

Series F61

Liquid Flow Switches

Product Bulletin

The F61 Liquid Flow Switches can be used in liquid lines carrying water, sea water, swimming pool water, ethylene glycol or other liquids not harmful to the specified materials.

The switches have SPDT contacts and can be wired to energise one device and de-energise another device powered from the same source when liquid flow either exceeds or drops below the set flow rate.

There are two different models available. The pipe insert models and the T-body types for low-flow applications. All materials in contact with the liquid are specified in the part "specifications". At doubt about the liquid used with regards to these materials it is advised to contact the liquid supplier. The IP43 versions can be used for liquid temperatures above dewpoint. Remove the drain plug for applications below dewpoint (IP23). Vapour proof IP67 versions can be used for liquid temperatures of minus 30°C and up or in high moisture environments. Typical applications are to shut down the compressor on liquid chiller systems, to prove flow on electric immersion heaters and to give a signal or alarm when the pump on condenser cooling system shuts down.



- **T-body and Pipe-insert types available**
For low flow applications (0.04 dm³/s) up to flows of 48 dm³/s
- **Polycarbonate IP43 enclosure**
For indoor and outdoor applications.
- **Vapour tight IP67 enclosure**
For low temperature applications.
- **Stainless steel Pipe-insert type**
Used for liquids like swimming pool water
- **Large wiring space**
Makes wiring convenient and easily accessible
- **Range screw easy accessible**
Easy to adjust in the field

Note: These controls are designed for use only as operating controls. Where an operating control failure would result in personal injury or loss of property, it is the responsibility of the installer to add devices or systems that protect against, or warn of, control failure.



Caution

Do not use with hazardous fluids or in hazardous atmosphere.

Installation

Pipe-insert types

To allow the switch to detect changes in the liquid flow, the paddle must not touch the pipe or any other obstacle in the pipe. The Pipe-insert types are mounted on top of the liquid line.

An angle of 120° is allowed (as indicated in Figure 1).

To keep the flow switch close to the pipe and to provide an adequate paddle length in the flow stream the use of a reducing tee for larger pipe sizes is advised.

The arrow on the cover must point in the flow direction. To avoid turbulence it is advised to mount the controller at a distance of minimal 10xD (on each side) away from elbows, valves and other appendages.

The Pipe-insert types can be mounted in a vertical pipe as long as the flow is up-stream. This mounting position affects the adjustment of the controller.

The 6" paddle can be trimmed (as indicated on Page 6). For added stiffness it is advised to mount the smaller paddles behind the largest one.

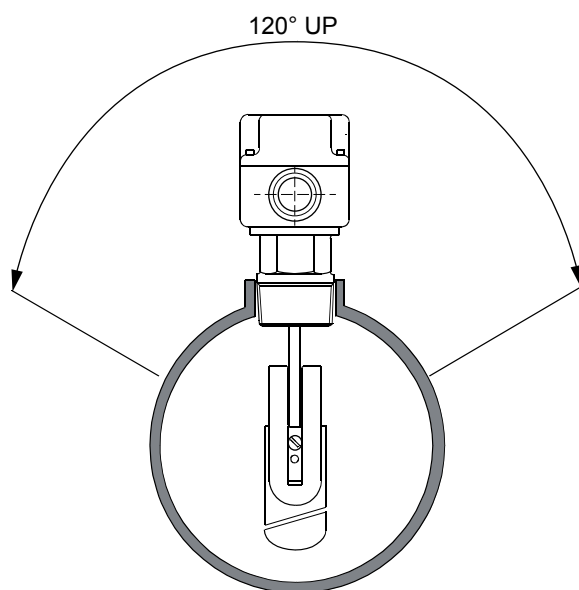


Figure 1: Angle allowed

T-body types

These types are mounted in the liquid line with the housing at the top. An angle of 120° is allowed (as indicated in Figure 1).

The arrow on the body and cover must point in the flow direction. To avoid turbulences it is advised to mount the controller at a distance of minimal 10xD (on each side) away from elbows, valves and other appendages. The T-body types cannot be mounted in a vertical pipe.

Wiring

A special vapour proof PG-16 nipple for cable inlet is delivered by the IP67 type controls. This nipple has to be used to keep the control vapour tight.

