

## Series VD Pneumatic diaphragm actuators

Metso's Neles series VD actuators are exclusively developed for linear valves. They provide safe and reliable operation and are well suited for many different kind of applications. The high performance internal coating resists wear and corrosion and the replaceable inner parts guarantee a long life cycle. The VDD/VDR series diaphragm actuator is well suited for most of the control applications.

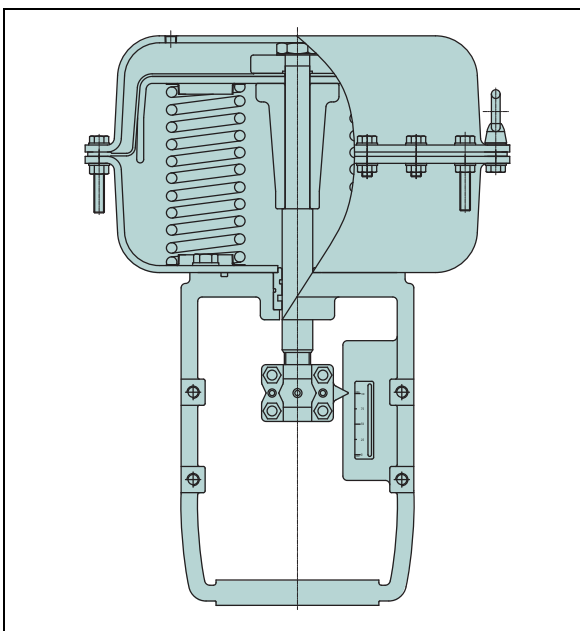
### Construction

- Excellent long lasting accuracy and reliability is achieved through the use of multiple springs and rolling diaphragm in the actuator.
- The use of involute rolling diaphragm permits long travel and excellent linearity without the need of expensive hardware normally associated with diaphragm actuators.
- A wide selection of spring ranges are available
- The actuator is field reversible between direct and reverse acting
- The rugged one piece yoke, pressed steel diaphragm case and special nylon reinforced diaphragm provide dependable, high thrust performance
- Optional handwheel for manual operation

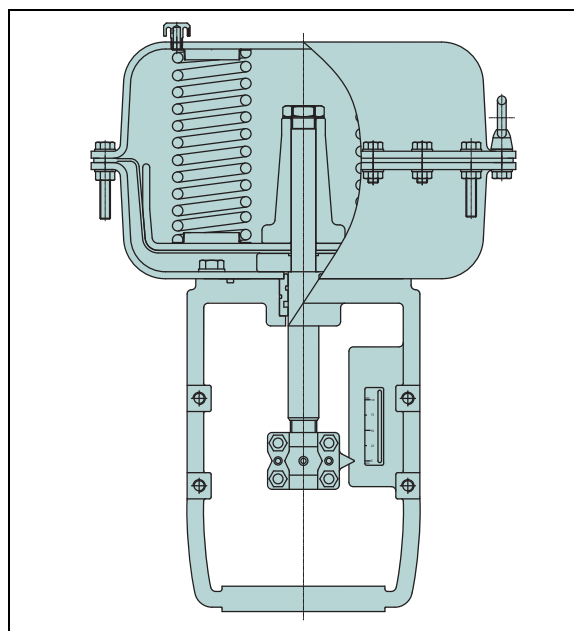


### Simple and cost effective

- Simple and cost effective design guarantee increased life time and reliability. No accurately honed bores with delicate sealing systems are required
- Low cost, simple maintenance
- High performance, low friction rolling diaphragm gives good control performance



VDD, Direct  
Air to stem extend  
Field-reversible VDD



VDR, Reverse  
Air to stem retract  
Field-reversible VDR

### VD Diaphragm actuators design details

#### VD specifications

Actuator size	Effect area		Volume		Actuator stem size (Φ)		Maximum stroke		Max. allowable pressure	
	cm <sup>2</sup>	inch <sup>2</sup>	dm <sup>3</sup>	inch <sup>3</sup>	mm	inch	mm	inch	bar	psi
#25	270	42	0.9	54.9	24.0	0.95	20	0.8	4.2	60
#29	390	60	1.8	109.8	24.0	0.95	40	1.6		
#37	640	99	3.5	213.5	24.0	0.95	50	2.0		
#48	1130	175	10.2	622.4	35.0	1.38	70	2.8		
#55	1520	236	18.2	1110.0	35.0	1.38	80	3.2		

