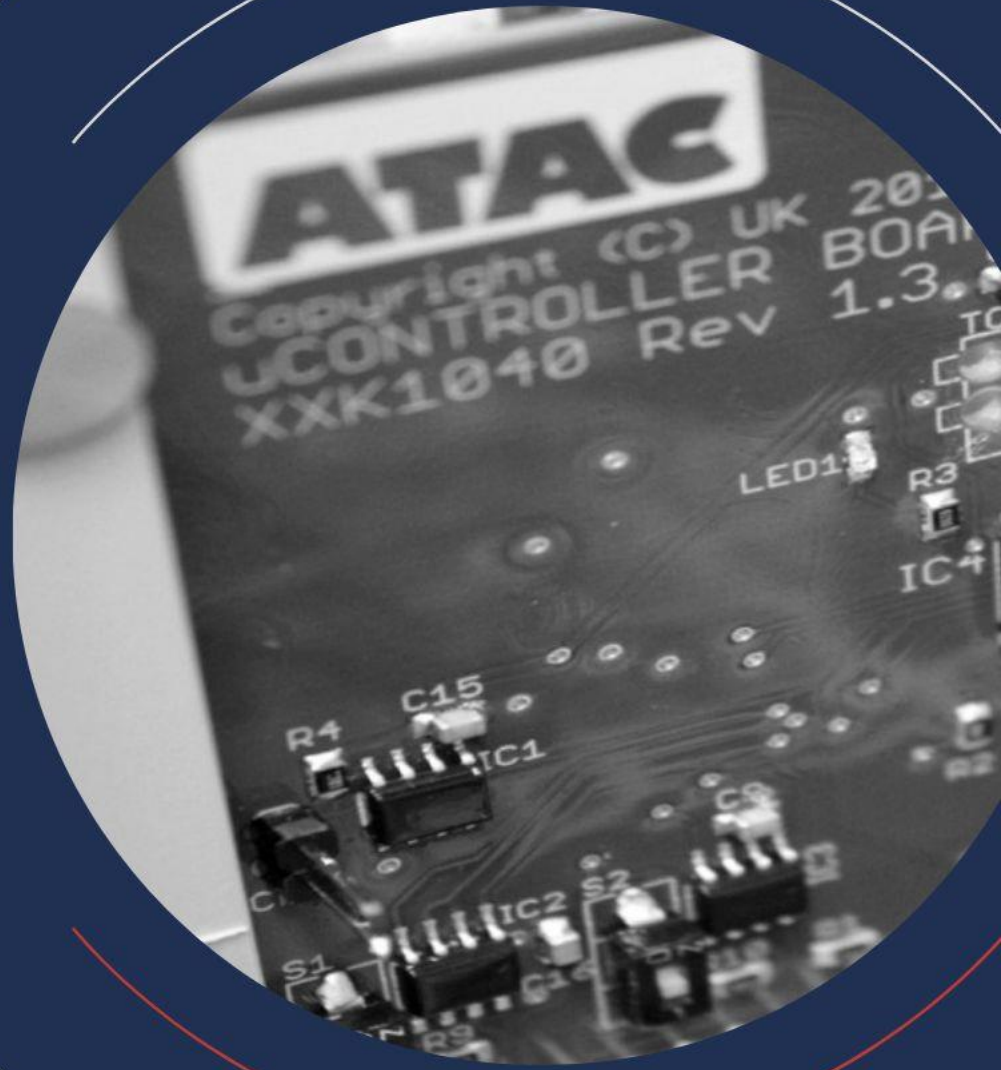
ANALYTICAL TECHNOLOGY AND CONTROL LIMITED

# NμLine Cone & Plate Viscometer




New customer info deck, 2023

ATAC®

# Thank you for choosing NµLine!

We summarised some essential information from our Operating and Maintenance Manual and included new resources and helpful info (like unboxing instructions).

Please also read the manual delivered with the instrument.

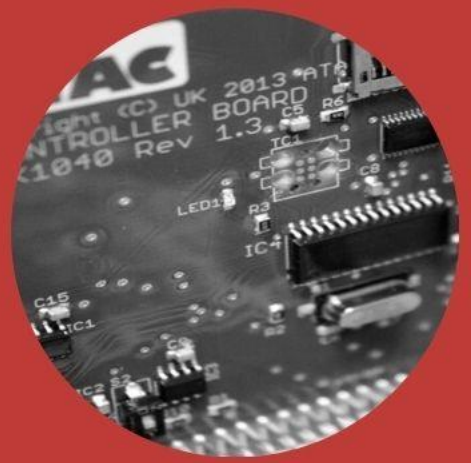
# INTRODUCTION TO ATAC

# ABOUT US

Corporate movie is available here


We are a world-leading manufacturer of process analysers and viscometers, with over 50 years of experience.

