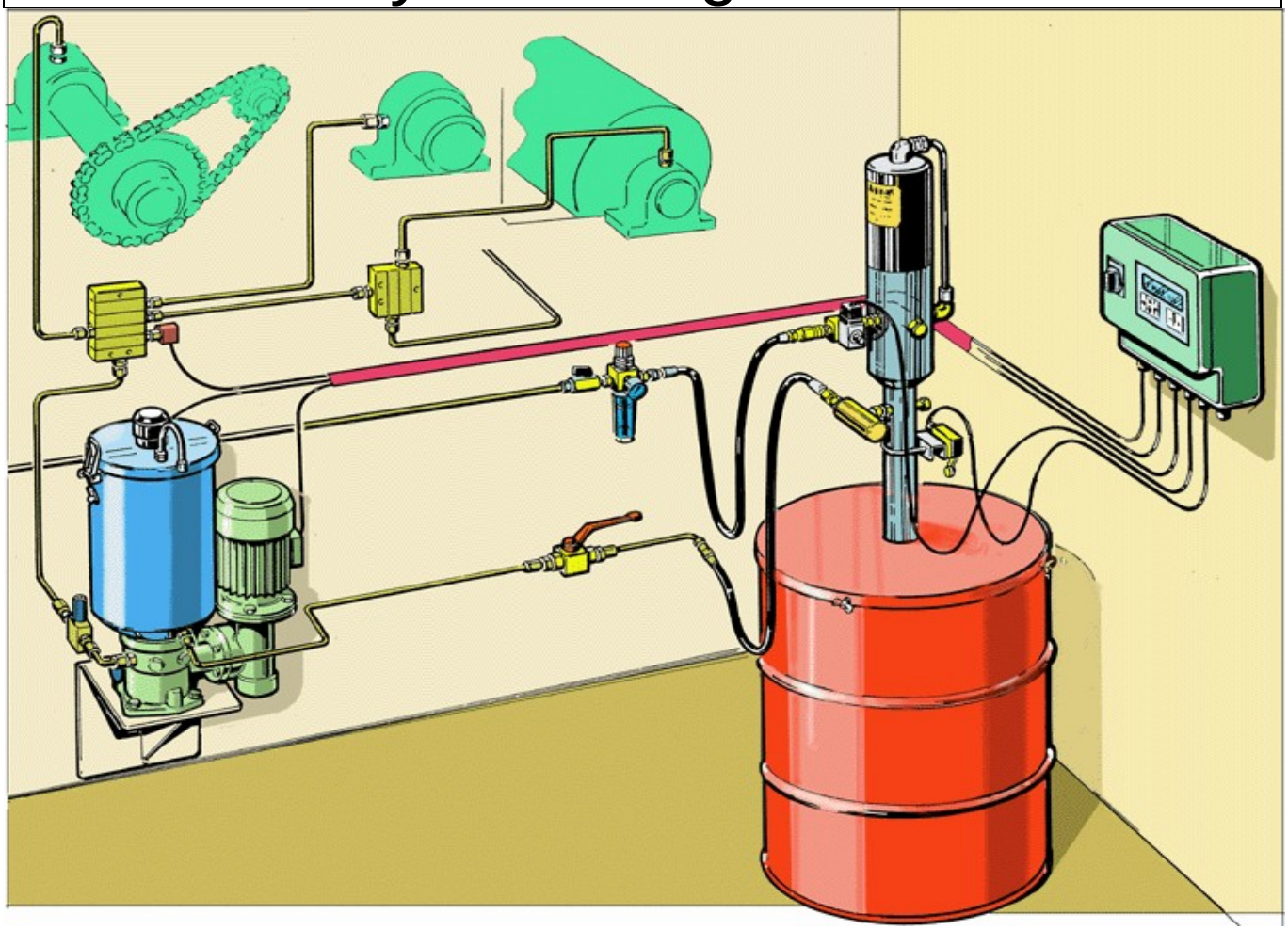
SAFELUBRIC

Multi-line system for grease lubrication



ASSALUB

Grease Lubrication

CONTENTS

1. LUBRICATORS

SELECTION

ASSALUB can offer two sturdy, reliable, electrically driven grease lubricators for multi-line systems. The unique pre-feeder utilizes a grease scraper vane and oscillating pre-feed roll which homogenize the grease and force it into the pump unit cylinder. This ensures proper filling of the cylinder even for short plunger strokes and problem-free pumping of heavy greases with penetration up to NLGI 4. Type FLM with 1 to 6 outlets is suitable for small lubrication systems with grease requirements up to approximately 0.55 cm^3 per min per outlet, and with continuous back pressure not exceeding 50 bar. Type FEM with 1 to 12 outlets is larger and more powerful and is used for lubrication systems with grease requirements up to approximately 1.4 cm^3 per min per outlet, and with continuous back pressure up to 250 bar. Both types can be supplied with grease reservoirs of different sizes, with or without electrical level transducers, for manual open replenishment or closed manual or automatic replenishment. They are driven by standard high quality electric motors. Descriptions, operation, technical data with dimensions and weights and ordering codes for each type are to be found on the following pages 2 – 7.

FLM - DESCRIPTION

The type FLM lubricator is intended for automatic lubrication of 1 – 6 directly connected lubrication points or up to 50 lubrication points with progressive distributors.
The discharge from each individual outlet is fully adjustable from 0 to 0.10 cm^3 / stroke. Sturdy, reliable design makes for very dependable operation and long life. All moving parts of the lubricator are mechanically operated. There are no valves, springs or packings.
Compact design and convenient accessories make the type FLM lubricator particularly suitable for reliable automatic lubrication of machines with a small number of lubrication points.

FLM - DESIGN AND OPERATION

The main components are:

Top section I - lubricant reservoir with pre-feed device
Centre section II - pump mechanism
Bottom section III - drive assembly

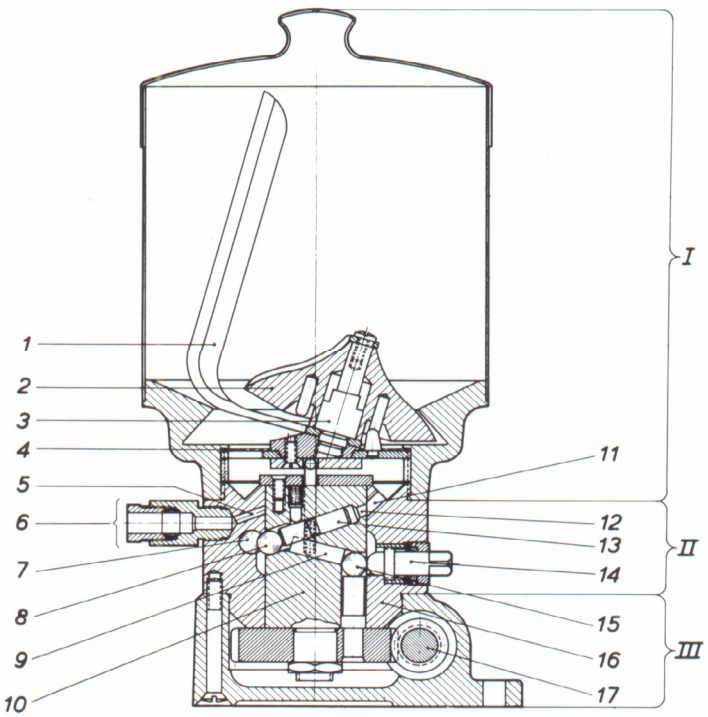


Fig. 1

When the central shaft **10** rotates, driven by shaft **17**, the pre-feeder (comprising vane **1**, pre-feed roller **2** and angled pin **3**) feeds lubricant from the reservoir down through the strainer **4** to the pump cylinder **13** via the inlet passages **11** in the pump body **16**. Fig. 1 shows the situation when the pump cylinder is being filled with lubricant.

When the central shaft continues its rotation the pressure ball **8** presses the pump plunger upwards when it passes any of the outlet pressure balls **7**. At the same time, the cylinder passage orifice **12** passes one of the outlet passages **5** in the pump body and lubricant is forced out into the line to the lubrication point via the fitting **6**. The pump plunger then makes its suction stroke through the action of pin **9** when the guide ball **15** in the central shaft engages with the setting screw **14.** Each outlet has a pressure ball **7**, a setting screw **14**, an inlet passage **11** and an outlet passage **5**. The setting screws **14** permit adjustment of the pump plunger stroke and thus of the quantity of lubricant fed to each outlet. The lubricant discharge rate set for each outlet is completely independent of the feed and back pressure at the other outlets.

FEM - DESCRIPTION

The type FEM lubricator is intended for automatic lubrication of 1 – 12 directly connected lubrication points, or up to 150 lubrication points with progressive distributors.
The discharge from each individual outlet is fully adjustable in six steps from 0 to 0.25 cm^3 per stroke. Sturdy, reliable design makes for very dependable operation and long life. All moving parts of the lubricator are mechanically operated. There are no valves, springs or packings and the pump units are easy to replace.
The type FEM lubricator is a versatile unit for reliable automatic lubrication of machines with a limited number of lubrication points.

