



## **Final Test Report and recommendations**

**CT70120011**





### *Introduction*

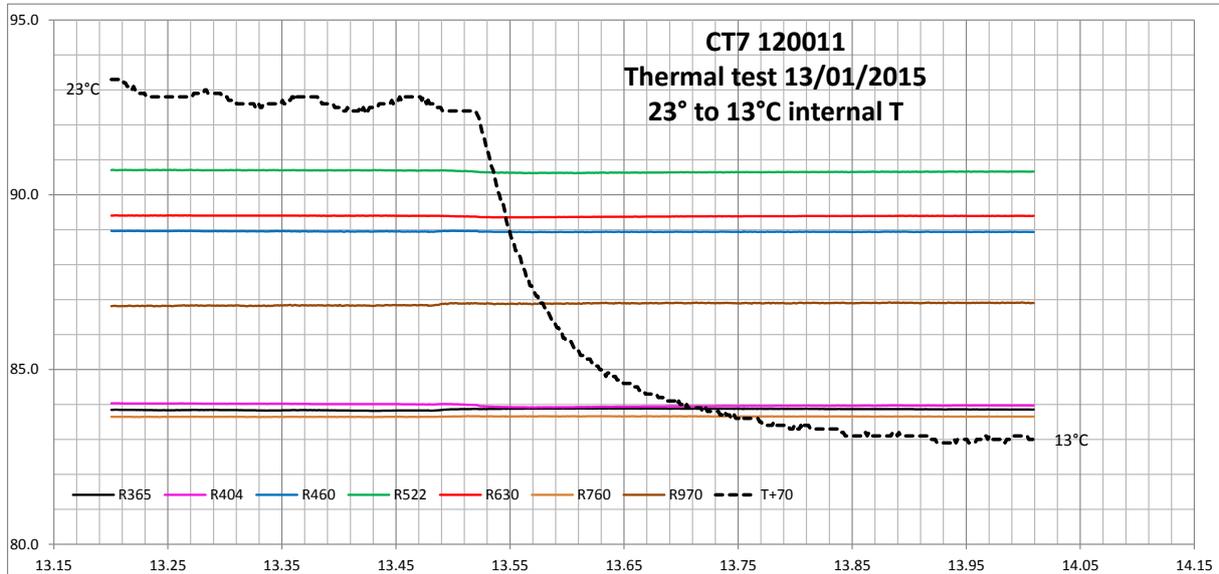
The last model of CT7 comprises of a new optical layout that yields exceptional stability so that recalibration is unnecessary unless the instrument gets contaminated.

Accuracy and repeatability are measured during a one day thermal test and between 15°C and 5°C external temperature. The measurement will remain stable at least 5°C external to these limits ( $0^{\circ}\text{C} < T < 20^{\circ}\text{C}$ ); the internal temperature indicated by the instrument's thermometers are 6° to 8° higher than the ambient temperature.

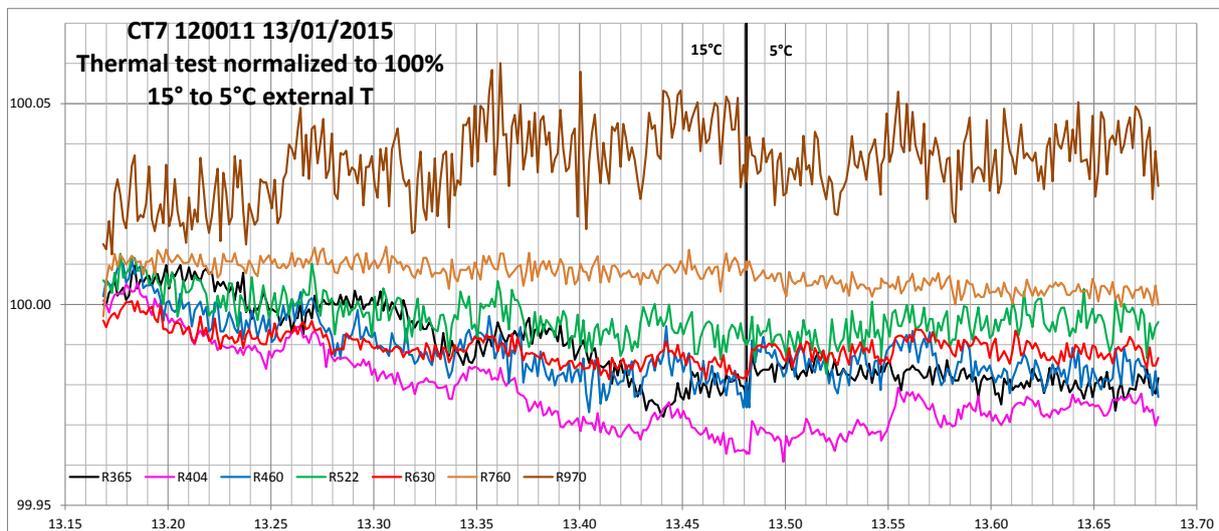


**Thermal tests**

The first graph shows the final thermal test of the CT7012011; The external temperature runs from 15°C down to 5°C ; the internal temperature, reported on the graph, runs from 23°C down to 13°C. The test lasts for 19.44 hours.



The second graph shows the same data on an expanded scale; to allow maximum expansion, the data have been normalized to 100.



The shift of external temperature from 15°C to 5°C is shown on the graph.

	R365	R404	R460	R522	R630	R760	R970
<b>shift error</b>	-0.01	-0.02	-0.01	0.00	-0.01	0.01	0.04
<b>variable error</b>	0.05	0.02	0.02	0.01	0.01	0.01	0.02
<b>repeatability</b>	0.005	0.005	0.010	0.010	0.007	0.007	0.040



The table shows the related errors:

- The shift error is the average absolute error of all the readings in %
- The variable error is the variations over the entire period of measurements about the average (in +/- %)
- The repeatability is the maximum difference (in %) between two successive measurements.

