

Diaphragm seal for flange connection With flush diaphragm, cell-type Model 990.28

WIKA data sheet DS 99.28

Applications

- Aggressive, highly viscous, crystallising or hot media
- Process industry
- High-pressure applications

Special features

- Compact cell-type
- Intermediate flange with flush diaphragm
- Common standards and nominal widths available
- Wide variety of different materials and material combinations
- Instrument connection via radial connection adapter



Diaphragm seal for flange connection, model 990.28

Description

Diaphragm seals are used to protect pressure measuring instruments in demanding applications under difficult conditions. These diaphragm seal systems, consisting of a process transmitter, pressure sensor, pressure gauge or pressure switch with diaphragm seal, can be combined individually for each customer application. For this, a wide range of different designs, process connections, mounting types and wetted materials are available.

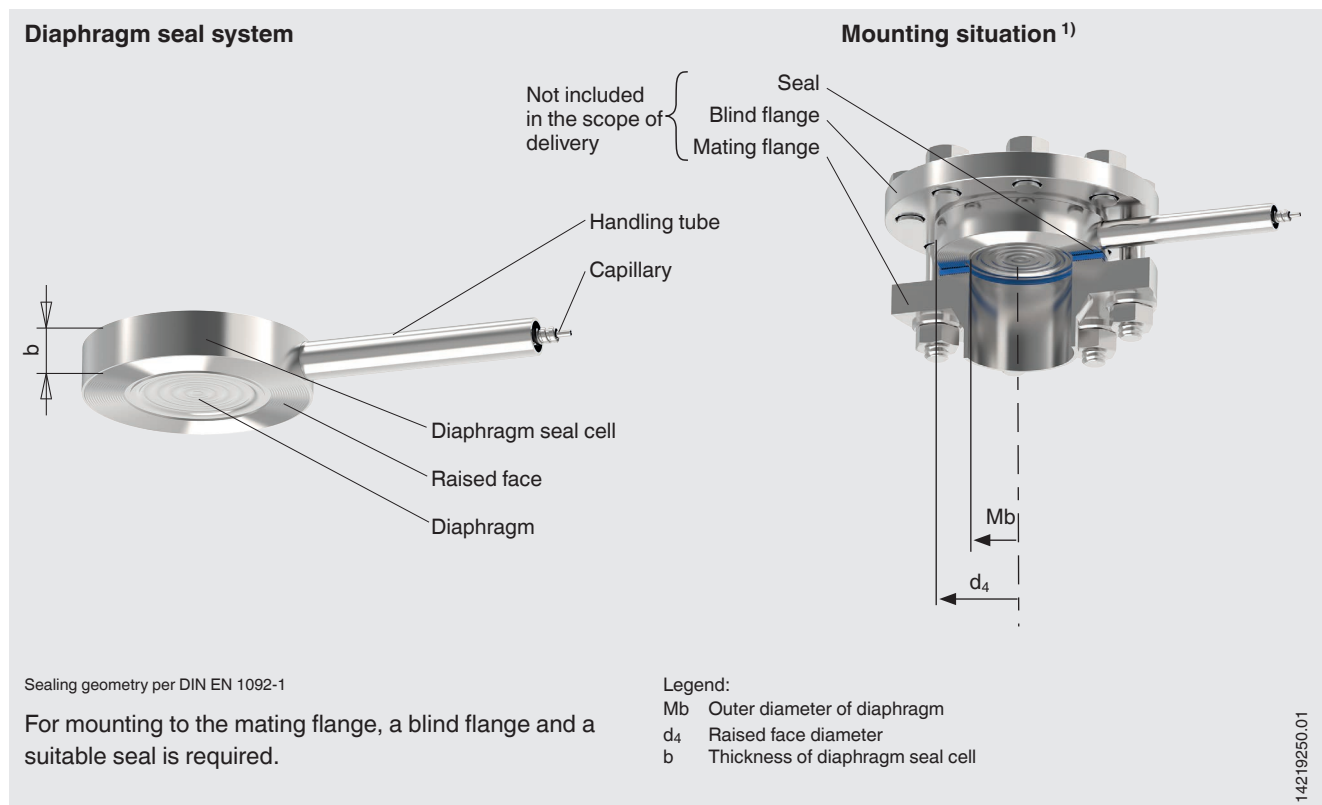
Diaphragm seal models with flange connections are available with flush or internal diaphragms, in tubular design or as in-line diaphragm seals.

