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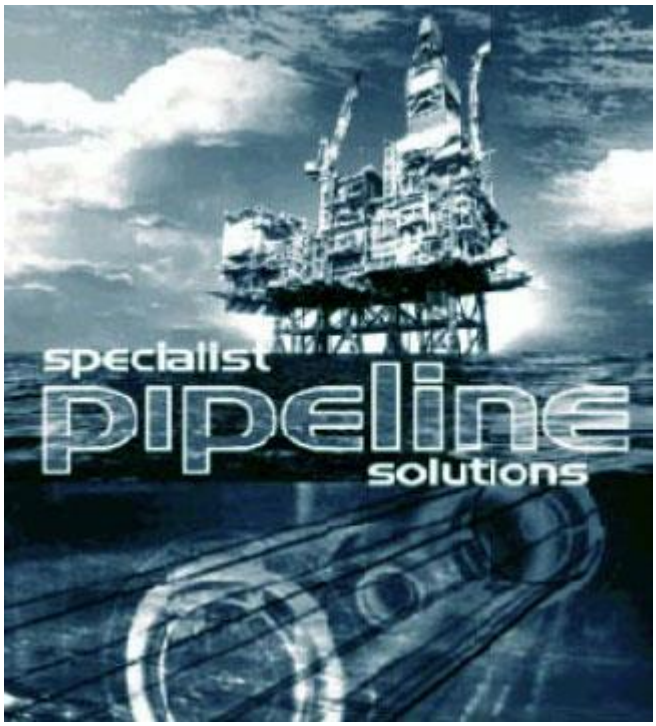
ID5002P INTRINSICALLY SAFE PIG SIGNALLER

OPERATING MANUAL



ID5002P MANUAL

Checked	(IF APPLICABLE)	**Date**	(IF APPLICABLE)
Approved	APPROVED aa , 09:00:48, 20/12/2016	**Date**	

Rev	Date	By	Summary of change
A01	15/04/16	EI	Incomplete draft for review.

COMMENTS:

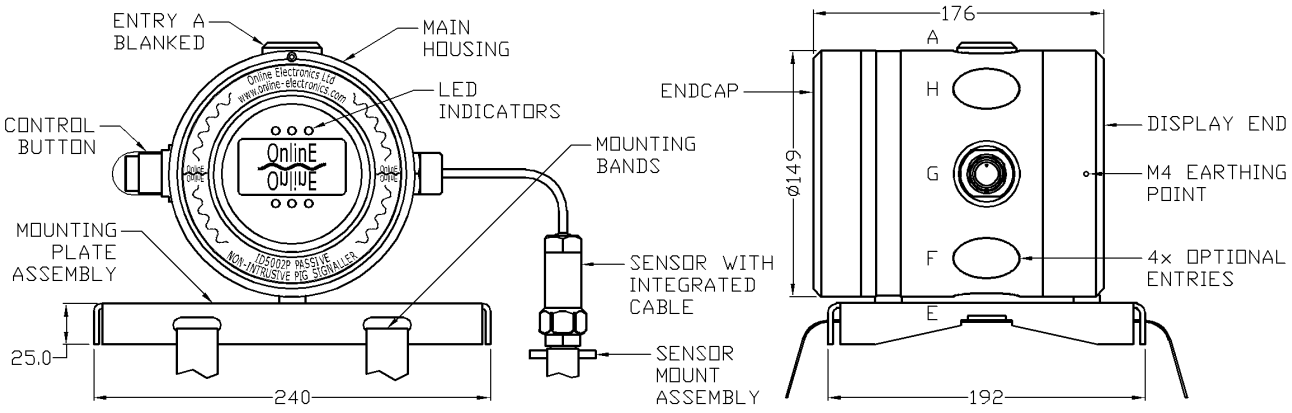
CONTENTS **Page**

1. GENERAL DESCRIPTION

The ID5002P is a fully certified, Exia intrinsically safe, non-intrusive, pig signaller which uses passive (listening) techniques to detect, signal, and log the passage of pigs at critical points along a pipeline both on land and offshore. Events are signalled as they occur via a display, high brightness LEDs positioned around the perimeter of the display and over several optional interfaces.

The unit logs the time and date of up to 100 events. Events can be viewed locally on the graphical display or transmitted remotely over several optional interfaces. The user can turn the unit ON and OFF as well as modify several settings using the single control button and intuitive menu system.

The ID5002P has two basic parts as shown below. The sensor is permanently connected to the main housing via a cable and can be quickly and easily attached to the pipeline using ratchet straps or steel banding. The main housing contains all electronics, display and the control button and can be mounted onto the pipeline using a mounting plate and straps in a similar fashion to the sensor or mounted on a wall or post.



2. SPECIFICATIONS

GENERAL

External Supply ..... PSD5201 Intrinsically Safe Power Supply[NOTE1]

Main Housing Ambient Temperature Range ..... -40°C to +85°C

Sensor Ambient Temperature Range ..... -55°C to +110°C

Maximum Pipeline Surface Temperature ..... +110°C

Typical minimum pig speed ..... 0.1m/s[NOTE2]

Ingress Protection IP66

ATEX code .....  II 1 G

IECEx code ..... Ex ia IIB T4 Ga

EU Type Examination Certificate Number EMT16ATEX0007X

IECEx Certificate Number ..... IECEx EMT 16.0006X

Weight in Aluminium 8kg

Weight in Stainless Steel 13kg

OUTPUTS

Relay Outputs (Volt Free Contacts) ..... DPDT[NOTE3]

Current Loop Output ..... 4-20mA[NOTE4]

Serial Data Interface ..... RS485 MODBUS

NOTE1 The ID5002P must be powered from a GM International PSD5201 power supply which may be purchased separately from Online Electronics Ltd.

NOTE2 Minimum pig speed depends on pig type, pipeline configuration and installation position.

NOTE3 DPDT is equivalent to 2x SPDT. Contact rating 30VDC @ 2A. Limited by certification entity parameters.

NOTE4 Current Loop levels are configurable between 4mA and 20mA. Default set state 15.0mA. Default reset state 5.0mA. Tolerance ±1.0mA.

3. OPERATION

The instructions detailed within the product certificate and section 7 CERTIFICATION APPENDIX of this manual must be followed at all times.

