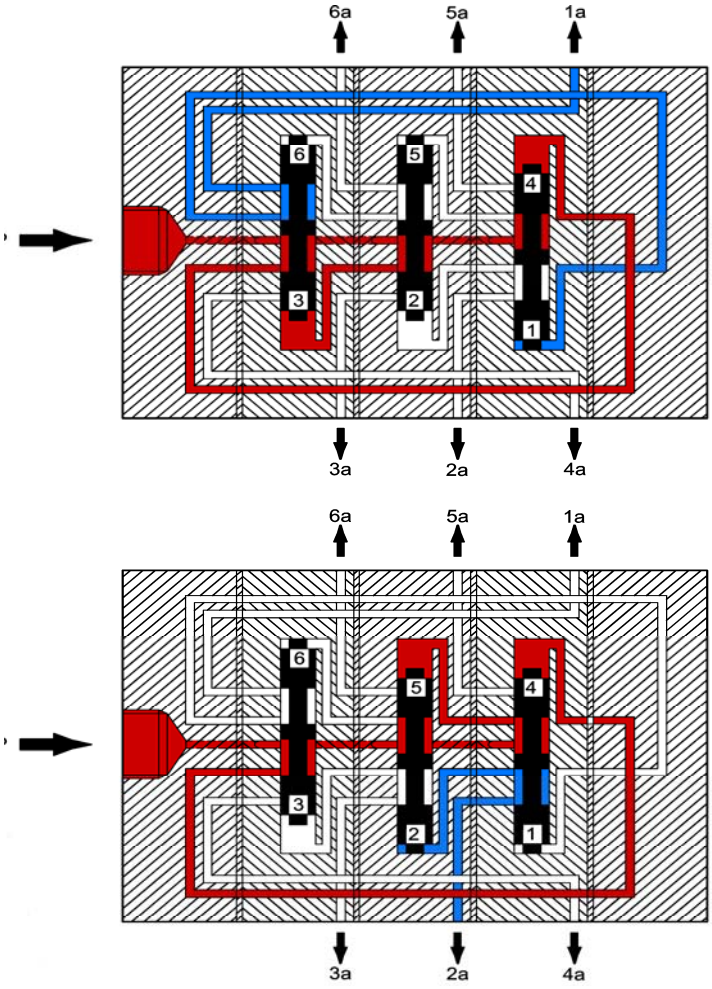
# MANUAL
# PROGRESSIVE FEEDER
# TYPE PF

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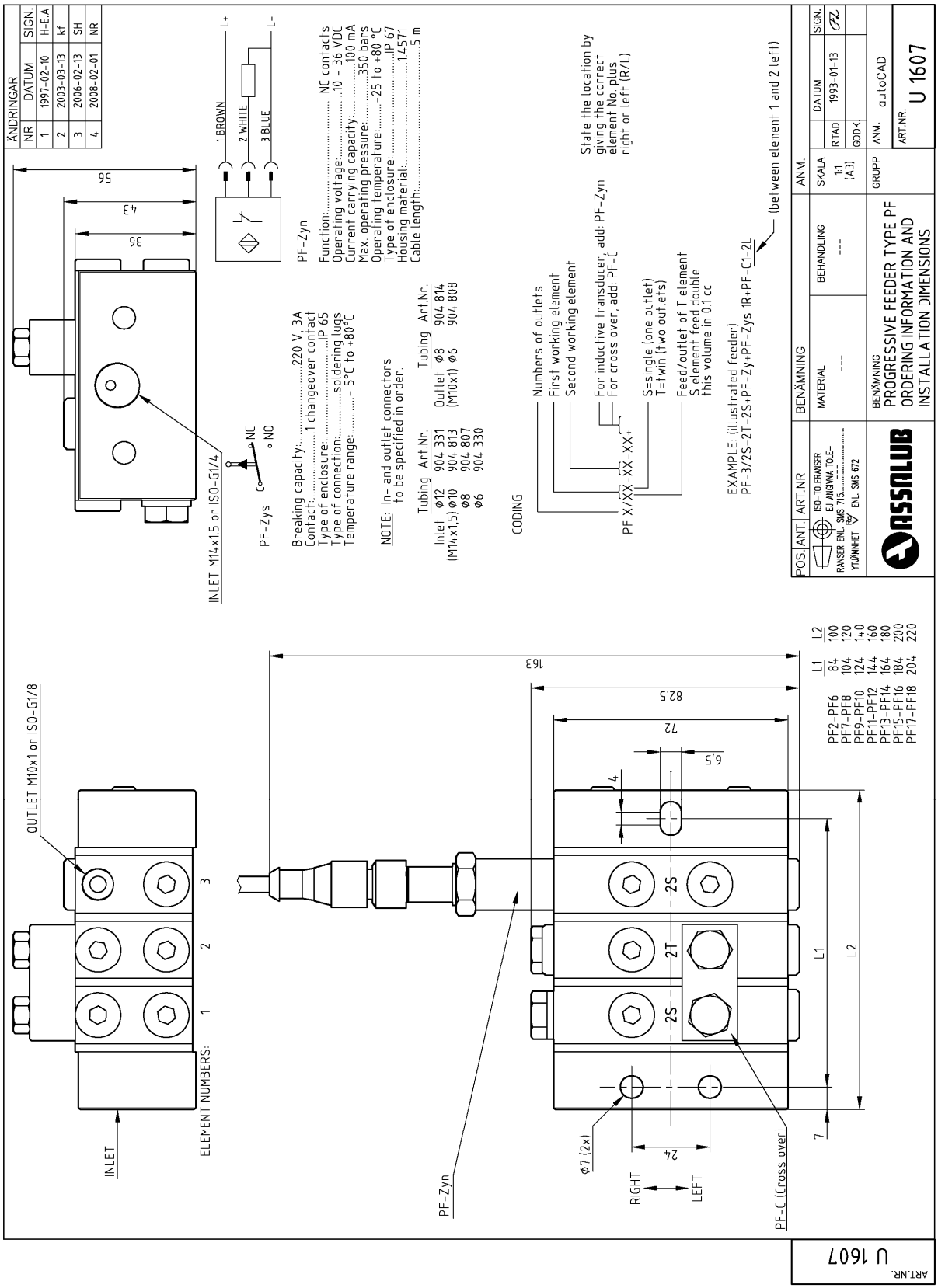

