



PSM INSTRUMENTATION LTD

**Ultrameter II Series  
Blind Unit  
8200 Ultrasonic Transmitter**

**USER MANUAL**

Issue A

Burrell Road Industrial Estate  
Haywards Heath, West Sussex RH16 1TW, UK  
Tel: +44 (0)1444 410040 Fax: +44 (0)1444 410121  
[Http://www.psm-sensors.co.uk](http://www.psm-sensors.co.uk) E-mail: [sales@psm-sensors.co.uk](mailto:sales@psm-sensors.co.uk)

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## GENERAL DESCRIPTION

The **8200** range of Level Transmitters is capable of non-contact level measurement over distances of 60 metres and beyond on dirty dusty solids applications as well as clean liquid applications. The 8300 Smart range is an intelligent, minimal system approach to measurement of solids and liquids with maximum performance but without costly display and keyboard parts.

The 8200 is available with four different transducers for ranges of 10, 20, 40 and 60 metre operation. Each configuration is available as a 2-wire, 4-20mA output transmitter with PC comms or it can have a combination of Modbus, relay, 4-20mA and PC comms output.

The transmitter must be mounted directly above the surface of the material to be monitored.

Ultrasonic pulses are transmitted to the surface of the material to be monitored and reflected back to the transmitter. The time period between transmission and reception of the pulses is directly proportional to the distance between the transmitter and the material.

Since the speed of sound through air is affected by temperature, a temperature sensor is integrated into the face of the transmitter to improve accuracy.

The 8200 is suitable for measuring the following functions on solid and liquid materials:

- a. Ullage space or distance to material
- b. Material level
- c. Volume measurement
- d. Material percentage

### WARNING

**Do not remove any connection whilst the power is ON.  
REFER TO SUPPLEMENTARY SAFETY INSTRUCTIONS  
IF INSTALLING IN A HAZARDOUS AREA**

The 8200 transmitter is an easy to use level transmitter available with four (4) different high power, low frequency front ends, capable of reliably tracking the level of solid and liquid products under extreme conditions.

Powered from 10-25 volt dc power supplies, all the range is approved to ATEX EExm Zone 1 & 2 for liquids and gases and to ATEX DIP for Zones 20, 21 and 22 dust environments.

The 8200 series is available with 4 different outputs:

**MSA**—Smart Blind with 2-wire loop powered, 4-20mA output & PC Comms - 4 core & Shield

**MSB**—Smart Blind with 4-20mA output, 1 Relay & PC Comms - 8 Core & Shield

**MSC**—Smart Blind with Modbus output and 1 Relay - 6 Core & Shield

**MSD**—Smart Blind with Modbus output and PC Comms - 4 Core & shield

Focalisers are used with the longer range 20-60 metre transducers in order to improve signal strength and ensure continuous tracking of material level under dirty, dusty conditions.

## Installation Guide

The 8200 transmitters are designed to be screwed directly into a flange on a tank. For long range and dirty dusty applications, the use of a focaliser on the underside of the flange improves the concentration of the signal and ensure that spurious or false signals are eliminated.

### Position

Ensure that the mounting surface is not subject to vibration and is not in close proximity to high voltage power cables, contactors or drive controls. The unit should not be mounted in a confined space where temperature may exceed the safe working temperature  $-20^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$ . If the unit is mounted outside it should be protected from direct sunlight or severe weather conditions.

