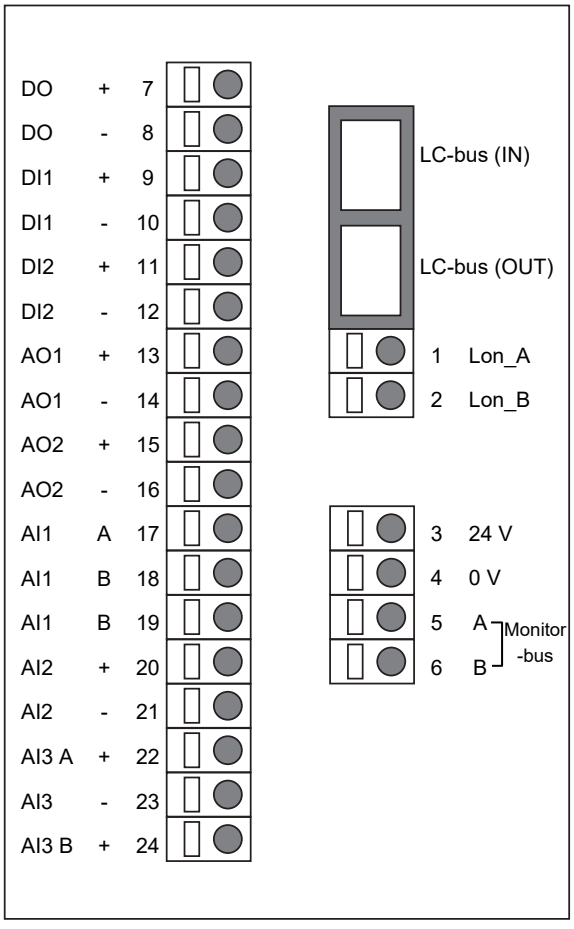


Figure 2. Terminals arrangement

Term. No.	Connection to:	Signal	
		Type	Description
CN1	Another controller	LC-bus input	Communication via LonTalk® protocol
CN2		LC-bus output	
1	Fume Hood Monitor for PC-MMI	Lon_A	Communication via LonTalk® protocol
2		Lon_B	
3	Fume Hood Monitor	Power	24 V DC power supply
4			0 V
5		Monitor-bus A	Communication
6		Monitor-bus B	
7	Alarm panel	DO	Dry contact output (alarm output, etc.)
8			
9		DI1	Dry contact input
10			
11		DI2	Dry contact input
12			
13		1-5 V DC voltage output 2-10 V DC voltage output 0-5 V DC voltage output 0-10 V DC voltage output	AO1: Selectable by parameter. Default: • Fan output 2-10 V • FBK airflow output 0-10 V
14			
15		1-5 V DC voltage output 2-10 V DC voltage output 0-5 V DC voltage output 0-10 V DC voltage output	AO2: Selectable by parameter. Default: • Reheater coil output 2-10 V
16			
17	Temperature sensor	AI1 A	Pt 100 for room temperature measuring
18		AI1 B	
19		AI1 B	
20	Zone Presence Sensor, etc.	AI2+	0-10 V DC input
21		AI2-	
22	H/V IF*, etc.	AI3 A+	0-10 V DC input for sash opening measuring
23	H/V IF, etc. / Sash Sensor	AI3-	0-10 kΩ input for sash opening measuring / room humidity measuring
24	Sash Sensor	AI3 B+	

Notes:

* For available input/output signals of each model, refer to **Available inputs and outputs** section below.

* H/V IF: H/V interface unit for Combination Sash Sensor

Available inputs and outputs

Input/output		Valve model					
Type	For	Fume hood exhaust VAV control	Fume hood exhaust two-position control	Laboratory zone control*1	Supply air VAV control	General exhaust VAV control	Booster valve*2
		EXV-H-v EXV-H-vMain	EXV-H-t EXV-H-tMain	LAB-H	MAV-H MAV-H-Main	GEX-H GEX-H-Main	BST-H
AI1 (Pt100)	Room temperature	N/A	N/A	✓	✓	✓	N/A
AI2	Zone Presence Sensor	✓	✓	N/A	N/A	N/A	N/A
	Additional flow feedback input	N/A	N/A	✓	✓	✓	N/A
	Overriding airflow setting	N/A	N/A	✓(selectable)	N/A	N/A	N/A
	Flow command input	N/A	N/A	N/A	N/A	N/A	✓
AI3 A	Combination Sash Sensor / Voltage input	✓	✓	N/A	N/A	N/A	N/A
	Room humidity	N/A	N/A	✓	✓	✓	N/A
AI3 B	Vertical/Horizontal Sash Sensor / Resistance input	✓	✓	N/A	N/A	N/A	N/A
AO1	Fan inverter output	N/A	N/A	✓	N/A	N/A	N/A
	Flow feedback output	✓	✓	N/A	N/A	N/A	✓
AO2	Reheat coil output	N/A	N/A	✓	✓	✓	N/A
DI1	OFF mode	✓	N/A	N/A	N/A	N/A	N/A
	Ventilation frequency switch	N/A	N/A	✓	N/A	N/A	N/A
DI2	Two-position switch	N/A	✓	N/A	N/A	N/A	N/A
	Additional flow feedback input	N/A	N/A	✓	✓	✓	N/A
DO	Group alarm	✓	✓	✓	✓	✓	✓
	Two-position status	N/A	✓(selectable)	N/A	N/A	N/A	N/A

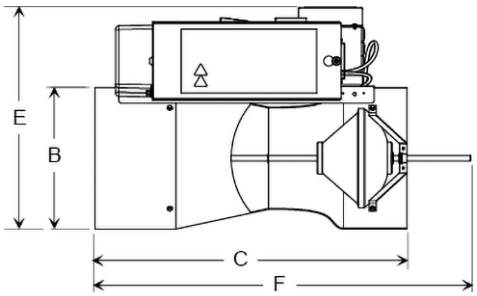
Notes:
*1 Laboratory zone control valve is supply air VAV control valve or general exhaust control valve that performs flow balance control.
*2 Booster valve is an individual VAV valve controlled by external input, or a slave valve that operates the same as its master valve.

Polarity of DI input and DO output is described below.