ÄNDRINGAR
NR DATUM SIGN.
1 1997-02-10 H-E.A
2 2003-03-13 kf
3 2006-02-13 SH
4 2008-02-01 NR
INLET M14x1.5 or ISO-G1/4
PF-Zys
NC
NO
1 BROWN L+
2 WHITE
3 BLUE L-
PF-Zyn
Function: NC contacts
Operating voltage: 10 - 36 VDC
Current carrying capacity: 100 mA
Max. operating pressure: 350 bars
Operating temperature: -25 to +80 °C
Type of enclosure: IP 67
Housing material: 14571
Cable length: 5 m
Breaking capacity: 220 V, 3A
Contact: 1 changeover contact
Type of enclosure: IP 65
Type of connection: soldering lugs
Temperature range: - 5°C to +80°C
NOTE: In- and outlet connectors to be specified in order.
Tubing Art.Nr. Tubing Art.Nr.
Inlet ø12 904 331 Outlet ø8 904 814
(M14x1,5) ø10 904 813 (M10x1) ø6 904 808
ø8 904 807
ø6 904 330
CODING
Numbers of outlets
First working element
Second working element
For inductive transducer, add: PF-Zyn
For cross over, add: PF-C
PF X/XX-XX-XX+
S=single (one outlet)
T=twin (two outlets)
Feed/outlet of T element
S element feed double
this volume in 0.1 cc
State the location by giving the correct element No. plus right or left (R/L)
EXAMPLE: (illustrated feeder)
PF-3/2S-2T-2S+PF-Zy+PF-Zys 1R+PF-C1-2L
(between elenent 1 and 2 left)
POS. ANT. ART.NR BENÄMNING ANM.
ISO-TOLERANSER
EJ ANGIVNA TOLERANSER ENL. SMS 715
YTJÄMNHET Ra ENL. SMS 672
MATERIAL
BEHANDLING
SKALA 1:1 (A3)
GRUPP
BENÄMNING
PROGRESSIVE FEEDER TYPE PF
ORDERING INFORMATION AND
INSTALLATION DIMENSIONS
ASSALUB
R.TAD DATUM SIGN.
1993-01-13
GODK
ANM. autoCAD
ART.NR. U 1607
ART.NR. U 1607
OUTLET M10x1 or ISO-G1/8
INLET
ELEMENT NUMBERS: 1 2 3
PF-Zyn
PF-C (Cross over)
RIGHT
LEFT
ø7 (2x)
24
7
4
6,5
72
82,5
163
L1
L2
PF2-PF6 84 100
PF7-PF8 104 120
PF9-PF10 124 140
PF11-PF12 144 160
PF13-PF14 164 180
PF15-PF16 184 200
PF17-PF18 204 220
56
43
36

## Mounting instructions

### 1. In general

- Compare pipe layout plan with actual conditions.
- Mount feeders in the center of lubrication points to be supplied.
- Pay attention to cleanliness! Avoid entering of dirt into the components!
- Mount feeders distortion-free on plane surfaces. Make up unevenness by shim rings.
- Mount pump and auxiliary equipment, wire control and monitoring equipment for automatic systems according to electric wiring diagram.
- Lay tubing; pay attention to clean tubes, if necessary flush out lines (similar to hydraulic lines).
- Fill reservoir with lubricant.
- Bleed system.
- Check function.