Our equipment is manufactured in the United Kingdom based on our own R&D concepts.


# WHAT WE DO

Process Analysers & spare parts

Oil & Gas

Lab Analysers/ C&P Viscometers

Various applications

Site services

Maintenance.
Commissioning

Training

Bespoke instrumentation

Positive material identification

For any enquiries, please contact ATAC Front office at sales@atacgroup.com

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# INTRODUCTION NULINE

# Why NμLine


# NµLine Cone & Plate At-line viscometers

Our NμLine Cone & Plate Viscometer is based upon the proven historical concept and long-established design of Research Equipment London's (REL) Analogue Viscometer, which was used as the original instrument for the BS3900 standard.

NµLine® Cone & Plate viscometer is a self-calibrating, highly adaptable ‘At-Line’ instrument.

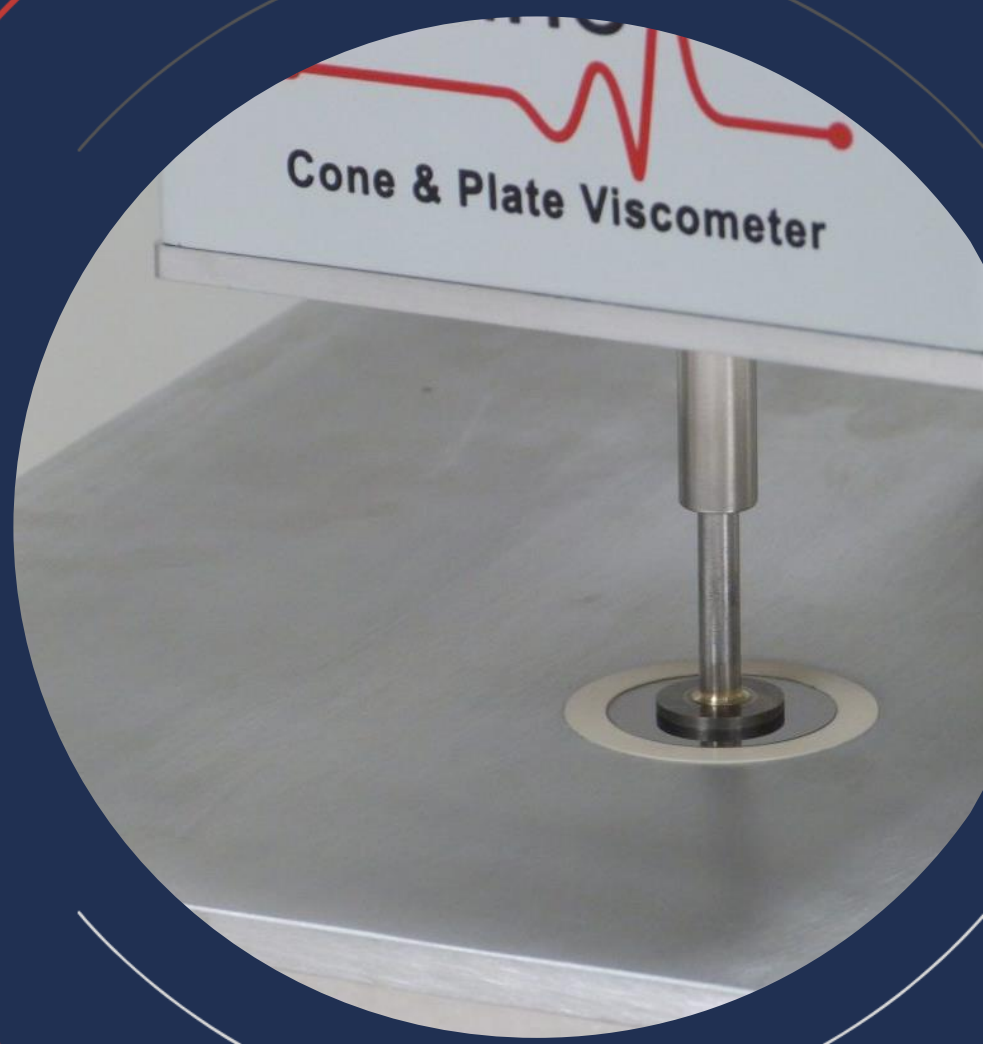
Low-temperature Model REL0100:

10°C to 100°C variable temperature range with sub-ambient capabilities

High-temperature Model REL0230:

ambient to 230°C variable temperature range (no cooling)

No other accessories needed.
One machine for everything.



