

LUBRICATION SOLUTIONS FOR WIND TURBINES



CHARACTERISTICS

- REDUCE MAINTENANCE TIMES AND COSTS
- INCREASE TURBINE LIFE
- MORE PROTECTION FROM CORROSION
- REDUCE BEARING WEAR
- ELIMINATE GREASE WASTE
- EXCELLENT DISTRIBUTION OF LUBRICANT
- LOWER REPAIR COST
- INCREASE TIME BETWEEN SCHEDULED MAINTENANCE
- INCREASE BEARING LIFE
- PROTECTION AGAINST CORROSION

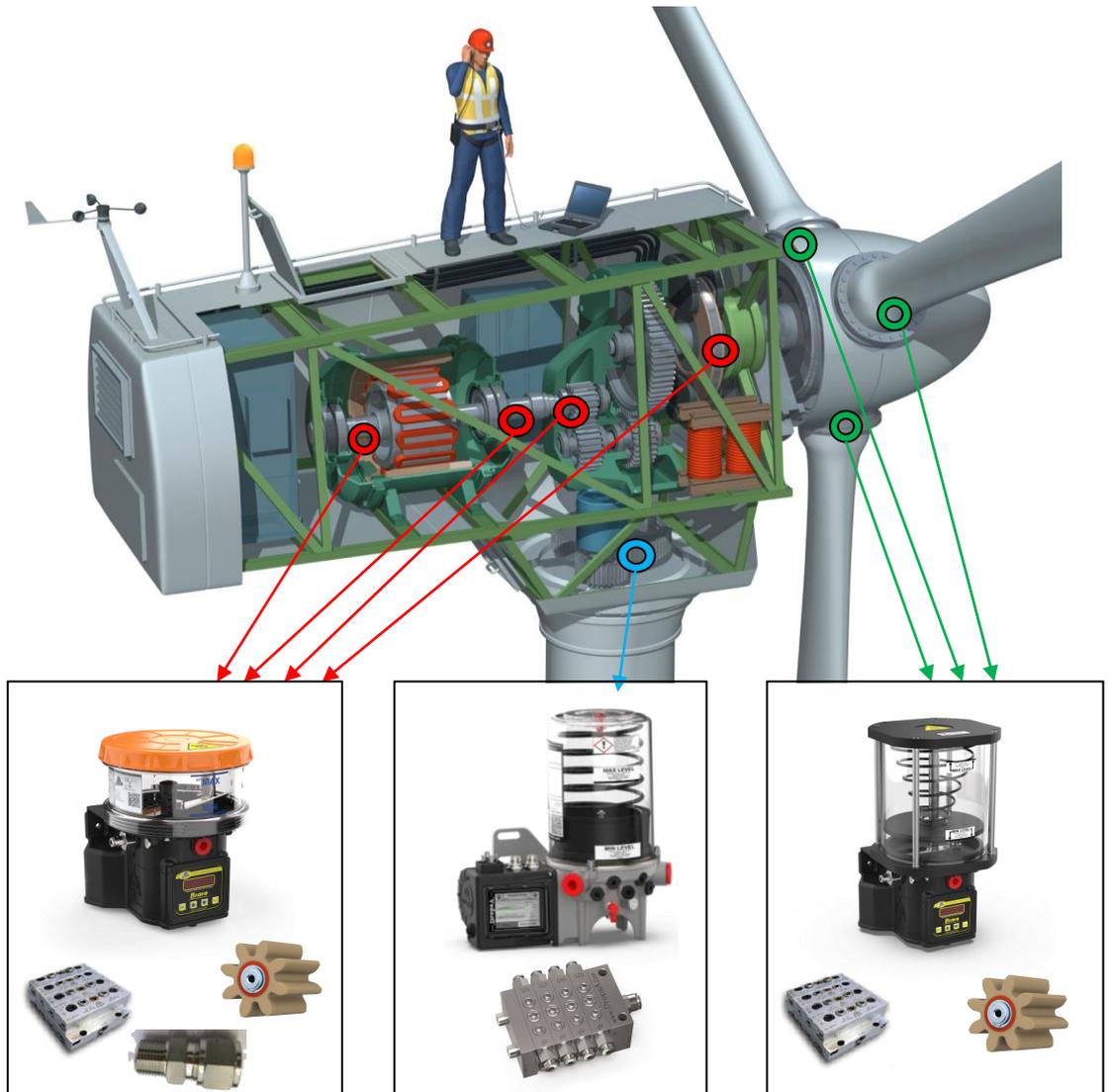
EACH SYSTEM MUST BE DESIGNED ACCORDING TO THE PARTICULAR REQUIREMENTS OF THE WIND TURBINE GENERATOR.

