VG7000 Series Bronze Control Valves

Installation Instructions

VG7000

Part No. 14-1078-6, Rev. G
February 8, 2010
Supersedes January 30, 2009

Applications

VG7000 Series Bronze Control Valves are primarily designed to regulate the flow of water and steam in response to the demand of a controller in Heating, Ventilating, and Air Conditioning (HVAC) systems. Contact the local Johnson Controls® representative for compatibility concerns before using the VG7000 Series Bronze Control Valves *Technical Specifications* table at the end of this document.

These installation instructions conform to the relevant and valid European Norm (EN) safety standards, as well as the current laws and regulations of the European Union. Qualified personnel are required for the proper application of these installation instructions. Qualified personnel are trained in the installation, mounting, commissioning, operation, and servicing of pneumatically and electrically actuated VG7000 Series Bronze Control Valves; they include trainers and instructors who have the following responsibilities:

- ensure adherence to regional and international ordinances and requirements
- teach safety standards
- enforce adequate facility safety and protective operation
- instruct first aid

Location of Valve Data

Each VG7000 Series Bronze Control Valve shipped from the factory includes a brass tag chained to the valve bonnet. The tag features technical data about the valve, including:

- **code number** of the valve
- **flow coefficient Cv** of the valve
- **maximum allowable fluid temperature** of the controlled media
- **manufacturing date code** of the valve (as illustrated in Figure 1)

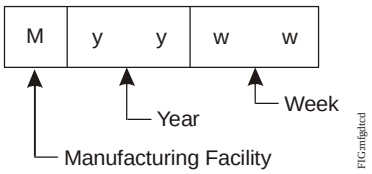


Figure 1: Manufacturing Date Code

Installation

IMPORTANT: The VG7000 Series Bronze Control Valves are intended to control saturated steam, hot water, and chilled water flow under normal equipment operating conditions. Where failure or malfunction of the VG7000 Series Valve could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the VG7000 Series Valve.

Pre-installation Details

Before installing a VG7000 Series Bronze Control Valves, note the following:

- Be sure to mount the valve in an upright position, in a conveniently accessible location.
- Protect the electric actuator from dripping water that could enter the actuator housing and damage the mechanism or motor.
- Do not cover the actuator with insulating material.
- Allow sufficient clearance to remove the actuator (see Figure 2, Table 1, and Table 2).
- Pipe the valve with the flow in the direction of the arrow on the valve body, so that the plug seats against the flow.
- Wire all electrically actuated valve assemblies in accordance with applicable electrical code requirements. Input lines to the actuator must be wired correctly for the valve to move in the proper direction.

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IMPORTANT: Take care to prevent foreign material such as weld slag, thread burrs, metal chips, and scale from entering the piping system. This debris can damage or severely impede the operation of the valve by embedding itself in the seats, scoring the valve, and ultimately resulting in seat leakage. If the debris becomes embedded in the seats, subsequent flushing and filtering of the piping system with the valve installed does not remedy the problem.

