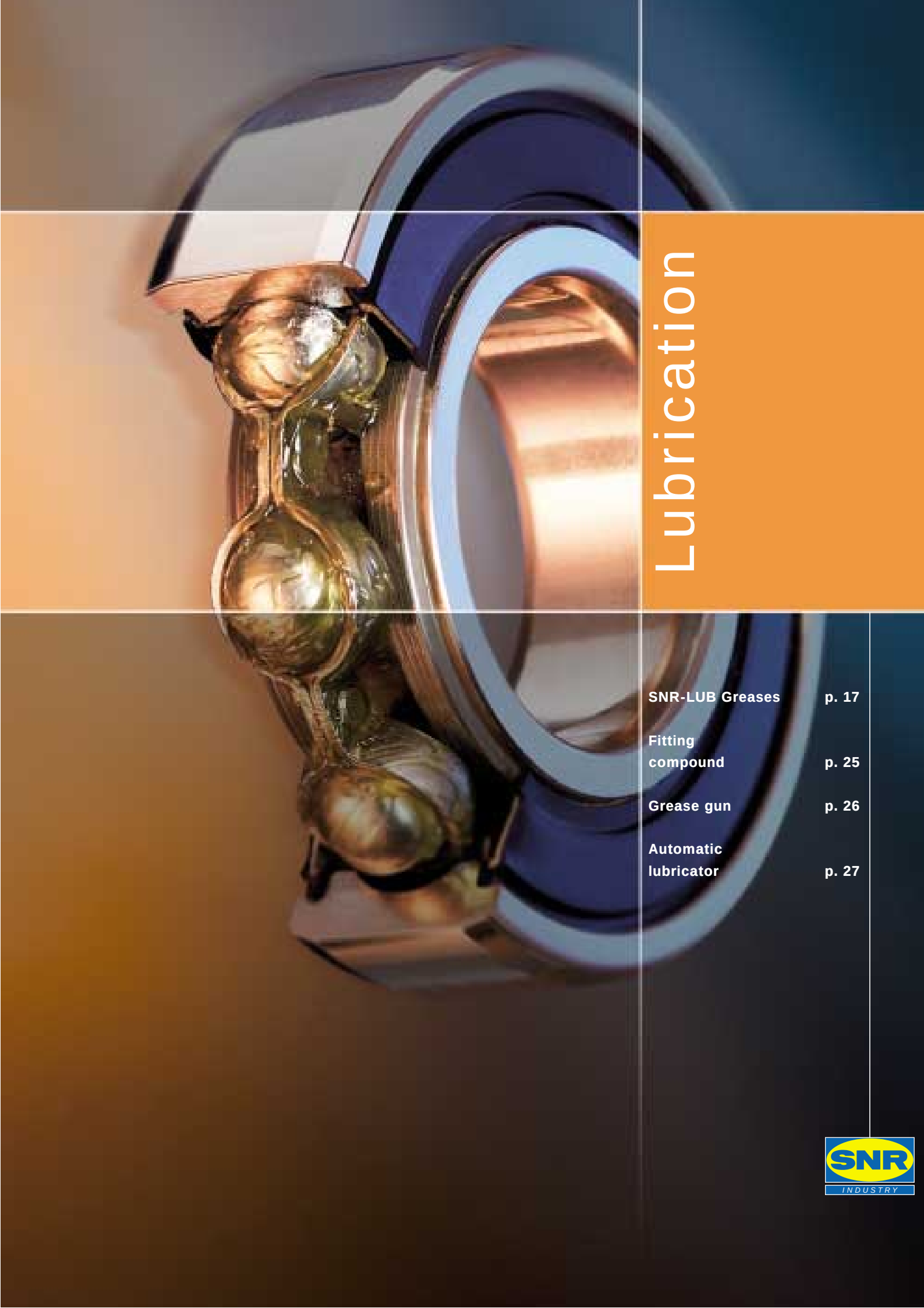
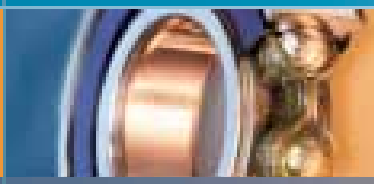


Lubrication

Lubrication



Life insurance for your bearings

Lubrication is taking integral part of the bearing

Lubrication is essential for correct operation of the bearing. In fact, 70 % of bearing failures originate from lubrication problems.

Lubrication's function is to insert an oil film between rolling elements and bearing races to avoid wear and seizing.

Besides, lubrication ensures protection against oxidation and external contamination.