3.1. TURNING ON

Whenever power is applied to the unit it will turn on following the sequence of screens shown opposite.

When first turned on the COMPANY LOGO should appear for approximately 5 seconds.

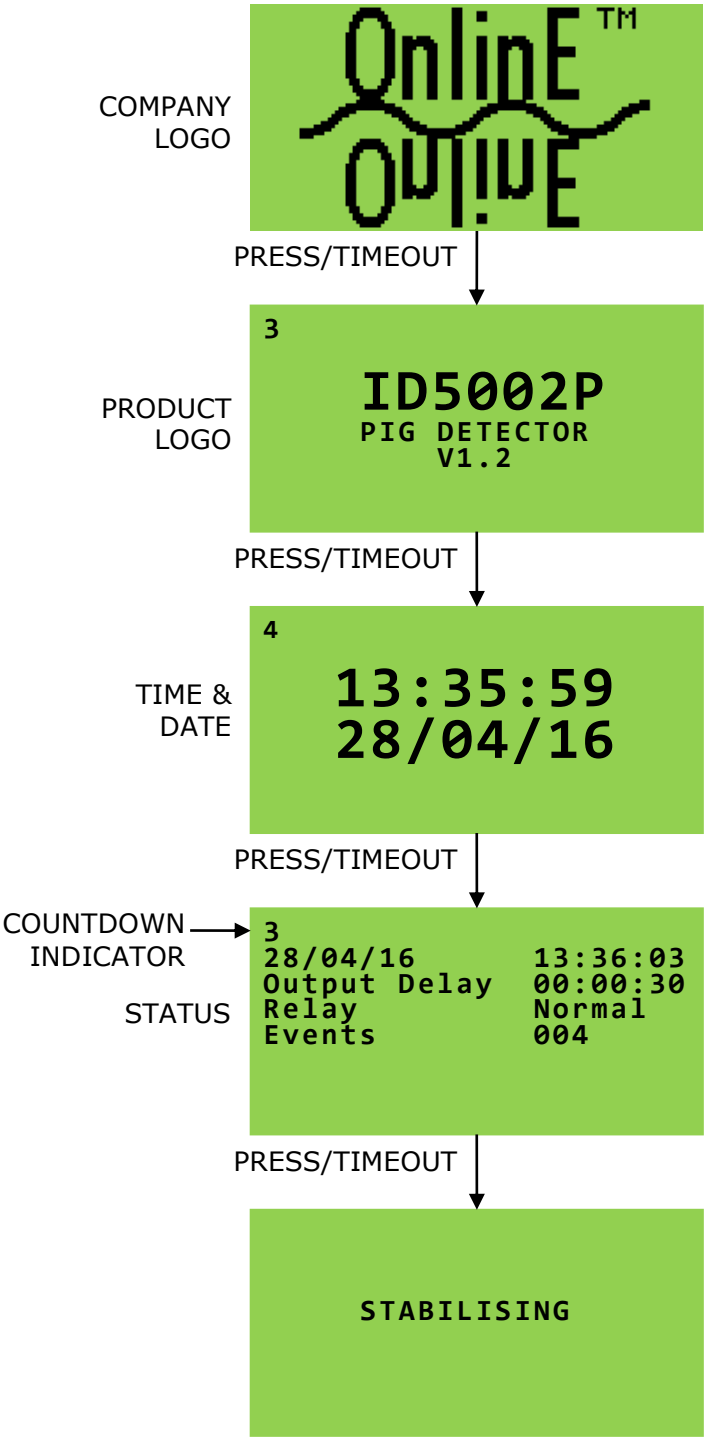
The next screen to appear will be the PRODUCT LOGO screen which will be displayed for 5 seconds as shown by the COUNTDOWN INDICATOR located at the top left hand side of the display. The PRODUCT LOGO screen shows firmware version on the bottom line.

When the COUNTDOWN INDICATOR reaches zero or the CONTROL BUTTON is pressed the next screen will appear.

The next screen shows the STATUS screen.

The unit now enters STABILISATION.

The unit now enters LISTENING mode. See 3.2 LISTENING.



3.2. LISTENING

While LISTENING, the display will remain blank but the 3x LEDs above and below the display will flash every 5 seconds to indicate that the unit is active.

While LISTENING the unit uses the algorithm described in 3.4 DETECTION ALGORITHM to detect a pig passage.

If a pig is detected then the unit will start signalling detection as per 3.3 DETECTION.

If the CONTROL BUTTON is pressed then the unit will enter the menu system as per 3.5 SINGLE BUTTON MENU INTERFACE.

