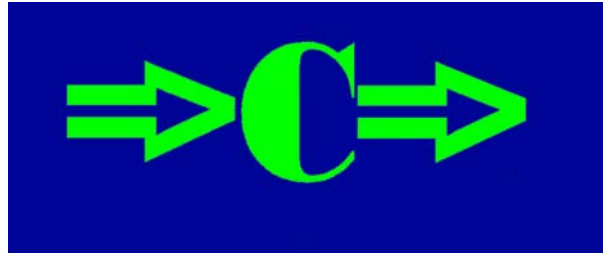


CyberSense



CyQ 111

OPERATORS MANUAL

SUPPORT

support@cyq.com

CyberSense Inc.
1330 River Road Nicholasville, KY 40356-9649
www.cyq.com
800-942 9327
Copyright 1998-2003

Table of Contents

| | |
|----------------------|---|
| INSTALLATION | 1 |
| CALIBRATION | 2 |
| INPUTS | 4 |
| OUTPUT | 5 |
| SPECIFICATIONS | 6 |
| LEGAL STUFF | 7 |
| Warranty..... | 7 |
| CE Safety..... | 8 |
| CE EMC..... | 9 |

QUICK START

The 111 is given a final test prior to packing and shipping. Then we disconnect the transducer and unplug the wall transformer. We pack the system as tested. This ensures that only tested product ships.

Connect the wall transformer by plugging the barrel connector into the receptacle below the red on-off switch on the back of the 111. Plug the wall transformer into the mains power receptacle. Plug the blue connector on a thermocouple probe into the blue receptacle on the back of the 111; this plug will go in only one way.

Flip the red handle power switch up (on position). The LCD display should read room temperature (about 20 deg C). Hold the probe between your fingers; the reading should increase.

Unplug the probe and note that the display goes to maximum; this reading indicates a broken or absent temperature sensor.

CALIBRATION

The CYQ model 111 thermocouple signal conditioner is shipped pre calibrated with the probes included with the instrument. Calibration is done using a YSI 49 TA thermistor digital meter that is periodically checked against an ASTM-91C-CC-NC mercury in glass thermometer that is NIST traceable to a reading of 37.01 deg C at 37 deg C.

The calibrate control allows for a one point calibration to high precision and accuracy. This is a 10 turn vernier adjustment. The range is 2 deg C; therefore, the smallest division on the dial equals 0.02 deg C. The voltage output is usable to a resolution of 0.01 deg C. The meter updates two times per sec; it is readable to 0.1 deg C with the usual caveat of +- 1 in the last digit. We routinely see meter rounding at 0.05 deg C in our calibrations, but do not guarantee this.

Calibration must be preformed using a well stirred water bath. The thermocouple probe should be in physical contact with the calibration probe. We use a tapered piece of clear tubing and wedge the probe tips in the taper. The 30 gauge probes leads must be taped into place to keep the tips from moving up or down even though they are in the tapered tubing.

The actual calibration should be done as a secondary task. The settling times can be quite long. It is best to occasionally check the numbers to see if they have stopped changing, and return to the primary task if they have not. This can take several hours depending on thermal mass and insulation.

The thermocouple probe is likely to respond faster than the calibrating probe (especially if the calibration probe is a thermometer). It is essential to wait for equilibrium. The approach to final temperature is exponential, and this requires patience. For example we often see separations of 0.1 deg C between a YSI400 probe and our thermocouples even after 15 minutes; it takes another 30 min or more for this separation to approach zero.

A beaker of water on a hotplate can have temperature gradients of several tenths of a degree over very small distances (a millimeter). Transients due to heater cycling can create large differences between probes with differing time constants.

Precise adjustment is needed due to the fact that only a small increase in body temperature is lethal to an animal. (Decreased body temperature is not as critical.) Animals under anesthesia have little, if any, thermoregulatory capability, and body temperature tends to fall toward room temperature. This slows all physiological and biochemical processes.

Type T thermocouples were chosen because the specifications on the temperature coefficient are twice as accurate as the more common type K thermocouple. This reduces the need for calibration adjustment when changing probes.

A two point calibration is done at about 20, and about 40 deg C prior to shipping (+-2 deg C). The span (slope) adjustment used for this may be accessed using a jewelers screwdriver in the small opening adjacent to the input connector. This should **NOT** be done UNLESS the CyQ111 is to be used over a much different temperature range, e.g., -30 deg C to 10 deg C, and loss of accuracy has been verified.

To perform a two point calibration the span (slope) should be adjusted first. Ignore temperature readings except for calculating the difference between them. For example, if the calibration thermometer shows one beaker at 38.7 and the other at 20.3, then the difference is 18.4 deg C. The span should be adjusted to attain this difference. Readings on the 111 might be 20.7 and 39.0 to begin with and 21.0 and 39.4 when the span is properly adjusted. Now adjust the calibrate control for a reading of 38.7 deg C in the warm bath (that is the actual both temperature).

INPUTS

Thermocouple

A type T SMP connector is used.

