GPS STANDARD

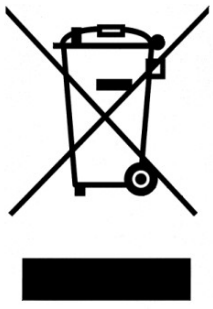
Committed to security.

PERIMETER

INSTALLATION MANUAL

SYSTEM **DPS**

ENGLISH



Disposal of Old Electrical & Electronic Equipment (Applicable in the European Union and other European countries with separate collection system)

This symbol on the product or on its packaging indicates that this product shall not be treated as household waste. Instead it shall be handed over to the applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. The recycling of materials will help to conserve natural resources. For more detailed information about recycling of this product, please contact your local city office or your household waste disposal service.

Version document: T-DPS™/205/11 – February 2011
Version FW: _ _
Version HW: _ _
Versioe SW: _ _
Language: English

INDEX

INTRODUCTION

Twenty five years experience in the electronic security industry, coupled with the production of around 5,000 **"GPS"** systems, is the base which has allowed **GPS Standard S.p.A.** to develop the most important detection system for external detection: the "DPS".
It constitutes the most advanced answer to the requirements of an external perimeter system. The equipment is based on solid field experience in the application of electronic security systems and a profound technical understanding of the most advanced electronic components and systems.
The fundamental characteristic is the complete camouflage of the system: most of today's external protection systems are easily avoided and damaged.
The DPS system will detect human intrusions, silently and invisibly, ignoring small animals, birds and other weather related disturbances that can cause alarms on other systems.

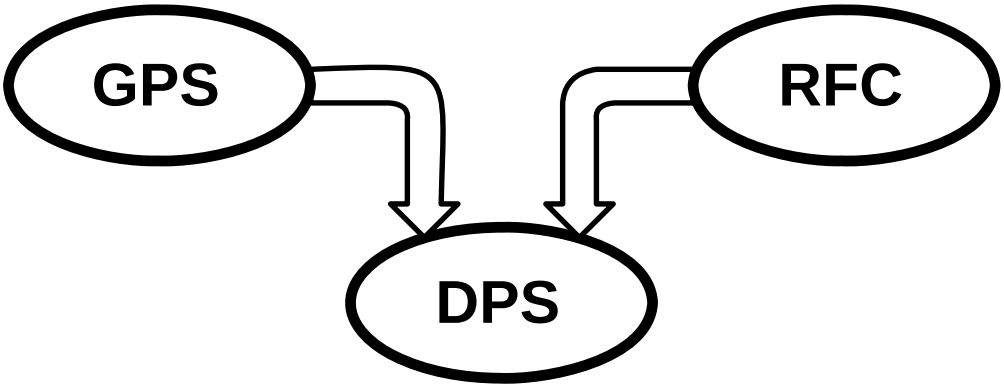
All the external components of the system can be buried, giving two essential advantages:

- The **DPS** system does not alter the aesthetics of the protected area.

- It does not allow the protected zone to be identified.

What is the DPS SYSTEM

The DPS (**D**ual technology **P**erimeter **S**ystem) is a perimeter intrusion system that adds to the features of the **GPS** system (pressure variation detector) the features of the **RFC** system (electromagnetic field variation detector).



The **GPS System**

(Perimeter protection using buried tubes)

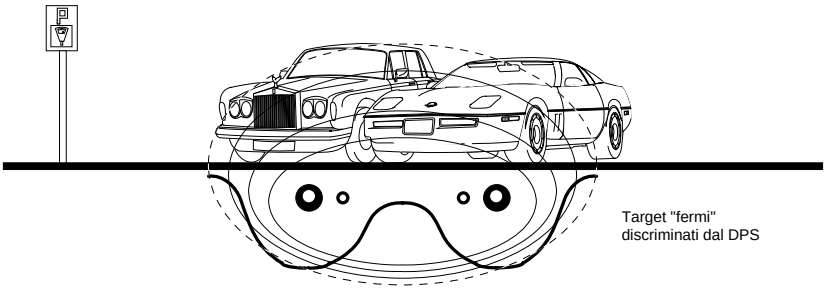
The GPS system, using buried tubes, detects differences in pressure generated by a target crossing the sensitive zone **(it is completely insensitive to electromagnetic fields and interference)**.
The tubes, buried along the length of the perimeter, are filled with a low freezing point fluid (antifreeze) and then pressurised.
Something crossing the sensitive area generates a change in pressure between these two tubes, which is recorded and amplified by an appropriate transducer. The signal obtained is sent to the **Concentrator Analyser** where it is analysed and then an appropriate signal is sent to the **Universal Communications Processor** (Pre-alarm GPS, Alarm GPS, ..etc.).

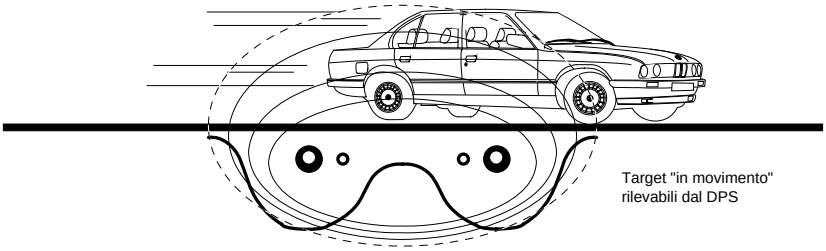
The RFC System

(Perimeter protection using buried electromagnetic cables)

The **RFC system**, using two buried cables (one for Transmit, one for Receive), creates an electromagnetic field sensitive to movement of a target in the protected area. **It is insensitive to vibrations in the ground**.
The target generates a variation in permeability inside the electromagnetic field, which is detected by a comparison between the radio frequency energy transmitted and the energy received.
The signal obtained is sent to the **Concentrator Analyser** where it is analysed and then an appropriate signal is sent to the **Universal Communications Processor** (Pre-alarm RFC, Alarm RFC, ..etc.).

The **RFC System** is designed to identify ‘’Moving’’ targets with a high dielectric constant or with a large enough electromagnetic cross-section. It is designed to detect the human body (which has a high water content) or metallic objects of sufficient size (car, trucks, bicycles, etc). It discriminates between small and large objects (e.g. small animals, such as dogs and cat will not be detected) and between moving and stationary metallic objects in the protected area.





THE DPS SYSTEM

Technical Characteristics

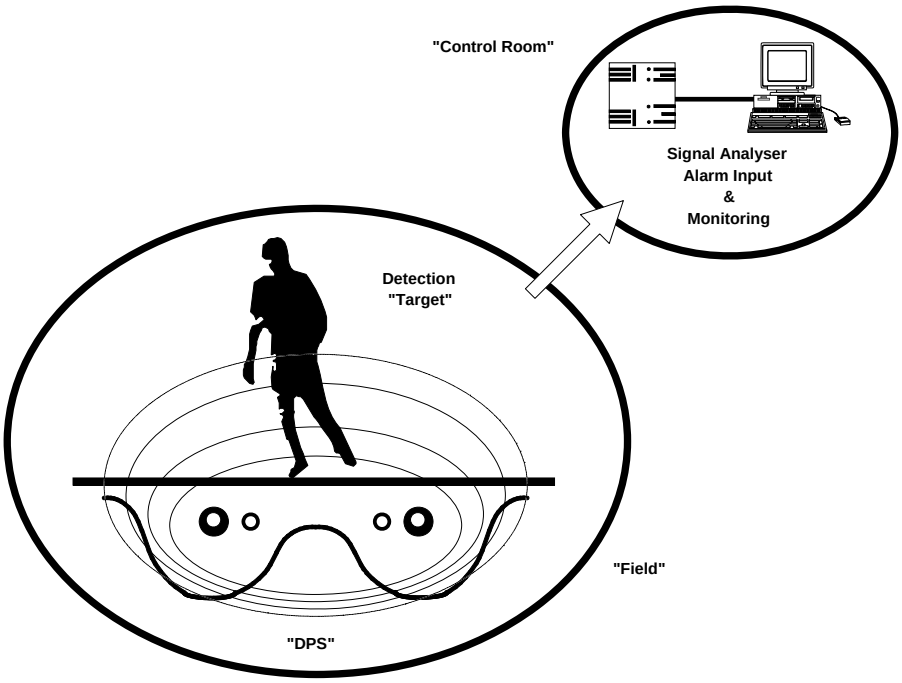
The **DPS** system, thanks to the use of the most up to date **DSP** (**D**igital **S**ignal **P**rocessing) technology, allows a high number of signals received by the DPS System to be processed in a very short time:

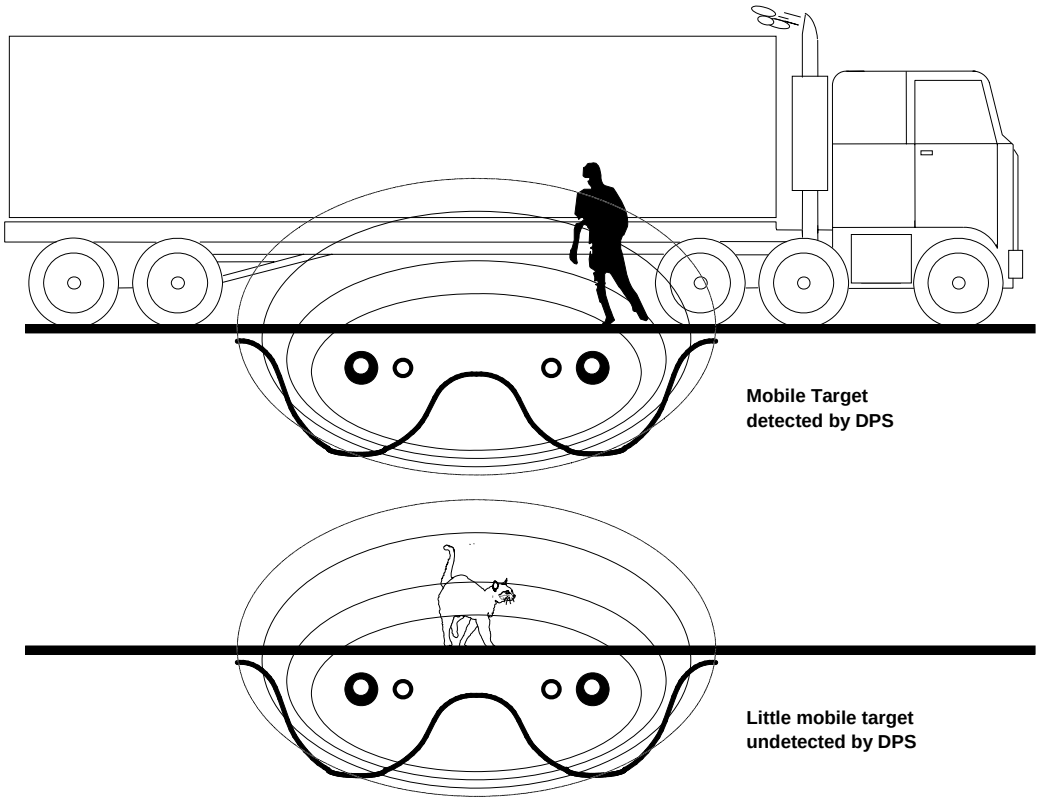
- Evaluation of signals in the time domain;
- Evaluation of signals in the frequency domain;
- Combined time/frequency evaluation;
- Use of characteristic masks to recognize signals detected by the sensors;
- Detection of signal energy levels (spectral analysis);
- Energy matrix categorization for signal energy levels;

The DPS system creates a sensitive zone of about 3/4m wide and up to 200m long.
To cover longer perimeters it is possible to have a system with up to 64 sensors connected to a single **U**niversal **C**ommunications **P**rocessor (UCP).

Operating Characteristics of the DPS System

The operation of the **DPS** is based on target detection by the pressure sensor and the radio frequency sensor in the "**Field**". The pressure (**GPS**) and/or electromagnetic (**RFC**) variation produce a signal that is sent to "**Control Centre**", and, after time and frequency analysis, gives management and alarm monitoring indications.



