世界首創

奈升(nl)釋放泵　Nanopump®
Nanoliter(nl) discharge pump

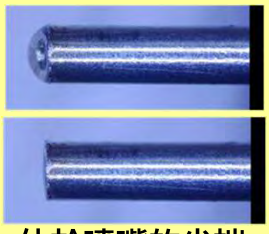
Nanopump®的開發是為了實現精確的對滾動中的軸承提供所需的極少量潤滑,這項突破性的技術實現了前所未有的精確給油是傳統方法無可及的,奈升(nl) 潤滑可促使機器發揮最大潛力,大大提高了機械效率

The Nanopump® was developed to achieve the precise minimal lubrication required for rolling bearings to perform at their maximum potential. This groundbreaking technology enables an unprecedented level of precision in lubrication supply, which was unattainable with conventional methods, dramatically enhancing the efficiency of machinery.

奈米泵 ® 是一種極小容量的釋放泵,設計用於在排出噴嘴尖端釋放外徑為 1 毫米或更小的半球形潤滑油,利用表面張力將潤滑油保持在約50 nl

The Nanopump® is an ultra-precise dispensing pump designed to discharge minute amounts of lubricant, approximately 50 nanoliters, at the tip of a nozzle with an outer diameter of less than 1 mm. By leveraging surface tension, the lubricant forms and remains as a hemispherical droplet at the nozzle tip, ensuring precise and controlled application.

各式各樣的奈米泵®
全部皆獨立式釋油,
給油量約10nl～90nl

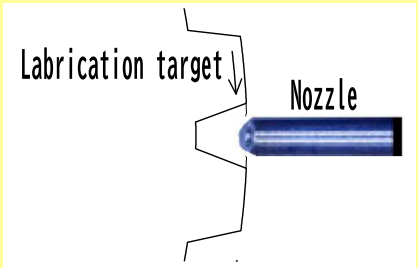


位於噴嘴的尖端
上圖:一次釋出的油量
下圖:供油前噴嘴

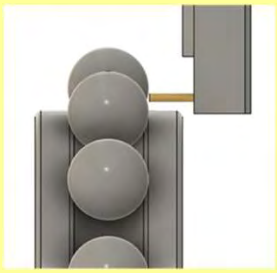
奈升(nl)潤滑技術
Nanoliter(nl) lubrication technology

1. 定期釋放奈升水平的超少量潤滑油,並利用其表面張力將釋出的潤滑油保持在噴嘴的尖端、
2. 供油噴嘴並不直接與潤滑目標接觸、僅因表面張力維持在噴嘴的尖端油分靠近目標提供均一且安定供給, 介由滾動軸承的自轉和公轉產生的離心力使潤滑劑圍繞其旋轉軸擴散

1. ***The Nanopump® dispenses an ultra-small amount of lubricant, measured at the nanoliter level, at regular intervals. This dispensed lubricant is held at the tip of the nozzle using surface tension.***
2. ***Without making direct contact with the nozzle, the moving lubrication target comes into contact with the lubricant held at the nozzle tip. A portion of the lubricant is then transferred uniformly and stably to the target surface, ensuring precise and efficient lubrication.***



Example of nl Lubrication for Gears



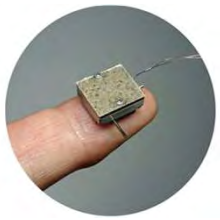
Example of nl Lubrication for Rolling Bearings

Nanopump®的特徵
"Unveiling the Unique Features of the Nanopump® "

Nanopump®的特徵は:　Features:

■僅將極少量液體釋出到極接近目標場所的泵
☐每次的釋出量約為 10～90nl
☐釋出間隔可設定在 1～999 秒之間
☐由奧氏體不銹鋼製成
☐連續使用一年約為耗電0.07日元

■A pump designed to discharge extremely small amounts of liquid to a nearby target area.
☐Single discharge volume: approximately 10–90 nanoliters.
☐Discharge intervals can be set between 1 and 999 seconds to match required amounts.
☐Made from austenitic stainless steel.
☐Power consumption: approximately ¥0.07 for one year of continuous operation.



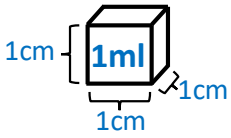
Nanopump®的注意事項:　Precautions:

☐只能釋出過濾乾淨的液體
☐如果空氣混入系統則無法釋出

☐Only filtered and clean liquids can be discharged.
☐Unable to discharge if air enters the system.