THE CHOICE THE SYSTEM DEPEND BY MANY FACTORS AS NACELLE TEMPERATURE, ENVIRONMENT (ONSHORE OR OFF-SHORE), NUMBER OF LUBRICATION POINTS, QUANTITY OF GREASE FOR EACH POINT.

WIND GENERATOR LUBRICATION PRODUCTS

Wind turbines are subject to high mechanical loads and therefore benefit greatly from adequate and reliable lubrication. All this can be obtained thanks to an automatic lubrication system.

APPLICATION EXAMPLES :



These points are under frequent operation and need to be lubricated to prevent premature failure. The system is setup for frequent lubrication at regular intervals.



The blue point consists of the rim lubrication located in the lower part of the nacelle. A special type of gear/pinion applicator is used to distribute grease uniformly at the final lubrication point.



The green point indicates the support used to modify the single blade inclination (pitch). This point is subject to both centrifugal force and load from the wind force working during hub rotation. The entire lubrication system must be able to resist to centrifugal force and loading and avoid reservoir cavitation during operation. A pump fitted with a spring loaded follower plate prevents this problem.

DROPSA OFFERS TWO INNOVATIVE POSSIBILITIES:

BRAVO PUMP



Bravo Pump contains many innovative features exclusive to Dropsa that allow new possibilities in lubrication systems engineering.

Thanks to VARIO DRIVE , an innovative electronic system, it can manage pump motor, protecting and adjusting the pumping system electronically. That means increased reliability and greater lifespan of the pump motor as well as the ability to electronically adjust the pump output from 50% to 100% of its nominal value.

Bravo Controller also has built in Diagnostic logging features as standard.

The Bravo key features are:

- Modular stackable reservoir and minimum level standard
- Voltage available: 12V AC/DC - 24V AC/DC -110V/230V 50/60 Hz, standard.
- Integrated fixture for SMP and SMPM distributors
- VARIO-Drive: allows electronic variation of pump motor 50-100% of nominal output.
- Diagnostic and event logging
- Multi connector system: allows many electrical connector types to be applied to the standard product to suit varied OEM and end user requirements.
- Dual access ports: for convenient refilling and grease return line

BRAVO PUMP WITH FOLLOWER PLATE



The Bravo Pump with follower plate, offers all the features as the standard Bravo pump but has the advantage that it has been designed to work with more extreme temperature conditions and be able to cope with centrifugal forces.

The plexi-glass reservoir of the new pump version has new internal and external characteristics.

Externally it has been designed a system with tie rods and spacers that allow the reservoir thermal deformation.

To ensure problem free operation with centrifugal forces it includes a follower plate with a pre-loaded spring. This allows installation of the pump even in the Hub of wind turbine so it can rotate with the wind turbine blades.

AUTOMATIC OMEGA

ELECTRIC PUMP



The automatic OMEGA electric pump is a multi-output control unit equipped with a touch screen display that enables all pump statuses to be monitored, facilitating the management and use of the pump by the user.

The pump is characterised by its versatility. In fact, it can be used simultaneously on both PROGRESSIVE SYSTEMS, by coupling the related progressive dosers to the pump (SMX - nP - nPr+ - SMP and SMPM) and on MULTILINE SYSTEMS, directly lubricating the tip.