Accuracy and repeatability: better than 1% of span using standard calibration oils.
Sample size typically 0.2ml.
BS EN ISO2884-1:2006
It can be calibrated to operate with multiple cone sizes in the same machine.
Stored calibration data for all six cone sizes for easy change-over.

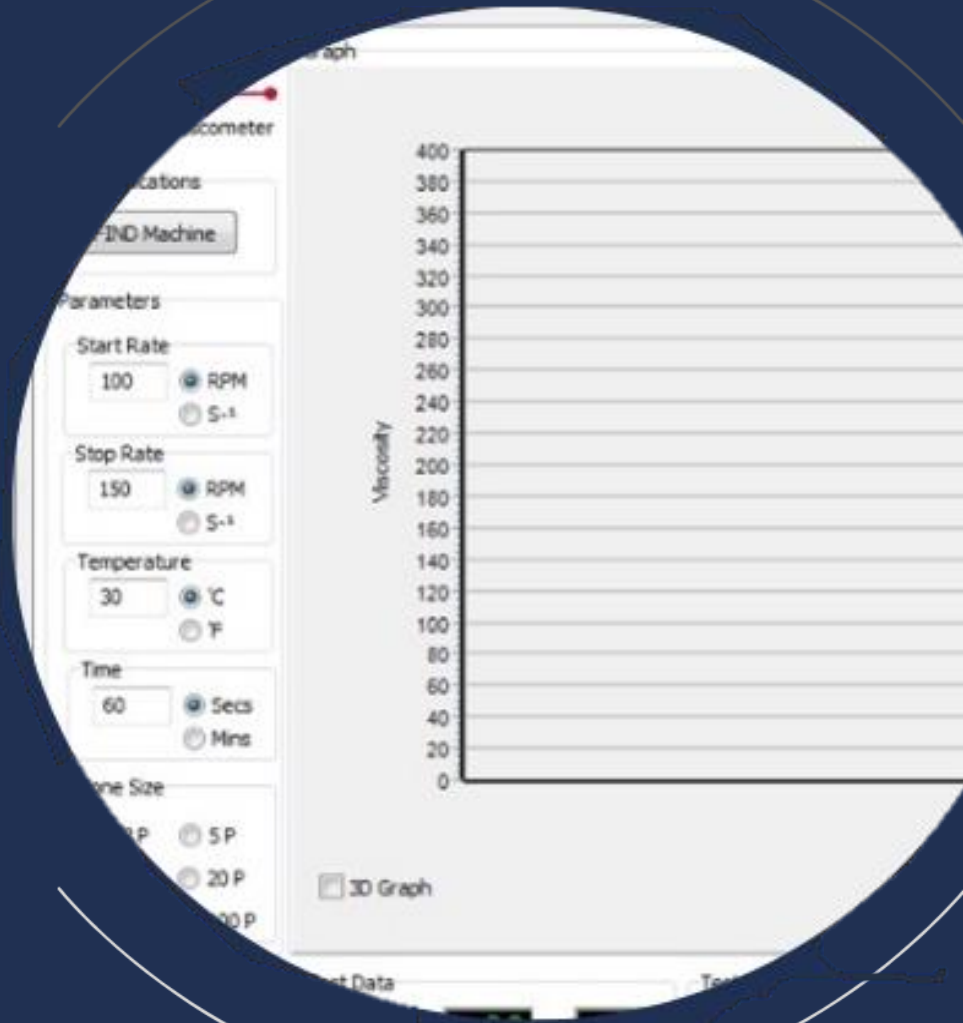
Two button options: piezo or push.

With process applications in the paint, varnish, inks, resins, food, bitumen, oil, adhesives and pharmaceutical industries, to name but a few.

Complete and intuitive PC Interface Software.
Windows compatible. Available in English.
Included with the instrument at no extra cost.

No additional components are necessary.
Ready to use straight out of the box.

It allows the user to analyse and record results and run shear rate or time sweeps.



# Unboxing the instrument

# Step 1

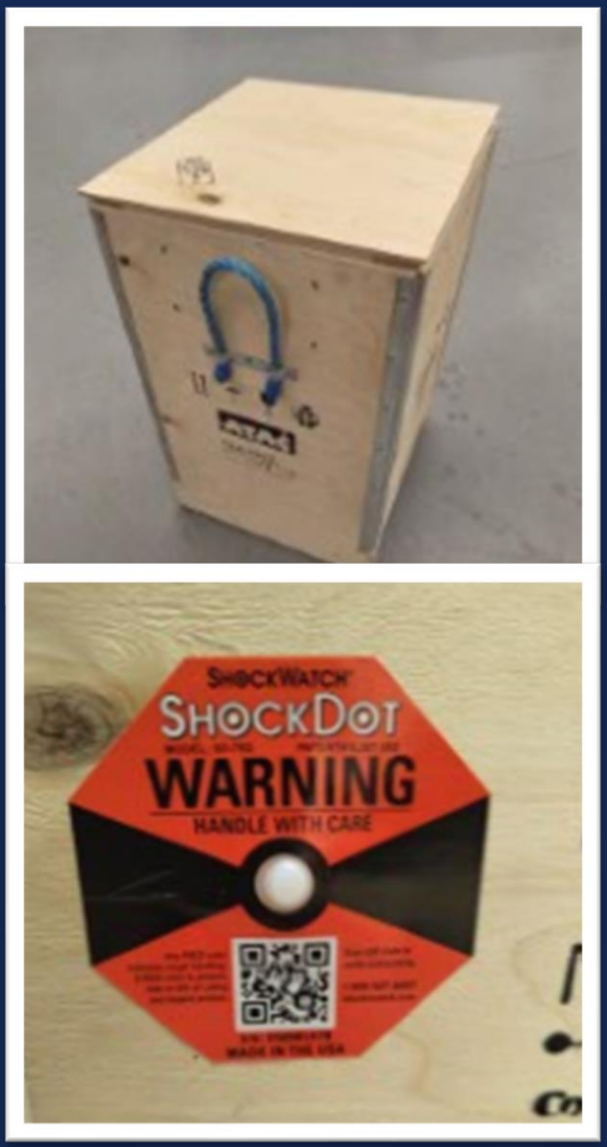
## Check the shock dots on the wooden crate.

If they are red, it doesn’t necessarily mean that the instrument has been affected. Send us an email, and we will guide you. Our certified partners are trained on how to handle such situations and check the instruments to ensure they operate properly.

The shock dots are an extra precaution.

The three-layer packaging is very sturdy, reliable, and reusable, consisting of a wooden crate, doubled by a cardboard box and special cut-out foam support.

It was designed and tested to protect our instruments during long journeys. The wooden crate and the cardboard box have special handles.



# Step 2

## Carefully take the instrument out of the box by the base unit

The wooden crate lid has lateral screws. Inside there are instructions regarding the packaging and not to lift the instrument by the head unit. The cut-out foam support has space for you to grab the base unit safely and easily.

# Step 3

## Check the warranty seals

All new instruments have a 12-month warranty and leave our factory with warranty seals. Also, we keep the sensor calibration setup records for each viscometer.

Without our written permission, no one is allowed to open the viscometer and make changes or adjustments during the first 12 months after purchase, or the warranty will be void.

Please refer to the manual, Section 14

# Step 4

## Check the accessories and safely store the packaging

Each new instrument is delivered with everything you need:

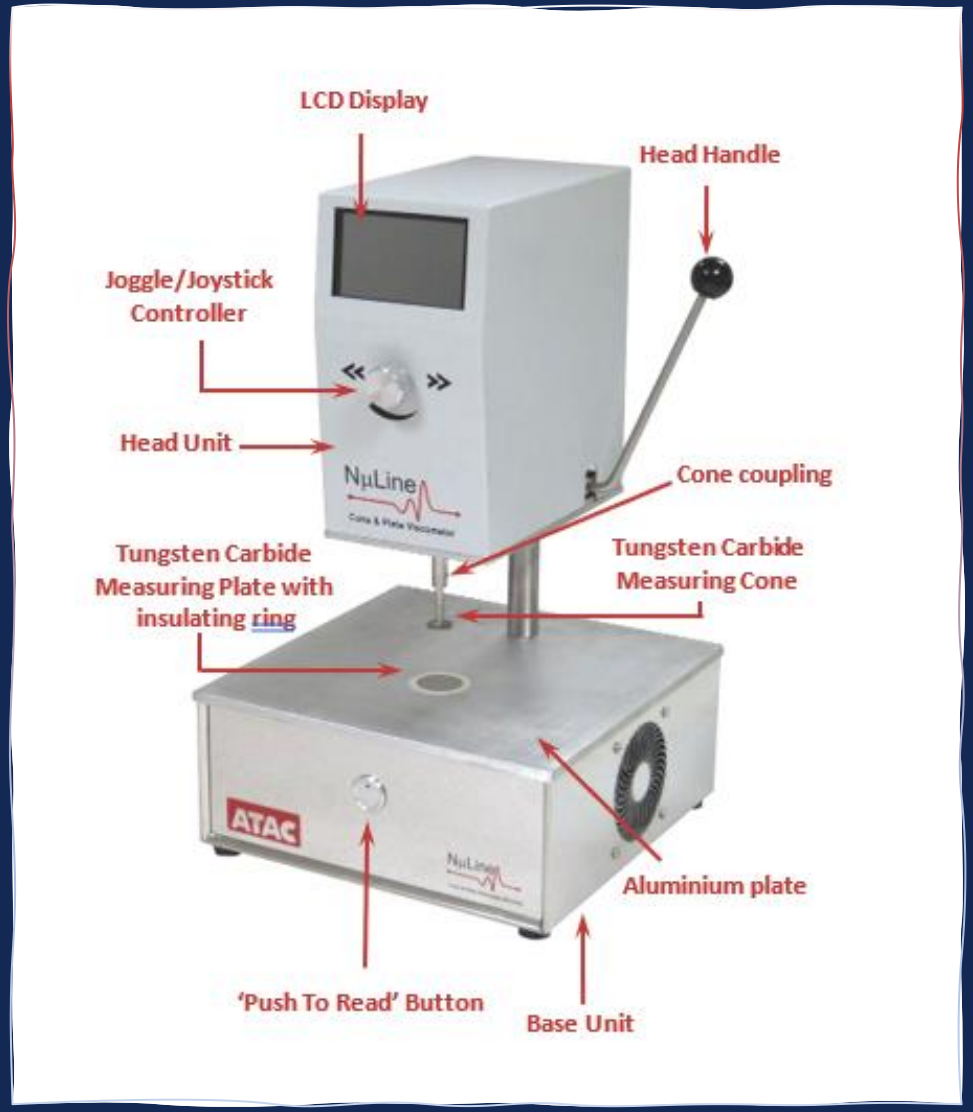
- plug cord, USB cable, and hex key
- a 5 ml calibration oil sample with a certificate and  instructions card
- calibration certificate, manual, quick guide, USB with software
- a set of five cone covers (for the low-temp REL0100 model only)