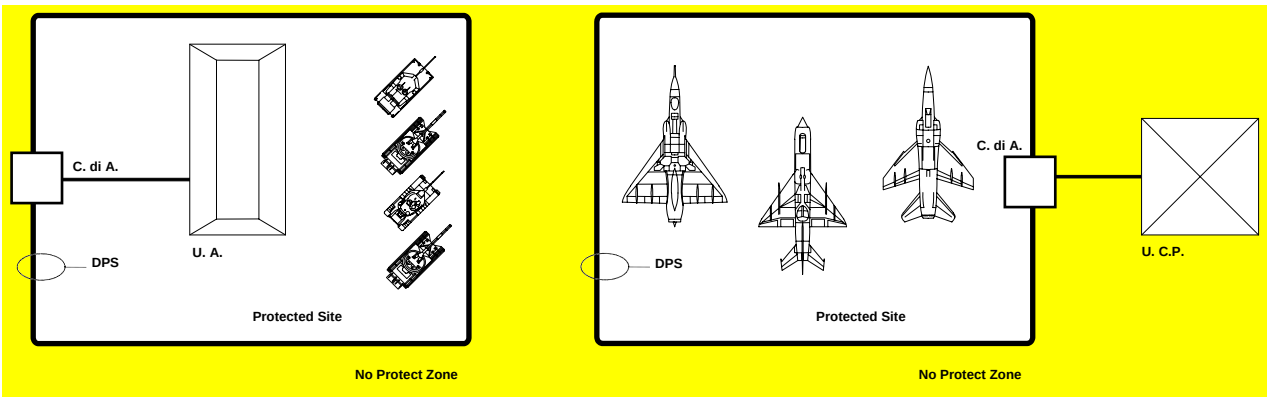


Structure of the DPS System

DPS system is subdivided into two principal parts:

a) The **Analysis Concentrator** in the **Field**;

b) The **U**niversal **C**ommunications **P**rocessor (**UCP**).



a) The Field

This comprises the "***sensor***" part of the system, with the capacity to detect the events generated by a violation of the protected perimeter.
The parts are: the **Analysis Concentrator**, the **GPS Sensor**, the **GPS Tubes** the **RFC Sensor** and the **RF cables**.
This represents the intelligence of the system, with the capability to analyse, discriminate and signal all the events detected along the perimeter.
There is a board containing a Digital Signal Processor, which permits the analysis of all the system events generated by GPS tubes and RFC cables that define the sensitive zone, delimiting the area to be protected.

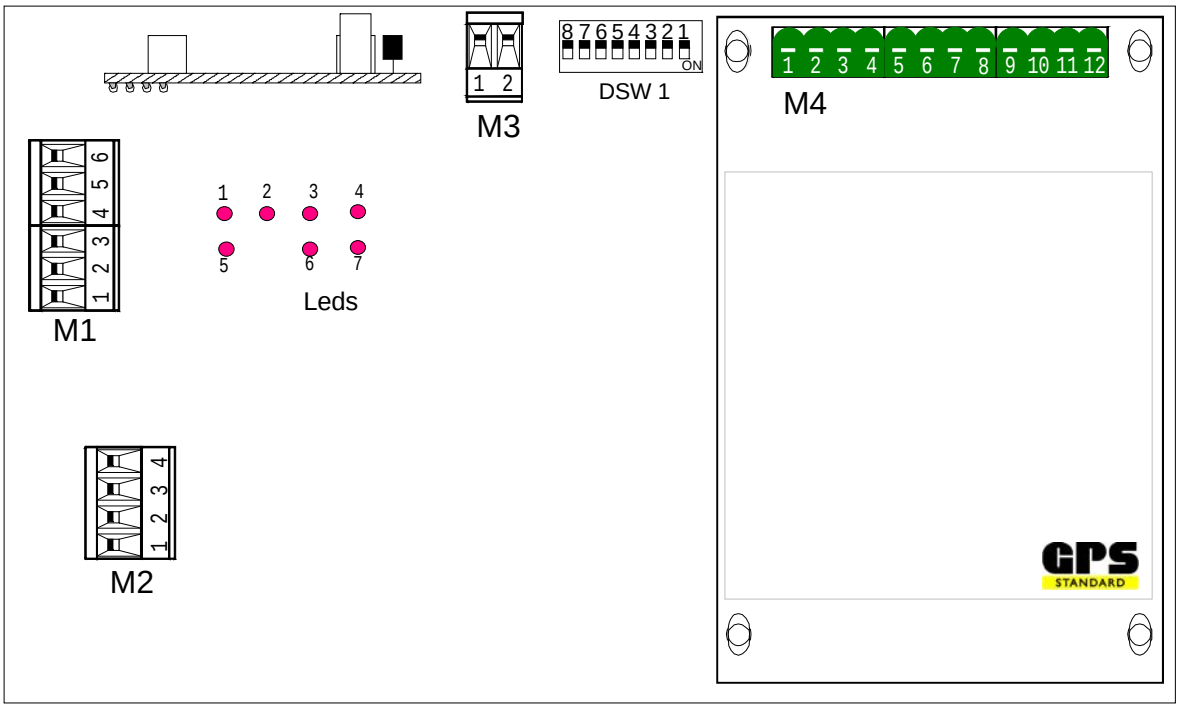
b) Universal Communications Processor (UCP)

Comprises: the **Power Supply**, **Analyser Unit**, and the **Relay Cards**.
Allows the collection of the alarm signals and is usually installed within the area to be protected, but it is also possible to install it remotely.
The **DPS** system can manage up to 64 peripherals (**Analysis Concentrators**) all connected to a single cable. At each concentrator are connected a GPS and RFC sensor which together creates a sensitive zone **3m** wide and up to **200m** long (2 x 100m zones).

DPS Multiplex SYSTEM (art. PDPS2002)

The **DPS Multiplex System** is designed to be integrated into a **Multiplex 2000** system, an interconnection system which, using a single Data Cable (art. **PUCP2115**), can connect up to 64 Sensors to a single **Universal Communications Processor** (**UCP**), which can manage and output the signals provided by the sensors using the Relay Cards (art. **PUCP2005** and **PUCP2006**). In this system the management of the sensors, up to 5km from the **UCP**, is by a software package running in the **Windows® 95/98/2000/NT** environment (art. **PUCP2000SW**). It is possible to control all of the sensor parameters as well as monitoring and recording the signals generated by the sensor and updating sensor firmware, etc.…
The main board is designed to accommodate an optional board, which can provide local inputs and outputs (art. **PCPS2002**).
The **Multiplex 2000** System, because of the distance from the UCP to the sensors, uses a power supply of **48** Vdc (minimum). The **DPS** sensor has an internal board, which generates the 12Vdc required for normal operation.
The Dip-Switch **DSW1** (1-6) assigns the unique address used to communicate with the UCP to which it is connected (see Table 1).

The Leds **1**, **2**, **3**, **4**, **6** and **7** provide indications as described below and dependent on the setting of switches 7 and 8 of Dip-Switch **DSW1**, as shown in Table 2. Leds 1, 2, 3, 4 **DO NOT** give alternative indications, whereas leds 6 and 7 can give indications of the communications traffic to and from the PC.
All of the operating parameters can be varied using the management software and, by short circuiting link P1 for at least 1 second it is possible to reset all the parameters back to the factory defaults.



Terminals M1 (Serial Communication Line)

6 = [**COM_A**] Serial Communications (COM115) to UCP (or previous sensor)
5 = [**COM_B**] Serial Communications (COM115) to UCP (or previous sensor)
4 = [**COM_A**] Serial Communications (COM115) to Next Sensor
3 = [**COM_B**] Serial Communications (COM115) to Next Sensor
2 = [**GND**] Screen
1 = [**+12V**] Power Supply +12V

Terminals M2 (Power Supply)

1 = [**+55V**] Positive Power Supply Input (55Vdc)
2 = [**GND**] Negative Power Supply Input (55Vdc)
3 = [**GND**] Negative Power Supply Input (55Vdc)
4 = [**+55V**] Positive Power Supply Input (55Vdc)

Terminals M3 (Tamper Input)

1 = [**GND**] Negative
2 = [**TAMPER**] Tamper Input N.C.

Terminals M4 (Signal Input and power supply for GPS sensor)

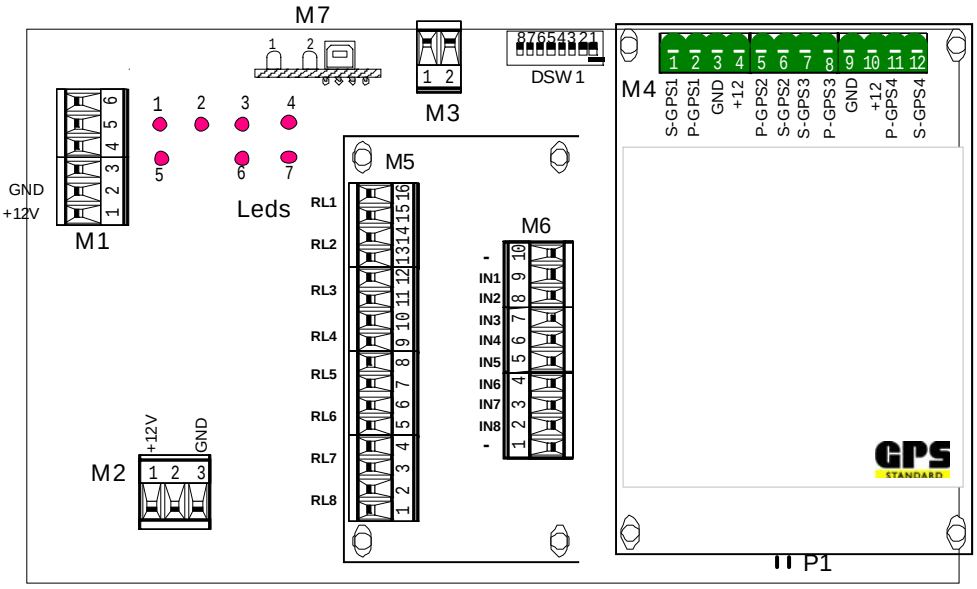
1 = [**Ch1**] Signal Input GPS Ch1
2 = [**P-Ch1**] Pressure ch1
3 = [**-**] Negative Power Supply to GPS sensor
4 = [**+**] Positive Power Supply to GPS sensor
5 = [**P-Ch2**] Pressure Ch2
6 = [**Ch2**] Signal Input GPS Ch2
7 = [**Ch1**] Signal Input RFC zone 1
8 = [**Cmd1**] Positive Command RFC
9 = [**-**] Negative Power Supply to RFC Sensor
10 = [**+**] Positive Power Supply to RFC Sensor
11 = [**Cmd2**] Command Output RFC
10 = [**Ch2**] Signal Input RFC zone 2.

Link P1 (Set to default)

Leds (Indicators)

1 = Pre-alarm channel **A**
2 = Alarm channel **A**
3 = Alarm channel **B**
4 = Pre-alarm channel **B**
5 = Power supply
6 = Pressure low channel **A** / transmitted data line COM115
7 = Pressure low channel **B** / received data line COM115

DPS Stand – Alone (USB version)



Terminals M1

6 = [**N.U.**] Not Used
5 = [**N.U.**] Not Used
4 = [**N.U.**] Not Used
3 = [**N.U.**] Not Used
2 = [**GND**] Screen [Not Used]
1 = [**+12 VDC**] Auxiliary power supply 12 VDC [Not Used]

Terminals M2 (Power Supply)

1 = [**+12V**] Positive Power Supply Input (nominal 12Vdc)
2 = [**N.U.**] Not Used
3 = [**–**] Negative Power Supply Input (nominal 12Vdc)

Terminals M4 (Signal Input and power supply for GPS sensor)

1 = [**Ch1**] Signal Input GPS Ch1
2 = [**P-Ch1**] Pressure ch1
3 = [**-**] Negative Power Supply to GPS sensor
4 = [**+12**] Positive Power Supply to GPS sensor
5 = [**P-Ch2**] Pressure ch2
6 = [**Ch2**] Signal Input GPS Ch2
7 = [**Ch1**] Signal Input RFC Ch1
8 = [**CMD1**] Signal Input CMD1
9 = [**-**] Negative Power supply to RFC sensor
10 = [**+12V**] Positive Power supply to RFC sensor
11 = [**CHD2**] Out signal CMD2
12 = [**Ch2**] Signaò input RFC Ch2

Terminals M3 (Tamper Input)

1 = [**–**] Negative

2 = [**TAMPER**] Tamper Input N.C.