Dimensions

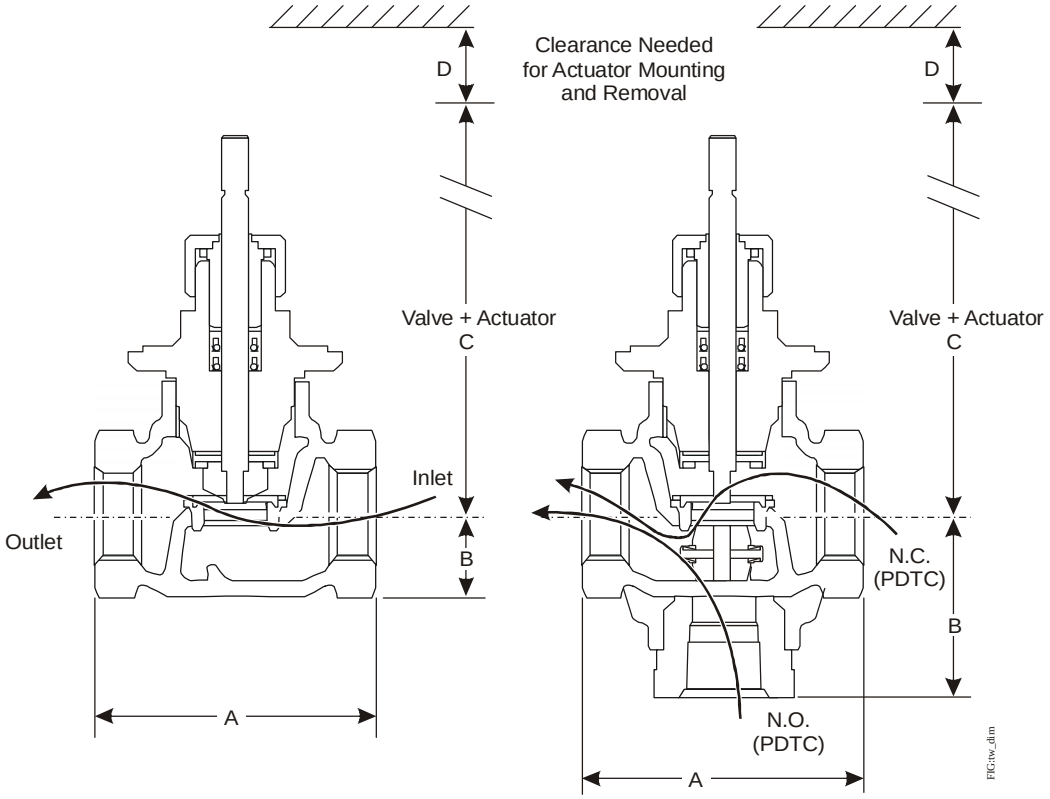


Figure 2: Two-Way Normally Open (N.O.)/Push-Down-to-Close (PDTC), Two-Way Normally Closed (N.C.)/Push-Down-to-Open (PDTO), and Three-Way Mixing Valve Dimensions, Fluid Flow Directions, and Port Designations (See Table 1 and Table 2.)

Table 1: Internal National Pipe Thread (NPT) Valve Dimensions, in. (mm)

Valve Size, in. (DN)	A	B		
	N.O., N.C., and Three-Way	N.O.	N.C.	Three-Way
1/2 (DN15)	3 (76)	13/16 (21)	1-9/16 (39)	1-13/16 (46)
3/4 (DN20)	3-7/32 (81)	15/16 (24)	1-5/8 (41)	2-1/8 (54)
1 (DN25)	4-1/8 (104)	1-5/32 (29)	1-3/4 (44)	2-9/16 (65)
1-1/4 (DN32)	4-23/32 (119)	1-11/32 (34)	2 (51)	2-25/32 (70)
1-1/2 (DN40)	5-1/8 (130)	2-5/32 (55)	2-3/4 (70)	3-3/8 (85)
2 (DN50)	5-29/32 (150)	2-1/8 (53)	2-27/32 (72)	3-3/4 (95)

Table 2: Valve Assembly Dimensions, in. (mm)