FEM - DESIGN AND OPERATION

The main components are:

Top section I - lubricant reservoir with pre-feed device
Centre section II - pump mechanism
Bottom section III - drive assembly

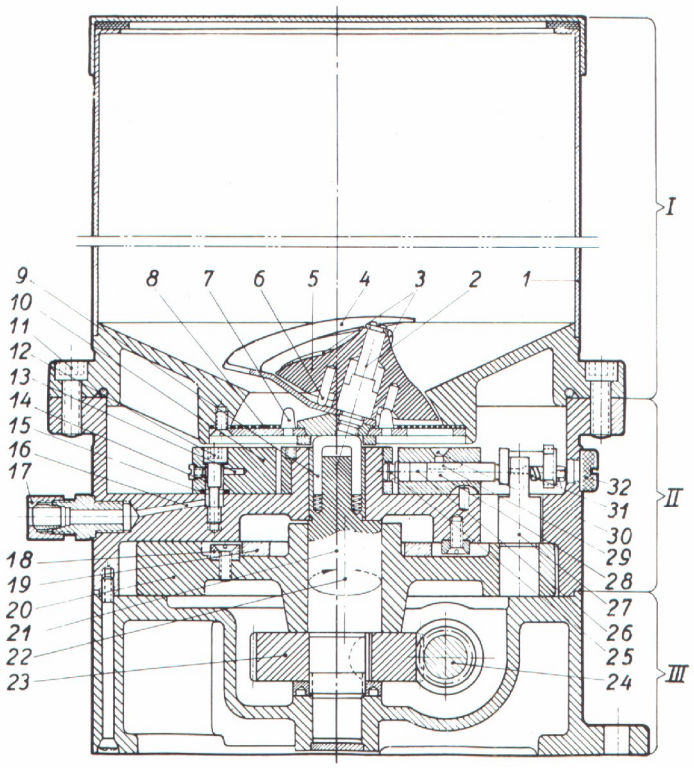


Fig. 2

When the central shaft **21** rotates, driven by shaft **24**, the pre-feeder **2 – 6** feeds lubricant from the reservoir down through the strainer **8** to the inlets **30** of the pump units **10**. At the same time, the eccentric on the central shaft and the guide plate **19** impart a plane-parallel circular motion to the pump disc **20**. By this means the pressure studs **27** give the pump plungers **28** their axial suction and compression motion, with the rotational motion at dead centre that places the pump unit cylinder **26** alternately in communication with the inlet opening **30** and the discharge connection **17** via passages **13** and **16** .

The central shaft drives the pre-feeder via the driver **9**. The pre-feeder homogenizes the grease and renders it free from air.

The discharge rate can be set individually for each outlet by adjusting the pump plunger stroke by means of the setting screw **31**. The setting screws are accessible after unscrewing the protective plugs **32**.

TECHNICAL DATA

	FLM		FEM	
Number of outlets	1 - 6		1 - 12	
Back pressure, continous (MPa)	5.0		25.0	
Back pressure, intermittent (MPa)	10.0		45.0	
Feed / pump stroke (cm^3)	0.03 - 0.10		0.05 – 0.25	
Pump strokes / min 50 Hz	5.5	2.8	1.4	0.7
Pump strokes / min 60 Hz	6.6	3.3	1.7	0.8

Surface finish	standard	Priming coat 30 µm (alkyd paint) Finish coat silver grey 30 µm (alkyd paint)
	corrosive environment	Priming coat 15 µm (epoxy ester)
		Finishing coat silver grey 100 - 150 µm (oxiran ester)

ELECTRICAL DATA - MOTORS TO IEC 34 - 1 , MANUFACTURED BY BROOK CROMPTON

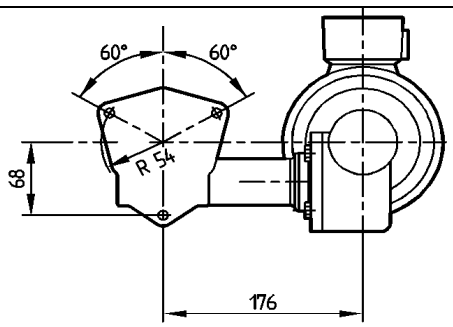
Insulation class	F		
Protection class	IP 55		
			Voltage code
Voltages	3 x 220 - 240 / 380 - 420 V	50 Hz	1
	3 x 250 - 275 / 440 - 480 V	60 Hz	1
	3 x 500 V	50 Hz	2
	3 x 400 / 690 V	50 Hz	3
	3 x 575 V	60 Hz	4
	Motors of other makes, for other voltages, single-phase, operation with standby heating, Nema or CSA approval, etc. are available on special request.		9
Power rating, rpm	0.18 kW / 1370 rpm	50 Hz	
	0.21 kW / 1680 rpm	60 Hz	
	0.25 kW / 2810 rpm	50 Hz	
	0.28 kW / 3370 rpm	60 Hz	

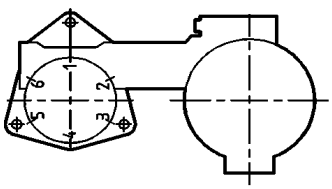
DIMENSIONS AND WEIGHTS

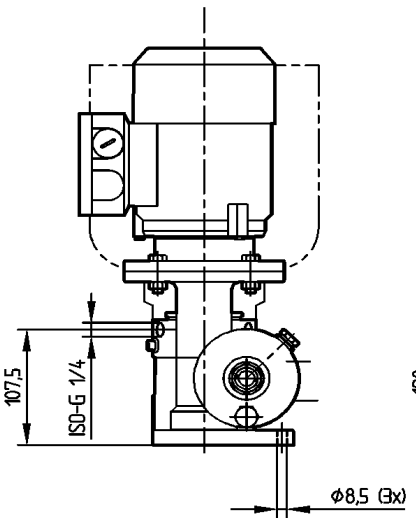
TYPE FLM - RESERVOIR EXCLUDED

Weight (including motor) : 16 kg

The outlets have priority in the following order:
1,6,5,4,3,2.
For example, a lubricator with 3 outlets will have outlets 1,6 and 5.
Outlets not required are plugged at the factory.







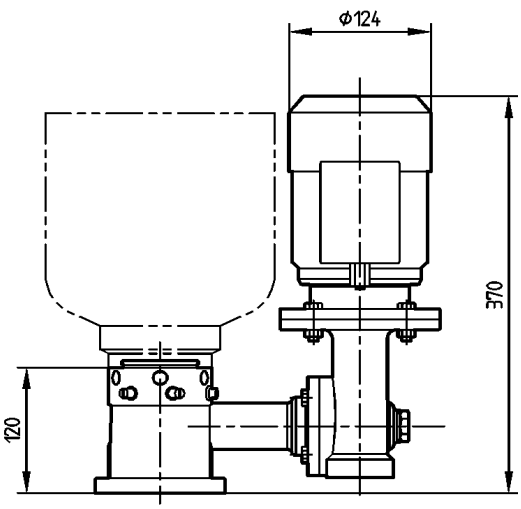


Fig. 3

TYPE FEM - RESERVOIR EXCLUDED

Weight (including motor) : 31 kg

Location of outlets:
The outlets have priority in the following order: 1, 12, 2, 11, 10, 9, 8, 7, 6, 5, 3, 4.
For example, a lubricator with 4 outlets will have outlets 1, 12, 2, 11.
Outlets not required are plugged at the factory.