Terminals M5 (Local Relay Outputs)

1, 2 = [**RL8**] NC contact with 22 Ohm series resistor.
3, 4 = [**RL7**] NC contact with 22 Ohm series resistor.
5, 6 = [**RL6**] NC contact with 22 Ohm series resistor.
7, 8 = [**RL5**] NC contact with 22 Ohm series resistor.
9, 10 = [**RL4**] NC contact with 22 Ohm series resistor.
11, 12 = [**RL3**] NC contact with 22 Ohm series resistor.
13, 14 = [**RL2**] NC contact with 22 Ohm series resistor.
15, 16 = [**RL1**] NC contact with 22 Ohm series resistor.

Terminals M6 (Local Logic Inputs)

1 = [**–**] Negative
2 = [**IN8**] Logic Input **8** (NC)
3 = [**IN7**] Logic Input **7** (NC)
4 = [**IN6**] Logic Input **6** (NC)
5 = [**IN5**] Logic Input **5** (NC)
6 = [**IN4**] Logic Input **4** (NC)
7 = [**IN3**] Logic Input **3** (NC)
8 = [**IN2**] Logic Input **2** (NC)
9 = [**IN1**] Logic Input **1** (NC)
10 = [**–**] Negative

Terminals M7 (USB Connector B type)

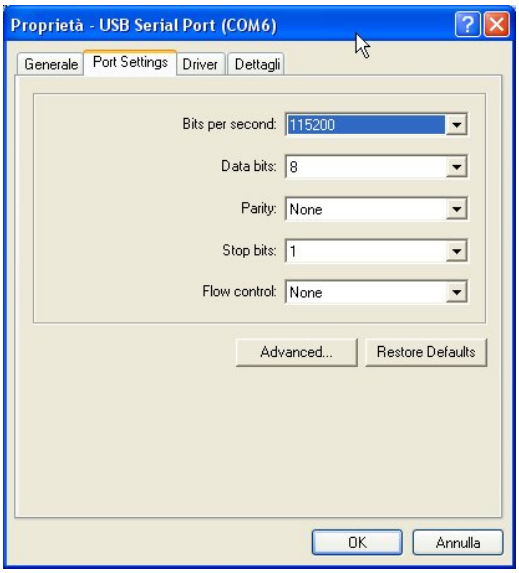
1 = [] Led TX
2 = [] Led RX

DPS Concentrator (USB Version)

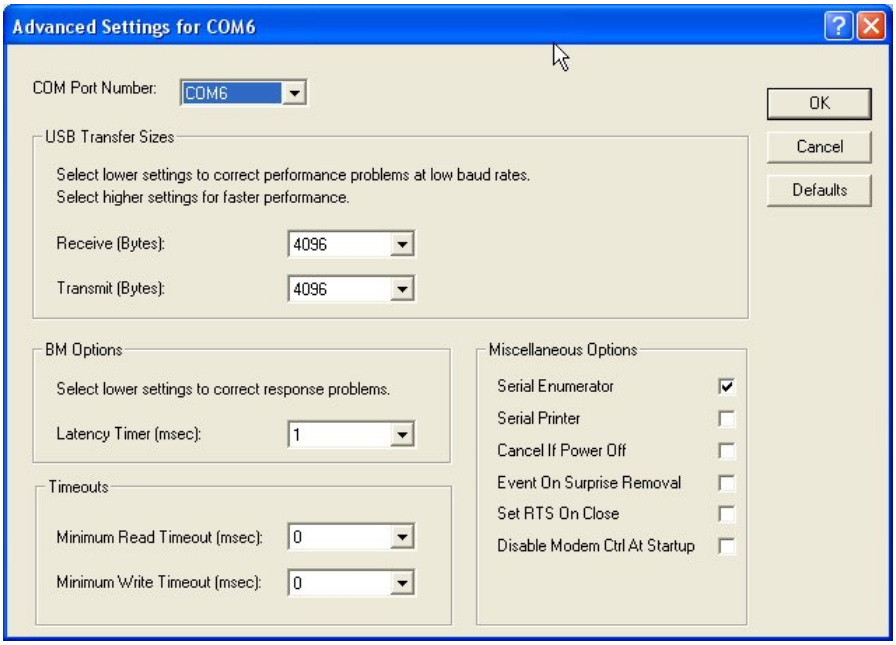
In the USB version the connection between analyzer and PC occur through USB cable supplied.

For system parameters setting, it is necessary to connect a computer to analyser with the software Multiplex 2000.

To connect the DPS SA analyzer to PC please use a USB cable. The drivers for the USB port are located on the Multiplex2000 software installation CD.
Switch on the PPS analyser, and then connect the USB cable between analyser and PC. Follow the instructions to install the USB port drivers by selecting the USB DRIVERS folder on the CD. At the end of the driver installation, please open the Control Panel, select System. Open Hardware and Peripheral management.
Select Serial Port (COM and LPT), open it and select “Port Setting”.

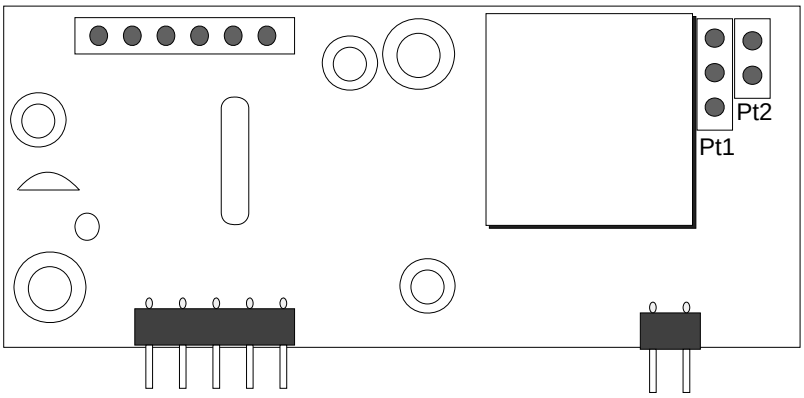


Selecting “Advanced” will display the next window:



Verify that “Latency Timer” is set to 1 msec

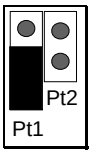
COMMUNICATION "*COM115*" LINE TERMINATION



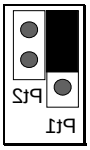
To ensure reliable operation of the COM115 communications it is necessary to terminate the line using links PT1 and PT2 on the small communications board located close to M1.

There are two possible scenarios:

1. The sensor is located between 0 and 3 Km from the UCP and it is the last one in the line: terminate PT1 and PT2 as shown in the following figure:



2. The sensor is located between 3 and 5 Km from the UCP and it is the last one in the line: terminate PT1 and PT2 as shown in the following figure:

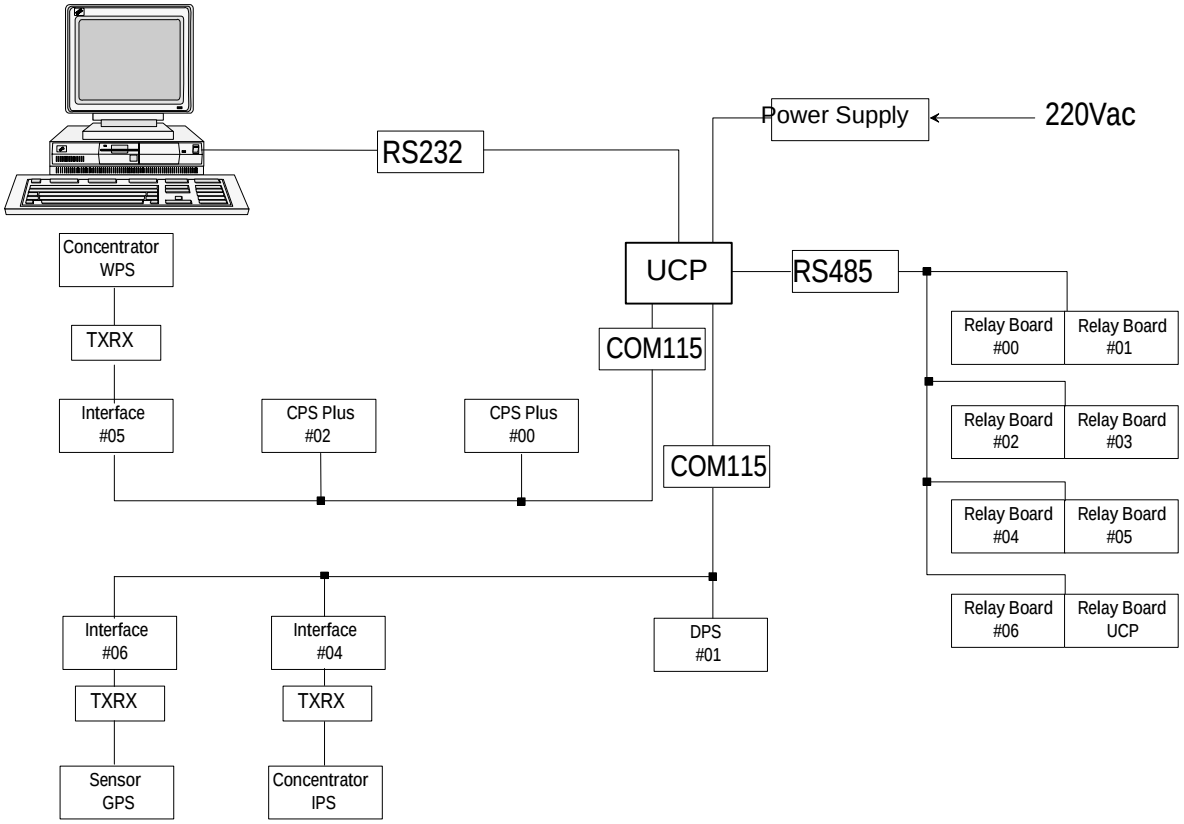


For more details see the *UCP Installation Manual.*

GPS “Communication 115” (COM115) Serial Line

The high speed communication line, called “Communication 115”, between the peripherals and the UCP has allowed an increase in the number of sensors that can be managed and gives a very quick system response in the event of an Alarm or Pre-alarm.

The presence of two seperate communication ports means that the maximum distance covered by the system can be increased to 10 Km (5Km + 5Km)



Example of a **Multiplex 2000** system with one UCP, Relay Boards, two COM115 connected to DPS Sensors, GPS PLUS sensors, RFC sensors, CPS PLUS sensors and, using an interface, to IPS, WPS and GPS sensors.

Dip-Switch Sensor Address Selection

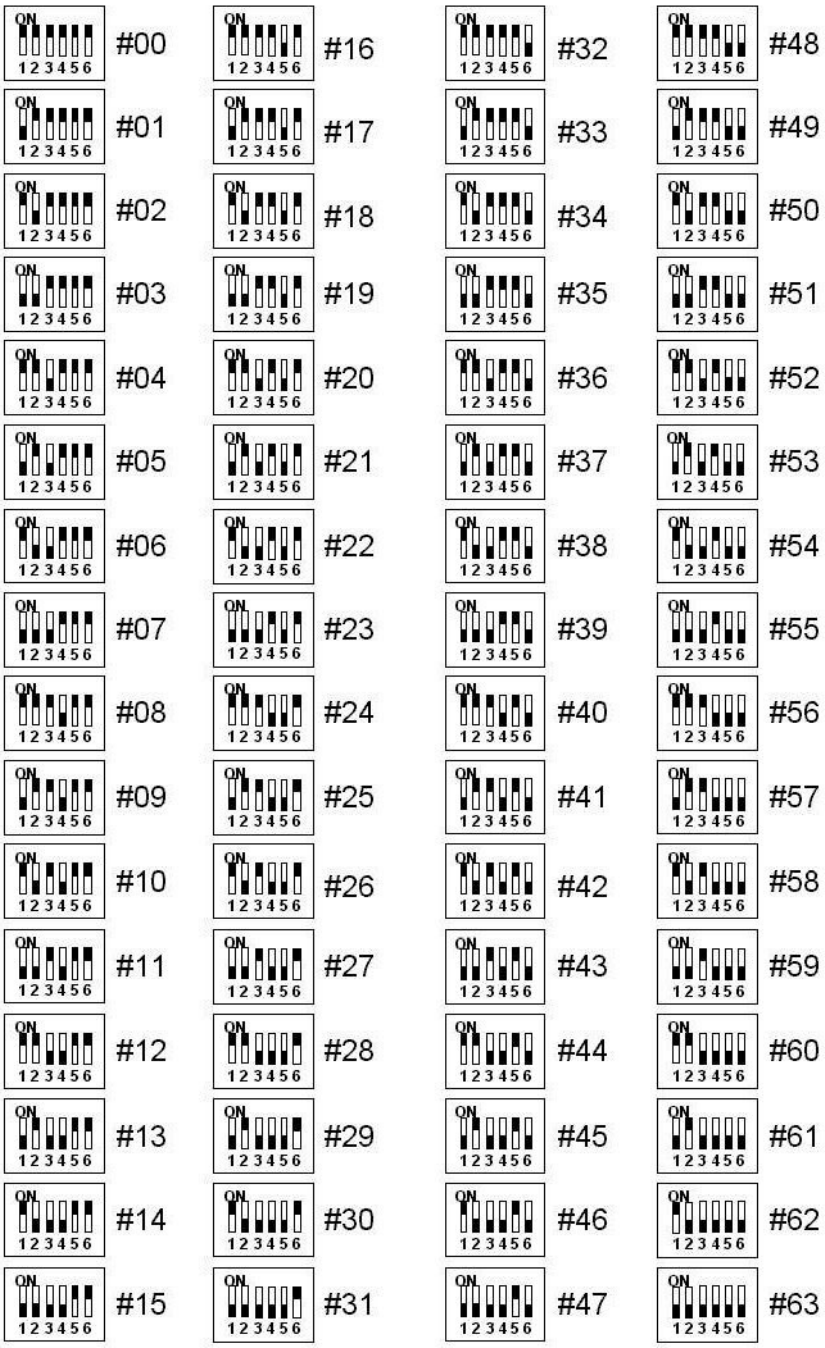
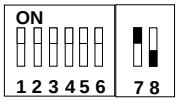


