# CATHODE CURRENT DISTRIBUTION CONTROL DEVICE

## INSTRUCTION MANUAL

- REV 0 -

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# CATHODE CURRENT DISTRIBUTION CONTROL DEVICE

**FUNCTION**

This equipment can distinguish between three types of cathode bar on a given pot:

- Those with rated current flowing through them
- Those with half the rated current flowing through them
- Those with no current flowing through them at all (cut bars)

**COMPOSITION OF THE DEVICE**

The device consists of:

- A measurement probe with Hall effect sensors:

  CATHODE CURRENT DISTRIBUTION CONTROL CANE - CCRC

- A digital-display measurement indicator:

  INDICATOR FOR CATHODE CURRENT DISTRIBUTION CONTROL CANE - IN-CCRC

- A test bench:

  TEST BENCH FOR CATHODE CURRENT DISTRIBUTION CONTROL CANE - BT-CCRC

**REMARKS CONCERNING USE**

This device is a measuring instrument; although it has been designed to withstand harsh measurement conditions (industrial context, high temperatures, measurement points accessible with difficulty, risks of electric shock), it must be handled with care.

The measurement probe (CCRC cane) is long and thin. It is made of materials that react in different ways to temperature stresses (aluminium and epoxy), so it is important to respect the following instructions:

- Avoid twisting and bending it while passing it through the grating.
- Avoid leaving the cane immobile on the cathode bar for too long, since this causes it to become very hot and there is a risk of it being damaged.
- Cool the jumper (bottom part) with compressed air after having taken measurements on half a pot.
- Check the general condition of the probe frequently.

# CATHODE CURRENT DISTRIBUTION CONTROL CANE
# CCRC

**MODEL:** Cane – CCRC type

**FUNCTION:** Used in conjunction with an IN-CCRC type indicator, this cane measures the magnetic field generated by direct current flowing through a cathode bar, operating from the gap between pots, through the grating.

**CHARACTERISTICS:**

- Nylon handle.
- Epoxy tube.
- Aluminium jumper and lamp holder.
- Push button on handle to activate lighting.
- Push-pull connector for the digital indicator (IN-CCRC).
- Lamps to light up the measurement area (6 V – 0.2 A).
- Electrical insulation between top part and bottom part: > 5 kV.
- Instantaneous maximum temperature of use (at the bottom part): 300°C.
- Ambient temperature of use: 100°C.
- Max. thickness (tube and bottom part): 30 mm.
- Dimensions: 2060 x 160 x 32 mm.
- Weight: 2.1 kg.

Remarks:

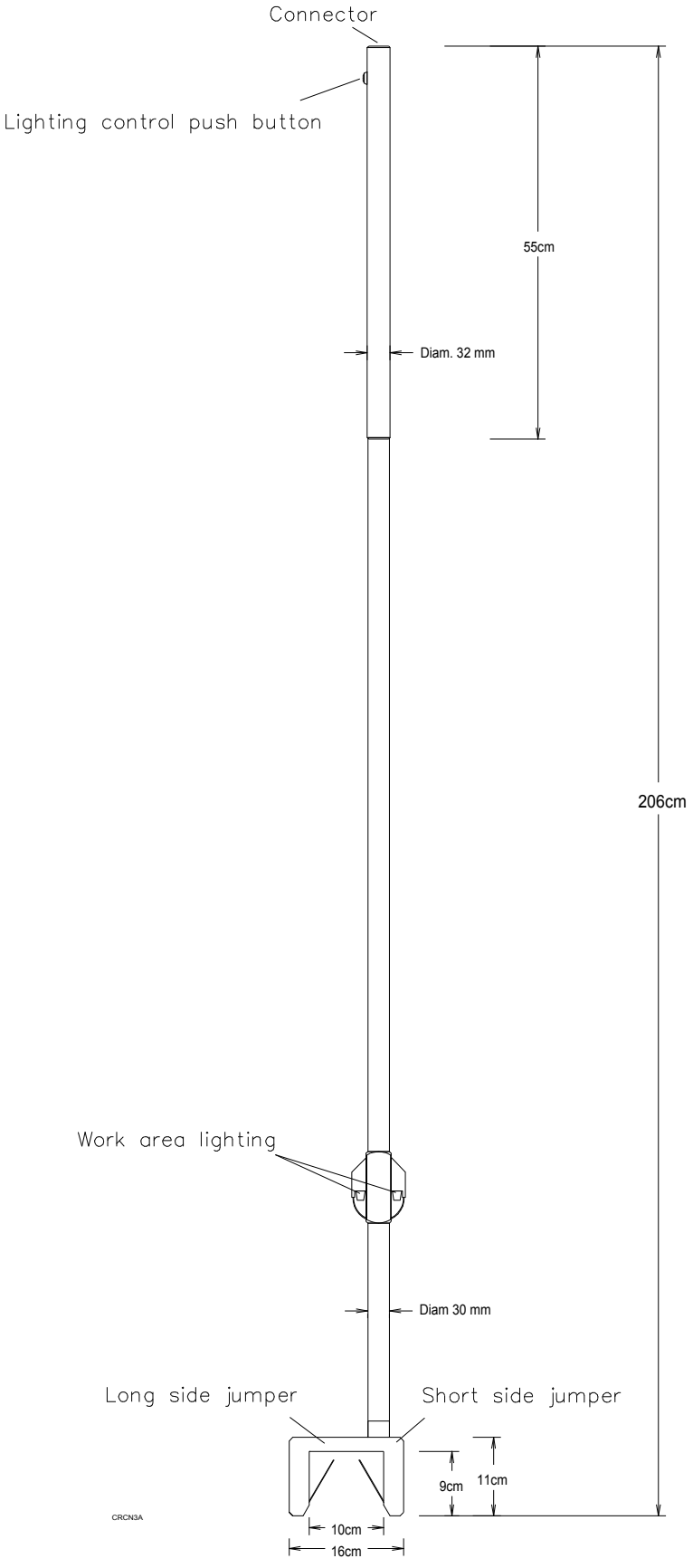
This cane is a measuring instrument and must be handled with care.

