

Alpha ACC cylinder lubrication system

The MAN B&W Alpha cylinder lubrication system, see Figs. 9.02.02a, 02b and 02c, is designed to supply cylinder oil intermittently, for instance every 2, 4 or 8 engine revolutions with electronically controlled timing and dosage at a defined position.

Traditional two-tank cylinder lubrication system

Separate storage and service tanks are installed for each of the cylinder oils with different BNs used onboard ships operating on both high- and low-sulphur fuels, see Fig. 9.02.01.

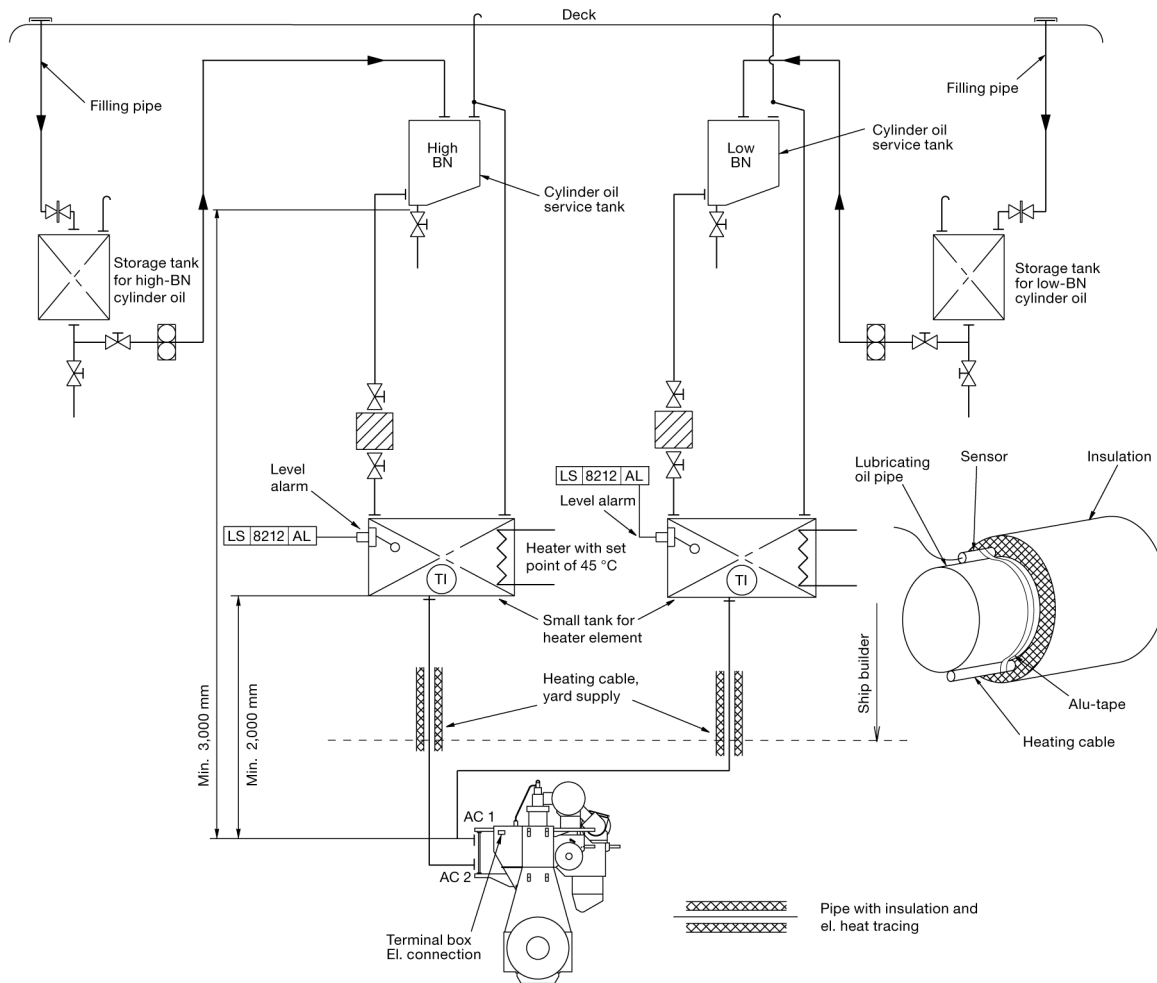


Fig. 9.02.01: Cylinder lubricating oil system with dual storage and service tanks and ACOS2 (behind AC1 and AC2)

The cylinder lubricating oil is pumped from the cylinder oil storage tank to the service tank. The size of the service tank depends on the owner's and the yard's requirements, it is normally dimensioned for about one week's cylinder lubricating oil consumption.

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Oil feed to the Alpha cylinder lubrication system

Cylinder lubricating oil is fed to the Alpha cylinder lubrication system by gravity from the service tank or ACOM.

The oil fed to the injectors is pressurised by the Alpha Lubricator which is placed on the hydraulic cylinder unit (HCU) and equipped with small multi-piston pumps.

The oil pipes fitted on the engine are shown in Fig. 9.02.04.

The whole system is controlled by the Cylinder Control Unit (CCU) which controls the injection frequency based on the engine-speed signal given by the tachometer signal and the fuel index.

Prior to start-up, the cylinders can be pre-lubricated and, during the running-in period, the operator can choose to increase the lubricating oil feed rate to a maximum setting of 200%.

The MAN B&W Alpha Cylinder Lubricator is preferably to be controlled in accordance with the Alpha ACC (Adaptable Cylinder Oil Control) feed rate system.

The yard supply should be according to the items shown in Fig. 9.02.02a within the broken line.

Regarding the filter and the small tank for heater, please see Fig. 9.02.05.

