

METERING PUMPS

BlackLine pumps - M and R series Maintenance Plan



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- To check
- To correct
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Blackline Pumps

WHAT IS ?

- Maintenance Plan
- Corrective Maintenance
- Preventive Maintenance
- Predictive Maintenance



Maintenance PLAN

- **Ensures long life** and correct pump operation.
- **Helps to prevent** faults that would cause production downtime.
- **Avoids wasting time** and allows saving money.
- **Schedule the maintenance** considering pump/plant downtime.



CORRECTIVE Maintenance

- It is currently the most commonly used method.
- It is an **urgent** maintenance work to repair an **unexpected failure**.
- Forces unscheduled pump/plant downtime, generating **wasting of time and money**.
- Usually happens that the user **does not have** spare parts available from stock.



PREVENTIVE Maintenance

- It is better than Corrective Maintenance.
- It is a **set of activities** to keep the optimal pump performance and prevent failures.
- It is based on **pre-established periodic inspections**.
- The components subject to wear are **systematically replaced**.



PREDICTIVE Maintenance

- It is better than Preventive Maintenance.
- With specific periodicity, **precise parameters of the pump** (and of the process) are checked.
- **The results are** recorded on specific reports and **compared with the previous ones.**
- Finding any anomalous "deviations" reveals the need to **organize a maintenance.**



TEST

PLANT EXAMPLE

Accessories usefull for maintenance

Example of system for metering pumps



Provides a verification of the actual flow rate of your chemical dosing pump. The calibration pot must be installed on the supply side of the pump. It is not essential but is extremely useful when dosing hazardous chemicals, or when a pulsation damper is absent on the discharge line or in any situation where it is difficult to determine and verify the pumps flow rate.



PULSATION DAMPENER

It is particularly important in a dosing process when using reciprocating metering pumps, many are the benefits of its installation:

- Protects the pump from high pressure peaks (water hammer effect) and increases lifespan of the pump and system
- Flow rate becomes continuous with a linear flow, increasing the reliability and ease of the dosing process.
- Significant reduction of vibrations transmitted along the discharge line
- Helps reduce noise emission of the pump



Installation of a safety valve is highly recommended in order to prevent catastrophic failures in the event of pressure peaks on the discharge line. The safety valve protects the pump, the dosing system as well as the environment.



The installation of a backpressure valve prevents siphoning and eliminates varying dosage rates caused by fluctuating downstream pressure.

Accessories usefull for pump check and maintenance

To be installed on **discharge** pipeline:

- **Pressure gauge.**
- Pulsation dampener.
- Backpressure valve.
- Safety valve.

To be installed on **suction** pipeline:

- **Calibration pot gauge.**
- Filter.