To use it properly, it is important to respect the following instructions:

- Avoid twisting it while passing it through the grating.
- Avoid leaving the cane immobile on the cathode bar for too long, since this causes it to become very hot and there is a risk of it being damaged.
- Cool it with compressed air after having taken measurements on a half-pot
- Check the general condition of the probe frequently

# CATHODE CURRENT DISTRIBUTION CONTROL CANE

# CCRC



# INDICATOR FOR CATHODE CURRENT DISTRIBUTION CONTROL CANE

# IN-CCRC

**MODEL:** Digital indicator - IN-CCRC type

**FUNCTION:** Connected with a CCRC type cane, this indicator is used to control cathode current distribution (measurement of magnetic fields up to 200 Gauss).

**CHARACTERISTICS:**

- Operating range: 0 to 200.0 Gauss
- Display: 3 1/2 digits, LCD,
  height: 14 mm, back-lighting possible
- Indicator precision: ± 0.1%
- Temperature stability: 100 ppm/°C
- Zero adjust control: by externally accessible potentiometer.
- Full scale adjustment: by externally accessible potentiometer
- Power supply: by Ni-Cd 6V/2, 4Ah storage battery, allowing over 8 hours of autonomous operation.
- Push buttons: “ON” to switch the device on (it switches off automatically)
  “SIDE” to display the “Long Side” or “Short Side” measurement
- Operation indicators: red light-emitting diodes.
- Unit: black ABS, with carrying strap
- Dimensions: (H x W x D): 75 x 148 x 195
- Weight: 1 kg
- Accessories supplied with the IN-CCRC:
  1 IN/CCRC connector cable (0.3 kg)
  1 battery charger (0.4 Kg)

Remarks:

To ensure that the cane lighting functions correctly, do not forget to charge up the indicator.