3.3. DETECTION

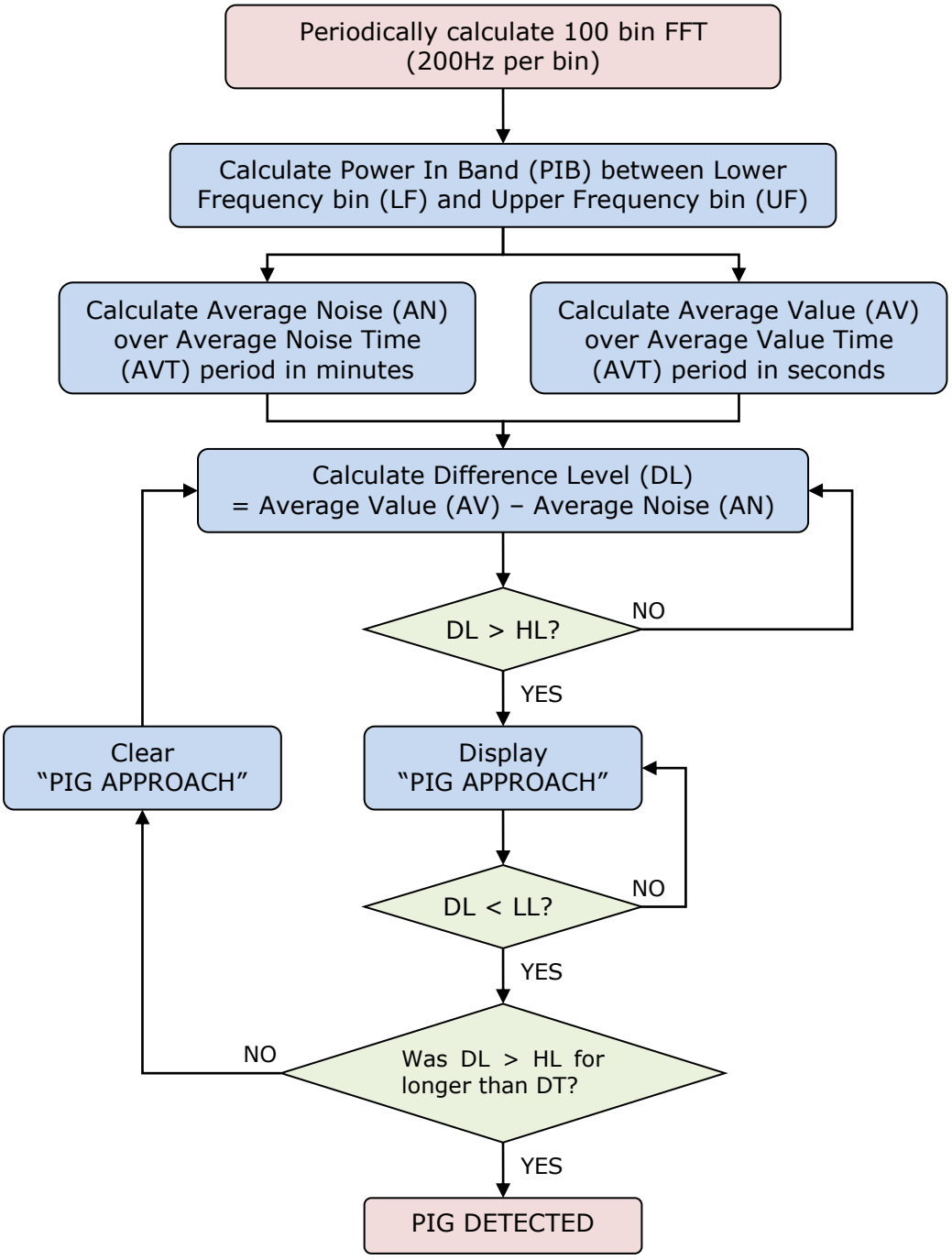
While signalling detection the display will illuminate to show a PIG DETECTED message along with the time and date of the event, the 3x LEDs above and below with display will flash every 1 second and the relay and current loop outputs will change state.

The unit will remain in this state for the length of time defined by the OUTPUT DELAY before re-entering LISTENING mode. The OUTPUT DELAY can be bypassed by pressing the CONTROL BUTTON.

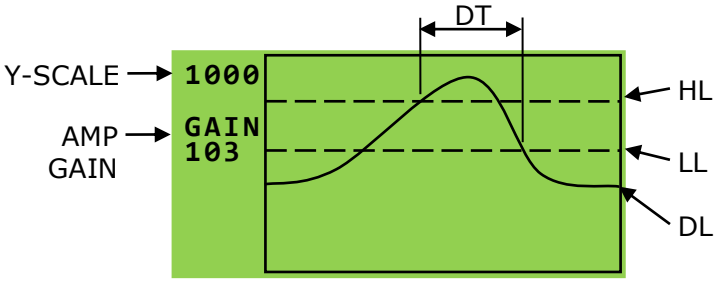
The OUTPUT DELAY controls how long the unit will signal an event for. Usually it will be configured to give the pig enough time to get out of range of the sensor after it has been detected to avoid re-trigger. When dealing with pig trains, the expected pig speed and separation should be used to configure a suitable value for the OUTPUT DELAY such that the unit will not detect the same pig twice but will enter LISTENING mode in time to detect the next pig.

3.4. DETECTION ALGORITHM

Below is a simplified flowchart for the ID5002P detection algorithm which is running while LISTENING.



The image to the right shows what a typical pig passage will look like while in live display mode (see section 3.5.8 SYSTEM MENU 2 – LIVE DISPLAY).



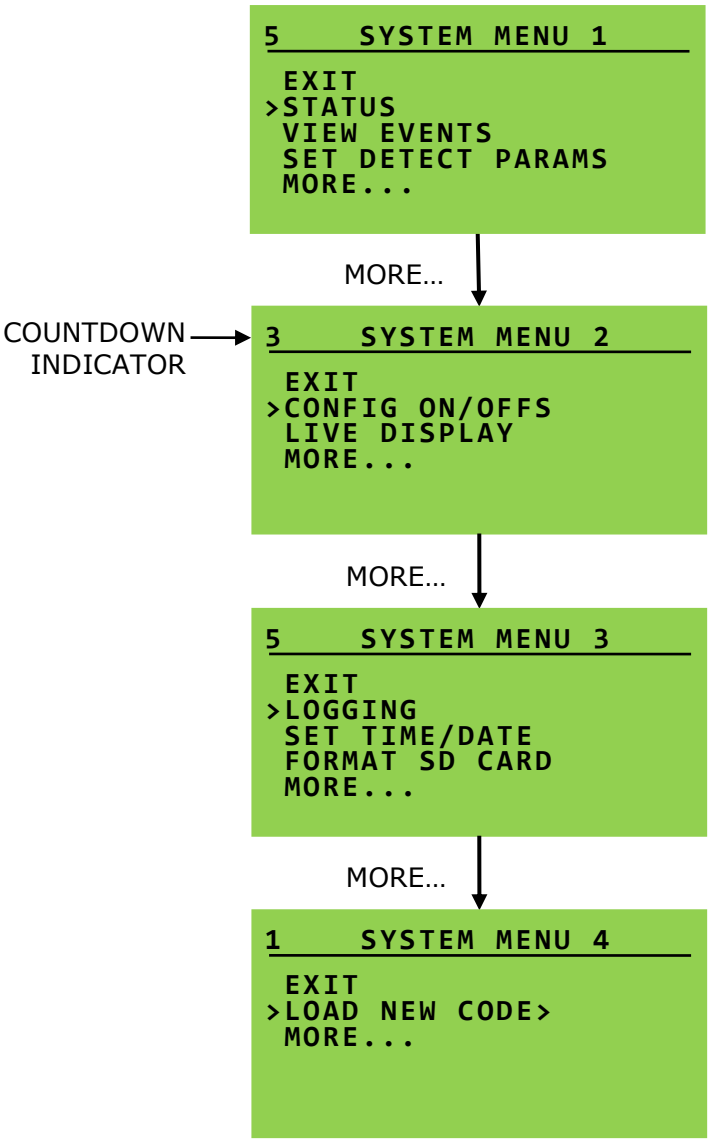
3.5. SINGLE BUTTON MENU INTERFACE

While LISTENING, the control button can be pressed to enter the menu interface. From the menus the user can configure several parameters which are discussed in this section.