Actuator Type	C[1]						D[1]
	1/2 in. (DN15)	3/4 in. (DN20)	1 in. (DN25)	1-1/4 in. (DN32)	1-1/2 in. (DN40)	2 in. (DN50)	
Brass Trim Valve Assemblies							
V-3000-8011	4-3/4 (120)	4-3/4 (120)	5-31/32 (151)	5-7/8 (149)	5-13/16 (147)	6-3/16 (157)	3-9/16 (90)
V-3000-8003	5-11/32 (135)	5-11/32 (135)	6-9/16 (166)	6-19/32 (167)	6-13/32 (162)	6-13/16 (172)	3-9/16 (90)
V-3801-8001	4 (102)	4 (102)	---	---	---	---	2-3/8 (60)
MP82xx, MP83xx	---	---	12-23/32 (323)	12-27/32 (326)	13-13/32 (341)	13-13/16 (351)	3-1/2 (89)
VA-4233	8-15/32 (215)	8-15/32 (215)	9-7/16 (240)	9-9/16 (243)	---	---	1-1/2 (38)
VA-715x	7-11/16 (195)	7-11/16 (195)	8-21/32 (220)	8-25/32 (223)	9-11/32 (238)	9-3/4 (248)	2-1/2 (64)
VA-720x	---	---	10-7/16 (265)	10-17/32 (268)	11-1/8 (283)	11-1/2 (293)	4-1/2 (114)
VA-8x2x	6-7/16 (164)	6-7/16 (164)	---	---	---	---	1-1/2 (38)
VA78x0	10-3/4 (273)	10-3/4 (273)	11-23/32 (298)	11-27/32 (301)	12-13/32 (315)	12-13/16 (325)	4-1/2 (114)
M1xx	10-13/16 (274)	10-13/16 (274)	12-1/32 (305)	12-1/32 (305)	11-7/8 (301)	12-1/4 (311)	---
Stainless Steel Trim Valve Assemblies[2]							
V-3000-8011	5-7/16 (138)	5-7/16 (138)	6 (152)	6-1/4 (158)	---	---	3-9/16 (90)
V-3000-8003	6-1/16 (153)	6-1/4 (158)	6-19/32 (167)	6-27/32 (173)	---	---	3-9/16 (90)
MP82xx	12-3/4 (324)	13-17/64 (337)	13-39/64 (346)	13-27/32 (352)	14-1/32 (356)	14-15/64 (361)	3-1/2 (89)
MP83xx	12-21/64 (313)	12-35/64 (319)	12-7/8 (327)	13-1/8 (333)	13-19/64 (338)	13-1/2 (343)	3-1/2 (89)
MP84xx	---	---	---	---	17-7/32 (437)	17-27/64 (443)	3-1/2 (89)
MP85xx	---	---	---	---	15-61/64 (405)	16-5/32 (410)	3-1/2 (89)
VA-4233	8-23/32 (221)	8-15/16 (227)	9-9/32 (236)	9-13/16 (249)	---	---	1-1/2 (38)
VA-715x	8-13/32 (214)	8-5/8 (219)	8-31/32 (228)	9-7/32 (234)	9-13/32 (239)	9-5/8 (244)	2-1/2 (64)
VA-720x	9-3/32 (231)	9-5/16 (236)	9-21/32 (245)	9-7/8 (251)	10-3/32 (256)	10-9/32 (261)	4-1/2 (114)
VA78x0	11-15/32 (291)	11-11/16 (297)	12-19/32 (320)	12-27/32 (326)	13-1/32 (331)	13-1/4 (336)	4-1/2 (114)
M1xx	11-1/2 (292)	11-23/32 (297)	12-1/16 (306)	12-5/16 (312)	12-1/2 (318)	12-11/16 (322)	---

1. Dimension **C** is the overall height above the centerline of the valve body, and dimension **D** is the clearance required for actuator removal (as illustrated in Figure 2).
2. An extended bonnet comes as standard equipment on VG7000 Series Bronze Control Valves with stainless steel trim, to allow for higher fluid temperatures (100 psig [690 kPa] saturated steam at 338°F [170°C]).

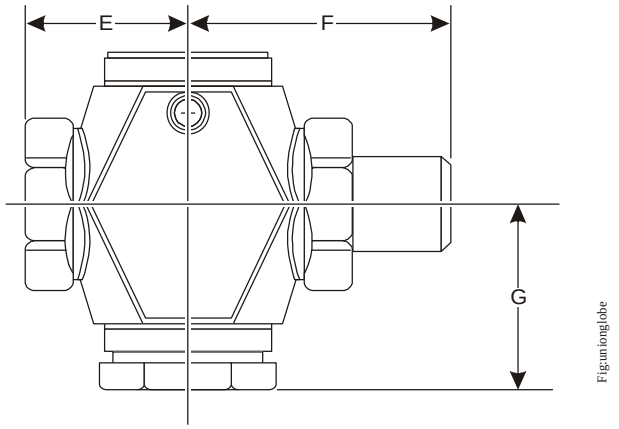


Figure 3: Two-Way N.O./PDTC and Two-Way N.C./PDTO Union Globe Valve Dimensions (See Table 3.)

