

# Level by Sound Knowledge®



# SHORTI

Instruction Manual

**KAB** INSTRUMENTS (PTY) LTD



**CONTENTS**

<b>Declaration of conformity</b> □	2
<b>Warranty</b> □	2
<b>Introduction</b> □	3
<b>Quick start for SHORTI 4W &amp; LP</b> □	3
<b>Quick start for SHORTI SW</b> □	4
<b>Changing parameters</b> □	5
<b>Specification for SHORTI 4W</b> □	7
<b>Specification for SHORTI LP</b> □	8
<b>Specification for SHORTI SW</b> □	9
<b>Installation</b> □	10
<b>Key description</b> □	13
<b>Security code</b> □	13
<b>Configuration for SHORTI 4W</b> □	14
<b>Configuration for SHORTI LP</b> □	16
<b>Configuration for SHORTI SW</b> □	18
<b>Example for SHORTI 4W &amp; LP</b> □	20
<b>Example for SHORTI SW</b> □	21
<b>Fault finding</b> □	22
<b>Terminal connections for SHORTI 4W</b> □	23
<b>Terminal connections for SHORTI LP 20 - 30 V DC</b> □	24
<b>Terminal connections for SHORTI LP 9 - 15 V DC</b> □	25
<b>Terminal connections for SHORTI SW - 220 V</b> □	26
<b>Terminal connections for SHORTI SW - 110 V</b> □	27
<b>Dimensions</b> □	28

Copyright (c) 1994....2004 by KAB Instruments (Pty) Ltd. All rights reserved.  
No part of this manual may be reproduced by hard-copy, electronic or  
computerized copy or any other copy method.

## DECLARATION OF CONFORMITY

The SHORTI range complies with conformity in accordance with the following tests.

### Electromagnetic Compatibility

Susceptibility:  EN50082-1  EN801-2,3,4,  
 EN50082-2  ENV50140  ENV50204  
 EN61000-4-2  ENV50141  
 EN61000-4-4  
Emission:  EN50081-2  EN55011  
 EN50081-1  EN55022  EN60555-2,3  
Safety :  BSEN61010-1

### CE Conformity Declaration

The SHORTI range is in accordance with EN50081-2 1993 and EN50082-2 1995.

Johannesburg, South Africa, 3rd June 1999.

*Kevin Barnfather*

Kevin Barnfather

KAB Instruments (Pty) Ltd

## WARRANTY

The products of KAB Instruments (Pty) Ltd will be replaced, repaired, put in good operating condition, or the purchase price refunded, at the option of KAB Instruments, free of charges except transportation, if defective in their manufacture, and if notice of the said defect is received by KAB within one year from date of delivery. The cost of such replacement, repair or refund of purchase price shall be the exclusive remedy for any breach of warranty, and KAB shall not be liable to any person for consequential damages for injury or commercial loss resulting from any breach of warranty. KAB makes no warranty of fitness for a particular purpose, and makes no other warranty, express or implied, including implied warranty arising from course of dealing or usage of trade.

## INTRODUCTION

The SHORTI range works on the non-contact principle of ultrasonics. A pulse of energy emits from the Transducer at the speed of sound and is detected on its return. The Transmitter can distinguish the difference between the correct echo and other ambient noise.

When the signal returns, the SHORTI measures the time period, and then knowing the speed of sound, it can accurately calculate the distance from the material to the Transducer. If you have purchased the SHORTI 4W or LP the Microprocessor will adjust the display and 4-20 mA output accordingly. If you have purchased a SHORTI SW the microprocessor adjusts the display and the relay status accordingly.

## QUICK START for the SHORTI 4W and LP

SHORTI was designed with a very simple configuration program. This allows the technician to set up SHORTI without the aid of a complicated source code book. There are no references to any codes in SHORTI. The set up procedure is all menu driven.

### SHORTI 4W WIRING CONNECTIONS

Simply connect up a regulated Power Supply (20 - 30 V DC) and for the SHORTI LP 12V unit (9 - 15 V DC) to the connector block on the right side of the display, the POSITIVE supply to positive terminal and the NEGATIVE supply to negative terminal.