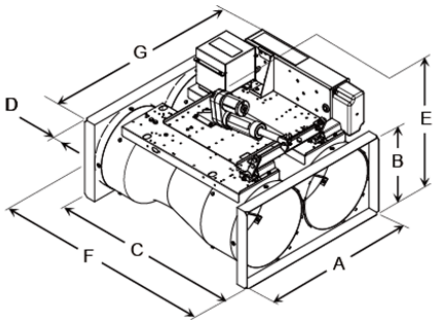
Usage		Description	Remarks
DI1	OFF mode switch	Contact OFF: OFF mode cancel	
		Contact ON: OFF mode transition	
	Ventilation frequency switch	Contact OFF: Normal mode	
		Contact ON: Nighttime mode	
DI2	Two-position switch	Contact OFF: Stops (min. airflow)	Polarity can be changed. Can set "Contact OFF: Operate", "Contact ON: Stop" by changing the settings with the DI2 input.
		Contact ON: Operates (max. airflow)	
	Additional airflow feedback	Contact OFF: Additional flow feedback input "invalid"	
		Contact ON: Additional flow feedback input "valid"	
DO	Group alarm	Contact OFF: Normal	
		Contact ON: Abnormal	
	Two-position state	Contact OFF: Stops (min. airflow)	Although polarity of the DI2's two-position switch is reversed, the polarity of two-position state is not reversed.
		Contact ON: Operates (max. airflow)	

Dimensions

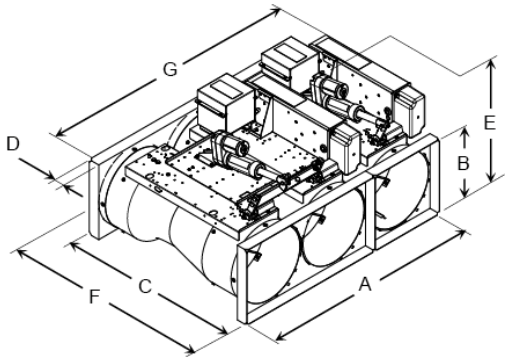
Single valve



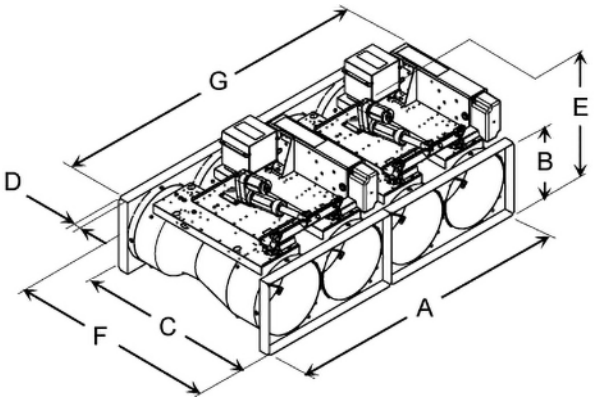
Dual valves



Triple valves



Quad valves



Valve configuration	Valve size (mm)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F*2 (mm)	G (mm)	Mass (kg)
Single	200	—	200	597	—	329	711	258*3	9.6
Single	250	—	251	553	—	380	666	283*3	8.8
Single	300	—	302	681	—	431	830	309*3	11.5
Single	350	—	353*1	762	—	493	930	340*3	13.1
Dual	250	511	257	629	38	384	704	542	17.2
Dual	300	613	308	757	38	434	868	618	20.3
Triple	300	921	308	757	38	434	868	925	31.5
Quad	300	1226	308	757	38	434	868	1231	40.3

Notes:

*1 Dimension B of the single 350 mm valve indicates the dimension of the end of the valve tapered slip-in-duct outlet. Dimension B of 350 valve without flanges indicates the dimension of the end of the valve tapered (not the opening side of slip-in-duct). The slip-in-duct part of 350 is squeezed narrow and tapered so that the opening is narrowed.

*2 Dimension F is the total distance of the maximum shaft projecting length (from the valve inlet) and the dimension C.

*3 Dimension G of the single valve is the width between this side (facing to you in the figure above) of the control unit and the other side of the valve body.

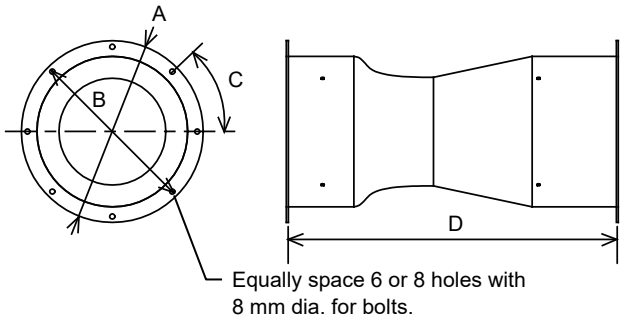
Figure 3. Dimensions (mm)

IMPORTANT:

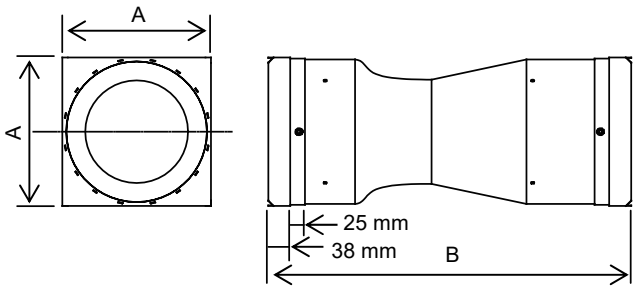
- Leave minimum of 400 mm clearance around the product for maintenance.
- When installing the product somewhere in the ceiling, select the location where our serviceperson will be able to perform the maintenance of the product.
- Dimensions given above are accurate to ± 3 mm. To facilitate the connection of the valve onto a installed duct at a job site, set an adjustment margin on each end of the valve (for flange halls, etc.).
- No additional straight duct runs before and after the valve is necessary. The shaft, however, needs an unobstructed space larger than [dimension F - dimension C + 20] mm in the duct on the inlet side of the valve for operation. To prevent extreme pressure difference between the inlet and outlet of the dual/triple/quad valves, a certain length of straight duct runs might be necessary on the valve inlet and outlet sides, or a duct vane might be necessary inside the valve-duct joint.
- Dimensions given above do not include 10 mm thick insulation for the valve.
- Valve body is 1.5 mm thick.
- To keep airflow control accuracy, do not make any changes, such as deforming the valve body to slip into a duct, drilling a hole on the valve body to fix the valve, etc., on the valve body.