#### VD Spring ranges and max. travel (stroke)

Actuator size	VDR (Signal increased to open)						VDD (Signal increased to close)					
	Spring range		Supply air set pressure		Max. travel		Spring range		Supply air set pressure		Max. travel	
	bar	psi	bar	psi	mm	inch	bar	psi	bar	psi	mm	inch
#25	0.2~1.0	3~15	1.2	18	20	0.8	0.2~1.0	3~15	1.2	18	20	0.8
	0.8~2.6	11~37	3.2	44			0.8~2.6	11~37	3.2	44		
	1.5~3.4	21~48	3.9	55			1.5~3.4	21~48	3.9	55		
#29	0.2~1.0	3~15	1.2	18	40	1.6	0.2~1.0	3~15	1.2	18	40	1.6
	0.8~2.6	11~37	3.2	44			0.8~2.6	11~37	3.2	44		
	1.5~3.4	21~48	3.9	55			1.5~3.4	21~48	3.9	55		
#37	0.2~1.0	3~15	1.2	18	50	2.0	0.2~1.0	3~15	1.2	18	50	2.0
	0.8~2.6	11~37	3.2	44			0.8~2.6	11~37	3.2	44		
	1.5~3.4	21~48	3.9	55			1.5~3.4	21~48	3.9	55		
#48	0.2~1.0	3~15	1.2	18	70	2.8	0.2~1.0	3~15	1.2	18	70	2.8
	0.8~2.6	11~37	3.2	44			0.8~2.6	11~37	3.2	44		
	1.5~3.4	21~48	3.9	55			1.5~3.4	21~48	3.9	55		
#55	0.2~1.0	3~15	1.2	18	80	3.2	0.2~1.0	3~15	1.2	18	80	3.2
	0.8~2.6	11~37	3.2	44			0.8~2.6	11~37	3.2	44		
	1.5~3.4	21~48	3.9	55			1.5~3.4	21~48	3.9	55		

#### VD Stroking times (new)

Size	Stroke(m m)	ND Model	Stroking time(Sec.)			
			Case-1		Case-2	
			Load	Vent	Load	Vent
# 25	20	ND 9202	4	5	4	5
	20	ND 9203	2	3	2	3
# 29	20	ND 9203	4	5	4	5
	40	ND 9203	6	8	6	8
# 37	20	ND 9203	7	9	7	9
	40	ND 9203	11	14	11	14
	50	ND 9203	12	17	12	17
# 48	20	ND 9206	4	7	6	7
	40	ND 9206	5	9	8	9
	50	ND 9206	6	10	9	10
	60	ND 9206	7	11	10	11
# 55	20	ND 9206	6	9	8	9
	40	ND 9206	7	11	10	11
	50	ND 9206	11	13	12	13
	60	ND 9206	12	15	14	15
	70	ND 9206	13	17	16	17
	80	ND 9206	14	18	17	18

- Note :
1. Mounted with ND 9200 smart positioners
  2. Case-1 : when applied B72G-1AS-980 Air set  
Case-2 : when applied YT-200BN210 Air set
  3. VD model & spring range : VDR, 0.8~2.6 bar
  4. Air supply pressure : 3.2 bar
  5. Stroking time accuracy : ± 10 %