The ANALOG signal (4 - 20 mA) is measured on positive and negative terminals on the left hand side connector.

NOTE: The power supply and analog signal share a common NEGATIVE (-) supply in the 3W configuration.

Using the default values of the instrument, aim the Transducer at a wall about 1 m away and check the display. It should read the following.

**7.000**

If the reading is below 7.00 m then move the transducer closer to the wall. If the reading is above 7.00 m then move the transducer away from the wall. You may now proceed and check other distances.

## SHORTI LP WIRING CONNECTIONS

Simply connect the regulated power supply to positive and negative terminals. A multi-meter can be placed in series with the positive supply to measure the mA output.

Using the default values of the instrument, aim the Transducer at a wall about 1 m away and check the display. It should read the following.

4.000

If the reading is below 4.00 m then move the transducer closer to the wall. If the reading is above 4.00 m then move the transducer away from the wall. You may now proceed and check other distances.

## QUICK START for the SHORTI SW

### SHORTI SW WIRING CONNECTIONS

Simply connect up a Mains Power Supply (110 or 220 V AC) to connector.

The relay output can be measured on the connector box on the left hand side of the display.

Using the default values of the instrument, aim the Transducer at a wall about 1 m away and check the display. It should read the following.

7.000

If the reading is below 7.00 m then move the transducer closer to the wall. If the reading is above 7.00 m then move the transducer away from the wall.

You may now proceed and check other distances.

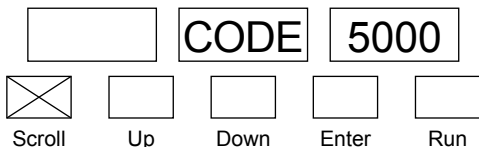
Set up the SHORTI SW for a high relay at 7.05 m and the reset at 7.00 m. Move the transducer closer to the wall and the level should increase and the relay will change state. Move the transducer back away from the wall and the relay should reset at 7.00 m.

## CHANGING PARAMETERS

Before any parameters can be changed, the security code must first be entered in order to gain access to the parameters.

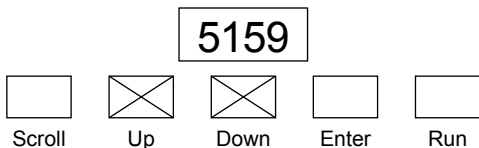
### Step 1

Simply press SCROLL and the SECURITY CODE prompt will be displayed.



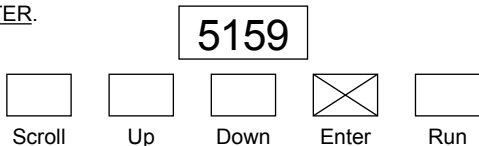
### Step 2

Then enter the code 5159 by pressing the UP and DOWN keys.



### Step 3

Press ENTER.



Code has been accepted  
(only for the SHORTI LP series).

ACC

If code was not accepted the instrument will carry on with normal operation.

SHORTI 4W  
and  
SHORTI SW

7.000

SHORTI LP

4.000

The display will indicate that it has accepted the code by displaying “ED” empty distance.

If you would like to carry on programming, the configuration list is on page 14 for the SHORTI 4W, page 16 for the SHORTI LP, and page 18 for the SHORTI SW.

**SPECIFICATIONS SHORTI 4W**Enclosure

- Polycarbonate
- Rated at IP65 non condensing
- Transparent window or  
 no window

Power Supply

- 20 - 30 V DC

Power consumption

- 60 mA

Dimensions

- 196.8 mm x 86.7 mm   
7.748 in x 3.413 in
- Transducer:  
 2 in BSP x 52.3 mm x 59.2 mm  
 2 in BSP x 2.059 in x 2.330 in