Flange/frame dimensions

Circular ANSI flange



Square frame



Valve size	A	B (PCD*)	C (angle)	D	Bolt hole diameter	Number of bolt holes
200 mm (8 in)	261 mm	238 mm	60°	597 mm	8 mm	6
250 mm (10 in)	324 mm	289 mm	60°	553 mm	8 mm	6
300 mm (12 in)	375 mm	340 mm	45°	681 mm	8 mm	8
350 mm (14 in)	425 mm	391 mm	45°	762 mm	8 mm	8

PCD: Pitch Circle Diameter

Valve size	A	B
250 mm (10 in)	257 mm	629 mm
300 mm (12 in)	308 mm	757 mm

Thickness of the circular ANSI flange: 3.2 mm
Thickness of the square frame: 0.9 mm

Figure 4. Flange/frame dimensions

Parts Identification

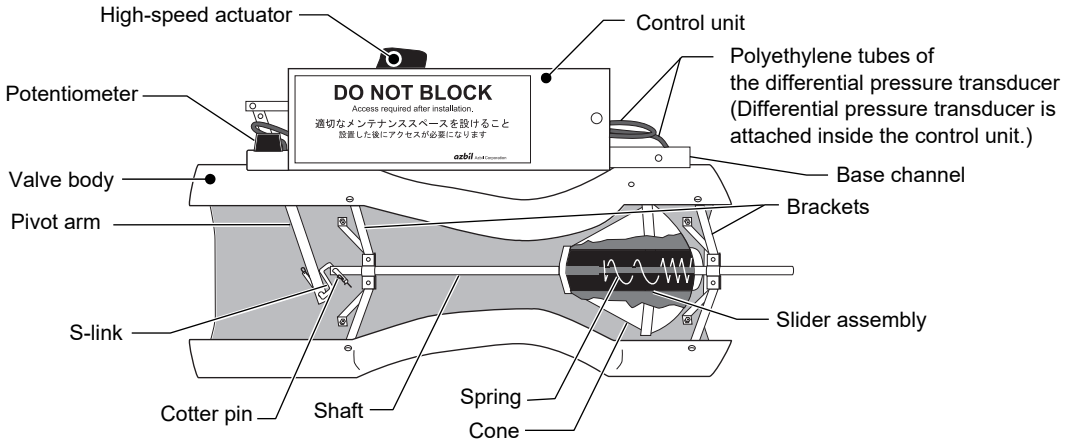


Figure 5. Parts identification

Functions

(1/3)

Function	Description	Valve type					
		EXV-H-v EXV-H-vMain	EXV-H-t EXV-H-tMain	LAB-H	MAV-H MAV-H-Main	GEX-H GEX-H-Main	BST-H
Face velocity control by sash opening	Maintains constant face velocity (FV) by calculating exhaust air volume as the sash opening varies and controlling the fume hood exhaust valve.	✓	N/A	N/A	N/A	N/A	N/A
Standby operation changeover	Using the Zone Presence Sensor, the presence of a person in front of the fume hood is detected. When no one is present for a certain period, the operation mode of the fume hood exhaust valve is changed to the standby operation mode..	✓	N/A	N/A	N/A	N/A	N/A
Emergency exhaust operation changeover	Overrides the control of hood exhaust valve to the control based on predetermined flow during emergency conditions, initiated by the Fume Hood Monitor operation.	✓	N/A	N/A	N/A	N/A	N/A

(2/3)

Function	Description	Valve type					
		EHV-H-v EXV-H-vMain	EXV-H-t EXV-H-tMain	LAB-H	MAV-H MAV-H-Main	GEX-H GEX-H-Main	BST-H
OFF mode changeover	Switches the flow of hood exhaust valve to the minimum flow position (normal valve) or to the shut off position (shut-off valve), initiated by the Fume Hood Monitor operation or DI1 (dry contact input).	✓	✓*1	N/A	N/A	N/A	N/A
Face velocity changeover	Changes the face velocity setting of hood exhaust valve (or changes to the fixed airflow), initiated by the Fume Hood Monitor operation. Applicable to powder test that requires reduced face velocity.	✓	N/A	N/A	N/A	N/A	N/A
Two-position changeover	Switches the flow control of hood exhaust valve between two positions, initiated by Sash Sensor, Zone Presence Sensor, Fume Hood Monitor operation, or DI2 (dry contact input). (Polarity of DI2 can be set by the parameter.)	N/A	✓	N/A	N/A	N/A	N/A
Airflow balance control	LAB calculates the airflow balance of supply/exhaust air responding to exhaust air volume of home exhaust and calculates the supply air/general exhaust so that the offset airflow becomes constant, and then send the results to each valve. MAV/GEX controls airflow to attain the flow sent by LAB.	N/A	N/A	✓	✓	✓	N/A
Minimum ventilation control	Controls airflow to maintain the minimum ventilation level in a room by calculating the supply air/general exhaust. This control cooperates with the airflow valance control.	N/A	N/A	✓	N/A	N/A	N/A
Temperature control	When the primary air handler operates in cooling mode, controls cooling operation and calculates the supply air to control airflow of supply/general exhaust valve. Also, can use the supply airflow calculated by other DDC. (Override setting airflow input is used.) Note that the airflow calculated by the airflow balance control is maintained.	N/A	N/A	✓*2	N/A	N/A	N/A
Room temperature measurement input	Room temperature measurement can be input. Used for temperature control and room temperature monitoring.	N/A	N/A	✓	✓	✓	N/A
Reheater control	Performs heating control based on the room temperature, controls the reheater.	N/A	N/A	✓	N/A	N/A	N/A
Additional flow feedback input (continuously variable)	The airflow feedback from third party's VAV, etc. is input to AI, and the supply air or exhaust air is added. (Additional flow feedback input is used.)	N/A	N/A	✓*2	✓	✓	N/A
Additional flow feedback input (two-position)	The airflow feedback from third party's VAV, etc. is input to DI2, and the supply air or exhaust air is added. (Additional flow feedback input is used.)	N/A	N/A	✓	✓	✓	N/A
Humidity monitoring input	Humidity measurement can be input.	N/A	N/A	✓	✓	✓	N/A
Ventilation frequency changeover	Using DI1, the minimum ventilation (ventilation frequency) that is used for the minimum ventilation control can be switched by 2 steps.	N/A	N/A	✓	N/A	N/A	N/A
Airflow increase by BST	Airflow can be increased using BST.	✓*3	✓*3		✓*3	✓*3	✓
Feedback airflow output	Feedback airflow is output to AO.	✓	✓	N/A	N/A	N/A	✓
Group alarm output*4	Logical OR of valve failure or airflow unmatched is output to the contact as an alarm.	✓	✓*6	✓*7	✓	✓	✓
Group alarm gathering	Alarm of each valve is gathered to LAN-N and it is sent to the central monitoring or output to the contact as an alarm.	N/A	N/A	✓*7	N/A	N/A	N/A

(3/3)

Function	Description	Valve type					
		EXV-H-v EXV-H-vMain	EXV-H-t EXV-H-tMain	LAB-H	MAV-H MAV-H-Main	GEX-H GEX-H-Main	BST-H
Insufficient differential pressure alarm*5 (differential pressure sensor)	Detects the insufficient differential pressure between valves and alarms.	✓	✓	✓	✓	✓	✓
Two-position state output	Outputs the state of two-position to DO.	N/A	✓*6	N/A	N/A	N/A	N/A

∗1 For EXV-H-t/EXV-H-tMain, can be changed by the Fume Hood Monitor.