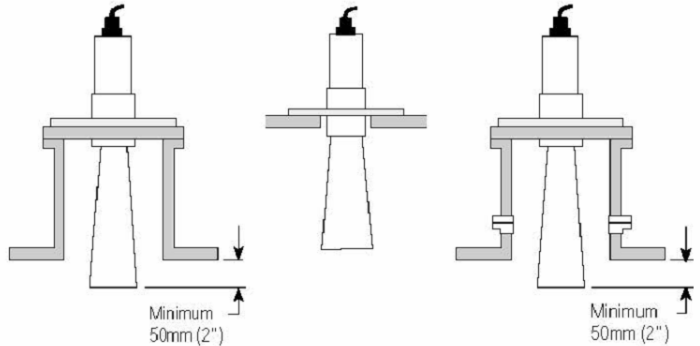
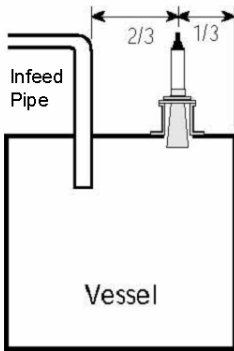
When using a focaliser cone, ensure that it protrudes at least 50mm into the vessel.

Transmitter should be installed to ensure a clear line of sight from the transducer face to the product being monitored.

Mount the transducer perpendicular to the measured surface and away from the in feed.

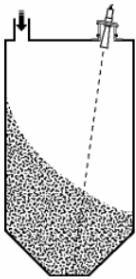
Avoid mounting near ladders, baffles, agitators etc.

### Mounting Position    Nozzle mounting    Flush Mounting    Stand Pipe mounting



## Transducer Mounting

**SOLID (Granular)**



Aim transducer at point of outfeed.

**LIQUID**



Transducer should be as perpendicular to product as practicable.

**DUAL OUTFEED**



Use two transducers and select sequence option to avoid cross-talk.

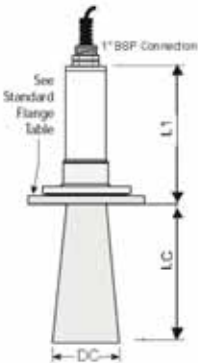
**POWDER**



Mount away from infeed

## Installation Dimensions

MSA, B, C and D have common dimensions and only vary in size depending on range and the use of a focaliser.



Range Metres	LI	LC Optional	D	DC Optional	Thread Size	Flange Optional
10	140	-	50	-	2"	-
20	185	258	75	98	3"	4"
40	360	413	89	236	3.5"	10"
60	672	413	89	236	-	10"

Flange Options: ANSI, DIN or JIS

Dimensions for 10, 20, 40 & 60 metre range

Ensure that the transmitter face always has the minimum Blanking Distance above the highest product level in the tank. See table below.

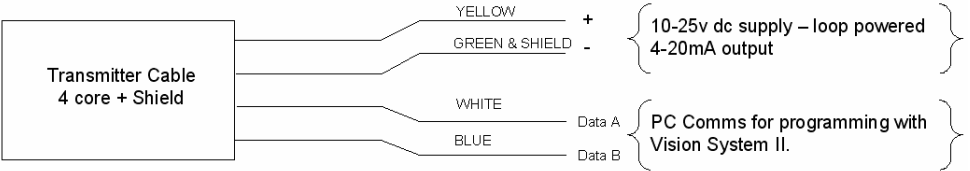
TRANSDUCER	MINIMUM DISTANCE	
	Minimum	Nominal
MS10	0.35m (1.2ft)	0.5m (1.6ft)
MS20	0.5m (1.6ft)	0.8m (2.6 ft)
MS40	1.0m (3.3ft)	1.3m (4.2 ft)
MS60	1.2m (4ft)	1.5m (5 ft)

## Installation Wiring

The following specifies the wiring colour codes when using Belden 3084A cable.

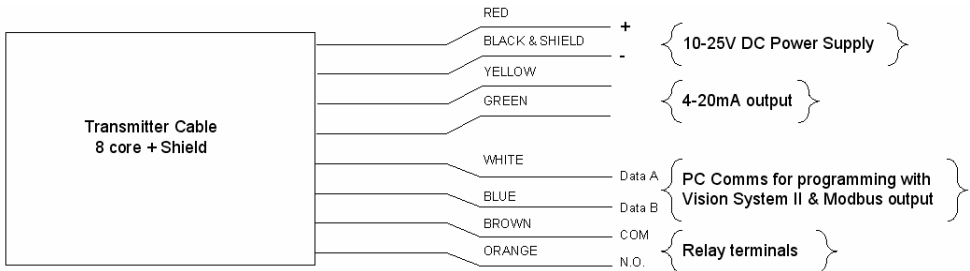
### Wiring Colour Code for MSA

2-wire, loop powered, 4-20mA output with PC Comms for programming - 4 core & Shield