While in the system menu, every time the user presses the control button the CURSOR will move down one line and the COUNTDOWN INDICATOR will be reset to 5. Once the CURSOR is pointing at the desired item the user simply allows the COUNTDOWN INDICATOR to reach 0 and the selected item will be executed. This simple behaviour is used throughout the menu interface to modify settings and interact with the unit.

To modify parameters, simply follow the instructions provided on screen. All parameters are incremented by pressing the CONTROL BUTTON until they are at the desired value then allowing the COUNTDOWN INDICATOR to reach 0.

If you do not wish to modify a parameter then simply allow the COUNTDOWN INDICATOR to reach 0 without operating the CONTROL BUTTON. The menu system is designed so that the unit will always start LISTENING again if the CONTROL BUTTON is left released for a long enough time.



3.5.1. SYSTEM MENU – EXIT

If EXIT is selected then the unit will exit the menu system and resume LISTENING.

3.5.2. SYSTEM MENU – MORE...

If MORE... is selected then the unit will display the next page of the menu system.

3.5.3. SYSTEM MENU – BACK

If BACK is selected then the unit will display the previous page of the menu system.

3.5.4. SYSTEM MENU 1 – STATUS

This menu item consists of two status pages.

STATUS 1 shows if data LOGGING is ON or OFF, the number of events and relay configuration.

STATUS 2 shows the date, time and output delay setting. The STATUS screen can be halted by pressing and holding the control button.

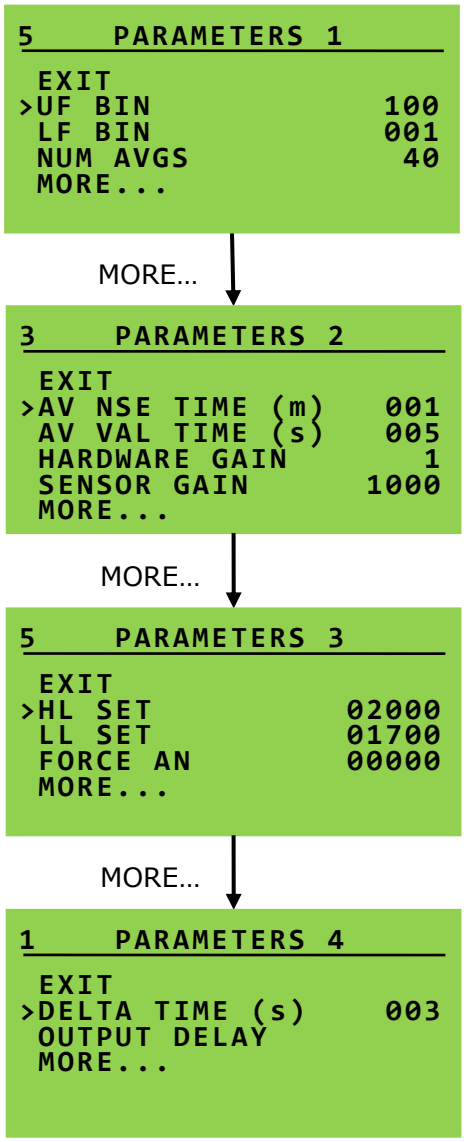
Ensure all of these settings are at the required values.

3.5.5. SYSTEM MENU 1 - VIEW EVENTS

Selecting this item will allow the user to cycle through all logged EVENTs from newest to oldest. The EVENT number, and EVENT date and time are shown. Pressing the CONTROL BUTTON will cycle to the next event. The CONTROL BUTTON can be held to pause at any point. If the COUNTDOWN INDICATOR reaches 0 then the unit will exit and resume LISTENING.

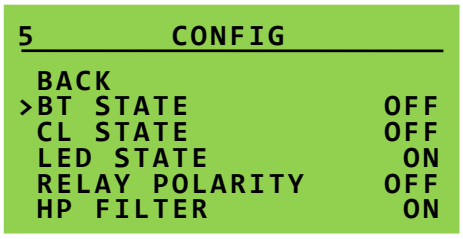
3.5.6. SYSTEM MENU 1 – SET DETECT PARAMS

These items allow the user to configure the detection parameters. Refer to 3.4 DETECTION ALGORITHM.



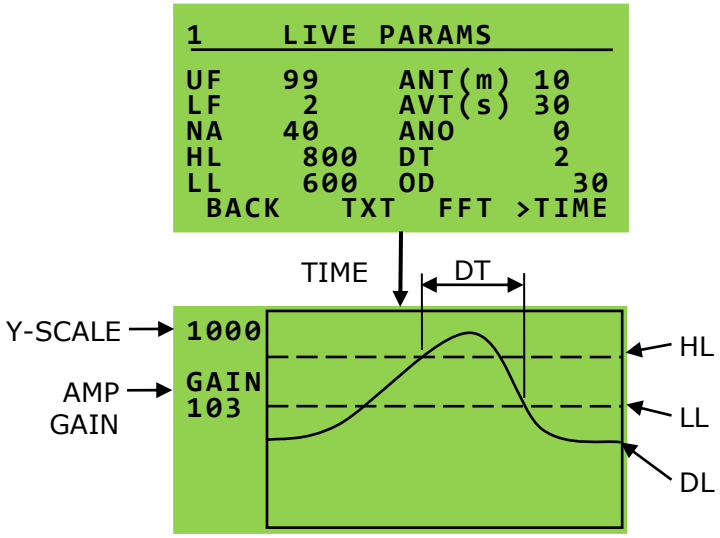
3.5.7. SYSTEM MENU 2 – CONFIG ON/OFFS

These items allow the user to configure several settings.