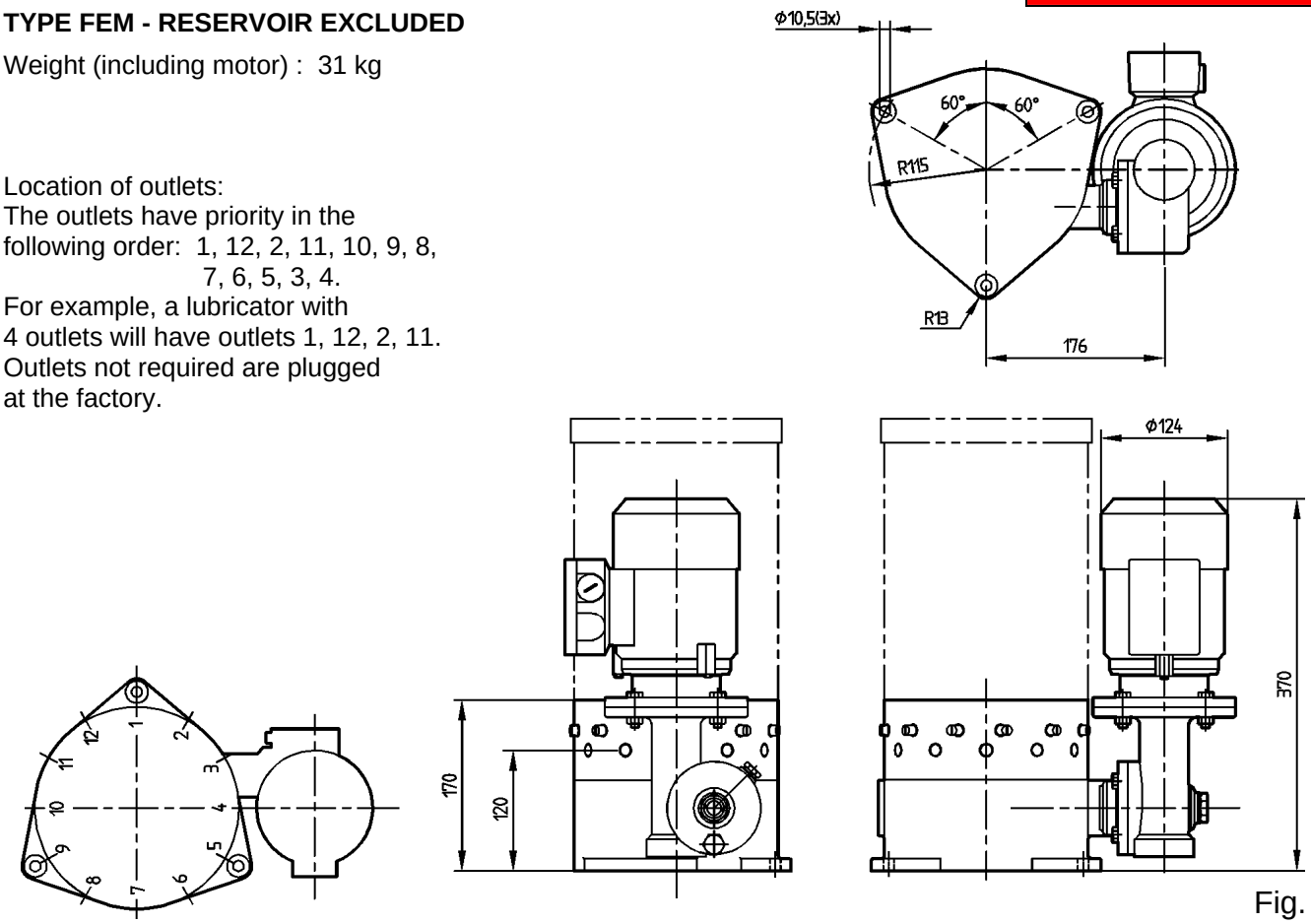


Fig. 4

RESERVOIRS

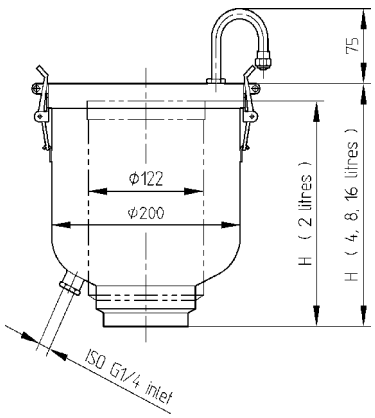


Fig. 5

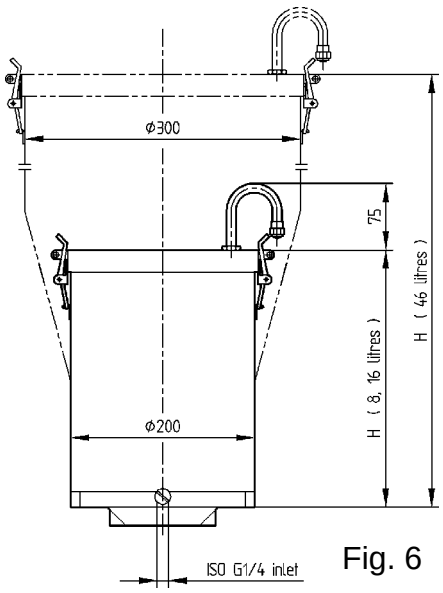


Fig. 6

Type FLM - standard reservoir, manual replenishment			
Volume (litres)	Weight (kg)	Height H (mm)	Reservoir code
2	2.5	220	2S
4	4.6	230	4S
8	5.7	350	8S
16	8.3	600	16S

Type FEM - standard reservoir, manual replenishment			
Volume (litres)	Weight (kg)	Height H (mm)	Reservoir code
8	7.2	280	8S
16	9.6	530	16S
46	16	830	46S

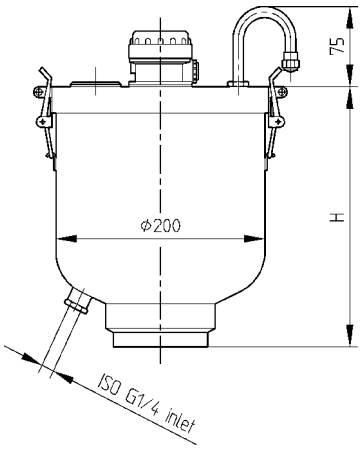


Fig. 7

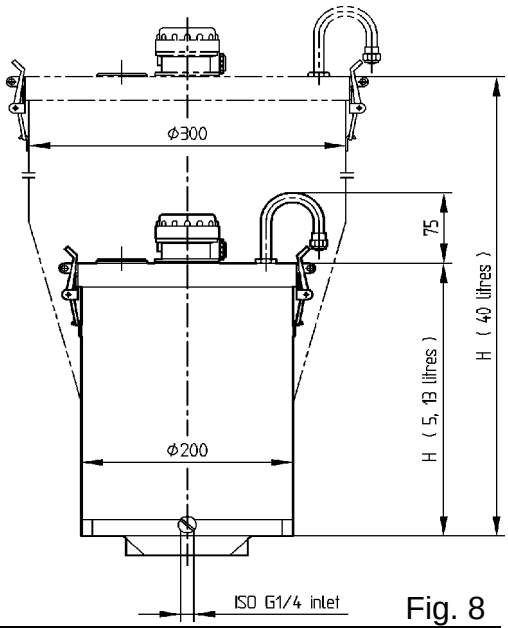


Fig. 8

Type FLM - reservoir with contacts for high, low and alarm levels			
Volume (litres)	Weight (kg)	Height H (mm)	Reservoir code
5	5.9	350	5HLA
13	8.5	600	13HLA

Type FEM - reservoir with contacts for high, low and alarm levels			
Volume (litres)	Weight (kg)	Height H (mm)	Reservoir code
5	7.4	280	5HLA
13	9.8	530	13HLA
40	16	830	40HLA

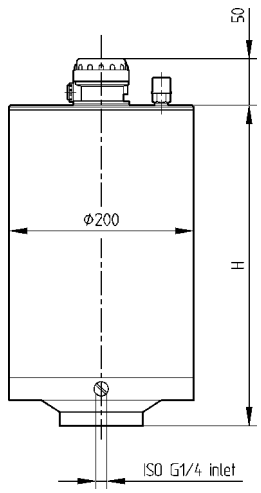


Fig. 9

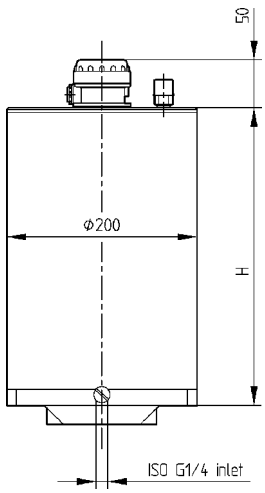


Fig. 10

Type FLM - reservoir with contacts for high, low and alarm levels, enclosed design for marine environment etc.			
Volume (l)	Weight (kg)	Height H (mm)	Reservoir code
5	8	350	5HLAM

Type FEM - reservoir with contacts for high, low and alarm levels, enclosed design for marine environment etc.			
Volume (l)	Weight (kg)	Height H (mm)	Reservoir code
5	8	315	5HLAM

CONTACT LEVEL VOLUMES

	Reservoir code			
	5HLA	5HLAM	13HLA	40HLA
Usable volume between high and low levels (litres)	3.5	3.5	11	38
Reserve volume between low and alarm levels (litres)	1	1	1	2
Residual volume at alarm level (litres)	0.5	0.2	0.5	1

ELECTRICAL DATA FOR RESERVOIR LEVEL TRANSDUCER

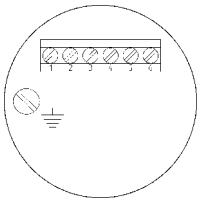


Fig. 11

1, 2	Alarm contact	closes at alarm level
3, 4	Lower contact	closes at low level
5, 6	Upper contact	closes at high level

Max. power rating:	50 VA
Max. voltage rating:	300 V
Max. current rating:	3 A
Protection class:	IP 67
Connection box:	IP 54

ORDERING CODE

[ ] - [ ] / [ ] - [ ] - [ ]

PUMP TYPE (see p. 2)
FLM — FLM
FEM — FEM

NUMBER OF OUTLETS (see p. 2-3)

1 - 6 (FLM)
1 - 12 (FEM) — 1 - 12

RESERVOIR CODE (see pp. 5-6)
Standard reservoirs, manual replenishment

2 litres (FLM)	2S
4 litres (FLM)	4S
8 litres (FLM, FEM)	8S
16 litres (FLM, FEM)	16S
46 litres (FEM)	46S

Reservoirs with contacts for high, low and alarm levels

5 litres (FLM, FEM)	5HLA
13 litres (FLM, FEM)	13HLA
40 litres (FEM)	40HLA

Reservoirs with contacts for high, low and alarm levels
enclosed design for marine environment etc.

5,0 litres (FLM, FEM)	5HLAM

NUMBER OF PUMP STROKES / MIN. (see p. 3)
50 Hz

0.7	0.7
1.4	1.4
2.8	2.8
5.6	5.6

60 Hz

0.8	0.8
1.7	1.7
3.3	3.3
6.6	6.6

VOLTAGE CODE (see p. 4)

3 x 220 - 240 / 380 - 420 V 50 Hz	1
3 x 250 - 275 / 440 - 480 V 60 Hz	1
3 x 500 V 50 Hz	2
3 x 400 / 690 V 50 Hz	3
3 x 575 V 60 Hz	4
Special	9

Example: FLM - 4 / 13HLA - 2.8 - 1

In addition to the above data, the desired outlet locations in accordance with Fig. 3 / p. 4 (FLM) or Fig. 4 / p. 5 (FEM) and pipe diameters for the outlet fittings must be specified.