Contact Function

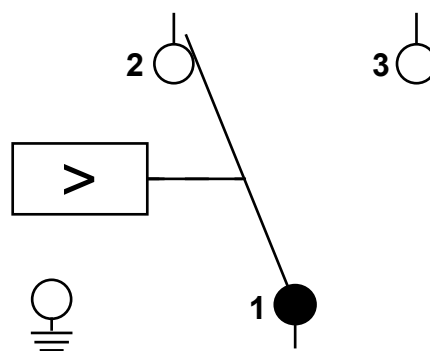


Figure 2: 1-3 closes on flow increase

Adjustment

The switches are factory set at minimal flow setting. On the application the setting can be adjusted by the range screw under the cover (as indicated in Figure 3). For higher flow rates turn the adjusting screw clockwise.

Note: Prevent to adjust the setting below factory setting as this may result in the switch failing to return to "no flow" position.

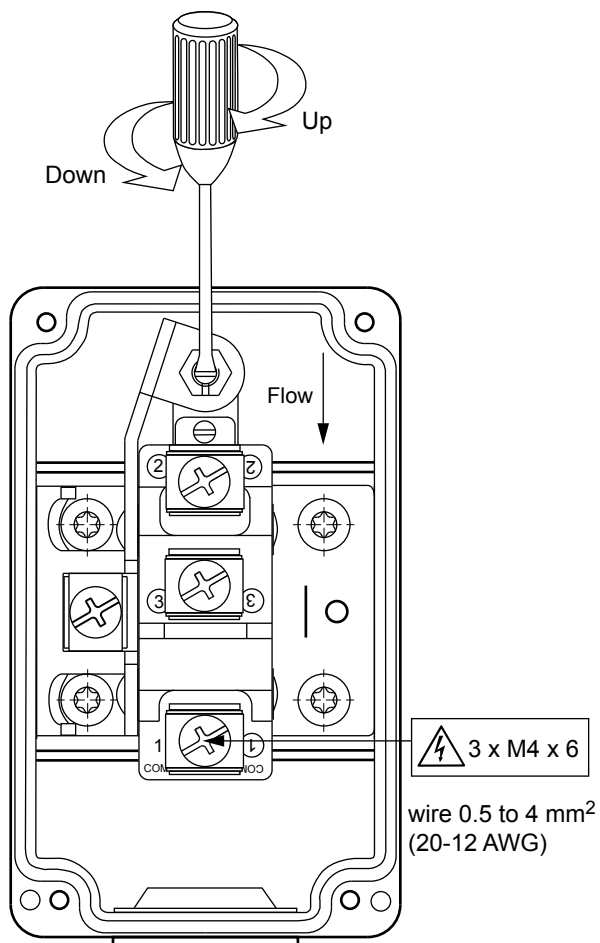


Figure 3: Adjustment

Flow Rates

Note: Please note that these curves are approximate data obtained in a laboratory test by use of water and are not necessarily representative or accurate when compared with various field applications. Values are affected by the liquid used and the mounting position of the controller. Flow rates for pipe sizes 3" and up are calculated values.