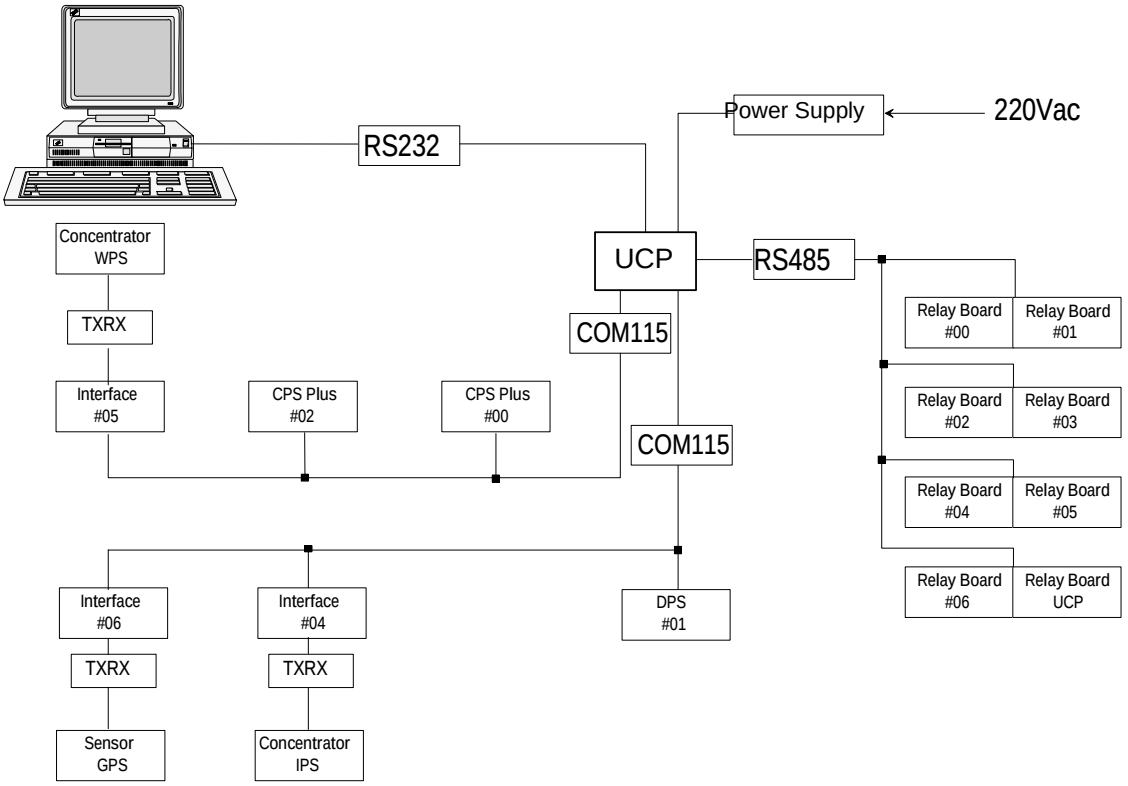
Table 1

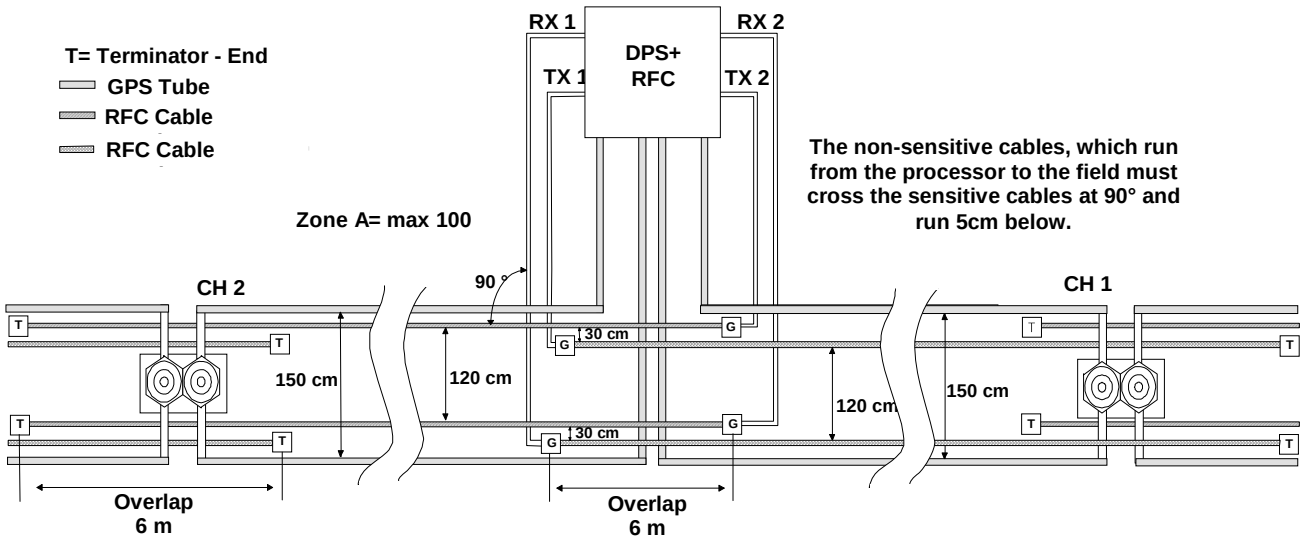


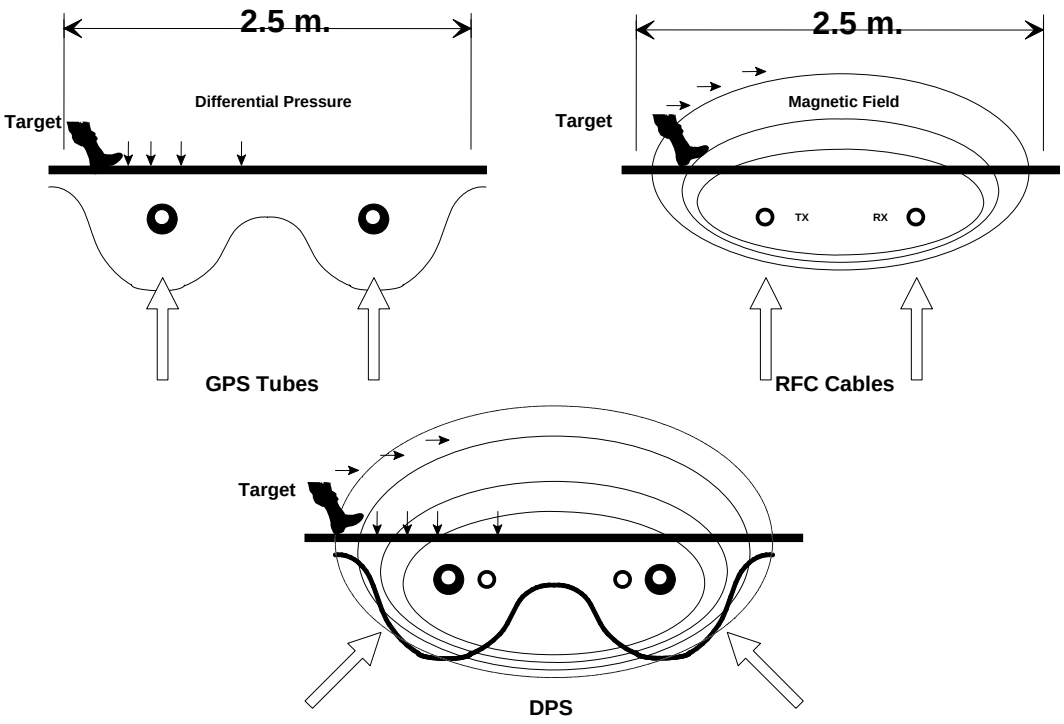
Selecting the switches 7 & 8 on the Dip – Switch as shown in the figure make it possible to view the data traffic on the COM115 line connected to the sensor:

Led n°6 = Transmit Data **Led n° 7 = Receive Data**

DPS System Connections







DESIGN and INSTALLATION DPS SYSTEM

Site preparation

Site analysis

The following checks on the site where the tubes and the cables will be buried are required.

- Walk along the tube and cable routes.
- Check for any obstacles along the tube and cable route.
- Check the distances from any obstacles.
- Check with a metal detector if there are metal objects in the ground.

Define the route for the cables to where the Analysis Concentrator is to be installed.

Preparation and Positioning for RFC Cables and GPS tubes

The tube and cable positions depend on the ground type:

- Soft (soil, gravel,...)
- Hard (cement, asphalt,...)

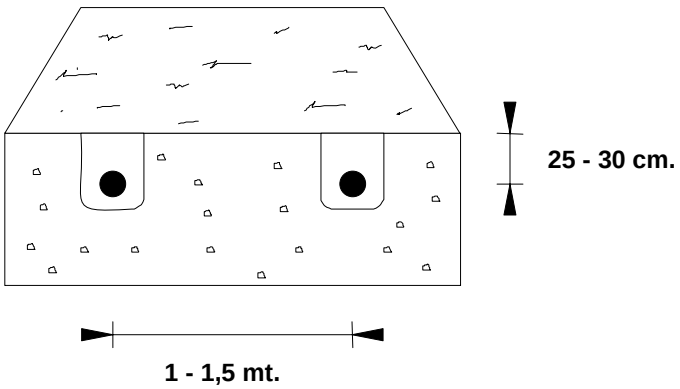
The installation method for the two systems will be shown separately, in detail.

- Design and installation for **GPS** section
- Design and installation for **RFC** section.