∗2 Select either the additional flow feedback input (continuously variable) or the override setting airflow input.

∗3 Airflow increase is supported by ∗∗∗-H-Main.

∗4 Refer to IMPORTANT below.

IMPORTANT: • If the fume hood exhaust is not equipped or it is equipped but the Fume Hood Monitor is not equipped, be sure to use the group alarm output and configure the system so that abnormal status is surely notified. (E.g.) Installing an alarm lamp, etc.

∗5 This sensor cannot be used for measuring.

∗6 Select either the group alarm output or the two-position state output.

∗7 Select outputting alarm of LAB, or outputting the gathered alarm.

Construction of Valve

Airflow control

The shaft is controlled to meet the flow command input with the flow feedback output.
All the valves are characterized at factory so that the potentiometer signal that detects the shaft position is linear to the airflow rate.

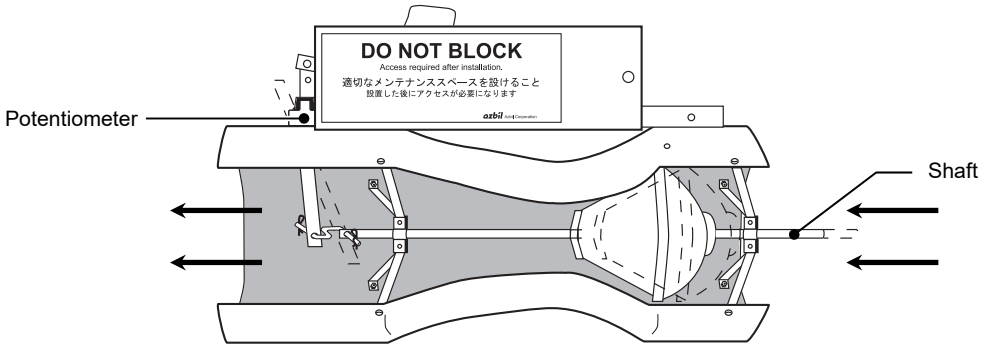
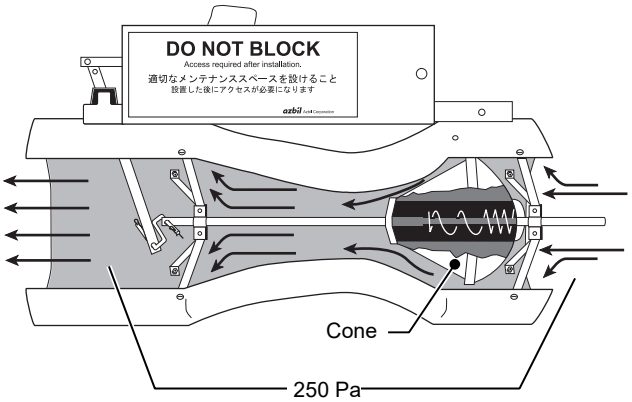


Figure 6. Shaft movement of the valve

Pressure-independent mechanism

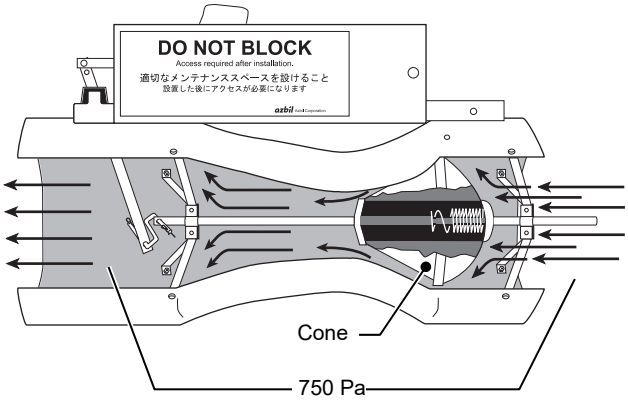
All valves strictly maintain set flow rate of air by quickly adjusting to changes in duct static pressure. Each valve has a cone assembly with a spring designed to compensate for changes in duct static pressure.

At low static pressure



When there is low static pressure, less force is applied to the cone, which causes the spring inside the cone to expand. The combination of low pressure and the large open area provides the desired flow.

At high static pressure



As static pressure increases force on the cone, the spring compresses and the cone moves into the venturi (left in the figure above) to maintain set flow. Higher pressure and the smaller opening combine to maintain flow set point.

Figure 7. Pressure-independent mechanism

Valve Leakage Performance

Shut-off leakage (Cone in closed position): Shut-off valve

Shut-off leakage shown in the below table is common to all the sizes of the shut-off valves.

Static pressure (Pa)	Leakage (m^3/h)
1250	9
1000	8
750	7
500	6
250	5

Casing leakage: Shut-off valve

Casing leakage shown in the below table is common to all the sizes of the shut-off valves.

Static pressure (Pa)	Leakage (m^3/h)
2500	0.19
2000	0.16
1500	0.13
1000	0.09
500	0.05

Application and Control Details

Airflow control (VAV control):

Applicable to fume hood exhaust, general exhaust, and supply air for face velocity control and room pressure control.