A solution for each application

Bearing life is directly dependent on oil film efficiency, which is influenced by:

• lubricant nature, hence, its adhesion or retention capabilities with temperature, speed…

• bearing load and speed.

General purpose greases do not always meet the specific requirements of some applications. Bearings intended to operate in high load, speed and temperature conditions, or in the presence of water, humidity or vibrations, require carefully selected grease.

For more than 50 years, SNR has conducted research in this field, jointly with the largest lubricant manufacturers worldwide. Therefore, we have acquired extensive knowledge and experience in bearing lubricants.

SNR-LUB Greases

The SNR-LUB range is available in many packaging types and covers a large diversity of applications. Designed to meet your needs, it is your best asset in increasing your bearing service life. For this reason, careful, clean lubrication processes are strongly recommended. Any foreign body in the grease can cause premature bearing damage.

Physical and chemical characteristics of the greases

- NLGI grades (National Lubrication Grease Institute) correspond to a penetration value in the worked grease (according to test specification ASTM/D217).
- For bearings, the generally acknowledged consistency is grade 2 or 3.

NLGI grades	Worked penetration	Consistency
0	385-355	Half-fluid
1	340-310	Very soft
2	295-265	Soft
3	250-220	Average
4	205-175	Half-hard

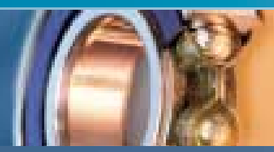
Basic oil viscosity: generally defined in cSt (mm^2/s) at 40°C (100°F).

Density: on the order of 0.9ccm.

Drop point: temperature at which the 1st oil drop falls from a grease liquefied by heating of sample. For more details, write to your SNR technician.

Order of magnitude: 180°C / 250°C according to grease constituents. The max. operating temperature of the grease is always lower than drop point.

Lubrication



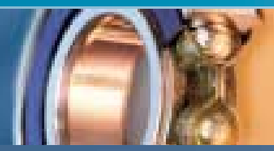
SNR-LUB Greases

RPM.Dm: RPM x mean diameter
VG: Very good performance
G: Good performance
NR: Not recommended

Technical characteristics

	MS	EP	HT	GV+	VX	THT	AL1	FV new
Color	Amber	Amber	Light brown	Light yellow	Golden	White	Clear yellow	Dark brown
Composition	- Mineral oil - Lithium soap	- Mineral oil - Extreme pressure - Lithium soap	- Synthetic oil - Polyurea thickener	- Diester oil - Lithium soap	- Mineral paraffinic oil - Lithium soap	- Perfluorated thickening fluid - PTFE	- Mineral paraffinic oil - Complex aluminum soap	- Mineral oil - Lithium + calcium
Basic oil viscosity (SUS)	105	105	150	15	310	390	200	950
Consistency, NLGI Grade	2	2	2	2	2	2	2	2
Operating temperature, (°C / °F)	-30 +120 / -20 +250	-30 +110 / -20 +230	-30 +150 / -20 +300	-50 +120 / -75 +250	-20 +130 / -5 +270	-20 +220 / -5 +430 / -20 +250 / -5 +480	-30 +120 / -20 +250	-5 +140 / +25 +285
Moderate loads P < C / 5	G	VG	G	G	G	VG	G	G
High loads P > C / 5	NR	VG	NR	NR	VG	VG / NR	G	VG
Low speed RPM x Dm < 100,000	G	G	NR	NR	VG	VG	G	VG
High speed RPM x Dm > 100,000	G	G	G	VG	NR	G / G	G	NR
Humidity, Presence of water	VG	VG	G	VG	G	G	G	G
Oscillations, Low amplitude	G	G	VG	G	VG	VG	G	G
Vibrations at idle	NR	NR	NR	VG	NR	NR	NR	NR
Adhesion	G	G	VG	G	VG	VG	G	VG
Low torque	G	G	G	VG	NR	NR	G	NR
Quietness	G	G	G	VG	NR	NR	NR	NR
Corrosion protection	VG	VG	G	VG	G	G	G	G
Resistance to chemical agents	NR	NR	NR	NR	NR	VG	NR	NR
Pumpability	VG	VG	VG	VG	VG	VG	VG	G
Packaging	- Tube 230g - Cartridge 400g - Can 1kg - Bucket 5kg - Barrel 23kg, 50kg	- Cartridge 400g - Can 1kg - Bucket 5kg - Barrel 23kg, 50kg and 190kg	- Cartridge 400g - Can 1kg	- Tube 90g - Can 1kg	- Cartridge 400g - Can 1kg - Barrel 50kg	- Tube 50g (25 ml)	- Cartridge 400g - Can 1kg	- Cartridge 400g - Can 1kg
Remarks	–	–	Grease life depends on operating temperature	Pay attention to: - quantity - hold - eighboring active parts - grease retention	–	–	Conforms to US Food and Drug Administration Recommendations, Class H1	–