*Absolute measurement of the gauge G05*

The gauge G05 has been utilized to calibrate the CT7 120011. This gauge has been absolutely calibrated with our VW calibration jig. The table shows a series of 5 measurements sessions performed on various dates spanning on nearly one month. Most sessions comprise of six independent measurements of the gauge **G05** except the first one that has thirty.

Mesures de G5	#	R365	R404	R460	R522	R630	R760	R970
8-9/11/2014	30	83.81%	84.02%	88.95%	90.74%	89.48%	83.72%	86.74%
19/11/2014	6	83.81%	83.99%	88.95%	90.73%	89.42%	83.67%	86.85%
25/11/2014	6	83.84%	84.00%	88.95%	90.71%	89.43%	83.70%	86.82%
3/12/2014	6	83.83%	84.05%	88.98%	90.70%	89.40%	83.65%	86.84%
5/12/2014	6	83.83%	84.02%	88.96%	90.71%	89.40%	83.64%	86.82%
<b>Average</b>	54	<b>83.82%</b>	<b>84.02%</b>	<b>88.95%</b>	<b>90.73%</b>	<b>89.45%</b>	<b>83.70%</b>	<b>86.78%</b>

The last line shows the average among the 54 measurements; the absolute accuracy is +/- 0.2% or better.

However the uniformity of the gauge is of the same order (+/-0.15%) and deposition of thin layers of pollutant on the sample mirrors can induce variations of the reflectivity of several tenths of a percent, mainly if measurements are performed while temperature is raising or if the relative humidity exceeds 50%. These are variations of the sample mirror reflectivity **not** of the CT7. It is also observed that a mirror freshly coated with pure aluminum will change reflectivity by several percent due to the oxidization of the coating.

*Batteries*

Batteries are of the type NiMH rechargeable size AA 2700mAH (2100 minimum); do not use another type.

Loading is done by the CT7 when connected to a PC but **not lit (shut off)**. This is done in order to protect the NiMh batteries against repeated micro-loads that destroyed them rapidly with memory effect.

The load tests conducted show after 3h charge, with different waiting times (instrument off):

- Charge /no wait period/ measures each 5 minutes: 152 measures before discharge
- Charge /3 days wait/ measures each 5 minutes: 127 measures before discharge
- Charge /7 days wait/ measures each 5 minutes: 108 measures before discharge



With the instrument **lit and not connected to USB**, the batteries last for 3h50 whatever measurement number performed (tests were conducted with one measurement each 2; 5 and 10 min).

### *Recommendations*

When delivered, the display window is protected by a transparent plastic sheet that can be removed by pulling out the small green square in the bottom left corner of the window.

The small 1mm hole at the back of the instrument gives access to a reset switch. It has to be used when disconnecting CT7 from a PC without putting it to sleep: then it remains locked in PC mode and cannot be shut off otherwise.

CT70120011 is provided without the Dust Scattering Measurement; accordingly, you should select the Reflectivity Card in the Measure configuration.

If you activate the expert configuration in the “About” menu (top left button), you will have access to modifying the basic parameters of the instrument. We do not recommend that you utilize this option before being well acquainted with the instrument. If, anyhow, you corrupt the parameters; you can always recover the original ones by pushing the button “import params” at the left of the main screen. Take care not to overwrite the original parameters with Export function. If this would happen, you still can recover the original parameters from the installation USB key delivered with the instrument.

Keep the instrument away from dust (use the steel sheet cover to close the beam aperture) and chemical pollution. Keep it in its container when not in use.

Avoid performing measurements in raising temperature or high humidity environment (Rh>50%). Error due to mist could reach 0.5% in bad conditions.

CT7 is not sensitive to small parallel displacement with respect to the sample mirror (piston displacement). It has been measured up to 0.5 mm. This allows introducing an optical cloth between the three feet of CT7 and the sample mirror for protecting the coating. The thickness should be equal within 0.05 mm under the three feet.

Mirrors with radius of curvature down to +/- 1000 mm can be measured safely; between 1000 mm and 500 mm, it requires a correction and under 500 mm the result will not be significant. The best way to determine the correction is to aluminize a flat sample together with the curved mirror and to compare reflectivity measurement on both mirrors.

User Manual (PDF) is delivered on the USB memory with the instrument and may be recalled from the CT7Console application.



### Installation:

#### CT7 installation on Win7, Win8 system

The installation procedure for Windows 7,8 is simpler than ever.

In contrast to XP and Vista systems, the USB driver will be automatically downloaded (\*) and installed. The necessary ".NET framework" is already included in Windows since Win7.

You may use CT7 software provided with the instrument or check for updated versions from [CT7 DOWNLOAD AREA](#).

(\*) The PC shall have internet access.

#### Installation:

The installation is performed in only two steps:

- Let Windows to find and install USB driver
- Run CT-7 Console setup

Now, let's see it in details:

- Let Win to install driver:
  - Power ON the CT7 instrument and connect to USB port of the PC - after few seconds the PC will download drivers and the CT7 device will be available as well as COM port created (see Hint 2 below).
- Install CT7-Console:
  - Copy from the USB memory the CT7 folder (with subfolders) to your MyDocuments folder
  -

Do not forget to power-up and switch CT7 into PC-Link mode (using it's navigation switch and menu), select the Communication port and you may enjoy the connection.

#### Hints:

1. If the driver is not correctly installed, or CT7 is not connected to PC you will most probably get error "No Communication Port Available".

Windows creates dynamically the port when CT7 is connected (and powered).

2. Typical message during automatic CT7 driver installation:

