

LUMIGLAS®

Lumistar Special Glass Technology Co., Ltd.

Model LMX 880-XR Series

Extreme-Service Flanged Sight Flow Indicator with Rotor

ANSI / ASME B16.5 · Fully Customizable Body, Coating & Service Conditions



Engineered for pharmaceutical, chemical, petrochemical, offshore & other extreme process environments.

Product Technical Manual

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Contents

1. Product Overview
2. Operating Principle
3. Applications & Industries
4. Construction & Bill of Materials
5. Materials of Construction (Customizable)
6. Technical Specifications
7. Pressure–Temperature Ratings (ASME B16.5)
8. Glass & Sealing Limits
9. External Coating Systems (Customizable)
10. Dimensions & Weights
11. Installation
12. Inspection, Testing & Certification
13. Ordering Information

1. Product Overview

The LUMIGLAS LMX 880-XR is a flanged, dual-window sight flow indicator fitted with a rotor (spinner) for the visual inspection of flow, filling and product condition in process pipelines. A rotor mounted in the flow path turns whenever medium passes through the unit, giving an immediate, unambiguous indication of flow — even at very low rates — while the twin borosilicate windows allow the colour, clarity and phase of the medium to be observed directly.

Unlike a standard catalogue sight glass, the LMX 880-XR is configured per order for extreme-service duty. The body material, glass type, gasket/seal material and external coating system are all selectable, so a single design platform can be tailored to aggressive chemicals, cryogenic and high-temperature media, offshore/marine atmospheres and hygienic pharmaceutical service.



Fig. 1 — Sectional view showing rotor and dual borosilicate windows.

Key features

- Dual-window design — observation from both sides for maximum light transmission and clarity.
- Rotor flow indication — visible motion confirms flow and rough rate at a glance; no power required.
- Flange connections to ANSI/ASME B16.5, Class 150 and Class 300 (RF standard; RTJ optional).
- Fully customizable materials — body, windows, seals and coating specified to the service.
- Suitable for extreme environments — corrosive, cryogenic, high-temperature and offshore duty.
- Compliant manufacture — EN 10204 3.1 material certification and hydrostatic testing standard.

2. Operating Principle

Process medium enters the body bore and passes the rotor, which is retained on a shaft between the two window assemblies. Flow imparts rotation to the rotor; the operator reads flow presence and approximate rate from the speed of rotation, observed through either window. Because indication is purely mechanical and visual, the device needs no electrical supply and introduces no additional failure modes into the process.

The standard drip nose (drip tube) variant additionally reveals the smallest drip-wise flow rates, making the unit suitable for leak-down checks and low-throughput dosing lines.

3. Applications & Industries

The LMX 880-XR is specified wherever operators must confirm flow or observe product condition under demanding conditions. Typical industries and services include:

Industries

- Pharmaceutical & fine chemical — hygienic and CIP/SIP-compatible configurations.
- Chemical & petrochemical — aggressive, corrosive and solvent-bearing media.
- Oil & gas / refining — hydrocarbon streams, separators and utility lines.
- Offshore & marine — topsides duty with heavy-duty external coating systems.
- Power, water treatment & general process — cooling water, dosing and utility service.

Typical services

- Flow / no-flow confirmation on pumps, dosing skids and transfer lines.
- Observation of colour, clarity, phase separation and entrained gas or solids.
- Low-rate and drip-wise flow detection via the optional drip nose.

4. Construction & Bill of Materials

The unit is a bolted assembly of a central flanged body, two cover flanges carrying the borosilicate windows, the rotor sub-assembly, and the associated gaskets, studs and nuts. The exploded view below identifies the principal parts; the bill of materials lists the standard (default) material for each. All wetted materials are selectable — see Section 5.