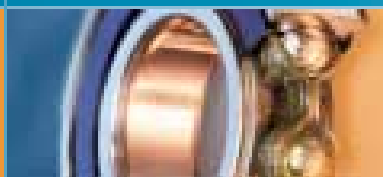
Lubrication



SNR-LUB Greases

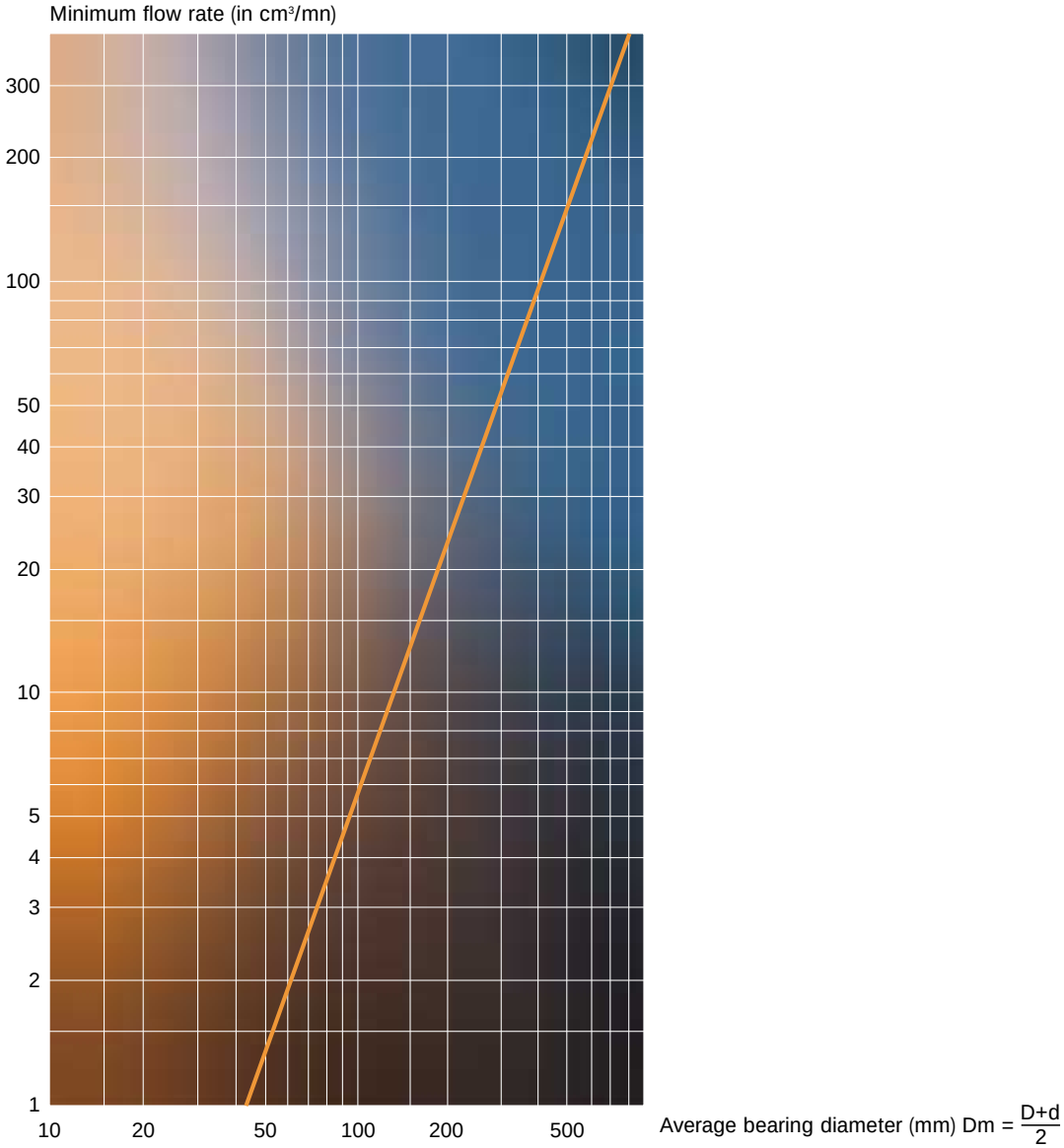
Choosing an SNR grease according to your applications

