



## SYLVAC CALIBRATION STANDARD

### Calipers S\_Cal WORK / S\_Cal PRO 0-300

ID Nr :	<b>SYL 801</b>
Date :	06/28/2011 - E
By :	DSC
Valid. by :	Workflow KT

## 1. REFERENCES FOR CALIBRATION

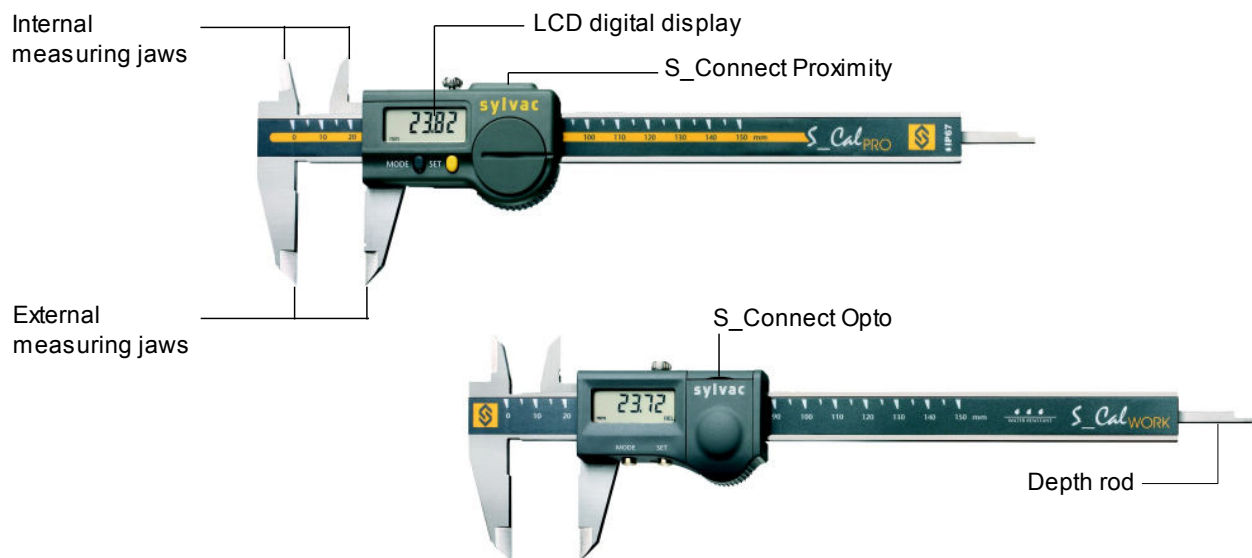
### 1.1. Master standards

- A set of Master gauge blocks (steel or ceramic) from 5 to 300 mm.
- A set of Master ring gauges, diameter 4 to 25 mm.
- A computer with calibration software (Sycopro) and connexion cable.

### 1.2. Calibration conditions

- The reference temperature is 20°C.
- The maximum variation of the room temperature ( $\Delta$  max) is 2° on a duration of 6 hours

## 2. FUNCTIONAL LAYOUT



## 3. CALIBRATION SPECIFICATIONS

### 3.1. Preparation

- General checking (display of the value, movement of the measuring slide). If out of operation, it may be repaired or recycled.
- External cleaning using a soft cloth. Solvents to be used: isopropyl alcohol (except on the window), gentle benzene. Lubricate the zones of friction using fine grease.
- Keep the instrument and master gauges under calibration conditions at least 6 hours before starting the calibration.

### 3.2. Visual checking

- Readability of the identification number.
- Readability of the display and the LCD segments.

### 3.3. Functional checking

- Check the gap (see pt. 3.6) and the regular movement of the slide over the beam.
- Check the slide lock using the locking screw. The display must not vary more than 0.01 mm.
- Check the functionality of the keys.
- Check the stability of the digital display. Max. permitted error during 10 seconds: 1 digit.
- Check the data output by connecting the instrument to a PC or to a Sylvac display unit.



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**3.4. Determination of the measuring force and the zero setting of the display**

- The measuring force is applied with the thumb of the right hand. It must be as well constant as possible, during the zero setting of the display and during the measure. It should be included between 6 and 10N.
- Fit the measuring force according to the workpiece and its position between the measuring jaws. The purpose is to succeed in repeating the measure easily.
- We can accustom the operator to apply the good measuring force (F) by exercising him on a mechanical assembly provided with a dynamometer, in support on the mobile jaw of the caliper.
- Max. variation of the display when releasing the pressure after zero setting:

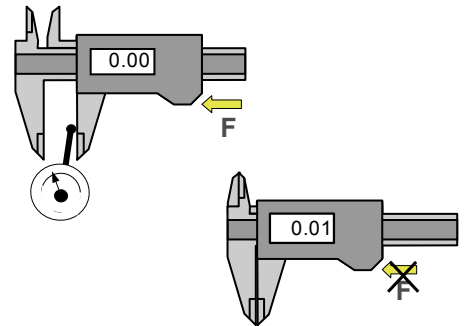


Chart 3.4.1.

Caliper	Variation of display on zéro
<b>S_Cal PRO 150 / 200 / 300</b>	0.01 mm
<b>S_Cal WORK 150 / 200 / 300</b>	0.01 mm

**3.5. Checking of the parallelism (//) of the jaws for external and internal measurements**

- Use a gauge block (5 to 25 mm) for the external measuring jaws and a ring gauge (Ø10 to Ø25 mm) for the internal measuring jaws. Check at each utmost position.
- The Master must be engaged from 2 to 3 mm since the end of the surface of jaw. The measuring force (F) is activated when using the control hump.

