INSTRUMENT VERIFICATION: METHOD AND PROCEDURE

Availability/Compatibility of features:

Feature:	Availability/compatibility:
Menu guided instrument verification.	PR-23 DTR/STR Program versions 2.0 and up

For K-Patents verification you need:

- K-Patents PR-23 sample holder (see Figure below). The sample holder keeps the sample on the prism surface and also keeps the ambient light out.
- A set of standard refractive index liquids.
- Cleaning solution (ethanol) to clean the sensor prism and the sample holder.

Figure 1. The universal sample holder PR-1012.

INTRODUCTION

A company maintaining ISO 9000 or other quality system needs to have defined procedures for controlling and calibrating its measuring equipment. Such procedures are needed for demonstrating that the end products conform to specifications.

The company should:

- Identify the required accuracy and select appropriate equipment for the measurements.
- Establish calibration procedures including a check method and acceptance criteria.
- Calibrate the equipment at prescribed intervals against certified equipment that has a known valid relationship with national standards. When no such standards exist, the basis for the calibration should be documented.

K-PATENTS VERIFICATION METHOD

K-Patents' quality system is ISO 9001 certified by Det Norske Veritas.

Each K-Patents sensor is provided with a calibration certificate comparing a set of standard liquids to the actual sensor output. Therefore, the calibration and accuracy can be easily verified on-site with the certified refractive index liquids and K-Patents documented and menu guided verification procedure. The sample holder PR-1012 (Figure 1) keeps the verification liquid on the prism surface and also blocks the ambient light from reaching the prism. The verification of the PR-23 sensor calibration is made using a set of standard refractive index liquids with the nominal values at 25 °C:

- 1.330
- 1.370
- 1.420
- 1.470
- 1.520

The accuracy of the certified standard refractive index liquids is ± 0.0002 and they can be traced back to national standards: NIST Standards # 1823 and # 1823 II. As the specified accuracy of PR-23 is ±0.0002, then the representative level is the sum of the three accuracy specifications, that is ±0.0004.

K-Patents provides a set of standard R.I. liquids, PR-2300, containing these five liquids. The set can be ordered directly from K-Patents or through your K-Patents representative.

VERIFICATION PROCEDURE

Select VERIFICATION from the Main menu. Instructions for the two verification steps are given on the display:

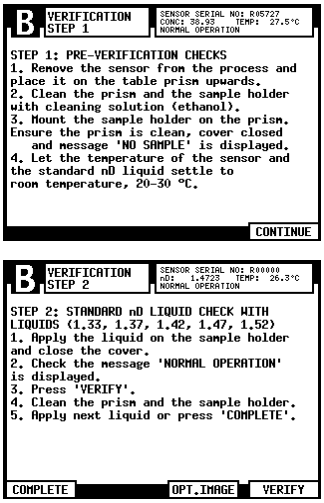

Figure 2. The two verification steps

To check that the standard liquid is properly wetting the prism, it is possible to press soft key OPT. IMAGE. The optical image should show a sharp shadow edge, as e.g. in Figure 3 (normal conditions).

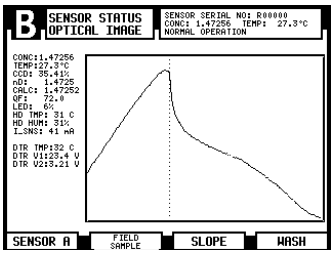

Figure 3. Typical optical image: Normal conditions

The instrument measures each verification data point ten times and uses the average of these measurements. Measuring each verification liquid takes a few seconds, during which the measurement progress display is shown.

Please wait until the verification step 2 display reappears before proceeding to next Verification liquid. The limit for acceptance is that all measurements must be within ± 0.0004 of the nominal values, Figure 4.

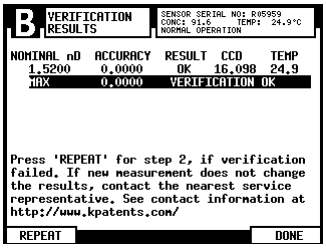

Figure 4. Verification results

Note: The sensor verification concerns only the refractive index n_D measurement. The calculation of concentration from n_D and process temperature TEMP is not included.

VERIFICATION CERTIFICATE

In the indicating transmitter (DTR) with program versions 2.10 or higher, you also have access to a *printable verification certificate* over the Ethernet connection (Figure 4). If the verification page is not available although the DTR has program version 2.10 or higher, the instrument homepage needs to be updated. Contact K-Patents or your K-Patents representative for further instructions.

The DTR stores the most recent verification done on the DTR and the results of that verification can be viewed on the instrument homepage by following the Verification link on the link bar. When you have performed a verification on a sensor, reload/refresh the verification page to view the newest results. The date given on the verification page is the page load date, not necessarily the verification date.

To print the verification certificate, simply use your browser's print function. The page is designed so that with browser default settings it normally fits onto a single sheet of A4 or letter sized paper; the navigation bar is omitted for cleaner printout (Figure 5).

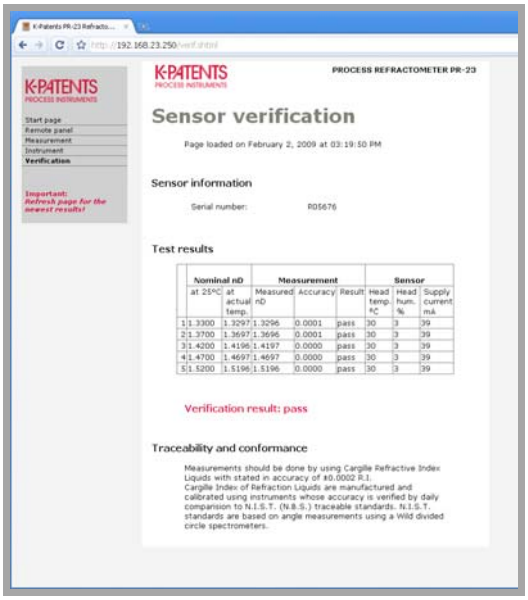

Figure 4. Instrument verification page open in a browser.

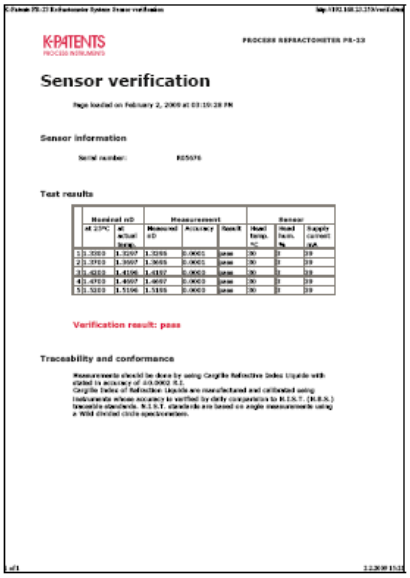

Figure 5. Instrument verification certificate.

CORRECTIVE ACTION

If VERIFICATION FAILED, first check that the prism **and** the sample holder are absolutely clean and the sample holder sits tightly on the sensor tip before a standard liquid is applied. Make sure the standard liquids are in good condition and not past their expiration date. Also, inspect the prism surface, checking that it is flat and glossy without any scratches.

Repeat the verification procedure. If the verification still fails, fill in the form **PR-23 sensor verification form**, found in the end of the manual. The sensor's serial number is shown in the upper right corner of each display. The list of CCD and TEMP values are found on the Verification results display (Figure 4). Send the form (preferably by fax) to K-Patents or your nearest K-Patents representative or email the collected data to info@kpatents.com and wait for further instructions.