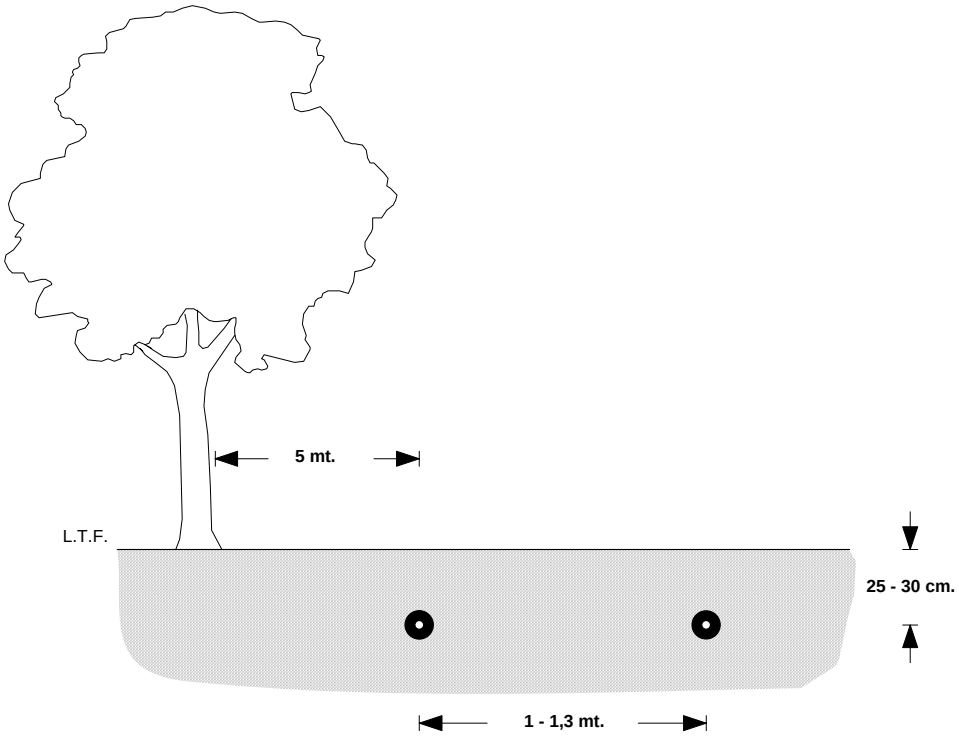
The GPS System

How to decide on the route for the trench.
The sensing tubes must be positioned as far as possible from trees with large trunks, which, in strong winds, can produce abnormal signals from the roots. If it is impossible to avoid these trees it is necessary to install a small wall/partition to contain the growth of the roots (see fig. 8, 9, 10). The trenches must be parallel throughout the route and have a maximum distance apart of 1.5 m with a depth of 25 – 30 cm.
The 2 tubes of one zone must be of equal length.
If the route of the perimeter is curved (for example, around a circular building) it is obvious that the path of the inner tube will be shorter than the outer tube. To overcome this it is necessary to cross the trenches at a convenient point around the perimeter so that the inner tube becomes the outer tube and vice-versa.

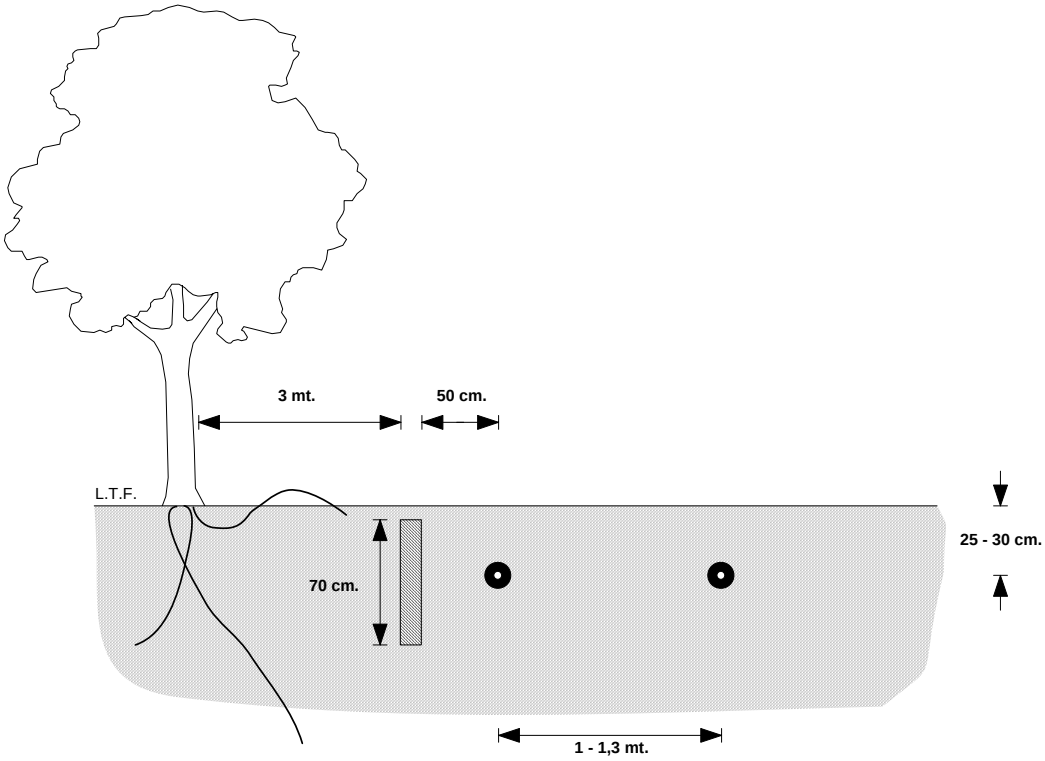
N.B. as was shown earlier the RFC cables MUST remain parallel and NOT be crossed in this way.



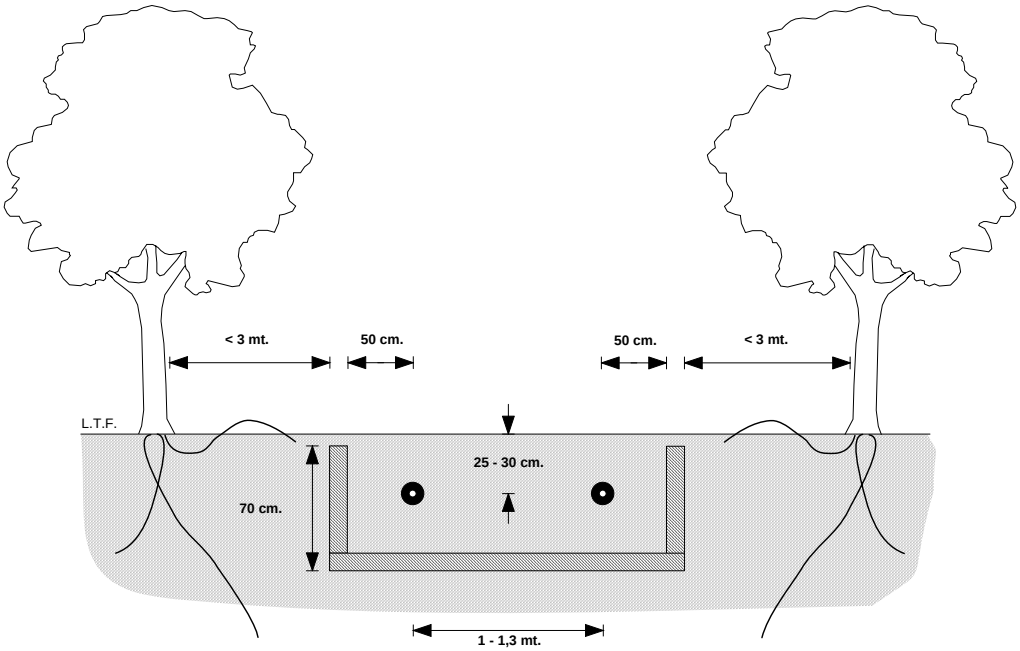
The next picture shows the distances, depth and GPS tube installation methods near medium and large trunk trees.



The GPS near medium and large trunk trees



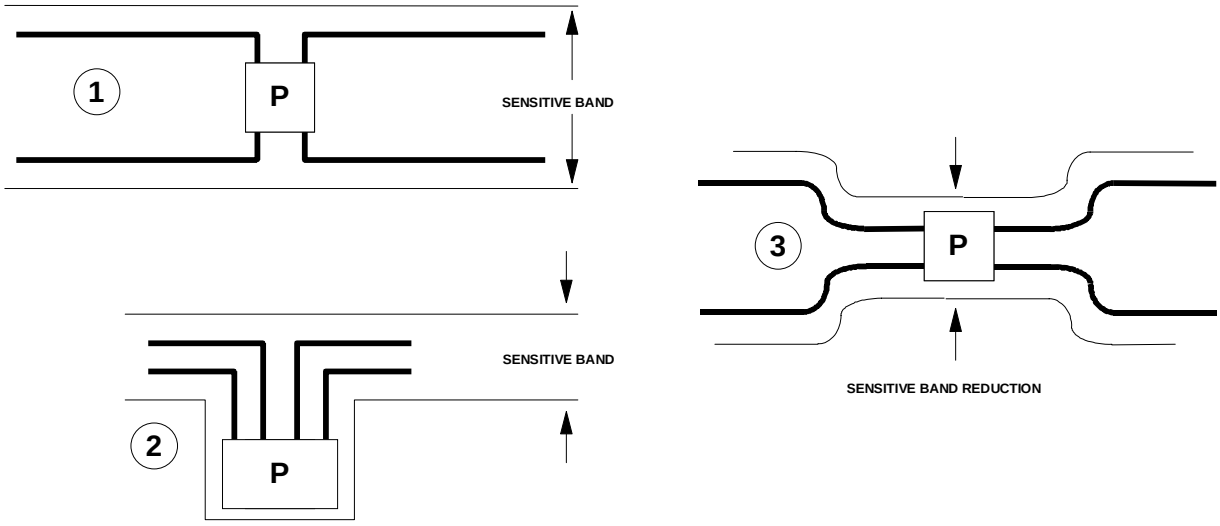
Partition for containing roots



Partition for containing roots in case of parallel trees.

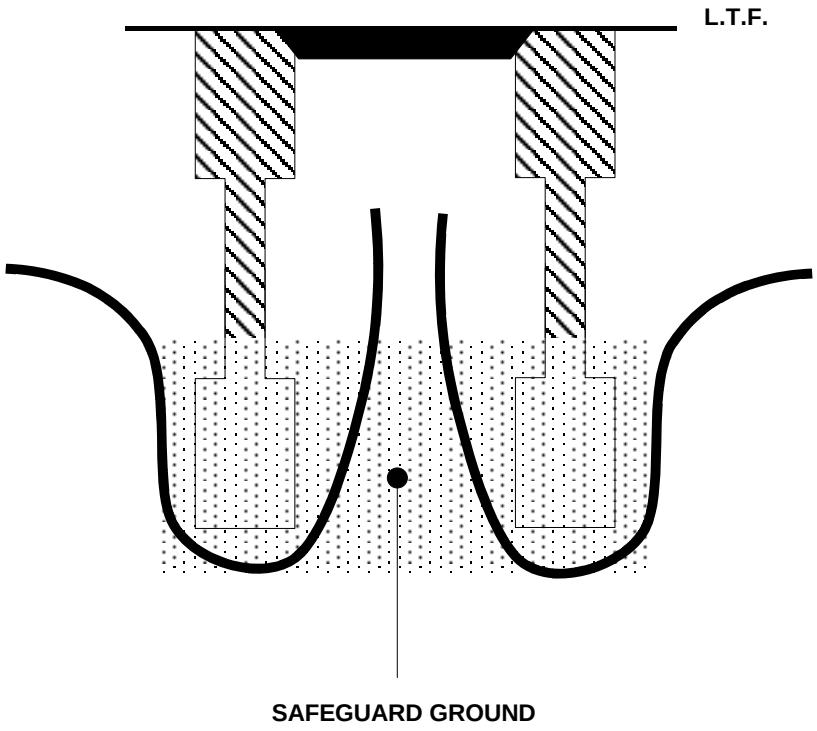
Pit Positioning

The choice of the pit positions is very important if in the area where they are proposed there are regular interference signals (railways, airports, main roads, etc.) that can put strong signals into the ground. In these cases the pits for the sensors must be placed so that the two zones of protection are an equal distance from the source of the interference.
Where the terrain is not level, in order to simplify the flushing of air from the tubes, it is recommended that, if possible, the sensor pit be at the highest point of the perimeter.
The sensors and valves can be placed in pre-fabricated plastic or cement pits with a minimum internal dimension of 40cm x 40cm.



How to enter the Pits with GPS tubes.