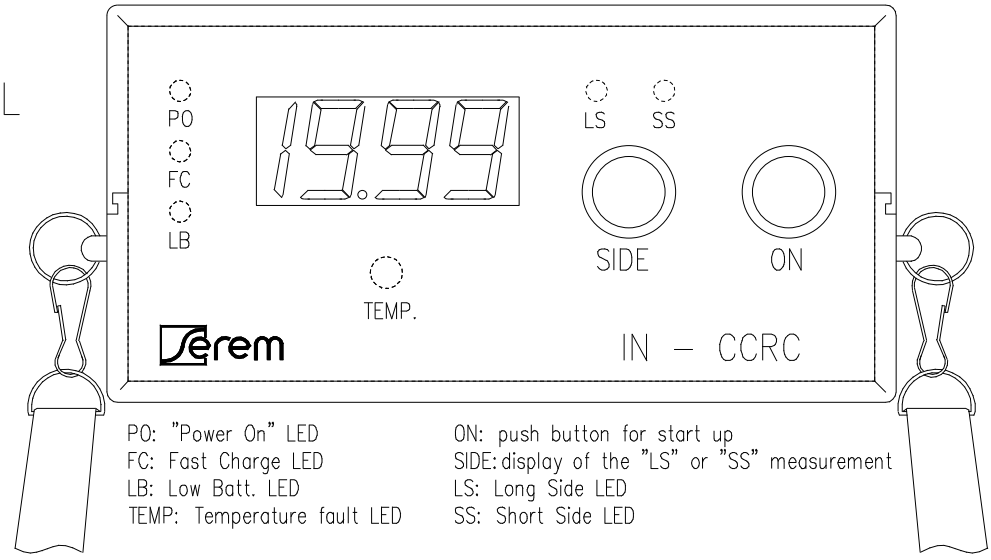
The "TEMP" indicator lights up when the cane temperature is too high. If this happens, stop the measurements, remove the probe from the conductor and leave it to cool down until the indicator goes out.

If these instructions are not respected, there is a risk of the measurement sensors and cane structure being damaged.

# INDICATOR FOR CATHODE CURRENT DISTRIBUTION CONTROL CANE

# IN-CCRC

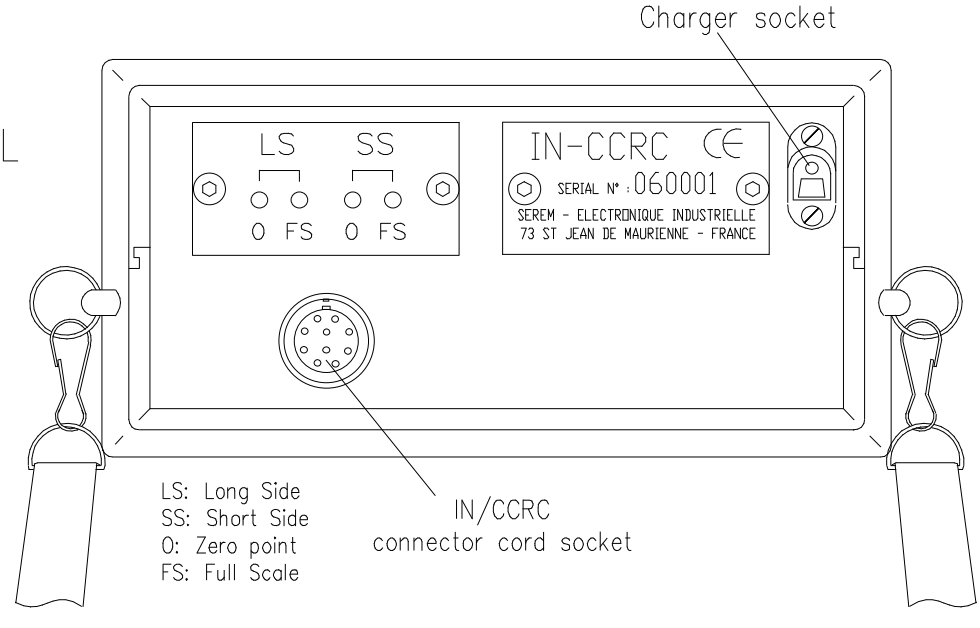
FRONT PANEL




PO: "Power On" LED
FC: Fast Charge LED
LB: Low Batt. LED
TEMP: Temperature fault LED

ON: push button for start up
SIDE: display of the "LS" or "SS" measurement
LS: Long Side LED
SS: Short Side LED