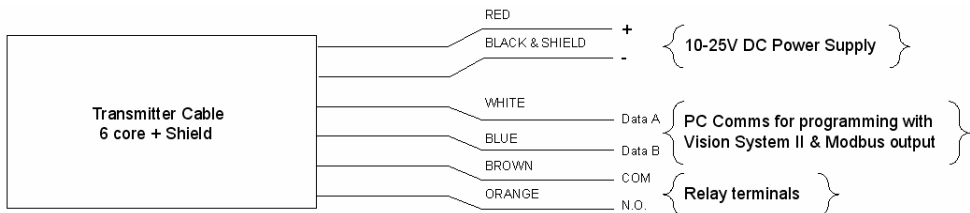
### Wiring Colour Code for MSB

4-20mA output, 1 relay and PC Comms for programming – 8 core & Shield



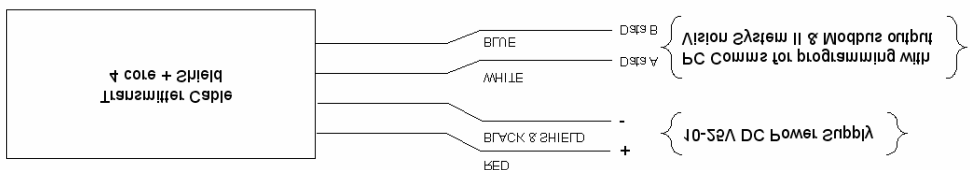
### Wiring Colour Code for MSC

Modbus output plus 1 relay – 6 core & Shield



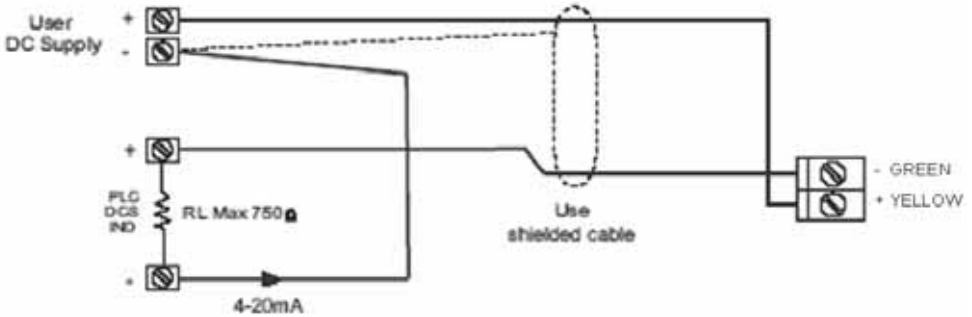
### Wiring Colour Code for MSD

Modbus & PC Comms – 4 core & Shield

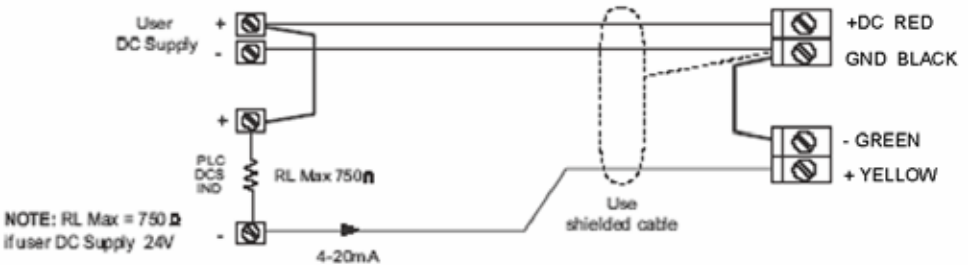