對於 Nanopump®,1 ml 的代表著:
For the Nanopump®, the significance of 1 ml is:

■1ml=1,000μl=1,000,000nl
☐1回釋出量 50nlの場合
1ml/50nl=20,000回釋出分
1分間隔釋出で20,000分潤滑可能
=333h=1か月分(16.7h運轉/1日)



•1 ml = 1,000 μl = 1,000,000 nl
•For a single discharge volume of 50 nl:
•1 ml ÷ 50 nl = 20,000 discharges.
•With 1-minute intervals, it provides lubrication for 20,000 minutes = 333 hours = 1 month (16.7 hours/day operation).

1ml潤滑劑所花的費用

在每分鐘50nl給油,每天16小時機器的運作下,
➡ 可持續1個月
若每分鐘50nl潤滑,每天8小時運轉下則,
➡ 可持續2個月

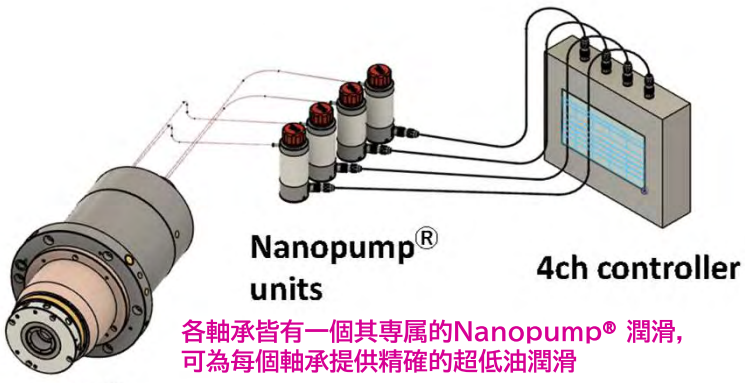
The value of 1 ml of lubricant:
•50 nl/min, 16 hours/day
➡ 1 month of lubrication.
•50 nl/min, 8 hours/day
➡ 2 months of lubrication.

Nanopump® unit

☐安裝奈米泵可以輕鬆實現奈升(nl)潤滑
☐奈米泵與油箱一體化,簡化安裝
☐控制線和潤滑油管也都是與奈米泵單一連結

☐The Nanopump® Unit makes it easy to implement nanoliter-level lubrication.
☐By integrating the Nanopump® and oil tank into a single unit, installation is simplified.
☐Control lines and lubrication tubes can be connected with a simple one-touch mechanism.

Nanopump ® unit



各軸承皆有一個其專屬的Nanopump® 潤滑,
可為每個軸承提供精確的超低油潤滑

Each bearing is lubricated by a dedicated Nanopump®, allowing for precisely tailored and optimal ultra-low oil lubrication for each individual bearing.

Nanoliter Lubrication System for Machine Tool Spindles

Bearing Spacer Type
One-Touch nl Lubrication Attachment

Bearing Shield Type
One-Touch nl Lubrication Attachment

減量供應潤滑油所代表的意義
”The Significance of Reducing Lubricant Supply ”

透過防止在不必要的區域過度使用潤滑油,我們可以大幅減少全球潤滑油的消耗,為實現永續發展目標和保護地球做出重大貢獻.如果我們將潤滑劑的使用量減少至目前水準的十分之一,則可以實現以下廣泛的好處:

1. 環境效益

•**減少溫室氣體排放:**潤滑油的製造和廢棄物處理過程會產生大量二氧化碳和甲烷排放,減少消耗將顯著降低這些排放量
•**原油資源節約:**潤滑油需求下降將減緩有限化石燃料儲備的枯竭
•**預防環境污染:**減少對土壤和水道的洩漏將減輕對生態系統的危害
•**促進永續發展:**“負責任的消費和生產 ”和“氣候變遷對策”做出直接貢獻

2. 經濟效益

•**降低成本:**減少潤滑油採購和廢棄物處理成本將降低生產費用並反應於產品售價
•**效率改進:**降低摩擦和減低能源消耗可將提高機器效率和延展機器壽命
•**新產業的創建:**更精密供給技術的研發及減少摩擦技術的發展將開闢新市場並創造就業機會

3. 社會效益

•**提高生活品質:**機器的靜音化和降低的維護成本將創造更舒適、更方便的生活環境
•**降低健康風險:減少工作場所油霧被害和食品生產污染風險將改善公眾健康**
•**全球影響:高效潤滑油用在發展中國家的機器將使其延長機器壽命、加強基礎設施並支持經濟成長**