BACK PANEL




CRCN5A

# TEST BENCH FOR CATHODE CURRENT DISTRIBUTION CANE

# BT-CCRC

**MODEL:** Test bench – type BT-CCRC

**FUNCTION:** This device is used to test the functioning of the “CCRC cane and IN-CCRC indicator“ assembly.

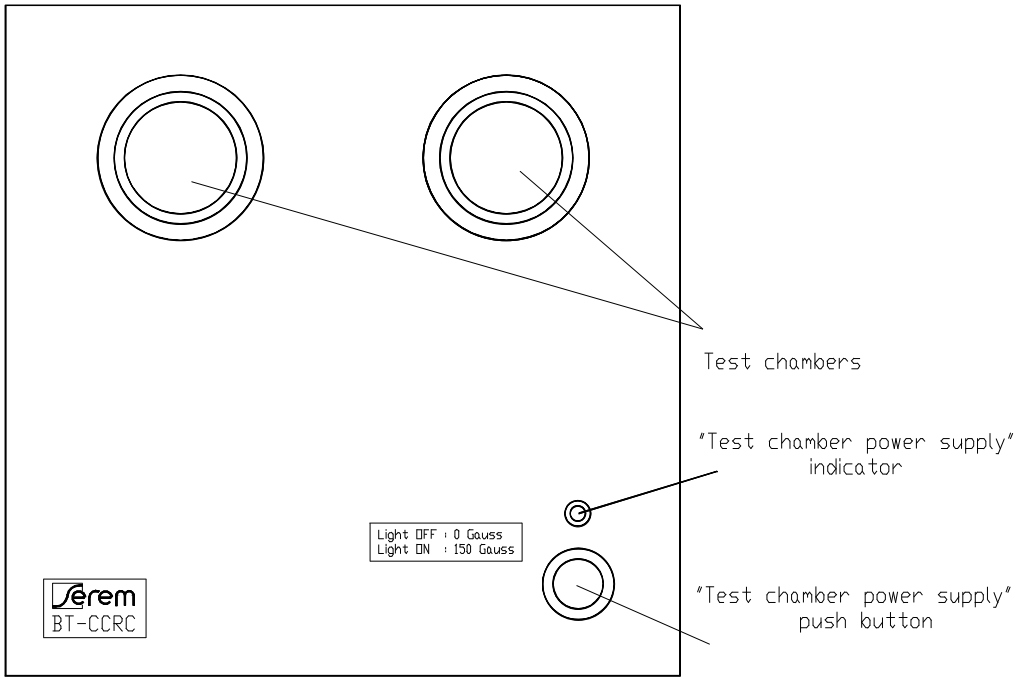
**CHARACTERISTICS:**

- 2 test chambers (150 gauss).
- Black ABS frame.
- Toggle switch.
- “Test chamber power supply“ push button (3 min. time delay)
- Red “test chamber power supply” indicator
- Auxiliary power supply: 120 or 230 V AC. (-15/+10%), 30 VA max.
- Dimensions (WxDxH): 265 x 265 x 113 mm.
- Weight: 5.1 kg.

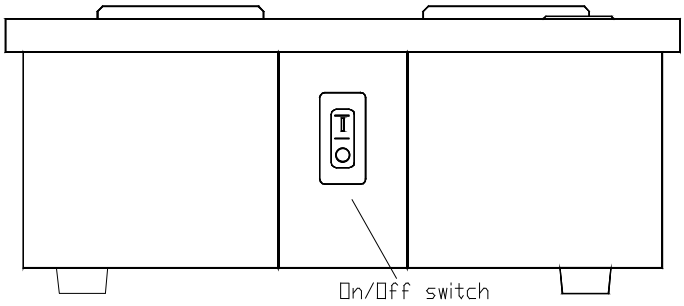
# TEST BENCH FOR CATHODE CURRENT DISTRIBUTION CANE

# BT-CCRC

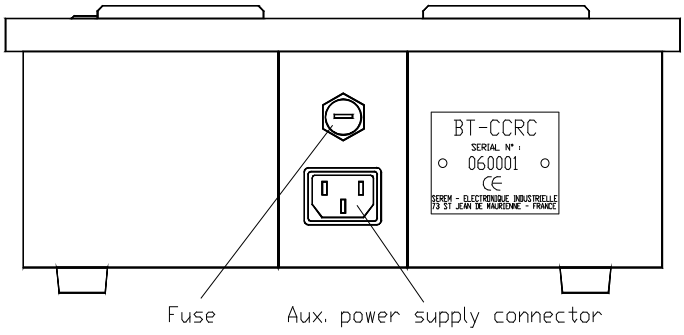
TOP PANEL




FRONT PANEL




BACK PANEL



# OPERATING PROCEDURE

**PERSONNEL REQUIRED**

2 operators.

**SPECIFIC RISKS LINKED TO OPERATION**

No specific risk linked to operation.

**WHEN SHOULD THE MEASUREMENT BE TAKEN?**

The current must be stable.

When no other operations are being performed on the pot being measured (for safety reasons).

**CHECKING THE DEVICE**

Before going to the potline, check that the device is working correctly.

- Connect the digital indicator (IN-CCRC) to the cathode current distribution control cane (CCRC) using the connector cable.
- Position the CCRC stirrup in the two test bench chambers (BT-CCRC).
- Switch on the test bench and the digital indicator.