Table 3: Two-Way N.O./PDTC and Two-Way N.C./PDTO Union Globe Valve Dimensions, in. (mm)[1]

Valve Size, in. (DN)	E	F	G
1/2 (DN15) N.O./PDTC	1-1/2 (38)	2-21/32 (68)	13/16 (20)
1/2 (DN15) N.C./PDTO	1-1/2 (38)	2-21/32 (68)	1-17/32 (39)
3/4 (DN20) N.O./PDTC[2]	1-9/16 (40)	3-3/32 (79)	15/16 (24)
1 (DN25) N.O./PDTC[2]	2-1/16 (53)	4-1/32 (102)	1-5/32 (29)
1-1/4 (DN32) N.O./PDTC[2]	2-3/8 (60)	4-19/32 (117)	1-11/32 (34)
1-1/2 (DN40) N.O./PDTC[2]	2-9/16 (65)	4-27/32 (123)	2-5/32 (55)

1. See Table 2 for overall assembly height **C** and clearance **D** dimensions.
2. Sizes greater than 1/2 in. (DN15) are available in N.O./PDTC only.

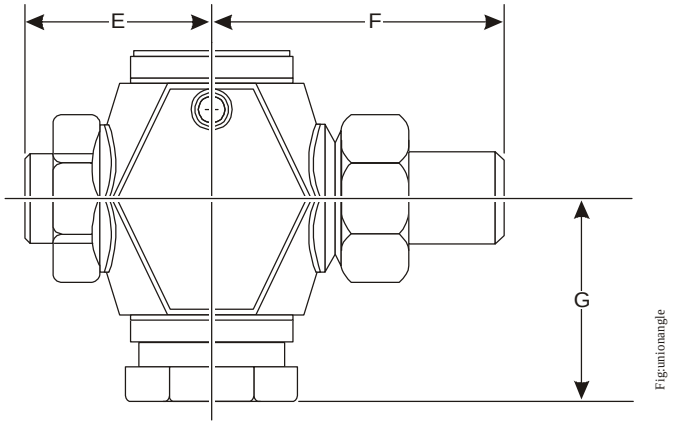


Figure 4: Two-Way N.O./PDTC Union Angle Valve Dimensions (See Table 4.)

Table 4: Two-Way N.O./PDTC Union Angle Valve Dimensions, in. (mm)[1]

Valve Size, in. (DN)	E	F	G
1/2 (DN15) N.O./PDTC	1-23/32 (44)	2-21/32 (68)	1-7/8 (48)
3/4 (DN20) N.O./PDTC	1-9/16 (40)	3-3/32 (79)	2-1/8 (54)
1 (DN25) N.O./PDTC	2-1/16 (53)	4-1/32 (102)	2-9/16 (65)
1-1/4 (DN32) N.O./PDTC	2-3/8 (60)	4-19/32 (117)	2-25/32 (70)
1-1/2 (DN40) N.O./PDTC	2-9/16 (65)	4-27/32 (123)	3-3/8 (85)

1. See Table 2 for overall assembly height **C** and clearance **D** dimensions.

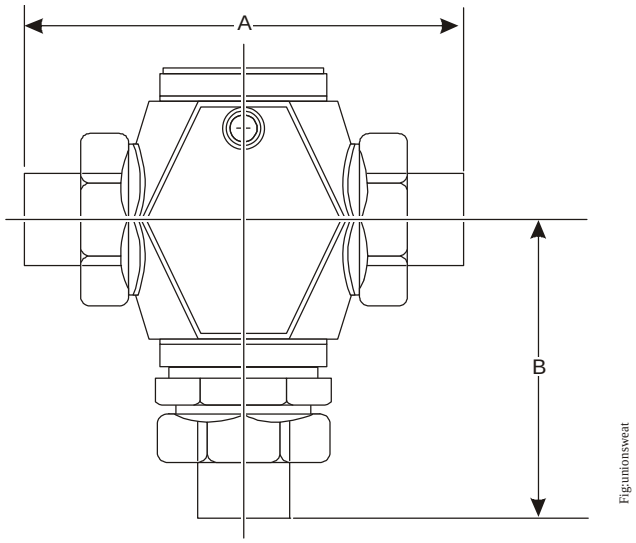


Figure 5: Two-Way N.O./PDTC, Two-Way N.C./PDTO, and Three-Way Mixing Union Sweat Valve Dimensions (See Table 5.)