Alpha Lubricator variants

Since the Alpha Lubricator on ME and ME-B engines are controlled by the engine control system, it is also referred to as the ME lubricator on those engines.

A more advanced version with improved injection flexibility, the Alpha Lubricator Mk 2, is being introduced on the G95/50/45/40ME-C9 and S50MEC9 including their GI dual fuel variants.

Further information about the Alpha Lubricator Mk 2 is available in our publication:

Service Experience MAN B&W Two-stroke Engines

The publication is available at www.man-es.com → 'Marine' → 'Products' → 'Planning Tools and Downloads' → 'Technical Papers'.

Alpha Adaptive Cylinder Oil Control (Alpha ACC)

It is a well-known fact that the actual need for cylinder oil quantity varies with the operational conditions such as load and fuel oil quality. Consequently, in order to perform the optimal lubrication – cost-effectively as well as technically – the cylinder lubricating oil dosage should follow such operational variations accordingly.

The Alpha lubricating system offers the possibility of saving a considerable amount of cylinder lubricating oil per year and, at the same time, to obtain a safer and more predictable cylinder condition.

Alpha ACC (Adaptive Cylinder-oil Control) is the lubrication mode for MAN B&W two-stroke engines, i.e. lube oil dosing proportional to the engine load and proportional to the sulphur content in the fuel oil being burnt.

Working Principle

The feed rate control should be adjusted in relation to the actual fuel quality and amount being burnt at any given time.

The following criteria determine the control:

- The cylinder oil dosage shall be proportional to the sulphur percentage in the fuel
- The cylinder oil dosage shall be proportional to the engine load (i.e. the amount of fuel entering the cylinders)
- The actual feed rate is dependent of the operating pattern and determined based on engine wear, cylinder condition and BN of the cylinder oil.

The implementation of the above criteria will lead to an optimal cylinder oil dosage.

Specific Minimum Dosage with Alpha ACC

The recommendations are valid for all plants, whether controllable pitch or fixed pitch propellers are used. The specific minimum dosage at lowersulphur fuels is set at 0.6 g/kWh.

After a running-in period of 500 hours, the feed rate sulphur proportional factor is 0.20 - 0.40 g/kWh × S%. The actual ACC factor will be based on cylinder condition, and preferably a cylinder oil feed rate sweep test should be applied. The ACC factor is also referred to as the Feed Rate Factor (FRF).

Examples of average cylinder oil consumption based on calculations of the average worldwide sulphur content used on MAN B&W two-stroke engines are shown in Fig. 9.02.01a and b.

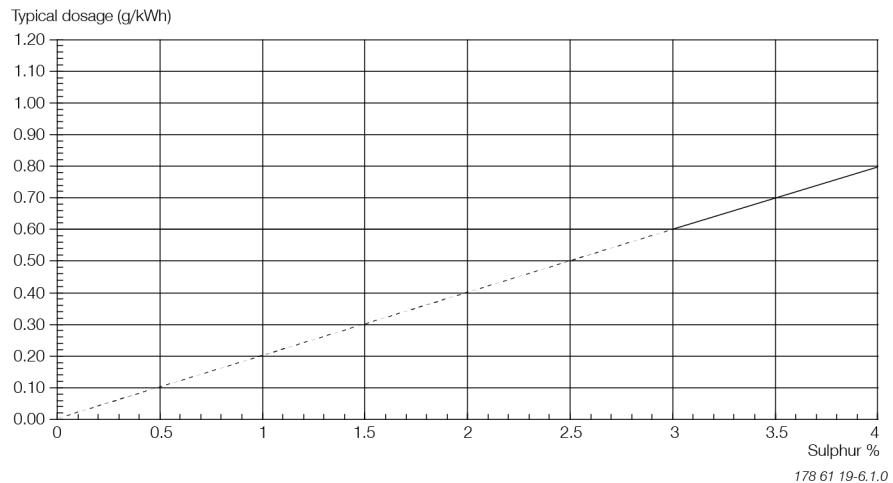


Fig. 9.02.01a: $FRF = 0.20 \text{ g/kWh} \times S\%$ and BN 100 cylinder oil – average consumption less than 0.65 g/kWh

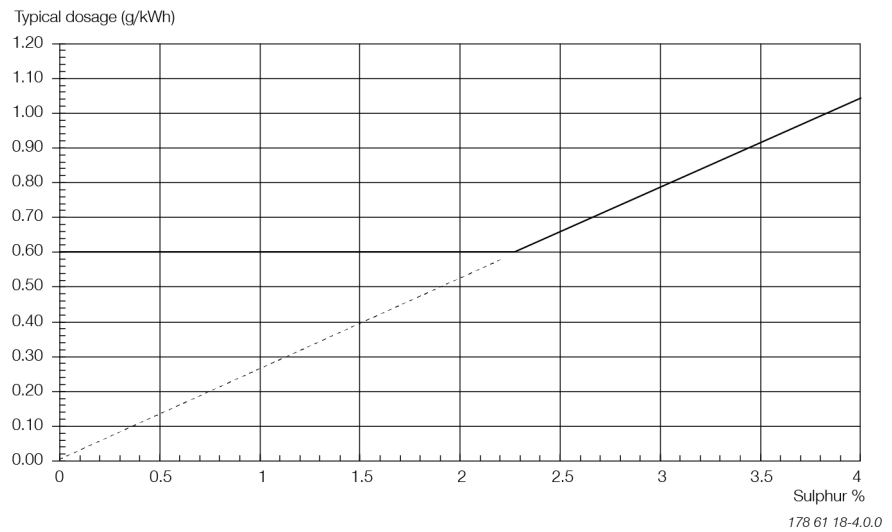


Fig. 9.02.01b: $FRF = 0.26 \text{ g/kWh} \times S\%$ and BN 100 cylinder oil – average consumption less than 0.7 g/kWh

Further information about cylinder oil dosage is available in MAN Energy Solutions' most current Service Letters on this subject available at www.marine.man-es.com --> 'Two-Stroke' --> 'Service Letters'.