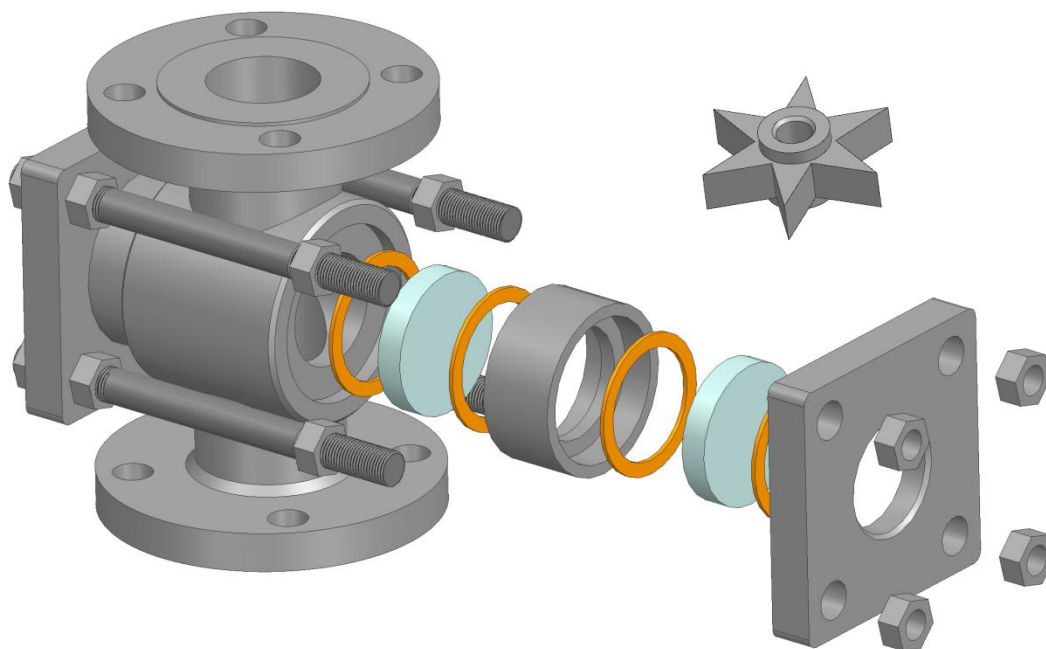


Fig. 2 — Exploded assembly, standard configuration.

Item	Part	Qty	Standard Material	Grade / Notes
01	Body	1	316 SS (cast)	ASTM A351 Gr. CF8M
02	Cover	2	316 SS (cast)	ASTM A351 Gr. CF8M
03	Window (Lens)	4	Tempered borosilicate	DIN 7080 / max. 260 °C (500 °F)
04	Gasket	8	PTFE	Max. 177 °C (350 °F); graphite optional
05	Studs	4	316 SS	ASTM A193 Gr. B8M2
06	Nuts	16	316 SS	ASTM A194 Gr. 8M
07	Rotor	1	316 SS	Spinner-type flow indicator
08	Retainer	2	316 SS	ASTM A351 Gr. CF8M

⚠ Default materials shown are for the standard 2" Class 150 configuration. Quantities and grades vary with size, pressure class and selected options. Refer to the certified order-specific drawing for the as-built bill of materials.

5. Materials of Construction (Customizable)

The LMX 880-XR platform accepts a wide range of body, window and seal materials so that the same design can be matched to the chemistry, temperature and mechanical demands of each service. Common selections are listed below; other alloys (e.g. duplex, Hastelloy, titanium) are available on request.

5.1 Body & pressure-retaining parts

Material	Cast Grade	Forged Grade	Typical Use
Carbon steel	ASTM A216 WCB	ASTM A105	General hydrocarbon & utility service
316 / 316L SS	ASTM A351 CF8M / CF3M	ASTM A182 F316 / F316L	Corrosive chemical & pharmaceutical (default)
304 / 304L SS	ASTM A351 CF8 / CF3	ASTM A182 F304 / F304L	Mild corrosive & general stainless service
Duplex 2205	ASTM A995 4A	ASTM A182 F51	Chloride-bearing & offshore service
Alloy / special	On request	On request	Hastelloy, titanium, Monel, etc.