3.5.8. SYSTEM MENU 2 – LIVE DISPLAY

Selecting LIVE DISPLAY makes the unit display one of three diagnostic screens selected in the usual manner from the bottom of the LIVE PARAMS screen.



3.5.9. SYSTEM MENU 3 – LOGGING

These items allow the user to configure logging.

3.5.10. SYSTEM MENU 3 – SET TIME/DATE

These items allow the user to set the system date and time.

3.5.11. SYSTEM MENU 3 – FORMAT SD CARD

This item allows the user to format the internal SD card (if fitted).

3.5.12. SYSTEM MENU 4 – LOAD NEW CODE

This item allows the user to update the unit firmware code.

3.6. MOUNTING

The instructions detailed within the product certificate and section 7 CERTIFICATION APPENDIX of this manual must be followed at all times.

Normally the unit is used to confirm whether or not a pig has passed a known point of interest on a pipeline such as a bend or valve. The unit should be mounted approximately 5m after the point of interest and a test run completed to confirm successful installation and reliable detection.

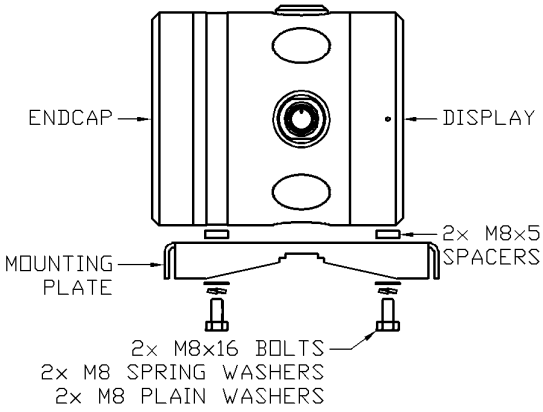
If the main housing is exposed to direct sunshine then it is recommended that a sunshade is installed to prevent unnecessary heating of the unit which may shorten the lifespan of the equipment. See sections 3.6.5 SUNSHADE POST MOUNTING and 3.6.6 SUNSHADE PIPELINE MOUNTING.

3.6.1. MAIN HOUSING MOUNTING PLATE

The unit is supplied with a mounting plate as shown which is suitable for use with ratchet straps or steel banding and for mounting the unit onto pipelines, posts and walls.

If the unit is post mounted then 4x M8x120 coach bolts should be fitted as per 3.6.2 MAIN HOUSING POST MOUNTING prior to attaching the mounting plate.

The mounting plate is attached to the main housing as shown using 2x M8x16 bolts / 2x M8 spring washers / 2x M8 plain washers / mounting plate / 2x M8x5 spacers / main electronics housing.



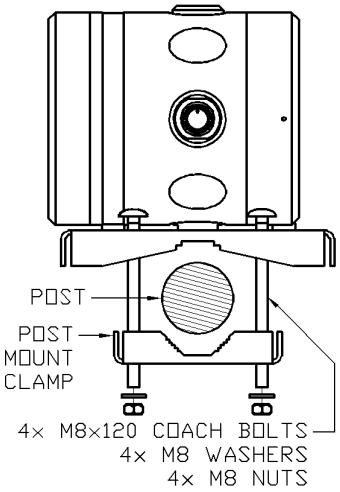
3.6.2. MAIN HOUSING POST MOUNTING

The post mounted unit is supplied with a post mounting assembly as shown.

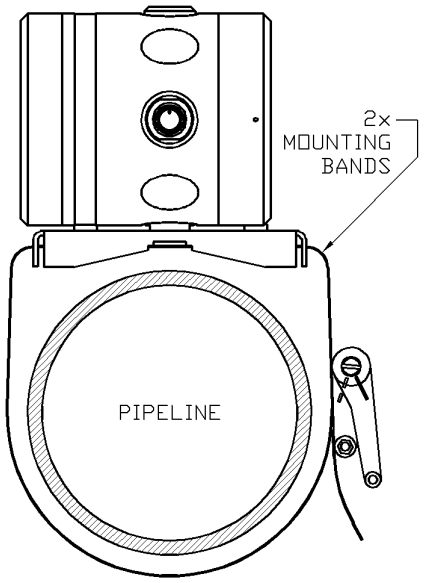
1. Prior to fitting the mounting plate as per 3.6.1 MAIN HOUSING MOUNTING PLATE pass the 4x M8x120 coach bolts through the mounting plate.

2. Hold the assembly in position on the post and secure using 4x M8 nutss / 4x M8 washers / post mount clamp / post / mounting plate / 4x M8x120 coach bolts as shown (view from above).

3. If equipotential bonding or earthing is required then the M4 threads around the perimeter of the display endcap may be used.



3.6.3. MAIN HOUSING PIPELINE MOUNTING



The pipeline mounted unit is supplied with a set of ratchet straps or steel banding as shown.

1. Ensure the mounting plate is securely fitted to the housing as per 3.6.1 MAIN HOUSING MOUNTING PLATE.

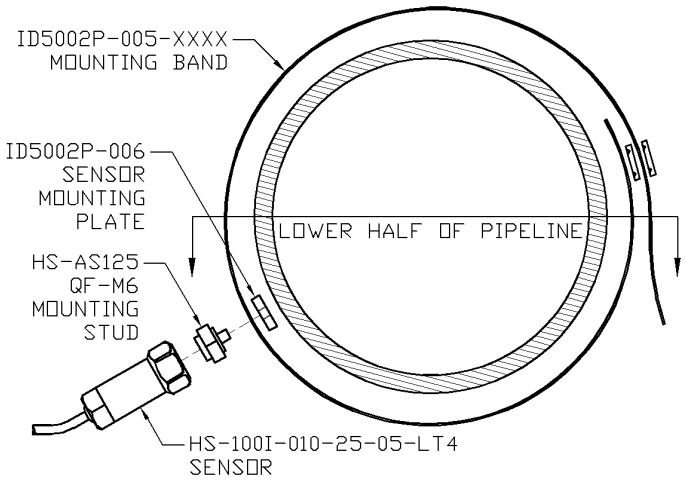
2. Temporarily place the unit at the chosen location to ensure that the unit sits in place without rocking excessively.