The diaphragm seal model 990.28 with flush diaphragm, cell-type, is optimised for applications in the chemical, petrochemical and the oil and gas industries and is therefore available in a wide range of dimensions in accordance with the standards common in these markets.

Through the high number of possible combinations and aided by the individual checking of the operating conditions, it is ensured that the ideal customer solution for a diaphragm seal system can be found with this model.

Installation example

Model 990.28 with capillary and handling tube



Diaphragm seal system

Diaphragm seal systems are mounted to existing connections, which are welded to a pipeline, a process reactor or a tank. A diaphragm made of the appropriate material separates the medium from the measuring instrument. The internal space between the diaphragm and the measuring instrument is completely filled with a system fill fluid.

Measuring element

The pressure of the medium is transmitted to the system fill fluid via the elastic diaphragm and then on to the measuring instrument. A diaphragm seal and its components are perfectly matched to each other to ensure a reliable measurement.

Mounting type

The mounting of the diaphragm seals to the measuring instruments can be made via a capillary with handling tube.

Technical information

Data sheet number	Title
IN 00.06	Diaphragm seals and diaphragm seal systems, application – functionality – design
IN 00.25	Diaphragm seal systems for vacuum processes
IN 00.21	General information about NACE standards for sour gas applications
IN 00.41	Specifications of oil- and grease-free instruments

→ See download on the WIKA website

Specifications

Basic information for diaphragm seal systems	
Version	Diaphragm seal with flange connection, cell-type
Other versions	■ Per NACE ¹⁾ MR0175 / ISO 15156, use in H₂S-containing environments in oil and gas production ■ Per NACE ¹⁾ MR0103 / ISO 17945, metals resistant to hydrogen sulphide stress cracking ■ With pre-volume deflagration flame arrester ²⁾ for mounting to zone 0 (EPL Ga); model 910.21; see data sheet AC 91.02
Pressure range	The maximum permissible operating pressure must be determined individually for each diaphragm seal system. It is dependent on the operating temperature, the process connection, the joining method, the system fill fluid and the mounted measuring instrument.
Connection to the instrument	Suitable connection adapter to the instrument (e.g. G ½, G ¼, ½ NPT or ¼ NPT)
Mounting type	Capillary with handling tube
Vacuum service ³⁾	■ Basic service ■ Advanced service ■ Premium service

1) General information about NACE standards; see technical information IN 00.21

2) Only for instruments with Ex approval

3) Diaphragm seal systems for vacuum processes; see technical information IN 00.25

Process connection				
Standard ¹⁾	■ DIN EN 1092-1 ■ ASME B16.5-2017 ■ GOST 33259 ■ JIS B2220			
Size				
DIN EN 1092-1	■ DN 40 ■ DN 100	■ DN 50 ■ DN 125	■ DN 80	
ASME B16.5-2017	■ 1 ½" ■ 4"	■ 2" ■ 5"	■ 3"	
GOST 33259	■ DN 40 ■ DN 100	■ DN 50 ■ DN 125	■ DN 80	
JIS B2220	■ DN 40A ■ DN 100A	■ DN 50A	■ DN 80A	

Process connection		
Sealing geometry		
DIN EN 1092-1	- Form B1 - Form A - Form B2 - Form C (tongue)	- Form D (groove) - Form E (spigot) - Form F (recess)
ASME B16.5-2017	- RF 125 ... 250 AA - RFSF - Flat face - Small tongue - Small male face - Small groove	- Small female face - Large tongue - Large male face - Large groove - Large female face - RJF groove
GOST 33259	- Type B - Type A (flat face) - Type C (tongue)	- Type D (groove) - Type E (spigot, male face) - Type F (recess, female face)
JIS B2220	RF	
Wetted parts	Diaphragm and raised face → See tables below for material selection	
Origin of wetted parts	- International - Exclusively from EU, CH, GB, US, CA	
Level of cleanliness of wetted parts ²⁾	- Oil- and grease-free per WIKA specification (< 1,000 mg/m²) - Oil- and grease-free per ASTM G93-03 level D (< 220 mg/m²) - Oil- and grease-free per ASTM G93-03 level C (< 66 mg/m²)	

1) The respective standard is met for the connection dimensions of the sealing geometry; other dimensions, e.g. bores or flange thicknesses, may vary slightly.