#### VD Temperature ranges

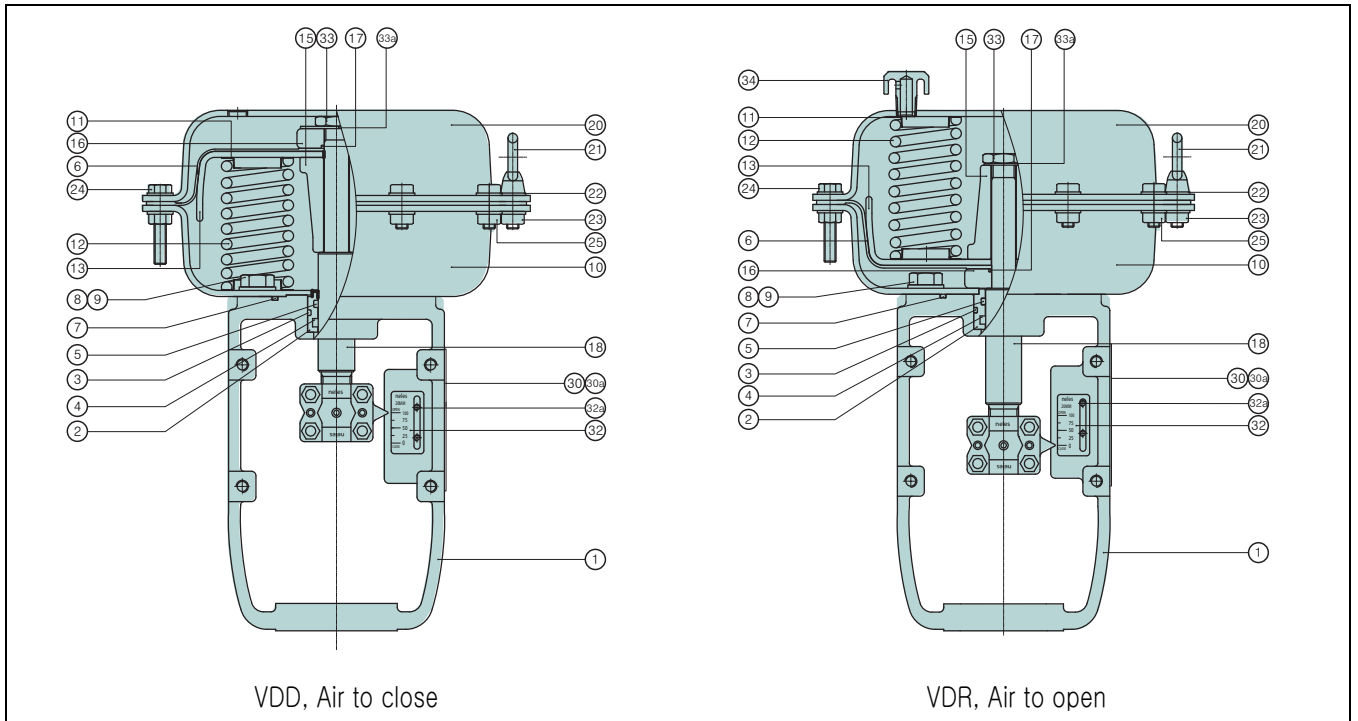
Description	Standard VD	Low. Temp. VD
Temp. range	-20 °C to 70 °C	-40 °C to 70 °C
Type code ref.	E, A	E, L

- Note :
1. Temperature : Ambient temperature
  2. Type code reference : Please see in page 6 (materials).
  3. Other low temperature ranges : Please contact Metso.