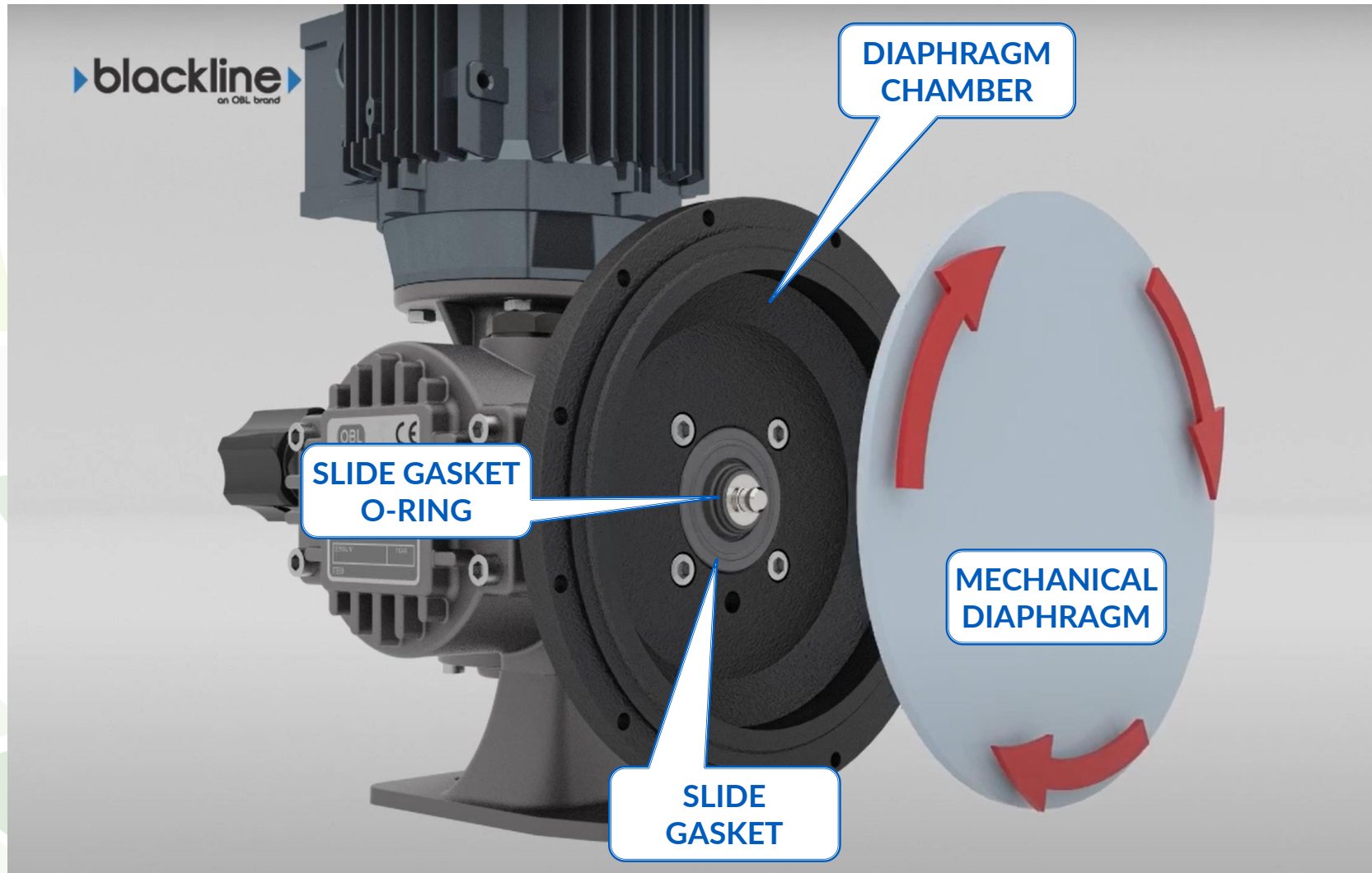


M series

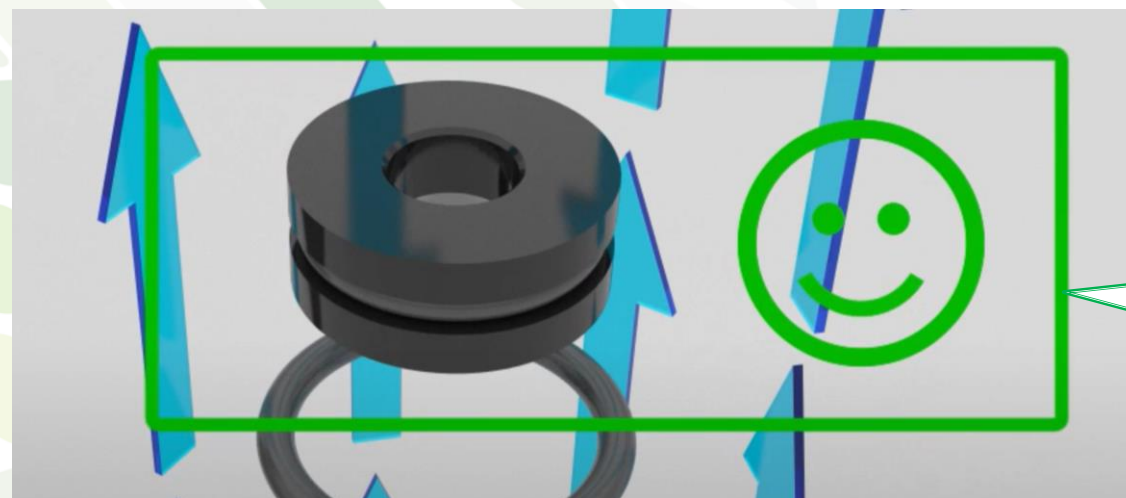
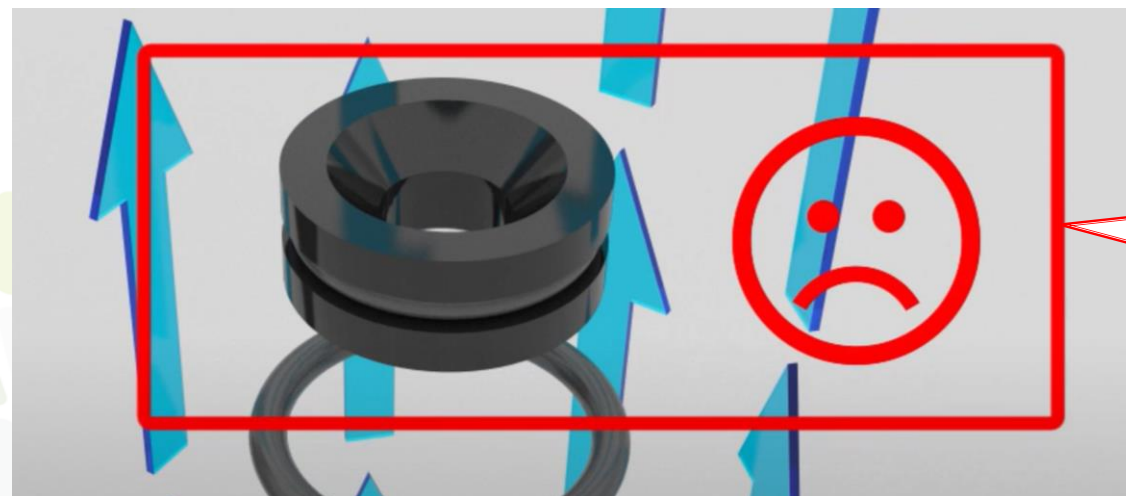
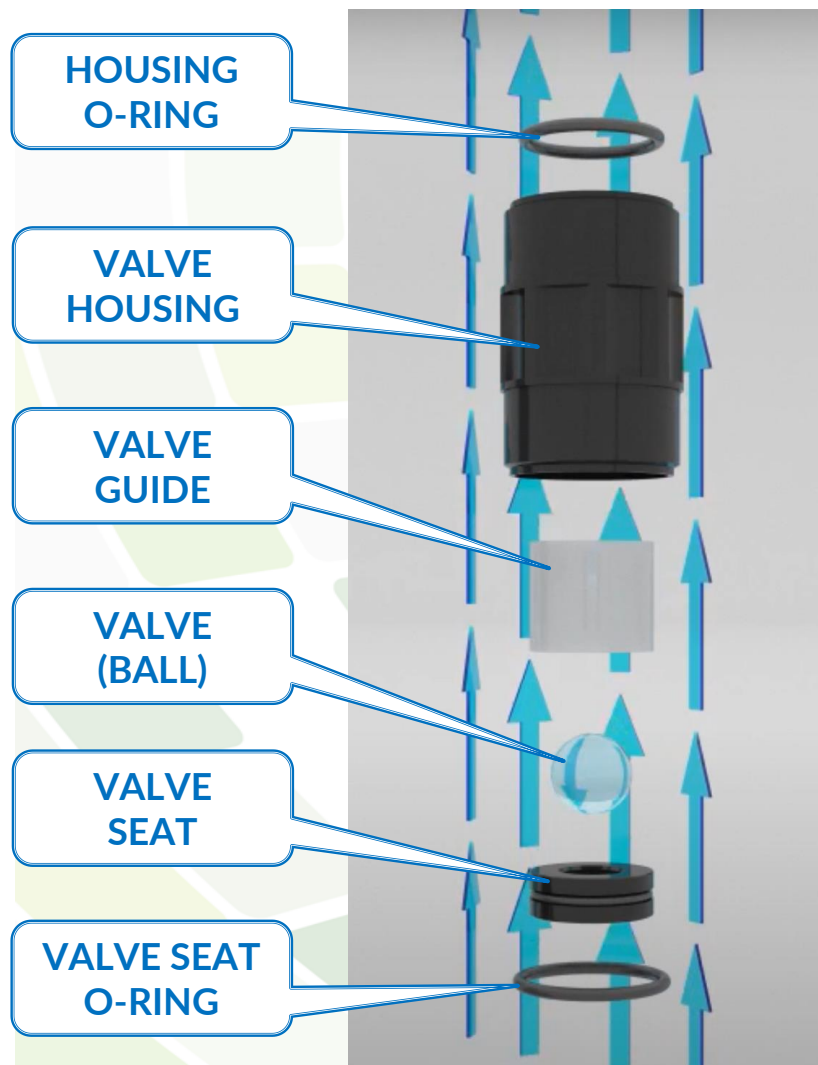
Mechanical Diaphragm

