

HBC-4301 Calibration & Test Procedure

Serial No. _____

- 1) Remove the lid's retaining screws and raise the lid
- 2) Remove the shield from the CPU board
- 3) Install a jumper on LK1 on HBC-4300-1 PCB
- 4) Measure the earth path impedance from the "EARTH" socket to the earth pin on the "POWER IN" connector, to all exposed metal and to the earth pins on the output zones. These readings should be less than 500 milliohms
- 5) Test and record that the RCD breakers are operating correctly with the RCD Tester on each of the zone outputs. Set all outputs to 100%. **28 & 29**
- 6) Test the power outputs in manual mode, 100% and 20%
- 7) Apply power in the "EXTENDED SET-UP MODE" (hold the set-up button while turning on the power). If an "INVALID SERIAL NUMBER" message appears then install the TEST EPROM and enter the unit's serial number.
- 8) Measure and record the DC voltage rails and the reference voltage values
- 9) Check that the "DATE" and "TIME" values are set correctly in the "EXTENDED SET-UP MODE". **34 & 35**
- 10) Input the measured reference voltages into the HBC-4301. **36**
- 11) Turn off the power. Insert a standard temperature sensor between the T/C input boards. Close the lid, turn the power on in "EXTENDED SET-UP MODE" and leave for 30 minutes
- 12) Adjust the "CAL CJ SENSOR" **38**, "CAL CJ BU SENSOR" **39**, "CAL CASE SENSOR" **40** and "HEATSINK SENSOR" **41** to show the actual measured temperatures. Log the calibration factors.
- 13) Simulate 20°C into the # 1 Thermocouple input. After about 20 seconds, select and enter "Start Low Cal" **42**, all thermocouple inputs will be trimmed to read 20°C.
- 14) Simulate 200°C into the # 1 Thermocouple input. After about 20 seconds, select and enter "Start High Cal" **43**, all thermocouple inputs will be trimmed to read 200°C.
- 15) Input and log the readings for 10, 20, 100, 150, 200, and 290°C.
- 16) Set the internal vacuum zero and span by connecting the test vacuum hose to Vacuum #2 quick connect and the vacuum measuring box transducer input. **45 (20 set to manual; 21 to set vac output level)**
- 17) Set the internal pressure values for zero and span by connecting the air supply hose. **46**
- 18) Calibrate the External Vacuum inputs using the CA71 Calibrator's 20mA Sink mode. Adjust the current to 5.60mA and set the zero to read -90kPa (approx. -8mV). Adjust the current to 18.40mA and adjust the span to read -10kPa (approx. 101.5%). **47 & 48**
- 19) Check the vacuum pumps with a 2 litre per minute vacuum flow (with 100% & 50% on pump #2)
- 20) Run a test cycle with a "dummy" patch. Print the results and file with the supply order
- 21) Remove the jumper from LK1
- 22) Replace the CPU shield
- 23) Close the lid and re-install the retaining screws
- 24) Fill in all of the details on the "HBC-4301 Recalibration Form", print, sign, and enclose in the HBC-4301. Apply calibration label to HBC.
- 25) Enter details into data base
 - a) Work carried out
 - b) Software Version
 - c) EPROM Version
 - d) Communications interface (RS232 or RS485)

HBC-4301 Calibration Form

| | | | |
|-----------|--|-------------|--|
| Customer: | | Date: | |
| Location: | | Serial No.: | |
| Comms: | | Order No.: | |

| Operation | Zone 1 | Zone 2 | Zone 3 |
|----------------|-----------------------|--------|--------|
| RCD trip tests | Trip Current (< 30mA) | | |
| | Trip Time (< 300ms) | | |

Voltages

| | |
|----------------------------|---|
| VCC Power supply 5VDC | |
| Power supply +12VDC | |
| Power supply -12VDC | - |
| TC Reference (12.3mV ±0.3) | |
| Reference #1 (53.6mV ±2.0) | |
| Reference #2 (481mV ±10) | |

Calibration

| | |
|----------------------------|--------------------------|
| Earth Continuity (< 500mO) | <input type="checkbox"/> |
| Cold start (new EPROM) | <input type="checkbox"/> |
| Enter date/time | <input type="checkbox"/> |
| Enter reference voltages | <input type="checkbox"/> |
| Cal at 20 °C | <input type="checkbox"/> |
| Cal at 200 °C | <input type="checkbox"/> |

Accuracy (after calibration)

| | | | | |
|-----------------------|--|----|-------------|----|
| Measured ambient Temp | | °C | | |
| CJ temperature | | °C | O/S set to- | ±4 |
| CJ BU temperature | | °C | O/S set to- | ±4 |
| Case temperature | | °C | O/S set to- | ±4 |
| H/S temperature | | °C | O/S set to- | ±6 |

| | | | | | | |
|----------------------------|----|----|-----|-----|-----|-----|
| Temperature checked at ... | 10 | 20 | 100 | 150 | 200 | 290 |
| (±1 °C) | | | | | | |

| | | | | | |
|--------------------------|------|------|----------------------|-------------|------------------------|
| Int. vacuum transducer | O/S | Span | Zero test (0kPa ±3) | | Span test (-75kPa ±3) |
| | | | | | - |
| Int. pressure transducer | O/S | Span | Zero test (0kPa ±10) | | Span test (460kPa ±20) |
| | | | | | |
| Ext vac transducer #1 | Zero | Span | -10kPa test | -90kPa test | |
| -90 & -10 kPa, ±3 | | % | - | - | |
| Ext vac transducer #2 | Zero | Span | -10kPa test | -90kPa test | |
| -90 & -10 kPa, ±3 | | % | - | - | |

| Inlet Pressure 460kPa | kPa | | |
|---|------|---|--------|
| Vac pump #2 manual control, leak rate 2 l/min | 100% | - | -73 ±5 |
| Vac pump #2 manual control, leak rate 2 l/min | 50% | - | -70 ±5 |
| Vac pump #1, leak rate 2 l/min | 100% | - | -70 ±5 |

Additional Checks

| | |
|----------------------------------|--------------------------|
| Temperature cycle run successful | <input type="checkbox"/> |
|----------------------------------|--------------------------|

Final check

| | |
|-----------------------|--------------------------|
| EPROM version | |
| Audible Alarm Enabled | <input type="checkbox"/> |
| Shield Installed | <input type="checkbox"/> |
| Calibration Label | <input type="checkbox"/> |

Signed

This is to certify that the above HBC-4301 was calibrated and checked by _____ on _____. The above HBC-4301 is operating in accordance and within specifications.