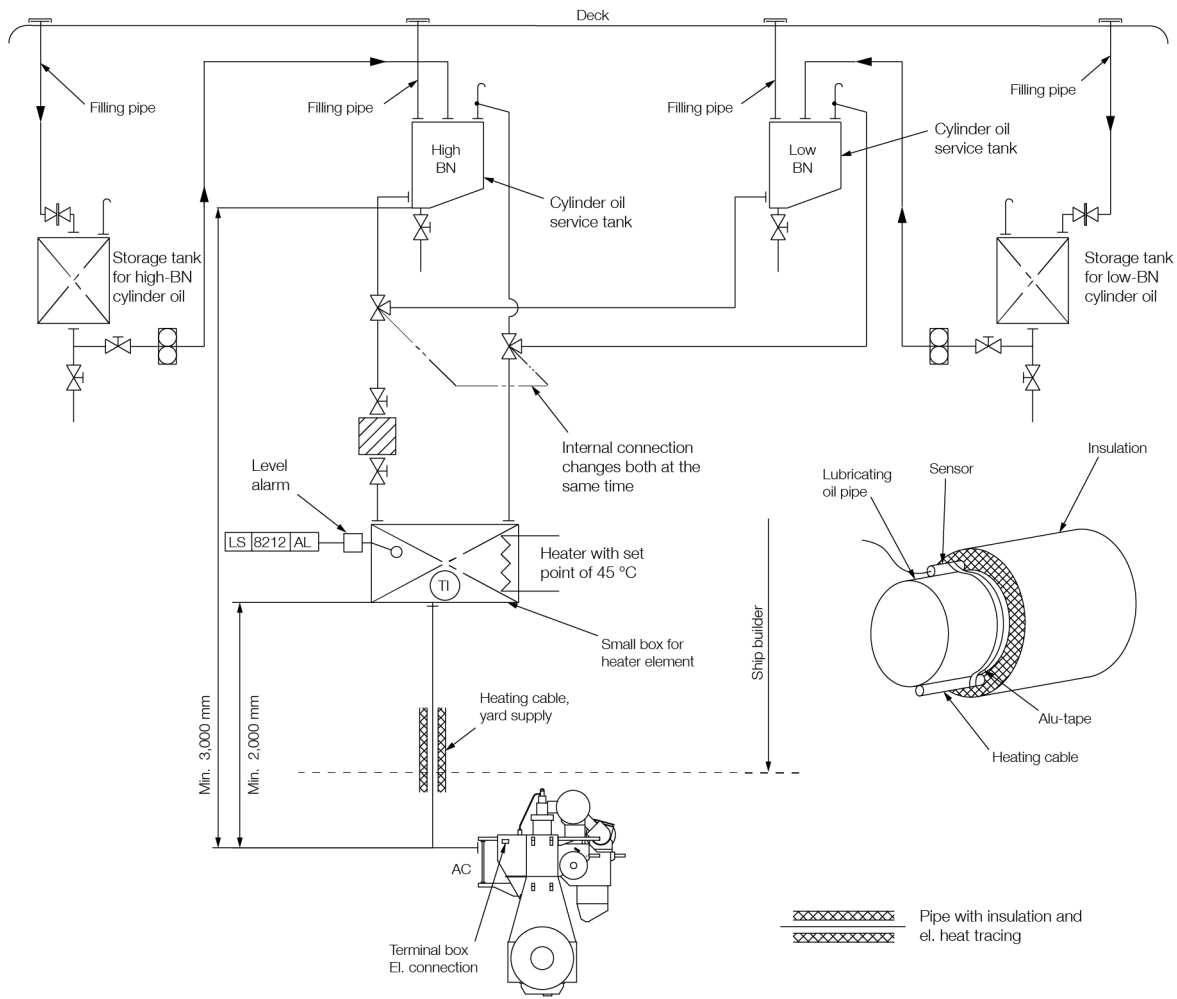
Cylinder Oil Pipe Heating

In case of low engine room temperature, it can be difficult to keep the cylinder oil temperature at 45°C at the MAN B&W Alpha Lubricator, mounted on the hydraulic cylinder.

Therefore the cylinder oil pipe from the small tank for heater element in the vessel, Fig. 9.02.02a, or from the ACOM, Fig. 9.02.02b, and the main cylinder oil pipe on the engine is insulated and electrically heated.

The engine builder is to make the insulation and heating of the main cylinder oil pipe on the engine. Moreover, the engine builder is to mount the terminal box and the thermostat on the engine, see Fig. 9.02.03.

The ship yard is to make the insulation of the cylinder oil pipe in the engine room. The heating cable is to be mounted from the small tank for heater element or the ACOM to the terminal box on the engine, see Figs. 9.02.02a and 02b.