### 2. Feeders

The feeders will be assembled in the factory, ready for use,

a) according to existing tube layout plan,
b) according to order code corresponding with the customer's order.

Each feeder manifold consists of at least 3 feeder sections and one inlet and one end section. The planned feeder outlets may **never** be plugged, unless the appropriate alternate outlet is used.

Maximum number of feeder sections: 9.
The number of outlets **S** or Tas well as the measured amount of lubricant per outlet and feeder cycle is marked on the name plate of every feeder section. The stamped-on index number, multiplied with 0.1, will result in the output in $cm^3$.
With T-sections (Twin = 2 outlets), this quantity will be dispensed from each of two outlets.
With S-sections (Single = 1 outlet), twice the quantity stamped on will be dispensed from either the right or left outlet.

If several outlets are **externally connected** (crossporting), a multiple of one feeder section amount may be pushed out per feeder cycle. The metered amounts of all connected piston sides are to be added together!
One feeder cycle represents one dispensing of the planned lubricant quantity from every one outlet. To carry out one cycle, the feeder must be supplied by the pump with a volume appropriate to the sums of the feeder section displacements.

### 3. Tubing for grease systems

Pump -> master feeder: tube dia. 10x1, 12x1, (12x1.5)

master feeder secondary feeder: tube dia.10x1 feeder

-. lubrication point: tube dia. 6x0.7

Other tube dimensions may be of advantage in case of extreme systems and conditions (small, large, cold, hot).

### 4. Lubrication point connections

Check prior to connection of tubing to the lubrication points that the lubricant supply boreholes in the bearings are unobstructed.

### 5. Grease reservoir

The reservoir must be filled with (filtered) grease of NLGI grades 1 or 2. Use only greases suitable for centralized lubrication systems with EP-additives.

## Maintenance directions

When inspecting the system, pay attention to the following:

- Do not overfill the reservoir and do not have it emptied completely.
- Fill in grease free of air.
- The lubricant must be clean and suitable for this centralized lubrication system.
- Open bleeding tap at the reservoir after every filling of the reservoir and actuate pump until lubricant emerges bubble-free.
- **Never close the outlet of a feeder** which is provided for the supply of a lubrication point or of a secondary feeder. This feeder would block the whole system!
- Replace ruptured blowout discs, find out, however, beforehand the cause of the excess pressure and eliminate the cause.
- Observe pressure loss in main line on pressure gauge.
- Find out the cause if faults of the function will be indicated by extreme pressure fluctuations.
- Check that all connections and screw unions at pump, feeders and lubrication points are tight.

## Pressure pattern in main line at pump outlet

The total restistance to be overcome by the pump pressure depends on the following factors:

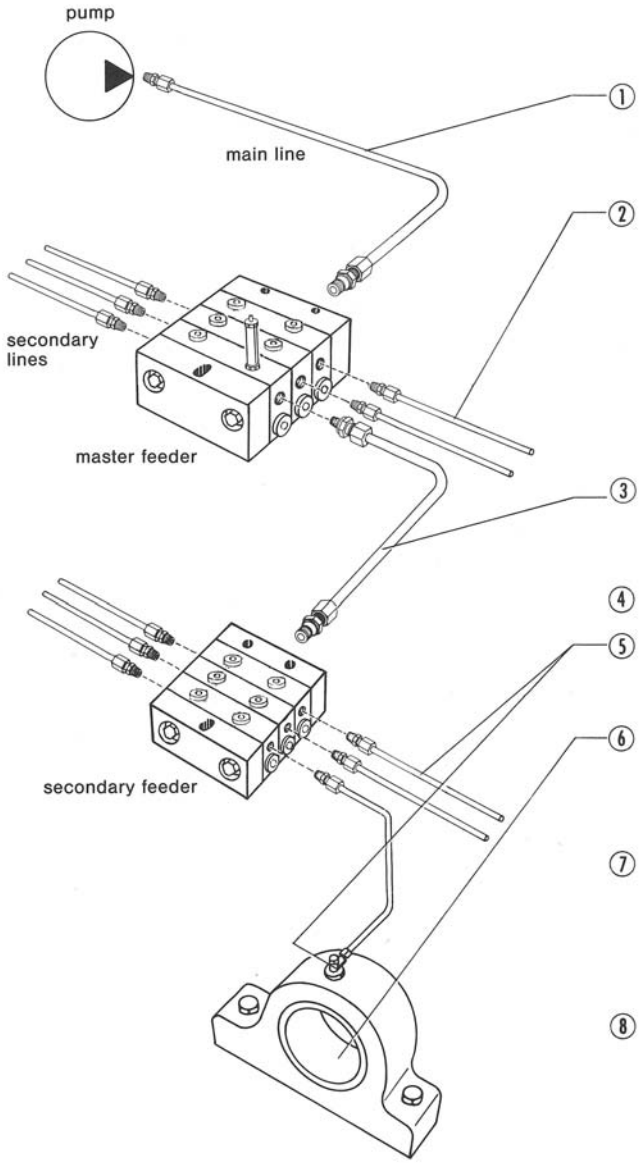
- Grease penetration resp. oil viscosity (type and temperature)
- Tube lengths and tube cross sections (inner diameter)
- Flow velocity of the lubricant
- Inner resistance of the feeders
- Resistances at the friction points