## Wiring Diagrams

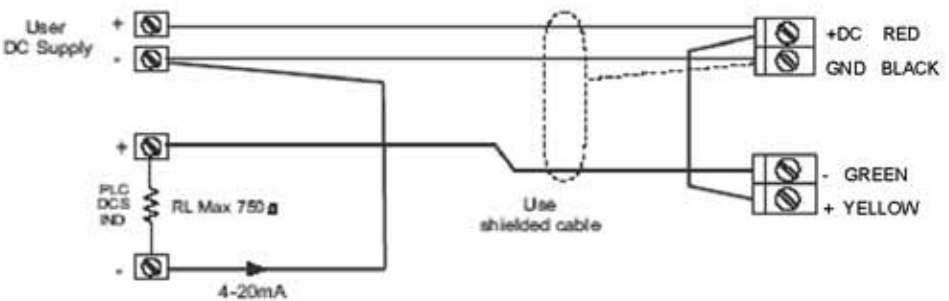
Terminal connections for DC Supply – Model dependent.  
**MSA 2 wire DC Loop Powered**



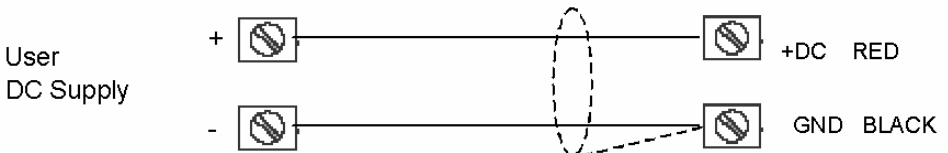
**MSB 3 wire DC - Modulating from Common User Supply (RL to +DC)**



**MSB 3 Wire DC – Modulating from Common User Supply (RL to GND)**

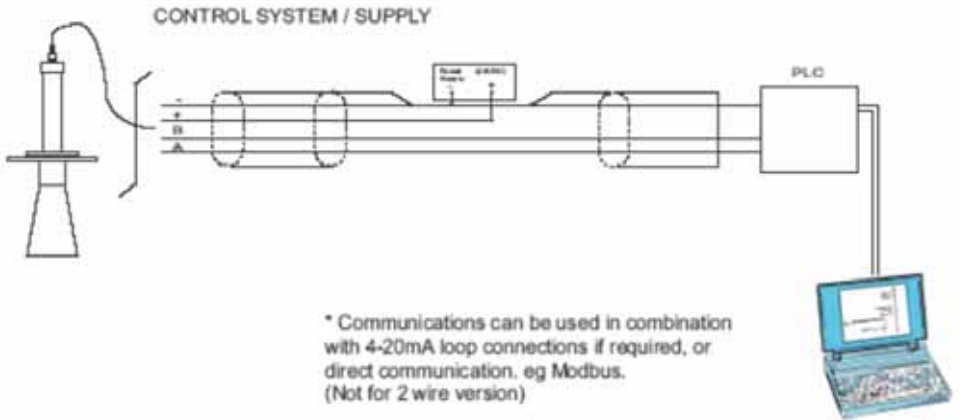
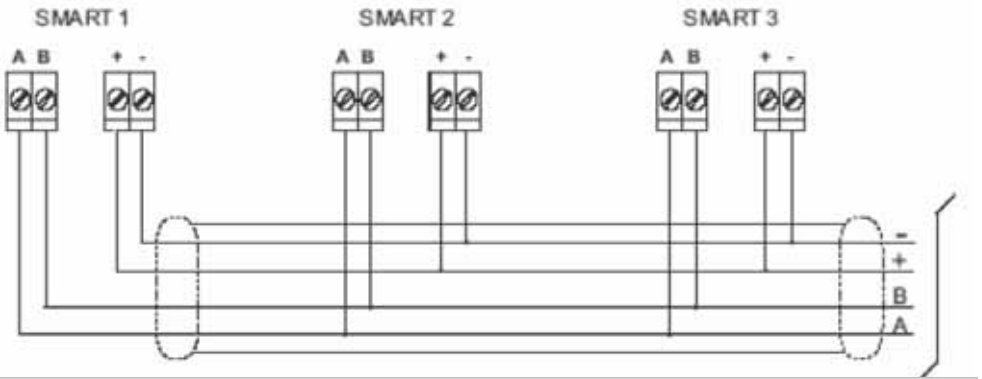