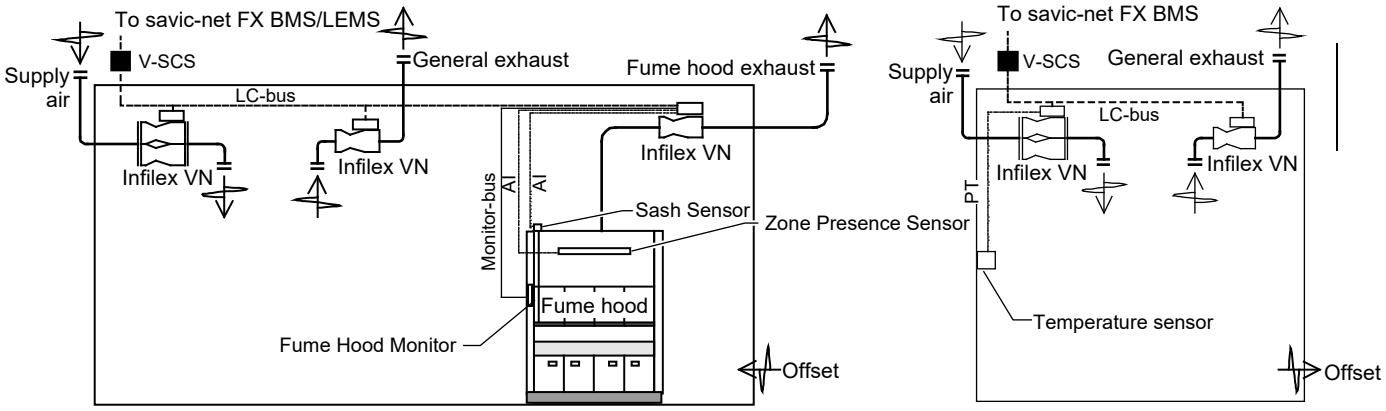


Figure 8. Application example: Control of fume hood exhaust, face velocity

For the room where the fume hood exhaust, general exhaust, or Infilex VN (high-speed) for supply air is used, the Infilex VN (normal-speed) can be installed as a fume hood exhauster.

* For Infilex VN (normal-speed), refer to "AS-981E Infilex VN Venturi Valve for Variable Air Volume (Normal-speed Actuation) Specifications."

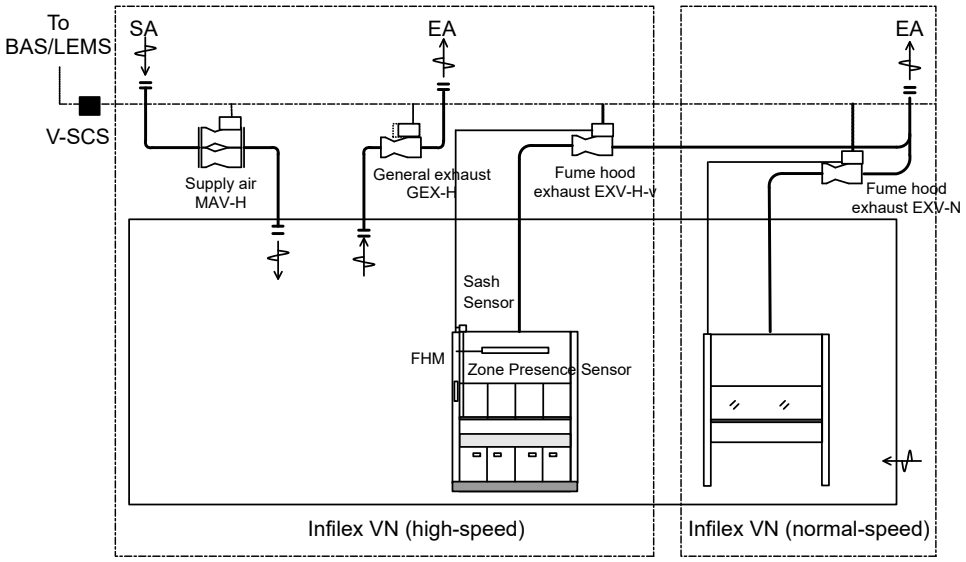


Table 5. Software

Functions	Abbreviation	Specifications
Fume hood exhaust VAV valve	EXV-H-v	Exhaust air valve for the fume hood exhaust . Maintains constant face velocity as the sash opening varies. Notifies a valve failure by connecting the Fume Hood Monitor. And, airflow is changed in emergency using the Fume Hood Monitor.
Fume hood exhaust VAV valve (with booster valve connection function)	EXV-H-vMain	Fume hood exhaust valve that has functions of EXV-H-v, BST-H, and communication. If a required exhaust airflow cannot be supplied by one EXV-H-v, it is used to connect BST-H for increasing air. Maximum two BST-Hs can be connected to one EXV-H-vMain.
Fume hood exhaust two-position valve	EXV-H-t	Exhaust air valve for the fume hood exhaust . Corresponding to the two-position airflow switch of the hood exhaust, prevents the flow back of air from the hood exhaust with the minimum airflow. Notifies a valve failure by connecting the Fume Hood Monitor. And, airflow is switched between two positions using the Fume Hood Monitor.
Fume hood exhaust two-position valve (with booster valve connection function)	EXV-H-tMain	Fume hood exhaust valve that has functions of EXV-H-t, BST-H, and communication. If a required exhaust airflow cannot be supplied by one EXV-H-t, it is used to connect BST-H for increasing air. Maximum two BST-Hs can be connected to one XV-H-tMain.
Supply/exhaust airflow balance control calculation value	LAB-H	Calculates the airflow balance of supply/exhaust air and transmits the airflow setting to other valves. Normally it is used as a supply air valve and is possessed of the temperature control function (room temperature input, output to reheater). Also, can input the humidity monitoring data. Supports ventilation frequency changeover using the external contact. Inputs the airflow of other values that do not perform LON communication with analog input data, also can adjust the airflow of supply/exhaust air.
Supply air valve	MAV-H	Receives the airflow setting from LAB-H and controls the supply air volume. Used to connect dual supply air valves, or used as a supply valve when LAB-H is used for exhausting air.
Supply air valve (with booster valve connection function)	MAV-H-Main	Supply air value that has functions of MAV-H, BST-H, and communication. If a required exhaust airflow cannot be supplied by LAB-H and MAV-H, it is used to connect BST-H for increasing air. Maximum five BST-Hs can be connected to one MAV-H-Main.
General exhaust valve	GEX-H	Receives the airflow setting from LAB-H and controls the exhaust air volume. Used as a general exhaust valve when LAB-H is used for supplying air.
General exhaust valve (with booster valve connection function)	GEX-H-Main	Exhaust air value that has functions of GEX-H, BST-H, and communication. If a required exhaust airflow cannot be supplied by one GEX-H, it is used to connect BST-H for increasing air. Maximum five BST-Hs can be connected to one GEX-H-Main.
Booster valve	BST-H	An airflow increasing valve for EXV-H-vMain, EXV-H-tMain, MAV-H-Main, and GEX-H-Main.