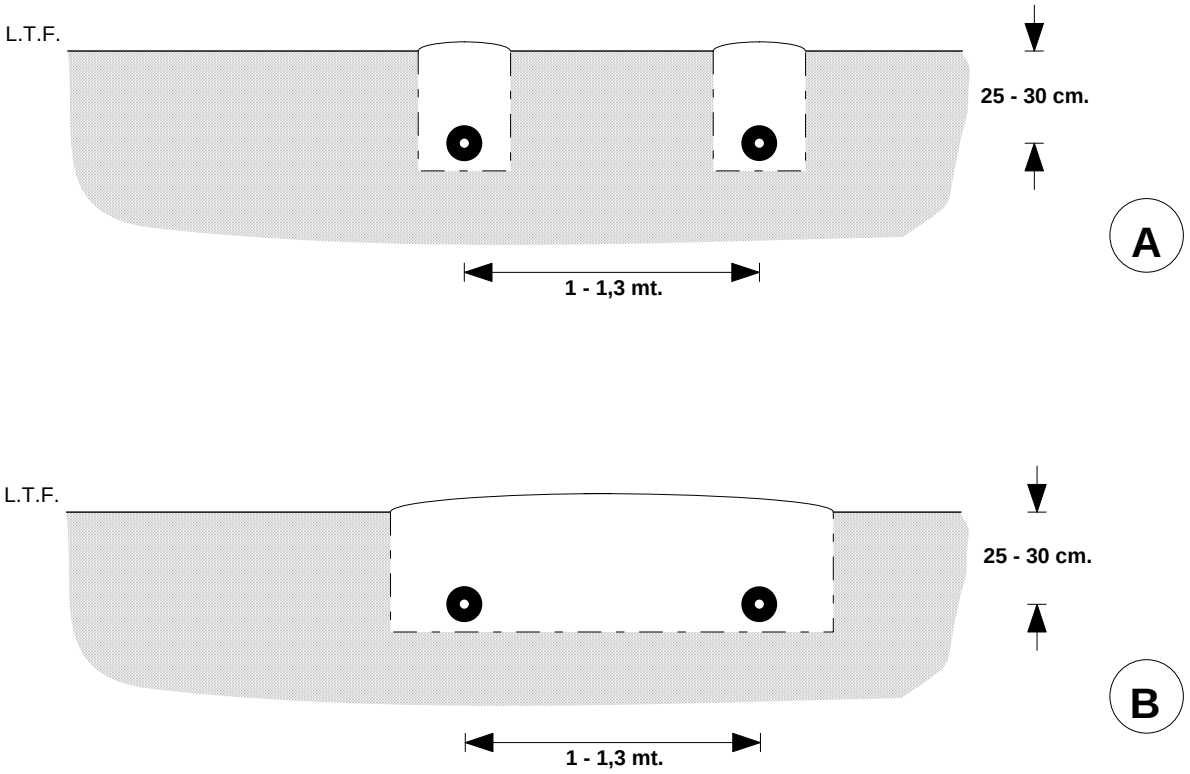
1) Normal condition;
2) Cofiguration to increase the protection area to greater than 3 metres.
3) **Poor** configuration; near the pit there is a reduced sensitive band.



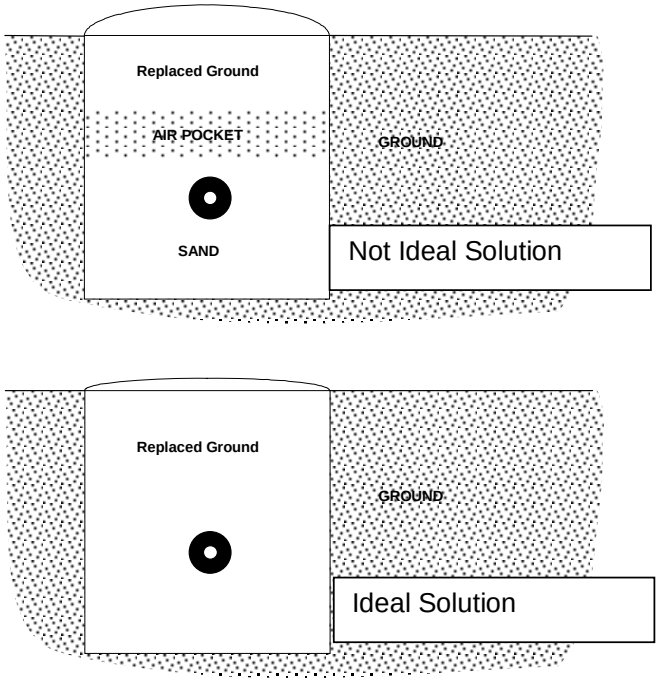
How to cut the trenches

No special considerations are required. It is sufficient that the two trenches are as parallel as possible with a maximum distance between them of 1.4m and a reasonably constant depth of between 25 – 30 cm.

If the installation area is infested with animals (such as moles, mice, etc.) it is necessary a de-infest the area.

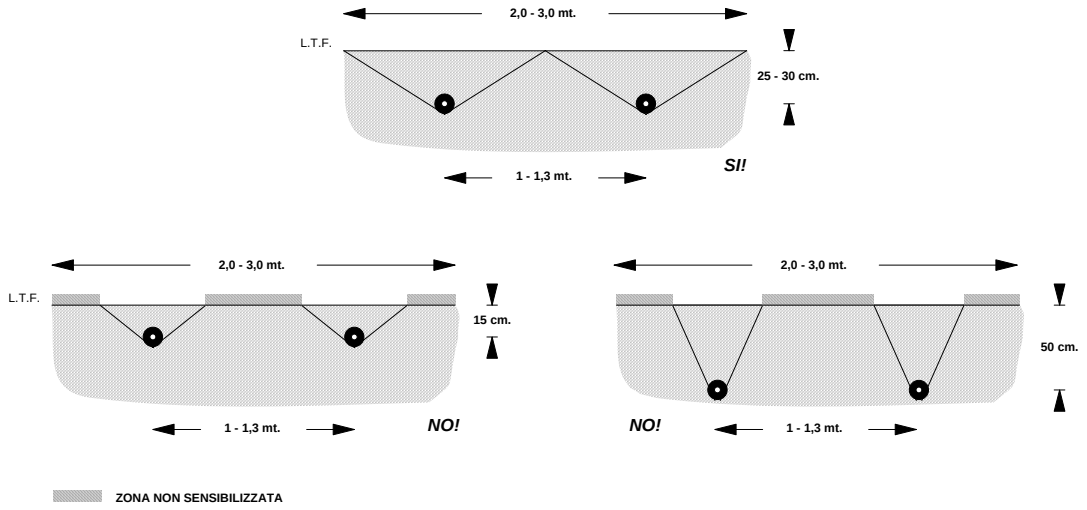


A single trench **B** is preferable to a double trench **A**, because the mass of ground to be made good is greater, which allows a quicker settlement time and a more even sensitivity in the early stages.

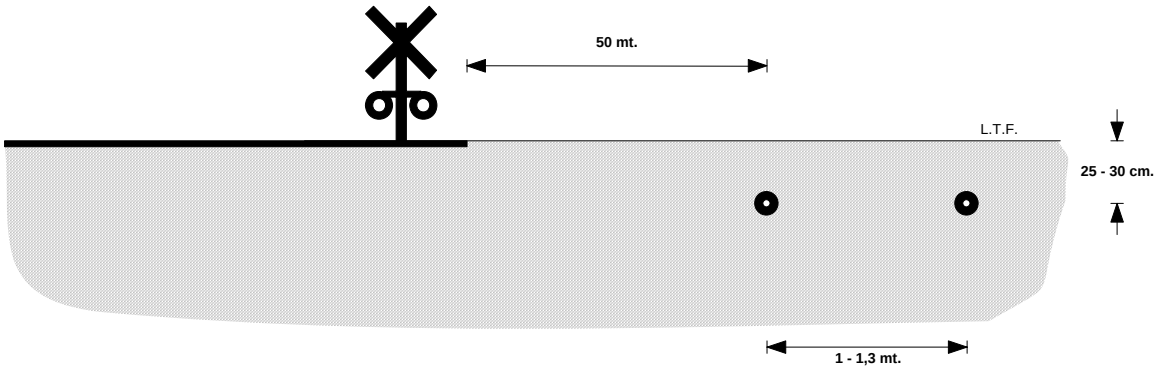


First solution (not good):
The hydroscopic characteristics of sand, when thawing, could create an air pocket, de-sensitizing the system (during extremes of temperature).

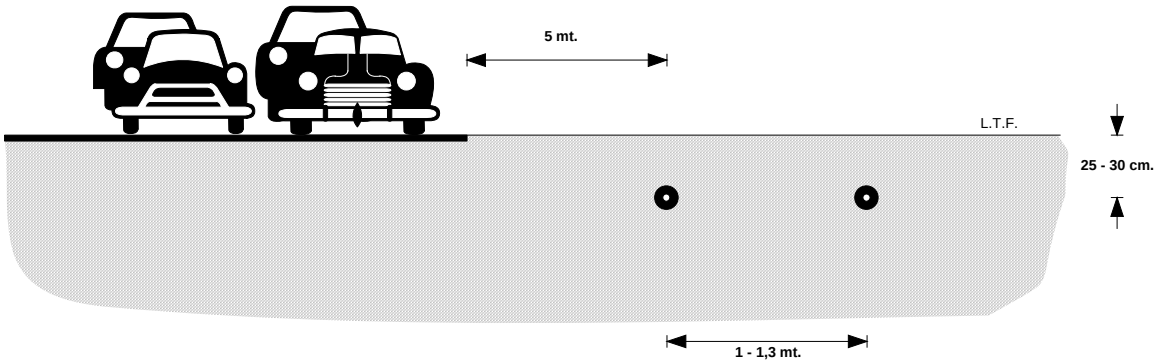
Second solution (best):
Before backfilling the trenches, ensure that there are no sharp stones or objects that could damage the tubes. Fill the trenches with the same material that was previously taken out to ensure homogeneous ground.



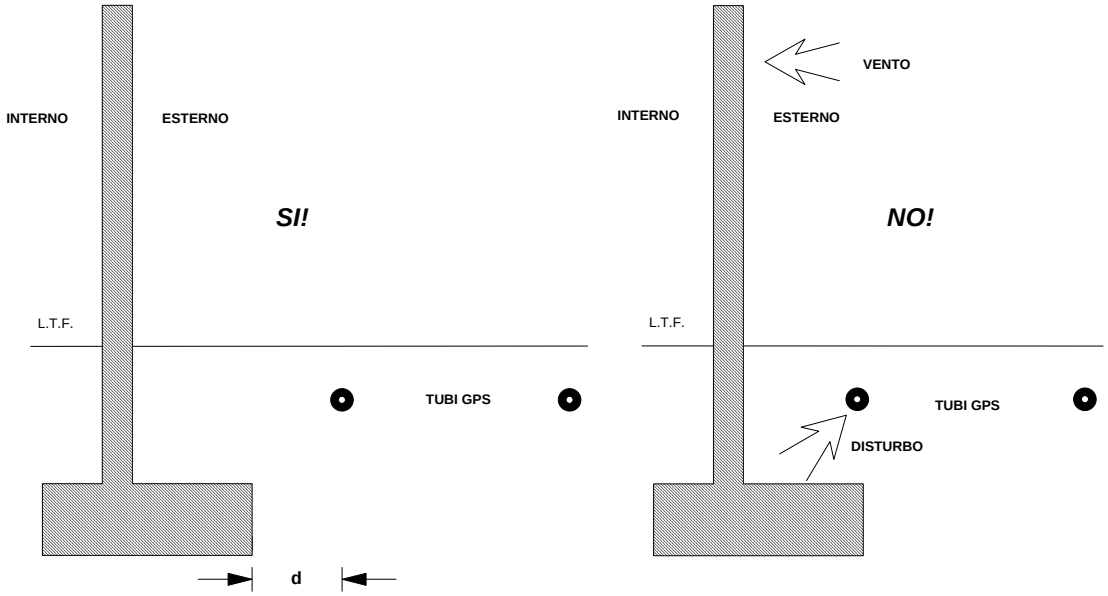
Depth and distance of GPS Tubes



The GPS system near a railway
*(The minimum distances railway truck-GPS tubes are **50 m**)*