#### VD Air supply connections

Standard	1/4" NPT for all sizes
Optional	3/8", 1/2" and others

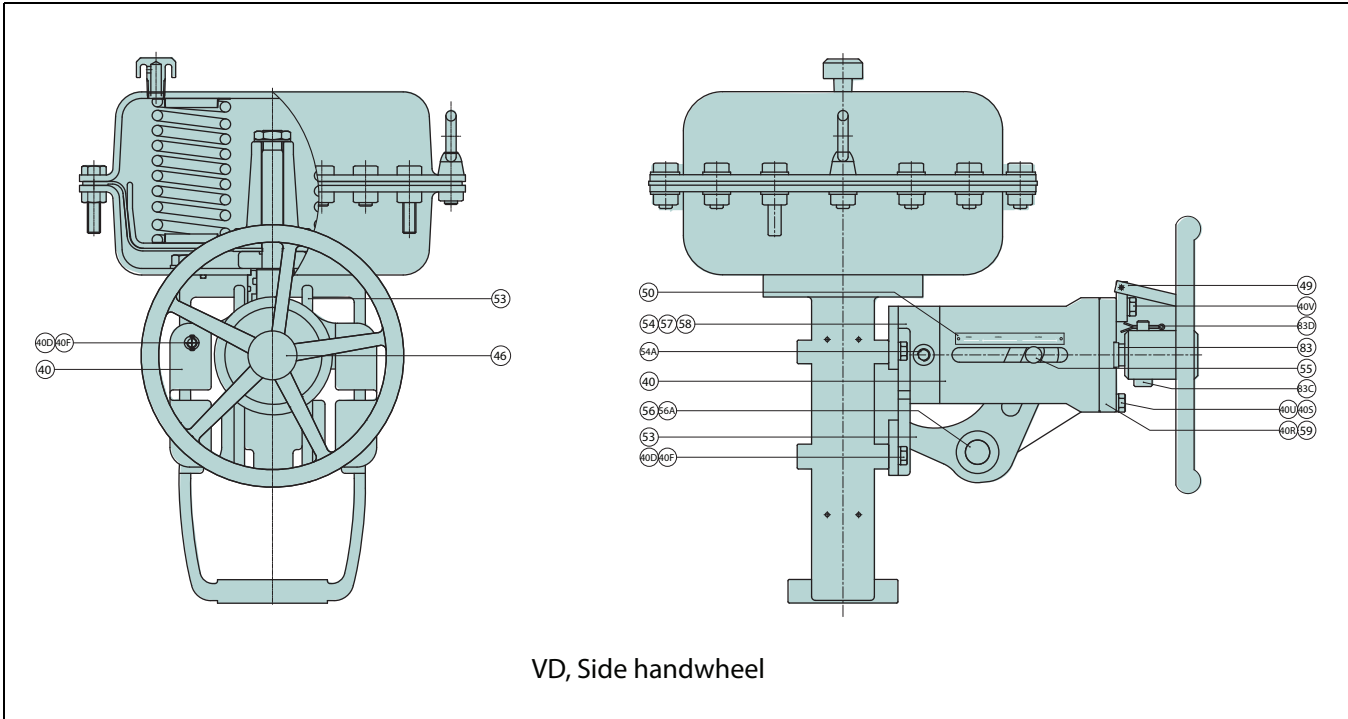
## VD, Actuator constructions without handwheel



### Standard VD, parts and materials without handwheel

Part No.	Description	Material
001	YOKE	ASTM A216 gr. WCB
002	STEM GUIDE	ASTM B209 ALLOY 6061 T6
003	O-RING	NITRILE, NBR
004	U-PACKING	NITRILE, NBR
005	O-RING	NITRILE, NBR
006	DIAPHRAGM	EPDM
007	O-RING	NITRILE, NBR
008	HEXAGON SCREW	ISO 3506 A2-70
009	WASHER	BRONZE
010	LOWER CASE	JIS G3101_SS400
011	SPRING SEAT	JIS G3101_SS400+Zn
012	SPRING	JIS G3560_SWOSC-B
013	DIAPHRAGM PLATE	JIS G3101_SS400
015	STOPPER	ASTM A216 gr. WCB+Zn
016	STEM ROD PLATE	JIS G3101_SS400+Zn
017	O-RING	NITRILE, NBR
018	TOP STEM	AISI 304+HCr
020	UPPER CASE	JIS G3101_SS400
021	LIFTING EYE NUT	AISI 304
022	WASHER	AISI 304
023	HEXAGON SCREW	ISO898/1 12.9+ZINC
024	HEXAGON SCREW	ISO898/1 12.9+ZINC
025	HEXAGON NUT	ISO898/2 8+ZINC
030	IDENTIFICATION PLATE	AISI 304
030a	RIVET	AISI 304
031a	STICKER (WARNING)	VINYL PAPER
032	INDICATOR	AISI 304
032a	ROUND HEAD SCREW	AISI 304
033	STEM NUT	AISI 304
033a	LOCK WASHER	AISI 304
034	VENT CAP	ASTM A351 gr. CF8