Keep all the packaging components safely to reuse them in case you need to ship the instrument to a new location, to us/a partner for calibration/repairs/upgrade in the future

# Understand the instrument

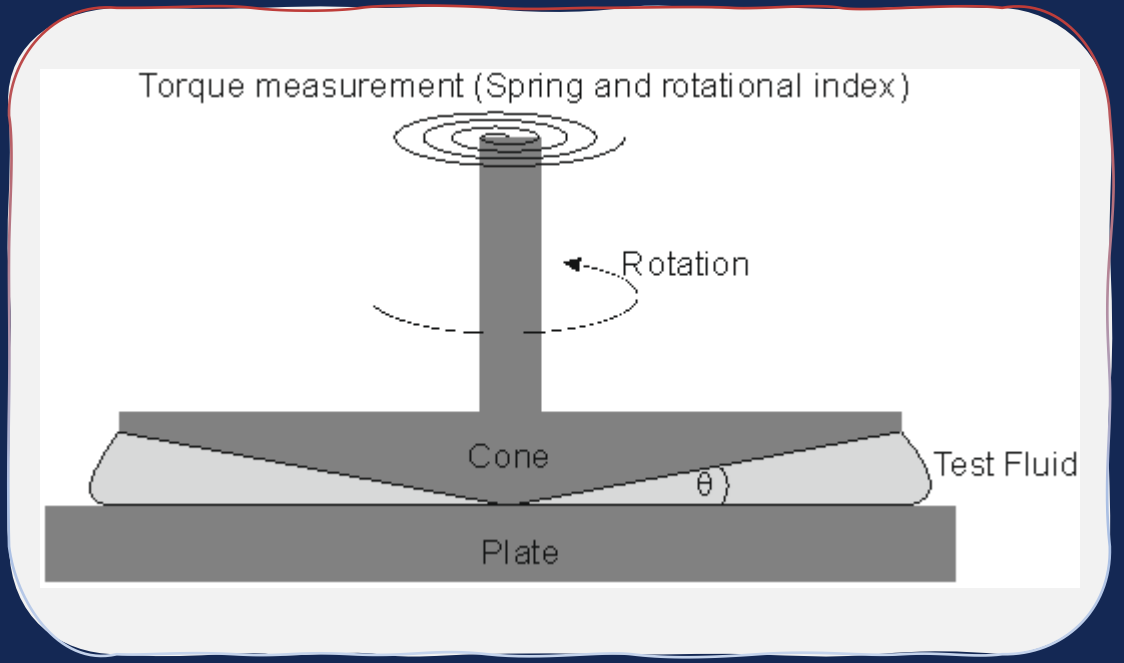
# Introducing NµLine

- Designed for robust ‘at line’ use
- Tough ceramic drive bearings
- Measuring geometry is all tungsten carbide – very hard-wearing
- Embedded computer system controls all functions via a 4.3” LCD screen
- Simple presentation of results in Poise or Pa.S. No user calculation required.
- Can store calibration data for 6 cones



# Principle

- Cone maintains a uniform shear field in the sample
- At any point a distance r from the centre of the cone the linear velocity and the gap is proportional to r.
- Θ is small (0.5 or 2 degrees) samples with hard particulates > 5µm can be problematic.
- The cone runs in contact with the plate – never operate without a sample as the sample provides lubrication. The cone tip will melt if runs dry.