Weight

- 1 kg / 2.2 lb

Temperature

- 30°C to 65°C  
 -22°F to 149°F

Output

- 4-20 mA
- Impedance 750 ohms

Operating Frequency

- 53 kHz

Range

- 8 m / 26.24 ft on liquids
- 3 m / 10 ft on solids

Accuracy

- +/- 1.00 %

Indication

- 4 Digit LCD

Fail-safe Analog

- High/Low/Hold

Configuration

- 5 touch button keys

Blanking distance

- min. 0.3 m / 1 ft

Damping

- 0.1 to 10 m / min  
 0.33 to 32.81 ft / min

**SPECIFICATIONS SHORTI LP**Enclosure

- Polycarbonate
- Rated at IP65 non condensing
- Transparent window or no window

Power Supply

- 20 - 30 V DC
- 9 - 15 V DC for 12 V unit

Power consumption

- 3.50 mA 200 mA on start up

Dimensions

- 196.8 mm x 86.7 mm  
7.748 in x 3.413 in
- Transducer:
  - 2 in BSP x 52.3 mm x 59.2 mm
  - 2 in BSP x 2.059 in x 2.330 in

Weight

- 1 kg / 2.2 lb

Temperature

- 30°C to 65°C  
-22°F to 149°F

Output

- 4-20 mA
- Impedance 750 ohms

Operating Frequency

- 53 kHz

Range

- 5 m / 16.4 ft on liquids

Accuracy

- +/- 1.00 %

Indication

- 4 Digit LCD

Fail-safe Analog

- High/Low/Hold

Configuration

- 5 touch button keys

Blanking distance

- min. 0.3 m / 1 ft

Damping

- 0.1 to 10 m / min  
0.33 to 32.81 ft / min

**SPECIFICATIONS SHORTI SW**Enclosure

- Polycarbonate
- Rated at IP65 non condensing
- Transparent window or no  window

Power Supply

- 110 V AC OR 220 V AC

Power consumption

- 2.6 VA

Dimensions

- 196.8 mm x 86.7 mm  
 7.748 in x 3.413 in
- Transducer :  
 2 in BSP x 52.3 mm x 59.2 mm  
 2 in BSP x 2.059 in x 2.330 in

Weight

- 1 kg / 2.2 lb

Temperature

- 30°C to 65°C  
 -22°F to 149°F

Output

- 5 Amp relay @ 220 V AC

Relay function

- Forward or reverse action

Operating Frequency

- 53 kHz

Range

- 8 m / 26.24 ft on liquids
- 3 m / 10 ft on solids

Accuracy

- +/- 1.00 %

Indication

- 4 Digit LCD

Fail-safe

- High/Low/Hold

Configuration

- 5 touch button keys

Blanking distance

- min 0.3 m / 1 ft

Damping

- 0.1 to 10 m / min  
 0.33 to 32.81 ft / min

## INSTALLATION

SHORTI is protected to IP65. The Transmitter is dust and waterproof so it can be mounted outside.

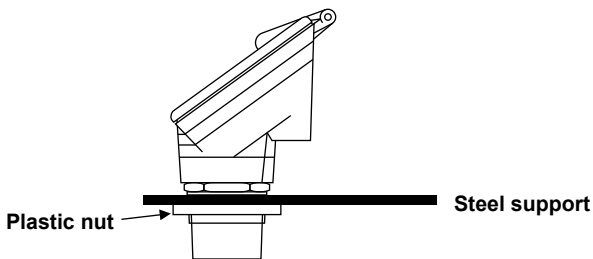
The LCD display should not face full sunlight as this can cause the display to fail. SHORTI should be fixed to a chassis plate using a plastic nut to tighten the 2-inch BSP thread.

Do not install SHORTI in areas of high vibration as this may cause failure.

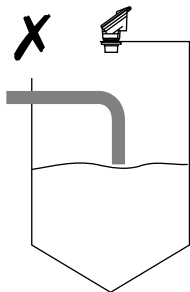
Do not install SHORTI in the close vicinity of electrical cable, SCR's or variable speed drives.

The installation of SHORTI is the most important section of this manual and has been divided up into 6 sub sections.

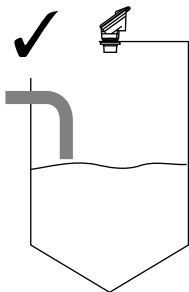
1. SHORTI must be fitted at least 0.50 m / 1.64 ft above the highest point of level.
2. Always use the plastic nut. SHORTI must be fitted to a rigid support. Use mild steel or a suitable plastic. Do not use stainless steel as this can cause ringing.