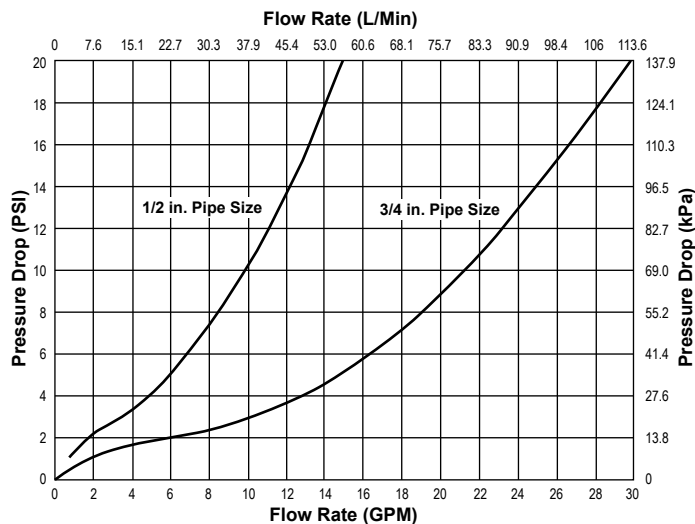


Figure 4: Flow rates T-body Types

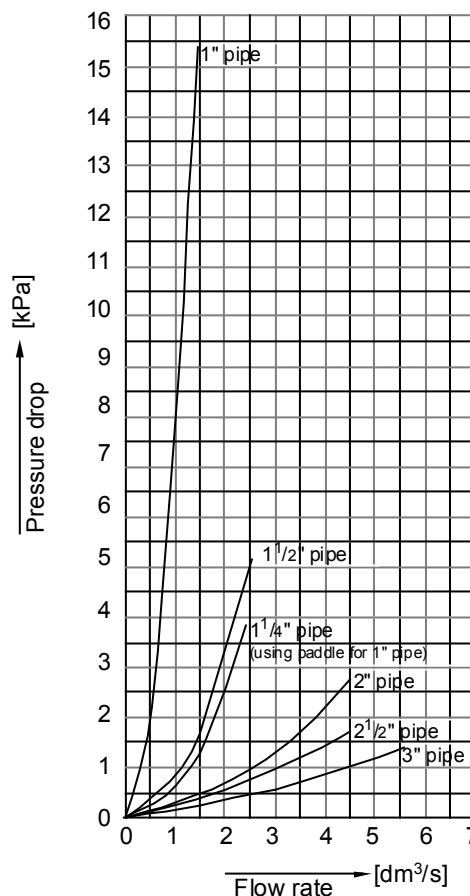


Figure 5: Pressure drop Pipe Insert Types

Flow Rate Table Pipe Insert Types

		Paddle size		Line Pipe Size									
				1"	1¼"	1½"	2"	2½"	3" *	4" *	5 *	6" *	8" *
Minimum adjustment	Flow increase	1"-2"-3"	dm ³ /s	0.3	0.4	0.5	0.9	1.1	1.7	4.2	7.8	12	24
			(m ³ /h)	(1.0)	(1.3)	(1.7)	(3.1)	(4.1)	(6.2)	(15)	(28)	(43)	(85)
	1-3 closes	6"	dm ³ /s	-	-	-	-	-	-	2.4 **	3.6 **	4.8	13
			(m ³ /h)	-	-	-	-	-	-	(8.5) **	(13) **	(17)	(47)
	Flow decrease	1"-2"-3"	dm ³ /s	0.15	0.2	0.3	0.6	0.8	1.2	3	6.4	10	20
			(m ³ /h)	(0.6)	(0.8)	(1.1)	(2.2)	(2.8)	(4.3)	(11)	(23)	(36)	(73)
	1-2 closes	6"	dm ³ /s	-	-	-	-	-	-	1.7 **	2.5 **	3.4	11
			(m ³ /h)	-	-	-	-	-	-	(6) **	(9) **	(12)	(39)
Maximum adjustment	Flow increase	1"-2"-3"	dm ³ /s	0.6	0.9	1.2	1.8	2.2	3.4	8.1	16	24	48
			(m ³ /h)	(2.0)	(3.0)	(4.4)	(6.6)	(7.8)	(12)	(29)	(56)	(85)	(173)
	1-3 closes	6"	dm ³ /s	-	-	-	-	-	-	5.0 **	7.6 **	9.2	26
			(m ³ /h)	-	-	-	-	-	-	(18) **	(27) **	(33)	(94)
	Flow decrease	1"-2"-3"	dm ³ /s	0.5	0.8	1.1	1.7	2.0	3.2	7.8	1 ⁵	23	43
			(m ³ /h)	(1.9)	(2.8)	(4.1)	(6.1)	(7.3)	(11.4)	(28)	(53)	(82)	(116)
	1-2 closes	6"	dm ³ /s	-	-	-	-	-	-	4.8 **	7 **	8.7	25
			(m ³ /h)	-	-	-	-	-	-	(17) **	(25) **	(31)	(91)

Notes:

1 dm³/s = 3.6 m³/h = 15.6 U.S. gal./min. = 13 U.K. gal./min.

* Flow rates for these sizes are calculated.

** For 4" and 5" line pipe the 6" paddle is trimmed

Accessories for Pipe-insert types

KIT21A-602	1", 2", 3" and 6" paddles stainless steel AISI 301
PLT69-11R	6" paddle stainless steel AISI 301

Repair and replacement

Repair is not possible. In case of an improperly functioning control, please check with your nearest supplier. When contacting the supplier for a replacement you should state the type/model number of the control. This number can be found on the data plate or cover label.