Main criteria	Operating limits: Temperature, °C/°F	Operating limits: Speed	Typical applications	General recommendations	SNR-LUB recommendation
General purpose	-30 to +120 / -20 to +250 -	< bearing's limiting speed	- Farming machines - General mechanics - Handling devices - Electrical tooling	- Mineral oil - Traditional soap (lithium, calcium…) - Consistency: generally grade 2, for large size bearings, or particular operating modes - Performance reduction above 80°C / 175°F in continuous mode; some applications may require another choice	**MS**
High loads	-30 to +110 / -20 to +230	< 2/3 bearing's limiting speed	- Automotive - Iron & Steel - Civil works equipment	- Similar to multi-purpose greases but with extreme pressure additives	**EP**
High temperature	-30 to +130 / -20 to +270	< 2/3 bearing's limiting speed	- Electrical motors, class E	- Traditional soap with high viscosity mineral base oil or synthetic oil	**HT**
	-20 to +150 / -5 to +300	–	- Electrical motors, class F - Alternators		
	-20 to +180 / -5 to +350	≤1/3 bearing's limiting speed	- Oven & furnace equipment - Electrical motors, class H - Couplers	- Entirely synthetic greases - Greases with silicone base oil feature poor performance under load	**THT**
	-20 to +250 / -5 to +480	<1/5 bearing's limiting speed	- Oven equipment - Furnace tubs	- Synthetic products, in solid or paste form - Hardly mixable products	**Consult SNR**
Low temperature	Down to -50 / Down to -75	≤ 2/3 bearing's limiting speed	- Aerospace - Special engines	- Very low viscosity base oil Pay attention to grease retention, if temperature exceeds 80°C / 175°F	**GV+**
High speed	-20 to +120 / -5 to +250	≤ 4/3 bearing's limiting speed	- Machine-tool spindles - Wood-working machines - Textile spindles	- Very low viscosity oil	
Humidity	-30 to +120 / -20 to +250	≤ 2/3 bearing's limiting speed	- Washing machines	- Traditional grease, with large amount of anti-corrosion additives	**MS** **EP**
Centrifugal forces Vibrations Rotating outer ring	-20 to +130 / -5 to +270	≤ 2/3 bearing's limiting speed	- Alternators - Civil works equipment - Idle pulleys	- Strong adhesion grease (grade 2 consistency)	**VX**
Food compatibility	-30 to +120 / -20 to +250	≤ 2/3 bearing's limiting speed	- Agri-food industry	- Food compatible grease	**AL1**
High load and low speed	-5 to +140 / +20 to +285	–	- Heavy industry: steel-works: paper mills, quarries	- Suitable for very low speed operation, under very high loads	**FV** new



Grease titration and regreasing

- **Oil lubrication** (minimum oil quantity)



- **Grease lubrication** (Grease titration)

Excess grease can cause overheating.
The grease must occupy 20 to 30% of the free volume inside the bearing.

Necessary grease weight calculation formula: **G = 0,005 D.B**

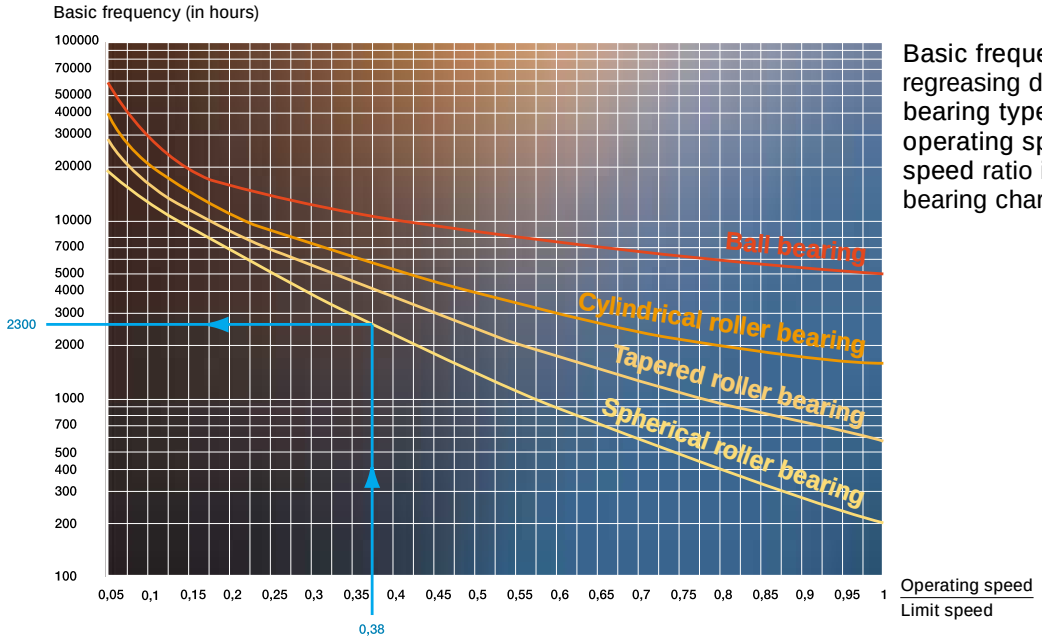
G = gram (or cm³) , D = bearing outer diameter in mm , B = bearing width in mm