2) Specifications of oil- and grease-free instruments; see technical information IN 00.41

→ Other process connections on request

Material combination		Maximum permissible temperature ¹⁾ in °C [°F]
Diaphragm seal	Wetted parts	
Stainless steel 1.4404 (316L)	Stainless steel 1.4404 / 1.4435 (316L)	400 [752]
	Hastelloy C22 (2.4602) ²⁾	260 [500]
	Hastelloy C276 (2.4819) ^{2) 3)}	400 [752]
	Inconel 600 (2.4816) ²⁾	400 [752]
	Inconel 625 (2.4856) ²⁾	400 [752]
	Incoloy 825 (2.4858) ²⁾	400 [752]
	Monel 400 (2.4360) ²⁾	400 [752]
	Nickel 200 (2.4066) ²⁾	260 [500]
	Nickel 201 (2.4068) ²⁾	260 [500]
	Titanium grade 2 (3.7035) ²⁾	150 [302]
	Titanium grade 11 (3.7225) ²⁾	150 [302]
	Tantalum ^{2) 3)}	300 [572]
Titanium grade 7 (3.7235)	Titanium grade 7 (3.7235) / Titanium grade 11 (3.7225)	250 [482]

1) The maximum permissible operating temperature of the diaphragm seal system is limited by the joining method, the system fill fluid and the measuring instrument.

2) This material combination is only possible with form B2 and RFSF sealing geometries. Since the parts do not allow any machining, the surface roughness Ra is ≤ 0.5 µm.

3) This material combination is additionally possible with form B1 and RF 125 ... 250 AA sealing geometries for DN 50, DN 80 and also 2" and 3".

Material	Maximum permissible temperature ¹⁾ in °C [°F]
Diaphragm seal and wetted parts	
Stainless steel 1.4435 (316L)	400 [752]
Stainless steel 1.4539 (904L)	400 [752]
Stainless steel 1.4541 (321)	400 [752]
Stainless steel 1.4571 (316Ti)	400 [752]
Duplex 2205 (1.4462)	250 [482]
Superduplex 2507 (1.4410)	250 [482]
Hastelloy C22 (2.4602)	400 [752]
Hastelloy C276 (2.4819)	400 [752]
Inconel 600 (2.4816)	400 [752]
Inconel 625 (2.4856)	400 [752]
Incoloy 825 (2.4858)	400 [752]
Monel 400 (2.4360)	400 [752]
Nickel 200 (2.4066)	300 [572]
Nickel 201 (2.4068)	400 [752]
Titanium grade 2 (3.7035)	300 [572]

1) The maximum permissible operating temperature must be determined individually for each diaphragm seal system. It is dependent on the operating pressure, the process connection, the joining method, the system fill fluid and the mounted measuring instrument.

Material of coating ¹⁾	Maximum permissible temperature ²⁾ in °C [°F]
Wetted parts	
ECTFE	150 [302]
PFA (perfluoroalkoxy), FDA	260 [500]
PFA (perfluoroalkoxy), anti-static	260 [500]
Gold	400 [752]
Wikaramic®	400 [752]

1) The coated basic material is from stainless steel 1.4435 (316L)

2) The maximum permissible operating temperature of the diaphragm seal system is limited by the joining method, the system fill fluid and the measuring instrument.

→ Further materials for special process temperatures on request.

Optional approvals

Logo	Description	Country
-	MChS Permission for commissioning	Kazakhstan
-	CRN Safety (e.g. electr. safety, overpressure, ...)	Canada

Manufacturer's declaration

Logo	Description
	SIL EXIDA report with SFF values from FMEDA analysis for functional safety assessment in accordance with IEC 61508