Table 5: Two-Way N.O./PDTC, Two-Way N.C./PDTO, and Three-Way Mixing Union Sweat Valve Dimensions, in. (mm)[1]

Valve Size, in. (DN)	A	B		
		Two-Way N.O./ PDTC	Two-Way N.C./ PDTO	Three-Way Mixing
1/2 (DN15), 3/8 in. Tubing	4-3/16 (106)	13/16 (20)	1-17/32 (39)	2-17/32 (64)
1/2 (DN15), 1/2 in. Tubing	4-3/16 (106)	13/16 (20)	1-17/32 (39)	2-17/32 (64)
1/2 (DN15), 3/4 in. Tubing	4-25/32 (122)	13/16 (20)	1-17/32 (39)	2-17/32 (64)
3/4 (DN20)	5-1/16 (129)	15/16 (24)	1-9/16 (40)	3-1/4 (82)
1 (DN25)	6-3/32 (155)	1-5/32 (29)	1-3/4 (44)	3-23/32 (94)
1-1/4 (DN32)	7-9/32 (185)	1-11/32 (34)	2 (51)	4-3/32 (104)
1-1/2 (DN40)	8-19/32 (218)	2-5/32 (55)	2-3/4 (70)	4-29/32 (125)
2 (DN50)	9-7/16 (240)	2-1/8 (53)	2-27/32 (72)	5-19/32 (142)

1. See Table 2 for overall assembly height **C** and clearance **D** dimensions.

Repair Information

If the VG7000 Series Bronze Control Valve fails to operate within its specifications, refer to the *VG7000 Series Bronze Control Valves Product Bulletin (LIT-977140)* for a list of repair parts and reconditioning kits available. For a replacement valve, contact the nearest Johnson Controls representative.

Pre-servicing Details

Before servicing a VG7000 Series Bronze Control Valve, isolate or disconnect the pneumatic supply or electrical power to the actuator and note the following:

WARNING: Risk of Electric Shock. Disconnect or isolate all power supplies before making electrical connections. More than one disconnect or isolation may be required to completely de-energize equipment. Contact with components carrying hazardous voltage can cause electric shock and may result in severe personal injury or death.

IMPORTANT: Make all wiring connections in accordance with local, national, and regional regulations. Do not exceed the electrical ratings of the VG7000 Series Bronze Control Valve.

CAUTION: Risk of Property Damage. Do not apply power to the system before checking all wiring connections. Short circuited or improperly connected wires may result in permanent damage to the equipment.

WARNING: Risk of Personal Injury. Shut off the liquid supply and relieve pressure in the line before servicing the valve. Contents of liquid lines could be under pressure and the release of liquid under pressure may cause severe personal injury.

Valve Removal Details

In addition to observing general mounting guidelines and National Code Standards, be sure to note the following before removing a valve from a piping system:

- Allow hot water or steam systems to cool down thoroughly before proceeding.
- Drain the piping system to provide a pressure-free work environment.
- Vent all piping systems that are used in conjunction with corrosive or aggressive fluids.
- Be sure all work is performed by qualified personnel only.

Technical Specifications

VG7000 Series Bronze Control Valves (Part 1 of 2)