Pipe-insert

	Range dm ³ /sec	Connection	IP class	Paddles st. st AISI 301	Paddles st. st AISI 316L	Application
F61SB-9100	0.15/46	(ISO 7-R1)	IP43	1", 2", 3", 6"	---	Water / Ethylene glycol / Sea water
F61TB-9100	0.15/46	(ISO 7-R1)	IP67	1", 2", 3", 6"	---	Water / Ethylene glycol / Sea water
F61TB-9104	0.15/46	(ISO 7-R1)	IP67	1", 2", 3", 6"	---	Water / Ethylene glycol / Sea water Gold flashcontacts
F61TB-9200	0.15/46	(ISO 7-R1)	IP67	---	1", 2", 3"	Water / Chlorinated water / Ethylene glycol

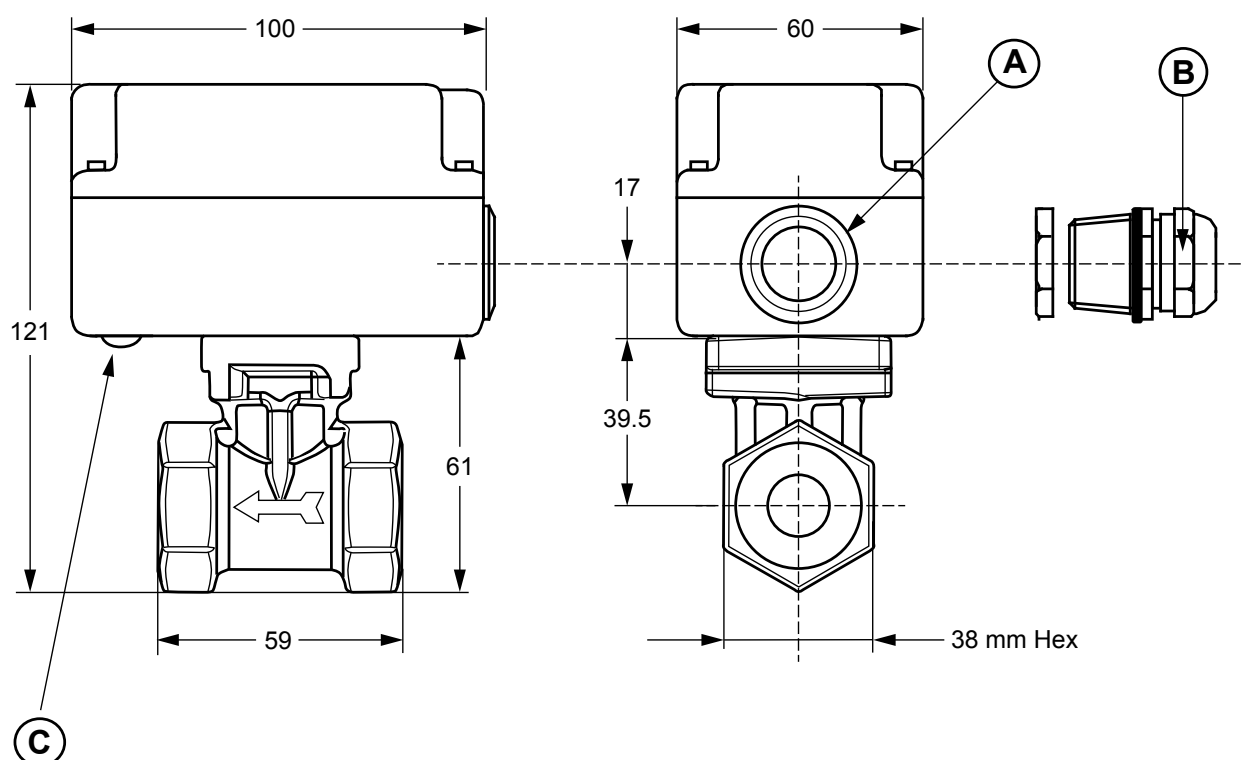
T-Body

	Range dm ³ /sec	Connection	IP class	Application
F61SD-9150	0.04/0.07	1/2-14 NPTF	IP43	Water/Ethylene glycol
F61SD-9175	0.04/0.07	3/4-14 NPTF	IP43	Water/Ethylene glycol
F61TD-9150	0.04/0.07	1/2-14 NPTF	IP67	Water/Ethylene glycol