# Torque Measurement

- Torque measurement is at the heart of any viscometer.
- The machine needs to measure torques as low as 0.0001 N/m
- Equivalent to a 10mg weight acting on a 1m long rod
- The spring-based torque measurement system is both precise and fragile. Other instruments in this class estimate torque from motor current, this is susceptible to errors.
- The system has been engineered to accommodate ‘at line’ production operations. However, the core of the machine is necessarily fragile. Care in handling and operation will extend the life and reliability of your instrument.
- Under no circumstances should the torque measurement system be disassembled – it requires special tools and alignment to reassemble.

# Essential Precautions

- DO Install in a stable location away from drafts
  - Temperature control is vital in viscosity measurements, viscosity typically changes by 10% per degree C of temperature.
- DO keep the instrument clean and free from dust accumulation.
- DON’T block or disconnect the fan – it is essential for proper temperature control
  - The heater control is tuned for high-flow cross-cooling provided by the fan
  - The heater control relies on accurate measurement of the ambient temperature
- DON’T use the cone to crush powdered samples. Let the sample melt first.
- AVOID locations with strong magnetic fields. The system uses hall effect sensors for positional data.
- AVOID locations with large daily swings (>5°C) in ambient temperature.

# Reliable Measurements

- Use the right amount of sample

| Cone | Dia/mm | Angle/deg | Edge gap/mm | Sample vol/uL | Recommended vol/uL |
|---|---|---|---|---|---|
| 2.5P | 28.6 | 0.5 | 0.119 | 38.3 | 150 |
| 5P | 24 | 0.5 | 0.100 | 22.6 | 100 |
| 10P | 19.4 | 0.5 | 0.081 | 11.9 | 50 |
| 20P | 24 | 2 | 0.400 | 90.5 | 350 |
| 40P | 19.4 | 2 | 0.323 | 47.8 | 200 |
| 100P | 14.5 | 2 | 0.242 | 20.0 | 100 |

Excess sample extends the shear field beyond the edge of the cone
Always use the same volume of sample or calibration oil.

- Measure with a lower value cone at lower speed
  - 0.5 degree cones (2P, 5P and 10P) are more precise
  - Samples can heat up through friction at high speeds
    - Hot sample = lower viscosity

# Reliable Measurements

- Keep the cone and the plate clean
- Take the cone off to clean it
  - Clean with solvent where possible
  - If necessary, hard residues can be removed with a wire brush or scouring pad
  - The cone is tungsten carbide – it will not be scratched by most cleaning methods
- Clean the plate thoroughly
  - The plate is tungsten carbide and will not scratch easily
  - Avoid heavy pressure on the plate – it is carefully aligned

The plate is tungsten carbide in a cobalt matrix, the support ring is PEEK, and the top plate of the bottom unit is aluminium.
Any solvent that will not affect these materials can be used. Avoid strong acids, strong alkalis, and paint stripper.

# Maintenance

| DAILY CHECKS | | |
|---|---|---|
| **Cone** | Run the cone calibration procedure as part of the daily start-up routine. | Ensures that any wear on the cone is corrected in the measurement |
| **Cone** | Check the cone calibration factor value. | For all but the 2P cone, the value should be close to 1. A value below 0.75 indicates that the cone needs replacing.<br>For the 2P cone, the value should be 0.7. A value below 0.5 needs replacing. |
| **Cone** | Check that the cone is clean, particularly when measuring resins. | Contamination with cured resin can be removed with a small stainless steel wire brush. |
| **Fan** | Check that the fan is running and unobstructed. | The fan is critical to temperature control. |
| **Cone Mount** | Check that the cone mounting collet doesn't bind on the bearing. | There should be a gap of at least 3mm between the collet top and the bearing. |

# Maintenance

| WEEKLY OR MONTHLY CHECKS | | |
|---|---|---|
| **Temperature** | Use a calibrated temperature probe and copper or brass washer assembly to run the temperature calibration procedure. | Ensures that the temperature control is precise. |
| **Temperature** | Check that the temperature accurately controls at your normal measurement temperature. | You can adjust a single point temperature using the temperature offset function |
| **Head** | Check the head for side-to-side movement. If the head moves, then the lift mechanism needs adjustment. | Contact the factory! |
| **Cone** | Check the cone for wear at the tip approx. every 50 readings. If the tip is noticeably rounded or flat, then replace the cone. | The measurement relies on the sample trapped between the cone and the plate being conic. The shear rate will not be constant if the cone is worn. |

We recommend that you return the unit to the factory or local service agent for an annual service and renew the calibration certificate. As part of this process, the machine hardware and software will be upgraded to the latest model standard, and any defects will be resolved.