A highly versatile solution for low-pressure applications

M series – Pumphead main components



M series – Valve unit components



M series - Inspection and maintenance plan

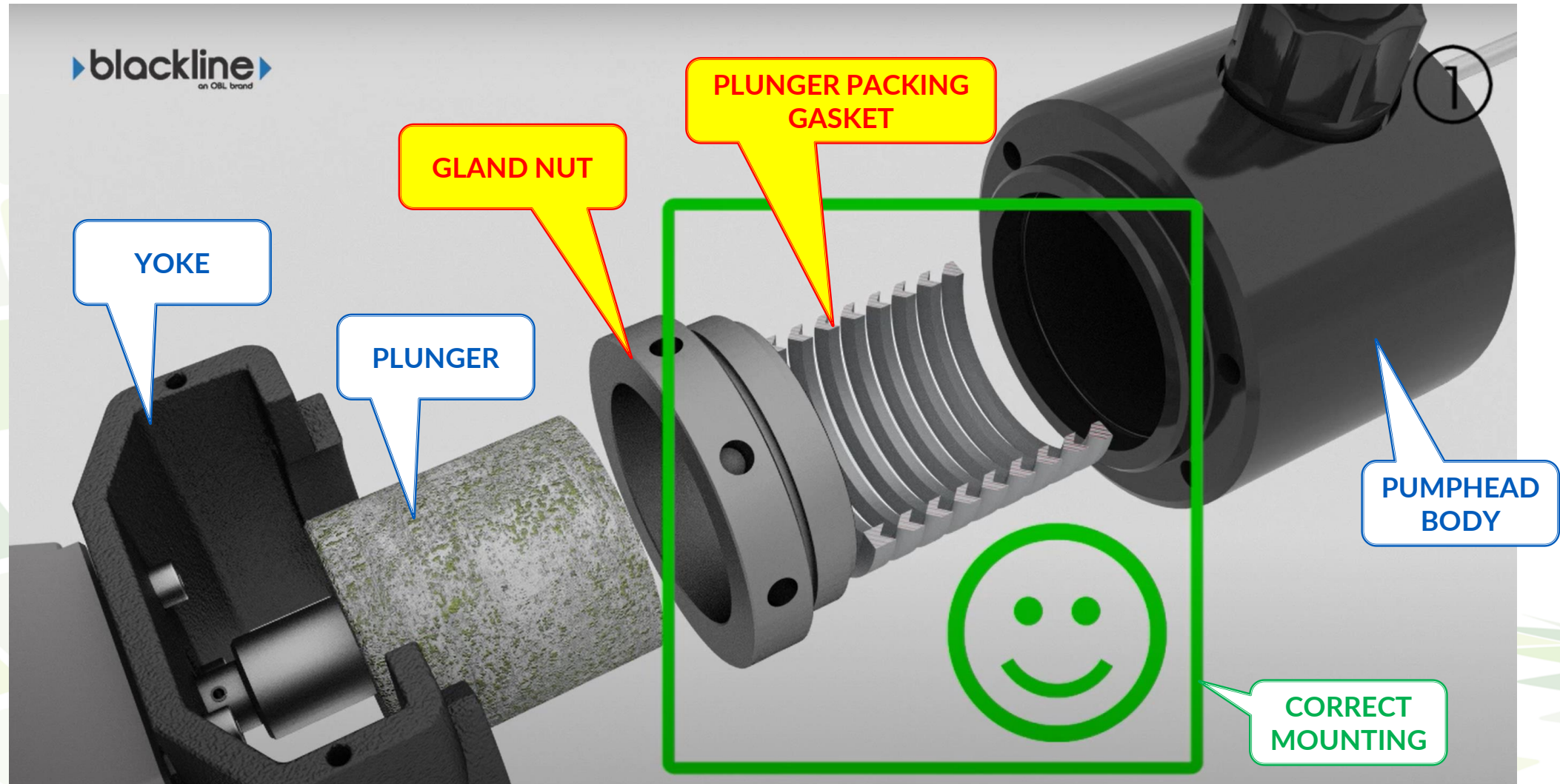
WHEN ?	INSPECTION	MAINTENANCE ACTION
After the first 2,000 hours.		Replace the lubricant oil (viscosity ISO VG 320).
Every week.	Check the lubricant oil condition in the gear reducer. In case of BAD condition ->	Replace the lubricant oil (viscosity ISO VG 320).
Every week.	Check there are no product leakages from pump connections or from the plant pipelines.	Verify: - The screws, nuts and bolts, flanges, are firmly tightened. - The sealing components are efficient and in perfect condition.
Every month.	Verify the external cleaning and the general conditions.	Remove presences of: - Corrosive product or incrustations. - Rusty (re-paint or apply a grease layer).
Every month.	Check, also based on the process importance and danger, the hydraulic seal and any pumphead deformations (combined action of pressure and temperature).	Verify: - The pumphead locking screws tightening, if necessary adjust the tightening torque (see Instruction Manual).
Every month.	Check if the pumped product temperature is lower than 45°C (113°F) both for metallic and plastic pumpheads.	Verify the condition: - Atmospherics of the plant, the storage of the pumped product. - The pumphead and the diaphragm.
Every 3 months.	Check the lubricating oil temperature is lower than 95°C (203°F) .	Verify: - The last oil change date and the possible oil contamination. - The actual pump operating conditions.
Every 6 months.	Verify (on the pump): - The flowrate conformity. - The valves and diaphragm conditions.	Evaluate the revision of: - The pumphead components. - The complete pump.
Every 2 years or 15,000 hours.		Replace the lubricant oil (viscosity ISO VG 320). Replace both the valve units and the diaphragm.
At each end of cycle or stop.	If the pump works in a batch dosing system, and the handled fluid tends to coagulate, solidify or crystallize easily. It is highly suggested to ->	Wash the pumphead to prevent the pumped product from solidifying in the valves or in the pumphead.