2. REPLENISHMENT SYSTEMS

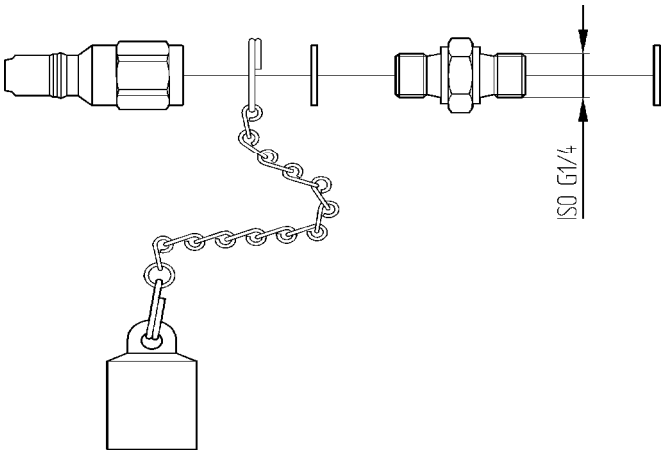


Fig. 12

Quick-release adapter 101 577

For installation in the lower part of the lubricator reservoir, which can then readily be connected to manual or motor-driven dispenser pumps.

Complete kit comprising:

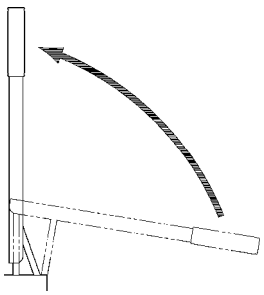
Quick-release adapter:	901 040 (TEMA 2520)
Protective cap:	901 041 (TEMA 2525)
Nipple ISO G1/4:	904 757
Packings:	900 742
(¤ Quick-release adapter body:	901 042 (TEMA 2510))
(¤ Protective plug:	901 043 (TEMA 2515))

(¤ **Not** included in kit 101 577)

Manual filling dispenser 101 518

For manual, closed replenishment from a 16 – 20 kg standard grease bucket. Complete with drum lid and 2 m hose with quick-release adapter body (TEMA 2510) and protective plug for same (TEMA 2515). For greases with penetration up to NLGI 2.

Capacity: 40 cm^3 / pump stroke.



Pressure relief position:

Lift the pump lever to this position to facilitate connection of the quick-release adapter.

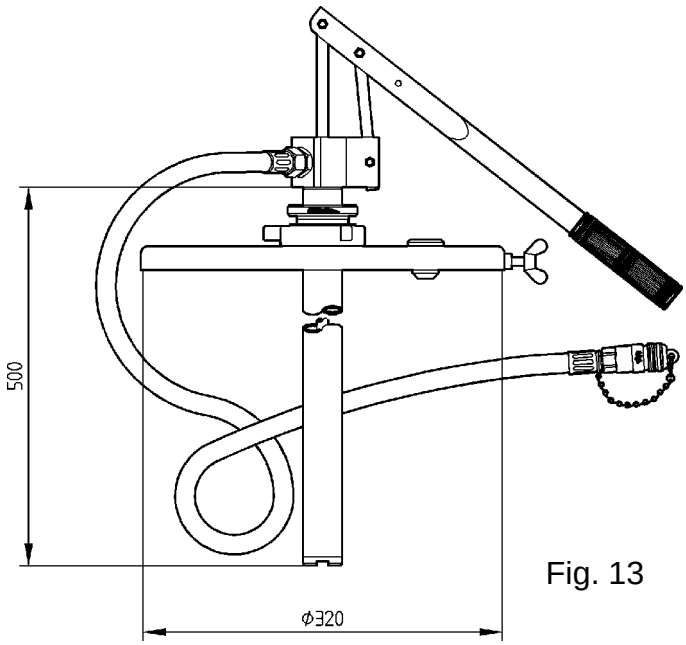
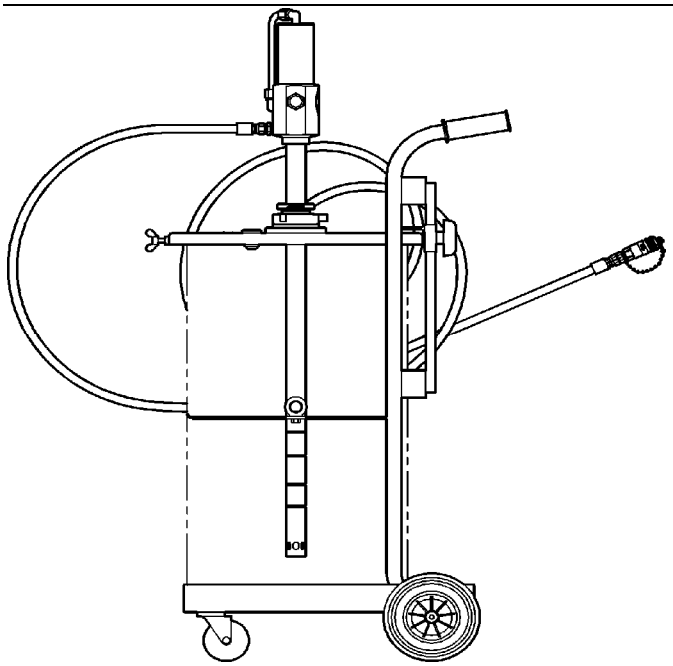


Fig. 13



Mobile grease replenishment unit

With air-operated drum-mounted pump 1:50, 2 m high-pressure hose with quick-release adapter body (TEMA 2510), protective plug for same (TEMA 2515), drum lid and follower plate mounted on zinc plated trolley with rubber wheels.

For 16-20 kg grease bucket	Part No. **0102222**
For 1/4 drum	Part No. **0102223**
Air connection:	ISO G1/4

Pump capacity and air consumption as per Fig. 18 / p. 10.

Fig. 14

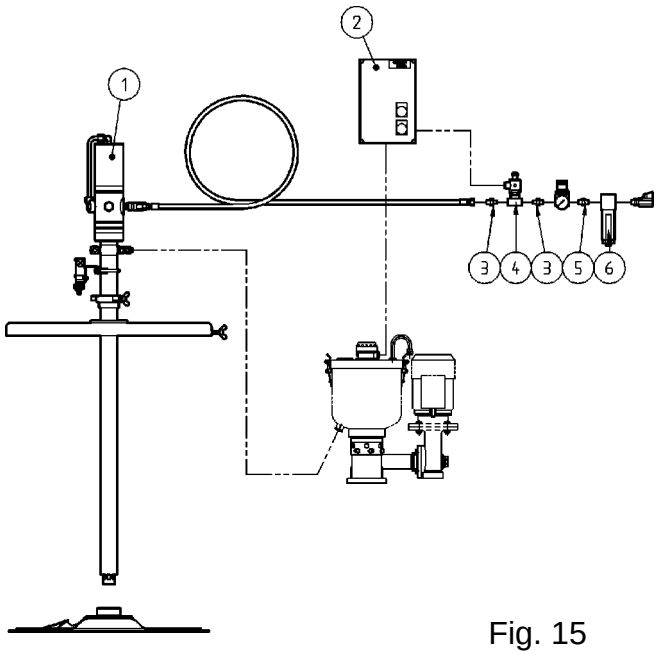


Fig. 15

System for automatic replenishment of one lubricator

POS	PART NO.	DESCRIPTION
1	200049 or	Pump equipment 1:65 1/1 drum
	200048	Pump equipment 1:65 1/4 drum
2	101 318	Level monitor unit
3	904 128	Adapter ISO G1/4 - ISO G1/8
4	101 311	Solenoid valve 220 V AC
5	3201087	Adapter ISO G1/4 - ISO G1/4
6	0230446	Filter / water separator

Pump capacity and air consumption as per Fig 19 / p. 10.

Required ceiling height: 1/1-drum: 2.2 m
1/4-drum: 1.8 m

System for automatic replenishment of several lubricators

POS	PART NO.	DESCRIPTION
1	200049 or	Pump equipment 1:65 1/1 drum
	200048	Pump equipment 1:65 1/4 drum
2	902 974 or	Solenoid valve 24 V DC
	903 005	Solenoid valve 220 V AC
3	904 128	Adapter ISO G1/4 - ISO G1/8
4	101 310 or	Solenoid valve 24 V DC
	101 311	Solenoid valve 220 V AC
5	3201087	Adapter ISO G1/4 - ISO G1/4
6	0230446	Filter / water separator

Pump capacity and air consumption as per Fig. 19 / p. 10.