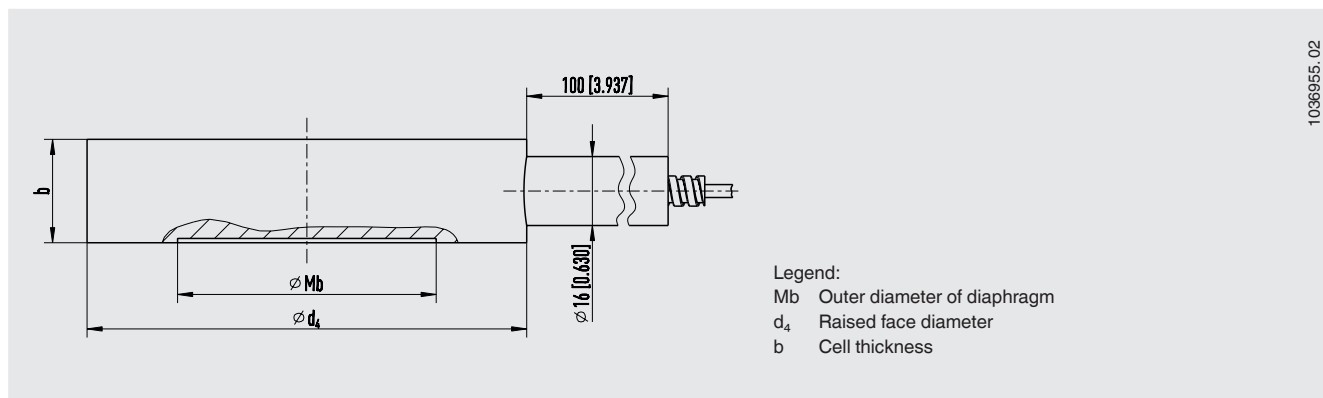
Certificates

Certificates	
Certificates	■ 2.2 test report per EN 10204 (e.g. state-of-the-art manufacturing, material proof, indication accuracy for diaphragm seal systems) ■ 3.1 inspection certificate per EN 10204 (e.g. material proof for wetted metal parts, indication accuracy for diaphragm seal systems)

→ For approvals and certificates, see website

Dimensions in mm [in]

Sealing geometry per DIN EN 1092-1, form B1



DN	PN in bar	Dimensions in mm [in]			Weight in kg [lb]
		Mb	d ₄	b	
40	10 ... 400	45 [1.772]	88 [3.465]	20 [0.787]	1.0 [2.205]
50	10 ... 400	60 [2.362]	102 [4.016]	20 [0.787]	1.3 [2.866]
80	10 ... 400	90 [3.543]	138 [5.433]	20 [0.787]	2.3 [5.071]
100	10 ... 16	90 [3.543]	158 [6.220]	20 [0.787]	3.1 [6.834]
100	25 ... 400	90 [3.543]	162 [6.378]	20 [0.787]	3.2 [7.055]
125	10 ... 400	124 [1.772]	188 [7.402]	22 [0.866]	4.8 [10.582]

→ Further dimensions and higher nominal pressures on request

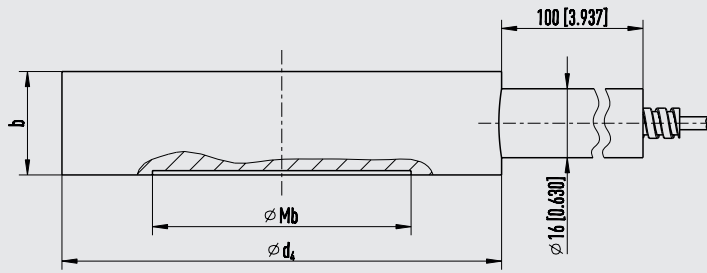
Special case: flange made of nickel per DIN EN 1092-1, form B

Nickel materials are not described in the DIN EN 1092-1 standard. For identical dimensions, lower values apply for the maximum allowable pressure. The values can be found in the table below.

Flange material	DN	PN	Maximum allowable pressure in bar [psi] at ambient temperature 21 °C [60.8 °F]
Nickel 200 (2.4066)	25, 40, 50, 80, 100, 125	10	7.4 [107]
		16	11.9 [172]
		25	18.6 [269]
		40	29.7 [430]
		63	46.8 [678]
		100	74.4 [1,078]
		160	119 [1,725]
		250	186 [2,697]
Nickel 201 (2.4068)	25, 40, 50, 80, 100, 125	10	6.2 [89]
		16	10 [145]
		25	15.6 [226]
		40	25 [362]
		63	39.3 [569]
		100	62.5 [906]
		160	100 [1,450]
		250	156.2 [2,264]