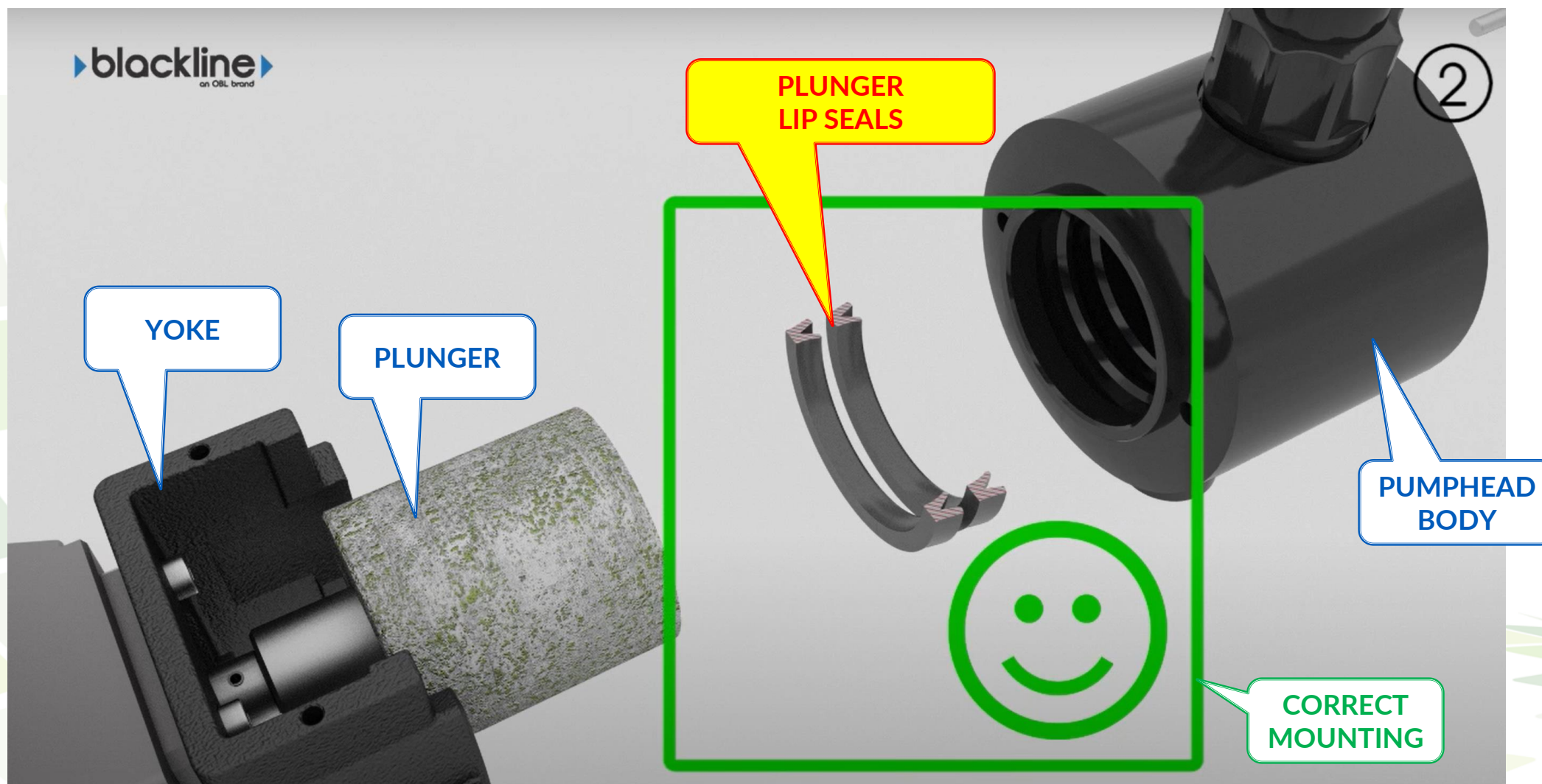
R series Plunger

A reliable answer to your mid-pressure dosing needs with clean liquids

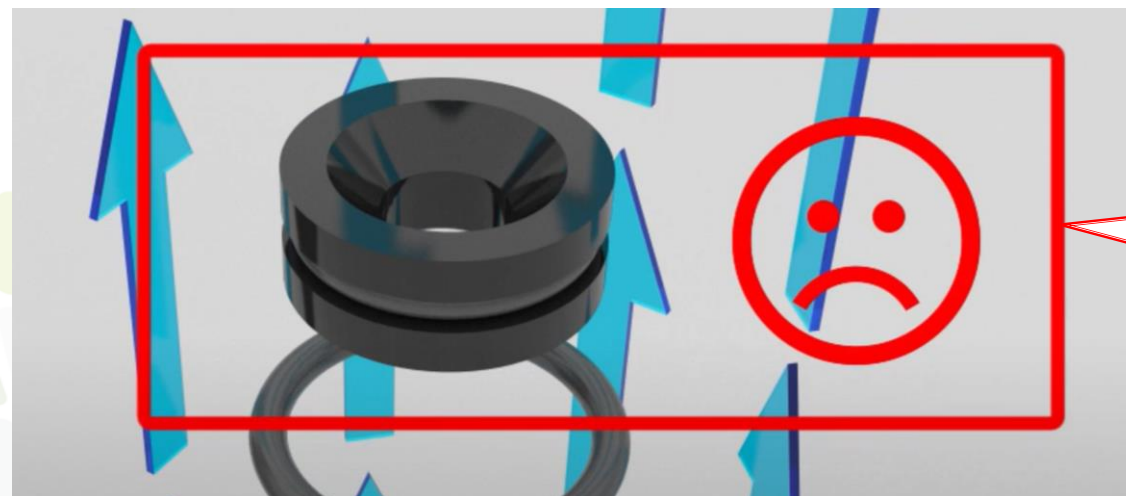
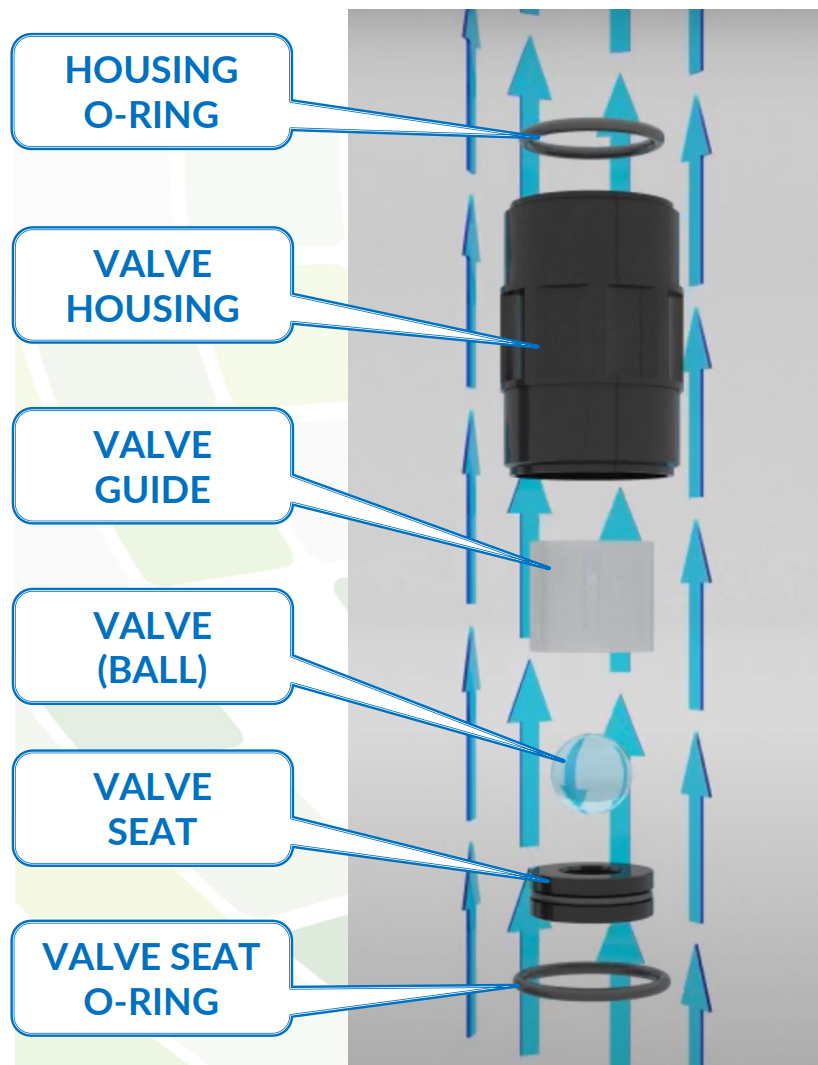
R series – Pumphead main components