As the resistances at the various friction points and the tube lengths leading to them are different, the pressure varies during a lubrication cycle.

## Filling up of a progressive system before putting system into service

To make sure that after the first actuations of the pump all lubrication points are supplied with the planned lubricant quantities, it is necessary to prefill the system with the lubricant suitable for the system.

All connection lines between master and secondary feeders as well as the lubrication lines are to be prefilled either by direct connection pump - tubing to be filled or with a grease gun.




① Connect main line with pump and actuate pump until bubble-free lubricant emerges at the other end. Afterwards connect free tube end with master feeder.

② The secondary lines are not connected to the master feeder. Actuate pump until bubble-free lubricant emerges from all feeder outlets.
Connect secondary lines to the master feeder afterwards.

If the secondary lines are connected already to the feeder - e.g. when checking an installed system - proceed as follows: Unscrew plug end fittings and - as far as existing - blockage indicators resp. blowout bodies. Actuate pump until bubble-free lubricant emerges from all alternate outlets. Close outlets afterwards.

③ Actuate pump until lubricant emerges from the prefilled connection line between master feeder and secondary feeder. Then connect the free tube end with the secondary feeder.

④ Proceed according to C2 above

⑤ Actuate pump until lubricant emerges from all tube ends. Connect secondary lines (connection lines to lubrication points) with the lubrication points afterwards.

⑥ Check that lubricant supplied will be accepted by all friction points.

⑦ The system is ready for use!
Check function by several pump actuations. Check monitoring equipment - in systems with functional control - by blocking one feeder outlet. (Fit screw plug into one feeder outlet).

⑧ Attention!
Continuous operation of a progressive system with idle machine may lead to overfeeding of the bearings with lubricant and may cause overpressure in system. This may lead to an unexpected fault indication.

## Repair instructions

### Breakdown causes

1. **Pump does not deliver:**
   Is there any operating energy available (voltage, compressed air, oil pressure)?
   Are the connections (electrical, pneumatical, hydraulical) in good order?
   Control unit in good order?
   Empty reservoir?
   Bleeding of pump carried out?
   Pump set to zero-supply?
   Pump mechanically in good order?
2. **Air in system:**
   This may lead in monitored automatic systems to delayed signal action.
3. **Feeder**
   Are there two lubrication points connected to one feeder outlet? In this case, one lubrication point will usually not receive the planned lubrication amount.
   Blocked feeder.

### Cause of a blockage in the system

- Crushed or clogged lubrication line.
- Bearing either clogged or overfilled with lubricant.
- Lubricant unsuitable for centralized lubrication systems.
- Closed feeder outlet.
- Blocked feeder.

### Indication of a blockage

Overpressure exceeding the operating pressure signals a blockage and is indicated as follows:

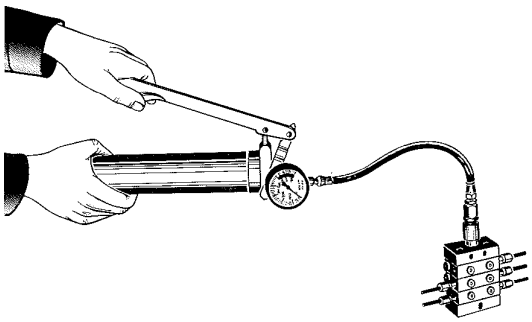
- By the electrically operated relief indicator at the pump or in the system. The blowout disc is ruptured and the micro switch will transmit a signal.
- On the pressure gauge.
- On the cycle indicator (resp. cycle switch) of the feeder.
- At the blockage indicator fitted to the feeder.
- By the pressure switch fitted to the system (in oil circulating systems).