Exceptions:

- The grease quantity can be increased by 20% for bearings fitted with a grease drain port,
- Bearings turning at very low speed will tolerate maximum filling.

SNR-LUB Greases

• Regreasing frequency



Basic frequency (Fb) of regreasing depends on bearing type and on operating speed vs. limit speed ratio indicated in the bearing characteristics.

This basic frequency must be corrected by the factors according to the particular environmental conditions of the mechanism (dust, humidity, shocks, vibrations, vertical shaft, operating temperature…) as per the relation: Fc = Fb x Te x Ta x Tt

	Environment	Application	Temperature		
Conditions	- Dust - Humidity - Condensation	- With shocks - Vibrations - Vertical shaft	Level	For standard grease	For high temperature grease
Factors	Te	Ta		Tt	Tt
Average	0.7 to 0.9	0.7 to 0.9	75°C	0.7 to 0.9	–
High	0.4 to 0.7	0.4 to 0.7	75°C to 85°C	0.4 to 0.7	0.7 to 0.9
Very high	0.1 to 0.4	0.1 to 0.4	85°C to 125°C	0.1 to 0.4	0.4 to 0.7
	–	–	130°C to 170°C	–	0.1 to 0.4

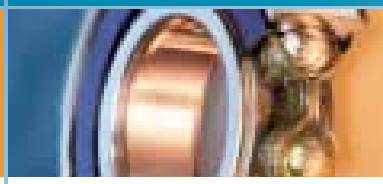
Example: A 22212EA bearing, lubricated with standard grease, turning at 1,500 RPM, in a dusty environment, at 90°C, except other application requirements:

22212 = Spherical roller bearing
S limit = 3,900RPM
S operating = 1,500RPM

$\frac{\text{S operating}}{\text{S limit}} = \frac{1,500}{3,900} = 0,38$ ----> Basic frequency Fb = 2,300H

Factors
Te = 0.5 ----> dust
Ta = 0.9 ----> normal
Tt = 0.3 ----> 90°C

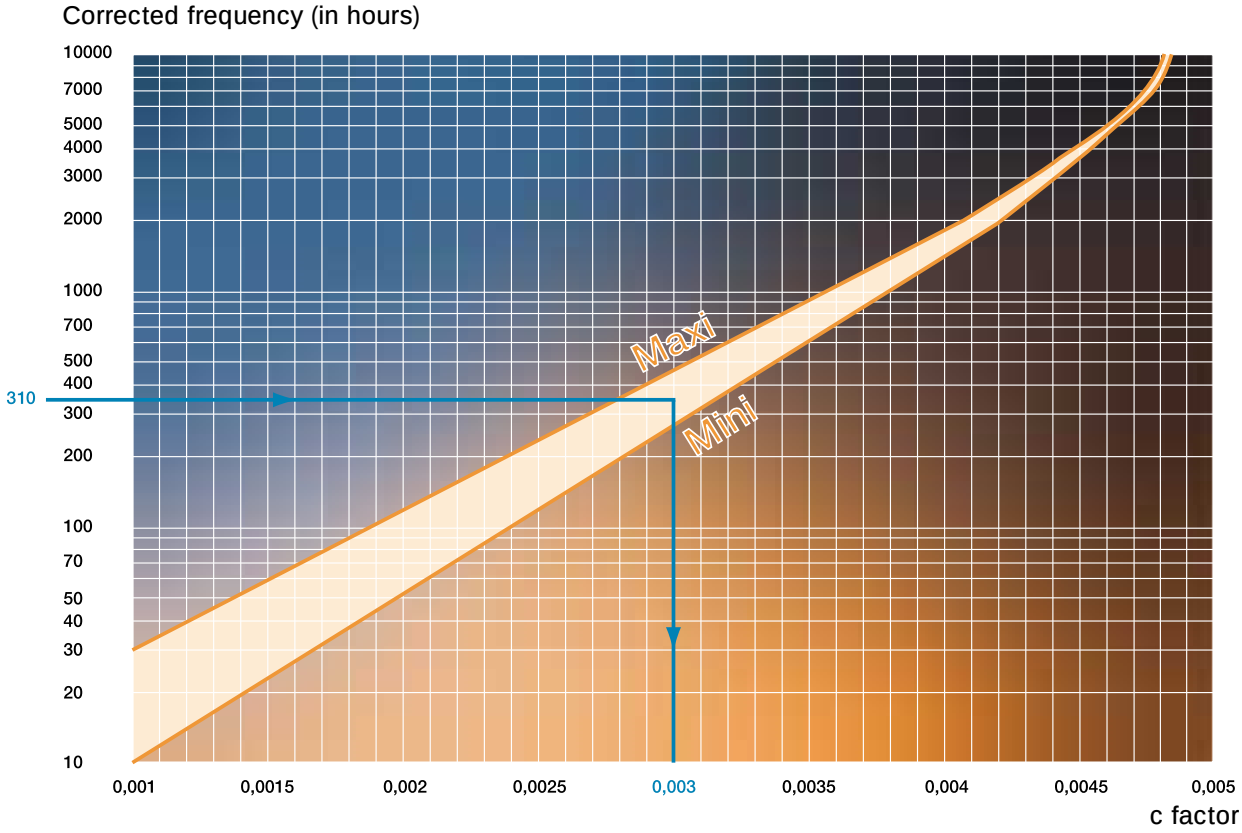
Corrected frequency (Fc) = Fb x Te x Ta x Tt = 2,300 x 0.5 x 0.9 x 0.3 = 310 hours