Service[1]		Hot Water, Chilled Water, 50/50 Glycol Solutions, or Steam for HVAC Systems (Fluid Group 1 According to 67/548/EEC)
Valve Body Size/Cv (kv)	**1/2 in.**	0.73 (0.63), 1.8 (1.6), and 4.6 (4.0)
	3/4 in.	7.3 (6.3)
	1 in.	11.6 (10)
	1-1/4 in.	18.5 (16)
	1-1/2 in.	28.9 (25)
	2 in.	46.2 (40)
Valve Stroke		5/16 in. (8 mm) for 1/2 or 3/4 in. Valves
		1/2 in. (13 mm) for 1 and 1-1/4 in. Valves
		3/4 in. (19 mm) for 1-1/2 and 2 in. Valves
Valve Body Rating		Meets Requirements of ANSI B16.15, Class 250 (EN 12360).
Valve Ambient Operating Temperature Limits		35 to 150°F (2 to 65°C)
Valve Assembly Maximum Allowable Pressure/ Temperature	**Steam**	**Brass Trim:** 35 psig (241 kPa) Saturated Steam at 281°F (138°C)
		SS Trim: 100 psig (690 kPa) Saturated Steam at 338°F (170°C)
	Water	**Brass Trim:** 400 psig (2,756 kPa) up to 150°F (66°C), Decreasing to 365 psig (2,515 kPa) at 248°F (120°C)
		SS Trim: 400 psig (2,756 kPa) up to 150°F (66°C), Decreasing to 308 psig (2,122 kPa) at 338°F (170°C)
Leakage	**Brass Trim**	0.01% of Maximum Flow per ANSI/FCI 70-2, Class 4
	SS Trim	0.05% of Maximum Flow
Inherent Flow Characteristics	**Two-Way Valves**	Equal Percentage
	Three-Way Mixing Valves	Linear
Rangeability[2]		25:1 for All Sizes (EN 60534-2-4)
Spring Range Pneumatic Actuators		3 to 6 psig (21 to 41 kPa) for All Except MP8000; 3 to 7 psig (21 to 48 kPa) for MP8000 Only; 4 to 8 psig (28 to 55 kPa); 9 to 13 psig (62 to 90 kPa)
Maximum Recommended Operating Pressure Drop	**Steam**	**Brass Trim:** 15 psig (103 kPa) for All Valve Sizes
		SS Trim: 100 psig (690 kPa) for All Valve Sizes
	Water	**Brass and SS Trim:** 35 psig (241 kPa) for 1/2 through 1-1/4 in. Valves; 30 psig (207 kPa) for 1-1/2 and 2 in. Valves
Maximum Actuator Supply Pressure (Pneumatically Actuated Valves Only)		25 psig (172 kPa) Maximum

VG7000 Series Bronze Control Valves (Part 2 of 2)

Materials		**Body:** Cast Bronze
		Bonnet: Brass
	Brass Trim	**Stem:** Stainless Steel
		Plug: Brass
		Seat: Brass Against Molded Elastomeric Disk
		Packing: Self-Adjusting Ethylene Propylene Rubber (EPR) Ring Pack U-Cups
	SS Trim	**Stem:** Stainless Steel
		Plug: Stainless Steel
		Seat: Stainless Steel
		Packing: Spring Loaded Polytetrafluoroethylene (PTFE) and Elastomer V-Rings
Valve Fluid Operating Temperature Limits	**Brass Trim Valve with Pneumatic Actuator**	**For V-3801-8001 and V-3000-8003 Actuators:** 35 to 248°F (2 to 120°C) Water; 15 psig (103 kPa) Saturated Steam
		For MP82 and V-3000-8011 Actuators: 35 to 284°F (2 to 140°C) Water; 38 psig (262 kPa) Saturated Steam
	Brass Trim Valve with Electric Actuator	**For VA-8x2x Actuators:** 195°F (91°C) Maximum Water; Actuators are not rated for steam.
		For VA-4233-xGx-2 Actuators: 35 to 250°F (2 to 121°C) Water; 15 psig (103 kPa) Saturated Steam
		For All Other Electric Actuators: 35 to 284°F (2 to 140°C) Water; 38 psig (262 kPa) Saturated Steam
	SS Trim Valve with Pneumatic Actuator	**All Pneumatic Actuators:** 35 to 338°F (2 to 170°C) Water; 100 psig (690 kPa) Saturated Steam
	SS Trim Valve with Electric Actuator	**For VA-4233-xGx-2 Actuators:** 35 to 250°F (2 to 121°C) Water; 15 psig (103 kPa) Saturated Steam
		For All Other Electric Actuators: 35 to 338°F (2 to 170°C) Water; 100 psig (690 kPa) Saturated Steam
Actuator Ambient Operating Temperature Limits		Refer to the appropriate actuator or linkage kit product bulletin. Ambient operating temperature or other service limitations vary by selected actuator.
Compliance	**1/2, 3/4, and 1 in. Valves**	**Pressure Equipment Directive (PED) 97/23/EC:** Paragraph 3, Comma 3 (CE Marking not Applicable.)
	1-1/4, 1-1/2, and 2 in. Valves	**Pressure Equipment Directive (PED) 97/23/EC:** Category 1, Mod. A (Subject to CE Marking)

1. Proper water treatment is recommended; refer to VDI 2035 Standard.
2. Rangeability is defined as the ratio of maximum flow to minimum controllable flow.

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

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