減少潤滑油消耗所做的努力是邁向環境保護、經濟進步和提高生活品質的關鍵一步。這種轉變有可能為我們的世界帶來深遠的利益,並成為建立永續未來的基石。

By preventing the excessive application of lubricants in unnecessary areas, we can dramatically reduce the global consumption of lubricating oil, significantly contributing to the achievement of the SDGs and the preservation of our planet. **If we were to cut lubricant use to one-tenth of current levels, the following wide-ranging benefits could be realized:**

1. Environmental Benefits

•**Reduction of Greenhouse Gas Emissions:** Manufacturing and waste disposal processes for lubricants generate substantial CO_2 and methane emissions. Reducing consumption would markedly lower these emissions.
•**Conservation of Crude Oil Resources:** Lower demand for lubricants would slow the depletion of finite fossil fuel reserves.
•**Prevention of Environmental Pollution:** Minimizing leaks into soil and waterways would mitigate harm to ecosystems.
•**Promotion of Sustainability:** This initiative would directly support SDGs, such as “Responsible Consumption and Production” and “Climate Action.”

2. Economic Benefits

•**Cost Reduction:** Decreasing lubricant purchase and waste disposal costs would lead to lower production expenses and reduced consumer prices.
•**Efficiency Improvements:** Lower friction and energy loss would enhance machine efficiency and longevity.
•**Creation of New Industries:** The development of precision dispensing technologies and friction-reducing coatings would open new markets and create job opportunities.

3. Social Benefits

•**Improved Quality of Life**: Quieter machines and reduced maintenance costs would create more comfortable and convenient living environments.
•**Reduced Health Risks**: Decreased exposure to oil mists in workplaces and contamination risks in food production would improve public health.
•**Global Impact**: Efficient lubricant use in developing countries would extend machine lifespans, bolster infrastructure, and support economic growth.

Efforts to reduce lubricant consumption represent a pivotal step toward environmental protection, economic progress, and enhanced quality of life. This transformation holds the potential to bring profound benefits to our world and serves as a cornerstone for building a sustainable future.

減少潤滑油浪費的方法
”Approach to Reducing Waste in Lubricating Oil”

目前許多機器都供應過量的潤滑劑。這通常是由於擔心”潤滑不足可能導致故障或損壞”的固有觀念。
,然而,過度供應潤滑劑實際上會降低效率並增加對環境的影響。請試著檢查一下自家的機器.

1. 了解當前情況　掌握潤滑劑目前的使用情況至關重要。請檢查以下幾點:

- •潤滑劑使用的量和頻率
- •潤滑劑是否供應到預期接觸點以外的區域
- •存在漏油或廢油現象
- •機器運轉過程中磨損和溫度升高的數據

如果您發現有浪費的部分並有改善的空間,請繼續下一步

2.「從小處開始:選擇一台」

一開始並不針對全部做改變,選擇一台機器或一個組件來進行測試。
選擇磨損最嚴重或潤滑劑使用率最高的區域進行試驗。

3.「嘗試奈升(nl)潤滑」

在選定的區域安裝奈米泵並進行簡短的試驗。
若是極少量潤滑被證明是有效的,帶來種種好處,例如減少振動、低噪音和溫度不上升,再考慮推擴到全工廠的機器應用。

In many machines, excessive lubricant is currently being supplied. This is often due to concerns that "insufficient lubrication can lead to failures or damage." However, over-supplying lubricant actually reduces efficiency and increases environmental impact.
Let’s start by examining your own machinery.

1. Understand the Current Situation

It is crucial to assess how lubricant is currently being used in your operations. Check the following points:

- •The amount and frequency of lubricant usage
- •Whether lubricant is being supplied to areas beyond the intended contact points
- •The presence of oil leaks or waste oil
- •Data on wear and temperature increases during machine operation

If you identify areas where waste occurs or where there’s room for improvement, proceed to the next step.

2. "Start Small: Choose One"

Instead of focusing on all equipment, select a single machine or one component to test the effects.
Choose areas with the highest wear or the highest lubricant usage for the trial.

3. "Try Nanoliter Lubrication First"

Install a Nanopump® unit on the selected area and conduct a short trial.
If ultra-low lubrication proves effective—yielding benefits such as reduced vibration, noise, and temperature increases—you can consider expanding to the next step.

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