SNR-LUB Greases

• Grease amount to be added

This corrected frequency allows the calculation of the amount of grease to be added, depending on:
- bearing width B,
- outer diameter D,
- c factor as read on the curve below, according to the relation P = D x B x c.



Example: for bearing 22212
(spherical roller bearing)

P = grease weight
D = 110mm
B = 28mm
c = 0.003

P = D x B x c = 110 x 28 x 0.003 = 9 grams
Therefore, 9 grams will be added every 310 operating hours

All these calcultations can be realized thanks to our CD Rom i-cat

Fitting compound

The fitting compound was especially designed for contact corrosion-critical applications.
By its unique composition, it is both a lubricating and a fitting compound.

Applications

- Installation and removal (bearings, wheels, flanges, etc.),
- Lubrication (smooth bearings, threaded spindles, splined shafts, adjustment nuts and bolts, rubber lip rings, etc.) for stick-slip reduction.

Technical characteristics

- Contact corrosion reduction, permitting easier removal,
- Extended shaft and bearing housing life,
- Composition: lithium soap, synthetic oil, solid organic lubricants,
- Enhanced corrosion protection,
- Operating temperature: -45°C to + 150°C,
- NLGI grade: 1 (basic oil viscosity at 40°C = 380 cSt),
- Water and washout resistant.

For lubrication of your bearings, SNR generally recommends the use of various types of grease from the SNR-LUB range. (See Choosing an SNR grease according to your applications p. 20-21).

Lubrication

Grease gun for bearings

When you carry out maintenance on your equipment, frequently access to the bearings is difficult and often in dusty, dirty environments.
The grease gun is designed to facilitate regreasing and allows you to cleanly inject the right grease quantity.
The grease gun and its specific accessories are designed to facilitate the operations of greasing and re-freasing of your bearings and to inject the good quantities of grease with cleanliness and precision.

Technical characteristics

- Material: heavy steel plate,
- Weight: 2-1/2 pounds with steep section and clip,
- 150mm steep section in steel,
- "Hydraulic" type steel clip, 3 jaws, with flat (10 x 100 threads),

Content	Flow rate	Operating pressure	Maximum pressure
500cm³	0.80cm³	180bar	360bar
Suitable for 400g cartridges, bulk grease, with bleed and filling valve. The SNR grease gun is compatible with standard grease cartridges, notably SNR-LUB grease cartridges.			

- Greasing accessories supplied with the gun: di-chromated, zinc-plated steel union (M10 x 100 threads), two plastic nozzles (standard threads).

Advantages

• Durable
- Entirely made of steel, it ensures long service life (resistance to shocks and intensive use).

• Practical use
- The pump can be actuated with one hand; you can turn the bearing with your free hand,
- Knurled body, permitting excellent grip,
- Accepts cartridges or bulk grease.