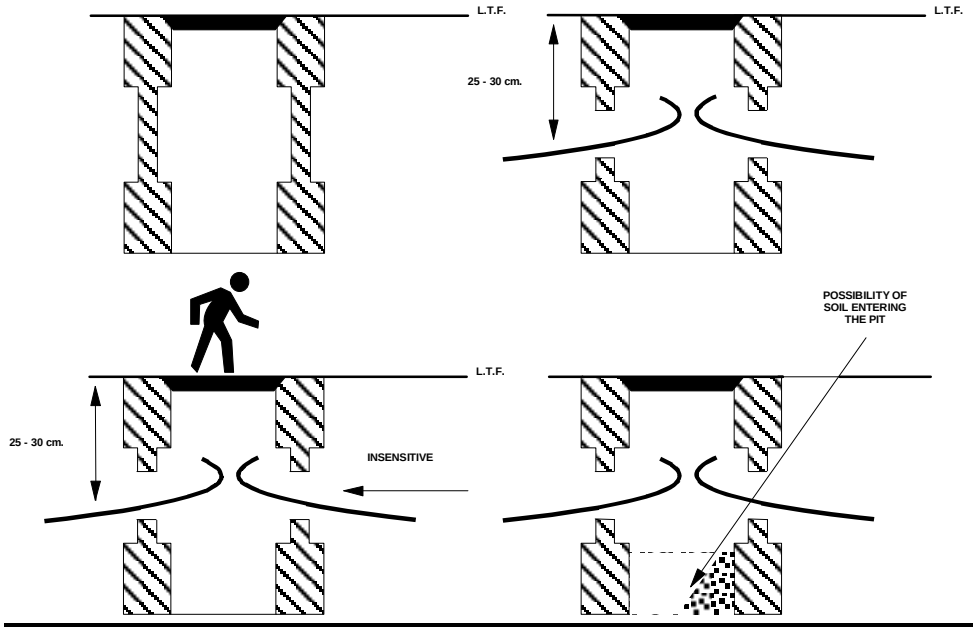


The GPS System near very busy road

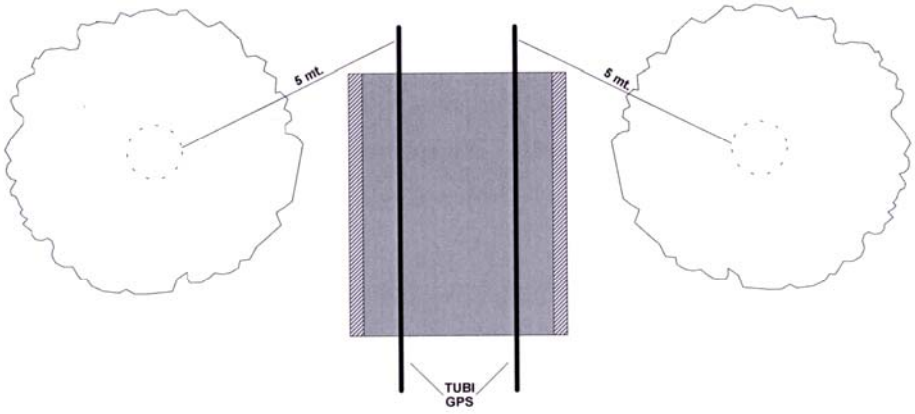


Noise from pre-fabricated structures

The distances "**d**" depend on the pre-fabricated height (sail effect). The pre-fabricated oscillation from its base can produce noise.



How to entry in the pits with the GPS tubes



Top view of GPS tubes

For convenience the installation procedure is divided into two phases.

The first phase is the positioning of the sensing tubes, temporary pressurisation of the system, complete covering of the trenches without connecting the sensor.

The reason for this is to avoid any damage to the sensor during the backfilling of the trenches.

The second phase, after positioning the RFC cables, is to connect the sensor, pressurise the system and then complete all the civil works, making the DPS System ready for operation.

TUBE PRESSURISATION

Tube pressurisation requires the use of the pump:

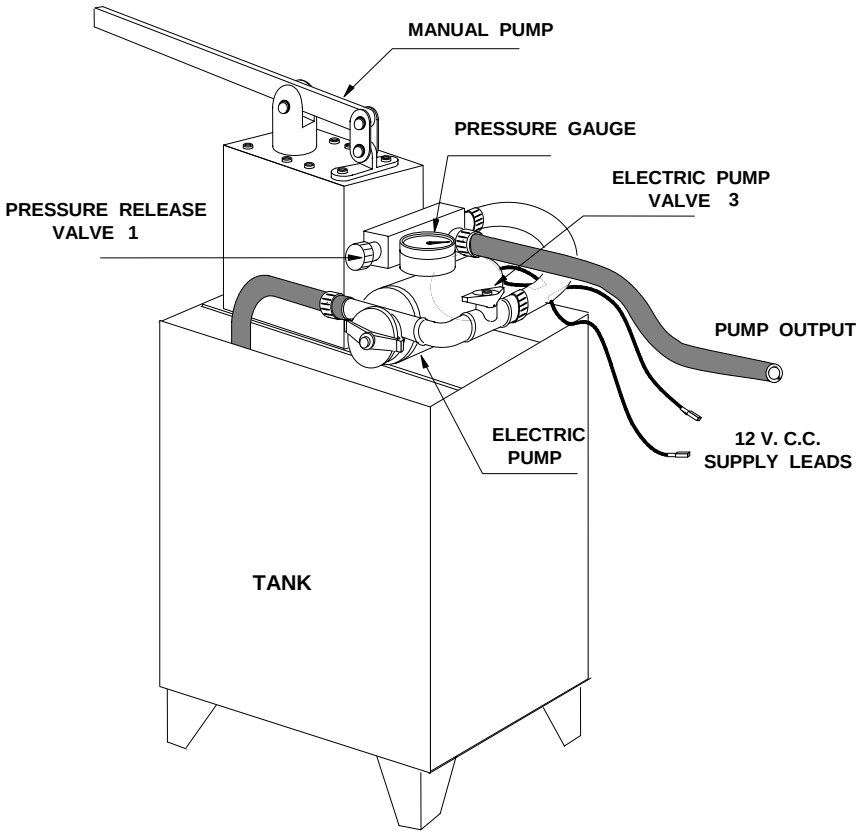


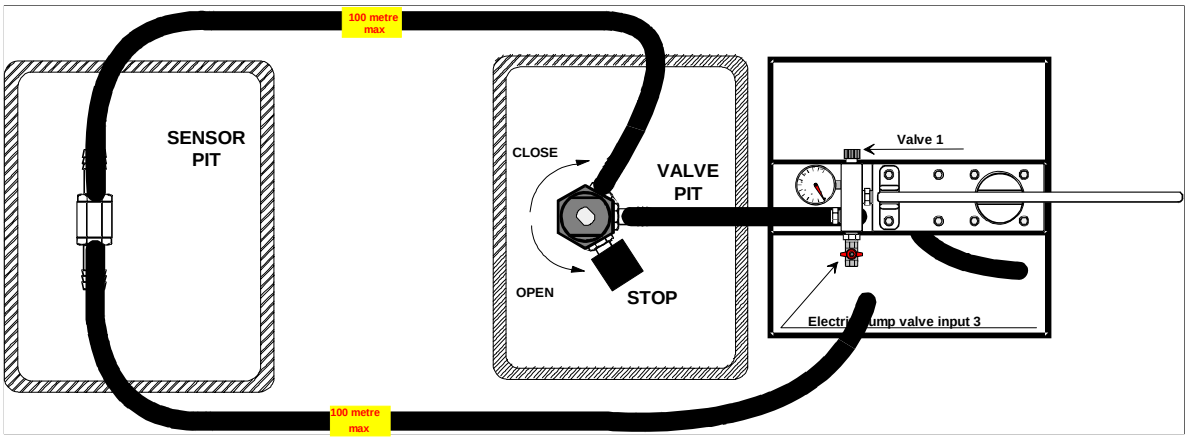
Fig. 1 (Pump)

Once all the tubes are placed in the trenches ensure that all the lengths for any one zone are the same.

If required, lay the sensor cable alongside the tubes.

Ensure that the tube has no sharp bends or kinks, which would prevent liquid, flow and also ensure that no stones or earth enter the ends of the tube.

Within the pit where the sensor is to be fitted, join Tubes 1 - 2 using GPS600 tube joints.



In the pit at the opposite end, connect tube 1 to inlets I1. Block inlet I4 with blind-end tube stops. The tube stops can be made of 15mm copper tube, blocked and fitted into a short length of GPS tube. Always use the tube clips provided.

Fill the pump tank to the top with water and Glycol in the appropriate mixture. This will be enough liquid to completely fill a 100 metre, two tube zone (both tubes).

Before connecting the pump to the system, it is always necessary to purge both the electric and manual pumps of air.

Close the electric pump valve (3) and the pressure release valve (1).

Operate manual pump until liquid flows evenly from the pump outlet. (To conserve liquid, this flow can be re-directed into the pump tank).

Open the electric pump valve (3).

Operate the electric pump briefly until liquid flows evenly from the pump outlet.

Switch off the electric pump and close the valve (3).

The pumps are now purged of air.

Connect the pump outlet to the Inlet IR on the valve.

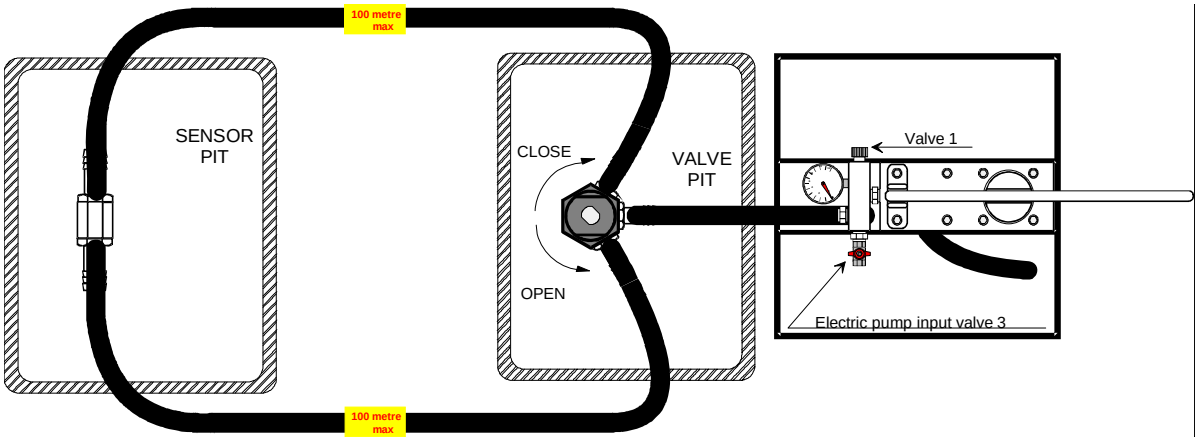
Place the ends of the tube 2 into the pump tank ensuring that the ends are below the level of the liquid. In this way a complete loop have been created, formed by Tubes 1 and 2. The loop start, via the valves from the pump tank and return to the pump tank.

Open the electric pump valve (3). Activate the electric pump (12v DC). After a few seconds, air will start to bubble out of the ends of the tubes 4.

Maintain the flow until fluid starts to come out of the end of tube 4. This can take some 20 - 30 minutes for a full length zone and will be signalled by a significant reduction in the bubbles rising to the surface of the pump tank.
Ensure that at no time does the level of liquid in the tank fall below the pump inlets, as this would suck air into the system.

Continue the circulation until no more bubbles are evident in the flow from Tube 4. This can take as long as 30 - 45 minutes and it is desirable to shake and tap the tubes and valves to prevent any trapped air.

Loosen and remove the tube stop connected to the valve inlet I4 and block this temporarily by hand. Remove Tube 4 from the pump tank and connect to valve inlet I4. Keeps the electric pump operating throughout.



Shut electric pump valve (3) and switch off the electric pump. Manually pump the system to approximately 5 ATM, indicated on the pump pressure meter.

Check all the tubes and joints for leaks.

Open the pressure reduction valve 1 and allow the pressure to reduce to 1 ATM. Close valve 1.

Close the GPS compensating valve but do not over tighten.

Open pressure reduction valve (1) and allow the pressure in the pump/valve connections to reduce to 0. Remove the tube from the valve inlet IR and cover the inlet to prevent ingress of stones, soil etc.

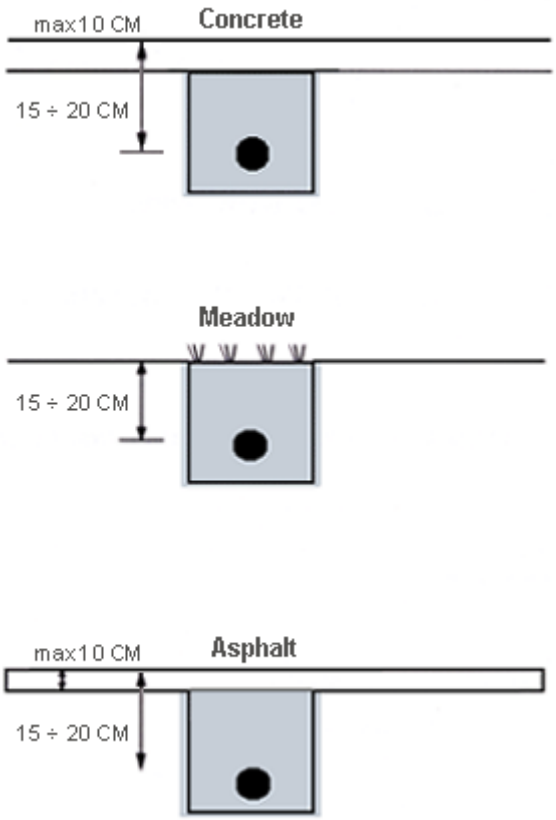
The tubes are now pressurised and the steps 2.9.1 – 2.9.19 should be repeated for the tubes associated with the second zone.