Required ceiling height: 1/1 drum: 2.2 m
1/4 drum: 1.8 m

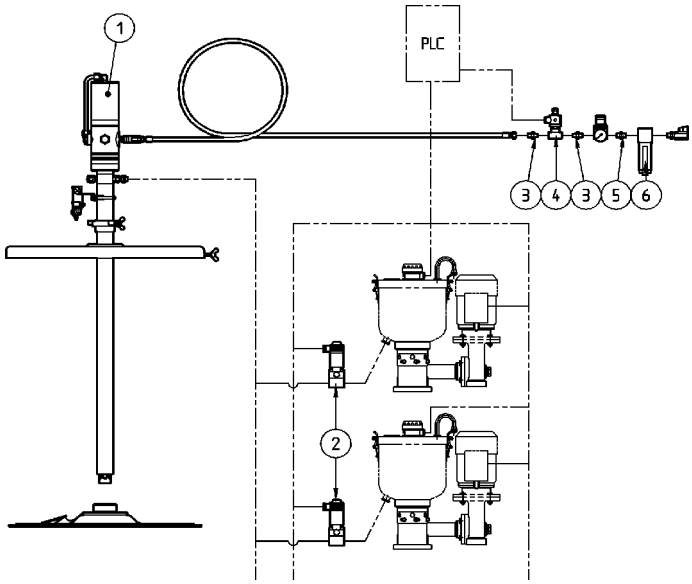
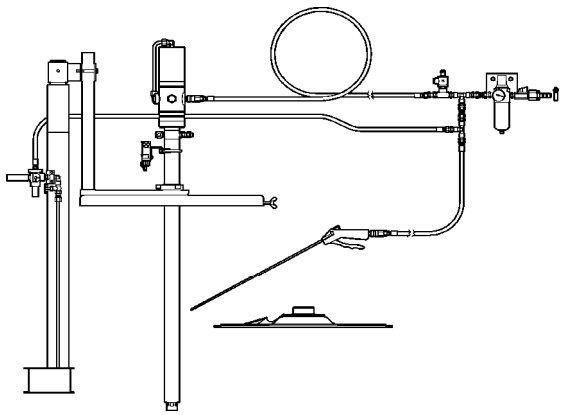


Fig. 16



Dispensing equipment for 1/1 drum 101 700

Complete with pump, pump hoist, drum lid and follower plate, low-level monitor, operating valve, air gun, air-processing unit and air hoses.

Pump capacity and air consumption as per Fig. 19 / p. 10.

Fig. 17

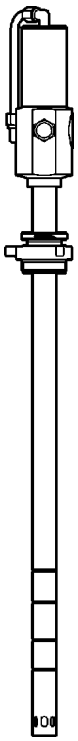
GENERAL DATA:

Pump capacity and air consumption

Grease pump	Pressure ratio 1:50
20 kg bucket:	Part No. **0102176** (included in 0102222)
1/4 drum:	Part No. **0102177** (included in 0102223)

Example: (marked red in the diagram)

At 6 bar air pressure and 95 bar back pressure the pump will need 6.2 litres air / sec. and feed 760 grams grease / min.



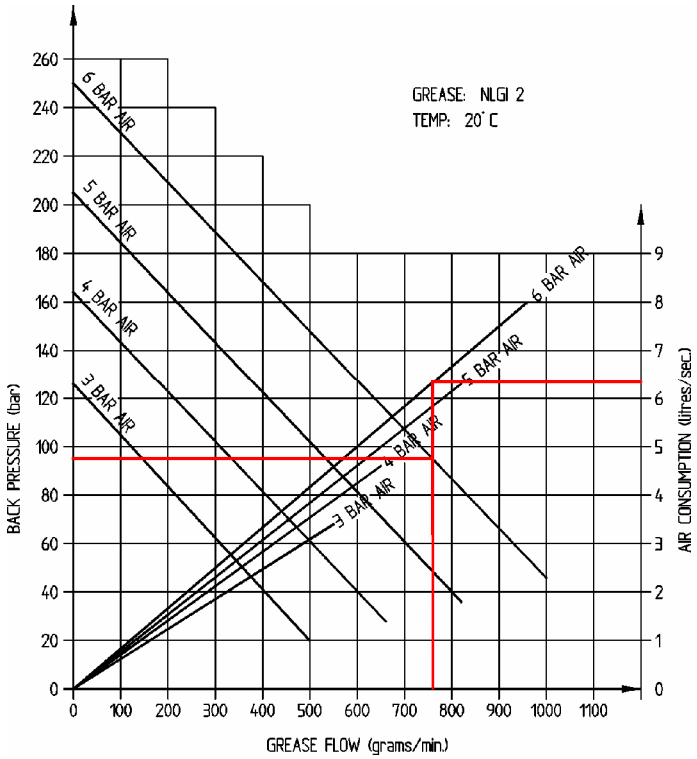
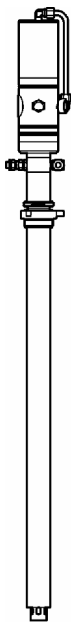


Fig. 18

Pump capacity and air consumption

Grease pump	Pressure ratio 1:65
1/4 drum:	Part No. **0102094** (included in 200048)
1/1 drum:	Part No. **0102093** (included in 200049)



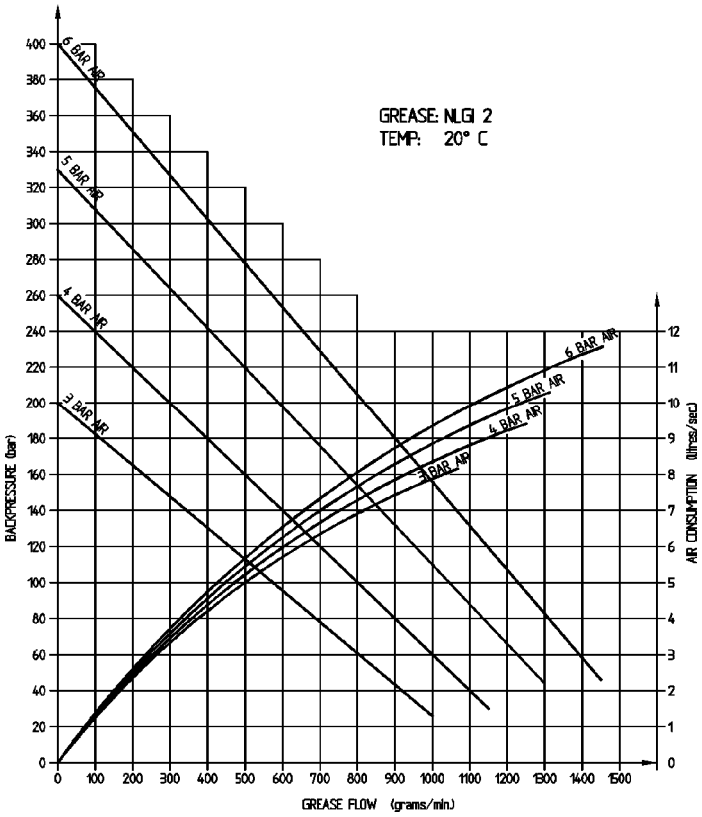


Fig.19

Low-level transducer 1117069 for drum-mounted pump (included in 200048 och 200049)

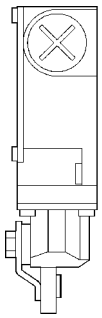


Fig. 20

Circuit-breaking capacity
AC Voltage: 240 V Current: 3.0 A
DC Voltage: 250 V Current: 0.27 A

Weight:	0.28 kg
Connection:	PG 13.5
Protection class:	IP 66

Solenoid valves 101 310 and 101 311, for air

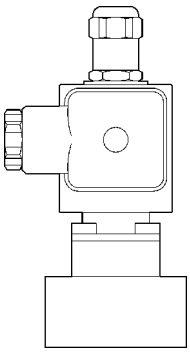


Fig. 21

101 310

Voltage:	24 V DC
Power rating:	9 W
Function:	normally closed
Connection:	ISO-G 1/8
Max. pressure:	10 Bar
Protection class:	IP 65

101 311

Voltage:	230 V AC
Power rating:	8 W
Function:	normally closed
Connection:	ISO-G 1/8
Max. pressure:	10 Bar
Protection class:	IP 65

Solenoid valves 902 974 and 903 005, for grease

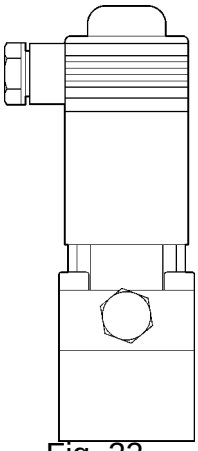


Fig. 22

902 974

Voltage:	24 V DC
Current:	0,83 A
Power rating:	20 W
Function:	normally closed
Connection:	ISO-G 1/4
Max. pressure:	700 Bar
Protection class:	IP 54

903 005

Voltage:	230 V AC
Current:	0,18 A
Power rating:	11 W
Function:	normally closed
Connection:	ISO-G 1/4
Max. pressure:	700 Bar
Protection	IP 54

Level monitor unit 101 318

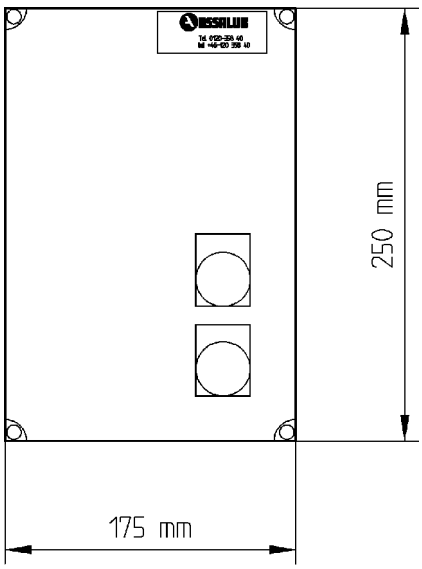


Fig. 23

This unit is connected to level transducers in reservoirs with codes HLA or HLAM and has indicator lamps with the functions described below. In the case of automatic replenishment, the relays in the level monitor unit control the solenoid valve (101 311) of the replenishing pump. In the case of electrically operated replenishment pumps the relays controlling the contactor.
There is a terminal block in the level monitor unit from which signals from the alarm level contact can be connected to a central alarm.