• Greasing precision
- Thanks to a specially designed SNR union, you can fit a special profile greasing nozzle onto the SNR grease gun. This nozzle will allow you to inject the grease at the right point,
- Reduced, controlled grease flow rate.

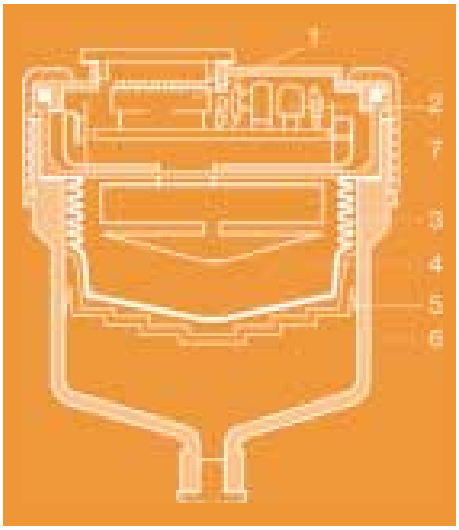
• Cleanliness
- Closed circuit, from grease cartridge to greasing nozzle,
- Clean for the environment and the user.

SNR automatic lubricator

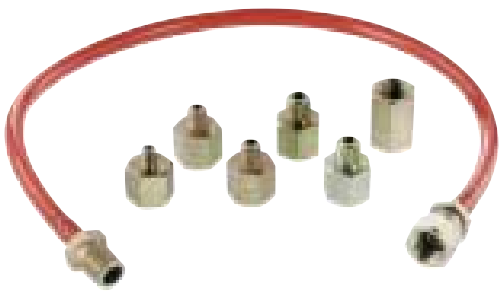
Any under-lubricated bearing is subject to irreversible premature failure.
The automatic lubricator allows constant, regular lubrication of your bearings. Easy to integrate into various types of applications (mechanical and motor industries, steel-works, paper mills, etc.), it enables you to optimize the lubrication function without the need to modify to your equipment.

Technical characteristics

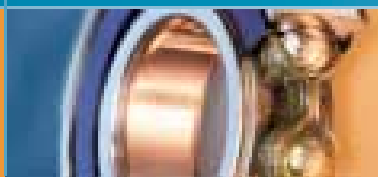
- Grease reservoir content: 125 cm^3 (6),
- Reservoir closed by piston (5), expressed by diaphram (3),
- Chamber sealed (4) closed by a membrane: the chamber contains the electro-chemical cell which generates the propellant gas,
- Upper part (7): monitoring cell (1) and control cell (2), comprised of an electrical system with indicator light and 6 switches,
- Cell power supply: 2 alkaline batteries, LR6 type, of 1.5 Volt each,
- Operating time selection (1, 2, 3, 6 months, 1 year) according to the flow rate selected via the switches,
- Switch set to "on": an indicator light blinks, indicating device in service.



Available installation accessories:
- Hoses: RGF 1000 N 01
- RDF unions - female / female
  1/4 inch, gas-type, cylindrical
- RDM unions – male / female
  6 x 100, taper
  8 x 100, taper
  8 x 125, taper
  10 x 100, taper
  10 x 150, taper



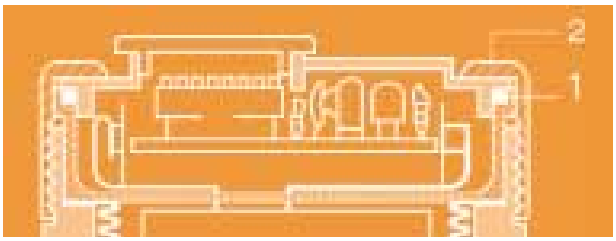
Lubrication



SNR automatic lubricator

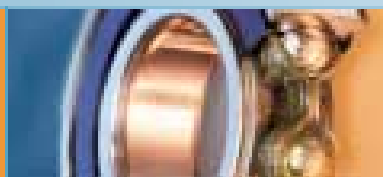
Composition of the various elements

- Lubricator body, injection-molded, transparent to show the remaining grease level. Fitted with 1/4 inch male threads.
- Diaphram features suitably shaped bottom section intended to ensure correct axial pressure on the grease contained in the reservoir. The body and diaphram materials (polyamide 11 and polypropylene) comply with the FDA list (US Food & Drug Administration), hence compatible for food applications.