**VD, Actuator construction with handwheel**

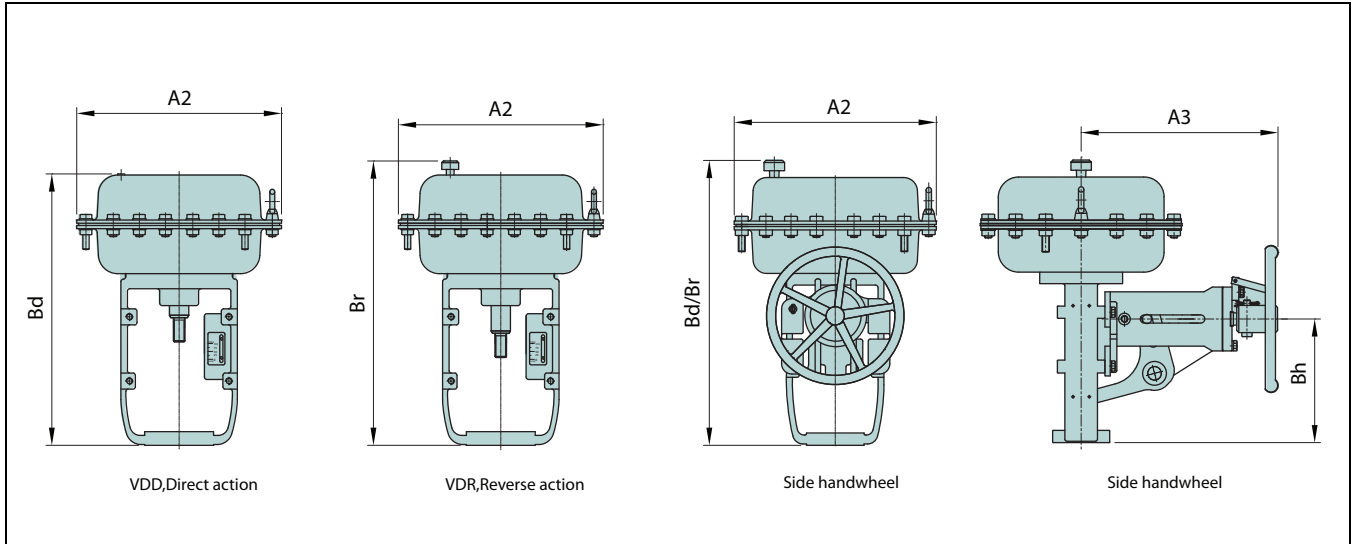


**Standard VD, parts and materials with handwheel**

Part No.	Description	Material
040	HANDLE BASE	ASTM A216 gr. WCB
040d	HEXAGON SCREW	ISO 3506 A2-70
040f	SPRING WASHER	AISI 304
040r	HANDLE BASE COVER	ASTM A216 gr. WCB
040s	HEXAGON SCREW	ISO 3506 A2-70
040u	SPRING WASHER	AISI 304
040v	HEXAGON SCREW	ISO 3506 A2-70
046	HANDLE	ASTM B209 ALLOY 6061 T6
049	LOCKING HANDLE	AISI 304
050	HANDLE INDICATOR	ALUMINIUM
053	LEVER ARM	ASTM A216 gr. WCB
054	BEARING FLANGE	ASTM A216 gr. WCB
054a	BEARING FLANGE SCREW	JIS G4051-S45C
055	SHAFT FLANGE	JIS G4051-S45C
056	LEVER ARM PIN	AISI 304
056a	SNAP RING (UNSHOWN)	AISI 304
057	THRUST BALL BEARING(UNSHOWN)	JIS G3101-S5400
058	SNAP RING(UNSHOWN)	AISI 304
059	DU DRY BEARING(UNSHOWN)	AISI304+PTFE+Pb
083	HANDLE SHAFT	JIS G4051-S45C
083c	SHAFT PIN	AISI 304
083d	SPLIT PIN	AISI 304

## VD Diaphragm actuators

### Actuators dimensions



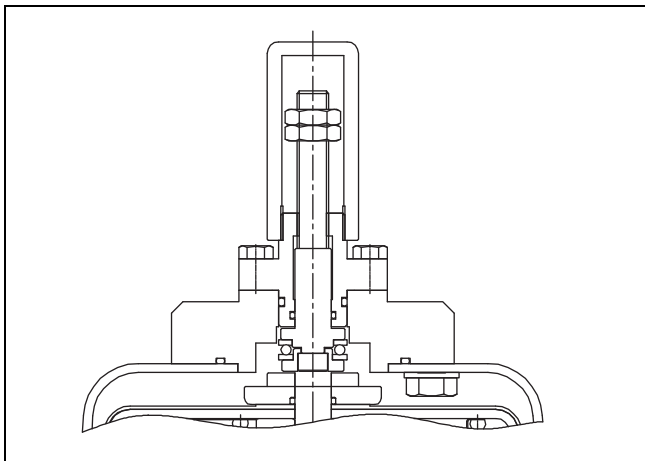
(UNIT : mm)