3. Thread 2x loops of banding through the slots provided in the mounting plate as shown and then following the instructions provided with the banding gradually tighten the banding until the unit is held firmly. Do not use excessive force.

4. If equipotential bonding or earthing is required then the M4 threads around the perimeter of the display endcap may be used.

3.6.4. SENSOR MOUNTING

The sensor is supplied with a mounting plate, a mounting stud and a length of mounting band.



1. Pass the mounting stud through the ø6mm hole in the mounting band and then screw into the mounting plate approximately 4 full turns. Do not tighten further at this point.

2. If the pipeline surface temperature is expected to exceed +110°C then the sensor must be fitted on the lower half of the pipeline as shown to minimise convection heating and Online Electronics should be contacted for further guidance.

3. Loop the mounting band around the pipeline and then following the instructions provided with the banding gradually tighten the banding until the mounting assembly is held firmly. Do not use excessive force.

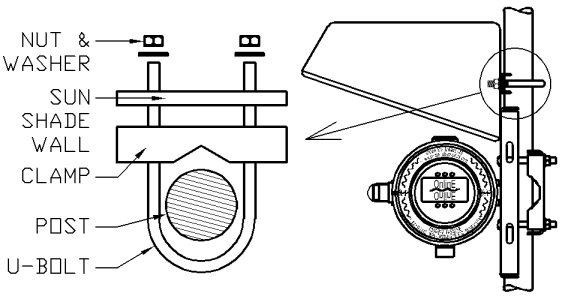
4. Ensure that the mounting plate is positioned to form a cross with the mounting band and the mounting band has been firmly tightened before fully tightening the mounting stud into the mounting plate using a 21mm AF spanner. It should not be possible to move the mounting plate at this point.

5. Attach the ID5002P sensor to the mounting stud tightening firmly using a 1” AF spanner.

3.6.5. SUNSHADE POST MOUNTING

If the main housing is exposed to direct sunshine then it is recommended that a sunshade is installed to prevent unnecessary heating of the unit which may shorten the lifespan of the equipment.

Secure the post mount sunshade to the post as shown using the supplied M8 U-bolt / post / clamp / sunshade / 2x M8 washers / 2x M8 nuts.



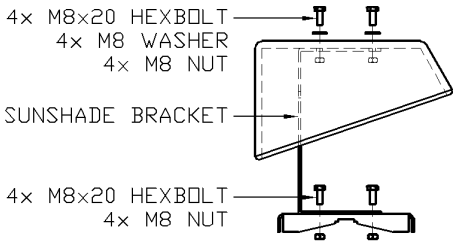
3.6.6. SUNSHADE PIPELINE MOUNTING

If the main housing is exposed to direct sunshine then it is recommended that a sunshade is installed to prevent unnecessary heating of the unit which may shorten the lifespan of the equipment.

The pipeline mounted sunshade is fixed to the same mounting plate as the main unit using 2x 'C' brackets as shown. This assembly is then mounted onto the pipeline as described in section 3.6.3 MAIN HOUSING PIPELINE MOUNTING.

Secure 2x pipeline mount sunshade brackets to the mounting plate using 4x M8x20 hexbolts / 2x 'C' brackets / mounting plate / 4x M8 nuts.

Secure the sunshade to the 2x brackets using 4x M8x20 hexbolts / 4x M8 washers / sunshade / 2x 'C' brackets / 4x M8 nuts.



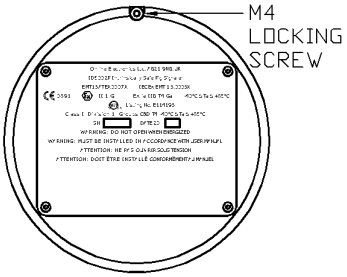
3.7. OPENING THE ENCLOSURE

The instructions detailed within the product certificate and section 7 CERTIFICATION APPENDIX of this manual must be followed at all times.

1. WARNING – DO NOT OPEN WHEN ENERGIZED.

2. Using a 3mm AF allen key loosen the M4 locking screw located at the 12 o'clock position on the rear endcap 6x full turns.

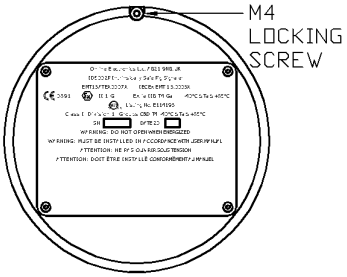
3. Carefully unscrew the rear endcap while being prepared to take the weight when it disengages. There are 4x unthreaded holes around the perimeter of the endcap which may be used should leverage be required.



3.8. CLOSING THE ENCLOSURE

1. Gently hand tighten the rear endcap. Do not use tools or over tighten otherwise the endcap will be difficult to remove. The M4 locking screw should be at the 12 o'clock position when the endcap is fully engaged, there should still be a small gap (<0.5mm) between the endcap and housing.

2. Using a 3mm AF allen key gently tighten the M4 locking screw located at the 12 o'clock position on the rear endcap. Do not over tighten, very little torque is required to lock the endcap in place.