Thanks to its compact design, it is the perfect solution for installation in small spaces.

PROGRESSIVE DIVIDER VALVES

Progressive divider valves are a reliable volumetric way of dividing the output flow from the lubrication pump into a number of points needed to complete the lubrication system.

Dropsa has two progressive divider systems suitable for Wind Turbine generators:

Dividers using for 26 system:

- SMX/SMO Progressive modular divider (standard serie/ miniature serie)
- SMP mono-block progressive divider
- NP nano-Progressive divider

Advantages :

- *Can be used at high pressure*
- *Easy Expansion or modification of the system*
- *Modular elements (using SMX/SMO progressive distributor) allow the element to be changed quickly and without disconnecting pipe work.*
- *Modular concept provides low cost replacement of components*

SMX/SMO MODULAR DIVIDER

The SMX/SMO modular system consists of two main components: the base and the metering elements.

The distributor assembly principle enables factory floor distributor assembly to accommodate grouping of lubrication points.

The base assembly can be mounted and pieced up without the metering elements. This provides the most advantageous routing of pipe work and the elements can then be fitted to suit.

Due to the modular concept, the system can be easily extended with extra components at a low cost.



Key features:

- *Stainless Steel AISI 316*
- *Cycles Max./minute: 500*

NP - NANO PROGRESSIVE

Dropsa's nano-Progressive (nP) dividers are the ideal solution for oil and grease lubrication applications that require small and accurately dispensed quantity of lubricant in a compact solid and reliable footprint. The nano-nP uses the progressive movement of pistons to allow precise quantities of lubricant to be accurately dispensed to multiple points.

Thanks to a patented RigidLock, novel interlocking mechanism between the elements it has the rigidity of a mono-block divider but the flexibility of a modular segmented unit.

The lubrication cycle can be controlled by a single sensor including the Dropsa solid state Ultrasensor product.

These metering elements may be used in a variety of system configurations and have different working configurations that make them flexible for use in multiple applications.

The compactness makes them particularly suitable for use in confined spaces.

These metering elements may be used in a variety of system configurations and have different working configurations that make them flexible for use in multiple applications.



Key features:

- *Singular outlet Flowrate: 0,025cm³ - 0,045cm³ - 0,075cm³ - 0,105cm³*
- *Number of Dividers elements: 3 ÷ 12*
- *Working pressure: 15bar (218psi) ÷ 300bar (4350psi)*
- *Working temperature: -20°C ÷ +80°C*
- *Material: Nickel-plated steel*
- *Number of inversion at minute: 200 max.*
- *Inlet thread: G1/8" – UNI ISO 228/1*
- *Outlet thread: G1/8" – UNI ISO 228/1*
- *Lubricants: Min. Oil. 32 cSt –max. 2 NLGI grease*

SMP DIVIDER

The SMP is a single block progressive divider valve that is ideal for applications where space is limited.

It is available in 6,8,10 and 12 outlet versions, each with an output of 0,2 cm³/0,012cu.inch per cycle

An outlet can also be merged with the sequential outlet on the block by removing the special outlet fitting and installing a plug. Visual or electronic monitoring can be achieved simply by removing a plug and installing a visual or electronic add-on device as shown below.

The spools in a progressive metering valve operate sequentially partitioning equally across the outlets, the grease being pumped into the metering block inlet.

In the event of the blocked lubrication point all the spools will stop, thereby allowing the user to monitor the entire system with a single monitoring device.