3. SHORTI must be perpendicular to the material it is measuring with a clear line of sight and must not be above beams or filling points.

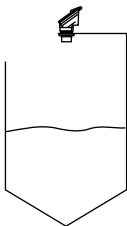


THIS IS INCORRECT AS THE FILLING POINT IS OBSCURING THE SHORTI'S LINE OF SIGHT



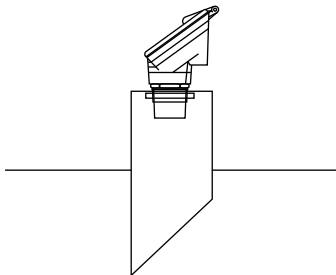
THIS IS CORRECT AS THE FILLING POINT IS NOT OBSCURING THE SHORTI'S LINE OF SIGHT

Transducer perpendicular to liquid level.



4. If SHORTI is in a coned vessel, it must be positioned over the cone.
- This ensures that the Transducer receives the true echo and not one
  - from the sides of the cone.

5. When a standpipe is being used it must be as wide as possible; i.e.
- the pipe diameter must be at least half its height, preferably made of
  - plastic. The base MUST have a 45° chamfer to reduce the echo size
  - from the bottom of the standpipe. No welding should be present on
  - the inside of the pipe as this causes false echoes.



6. If any large electrical equipment is installed in the vicinity, then
- earthed steel conduit must be used.

## KEY DESCRIPTION

SHORTI is “user friendly” having only 5 keys and a menu driven display. The keys are listed below with their appropriate functions.

### **SCROLL**

This is used to initially access the programming and then to run through the various commands.

### **UP**

This key is used to INCREASE value in the various commands.

### **DOWN**

This key is used to DECREASE value in the various commands.

### **ENTER**

When the value has been selected it can be accepted by pressing the ENTER key.

### **RUN**

When programming is complete, press RUN to return SHORTI back to the run mode.

## SECURITY CODE

To advance to the programming mode, the correct security code must be entered. The factory set up code is 5159.

## CONFIGURATION for SHORTI 4W

BASIC	OPTIONS	DEFAULTS	CUST
SECURITY CODE	0-9999	5159	
EMPTY DISTANCE	0.40 - 8.00 m 1.31 - 26.24 ft	8.00 m	
SPAN	0.10 - 7.70 m 0.32 - 25.26 ft	7.50 m	
RATE OF CHANGE	0.10 - 10.00 m / min 0.33 - 32.81 ft / min	1.00 m / min	
LOSS	LO/HI/HOLD	HOLD	
LOSS OF ECHO TIME	30 - 900 sec	300 sec	
FACTORY RESET	YES/NO	NO	
ZERO OFFSET	-50 - +50 mm -1.97 - 1.97 in	0 mm	
UNIT	meters / feet	meters	

### **SECURITY CODE**

Security code to advance to programming.

DEFAULT 5159

### **EMPTY DISTANCE (ED)**

This is the distance from the face of the Transducer to the bottom of the tank.

DEFAULT 8.00 m

### **SPAN**

This figure is the measuring range of the instrument i.e. distance from the bottom of the tank to the highest point being measured. Remember, the material must not approach within 0.50 m of the Transducer face.

DEFAULT 7.50 m

### **RATE OF CHANGE**

This is used to set up the rate of change of the level output. Increase the number if the level moves faster than 1.00 m / min and decrease it if a more stable output is required.

DEFAULT 1.00 m / min

**LOSS**

If a loss of echo condition is reached then the 4 - 20 mA output will follow the configured settings 3,6 mA (LO), 21 mA (HI), or hold the last recognised echo.

DEFAULT HOLD

**LOSS OF ECHO DELAY TIME**

This sets up the time period from the time the SHORTI does not receive a good echo to the time it goes into the loss of echo routine.

DEFAULT 300 Sec

**FACTORY RESET**

This prompt will reset all the values entered back to the factory setting except the password. Please write down all settings before using this function.

DEFAULT NO

**ZERO OFFSET**

Should there be a small zero offset in the measurement this function can correct it up to -50 mm / -1.97 in and +50 mm / +1.97 in.