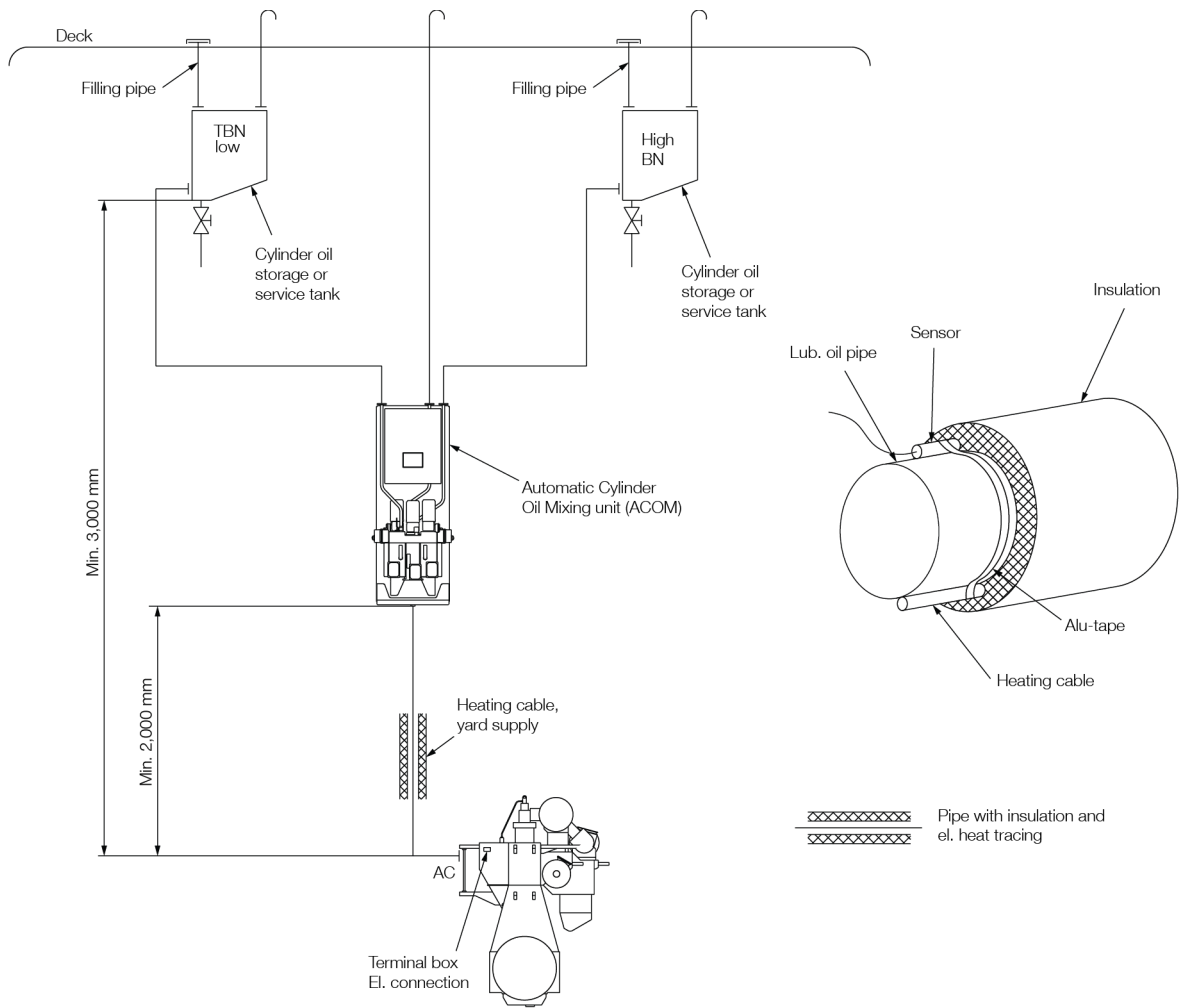


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Fig. 9.02.02a: Cylinder lubricating oil system with dual storage and service tanks