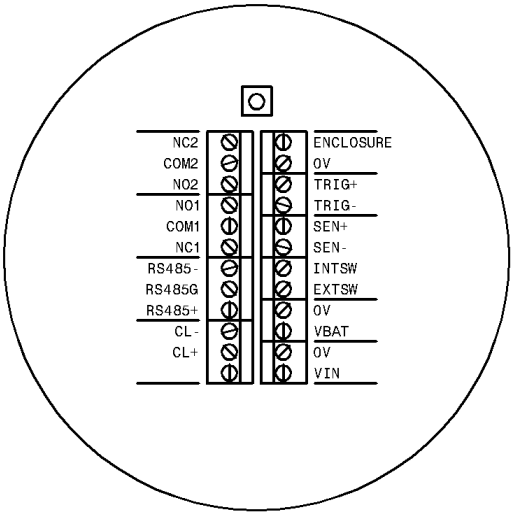


3.9. EXTERNAL CONNECTIONS

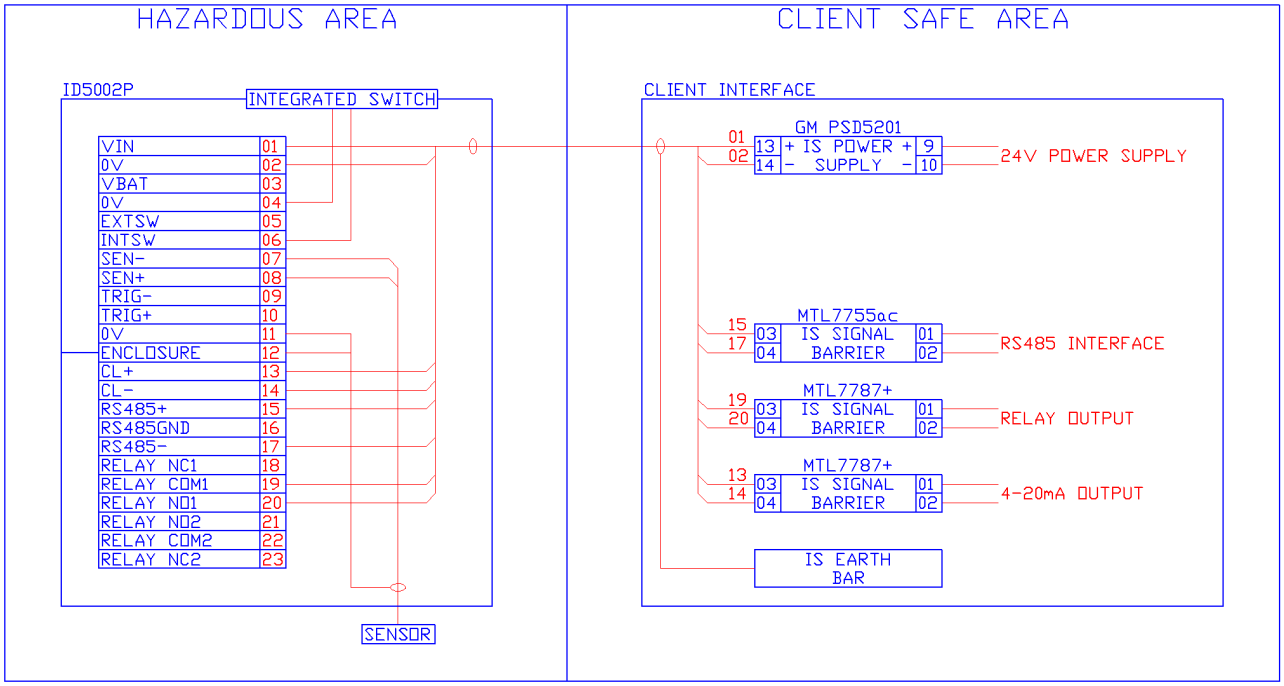
The instructions detailed within the product certificate and section 7 CERTIFICATION APPENDIX of this manual must be followed at all times.

Remove the endcap as described in section 3.7 OPENING THE ENCLOSURE to reveal the PCB connections.

All connections are made using 5.08mm pitch removable terminal blocks which can accept up to 2.5mm^2 (12AWG) wire size. All connections must be made using suitable crimp ferrules. Connections are clearly labelled on the PCB and have the functions described in the following sections.



An example of the recommended wiring for an ID5002P system is shown below.



3.9.1. 0V

0V is the 0V reference for the internal PCBs. 0V should be linked to the ENCLOSURE connection to improve electrical noise immunity.

3.9.2. VIN

VIN is connected to the positive side of the external DC supply. The negative side of the external DC supply is connected to 0V.

A GM International, PSD5201, intrinsically safe, isolated, power supply must be used at all times.

VIN is not isolated from 0V however the use of a PSD5201 supply provides isolation from earth.

3.9.3. VBAT

Do not use the VBAT connection.

VBAT is not isolated from 0V.

3.9.4. EXTSW

Do not use the EXTSW connection.

EXTSW is not isolated from 0V.

3.9.5. INTSW

The ID5002P is supplied with a suitable, momentary, NO switch connected between INTSW and 0V.

EXTSW is not isolated from 0V.

3.9.6. SEN+ / SEN-

The ID5002P is supplied with a suitable sensor connected between SEN+ and SEN-.

The sensor is supplied with a shielded cable. The cable shield is connected to the sensor body which is isolated from SEN+ and SEN-. The cable shield is connected to the main ID5002P enclosure using a suitable gland or via ENCL connection.

SEN+ / SEN- are not isolated from 0V.

3.9.7. TRIG+ / TRIG-

Do not use the TRIG+ / TRIG- connections.

TRIG+ / TRIG- are isolated from 0V and all other connections.

3.9.8. ENCL

ENCL provides an electrical connection to the main enclosure. ENCL should be linked to the 0V connection to improve electrical noise immunity.

ENCL is isolated from 0V (unless a link is fitted between 0V and ENCL).

If equipotential bonding or earthing is required then there are 2x M4 threads around the perimeter of the display endcap. As per e.g. EN60079-14:2008 section 12.2.4 the ID5002P must be isolated from earth or connected at one point to the equipotential bonding system.

3.9.9. CL+ / CL-

CL+ / CL- provide a current loop output for remote signalling.

CL+ is connected to the current loop supply (in to unit). CL- is connected to the current loop return here (out of unit).

CL+ / CL- are isolated from 0V and all other connections.

3.9.10. RS485+ / RS485- / RS485G

RS485+ / RS485- / RS485G provide an RS485 interface for remote signalling and interaction with the unit.

RS485+ / RS485- / RS485G are isolated from 0V and all other connections.

3.9.11. NO1 / COM1 / NC1 / NO2 / COM2 / NC2

These connections provide two isolated, Single Pole, Double Throw (SPDT) relay outputs for remote signalling.

NO1 / COM1 / NC1 / NO2 / COM2 / NC2 are isolated from 0V and the SPDTs are isolated from each other and all other connections.

4. RECOMMENDED MAINTENANCE

The instructions detailed within the product certificate and section 7 CERTIFICATION APPENDIX of this manual must be followed at all times.

Frequent inspections should be made. A schedule for maintenance checks should be generated according to the environment and frequency of use but should be regular enough to ensure the equipment continues to operate in the designed manner. It is recommended that it should be at least once a year.

External parts of the equipment should be periodically cleaned using fresh water to ensure that deposits are not allowed to accumulate. Avoid the use of aggressive chemicals.