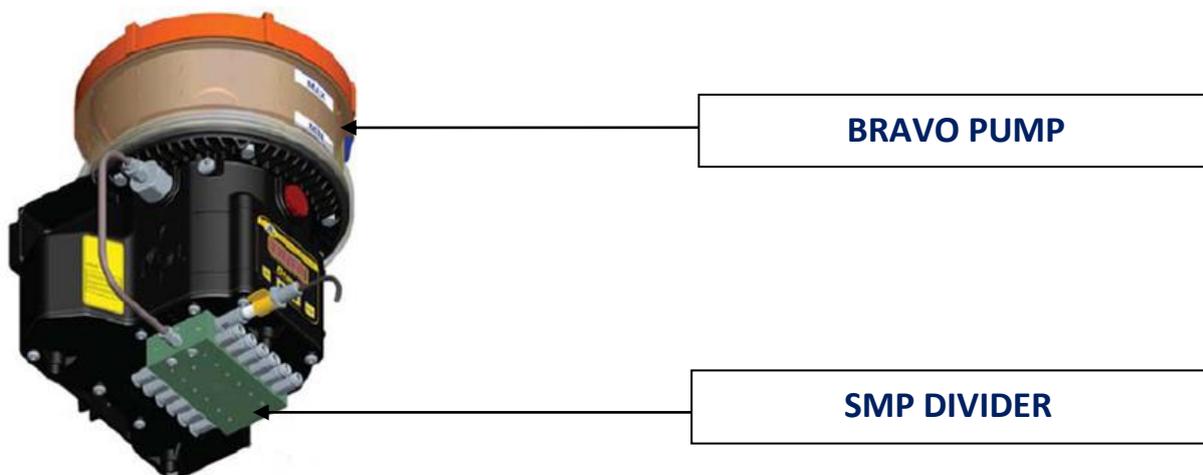
Key features:

- *Min. pressure: 20 Bar, 300 psi*
- *Max pressure: 300 Bar, 4400 psi*
- *Max cycles/minute: 625 cycles*
- *Operating temperature: -10 ÷ 70°C, 14 ÷ 158 °F*
- *Lubricant viscosity: Min.: oil 32 cSt Max.: grease NLGI 2*
- *Material: Zinc Plated Steel*

Cycle Sensor :

- *Material: Stainless Steel*
- *Proximity Type: PNP or NPN 10-30V DC - 200 mA*

SMP dividers can be easily integrated in a single system with Bravo



LUBRICATION SOLUTIONS FOR WIND TURBINES



AVAILABLE INJECTORS:

For the wind turbine lubrication the injector used are:

- [DL injector](#)
- [Lubricating Pinion](#)



DL

DL injector has been designed to deliver lubricant to friction points through the feeding line pressure. Flowrate can be set outside the unit in order to release the lubricant quantity needed.

These injectors are supplied with visual in-built level indicators to monitoring the operation.

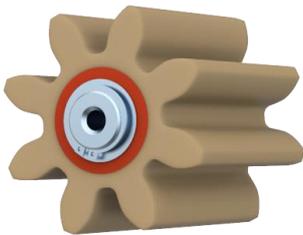
DL injector is available in different models: from one to four outlets. Every injector mounted on a manifold can be easily replaced or inspected without disassembling the unit or operating on fittings and tubings.

These units can be installed in any position and can be used with other types of injectors, if necessary.

Key features:

- Oil lubricant: Min. 220cSt
- Oil lubricant: Max NLGI 2
- Min delivery: 0.02 cm³
- Max delivery: 0.13 cm³
- Min. Operating pressure: 83 bar
- Max operating pressure: 240 bar
- Typical Operating pressure: 103 bar
- Recharge operating pressure: 13 bar

Lubricating Pinion



Lubricating Pinion is an innovative solution that replace manual and troublesome lubrication of gear rims and racks. This solution saves time and money by allowing automatic application of precise quantities of lubricant.

The unit comprises a central rotary stainless steel axel greasing distribution system and a absorbent foam allowing it to be used in demanding application due to its robustness.

The lubricating pinion is rotated by the moving gear rim; as it rotates grease is automatically deposited onto the gear rim and then replenished via the central rotary distributor that receives fresh grease from a centralized pump system.

Benefit using Lubricating Pinion over traditional methods:

- Grease is applied systematically and uniformly on all parts of gear rim.
- It is no longer left to the ability of the operator.
- The quantity of grease delivered can be accurately determined by the use of a Dropsa lubrication system.
- Use of a complete automatic lubrication system reduces operator costs to a minimum