DEFAULT 0 mm

**CONFIGURATION for SHORTI LP**

BASIC	OPTIONS	DEFAULTS	CUST
SECURITY CODE	0-9999	5159	
EMPTY DISTANCE	0.40 - 5.00 m 1.31 - 16.40 ft	5.00 m	
SPAN	0.10 - 4.70 m 0.32 - 15.42 ft	4.50 m	
RATE OF CHANGE	0.10 - 10.00 m / min 0.33 - 32.81 ft / min	1.00 m / min	
LOSS	LO/HI/HOLD	HOLD	
LOSS OF ECHO TIME	30 - 900 sec	300 sec	
FACTORY RESET	YES/NO	NO	
ZERO OFFSET	-50 - +50 mm -1.97 - 1.97 in	0 mm	
UNIT	meters / feet	meters	

**SECURITY CODE**

Security code to advance to programming.

DEFAULT 5159

**EMPTY DISTANCE (ED)**

This is the distance from the face of the Transducer to the bottom of the tank.

DEFAULT 5.00 m

**SPAN**

This figure is the measuring range of the instrument i.e. distance from the bottom of the tank to the highest point being measured. Remember, the material must not approach within 0.50 m of the Transducer face.

DEFAULT 4.50 m

**RATE OF CHANGE**

This is used to set up the rate of change of the level output. Increase the number if the level moves faster than 1.00 m / min and decrease it if a more stable output is required.

DEFAULT 1.00 m / min

**LOSS**

If a loss of echo condition is reached then the 4 - 20 mA output will follow the configured settings 4 mA (LO), 20 mA (HI), or hold the last recognized echo.

DEFAULT HOLD

**LOSS OF ECHO DELAY TIME**

This sets up the time period from the time the SHORTI does not receive a good echo to the time it goes into the loss of echo routine.

DEFAULT 300 Sec

**FACTORY RESET**

This prompt will reset all the values entered back to the factory setting except the password. Please write down all settings before using this function.

DEFAULT NO

**ZERO OFFSET**

Should there be a small zero offset in the measurement this function can correct it up to -50 mm / -1.97 in and +50 mm / +1.97 in.

DEFAULT 0 mm

## CONFIGURATION for SHORTI SW

BASIC	OPTIONS	DEFAULTS	CUST
SECURITY CODE	0-9999	5159	
EMPTY DISTANCE	0.40 - 8.00 m 1.31 - 26.20 ft	8.00 m	
SPAN	0.10 - 7.70 m 0.32 - 25.26 ft	7.50 m	
RELAY FUNCTION	HIGH/LOW/OFF	HIGH	
RELAY SET	0.01 - 7.70 m 0.33 - 25.26 ft	0.00 m	
RELAY RESET	0.00 - 7.69 m 0 - 25.23 ft	0.00 m	
RATE OF CHANGE	0.10 - 10.00 m / min 0.33 - 32.81 ft / min	1.00 m / min	
LOSS	LO/HI/HOLD	HOLD	
LOSS OF ECHO TIME	30-900	300	
FACTORY RESET	YES/NO	NO	
ZERO OFFSET	-50 - +50 mm -1.97 - 1.97 in	0 mm	
UNIT	meters / feet	meters	

### **SECURITY CODE**

Security code to advance to programming.

DEFAULT 5159

### **EMPTY DISTANCE (ED)**

This is the distance from the face of the Transducer to the bottom of the tank.

DEFAULT 8.00 m

### **SPAN**

This figure is the measuring range of the instrument i.e. distance from the bottom of the tank to the highest point being measured. Remember, the material must not approach within 0.50 m of the Transducer face.

DEFAULT 7.50 m

**RELAY FUNCTION**

This is used to set up the relay should the instrument be used for a high or low level switch.

DEFAULT HIGH

**RELAY SET**

This is used to set up the relay set point.

DEFAULT 0.00 m

**RELAY RESET**

This is used to set up the relay reset

DEFAULT 0.00 m

**RATE OF CHANGE**

This is used to set up the rate of change of the level output. Increase the number if the level moves faster than 1.00 m / min and decrease it if a more stable output is required.