**MSC, MSD**



## Multi-Drop Network (MODBUS) Connection

Connecting multiple 8200 instruments with minimum wiring required.  
Field Devices



## PROGRAMMING – Via Vision System II Software

Vision System II is a very powerful diagnostic tool that also allows the user to program the Microflex MS transmitter.

### Installing the Program

- There are three ways a connection can be made between the PC and the RS485 bus.
- Direct connection to a PC com port via a RS232 to RS485 converter or via a PCMCIA RS485 adaptor.
- A wireless connection via a GSM modem.
- A TCP/IP connection via the internet.

Place the Vision System II CD in the drive, access it from 'My Computer' or 'Windows Explorer' and double-click on 'Set-up.exe'. The program will be installed in C:\Program Files\Hycontrol\Vision System II.



## Running the Program

Navigate to C:\Program Files\hycontrol\Vision System II and double-click on 'Vision System II.exe.' In future, it may be convenient to create a short-cut to this file.

The program will come up displaying a box at the top of the screen as shown below:



1—Enables you to connect or disconnect from the instrument.

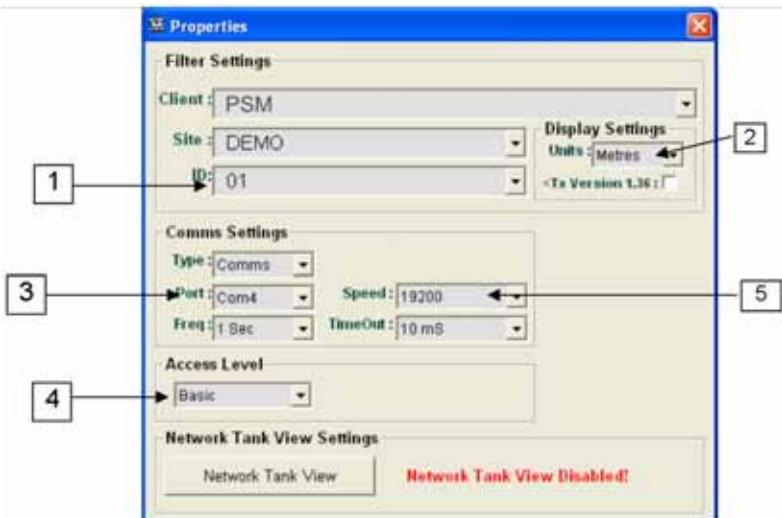
2—Select Device ID. New units are 01. Only change this if the instrument is being used in a multiple application.

3—Entering Basic Data .

9—To view product properties and set communication parameters.

## Setting the Communication Parameters

Click 'View' (9) on top of the tool bar. Click 'Options' on the drop down menu. The following 'Properties' screen comes up.



- 1— Set this field to the ID of the unit you wish to talk to. 01 is the default for single point instruments
- 2—Usually easier to program in metres and then change to feet if required.
- 3—Enter the number for the port that your RS485 comms is using. Make sure that this is correct as the instrument will not connect otherwise.
- 4—Select Basic
- 5—Set speed to 19200

Click on the X in the top right corner to close the Properties screen.

Click the 'Connect' button to establish communication.

The button icon changes to a hung-up telephone and is now used to disable communication and it shows an 'Info' screen.

Click the 'Set-up' button to bring up the 'Quick Start Menu' screen.

### Entering Basic Data—QUICKSET



### Changing Parameters

Click on any parameter field to alter it. The data may now be altered. Leaving the field by 'enter' or 'tab' will cause the data to be written to the device and read back. If the new value was successfully written and read back, that field will stay green.