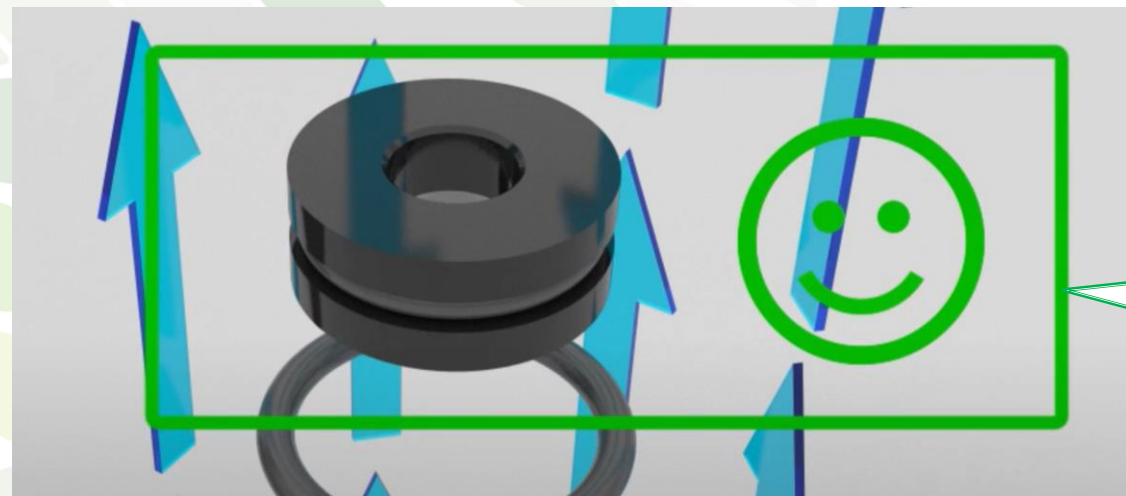
R series – Pumphead main components



R series – Valve unit components



WRONG
MOUNTING



CORRECT
MOUNTING

R series – Inspection and maintenance plan

WHEN ?	INSPECTION	MAINTENANCE ACTION
Every week.	Verify the cleaning and the conditions of the inside of the yoke and its transparent covers.	Clean the inside of the yoke and its transparent covers (replace if damaged).
Every week.	Make sure there are no product leaks from the plunger gasket. In case of leaks ->	Pumphead WITH gland nut: Tighten the gland nut to compress the plunger packing gasket. Pumphead WITHOUT gland nut: Replace the plunger lip seals.
Every week.	Check the lubricant oil condition in the gear reducer. In case of BAD condition ->	Replace the lubricant oil (viscosity ISO VG 320).
Every week.	Check there are no product leakages from pump connections or from the plant pipelines.	Verify: - The screws, nuts and bolts, flanges, are firmly tightened. - The sealing components are efficient and in perfect condition.
Every month.	Verify the external cleaning and the general conditions.	Remove presences of: - Corrosive product or incrustations. - Rusty (re-paint or apply a grease layer).
Every month.	Check, also based on the process importance and danger, the hydraulic seal and any pumphead deformations (combined action of pressure and temperature).	Verify: - The pumphead locking screws tightening, if necessary adjust the tightening torque (see Instruction Manual).
Every 3 months.	Check the lubricating oil temperature in the gear reducer is lower than 95°C (203°F) .	Verify: - The last oil change date and the possible oil contamination. - The actual pump operating conditions.
Every 6 months.	Verify (on the pump): - The flowrate conformity. - The valves and plunger packing conditions.	Evaluate the revision of: - The pumphead components. - The complete pump.
Every 2 years or 15,000 hours.		Replace the lubricant oil (viscosity ISO VG 320). Replace both the valve units and the plunger packing.
At each end of cycle or stop.	If the pump works in a batch dosing system, and the handled fluid tends to coagulate, solidify or crystallize easily. It is highly suggested to ->	Wash the pumphead to prevent the pumped product from solidifying in the valves or in the pumphead.

Links to maintenance videos on Youtube

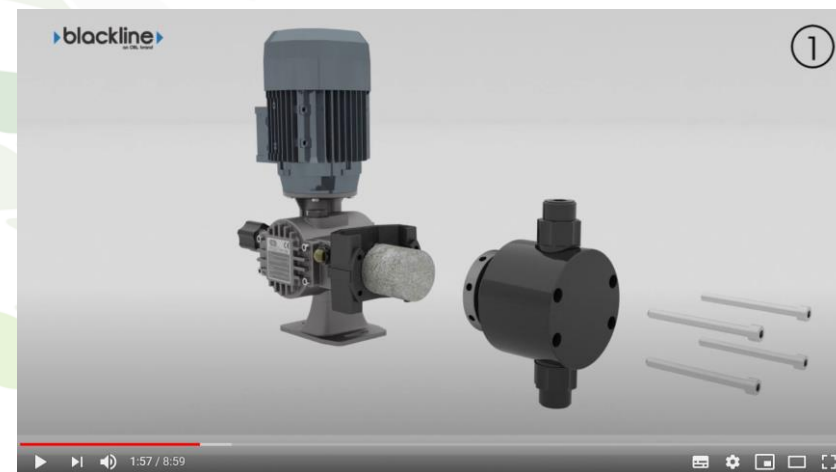
M series – Mechanical Diaphragm

https://www.youtube.com/watch?v=1VM5Sko-C_8&t=204s



R series – Plunger

https://www.youtube.com/watch?v=fKz_jgs8Zhl&t=419s



Blackline Pumps

PUMP AND PLANT

WHAT ?

- To check
- To correct
- To avoid

Plant #1:

1. **DANGER !** THERE IS AN ISOLATING VALVE ON THE DOSING LINE.