DEFAULT 1.00 m / min

**LOSS**

If a loss of echo condition is reached then the level will move to the high, low or hold setting.

DEFAULT HOLD

**LOSS OF ECHO DELAY TIME**

This sets up the time period from the time the SHORTI does not receive a good echo to the time it goes into the loss of echo routine.

DEFAULT 300 Sec

**FACTORY RESET**

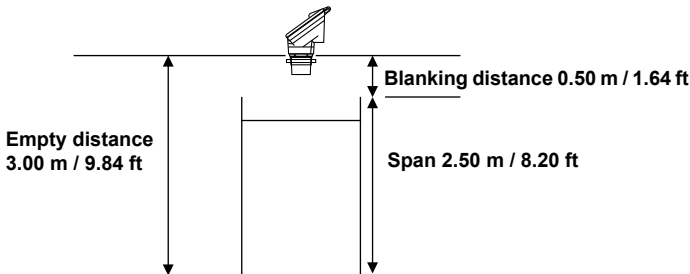
This prompt will reset all the values entered back to the factory setting except the password. Please write down all settings before using this function.

DEFAULT NO

**ZERO OFFSET**

Should there be a small Zero offset in the measurement this function can correct it up to -50 mm / -1.97 in and +50 mm / +1.97 in.

DEFAULT 0 m

**EXAMPLE****Level measurement for SHORTI 4W and LP**

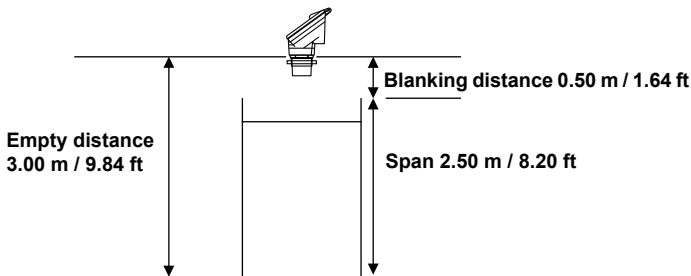
The SHORTI is monitoring the level in an open tank and sending back to the control room a 4-20 mA signal. The tank is 2.50 m / 8.20 ft high and the transducer is mounted 0.50 m / 1.64 ft above the tank. The actual level is at 2.00 m / 6.56 ft which would make the output 16.8 mA.

SECURITY CODE	5159
EMPTY DISTANCE (ED)	3.00 m / 9.84 ft
SPAN	2.50 m / 8.20 ft
LOSS	HOLD

Below is what SHORTI will display on the above application.

**2.000**

The analog output should be approximately 16.8 mA.

**EXAMPLE****Level control for SHORTI SW**

The SHORTI SW is controlling the level at 2.00 m / 6.56 ft. The relay sets at 2.00 m / 6.56 ft and resets at 1.75 m / 5.74 ft. The reason for the big differential is to avoid relay chatter caused by the ripples on the water.

SECURITY CODE	5159
EMPTY DISTANCE (ED)	3.00 m / 9.84 ft
SPAN	2.50 m / 8.20 ft
RELAY FUNCTION	HIGH
RELAY SET	2.00 m / 6.56 ft
RELAY RESET	1.75 m / 5.75 ft
LOSS	HOLD

Below is what SHORTI SW will display on the above application.

**2.000**

Above 2.00 m / 6.56 ft the relay will switch on the pump. After the level drops again below 1.75 m / 5.74 ft the relay will switch off again.

## FAULT FINDING

There are three categories of possible faults. The malfunction of the instrument, loss of echo and wrong reading.

The biggest problem is to identify the malfunction. If the instrument is not working satisfactorily then remove the transmitter to the workshop. Connect the power and aim the SHORTI to a wall about 2.00 m away, making sure that it is perpendicular to the wall. Now reset the instrument by the factory reset prompt. SHORTI 4W and SW should now read about 6 m. SHORTI LP should now read about 3 m. If it does not read the above then there is a malfunction with the instrument and it should be returned for repair.

If the above works and it still does not work in the field then there are many possible problems. Please check below for possibilities.