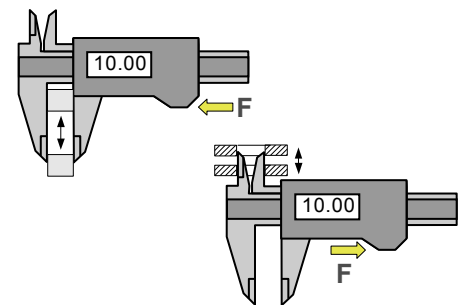


Chart 3.5.1.

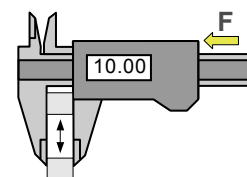
Caliper	Δ max // ext. jaws	Δ max // int. jaws
<b>S_Cal PRO 150 / 200</b>	0.01 mm	0.02 mm
<b>S_Cal PRO 300</b>	0.02 mm	0.02 mm
<b>S_Cal WORK 150 / 200 / 300</b>	0.02 mm	0.02 mm

**3.6. Adjustment of the measuring slide**

Measure as under point 3.5 above but the measuring force (F) must be activated on top at the right hand side of the housing, to cancel the force of compensation of the ledge gap.

Chart 3.6.1.

Caliper	Δ max // permitted gap
<b>S_Cal PRO 150 / 200</b>	0.02 mm
<b>S_Cal PRO 300</b>	0.03 mm
<b>S_Cal WORK 150 / 200 / 300</b>	0.03 mm

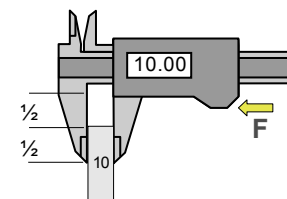


**3.7. Repeatability**

To determine the repeatability, perform 10 successive measurements on a gauge block (from 5 to 25 mm). The gauge block must be placed in the middle of the jaws length.

Chart 3.7.1.

Caliper	Δ max repeatability
<b>S_Cal PRO 150 / 200 / 300</b>	0.01 mm
<b>S_Cal WORK 150 / 200 / 300</b>	0.01 mm



**3.8. Max. external and internal measuring error**

- Use gauge blocks from 10 to 300 mm and ring gauges Ø4 and Ø25 mm.
- The display has previously been set to zero as specified on point 3.4
- Make 6 external measures distributed on the whole measuring range and 2 internal measures.
- To make the measures, the gauge block must be placed approximately in the middle of the jaws length as specified on point 3.7.



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Chart 3.8.1.

Caliper	Max. permitted error using master gauge blocks and master gauge rings			
	Max. error G <sup>(1)</sup> external measurements	$\Delta$ max <sup>(2)</sup> of external measurements error	Max. error internal measurements	$\Delta$ max <sup>(2)</sup> of internal measurements error
<b>S_Cal PRO</b> 150 / 200 / 300	0.02 mm up to 150 mm	0.03 mm from 0 to 150 mm	0.02 mm Ø4 to Ø25 mm	0.03 mm from Ø4 to Ø25 mm
	0.03 mm > 150 mm	0.04 mm from 0 to 300 mm	0.03 mm Ø26 to Ø150 mm	0.04 mm from Ø4 to Ø150 mm
<b>S_Cal WORK</b> 150 / 200 / 300	0.02 mm up to 100 mm	0.03 mm from 0 to 100 mm	0.03 mm up to Ø100 mm	0.04 mm from Ø4 to Ø100 mm
	0.03 mm > 100 mm	0.04 mm from 0 to 300 mm	0.04 mm > Ø100 mm	0.06 mm from Ø4 to Ø300 mm

(1) As per DIN 862 :  $G = 0.022 + (L / 5E4)$ . « L » represents the length in mm from the zero setting, jaws closed. The S\_Cal PRO model has a lower error.

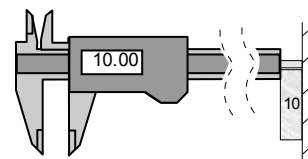
(2)  $\Delta$  max is the maximum extent of the measured errors (max – min). Example of external measure with S\_Cal PRO 150 mm, max. permitted error 0.02 mm / permitted  $\Delta$  max 0.03 mm: The permitted measured errors can be between -0.01 and +0.02mm or between -0.02 and +0.01 mm.

### 3.9. Error of depth measurements

Make a depth measurement (depth rod) on a gauge block of 10 mm placed on a flat measuring table or on a specific device.

Chart 3.9.1.

Caliper	Max. permitted error on 10mm
<b>S_Cal PRO 150 / 200 / 300</b>	0.02 mm
<b>S_Cal WORK 150 / 200 / 300</b>	0.02 mm

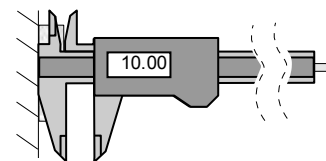


### 3.10. Error of shoulder measurements

Make a shoulder measurement on a gauge block of 10 mm placed on a flat measuring table or on a specific device.

Chart 3.10.1.

Caliper	Max. permitted error on 10 mm
<b>S_Cal PRO 150 / 200 / 300</b>	0.02 mm
<b>S_Cal WORK 150 / 200 / 300</b>	0.02 mm



## 4. RESULTS AND DECISION

- Establish a calibration certificate (with Sycopro). The measures covered by the calibration certificate shall be at least:
  - 3.5 parallelism of the jaws for external and internal measurement.
  - 3.8 external and internal measurement.
- If the instrument does not conform to the specifications of calibration, it will be repaired and again calibrated to either downgraded or recycled.
- Calibration specifications defined in this standard conform to DIN 862.