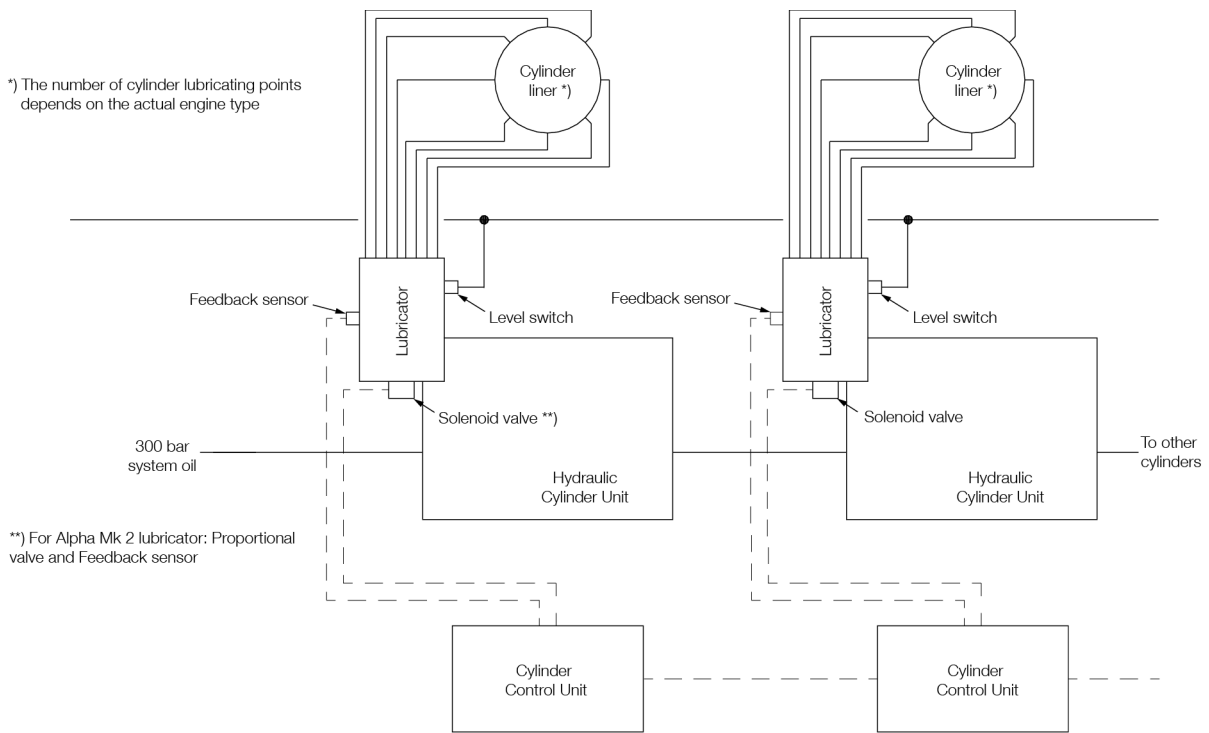
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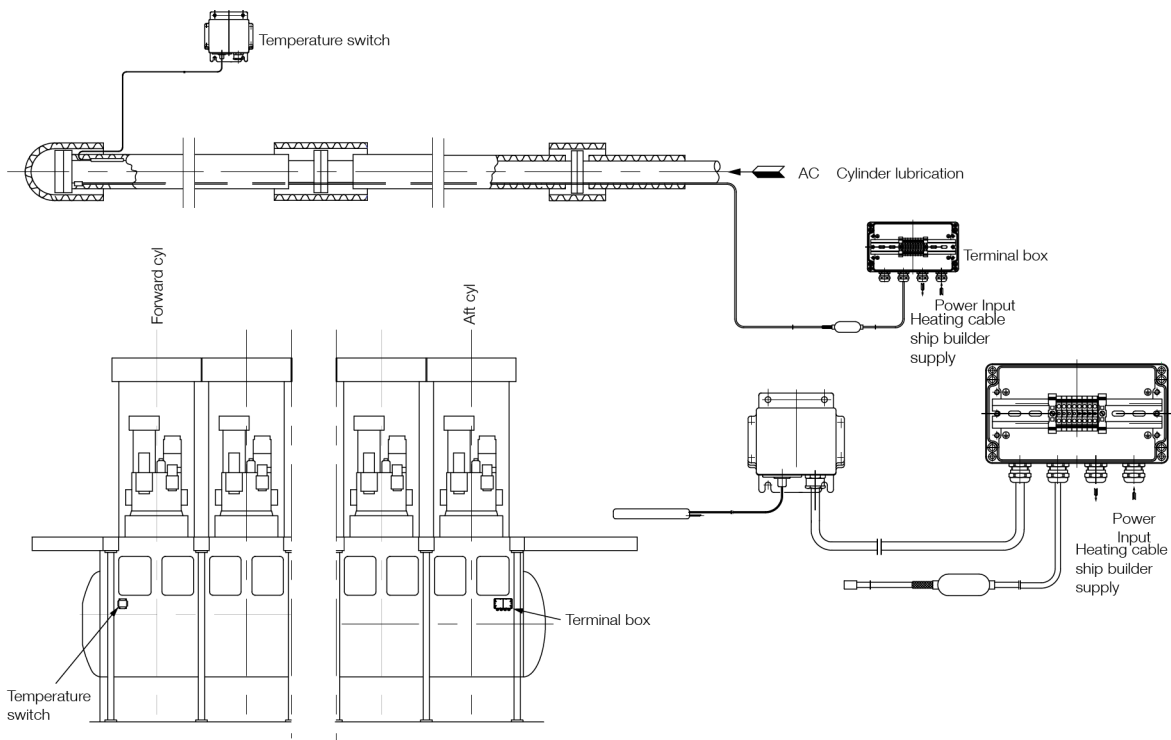
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Fig. 9.02.02b: Cylinder lubricating oil system with dual storage or service tanks and ACOM



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Fig. 9.02.02c: Cylinder lubricating oil system. Example from 80/70/65ME-C/-GI/-LGI engines

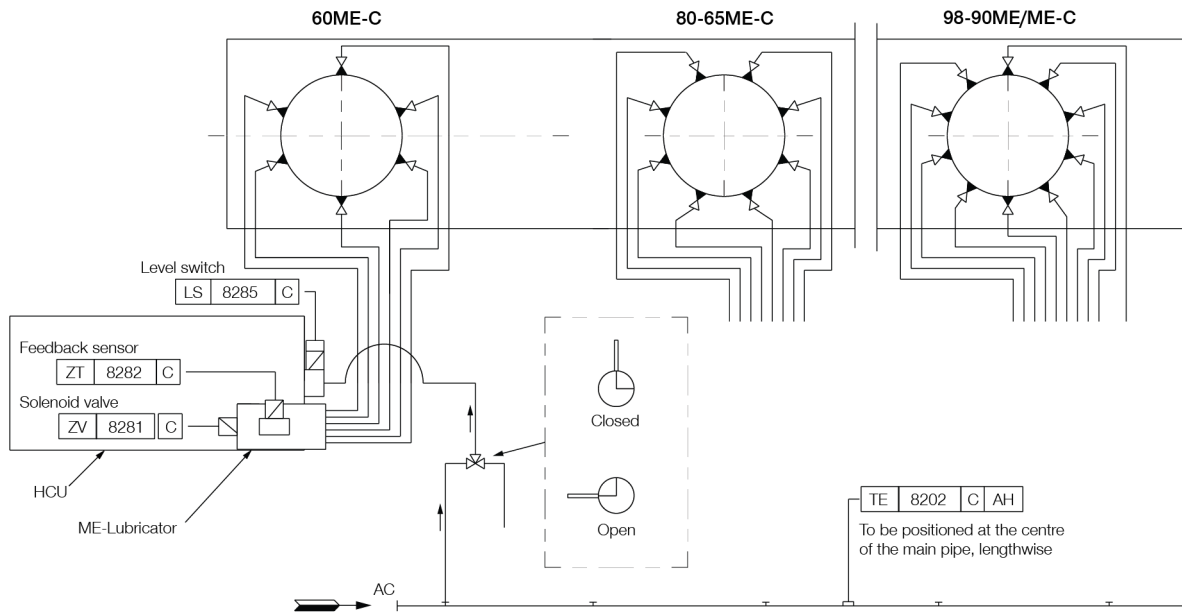


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Fig. 9.02.03: Electric heating of cylinder oil pipes

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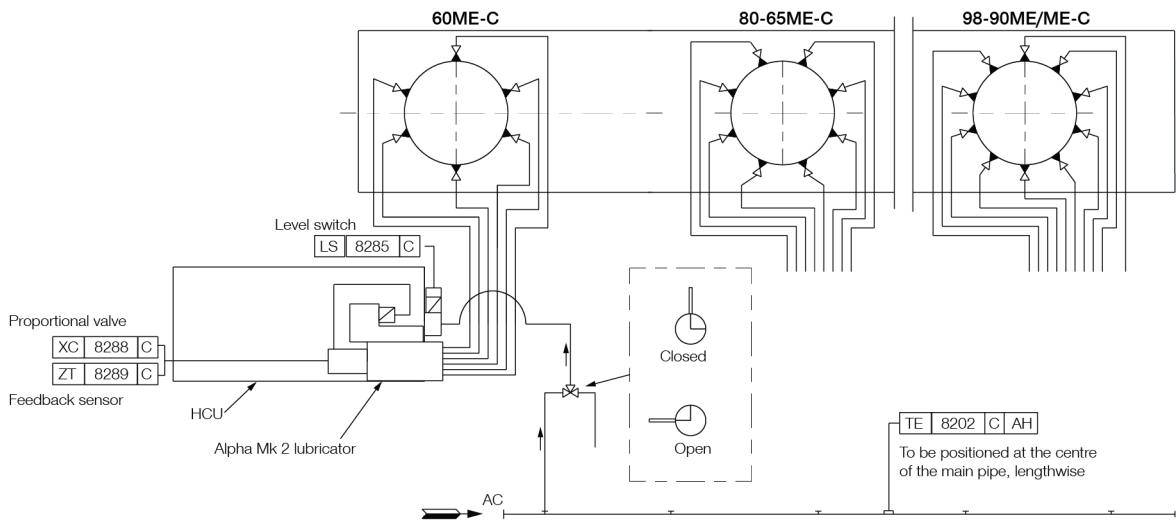
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The item no. refer to 'Guidance Values Automation'. The letters refer to list of 'Counterflanges'

Fig. 9.02.04a: Cylinder lubricating oil pipes, Alpha/ME lubricator

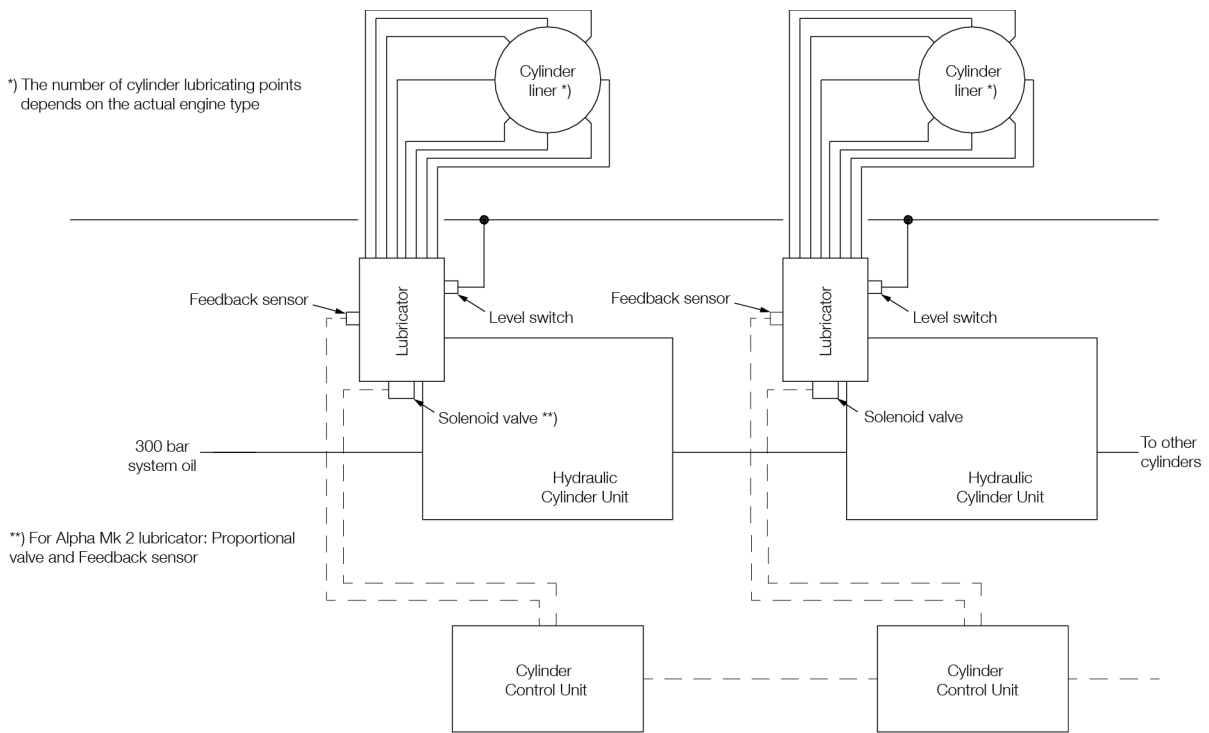


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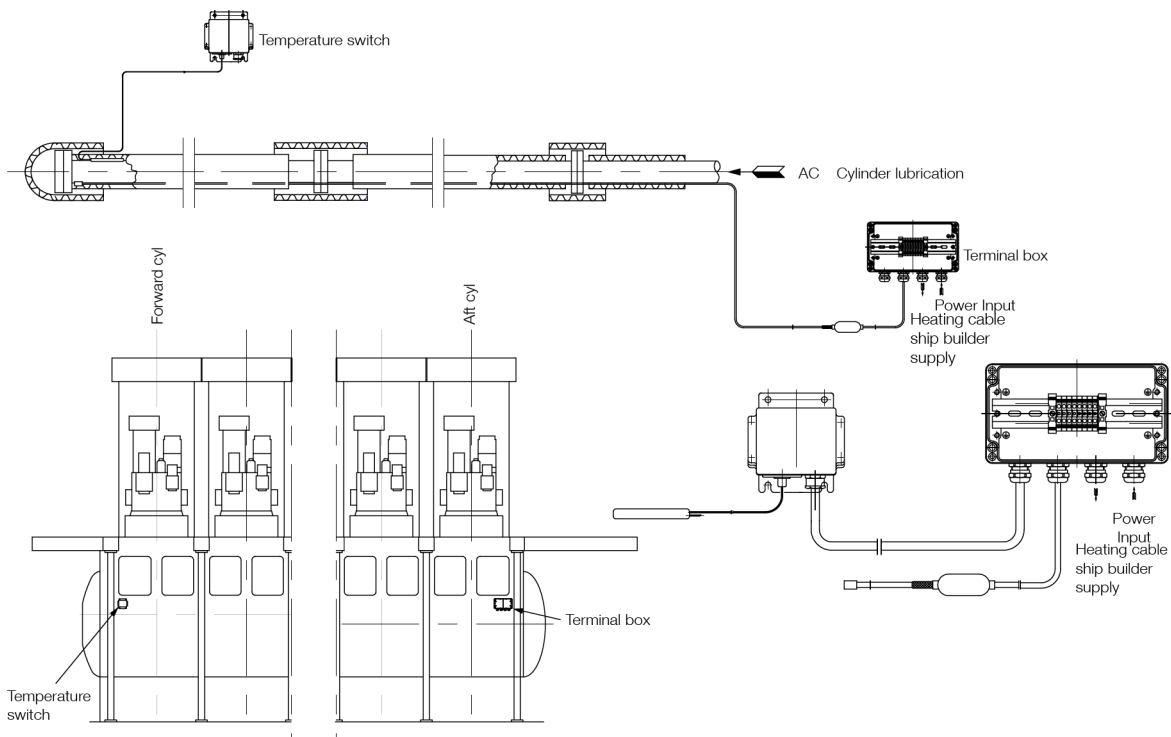
Fig. 9.02.04b: Cylinder lubricating oil pipes, Alpha Mk 2 lubricator

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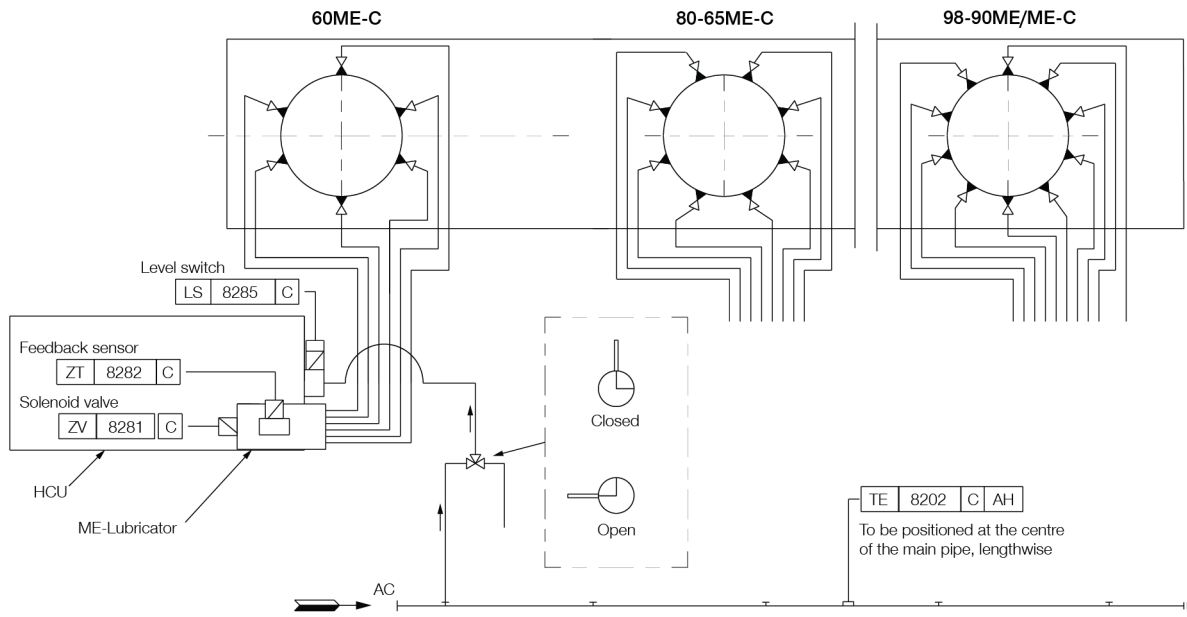
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Fig. 9.02.02c: Cylinder lubricating oil system. Example from 80/70/65ME-C/-GI/-LGI engines