5.2 Windows (glass)

Glass Type	Standard	Max. Temperature	Notes
Borosilicate (tempered)	DIN 7080	≤ 280 °C (536 °F)	Default; high thermal & chemical resistance
Soda-lime (tempered)	DIN 8902	≤ 150 °C (302 °F)	Economical, lower-duty service
Borosilicate, fused to metal	DIN 7079 / 7080	≤ 280 °C (536 °F)	For elevated pressure ratings

5.3 Gaskets & seals

Seal Material	Max. Temperature	Typical Use
PTFE	≤ 177 °C (350 °F)	Default; broad chemical compatibility
Graphite (armoured)	≤ 450 °C (842 °F)	High-temperature service
FKM / FFKM	Per compound	Aggressive chemical / hygienic duty
Non-asbestos fibre	≤ 200 °C (392 °F)	General utility service

6. Technical Specifications

The following table gives the standard specification for a typical 2" Class 150 unit. Values marked "customizable" are configured per order.

Feature	Specification
Product type	Flanged dual-window sight flow indicator with rotor
Nominal size	DN15–DN150 (½" – 6"); reference unit 2" (DN50)
Pressure class	ASME B16.5 Class 150 / Class 300 (customizable)
Flange facing	Raised Face (RF) standard; RTJ optional
Body material	316 SS (A351 CF8M) default — fully customizable
Windows	Tempered borosilicate, DIN 7080 (dual)
Gasket / seal	PTFE default; graphite / FKM / FFKM optional
Flow indication	Rotor (spinner), 316 SS
Design temperature	Determined by glass & seal selection (see Section 8)
Reference PMS rating	BB5 — compatible at –28.9 °C @ 18.76 bar (per drawing)
Connection standard	ASME B16.5, 4 × ¾" bolt holes (2" Cl.150)
External coating	Customizable multi-coat system (see Section 9)
Material certification	EN 10204 Type 3.1
Hydrotest	1.5 × design pressure, standard

7. Pressure–Temperature Ratings (ASME B16.5)

The flange pressure class (150, 300, ...) is a **dimensionless designation**, not a fixed pressure in bar or psi. The maximum allowable working pressure of the unit depends on the **body material group** and the **operating temperature**, and is further limited by the glass and seal selection (Section 8). The tables below are taken from ASME B16.5 pressure–temperature rating tables. Values are given as **psig / bar (g)**.

⚠ Important: the legacy datasheet figures of "16 bar at 150 lb / 40 bar at 300 lb" are PN-class equivalents and are NOT the correct ASME B16.5 ratings. Always select the class from the tables below using design pressure, design temperature and material group, and confirm against the controlling project specification.

7.1 Carbon steel body — Group 1.1 (A216 WCB / A105)

Temp. °F	Temp. °C	Class 150 (psig / bar)	Class 300 (psig / bar)	Class 600 (psig / bar)
-20 to 100	-29 to 38	285 / 19.7	740 / 51.0	1480 / 102.0
200	93	260 / 17.9	680 / 46.9	1360 / 93.8
300	149	230 / 15.9	655 / 45.2	1310 / 90.3
400	204	200 / 13.8	635 / 43.8	1265 / 87.2
500	260	170 / 11.7	605 / 41.7	1205 / 83.1
600	316	140 / 9.7	570 / 39.3	1135 / 78.3
650	343	125 / 8.6	550 / 37.9	1100 / 75.8
700	371	110 / 7.6	530 / 36.5	1060 / 73.1
750	399	95 / 6.6	505 / 34.8	1015 / 70.0
800	427	80 / 5.5	410 / 28.3	825 / 56.9

