

INSTRUMENT VERIFICATION FOR ISO 9000 QUALITY SYSTEM

K-PATENTS

PROCESS INSTRUMENTS



Verification of the calibration of K-Patents Process Refractometer...



...is made using certified Refractive Index liquids.



As a result of the check procedure...



...the accuracy is verified.

PROCESS REFRACTOMETER PR-01-S



1. INTRODUCTION

A company maintaining quality system according to ISO 9000 quality standards must have defined procedures for controlling and calibrating its measuring equipment. Such procedures are needed to demonstrate the conformance of final product to specified requirements.

The company should:

- Identify the required accuracy and select appropriate equipment for measurements.
- Establish calibration procedures including a check method and acceptance criteria.
- Calibrate the equipment at prescribed intervals against certified equipment having a known valid relationship to nationally recognized standards. In cases where no such standards exist, the basis used for calibration should be documented.

This brochure serves the users of K-Patents Process Refractometer PR-01-S, Version 5.0 or higher to meet all the earlier mentioned requirements.

K-Patents verifies the calibration of all delivered instruments according to a procedure similar to the one described in this brochure.

In addition to this off-line verification there is a separate procedure for in-line calibration, see Instruction Manual, Section 5.3.

This brochure does not contain detailed procedures for trouble shooting or fault detection of the instrument. Such procedures can be found in the Instruction Manual, Section 6.

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

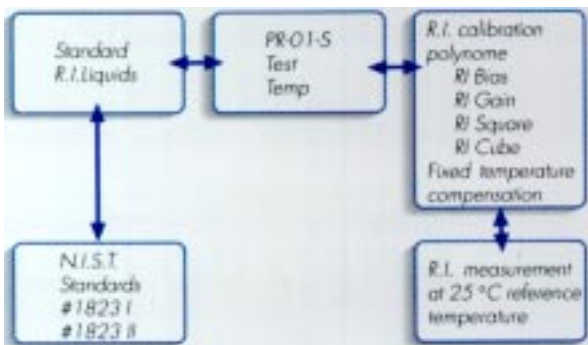
2. DEFINITIONS

Many of the definitions used in this instruction and in other K-Patents publications are related to the instrument. The terms defined below apply to PR-01-S, Version 5.0 or higher.

Refractive Index (R.I.) calibration

Calibration of PR-01-S is done using standard refractive index liquids. As a result of the calibration, a set of R.I. parameters are calculated: R.I.bias, R.I.gain, R.I.square and R.I.cube. These parameters define the calibration polynome which is used for Refractive Index measurement in a reference temperature of 25 °C.

The Refractive Index calibration can be traced to national standards when certified Refractive Index liquids are used for calibration. The chain of R.I. calibration is as follows:



Accuracy of R.I. calibration

Maximum acceptable deviation. The table below describes the sources of deviation in the calibration and the maximum total deviation. This defines the maximum acceptable deviation of the calibration.

PR-01-S is calibrated for one of the four different spans using two different sensor angles: 50° and 57° and two different lenses: f=18 and f=10.

	Standard span f = 18	Wide span f = 10	Deviation source/total
Low range 50° sensor	± 0,0002	± 0,0003	Accuracy of PR-01-S
	± 0,0002	± 0,0002	Accuracy of R.I. liquids
	± 0,0004	± 0,0005	TOTAL DEVIATION
High range 57° sensor	± 0,0002	± 0,0003	Accuracy of PR-01-S
	± 0,0002	± 0,0002	Accuracy of R.I. liquids
	± 0,0004	± 0,0005	TOTAL DEVIATION

Repeatability of the R.I. calibration

The repeatability of PR-01-S, or the deviation from the latest R.I. calibration is within R.I. ± 0,0002.

3. VERIFICATION PROCEDURE OF REFRACTIVE INDEX (R.I.) CALIBRATION

The R.I. calibration can be verified with three certified standard R.I. liquids as follows (For ordering information of the liquids, see Instruction manual, Section 5.4):

1. Take the sensor out of the process and mount it on a bench. The use of K-Patents service stand (K-Patents Part Number PR-1002) is recommended.
2. Let the sensor temperature settle close to 25 °C (77 °F). The temperature does not have to be exactly 25°C, since the differences are compensated by the software.
3. Check that the prism is clean. Use a cleaning solvent appropriate for the process medium.
4. Take certified standard R.I. liquids, which correspond to the values indicated in the Final Test Section of the latest Delivery Data Sheet or Standard Calibration Sheet of PR-01-S. The three R.I. values are selected by K-Patents calibration software to represent the R.I. range used.
5. Check the R.I. calibration with three different R.I. liquids. The use of K-Patents Sample holder (PR-5002) is recommended to ensure right apportion of the liquid on the prism.
6. The R.I. calibration can be checked against the standard R.I. liquid values as follows:

Display	Soft-key sequence from Normal Display	Value to be checked	Acceptable value
Information display	D	Standard R.I. (25 °C)	Sample R.I. \pm 0,0006 $f = 18$
			Sample R.I. \pm 0,0007 $f = 10$

4. CORRECTIVE ACTION

If the verification does not meet the acceptance criteria the following steps can be taken to correct the calibration of PR-01-S. References are made to the Instruction Manual.

1. Ensure that the prism is in good condition:
 - no scratches or cracks
 - sealing gaskets should form regular, concentric rings
 - no process medium inside the sealing rings
2. Check the following values and diagnostics from the Indicating transmitter displays with the standard R.I. liquid on the prism:
3. If the check criteria are met, the instrument can be calibrated. Calibration is done with minimum five, preferably seven, certified standard R.I. liquids as follows:
 - 3.1. Mount the sensor on a bench.
 - 3.2. Take certified standard R.I. liquids. The middle point value should correspond to the middle value indicated in the Final test -section of the latest Delivery Data Sheet or Standard Calibration Sheet of the PR-01-S. Then take 2-3 values above and below the middle point value.
 - 3.3. Record R.I. value and corresponding Test and Temperature values from the Normal display. Use the form on the back of this brochure.
 - 3.4. Send the completed form to K-Patents or the local K-Patents Representative.
 - 3.5. K-Patents calculates new calibration parameters for the R.I. measurement.
 - 3.6. Key in the new parameters (soft keys C-B-6-1/2/3/4) and then repeat the verification check as described in paragraph 2.

Display	Soft-key sequence from Normal Display	Value to be checked	Acceptable value
Raw sensor data	C-A	LED	below 200
Image diagnostics	C-A-A-A-A	Max intensity OK	Yes
		Endpoint below 75 %	Yes
		Image below corner	Yes
		Slope OK	Yes
		Left curve OK	Yes
		Right curve OK	Yes

For more details of the raw sensor values and image diagnostics, see Instruction Manual, Section 6.5.

If the checks 1 and 2 fail, contact K-Patents or local K-Patents Representative for corrective action.