# Operation

Please read the manual and watch the video tutorials on our YouTube channel

- Make a Measurement
- Calibrate the Cone
- Use the PC Software
- Calibrate the Temperature
- Set a Temperature Offset

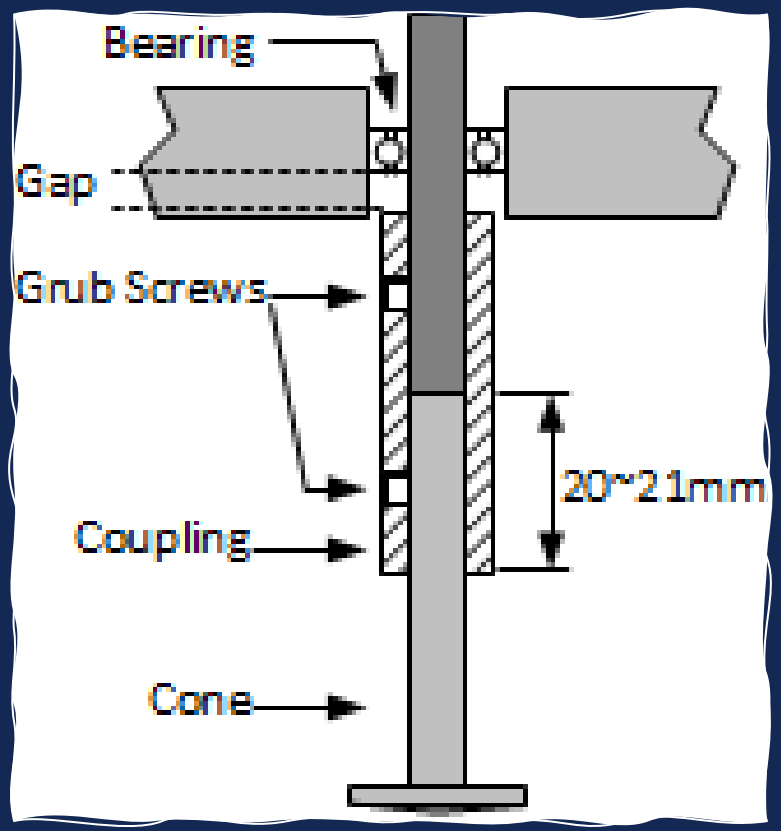
We can provide online training for our new NμLine end users' team, and we are one email or phone call away for all technical queries.

If you need the Manual, send us an email quoting the serial number of the machine, and we will (re)send it to you.

# Changing the cone/1

OPTION 1

- Keep the coupling in place.
- Remove the bottom screw and remove the old cone.
- Push the new cone into the coupling to the maximum.
- Put back the bottom screw.