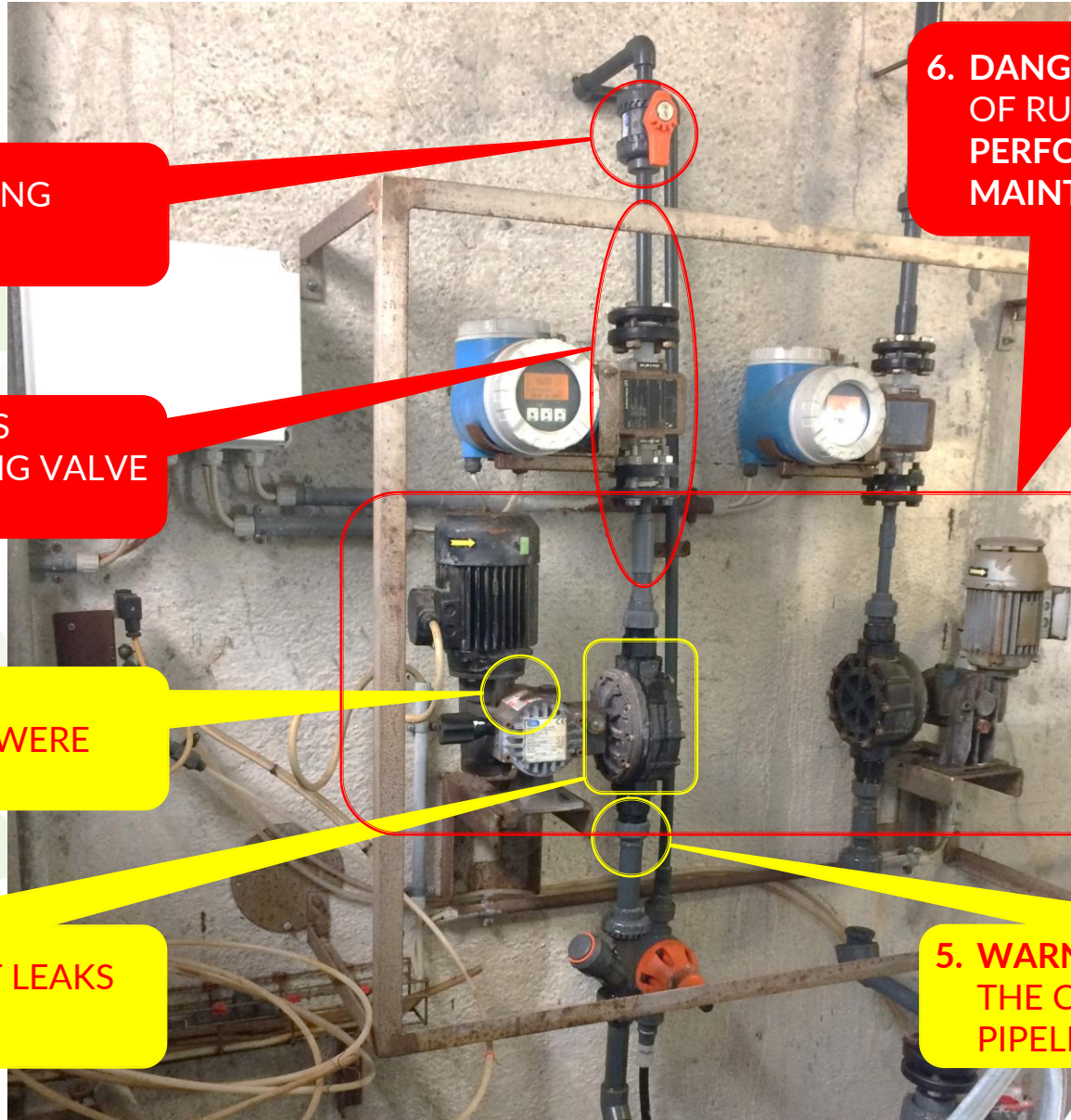
2. **DANGER !** THE SAFETY VALVE IS MISSING BEFORE THE ISOLATING VALVE (1).

3. **WARNING !** THE WARNING INSTRUCTIONS ON THE PUMP WERE NOT COMPLIED WITH.

4. **WARNING !** REMOVE PRODUCT LEAKS FROM THE PUMP SURFACE.

6. **DANGER !** BOTH PUMPS SHOW SIGNS OF RUST AND/OR CORROSION. PERFORM CLEANING AND MAINTENANCE SHORTLY.

5. **WARNING !** CHECK THE RELIABILITY OF THE CONNECTIONS TO THE SYSTEM PIPELINES.

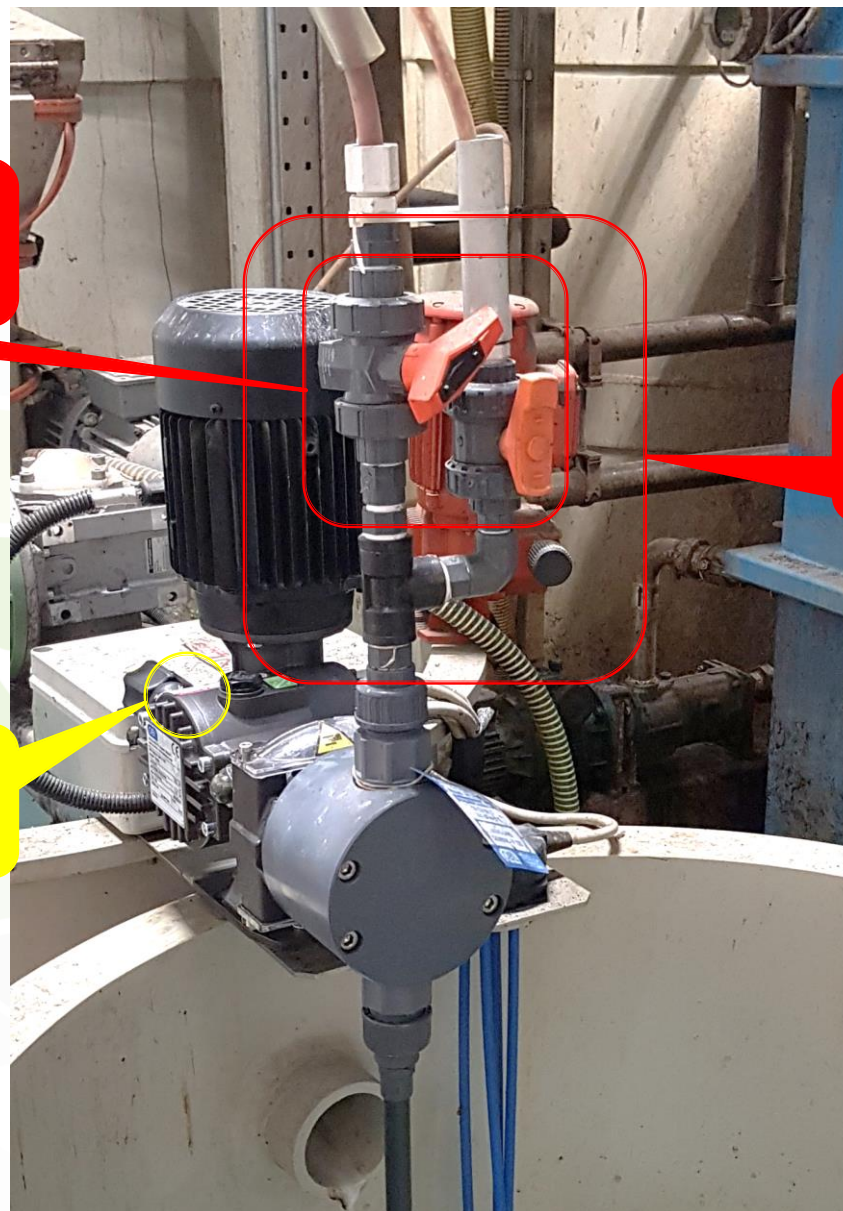


Plant #2:

1. **DANGER !** TWO DELIVERY DOSING LINES, BOTH WITH AN ISOLATING VALVE.