Voltage:	230 V AC
Frequency:	50 Hz
Feed voltage to replenishing pump:	230 V AC
Weight:	1.8 kg
Protection class:	IP 67

Operation:

Red lamp:
Comes on at low level. During replenishment it remains on until the reservoir is full and the green light comes on.

Green lamp:
Comes on at high level. During discharge it remains on until the red lamp comes on and indicates low level.

The replenishing pump solenoid valve or drive motor is operating when the red lamp is on.

3. PROGRESSIVE DISTRIBUTOR

DESCRIPTION

The progressive distributor divides up and distributes the quantity of grease fed to it into portions of equal or unequal size which are then discharged to the lubrication points connected to it. By this means a single lubricator can serve far more lubrication points than if there were a direct connection between the lubricator outlet and the lubrication point. The design and operation of the progressive distributor permit simple and reliable control and monitoring of the operation and discharged quantities in a lubrication system.

A complete distributor comprises at least three and not more than nine dosage units, together with inlet and connection units. Each dosage unit has a hydraulically controlled piston which measures and discharges the grease fed to it. The discharged quantity is determined by the diameter and stroke of the piston. Dosage units are available in six different sizes with twelve discharge quantities as tabulated under "Technical Data". The pistons of the dosage units operate in a progressive sequence one after the other, which means that each piston cannot make its stroke until the preceding piston has completed its stroke. If any piston is prevented from completing its stroke, the distributor stops immediately and ceases to operate.

When all the pistons in a distributor have made a reciprocating movement the distributor has completed a full cycle. The quantity of grease (cycle volume) that has to be fed to the distributor is dependent on the number and size of the dosage units, i.e. on their piston diameters and strokes.

Monitoring of the piston motion of only one dosage unit in a distributor enables the whole distributor or a complete lubrication system to be monitored. A microswitch or inductive transducer affected by the piston sends an electric signal to a control unit or counter for each cycle completed.

OPERATION

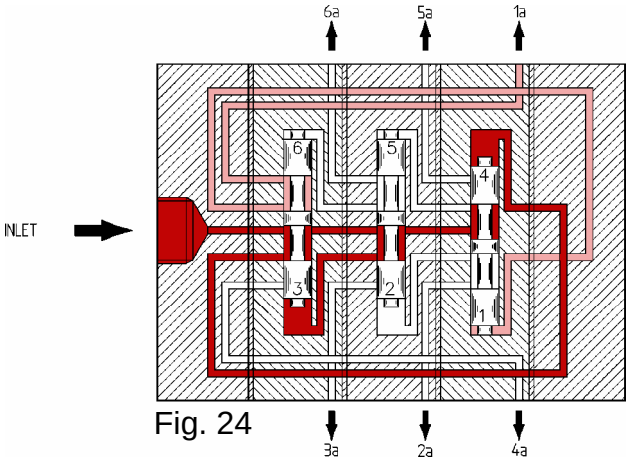


Fig. 24

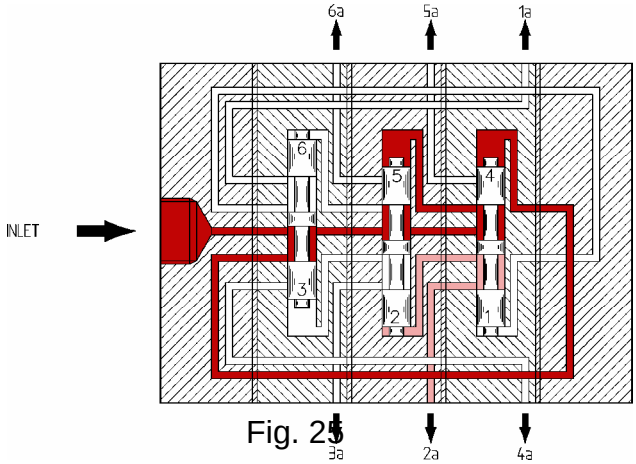


Fig. 25

Fig. 24 The pump pressure on piston end 4 then forces end 1 to discharge grease through outlet 1a. When piston 1/4 has completed its stroke, end 4 of the cylinder has been filled with a predetermined quantity of grease and the pump pressure then starts to act on piston end 5.

Fig. 25 Piston 5/2 then makes its stroke and the volume of grease under piston end 2 is discharged through outlet 2a. Then piston 6/3 starts its stroke and discharges the quantity of grease under piston end 3 through outlet 3a. The pistons will then move in the reverse direction, starting with piston 4/1. A full cycle is completed when all the pistons have made a back-and-forward stroke. The progressive sequence is repeated in subsequent cycles.

TECHNICAL DATA

Material:	Steel
Surface finish:	Zinc plated
Working pressure:	Min 10 bar, max 200 bar

Type T = 2 outlets
Type S = 1 outlet with selectable connection side

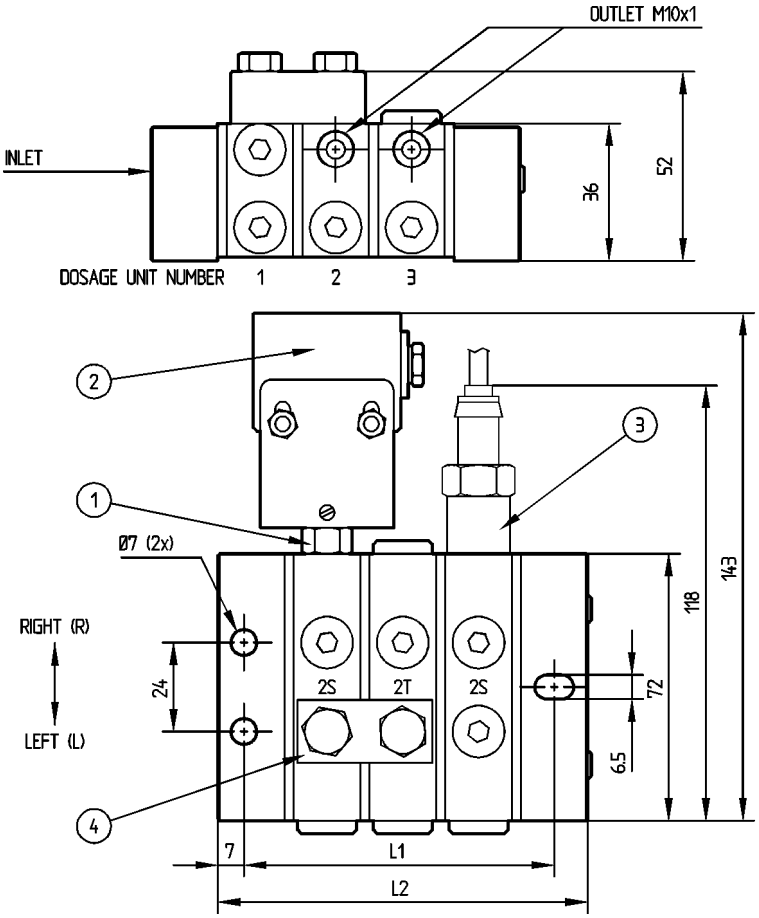
Dosage unit sizes:

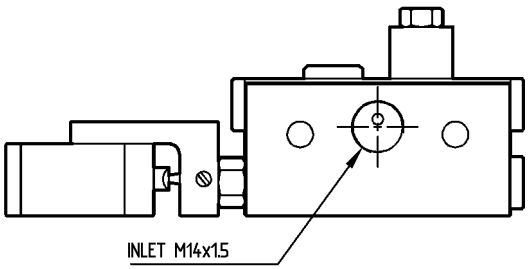
Discharge per cycle and outlet	Number of outlets	Designation of unit
0.1 cm^3	2,00	1T
0.2 cm^3	1,00	1S
0.2 cm^3	2,00	2T
0.4 cm^3	1,00	2S
0.3 cm^3	2,00	3T
0.6 cm^3	1,00	3S

Discharge per cycle and outlet	Number of outlets	Designation of unit
0.4 cm^3	2,00	4T
0.8 cm^3	1,00	4S
0.5 cm^3	2,00	5T
1.0 cm^3	1,00	5S
0.6 cm^3	2,00	6T
1.2 cm^3	1,00	6S

DIMENSIONS AND WEIGHTS

Size	Length L1 (mm) (see Fig. 26)	Length L2 (mm) (see Fig. 26)	Weight (kg)	Number of outlets
PF-2 - PF-6	84	100,00	1.8	2 - 6
PF-7 - PF-8	104,00	120,00	2.2	7 - 8
PF-9 - PF-10	124,00	140,00	2.5	9 - 10
PF-11 - PF-12	144,00	160,00	2.9	11 - 12
PF-13 - PF-14	164,00	180,00	3.1	13 -14
PF-15 - PF-16	184,00	200,00	3.4	15 -16
PF-17 - PF-18	204,00	220,00	3.7	17 - 18





POS	DESCRIPTION	DESIGNATION
1,00	Indicator pin	Zy
2,00	Microswitch	Zys *
3,00	Inductive transducer	Zyn
4,00	Cross connection	C

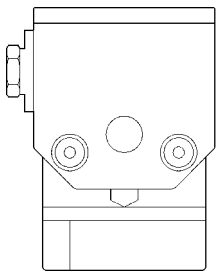
* Indicator pin assumed

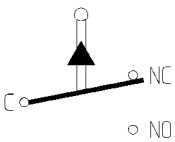
Indicator pins and microswitches are available from dosage unit size 2 (0.2 cm^3 and up).
Inductive transducers can be fitted to dosage units of all sizes.
Cross connections transfer the discharge from a unit with plugged outlet to an adjoining unit.