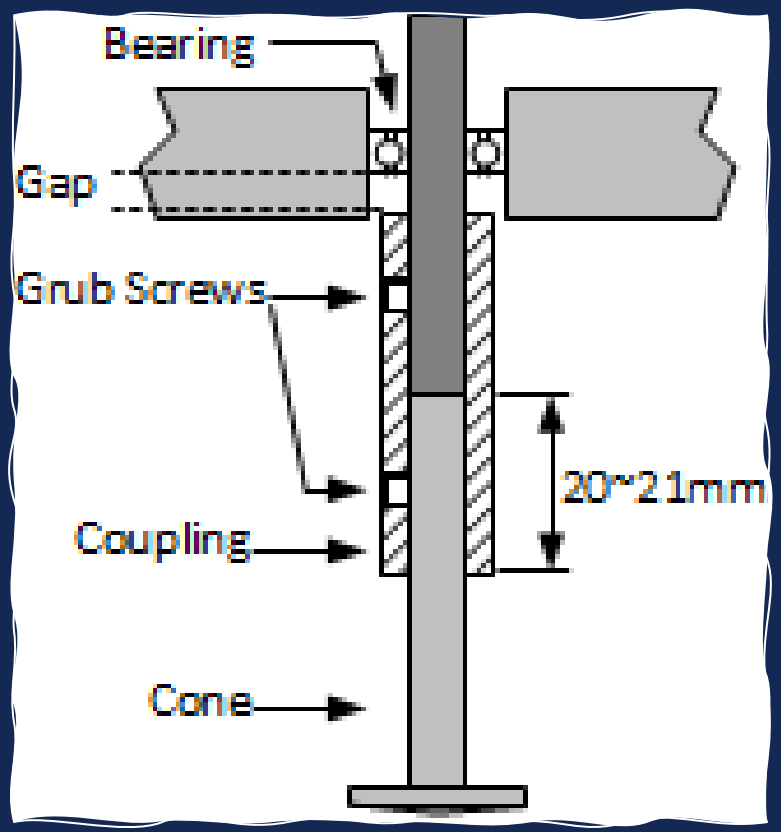



The paint colour ring on the cone matches the cap of the corresponding calibration oil bottle; it is irrelevant for anything else.

# Changing the cone/2

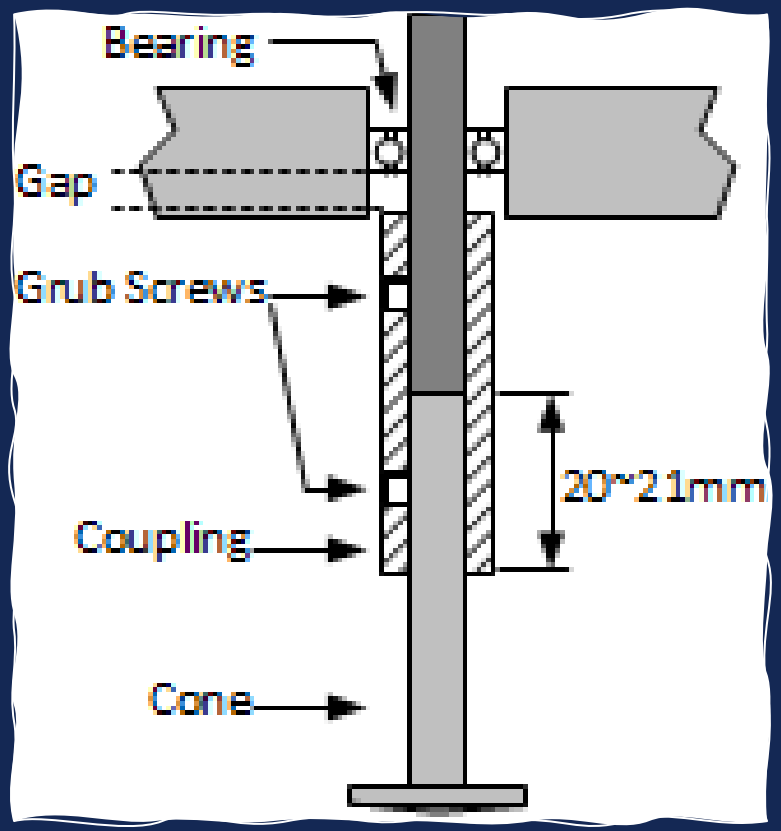
## OPTION 2 - If you must clean or reposition the coupling

- Push the new cone 20-21 mm into the coupling, locking the cone with the bottom grub screw.
- Fit the coupling to the machine, sliding it up the motor shaft until the shaft meets the coupling (it bottoms out).
- Lock the top grub screw.



# Test that the cone is mounted correctly

- Pull the handle down; you should see the cone coupling move up approx. 0.5mm creating a slight positive pressure. And the tip of the cone should touch the centre of the plate. Excessive pressure will damage the plate.




Don’t run the cone dry (without a sample or calibration oil)! It will damage both the cone and the plate.

# Position the coupling correctly

- The NμLine cone coupling position is different from the one of the old RELL/ICI viscometers.
- It shouldn’t have a gap on the top edge nor be pushed inside the head unit.
- Please contact us to help you reinstall the coupling correctly.

# The cone cover

- Some of our end users should have a cone cover for low-viscosity samples that can evaporate during the measurement (e.g., water-based paints)
- The cone cover is a disposable accessory. A set of five is delivered with each new low-temp instrument (Model REL0100).

# Technical issues

If one of our instruments in warranty has technical issues, please get in touch with us immediately at sales@atacgroup.com. Describe the problem and send us pictures and videos to help our tech team speed up the first assessment. Please mention the serial number.

Please don’t do anything before getting our feedback!

We will register your claim and get back to you ASAP for further details or instructions.

Any instrument open during the warranty without our written consent will lose its warranty.

Keep in mind that NµLine is different from REL; the spring calibration requires special technical knowledge, training and tools.

# ANY QUESTIONS?

Follow our YouYube Channel for NµLine related videos

Drop us an email at sales@atacgroup.com

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# THANK YOU!