2. **DANGER !** THE SAFETY VALVE IS MISSING BEFORE THE ISOLATING VALVES (NOTE #1).

3. **WARNING !** THE WARNING INSTRUCTIONS ON THE PUMP WERE NOT COMPLIED WITH.



Component analysis:

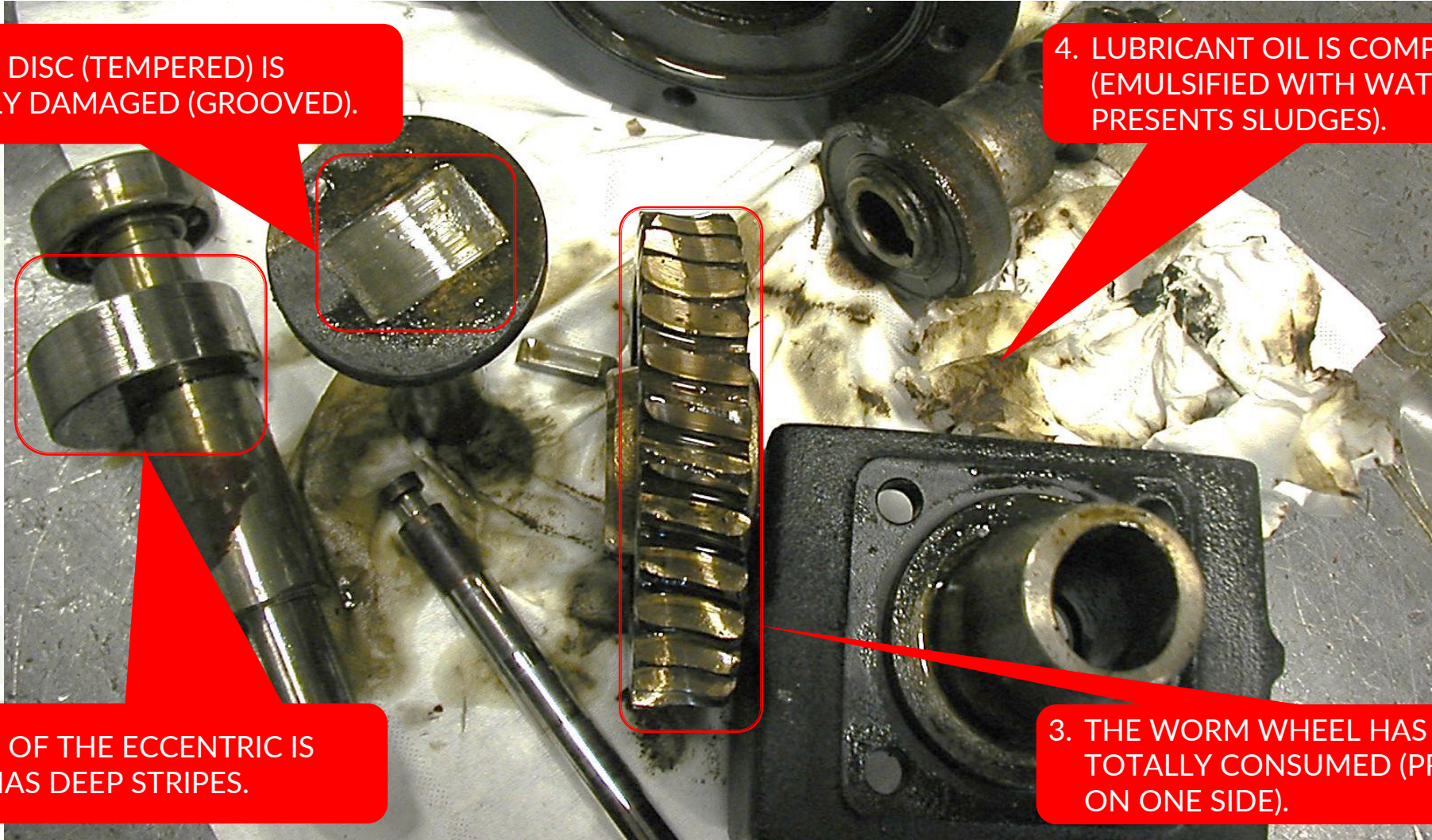
Cause: High pump working pressure and lubricating oil compromised.