Size	Without handwheel				With handwheel					
	A2	Bd	Br	Weight (kg)	A2	Bd	Br	A3	Bh	Weight (kg)
#25	255	348	373	12	255	348	373	312	170	22
#29	295	391	416	18	295	391	416	312	182	28
#37	375	464	489	28	464	464	489	342	201	43
#48	486	652	677	86	486	652	677	464	244	119
#55	566	695	720	112	566	695	720	464	244	145

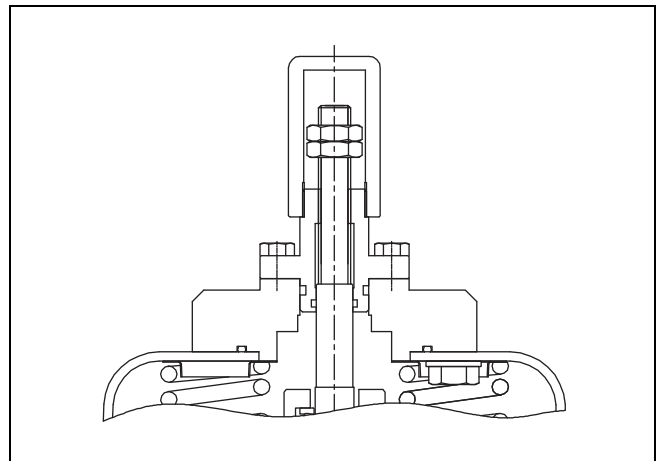
**NOTE**

1. 'Br' refers to reverse acting actuator, VDR
2. 'Bd' refers to direct acting actuator, VDD

### VD Actuator, max/min stop



Model VDD  
Maximum stop  
Optional adjustable limit stop



Model VDR  
Minimum stop  
Optional adjustable limit stop

## HOW TO ORDER

Pneumatic diaphragm actuator, linear type, series VD

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
VD	D	25	C	020	A	E	A	K	X	X	A	X	R

### ACTUATOR CONSTRUCTIONS

1.	ACTUATOR SERIES
VD	Pneumatic diaphragm actuator, linear type

2.	FUNCTION CODE		
	Direction	Spring to	Air to stem
D	Direct acting	Open	Extended
R	Reverse acting	Close	Retracted

3.	ACTUATOR SIZE	
	Outline dimension	
25	Ø255 mm	
29	Ø295 mm	
37	Ø375 mm	
48	Ø486 mm	
55	Ø566 mm	

4.	SPRING RANGE		
	bar	psi	Supply air pressure
C	0.8 - 2.6	11 - 37	3.2 bar / 44 psi
Optional spring range			
A	0.2 - 1.0	3 - 15	1.2 bar / 18 psi
D	1.5 - 3.4	21 - 48	3.9 bar / 55 psi
Y	Special	Special	Special

5.	STROKE					
	Desc.	VD_25	VD_29	VD_37	VD_48	VD_55
020	20 mm	O	O	O	-	-
030	30 mm	-	O	O	-	-
040	40 mm	-	O	O	O	O
050	50 mm	-	-	O	O	O
060	60 mm	-	-	-	O	O
070	70 mm	-	-	-	O	O
080	80 mm	-	-	-	-	O
YYY	Special	Contact Metso for special stroke				

### MATERIALS

6.	ACTUATOR CASE MATERIAL
A	JIS G3101-SS400 (ASTM A-36)
Y	Special

7.	DIAPHRAGM MATERIAL
E	EPDM
Y	Special

8.	SEAL MATERIAL
A	Nitrile rubber
Optional seal application	
L	Low temp. NBR
Y	Special

9.	BOLTING MATERIAL
K	Stainless steel
Optional bolting material	
A	Zinc coated carbon steel
Y	Special

### OTHERS

10.	POSITION LIMITATION
X	Not applicable
Optional application	
M	Mechanical stopper
Y	Special

11.	EXTERNAL OVERRIDE OPTION
X	Not applicable
A	Handwheel

12.	AIR SUPPLY CONNECTION	
	Connection size	Actuator size
A	1/4" NPT	VD_25/29/37/48/55
Y	Special	

13.	OPTIONS
X	Not applicable
Y	Special

14.	ACTUATOR DESIGN APPLICATION
-	Original type
R	Field reversible type

Subject to change without prior notice.

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