Performance Curves of Pressure-Independent Control

- 200 mm (8 inches) valve

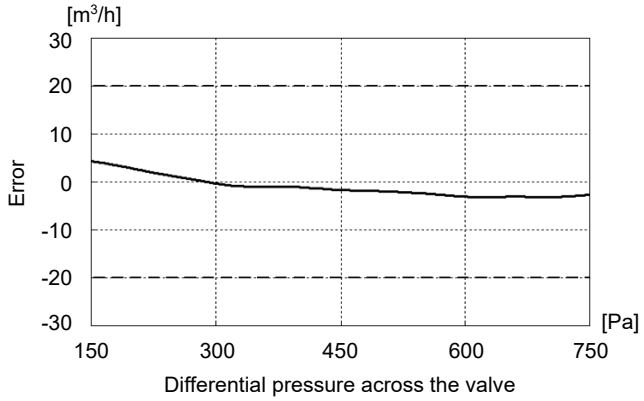


Figure 9. 200 mm (8 inches) valve at 60 m³/h flow

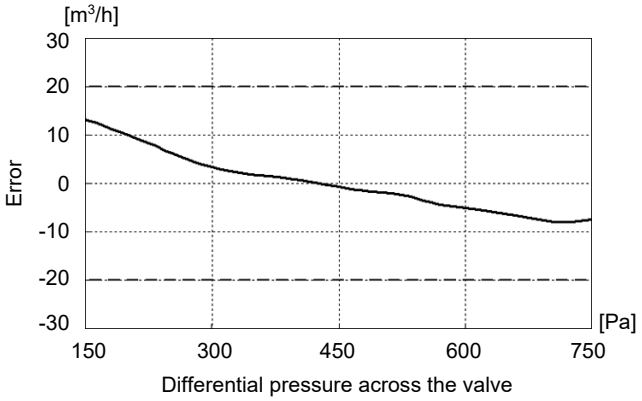


Figure 10. 200 mm (8 inches) valve at 155 m³/h flow

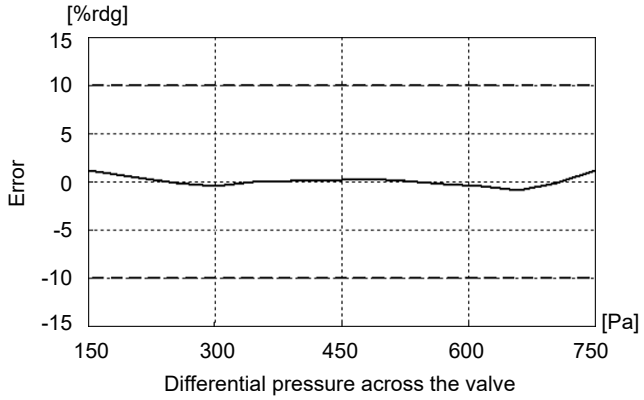


Figure 11. 200 mm (8 inches) valve at 425 m³/h flow

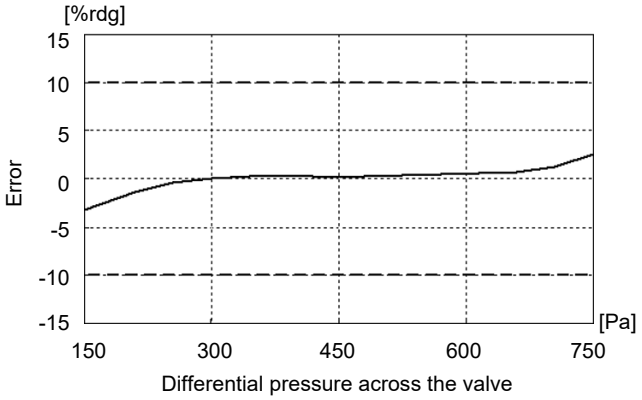


Figure 12. 200 mm (8 inches) valve at 850 m³/h flow

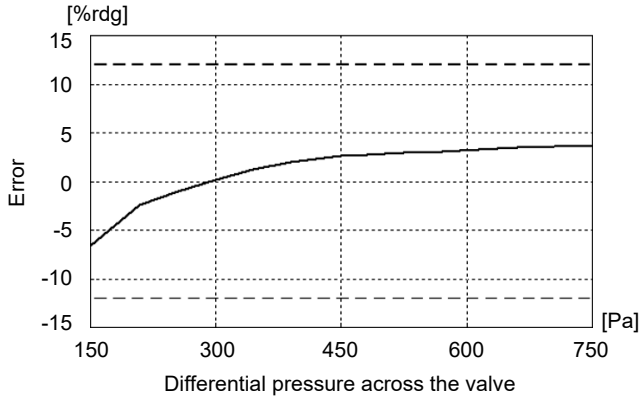


Figure 13. 200 mm (8 inches) valve at 1185 m³/h flow

- 250 mm (10 inches) valve

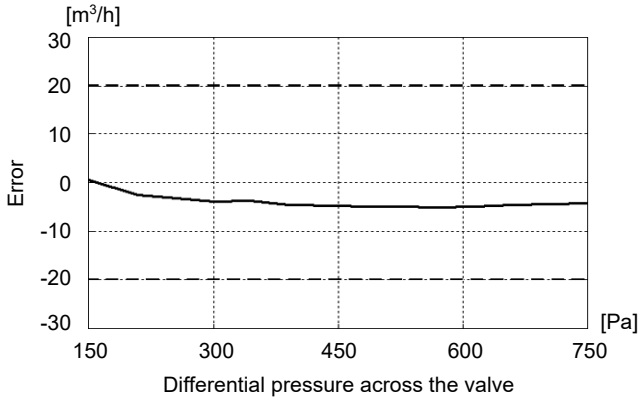


Figure 14. 250 mm (10 inches) valve at 85 m^3/h flow

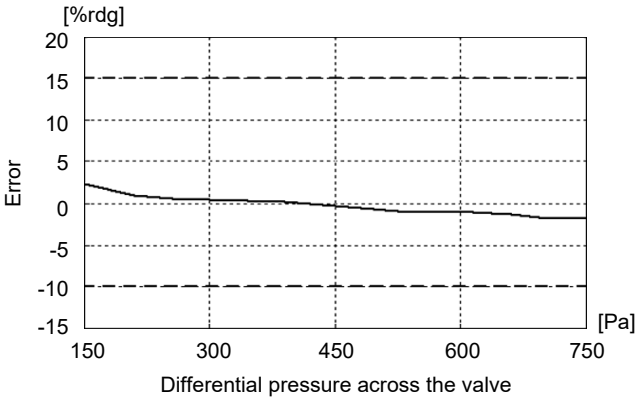