Note:

Paddles not mounted, packed with the control

Dimensions (in mm)



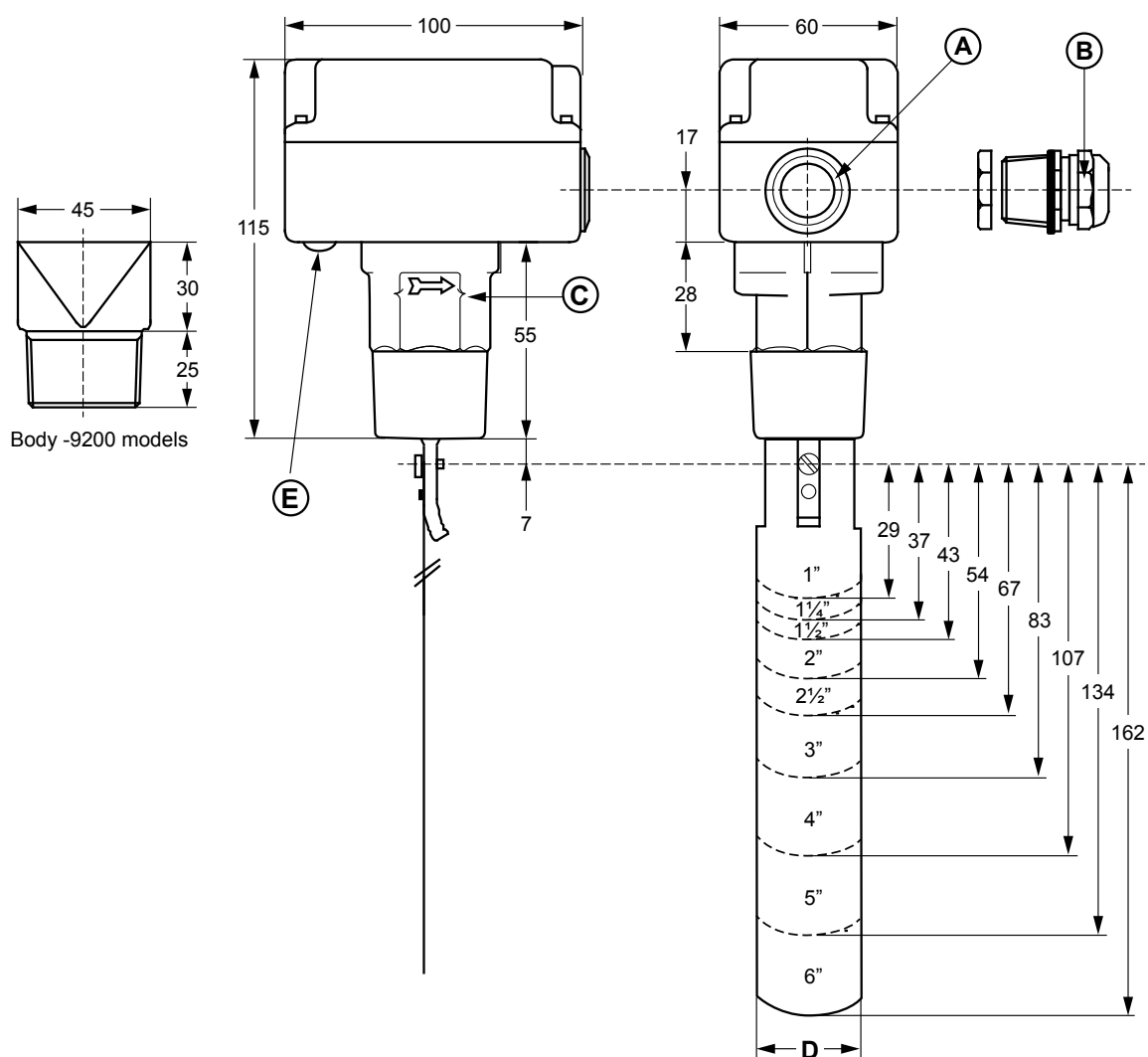
A. Cable inlet hole \varnothing 22.7 mm; Dust cap installed on IP43 types.