### Detection of blockage

If blockage indicators are mounted to the feeders, the blockage will be easily detected. If the blowout disc is ruptured or the indicator pin of the blockage indicators is visible, the system downstream of the appropriate feeder section must be checked.
If the feeders are without blockage indicators, proceed as follows:

1. Unscrew main line from master feeder. Replace any ruptured blowout discs at the pump. Actuate pump and check that lubricant is fed properly.
2. Screw main line to master feeder. Unscrew plug end fittings of the feeder one after the other and actuate pump every time. The plug end fitting opened which will cause dropping of the excess pressure indicates the blockage. Check appropriate secondary line and bearing and repair. If the particular feeder section is blocked, see section "Repair" below.
3. If no blockage will be detected on the master feeder, unscrew plug end fittings of secondary feeders one after the other and actuate pump every time.

For large systems it will be of advantage to screw a lubrication nipple into the feeder inlet and then check the feeder function with a grease gun.



### Repair of a blocked feeder

Remove feeder from system. Note sequence of feeder sections (e.g. 2T - 6S - 4T).

Unscrew the screw plugs of the piston boreholes (cylinders) and push pistons back and forth (do not push out). If a piston may be easily moved, replace screw plugs. Check next feeder section until blocked piston is found.

Push out piston of blocked feeder section and check borehole of feeder section and surface of piston for scratches and damage. If heavily damaged, replace feeder section.

**Attention!** Pistons may **not** be interchanged!
If there are deposits of hardened grease on piston and also in the borehole of the feeder section, this must be removed by washing and blowing out. The boreholes within the feeder section must be free from any grease deposits. Check with a thin wire!

**Attention!**
If grease hardens, it is an indication that it is unsuitable for the centralized lubrication system. The lubricant supplier should be asked for advice!

Re-assemble feeder manifold in the sequence noted (2T - 6S - 4T) after all feeder sections have been checked.

To avoid seizing of the pistons, tighten nuts of tie rods only with the standard **torque** to be applied for the bolt size.
torque 25 Nm

- Check function of feeder manifold with oil or grease.
- Mount feeder to system.
- Put system into service and check operating pressure.

**Important!**
**Pay utmost attention to extreme cleanliness when carrying out repairs!**

## Information on grease...

The consistency of lubricating grease is marked by its penetration number.

The penetration depth of a measuring cone is measured in accordance with DIN 51804 at +25°C.

In the USA, the NATIONAL LUBRICATING GREASE INSTITUTE (NLGI) introduced penetration grades which were adopted by DIN 51818 for the "Consistency classification of lubricating greases".

| NLGI grade acc. To DIN 51818 | Worked penetration in 0.1 mm | |
|---|---|---|
| 000 | 445 to 475 | |
| 00 | 400 to 430 | fluid greases |
| 0 | 355 to 385 | |
| 1 | 310 to 340 | |
| 2 | 265 to 295 | soft greases |
| 3 | 220 to 250 | |
| 4 | 175 to 205 | |
| 5 | 130 to 160 | harder greases |
| 6 | 85 to 115 | |

In general, the softer lubricants up to NLGI grade 2 are preferred.

The feedability of lubricating grease depends not only on the penetration, but also on their structure-viscous properties.

When used in centralized lubrication systems, attention is to be paid to the feedability of a lubricating grease. Pumps, tubing and feeders must be appropriately dimensioned.

In centralized lubrication systems for greases, progressive feeders and two-line feeders will be utilized.

The pressures required for delivery of grease through tubing and feeders are considerably higher than in systems suitable for lubricating oils and fluid greases. Depending on system dimensions, tube cross sections and tube lengths, pressures can reach and exceed 200 bar.

Greases consist of a soap skeleton, into which the lubricant oil is embedded like in a sponge.

There are cases where the grease in progressive systems will be separated into oil and soap skeleton (bleeding).The solid soap skeleton will choke feeder boreholes and will lead to a breakdown of the system.

The exact causes of these processes are not completely known yet. They may be traced back to the grease make, pressure and temperature change, filtration stability at precisely fitted pistons, etc.

The only remedial measures are cleaning of the feeders and possibly a change of the grease with a type already well tried in other systems.

When a grease lubrication system is to be used also at low temperatures, the change in penetration (reduction) of the grease must be taken into consideration.

**Penetration curve of a grease of NLGI grade 2 with change in temperature**