A value outside normal limits will not be accepted and the field will return back to the last entry displaying "Error in writing data message" (with the required range) that needs to be input.

Low Level - Enter the distance from the transducer face that corresponds to the low level in the vessel - 4-20mA output level.

Hi Level—Enter the distance from the transducer face that corresponds to the high level in the vessel - 20mA output level.

Application—Select from Slurries, Liquids or Solids.

Rate of Fill—Rate of change of level during filling – units/hour.

Damp fill — Damping during filling – 000 to 999 – low number fast response.

Rate of Empty - Rate of change of level during emptying – units/hour.

Damp Empty - Damping during emptying – low number fast response

Failsafe—Select required mA output in failure mode.

Failsafe time — Select time in seconds before failure is indicated.

To check that all new parameters have been accepted click the 'Read All Parameters' and check that all data displayed is correct.

Other screens available are:

- Info
- Quick Start
- Output adjust
- Tx Setup
- Tracking
- Factory
- ID Search
- Volume

but these should not need to be changed for most applications and need only be adjusted after consultation with PSM.

## General specification

<b>Range</b>	: Up to 60 metres
<b>Blanking</b>	: Variable from 0.3 metres
<b>Process media</b>	: Liquids or Solids
<b>Analogue Output</b>	: 4-20mA into 750 Ohm Ext. Supply.
<b>Power Supply</b>	: 10 - 25 v dc
<b>Relays</b>	: 1 Form C SPDT rated 0.5 amp at 240v ac
<b>Resolution</b>	: 1mm up to 20 metre range : 4mm from 20-40 metre range
<b>Accuracy</b>	: +/- 0.25% of maximum range
<b>Operating temperature</b>	: -40°C to + 80°C
<b>Ambient temperature</b>	: Electronics -40°C to +80°C
<b>Enclosure</b>	: Integral System IP67
<b>Mounting</b>	: 2" NPT or BSP or Flanged ANSI DIN or JIS
<b>Weight</b>	: 2kg - 15kg depending on transducer power
<b>Cable Extension</b>	: Beldon 3084A up to 500 metres
<b>Max.System Pressure</b>	: 2 bar
<b>Comms</b>	: Modbus : Multi-drop capability (up to 32 units) : Vision System II
<b>Certification</b>	: ATEX EExm* Zone 1 & 2 for Liquids & Gases : ATEX DIP* Zone 20, 21 & 22 Dust only

## BASIC MODBUS SPAN AND DIAGNOSTIC REGISTERS

The 8200 series units communicate using '2 wire' (plus Ground) RS485 connection, and can be connected in 'multi-drop' configurations.

Protocol: Modbus RTU (2 wire)

Speed: 19200 Baud

Data bits: 8

Parity: None

Stop Bits: 1

The 8200 series units act as 'slave' devices on a Modbus network.

Units are shipped from the factory with a default Modbus address of 01.

The Modbus address of any unit can be changed individually if units are to be connected in a multi-drop network. Each address number must only be used once on any network (possible addresses are 1...255).

Diagnostic Block (Read Only): \*Can be read as Singles or any Block wholly within the limits of this range of addresses\*

- 40124 - LOW LEVEL span set point in mm
- 40125 - HIGH LEVEL span set point in mm
- 40126 - DISPLAYED DISTANCE (DISTANCE) in mm
- 40127 - NOT USED
- 40128 - NEW DISTANCE (E-DISTANCE) in mm
- 40129 - CONFIRM DISTANCE (C-DISTANCE) in mm
- 40130 - ECHO SIZE in Volts/102
- 40131 - GAIN at Echo detection point in %/7.5
- 40132 - NOT USED (Gain Limit)
- 40133 - RECOVER GAIN currently being used in %/7.5
- 40134 - NOISE in %/7.5
- 40135 - TEMPERATURE in Degrees K/10 ((DegreesC-273.2)/10)
- 40136 - NOT USED
- 40137 - CONFIRM COUNTER current value
- 40138 - HOLD COUNTER current value
- 40139 - NOT USED
- 40140 - WINDOW FORWARD POSITION in mm
- 40141- WINDOW BACK POSITION in mm