Sealing geometry per ASME B16.5, RF 125 ... 250 AA

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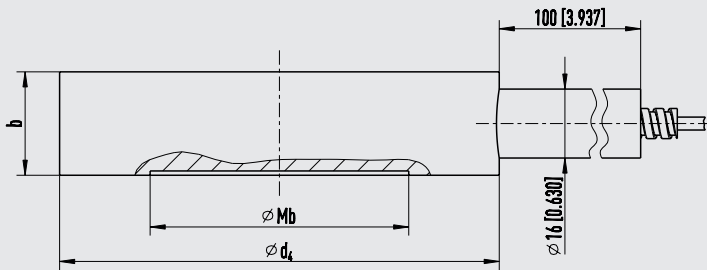
Legend:
Mb Outer diameter of diaphragm
d₄ Raised face diameter
b Cell thickness

DN	Class	Dimensions in mm [in]			Weight in kg [lb]
		Mb	d ₄	b	
1 ½"	150 ... 2500	45 [1.772]	73 [2.874]	20 [0.787]	0.7 [1.543]
2"	150 ... 2500	60 [2.362]	92.1 [3.626]	20 [0.787]	1.0 [2.205]
3"	150 ... 2500	90 [3.543]	127 [5.0]	20 [0.787]	2.0 [4.409]
4"	150 ... 2500	90 [3.543]	157.2 [6.189]	20 [0.787]	3.0 [6.614]
5"	150 ... 2500	124 [1.772]	185.7 [7.311]	22 [0.866]	4.7 [10.362]

→ Further dimensions and higher nominal pressures on request

Sealing geometry per GOST 33259, Type B

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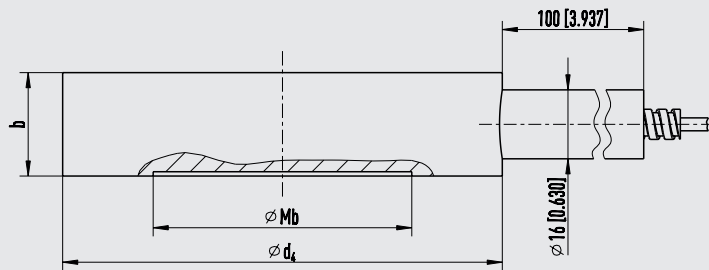


Legend:
Mb Outer diameter of diaphragm
d₄ Raised face diameter
b Cell thickness

DN	PN in bar	Dimensions in mm [in]			Weight in kg [lb]
		Mb	d ₄	b	
40	16 ... 200	45 [1.772]	88 [3.465]	20 [0.787]	1.0 [2.205]
50	16 ... 200	60 [2.362]	102 [4.016]	20 [0.787]	1.3 [2.866]
80	16 ... 200	90 [3.543]	133 [5.236]	20 [0.787]	2.3 [5.071]
100	16 ... 200	90 [3.543]	158 [7.244]	20 [0.787]	3.1 [6.834]
125	16 ... 200	90 [3.543]	184 [7.402]	22 [0.866]	4.8 [10.582]

→ Further dimensions and higher nominal pressures on request

Sealing geometry per JIS B 2220, RF



Legend:

- Mb Outer diameter of diaphragm
- d₄ Raised face diameter
- b Cell thickness

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DN	PN	Dimensions in mm [in]			Weight in kg [lb]
		Mb	d ₄	b	
40A	10K ... 20K	45 [1.772]	81 [3.189]	20 [0.787]	0.8 [1.764]
	30K ... 63K	45 [1.772]	90 [4.016]	20 [0.787]	1.0 [2.205]
50A	10K ... 20K	60 [2.362]	96 [3.78]	20 [0.787]	1.1 [2.425]
	30K ... 63K	60 [2.362]	105 [4.134]	20 [0.787]	1.4 [3.086]
80A	10K	90 [3.543]	126 [4.961]	20 [0.787]	2.0 [4.409]
	16K ... 20K	90 [3.543]	132 [5.197]	22 [0.866]	2.4 [5.291]
	30K ... 63K	90 [3.543]	140 [5.512]	22 [0.866]	2.7 [5.952]
100A	10K	90 [3.543]	151 [5.945]	22 [0.866]	3.1 [6.834]
	16K ... 30K	90 [3.543]	160 [6.299]	22 [0.866]	3.5 [7.716]
	40K ... 63K	90 [3.543]	162 [6.378]	22 [0.866]	3.7 [8.157]

→ Further dimensions and higher nominal pressures on request

Special case: flange made of nickel, Monel, Inconel, Incoloy or titanium per JIS B 2220, RF

Nickel, Monel, Inconel, Incoloy and titanium materials are not described in the JIS B 2220 standard. For identical dimensions, lower values apply for the maximum allowable pressure. The values can be found in the table below.