Figure 15. 250 mm (10 inches) valve at 220 m^3/h flow

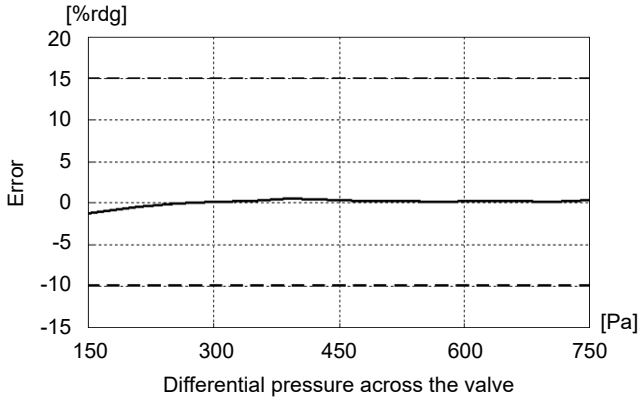


Figure 16. 250 mm (10 inches) valve at 595 m^3/h flow

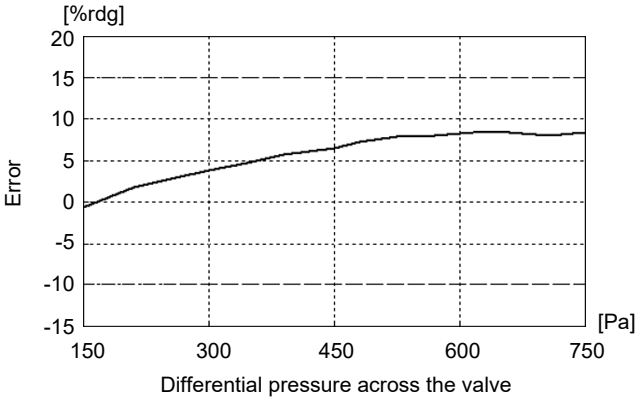


Figure 17. 250 mm (10 inches) valve at 1105 m^3/h flow

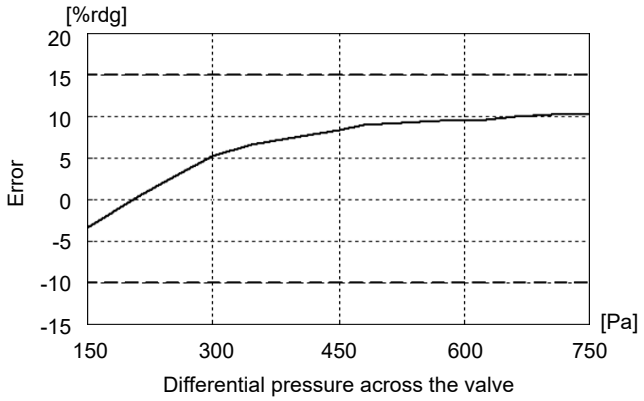


Figure 18. 250 mm (10 inches) valve at 1695 m^3/h flow

- 300 mm (12 inches) valve

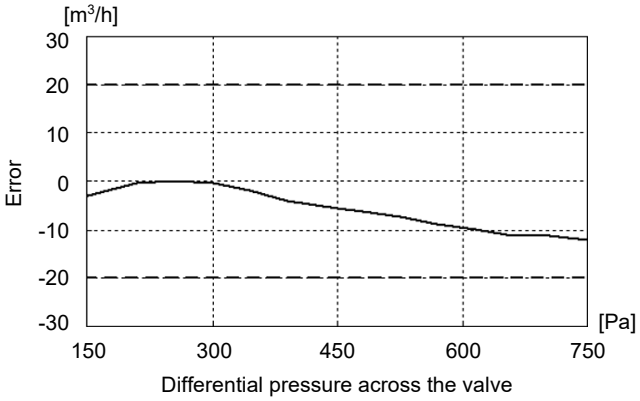


Figure 19. 300 mm (12 inches) valve at 155 m^3/h flow

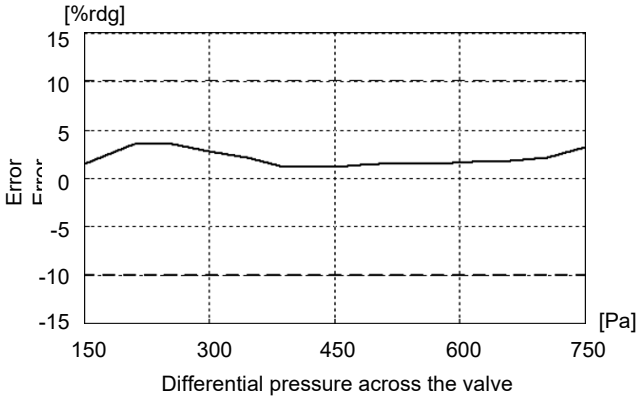


Figure 20. 300 mm (12 inches) valve at 440 m^3/h flow

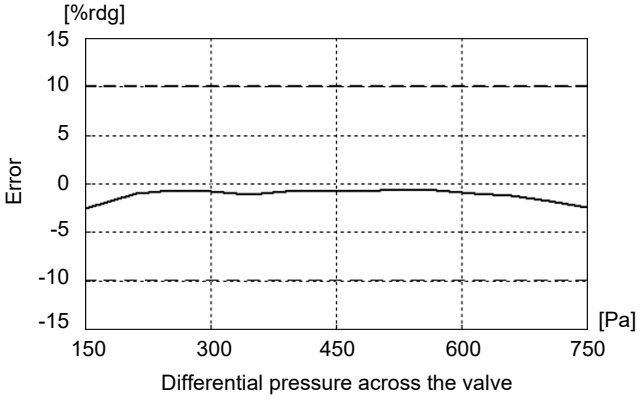


Figure 21. 300 mm (12 inches) valve at 1070 m^3/h flow

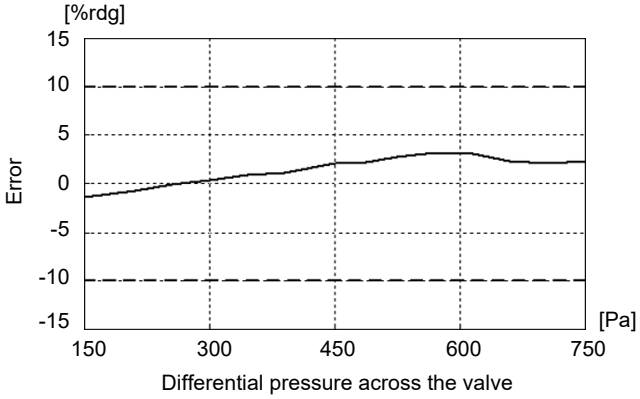