7.2 Stainless steel body — 316 / 316H (A351 CF8M / A182 F316)

Temp. °F	Temp. °C	Class 150 (psig / bar)	Class 300 (psig / bar)	Class 600 (psig / bar)
-20 to 100	-29 to 38	275 / 19.0	720 / 49.6	1440 / 99.3
200	93	235 / 16.2	620 / 42.7	1240 / 85.5
300	149	215 / 14.8	560 / 38.6	1120 / 77.2
400	204	195 / 13.4	515 / 35.5	1025 / 70.7
500	260	170 / 11.7	480 / 33.1	955 / 65.8
600	316	140 / 9.7	450 / 31.0	900 / 62.1
650	343	125 / 8.6	440 / 30.3	885 / 61.0
700	371	110 / 7.6	435 / 30.0	870 / 60.0
750	399	95 / 6.6	425 / 29.3	855 / 59.0
800	427	80 / 5.5	420 / 29.0	845 / 58.3

Note: 316 stainless ratings are lower than carbon steel above ambient temperature. Interpolation between temperature rows is permitted; interpolation between pressure classes is not. 304L/316L (Group 2.3) low-carbon grades carry lower ratings again and must be checked separately for high-temperature duty.

8. Glass & Sealing Limits

The flange P–T rating establishes the mechanical envelope of the metal parts. The actual permitted service window of the assembly is normally governed by the glass and seal, whichever is lower. The legacy operating-temperature figures (150 °C / 280 °C) refer to the glass/seal limit, not the flange.

Component	Standard Selection	Temperature Limit	Governing?
Windows	Tempered borosilicate (DIN 7080)	≤ 280 °C (536 °F)	Often governing at high T
Windows	Tempered soda-lime (DIN 8902)	≤ 150 °C (302 °F)	Governing where used
Seal	PTFE	≤ 177 °C (350 °F)	Often governing (default)
Seal	Graphite (armoured)	≤ 450 °C (842 °F)	Extends high-T range

⚠ The maximum service pressure and temperature of the assembly is the lowest value permitted by the flange rating, the glass and the seal, considered together. Do not exceed the glass or seal limit even where the flange rating would allow a higher figure.

9. External Coating Systems (Customizable)

For offshore, marine and corrosive atmospheres the external coating is specified per project. The reference offshore system below (uninsulated, per project spec 200-20-CE-SPC-00052, System A) is representative; alternative systems and colours are available.

Layer	Coating	DFT (μm)
Surface prep	SSPC-SP10 near-white blast (profile 50–85 μm)	—
Primer	Zinc-rich epoxy	75–100
1st intermediate	High-build epoxy MIO	125–150
2nd intermediate	High-build epoxy MIO	125–150
Finish	Polyurethane	50–75
Total system DFT	—	375–475

Finish colour on request.

10. Dimensions & Weights

The unit follows ASME B16.5 flange geometry. The dimensional key defines each symbol; the full size table below covers DN15–DN200 ($\frac{1}{2}$ " – 8") for both Class 150 and Class 300 flange connections. All dimensions are in millimetres unless noted; values are subject to confirmation on the certified order-specific drawing.

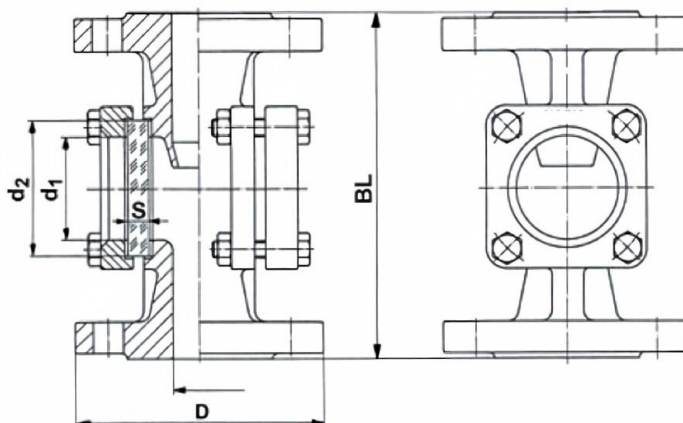


Fig. 3 — Dimensional key (see symbol legend below).