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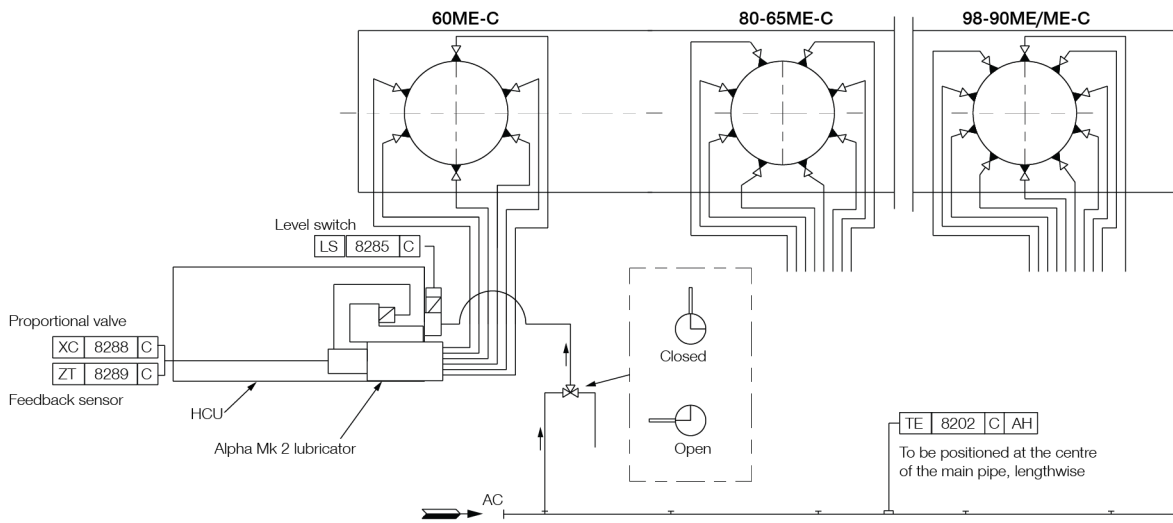
Fig. 9.02.03: Electric heating of cylinder oil pipes



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Fig. 9.02.04a: Cylinder lubricating oil pipes, Alpha/ME lubricator

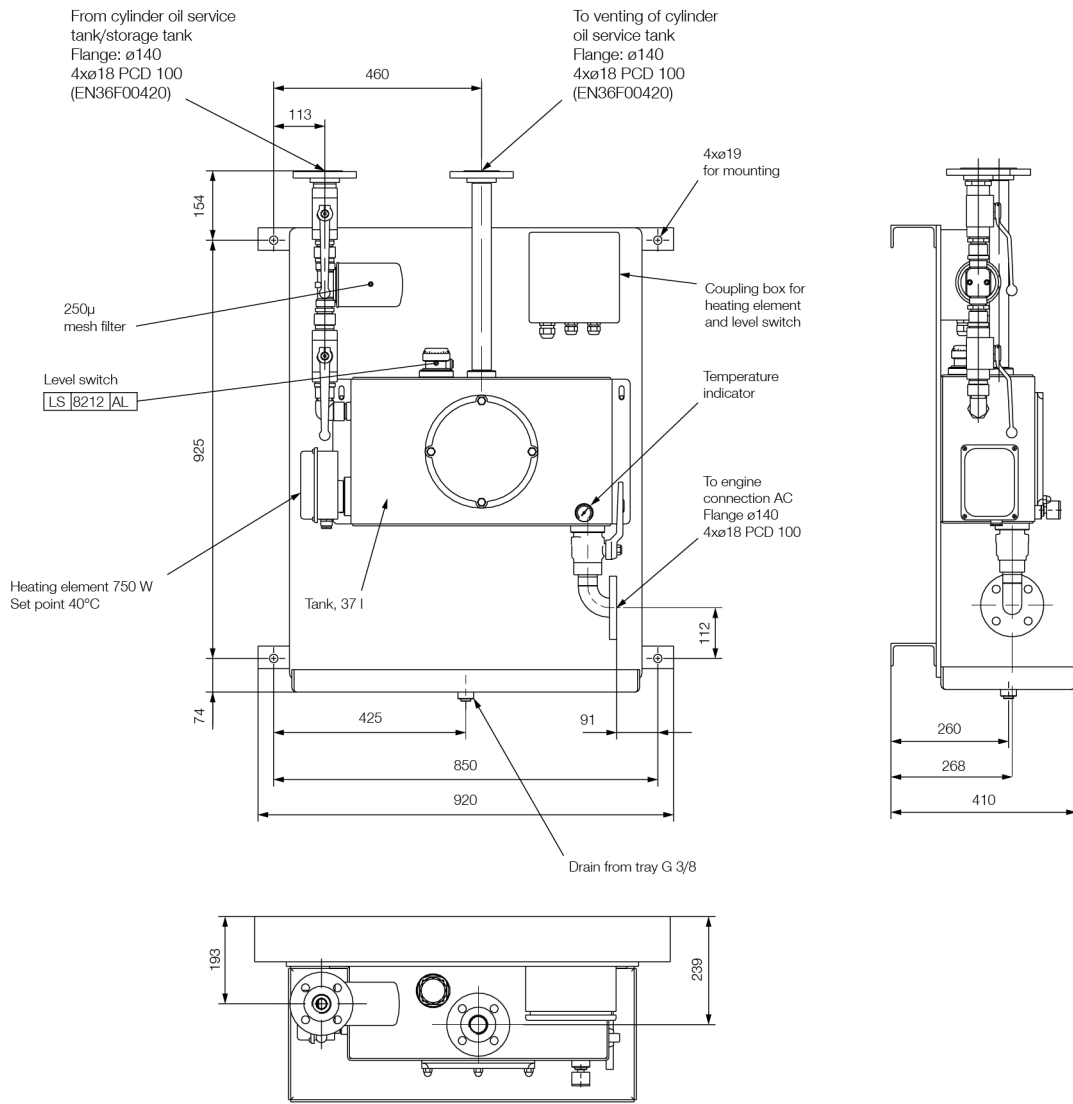


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Fig. 9.02.04b: Cylinder lubricating oil pipes, Alpha Mk 2 lubricator

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Fig. 9.02.05: Suggestion for small heating tank with filter (for engines without ACOM)