**Span Adjustment (Read/Write)\*MUST Read/Write SINGLES-NOT BLOCKS\*:**

40013 - LOW LEVEL span set point in mm

40014 - HIGH LEVEL span set point in mm

Extended Params (Read/Write)\*MUST Read/Write SINGLES-NOT BLOCKS\*:

- 40012- Units of Display parameter setting- values defined as listed here:
  - 0-Frequency (Hz) \*Not valid for level instruments\*
  - 1-Pressure (kPa) \*Not valid for level instruments\*
  - 2-Pressure (PSI) \*Not valid for level instruments\*
  - 3-Millimetres
  - 4-Centimetres
  - 5-Metres
  - 6-Feet
  - 7-Inches
- 40015- Failsafe Mode parameter setting- values defined as listed here: 0- 3.5mA
  - 1- 3.8mA
  - 2- 20.2mA
  - 3- Last Known
  - 4- 4.0mA
  - 5- 20.0mA
- 40016- Failsafe Time parameter setting- in seconds
- 40017- Application Type parameter setting- values defined as listed here:
  - 0-Liquid
  - 1-Solid
  - 2-Slurry
- 40018- Fill Rate parameter setting- in metres per hour/10
- 40019- Empty Rate parameter setting- in metres per hour/10
- 40020- Display Mode parameter setting- values defined as listed here:
  - 2-Flow
  - 3-Material %
  - 4-Material
  - 5-Space
- 40085- Offset parameter setting- in mm (0-5000)
- 40021- LOCK CODE parameter setting- raw number
- 40022- FILL DAMPING parameter setting- raw number
- 40023- EMPTY DAMPING parameter setting- raw number
- 40266- GAIN parameter setting in %/7.5
- 40267- GAIN STEP parameter setting in %/7.5
- 40268- DISTANCE STEP parameter setting in mm
- 40269- THRESHOLD parameter setting in Volts/100
- 40270- BLANKING parameter setting in mm
- 40274- VELOCITY parameter setting Value/10000
- 40300- RECOVER FIRST parameter setting in %/7.5
- 40301- RECOVER MAX parameter setting in %/7.5
- 40302- RECOVER INCREMENT parameter setting in %/7.5
- 40303- WINDOW parameter setting in mm
- 40304- WINFWD INC parameter setting in mm
- 40305- WINBACK INC parameter setting in mm
- 40306- CONFIRM parameter setting- raw number
- 40307- HOLD parameter setting- raw number
- 40312- ECHO WIDTH parameter setting in mm
- 40313- SEARCH FIRST parameter in %/7.5

## Assembly of Flange and Cones

05, 10 & 20 KHz – Transducer Assembly Process

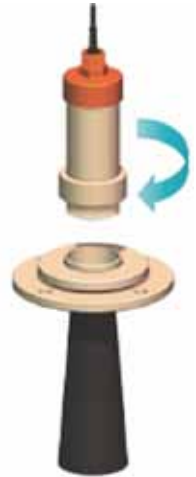
1—Remove cap including cardboard



2—Screw the flange assembly down onto the cone (as far down as it will go until the parts are tightly fastened).



3—Screw the transducer tightly down onto the flange and cone assembly.



4—Tighten the locking ring down to the flange to fix the components in place.



5—Completed assembly



Burrell Road Industrial Estate  
Haywards Heath, West Sussex RH16 1TW, UK  
Tel: +44 (0)1444 410040 Fax: +44 (0)1444 410121  
[Http://www.psm-sensors.co.uk](http://www.psm-sensors.co.uk) E-mail: [sales@psm-sensors.co.uk](mailto:sales@psm-sensors.co.uk)