### **Loss of echo.**

Check that the SHORTI is not being used on a solid or agitated surface, as agitated surfaces and solids do not reflect as much signal as flat surfaces.

Aim the Transducer straight down.

Check if the Transducer face is dirty.

### **Wrong reading, always reading close to the Transducer.**

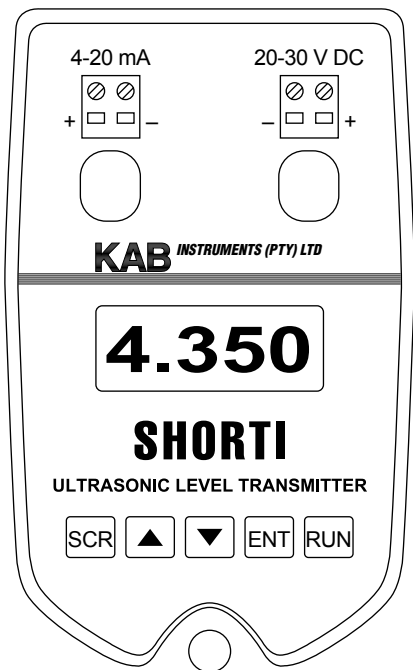
Do not reduce the blanking distance below 0.50 m / 1.64 ft unless consultation has been made with KAB.

Electrical noise can cause this error. Remove noise.

### **Wrong reading, anywhere in tank.**

Check to see if there is a reflection from the wall. Please note that a piece of wire across a tank can be a big enough obstruction for an echo to be accepted.

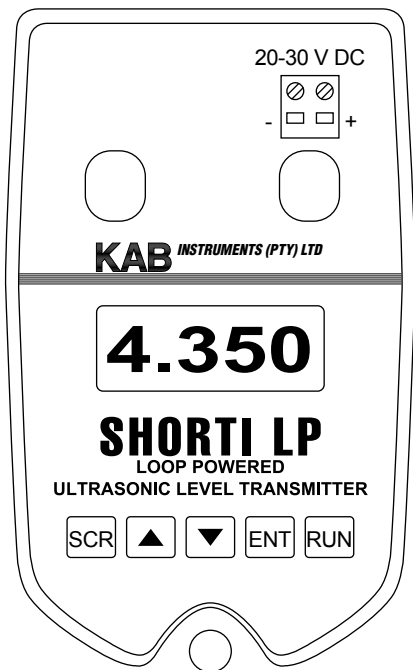
Are the parameters correct? Reset to factory default and check that SHORTI reads correctly. If the factory settings are OK then your parameters need changing. Re check them with a tape measure.