B. Vapour proof PG-16 nipple installed on IP67 types

C. Drain hole plug

F61SD/TD Dimensions

Dimensions (in mm)



A. Cable inlet hole \varnothing 22.7 mm; Dust cup is installed on IP43 types.

B. Vapour proof PG-nipple installed on IP67 types.

C. 33 mm Hex. F61SB/TB
45 mm F61TB-9200

D. 1" paddle D = 25.4 mm
2", 3", 6" paddle D = 28.45 mm

E. Drain hole plug

F61SB/TB

F61 Wetted Materials

	Pipe Insert Type			T-body Type	
	Water / Ethylene Glycol / Seawater		Water / Chlorinated Water / Ethylene Glycol	Water / Ethylene Glycol	
Bellows	---	---	Stainless Steel AISI 321	---	---
Diaphragm	EPDM	EPDM	---	EPDM	EPDM
Rod	Bronze ASTM B140 Alloy C31600	Bronze ASTM B140 Alloy C31600	Stainless Steel AISI 316L	Bronze ASTM B140 Alloy C31600	Bronze ASTM B140Alloy C31600
Body	ECO Brass CuZn21Si3P (CW724R)	ECO Brass CuZn21Si3P (CW724R)	Stainless Steel AISI 316L	Normal Brass CuZn40Pb2 (CW617N)	Normal Brass CuZn40Pb2 (CW617N)
Screw Paddle Conn.	Stainless Steel	Stainless Steel	Stainless Steel AISI 304	Stainless Steel	Stainless Steel
Washer Paddle Conn.	Phosphor Bronze C51000 HO8	Phosphor Bronze C51000 HO8	Stainless Steel AISI 304	Phosphor Bronze C51000 HO8	Phosphor Bronze C51000 HO8
Paddle	Type 301 SS ASTM A666-96b	Type 301 SS ASTM A666-96b	Stainless Steel AISI 316L	Phosphor Bronze C51000 HO8	Phosphor Bronze C51000 HO8
Seat	---	---	---	C23000 061 85/15 Red Brass (annealed)	C23000 061 85/15 Red Brass (annealed)
Shipping Weight	0.7 kg	0.7 kg	1.0 kg	1.0 kg	1.0 kg
Representative Model	F61SB-9100	F61TB-91xx	F61TB-9200	F61SD-91xx	F61TD-9150

Technical Specifications

Type Number	Pipe Insert Types			T-body Types	
	F61SB-9100	F61TB-91xx	F61TB-9200	F61SD-91xx	F61TD-9150
Max Liquid Pressure	20 bar	20 bar	10 bar	20 bar	20 bar
Max. Liquid Temp.*	120°C	120°C	100°C	100°C	100°C
Min. Liquid Temp.**	0°C	-30°C	-30°C	0°C	-30°C
Max. Ambient Temp.*	+55°C	+55°C	+55°C	+55°C	+55°C
Min. Ambient Temp. **	-40°C	-40°C	-40°C	-40°C	-40°C
Ambient Humidity	10-95%	10-95%	10-95%	10-95%	10-95%
Contact Type	SPDT snap-acting switch				
Electrical Rating	15(8) A 230 Vac (except F61TB-9104; max 400 mA / 15 Vdc)				
Wiring Connections	Screw terminals 1 up to 2.5 mm ²				
Enclosure	IP43 (IP23 w/o plug)	IP67 Vapour proof	IP67 Vapour proof	IP43 (IP23 w/o plug)	IP67 Vapour proof
Materials cover / case	Polycarbonate				
Materials in contact with liquid	See "F61 Wetted Materials" Table				

Notes:

* The max. liquid temperature of 100°C is at 20°C ambient. At higher ambient temperatures the max. allowed ambient becomes lower. Models F61SB-9100 are tested at 21°C ambient. The max. liquid temp. is 110°C at an ambient temp. of 21°C for ambient temp. <20°C the max. liquid temp. is 120°C. The temperature of the electrical switch inside should not exceed 70°C.

** The low liquid temperature combined with a low ambient temp. should not lead to freezing of the liquid inside the body / diaphragm / bellows. Please observe the liquid freezing point.

The performance specifications are nominal and conform to acceptable industry standards. For applications at conditions beyond these specifications, consult the local Johnson Controls office or representative. Johnson Controls shall not be liable for damages resulting from misapplication or misuse of its products.



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