Fig. 26

GENERAL DATA

Microswitch 902 811

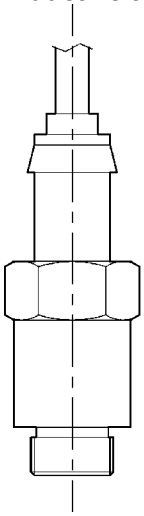




Breaking capacity:	230 V, 3 A
Contact:	1 change-over contact
Protection class:	IP 65
Electrical connection:	Solder lugs
Temperature range:	-5°C to +80 °C

Fig. 27

Inductive transducer 902 812



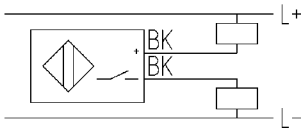


Fig. 28

Operating voltage:	10 - 36 VDC
Max. continuous load:	100 mA
Voltage drop:	< 4.6 at max. load
Current consumption:	< 1 mA
Min. load current:	> 5 mA
Switching frequency:	800 Hz
Protection class:	IP 67
Temperature range:	-25°C to +80 °C
Output:	NO
Tightening torque:	10 Nm max.
Cable length:	2 m

ORDERING CODE

PF- X / X X - X X - X X +

- Number of outlets
- First dosage unit
- Second dosage unit
- For indicator pin — add "Zy"
- For microswitch — add "Zy + Zys"
- For cross connection — add "C"
- For inductive cycle transducer — Ad "Zyn"

S = Single (one outlet)
T = Tandem (two outlets)

Discharge / outlet in 0,1 cm^3 with type T.
Type S discharges twice the volyme of type T with same number.

Specify location of indicator pin, microswitch, inductive transducer and cross connection by stating the dosage unit number and right (R) or left (L).

Example (refer to Fig. 26 / page 13)

PF- 3 / 2S - 2T - 2S + Zy+Zys 1R + C 1-2L

(dosage unit 1 right) (between unit 1 and 2 left)

In addition to the above, state desired pipe size in mm for inlet and outlet fittings.

4. CONTROL EQUIPMENT AND ACCESSORIES

CONTROL AND MONITORING UNIT **101 721** FOR CENTRAL LUBRICATION SYSTEMS WITH PROGRESSIVE DISTRIBUTORS

- Permits intermittent operation with preset time intervals, only lubricating when the machine is operating.
- Monitors correct operation and discharge of the system via the microswitch (inductive transducer) in the progressive distributor.
- Monitors levels in lubricator reservoir and replenishment pump drum.
- Controls automatic replenishment.
- Gives an alarm for faulty operation, excessively low level and release of motor circuit-breaker.
- Has provision for connection to a central alarm.

DESCRIPTION

When power is applied to the control unit the pump commences operation and the pre set lubrication cycles are counted. On completion the pump is stopped. The pump restarts when the pre set lubrication interval has elapsed. Should the machine be switched off during a lubrication cycle the pumping sequence will cease. When the machine is switched on the unfinished cycle will be completed.
A new lubrication cycle can be initiated at any time by selecting "Extra lubrication".

Automatic replenishment:
When the low-level contact for the lubricant reservoir closes, the output for the replenishment pump is activated and held activated until the high-level contact closes.

TECHNICAL DATA

Dimensions as shown in Fig. 29.
Weight: 2 kg

Supply voltage, control system:	115 / 230 V AC
Supply voltage, inputs:	24 V DC / 100mA
Supply voltage, outputs:	230 V 50 Hz
Power consumption:	20 VA
Protection class:	IP 55

Inputs
Machine blocking, open contact during operation
Cycle breaker, progressive distributor
High level, lubricant reservoir
Low level, lubricant reservoir
Alarm level, lubricant reservoir
Low level, lubricant drum
Motor circuit-breaker released

Outputs
Lubrication pump
Alarm buzzer
Replenishment pump

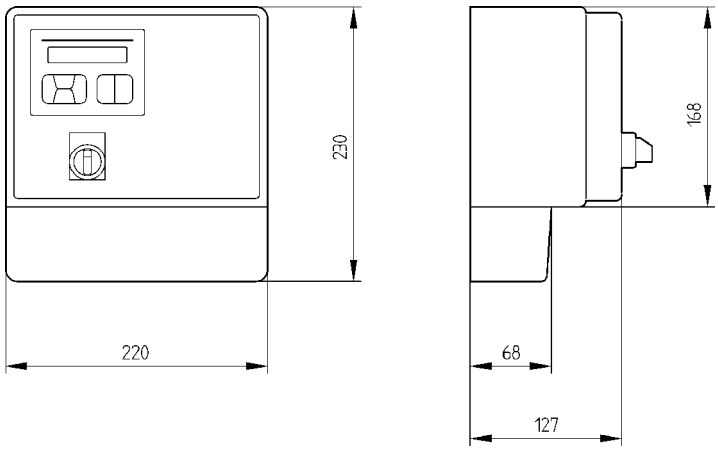


Fig. 29

Lubrication interval range	1 - 9999 minutes
Number of lubrication cycles / interval	1 - 99

ACCESSORIES

Mounting bracket 121 011, for installing lubricator type FLM or FEM

Weight: 8.5 kg

Material: galvanized steel

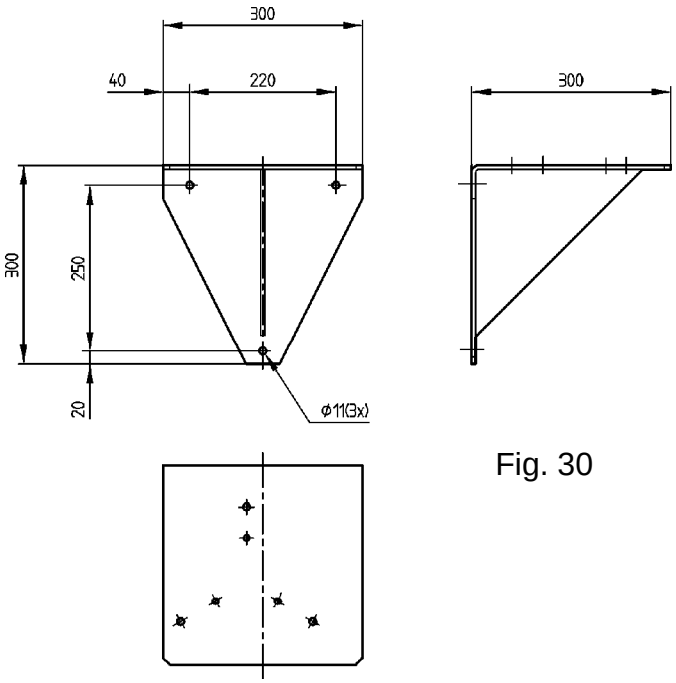
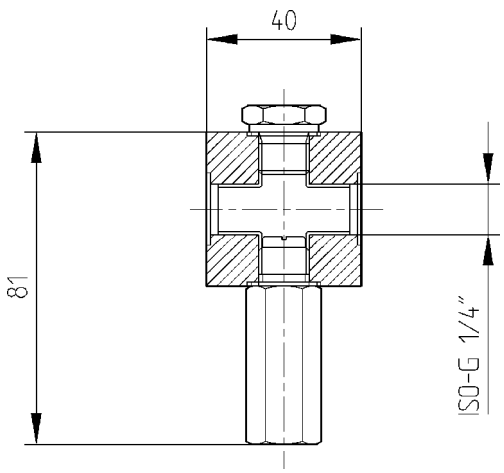


Fig. 30

Safety valve LTb 2050-3



The safety valve is installed in the lubrication line between pump and distributor. It is set to open at 100 bar and thus protects the pump from damage in the event of blockage of the lubricant distributor or line.

The opening pressure can be changed/adjusted with a hexagon wrench:
Turn clockwise to increase opening pressure.
Turn counter-clockwise to decrease opening pressure.

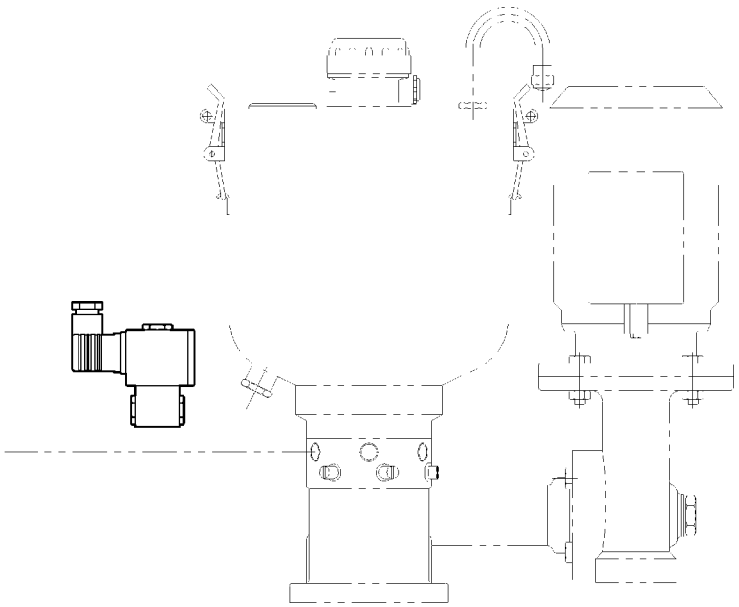
Weight: 0.4 kg

Fig. 31

Electrically controlled discharge with solenoid valve 904 542 or 904 544

For use when it is desired to shut off one or more outlets temporarily while the other outlets continue to discharge grease.

