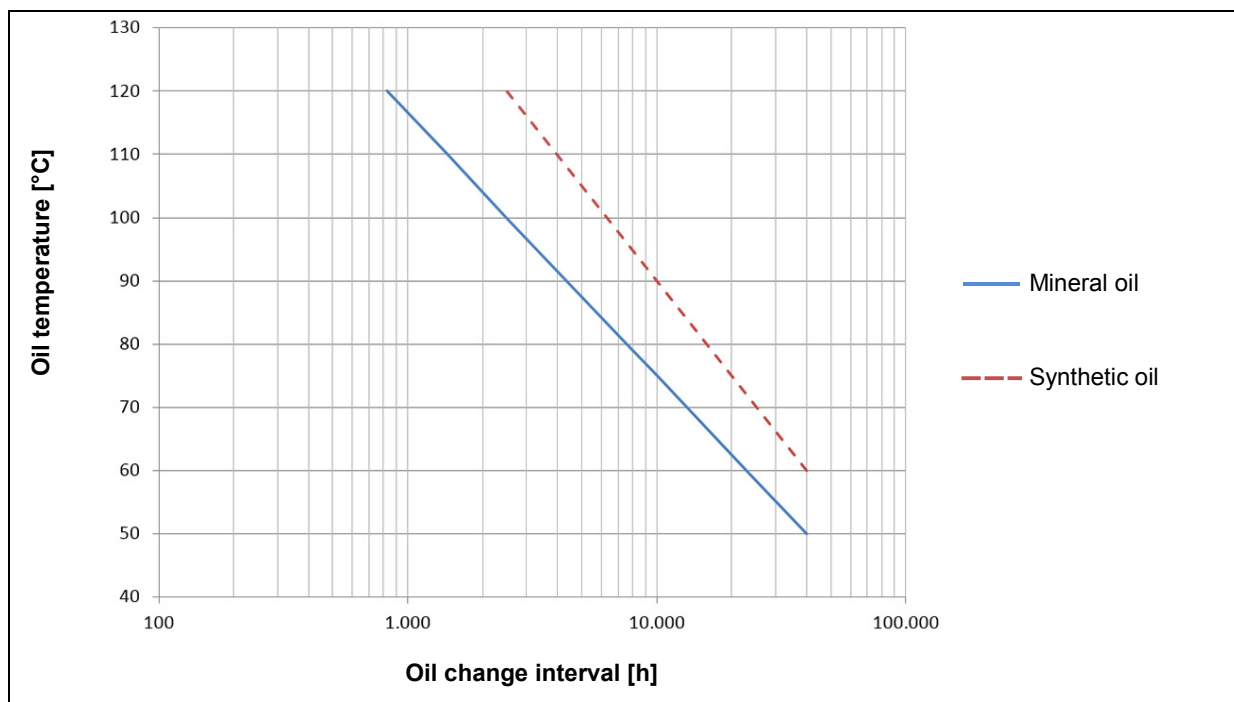


1 Introduction

Gear unit lubricants change over their lifetime and are primarily influenced by chemical reactions, contamination and mechanical loads.

Chemical reactions, which are highly dependent on temperature, have a significant effect on the ageing of the oil. Because of this, the state of the art is to specify oil change intervals depending on the oil temperature under the assumed operating conditions.



Factors which influence the oil temperature due to intermittent operation, partial load, ambient temperatures or long standstill times are not taken into account. In real-life operation the necessary intervals may differ considerably from the oil change intervals which are specified.

SmartOilChange function principle

Determination of the optimum time for an oil change is based on a continuous determination of the oil temperature. With **SmartOilChange** from the NORD DRIVESYSTEMS Group this is done entirely on the basis of key data for the specific product, the ambient temperature and internal measurement values of the power electronics (e.g. current consumption). Additional hardware (sensors) are therefore not required for the NORD solution.

The measurement results are processed and interpreted by the integrated software and result in the display of the residual time until the next oil change.

Technical Information / Datasheet	SmartOilChange			
Functional Description	TI 80_0026	V 1.0	2119	en

2 SmartOilChange function

2.1 Commissioning

During commissioning, in addition to the specific data for the drive, data regarding the ambient temperature and the lubricant which is used must be recorded and parameterised in the frequency inverter.

Information

Recording the ambient temperature

The ambient temperature is not measured, but rather is recorded as a statistical value via the parameter P355 [-03].

Because of this, an ambient temperature which is as constant as possible is a prerequisite for correct calculation of the oil temperature. Fluctuations in the ambient temperature are not taken into account.