Figure 22. 300 mm (12 inches) valve at 1785 m^3/h flow

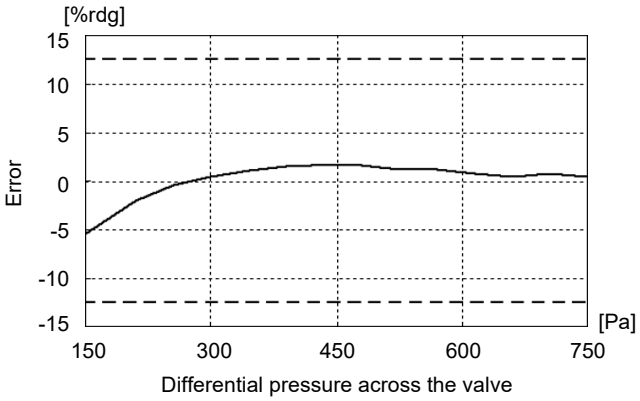


Figure 23. 300 mm (12 inches) valve at 2545 m^3/h flow

- 350 mm (14 inches) valve

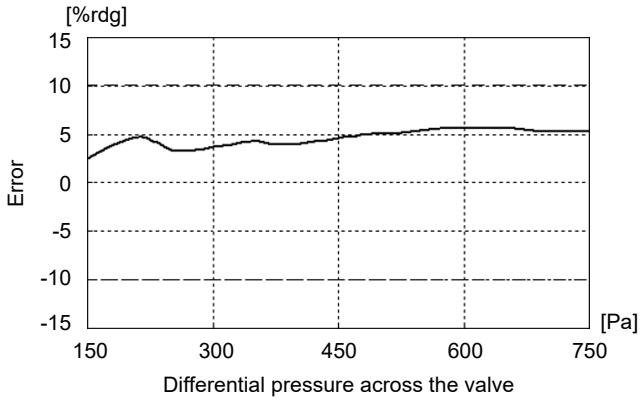


Figure 24. 350 mm (14 inches) valve at 340 m^3/h flow

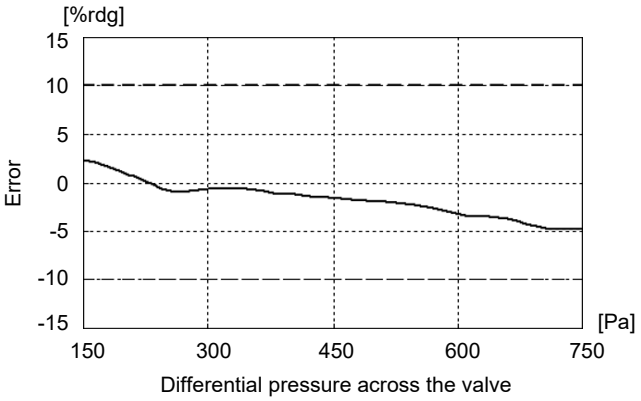


Figure 25. 350 mm (14 inches) valve at 1275 m^3/h flow

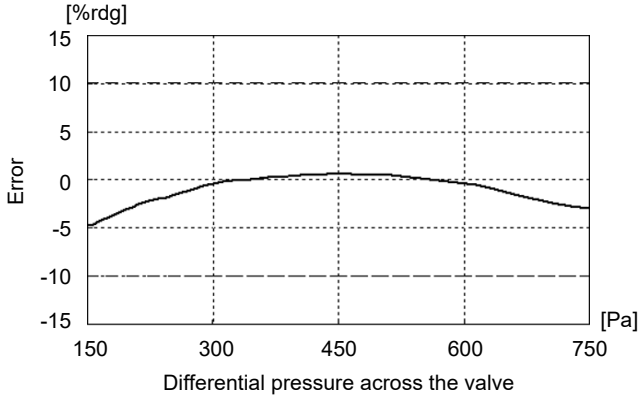


Figure 26. 350 mm (14 inches) valve at 2125 m^3/h flow

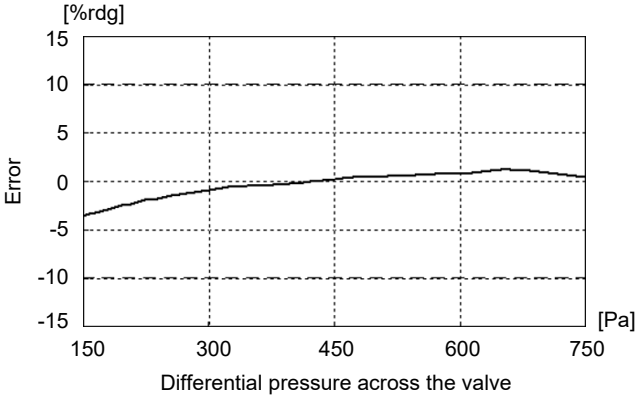


Figure 27. 350 mm (14 inches) valve at 2975 m^3/h flow

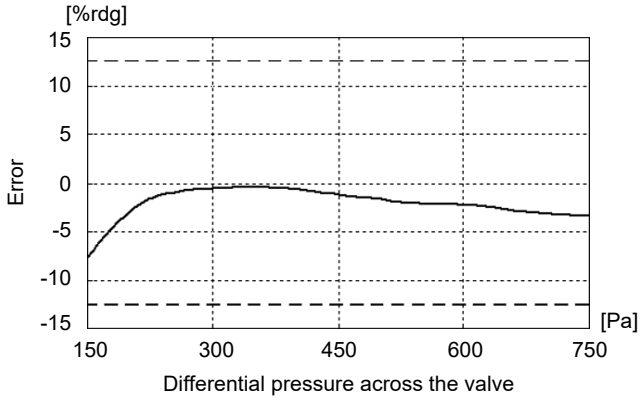


Figure 28. 350 mm (14 inches) valve at 4245 m^3/h flow

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