A T-connector is installed on the lubricator output pipe, with return line to the reservoir. A solenoid valve is installed in the return line. When the valve is shut grease is fed from the lubricator to the lubrication point/lubrication system. When the valve is open the grease is returned to the lubricator reservoir.
The principle is shown in Fig. 32. To special order, Assalub supply lubricators with one or more outlets equipped with T-connector, return line and solenoid valve. The desired voltage and size of the connection fitting are to be stated when ordering. The data for the solenoid valve are as shown in the following table.



904 542

Voltage:	24 V DC
Power consumption:	16 W
Function:	Normally closed
Connection:	ISO G1/4
Pressure:	40 bar
Weight:	0.6 kg

904 544

Voltage:	230 V AC
Frequency:	40 - 60 Hz
Power consumption:	10 W
Function:	Normally closed
Connection:	ISO G1/4
Pressure:	40 bar
Weight:	0.6 kg

Fig. 32

5. LAYOUT AND SIZING OF LUBRICATION SYSTEM

The following advice and instructions are intended to facilitate the choice of lubricators, progressive distributors, pipe sizes and accessories when designing grease lubrication systems with up to approximately 100 lubrication points.

- First decide on the number of lubrication points to be connected and the amount of grease required in cm^3 per operating hour or minute.
- For up to 12 lubrication points it is usually best to choose direct feed from pump outlet to lubrication point. Choose lubricator type FLM or FEM of suitable capacity, reservoir size and version depending on number of lubrication points and their grease requirements. See Fig. 33 below.
- In the case of large differences in grease requirement among lubrication points, two or more outlets on the lubricator can be connected together to an outlet line. By virtue of the design of the pump body and the pump units there is no need for non-return valves in the outlets. See Fig. 34 below.
- If it is desired to monitor the grease discharge visually or automatically the lubrication points should be coupled to one or more progressive distributors with indicator pins or cycle contacts (microswitches or inductive transducers), connected to control unit 101 721 or the PLC of the machine. See Fig. 35 below.
- Even with the smallest possible grease supply, continuous supply may lead to over-lubrication if the grease requirements are small. In such cases the lubricator must operate intermittently under the control of a timer, of control unit 101 721 or the PLC of the machine. The required quantity of grease per hour, day or week is then discharged in small portions at suitable time intervals.
- In the case of intermittent operation the discharge of grease / interval to the secondary distributor must be sufficient to ensure that there is at least one complete cycle during the interval.
  In lubricating systems with control unit 101 721 the discharge / interval is determined by the number of cycles set for the primary distributor. The pump is stopped automatically when the control and monitor unit has received that number of signals from the microswitch or the inductive transducer.

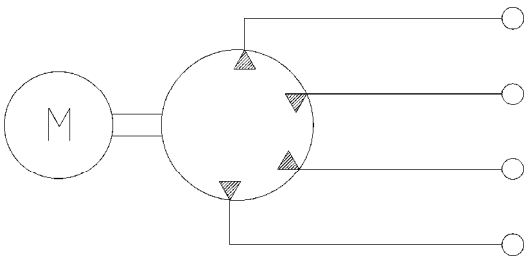


Fig. 33

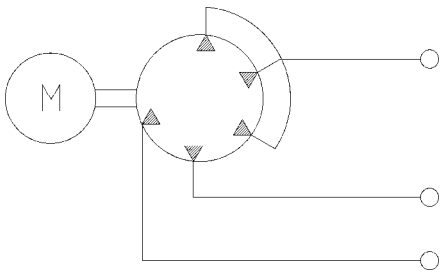


Fig. 34

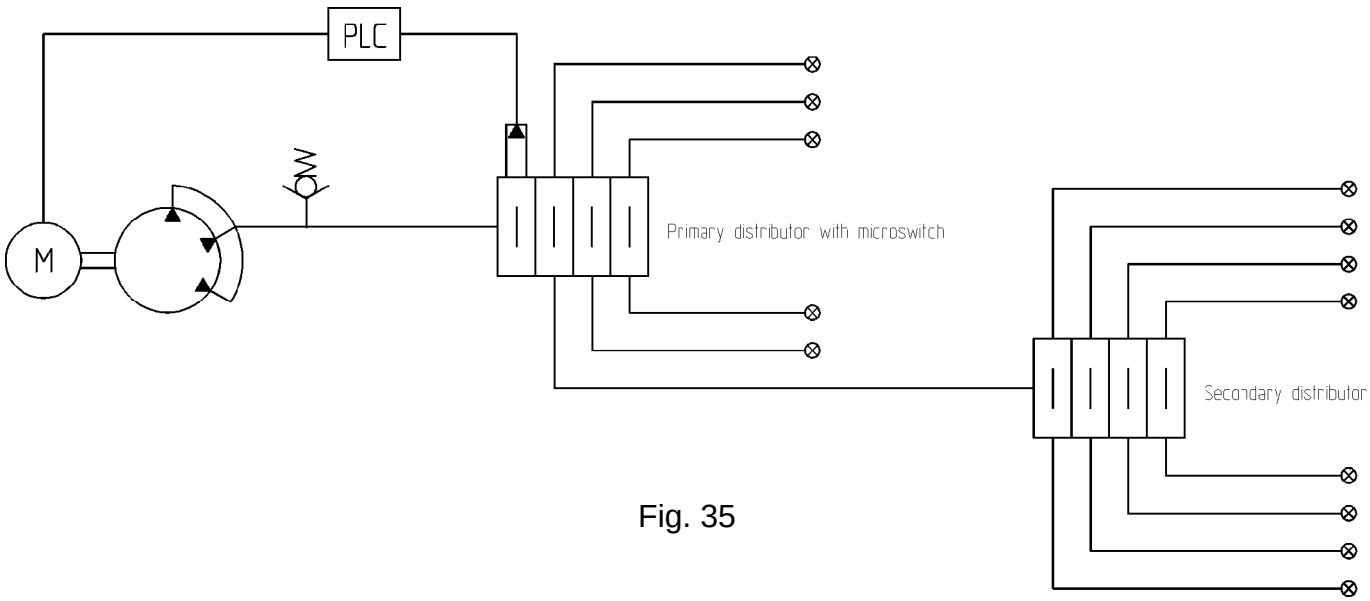


Fig. 35

LUBRICATION PRESSURE AND PIPE SIZES

The pump pressure required to overcome the total back pressure up to the lubrication point is dependent on:

- The penetration and pumpability of the grease and the temperature.
- The length and internal diameter of the pipes.
- The grease feed rate.
- The flow resistance of the progressive distributor.
- The back pressure of the lubrication points.

Together, these factors may result in the requisite pump pressure varying from approximately 1.0 MPa (10 bar) for small systems with direct connections up to approximately 20 MPa (200 bar) for large systems with primary and secondary distributors and long feed pipes to the bearings. It is therefore important not to choose pipes of too small a diameter, especially for outdoor installations with low temperatures in winter that will alter the apparent viscosity of the grease.
The following table of recommendations provides guidelines for suitable choice.

POSITION	PIPE LENGTH	PIPE SIZE
Pump - lubrication point Pump - primary distributor	< 8 m	8 x 1 mm
	8 - 15 m	10 x 1 mm or 12 x 1.5 mm
	> 15 m	12 x 1 mm or 15 x 1.5 mm
Primary distributor - secondary distributor	< 8 m	8 x 1 mm
	8 - 15 m	10 x 1 mm or 12 x 1.5 mm
	> 15 m	12 x 1 mm or 15 x 1.5 mm
Distributor - lubrication point	See below	6 x 1 mm or 8 x 1mm

If possible, install the progressive distributors in such a way that the delivery lines from them to the lubrication points are equal in length and as short as possible.

LUBRICANTS

With direct lines to the lubrication points, Assalub type FLM and FEM lubricators can distribute greases with penetration up to NLGI 4.

Lubrication systems with progressive distributors can distribute greases with penetration up to NLGI 2.

Always use high-quality, stable greases with good flow and shear characteristics and suitable for use in centralized lubricating systems.

If, as a result of open handling the grease becomes contaminated, thus reducing its life, or has air introduced into it, this will seriously adversely affect the operation of the pump and lubrication system. Therefore, we recommend that the lubricators be equipped with reservoirs for closed replenishment.

We will be happy to provide you with further advice and instructions.

6. GreaseCAD

ASSALUB GREASE LUBRICATION EQUIPMENT ON DISKETTE

As an aid to designing grease lubrication equipment for machines and process plants, Assalub can at no charge supply all the dimensioned drawings in this catalogue on diskette.

When requesting this facility, specify the desired file format: .DWG or .DXF
The files can also be downloaded at http://www.assalub.se

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