**TERMINAL CONNECTIONS SHORTI 4W****CONNECTIONS****Output**

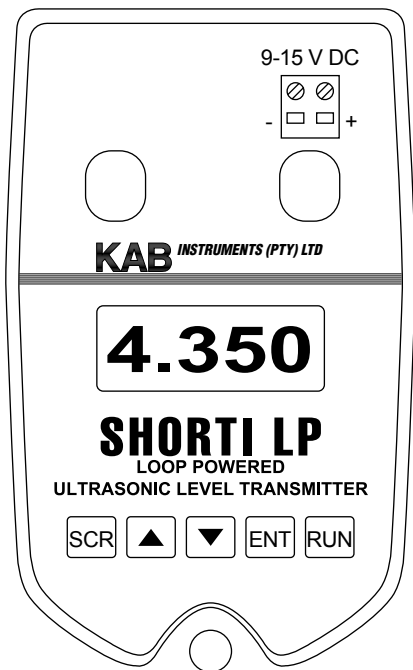
+ 4-20 mA  
- Ground

**Power Supply**

- Ground  
+ 20/30 V DC

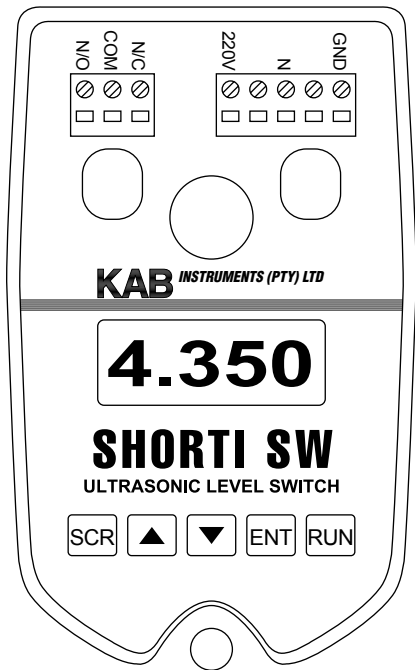
**TERMINAL CONNECTIONS SHORTI LP 20-30 V DC****CONNECTIONS****Power Supply and Output**

- Negative 4-20 mA and power
- + Positive 4-20 mA and power

**TERMINAL CONNECTIONS SHORTI LP 9-15 V DC****CONNECTIONS****Power Supply and Output**

- Negative 4-20 mA and power
- + Positive 4-20 mA and power

## TERMINAL CONNECTIONS SHORTI SW - 220 V



### CONNECTIONS

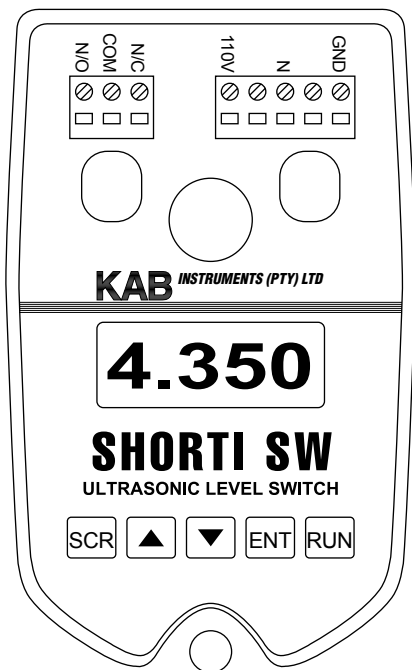
#### Relay output

N/O relay contact  
 COM relay contact  
 N/C relay contact

#### Power Supply

220 V AC power supply  
 Neutral  
 Ground

## TERMINAL CONNECTIONS SHORTI SW - 110 V



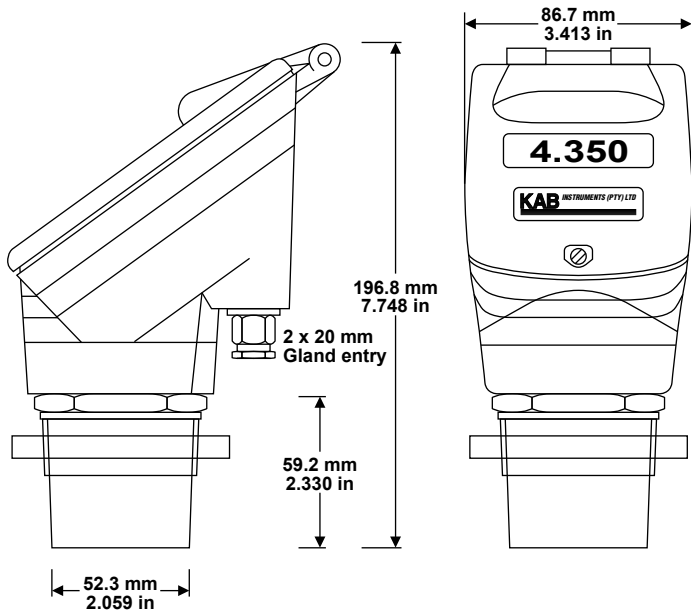
### CONNECTIONS

#### Relay output

N/O relay contact  
COM relay contact  
N/C relay contact

#### Power Supply

110 V AC power supply  
Neutral  
Ground

**DIMENSIONS**

**KAB Instruments (Pty) Ltd**  
**P.O.Box 1159**  
**Mondeor**  
**2110**  
**South Africa**

**Tel: +27 11 435 5380**

**Fax: +27 11 435 8726**

**Web Site: [www.kabinstruments.com](http://www.kabinstruments.com)**

**Email: [info@kabinstruments.com](mailto:info@kabinstruments.com)**