2.1.1 Parameterisation - Basic principles

The necessary settings are made with the parameters listed below and can be viewed or edited directly.

P355	PLC integer setpoint			
Setting range	-32768 ... 32767			
Arrays	[-01] ... [-10]			
Factory setting	All Arrays: { 0 }			
Description	Data can be exchanged with the PLC via this INT array. This data can be used by the appropriate process variables in the PLC.			
Setting values	Array		Meaning	
	[-01]	Reset counter	0=	Reset counter – After the counter has been reset, the value automatically returns to "1"
			1=	The counter has been successfully reset
	[-02]	Gear oil type	0=	Gear oil: " Mineral oil " (Standard service life = 10,000 operating hours)
			1=	Gear oil: " Synthetic oil " (Standard service life = 20,000 operating hours)
	[-03]	Ambient temperature [°C]	...	The typical ambient temperature must be recorded here
	[-04]	Drive-dependant factors		These must not be changed, or may only be changed according to the manufacturer's instructions.
...				
[-09]				
[-10]	Reserved			

P356	PLC long setpoint			
Setting range	-2 147 483 648 ... 2 147 483 647			
Arrays	[-01] ... [-05]			
Factory setting	All Arrays: { 0 }			
Description	Data can be exchanged with the PLC via this DINT array. This data can be used by the appropriate process variables in the PLC.			

Display values	Array		Meaning	
	[-01]	Time of last oil change [h]	...	Display of the operating hours since the last oil change (P355[-01]).
	[-02]	Drive-dependant factor		This must not be changed
	[-03]	<i>Reserved</i>		
	...			
	[-05]			

P360	PLC display value			
Display range	- 2 147 483.648 ... 2 147 483.647			
Arrays	[-01] ... [-05]			
Description	Display of PLC data. By means of the relevant process variables, the parameter arrays can be written by the PLC. The values are not saved!			

Display values	Array		Meaning	
	[-01]	Calculated remaining operating hours [h]	...	Display of the remaining operating hours until the next oil change.
	[-02]	<i>Reserved</i>		
	...			
	[-05]			

2.1.2 Parameterisation - Bus communication

In the case of bus control, the expected remaining time until the next oil change can alternatively be read out via the process data. As the relevant parameter (P360) is a DINT variable, this must be divided over 2 actual bus values.

Example

The High word of the variable is assigned as "PLC actual value 1" and the Low word is assigned as "PLC actual value 2".

The following additional settings are necessary:

- P543 [-01] ¹⁾, Actual bus value 1: Setting 53 „Actual value 1 PLC"
- P543 [-02] ²⁾, Actual bus value 2: Setting 54 „Actual value 2 PLC"

1) SK 500E ... SK 535E: **P543**

2) SK 500E ... SK 535E: **P544**

2.2 Operation

The remaining operating hours until the next oil change can be displayed via the display parameter P360 [-01]. On commissioning, depending on the oil which is used, this value is 10,000 operating hours (mineral oil) or 20,000 operating hours (synthetic oil). After an initial delay of a few operating hours, the calculated residual operating time is displayed in hours. In the event of significantly reduced load on the drive (e.g. due to over-dimensioning) an initial or intermediate increase in the remaining operating hours until the next oil change (residual operating hours) is possible.

2.3 Maintenance – Oil change

The estimated time of the next oil change can be derived from parameter (P360 [-01]).

Example:

- Situation
 - 2-shift operation= 16 operating hours ¹⁾ per working day
 - Current display value: (P360 [-01]) = 120 h

1) The control voltage is connected to the device

- Solution
 - $120 \text{ h} / 16 \text{ h} = 7.5$ working days → The next oil change must be carried out after 7.5 working days.

Information

Check the value in P360 [-01] at regular intervals

The display of the remaining operating hours until the next oil change must be checked at suitable intervals in order to respond to possible deviations due to operating conditions. The gear oil must be changed at the latest when the residual operating hours (P360 [-01]) reach the value "0".

During the oil change, the following parameters must be changed:

- P355 [-01] : Reset counter (setting "0")
- P355 [-02] : Selected gear oil (mineral / synthetic)

Information

Observe the manufacturer's instructions

It is essential to carry out the oil change according to the manufacturer's instructions and observe the oil fill level.

Further parameter changes are necessary if structural changes (e.g. orientation of the gear unit and therefore changes to the oil fill quantities), or changes to the ambient conditions are made, or the gear unit is replaced. In this case, please contact NORD.