**ZERO ADJUST CONTROL**

The test chamber power supply indicator must be unlit. If it is not, wait until the end of the time delay on the test chamber power supply (3 minutes).

- Push the “SIDE” button on the indicator (IN-CCRC); the “LS” (Long Side) indicator lights up.
- Take a reading from the digital indicator of the magnetic field value.

  If the value recorded is not within the 0 $\pm$ 1 Gauss range, do the zero adjust control using the potentiometer marked “O", which is accessed via the back panel of the digital indicator.
- Push the “SIDE” button on the indicator (IN-CCRC); the “SS” (Short Side) indicator lights up.
- Take a reading from the digital indicator of the magnetic field value.

  If the value recorded is not within the 0 $\pm$ 1 Gauss range, do the zero adjust control using the potentiometer marked “O", which is accessed via the back panel of the digital indicator.

(SEE ATTACHMENT 1)

**FULL SCALE ADJUSTMENT**

- Push the button located on the top of the test bench (BT-CCRC).
  The test chamber power supply indicator lights up.

- Push the “SIDE” button on the indicator (IN-CCRC); the “LS” (Long Side) indicator lights up.

- Take a reading from the digital indicator of the magnetic field value.

  If the value recorded is not within the range 150 ± 5 Gauss, set the full scale to 150 Gauss using the potentiometer marked “FS”, which is accessed via the back panel of the digital indicator.

- Push the “SIDE” button on the indicator (IN-CCRC); the “SS” (Short Side) indicator lights up.

- Take a reading from the digital indicator of the magnetic field value.

  If the value recorded is not within the range 150 ± 5 Gauss, set the full scale to 150 Gauss using the potentiometer marked “FS”, which is accessed via the back panel of the digital indicator.

(SEE ATTACHMENT 1)

# TEST ON THE POT

## TEST OPERATION

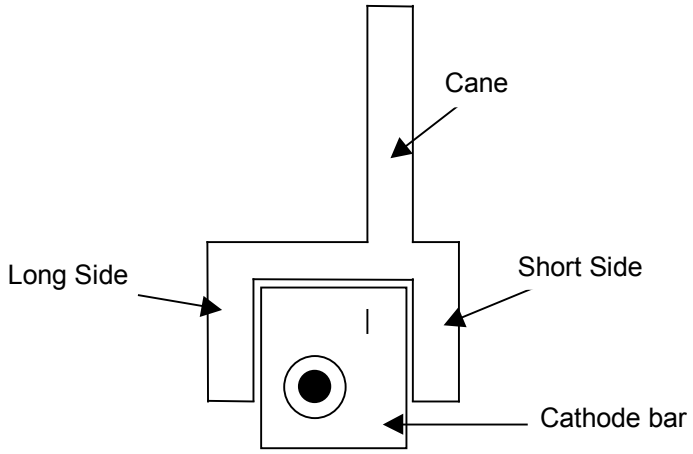
- Check cleanliness of the cathode bars. The measurement cane cannot be positioned correctly if alumina or crust is present on the cathode bars. If required, clean the cathode bars with a long-handled brush.
- Lower the cathode current distribution control cane through the grating, between 2 pot cradles.
- Position the aluminium stirrup “astride” the cathode bar, against the pot shell stuffing box.
- Take a reading from the digital indicator of the magnetic field value between the two sensors (no sensor selected). Do not take account of the value sign.
- Note the results on the measurement sheet.
- Note the pot current at the time the measurements were taken.
- In order to be able to compare these measurements and monitor their changes over time, they must be expressed as equivalent values using a reference potline current.

**REMARK 1:**

**POSITION OF THE CANE ON THE CATHODE BAR**

The measurement is very sensitive to the CCRC position on the cathode bar: it must be ensured that the measurement cane stops well up against the cathode bar.

The cane must always be turned the same way (unless it is impossible to do so).