1. THE THRUST DISC (TEMPERED) IS IRREPARABLY DAMAGED (GROOVED).

4. LUBRICANT OIL IS COMPROMISE (EMULSIFIED WITH WATER AND PRESENTS SLUDGES).

2. THE SURFACE OF THE ECCENTRIC IS WORN AND HAS DEEP STRIPES.

3. THE WORM WHEEL HAS THE TEETH TOTALLY CONSUMED (PREVALENTLY ON ONE SIDE).



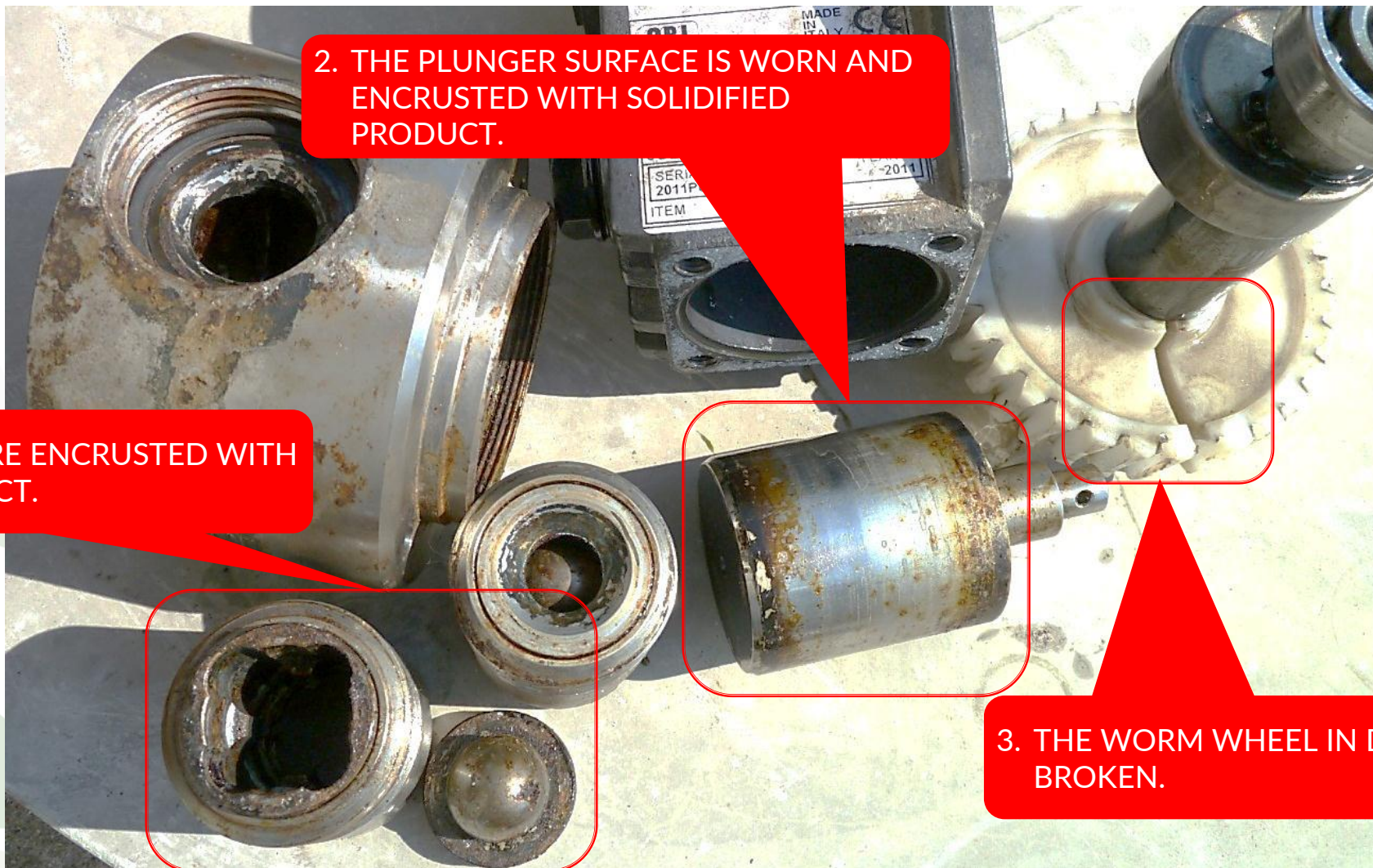
R series – Component analysis:

Cause: Peak of pressure and product encrusted in the valves.

1. THE VALVE UNIT ARE ENCRUSTED WITH SOLIDIFIED PRODUCT.

2. THE PLUNGER SURFACE IS WORN AND ENCRUSTED WITH SOLIDIFIED PRODUCT.

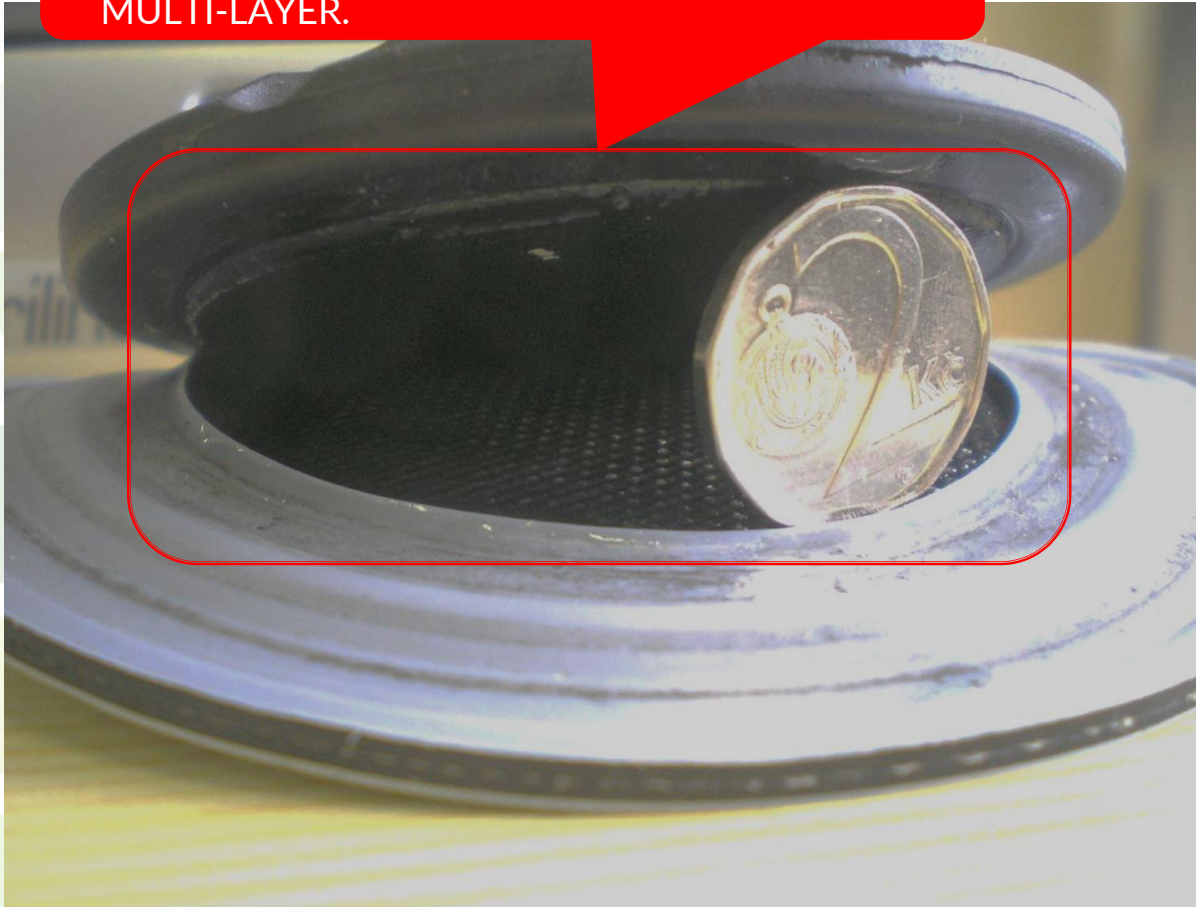
3. THE WORM WHEEL IN DELRIN IS BROKEN.



M series – Component analysis:

Cause: Product temperature higher than 45°C (113°F) and peak of pressure.

1. THE REAR CENTRAL METALLIC INSERT IS DETACHED FROM THE DIAPHRAGM RUBBER MULTI-LAYER.



2. THE REAR PLASTIC SUPPORT RING IS BROKEN.



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