- **Upper chamber:** clear PVC, housing electrodes, the extensible membrane, batteries and electrical system. After adding a cover sealed with O-ring (1) the chamber is centered in the body and secured with polyamide ring nut (2) .
- Electrolyte (14 to 15 grams of salt water solution), retained by an organic substrate held between two carbon fiber electrodes.
- Electrodes: fed through the bottom section of the upper compartment via sealed (bonded) ports. They extend into US-welded stainless steel contacts.
- Electrical system. The various elements: diode, transistors, resistors, condensers, and the switching unit are tin-welded on a PCB. This electrical unit and the two batteries are clipped onto the corresponding stainless steel contacts. To ensure continuous contact for the entire lubricator service life, the various elements are pressed by leaf-springs.
- Diaphram, made of thermoplastic material ensuring both the mechanical strength of plastic and the elasticity of elastomeric materials, it is US-welded on the bottom section of the upper compartment. Therefore, the electro-chemical cell is housed in a fully sealed enclosure. During final assembly, the sealed joint is pressed between the tank and the upper compartment by the flanged nut, ensuring a leak-proof connection.

- Protections. Access to the switching unit is closed by a cap fitted with an O-ring, ensuring a perfect seal, even when submersed. A grease flow port is sealed by a plug.
- Propellant gas. The inert gas in the SNR lubricator guarantees absolute safety. Comprised of 90% nitrogen, it is harmless both to the operator and the environment. Explosion-proof, flameproof, it allows the SNR lubricator to meet industrial safety standards, notably the non-combustable standards.



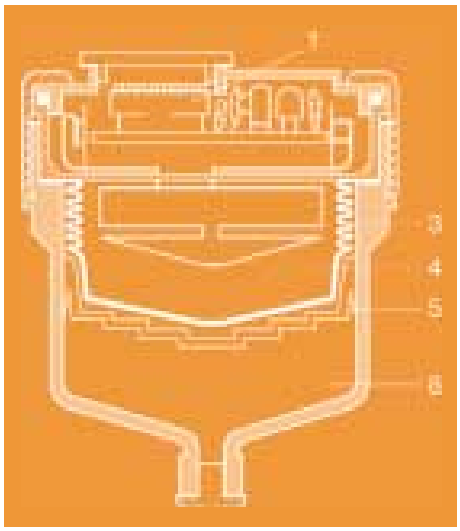
SNR automatic lubricator

Advantages

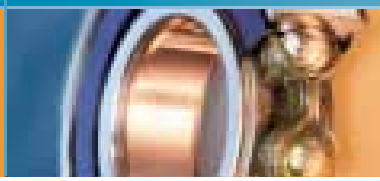
- Easily installed, reliable greasing system,
- Clear container with graduated label for permanent grease level monitoring,
- Regular flow rate,
- Large volume, compact size (diameter: 80mm, height: 130mm, weight: 14ounces),
- Perfectly tight connection between lubricator and greased component (no risk of contamination, clean for the environment and the user),
- Harmless to the environment. The gas generated in the SNR lubricator's sealed chamber (nitrogen) is explosion-proof and flame-proof (INERIS and CECHAR certifications),
- Operational up to 55°C / 130°F max. temperature, in high altitude, in water and in all positions,
- Extensive range of accessories (unions, hoses, etc.),
- Can be shut down then restarted,
- Programmable during operation,
- Allows limited maintenance in hazardous environments.

Operating principles

- Setting of the selected switch(es) (1) closes the corresponding electronic circuit and allows variable current (according to the desired flow rate).
- The electro chemical cell releases an inert gas, essentially comprised of nitrogen (90%).
- This gas fills chamber (4) and, via diaphram (3), pushes piston (5) qwhich, in turn, ejects lubricant (8) contained in the reservoir.



Lubrication



SNR automatic lubricator

Available types of grease

- SNR-LUB EP
- SNR-LUB HT
- SNR-LUB VX
- SNR-LUB AL1, meeting 21 CFR 178 357 requirements of the FDA (US Food and Drug Administration), classified H1 as per USDA recommendations (United States Department of Agriculture).

Please contact us for other types of greases or for empty lubricators, to be filled by the user.

Flow rate adjustment parameters

Shaft diameter	Manual greasing frequency (1 pump strike = 1cm³)	Daily quantity	Automatic lubricator replacement frequency
100 to 120mm	4 pumps, daily	3 to 4cm³	1 month
80 to 100mm	2 pumps, daily	2cm³	2 months
65 to 80mm	8 to 10 pumps, weekly	1.5cm³	3 months
50 to 65mm	8 to 10 pumps every 15 days	0.7cm³	6 months
< 50mm	8 to 10 pump strikes, monthly	0.3cm³	12 months

Values given for normal conditions. For more details, contact your SNR technician.