**REMARK 2:**

**PRECAUTIONS FOR USING THE DEVICE**

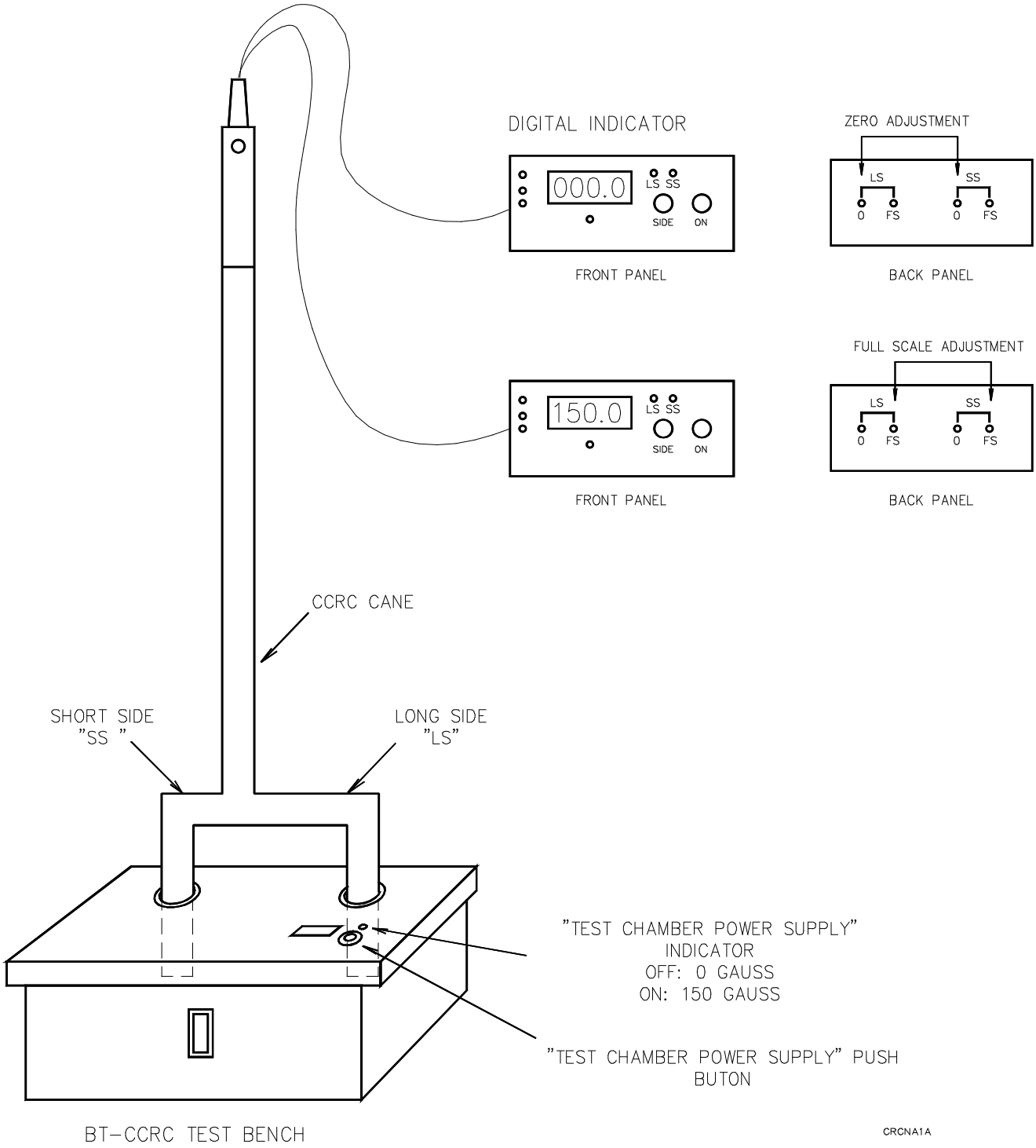
The CCRC must be cooled down using compressed air (for approx. 3 minutes) after measuring half a pot in order to reduce measurement deviations due to temperature.

If sensor temperature exceeds 80°C, an indicator on the front panel of the digital indicator lights up. Measurements must be stopped and the CCRC cooled down (for approx. 3 minutes) using compressed air.

If sensor temperature exceeds 100°C, the digital indicator display blocks.

# ATTACHMENT 1

## DIAGRAM DESCRIBING THE CHECKING OF THE CCRC CANE ON THE BT-CCRC TEST BENCH



# LIST OF SPARE PARTS AND ACCESSORIES

## SPARE PARTS

### CCRC

***DESCRIPTION***

- "HALL EFFECT PROBE" UNIT
- Batch of 10 spring plates to position the jumper on the bar
- Lamp bodies
- Batch of 10 lamp covers
- Batch of 10 lamps

### IN-CCRC

***DESCRIPTION***

- Display module.
- Storage battery, Ni-Cd 6V/2,4Ah

## ACCESSORIES

- Wooden carrying case for control cane and indicator.
  (dimensions: 320x2100x100 mm - Weight: 6 kg)