10.1 Dimensional key

Symbol	Description
D	Flange outside diameter — separate value per pressure class (Cl.150 / Cl.300)
BL	Face-to-face build length (DIN F1)
d ₁	Clear viewing bore of the window
d ₂	Glass (window plate) diameter
S	Glass thickness — 16 bar / 40 bar variants

10.2 Full dimensional table ($\frac{1}{2}$ " – 8", ASME B16.5)

Size	D — Cl.150	D — Cl.300	BL	d ₁	d ₂	S (16 bar)	S (40 bar)
$\frac{1}{2}$ "	89	95.2	130	32	45	10	10
$\frac{3}{4}$ "	98	117.3	150	32	45	10	10
1"	108	123.8	160	48	63	10	15
1 $\frac{1}{4}$ "	118	133.4	180	48	63	10	15
1 $\frac{1}{2}$ "	127	155.6	200	65	80	12	20
2"	152	165.1	230	80	100	15	25
2 $\frac{1}{2}$ "	178	190.5	290	80	100	15	25
3"	191	209.6	310	100	125	20	30
4"	228	254.0	350	125	150	25	32
5"	254	279.4	400	150	175	25	o.r.
6"	279	317.5	480	175	200	30 **	o.r.
8"	343	381.0	600	175	200	30 **	o.r.

o.r. glass thickness on request. DN250 (10") per Lumistar Bauform 112-A — consult factory.

⚠ The D column lists ASME/ANSI flange outside diameters for Class 150 and Class 300 respectively. BL, d₁, d₂ and S follow the Lumistar Bauform standard. Confirm the governing pressure class against Section 7 for the selected body material and design temperature.

11. Installation

- Observe the flow-direction arrow on the body; install so medium passes the rotor correctly.
- Preferred mounting is in a vertical line with upward flow for the clearest rotor indication; horizontal mounting is acceptable where noted on the drawing.
- Fit gaskets clean and undamaged; tighten studs evenly and in a diametrically opposed (cross) pattern to the specified torque.
- Do not over-tighten — excessive or uneven bolt load is the principal cause of glass fracture.
- Protect the windows from mechanical impact and thermal shock; avoid sudden temperature changes across the glass.

⚠ Never subject the assembly to pressure or temperature beyond the lowest limit of the flange, glass and seal. Sudden thermal shock or mechanical impact can cause glass failure.

12. Inspection, Testing & Certification

- Material certification: EN 10204 Type 3.1 for pressure-retaining parts.
- Hydrostatic test: each assembly hydrotested at 1.5 × design pressure (each assembly hydrotested at 1.5 × design pressure per ASME B16.34 / API 598.).
- NDE: performed per the applicable project specification where required.
- Marking & nameplate: per MSS SP-25; SS316 nameplate, project tag deeply die-stamped.
- Glass: fused/tempered borosilicate to DIN 7080 / DIN 7079 as applicable.

13. Ordering Information

To configure an LMX 880-XR unit, specify the following. Lumistar engineering will confirm the selection against the service conditions and issue a certified drawing.

Parameter	Options
Nominal size	DN15–DN150 (½" – 6")
Pressure class	Class 150 / Class 300
Flange facing	RF / RTJ
Body material	A216 WCB / A351 CF8M (316) / CF3M (316L) / duplex / alloy
Window glass	Borosilicate DIN 7080 / soda-lime DIN 8902
Gasket / seal	PTFE / graphite / FKM / FFKM
Indicator	Rotor (spinner) / flap / drip-nose
External coating	Standard / offshore multi-coat / custom RAL
Options	Heating jacket · sight-glass lights · special certification
Service conditions	Design pressure, design temperature, medium, atmosphere

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This manual is issued for reference. All ratings are subject to confirmation on the certified, order-specific drawing.