All external parts of the equipment should be periodically checked for corrosion or damage. If any damage is found then the manufacturer must be contacted.

All components that are replaced must be in accordance with the manufacturers' specifications and instructions. Failure to do so may invalidate the certification/approval and may make the equipment dangerous.

5. DISPOSAL OF UNIT

Online Electronics Ltd (OEL) takes its responsibilities under the WEEE Regulations extremely seriously and has taken steps to be compliant in line with our corporate and social responsibilities. In the UK, OEL has joined a registered compliance scheme WeeeCare (registration number **WEE/MP3538PZ/SCH**).

Electrical and electronic equipment should never be disposed of with general waste but must be separately collected for the proper treatment and recovery.

The crossed out bin symbol, placed on the product, reminds you of the need to dispose of it correctly at the end of its life.

When buying a new product you will have the possibility to return, free of charge, another end of life product of equivalent type that has fulfilled the same functions as the supplied equipment. These items may be deposited at:

Online Electronics Ltd
Online House
266 Auchmill Road
Aberdeen
AB21 9NB
UK

Alternatively, to arrange a collection of any waste electrical equipment, obligated to OEL please telephone WeeeCare on **0844 800 2004**.

6. WARRANTY

Online products are guaranteed for one year from the date of purchase. Goods should be returned transportation prepaid to Online Electronics Limited, 266 Auchmill Road, Aberdeen.

There is no charge for parts or labour should any product require repair due to a manufacturing deficiency during the guarantee period.

In the event of a manufacturing deficiency the inward transportation costs will be repaid to the client.

7. CERTIFICATION APPENDIX

EQUIPMENT: ID5002P Pig Signaller

MANUFACTURER: **Online Electronics Ltd**
Online House
266 Auchmill Road
Aberdeen
AB21 9NB
Tel: +44 (0) 1224 714 714
Web: www.online-electronics.com

NOTIFIED BODY NUMBER: 0891

ATEX CERTIFICATE: EMT16ATEX0007X

IECEx CERTIFICATE: IECEx EMT 16.0006X

MARKINGS:  II 1 G Ex ia IIB T4 Ga -40°C ≤ Ta ≤ +85°C

APPLICABLE STANDARDS: EN 60079-0:2012/A11:2013
EN 60079-11:2012
IEC 60079-0:2011
IEC 60079-11:2011

POLLUTION DEGREE: 2 (IEC 60664-1)

OVERVOLTAGE CATEGORY: I/II (IEC 60664-1)

SPECIAL CONDITIONS FOR SAFE USE:

1. WARNING: Do not open when energized.

2. WARNING: Must be installed in accordance with user manual.

3. All intrinsically safe installations must be in accordance with the assembly and installation regulations described in IEC 60079-14.

4. Refer to the provided parameter tables for external connection parameters.

5. Cable glands used with this equipment must be IECEx/ATEX approved with IP66 rating or greater and be selected with consideration of the expected environmental conditions at the point of installation.

6. This equipment contains an internal SD card that must not be accessed or removed or replaced in a hazardous area.

7. This equipment contains a USB port that must only be used by the manufacturer during production, test, repair and overhaul of the equipment in a safe area. It is not intended to be used by the end-user in a hazardous or non-hazardous area at any time.

8. Aluminium versions may present a spark hazard and must only be installed in hazardous areas such that the ignition sources due to impact and friction are excluded.

9. Painted or powder coated versions may present an electrostatic charging hazard and should not be mounted in areas where they could be subjected to highly efficient charging mechanisms, such as fast moving dust or particle filled air, and shall only be cleaned with an anti-static or damp cloth.

10. As part of a routine maintenance schedule, the condition of the window cement shall be periodically inspected for any degradation or discolouration of the cement that may compromise the explosion protection.

11. As per IEC/EN 60079-14 the ID5002P shall be either isolated from earth or connected at one point to the equipotential bonding system.

12. If enclosure equipotential bonding or earthing is connected then to avoid double earth faults the EXTSW connection must not be connected to a second earth.

PARAMETER TABLES:

The ID5002P must be connected via suitably certified intrinsically safe barriers satisfying the following parameters unless otherwise stated:

Description	Power Supply	RS485	4-20mA Current Loop	Internal Switch	External Switch	Remote Switch	Sensor
Terminals	VIN 0V	RS485+ RS485- RS485GND	CL+ CL-	INTSW 0V	EXTSW 0V	TRIG+ TRIG-	SEN+ SEN-
Ui	21.5V	6.0V	29.4V	- NOTE1	0V	29.4V	-
Ii	604mA	600mA	125mA	- NOTE1	0mA	125mA	-
Pi	3243mW	450mW	920mW	- NOTE1	0W	650mW	-
Ci (int)	0µF	110nF	121nF	- NOTE1	0µF	0µF	-
Li (int)	0µH	0µH	0µH	- NOTE1	0µH	0µH	-
Uo	-	-	-	- NOTE1	4.1V	-	23.1V
Io	-	-	-	- NOTE1	5mA	-	28mA
Po	-	-	-	- NOTE1	5mW	-	160mW
Co (ext)	-	-	-	- NOTE1	10uF	-	1.02µF
Lo (ext)	-	-	-	- NOTE1	0.2H	-	0.19H
Example Accessory NOTE3	GM PSD5201	MTL 7755ac	MTL 7787+	NA NOTE1	GM D1044S	MTL 7787+	NA NOTE2

Description	Relay								
Terminals	NO1 COM1 NC1 NO2 COM2 NC2								
Ui	15.0V	OR	21.6V	OR	24.0V	OR	30.0V	OR	45.0V
Ii	2000mA		611mA		433mA		253mA		113mA
Pi	7500mW		3299mW		2958mW		1897mW		1271mW
Ci	0µF		0µF		0µF		0µF		0µF
Li	0µH		0µH		0µH		0µH		0µH
Example Barrier NOTE4	MTL 7758+		MTL 7715P+		MTL 7715P+		MTL 7787P+		MTL 7787+

NOTE1 The ID5002P is supplied with a suitable internal switch.
NOTE2 The ID5002P is supplied with a suitable sensor.
NOTE3 Use only barriers or accessories supplied or approved by Online Electronics Ltd.