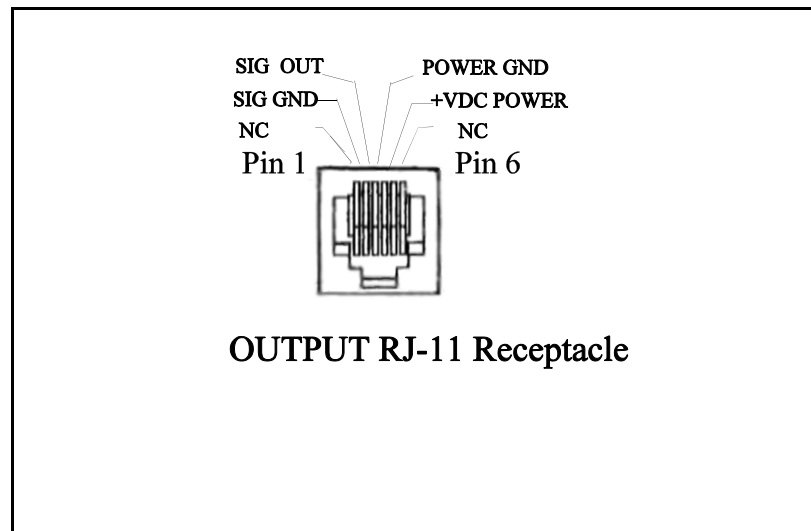
Power input

This is a two conductor barrel receptacle and mates with a 2.1 mm barrel plug. Power is supplied by a 7.5 to 9 VDC wall transformer. We provide a 9 VDC, 200 ma unit with the CYQ 111 (500 ma Euro plug).

The power input is varistor protected at 20 VDC against surges and diode protected against reverse polarity. It is fused at 500 ma after the varistor.

OUTPUT

Signal and power outputs are provided by a 6 pin modular telephone receptacle . The connections are:



SIG. OUT :

This is calibrated to 100 mv/deg C and increases (goes positive) with a increase in probe temperature. The output will sink or source 21 ma typically and is guaranteed to deliver 16 ma. The output swing capability is from -10.0 to +10.0 volts. Capacitive loads in excess of 120 pf may cause oscillations (typically, RG59 coaxial cable has 17 pf/ft while RG62 has 14 pf/ft)

+VDC power:

This is the interconnect for unregulated wall transformer power.

GND:

is pin 2 for signal ground and pin 4 for power ground. These are connected at signal conditioners internal power supply.

SPECIFICATIONS

Input: Type T thermocouple

Cold Junction Compensation: Internal, less than 0.05 deg C per deg C ambient.

Output:

- **Range:** bipolar -10 to 10 vdc. Scal Factor 100 mv/deg C.
- **Connector:** Signal out (pin 3), analog ground (pin 2), power interconnect (pin 5), and power ground (pin 4) via a 6 pin modular telephone receptacle. Contacts gold flashed, rated at 1.5 Amps, extremely reliable, locking.

Power:

- A barrel type receptacle is provided for a 7.5 to 9 vdc unregulated wall transformer.
- Surge protected at 18 vdc
- Self resetting 500 ma fuse
- Diode protected against reverse input voltage

Physical:

- **Size:** width 4 in.(10 cm), depth 3 in.(7.6 cm), height 2.0 in. (5 cm)
- **Weight:** 7.7 oz (218 g)
- **Material:** ABS plastic case, textured gray.

LEGAL STUFF

Limited Warranty

CyberSense warrants to the original purchaser or end-user complete satisfaction for 90 days - money back or exchange; we pay shipping. This product is warranted to be free from defects in material or workmanship for a period of three years. During this period, and upon proof of purchase, the product will be replaced or repaired without charge for either parts or labor. This warranty is voided if the product is modified, misused, subjected to abnormal environments (for example, submergence in water or harsh chemicals, ovens, etc.).

Purchase price refund including shipping for 90 days or repair and replacement for a period of 3 years are the ONLY REMEDY of the purchaser. This warranty is in lieu of all other warranties either express or implied; specifically, any warranties of implied merchantability or fitness for a particular use or purpose. CyberSense shall in no way be liable for indirect or consequential damages of ANY kind or nature.

Some jurisdictions do not allow exclusion or limitation of consequential or incidental damages, or how long implied warranties last; therefore the above limitations may not apply to you. This warranty gives you specific legal rights. In some states you may have other rights.

Trademarks

CyQ is a trademark of CyberSense, Inc.; CyberSense, Inc. is a tradename. Any other trademarks, trade names, service marks, or service names owned or registered by any other company and used in this manual are the property of their respective companies.

CE Conformity Safety Directive

1. Fire:

- a. Case: 100 grams ABS plastic UL94-HB
- b. Printed circuit board: Fiberglass 94V
- c. Total weight: less than 1 kg (CE exempt below 15 kg)

2. Electrical Shock

This unit must receive its power from the mains via a CE compliant wall transformer. This transformer should be rated at 9 VDC or less output voltage. This transformer must provide isolation from the mains.

Input voltage less than 15 VDC. Any attempt to use a higher voltage will cause a varistor (voltage limiting device) to conduct and trip a 0.5 amp internal fuse. It may also cause an electrolytic capacitor to break down thereby tripping the fuse.

3. Mechanical:

All corners are rounded. There are no sharp edges accessible to the user. The mass is too low to produce injury if accidentally dropped from 2 meters.

CE Conformity EMC Directive

Emissions:

Highest frequency present is 9000 Hz. Digital power delivered to this section is less than 25 mw. The power input is bypassed by 1000 MFD electrolytic and 0.1 MFD disk ceramic capacitors.

The output is filtered by a 1 mh inductor followed by a 1 MFD ceramic capacitor. This further ensures against RF emissions and blocks any interference from entering the unit from the output connections.

Immunity:

a. Power line, a 1 Amp, 100 PRV diode protects against accidental application of reverse voltage.

An 18 volt breakdown varistor protects against power line spikes. A 1000 MFD capacitor protects against power dropouts up to 0.1 seconds. Nonvolatile storage by the micro controller assures that proper operation will resume when power is restored after an extended outage. Solid state voltage regulated power supplies provide further immunity to power line fluctuations.

b. Sensor input. This can withstand up to 40 vdc overvoltage. Inputs are returned to common via a 1 Meg resistor preventing static buildup. Input transients are removed by a 50 MFD shunt capacitor.