Flange material	DN	PN	Maximum allowable pressure in MPa [psi] at ambient temperature 21 °C [60.8 °F]
Nickel 200 (2.4066)	25A, 50A, 80A, 100A	5K	0.4 [63]
		10K	0.8 [126]
		16K	1.6 [244]
		20K	2.1 [308]
		30K	3.1 [462]
		40K	4.2 [616]
		63K	6.6 [969]
Nickel 201 (2.4068)	25A, 50A, 80A, 100A	5K	0.3 [53]
		10K	0.7 [106]
		16K	1.4 [205]
		20K	1.7 [258]
		30K	2.6 [388]
		40K	3.5 [517]
		63K	5.6 [814]

Flange material	DN	PN	Maximum allowable pressure in MPa [psi] at ambient temperature 21 °C [60.8 °F]
Monel 400 (2.4360)	25A, 50A, 80A, 100A	5K	0.4 [69]
		10K	0.9 [138]
		16K	1.8 [266]
		20K	2.3 [335]
		30K	3.4 [502]
		40K	4.6 [670]
		63K	7.2 [1,055]
Inconel 600 (2.4816)	25A, 50A, 80A, 100A	5K	0.5 [73]
		10K	1 [146]
		16K	1.9 [281]
		20K	2.4 [355]
		30K	3.6 [532]
		40K	4.8 [710]
		63K	7.7 [1,117]
Incoloy 825 (2.4858)	25A, 50A, 80A, 100A	5K	0.6 [89]
		10K	1.2 [178]
		16K	2.3 [344]
		20K	2.9 [433]
		30K	4.4 [650]
		40K	5.9 [867]
		63K	9.4 [1,365]
Titanium grade 2 (3.7035)	25A, 50A, 80A, 100A	5K	0.6 [87]
		10K	1.2 [175]
		16K	2.3 [337]
		20K	2.9 [425]
		30K	4.3 [637]
		40K	5.8 [850]
		63K	9.2 [1,338]
Titanium grade 7 (3.7235)	25A, 50A, 80A, 100A	5K	0.6 [87]
		10K	1.2 [175]
		16K	2.3 [337]
		20K	2.9 [425]
		30K	4.3 [637]
		40K	5.8 [850]
		63K	9.2 [1,338]

Accessories and spare parts

Model		Description	Order number
	910.27	Flushing ring for flange-connection diaphragm seals → See data sheet AC 09.05	On request
	IBF2, IBF3	Monoblock with flange connection → See data sheet AC 09.25	On request
	910.16	Form H instrument mounting bracket per DIN 16281, 100 mm, aluminium, black	9091858
		Form H instrument mounting bracket per DIN 16281, 100 mm, stainless steel	9091882
		→ See data sheet AC 09.05	On request

Ordering information

Diaphragm seal:

Diaphragm seal model / Process connection (standard, flange size, nominal pressure, sealing geometry) / Material combination (upper body of diaphragm seal, wetted parts) / Level of cleanliness of wetted parts / Origin of wetted parts / Design per NACE / Connection to the measuring instrument / Certificates / Flushing ring

Diaphragm seal system:

Diaphragm seal model / Pressure measuring instrument model (per data sheet) / Mounting (direct mounting, cooling element, capillary) / Material combination (upper body of diaphragm seal, wetted parts) / Min. and max. process temperature / Min. and max. ambient temperature / Vacuum service / System fill fluid / Certificates / Height difference / Level of cleanliness of wetted parts / Origin of wetted parts / Design per NACE / Diaphragm seal for mounting to zone 0 / Instrument mounting bracket / Process connection (standard, flange size, nominal pressure, sealing geometry) / Flushing ring

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