Back-filling can now take place.

RFC SYSTEM

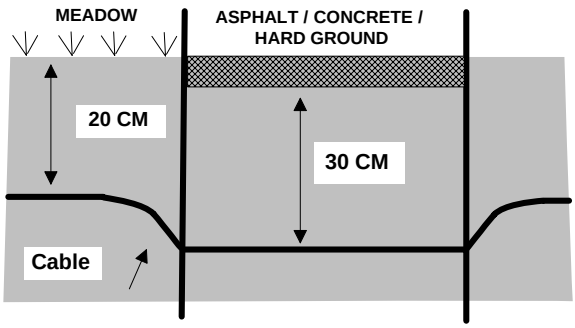
RFC SYSTEM LAYOUT

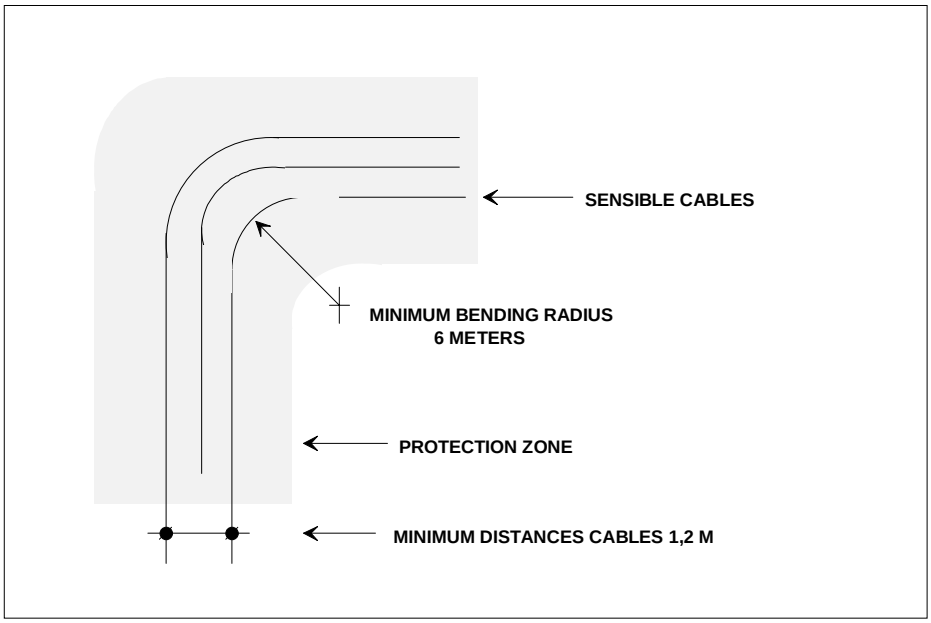
The two cables must be buried at different depths, depending on the type of ground under which they are buried and at a distance of about 1.2m apart.



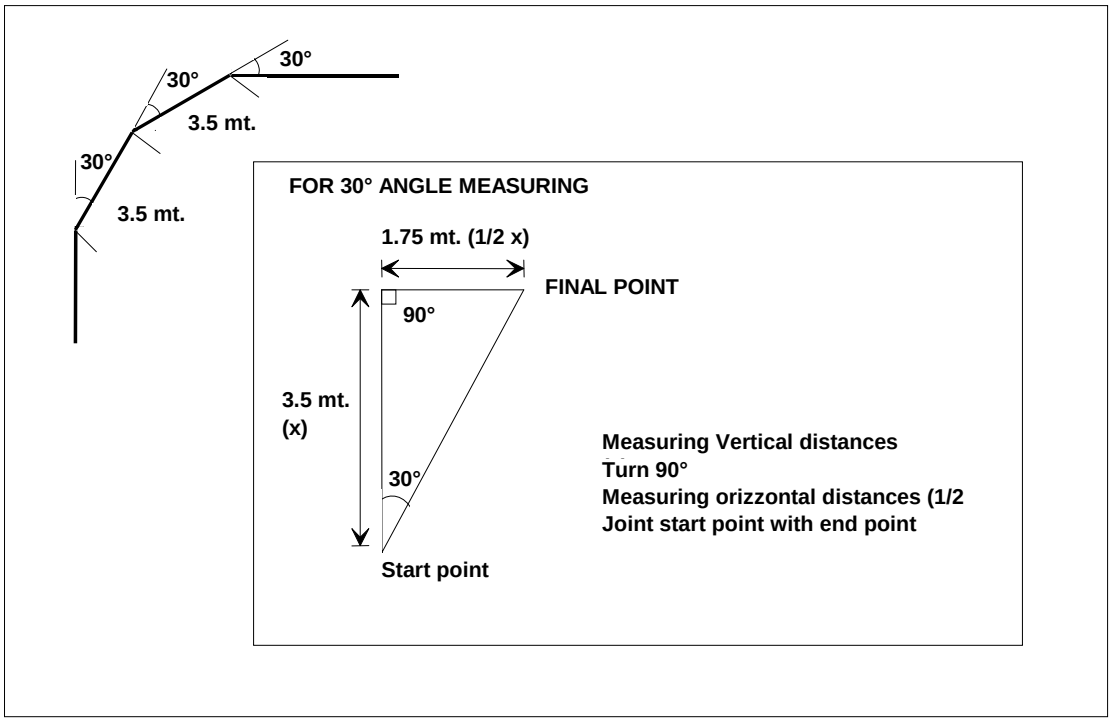
The surface must be constant throughout the whole zone. The two cables can be installed in whatever mode shown. Change of direction must have radius of curvatures less 6 m.

If there is a transition between meadow or soft ground and hard ground (asphalt, concrete) it is necessary follow this picture:





If the curve is to be in concrete or asphalt, it should be laid out as shown below:



Distance From Obstacles

Objects that can constitute a false alarm risk are:

1. Fixed metal objects (e.g. fences, lamp standards);
2. Buildings
3. Moving objects;
4. Temporary objects;
5. Surface water (puddles, streams);
6. Underground tubes and conductors;
7. Power lines

When defining the route for the RFC cables, ensure these objects are removed.

1. Fixed Metal Objects

The DPS must not be installed close to objects like metallic fences or light poles.
The distance will depend on the type of object and the type of ground.
The objects, which cause the most false alarms, are those subjected to oscillations (Metallic mesh, specially if not plasticized).
Rigid structures are less dangerous and it is possible to install the cables closet, whilst maintaining a minimum distance.

The following table establishes the minimum distances from various types of significant objects.

TYPE Of OBJECT	**SURFACE**		
	Soft (sand)	*Asphalt*	*Hard (soil or concrete)*
Very rigid structure, intermittent electrical switching (e.g. *Metallic fence with concrete posts, metallic lamps and pillars).*	3 metres	2.5 metres	2.5 metres
Rigid structure that moves less than 1.3cm at a height of 2.5m above the ground in strong winds (*tensioned structure for example a welded mesh fence).*	3.5 metres	3 metres	3 metres
Other categories of rigid structure (e.g. *Chain link fences, welded mesh fences).*	5.5 metres	4.5 metres	3.5 metres

2. Buildings

If the cables are installed too close to a building all the movements inside the building may be detected. The RF field can pass through all types of wall except metallic panels. Metallic objects inside the building may cause false alarms.
If the cables are parallel to the building it is possible to apply the same considerations as used for the rigid structures.
If the cables are perpendicular to the building allow at least 7 metres.

The integrity of the RFC field cannot be guaranteed when the sensitive zone is too close to an object, when the object can cause interference and generate false alarms.

3. Moving Objects

The distance will depend on the type of ground.

TYPE Of OBJECT	SURFACE		
	Soft (sand)	*Asphalt*	*Hard (soil or concrete)*
Moving Metal Object (e.g. *cars, bicycle, trucks)*	5.5 metres	5.5 metres	5 metres

4. Temporary Objects

Objects such as cable drums, piles of wood, wires and tubes are a probable cause of false alarms.
It is possible that they will distort the shape of the RFC field and generate an irregular sensitive area.
It is therefore advisable to position any such objects at least 1.5m from the RFC cables.

5. Surface Water

Standing water (puddles, swimming pools, ponds) also constitute a false alarm risk. Make sure there is adequate drainage throughout the area where the cables are to be installed and that the water cannot accumulate along the length of the cable. Maintain a distance of at least 1.5m from all standing water.

6. Underground Tubes and Cables

Buried tubes, cables and conductors can distort the sensitive field if adequate distance is not maintained between them and the RFC cables.
Suitable distances are shown in the following table:

TYPE of TUBE or CABLE	SECTION	MINIMUM DISTANCE
Metallic	Up to 10 cm	3 cm if parallel to the RFC cables
	Above 10 cm	5 cm if perpendicular to the RFC cables
Non metallic containing flowing water	Up to 10 cm	50 cm
	Above 10 cm	1 meter
Non metallic containing pressurized water	Up to 10 cm	15 cm if parallel to the RFC cables
		5 cm if perpendicular to the RFC cables

The distance specified applies to a tube or cable situated above or below the RFC cables.

6. Very Hard Ground

In very hard ground it is advisable to contact CENTRAL CUSTOMER SUPPORT at GPS:
Tel: +39 0125.96.86.11
Fax: +39 0125.96.60.43
e-mail: gpscom@gps-standard.com

for an analysis of the situation and a personalized solution for each problem.

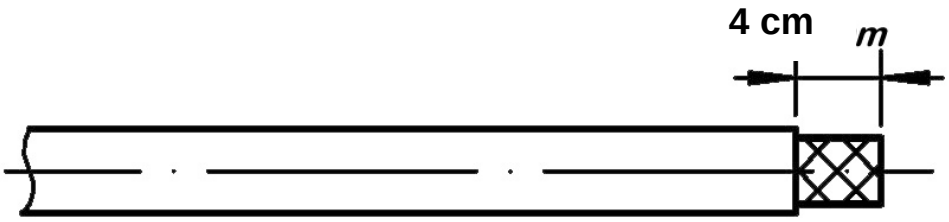
Sensitive Cable PRFC2001

Joint Kit PRFC2007

In order to maintain a constant distance between the two sensitive cables at the end where they arrive at the transmitter/receiver **PRFC2005**, it is necessary to make a joint between the sensitive cable **PRFC2001**and the non-sensitive cable **PDPS2120**.

1) Place the heat-shrink tubing on one of the two cables.

2) Strip the cable for 4 cm. As shown in the following figure:



3) On the RFC cable fold back the braid and remove the aluminium foil screen.

4) On the non-sensitive cable fold back the first braid, remove the aluminium screen, fold back the second braid and remove the second aluminium screen.

5) Strip the central conductor of the two cables for 2 cm.

6) Solder the two central cores together as shown in the following photograph.

7) Insulate the soldering with the vulcanised tape to the same diameter as the insulation.

8) First replace the first braid of the non-sensitive cable so that it covers the uniformly the whole of the joint area.

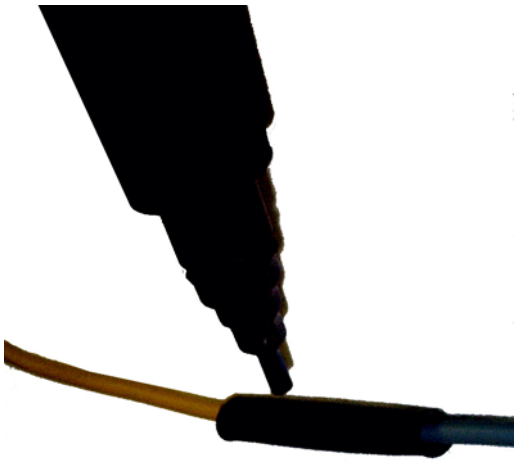
9) Cut any excess length of the braid and replace the braid of the sensitive cable over the first braid of the non-sensitive cable.

10) Replace the second braid of the non-sensitive cable over the two previous braids (see photo).

11) Link the various braids using solder, avoiding overheating with the iron.

12) Re-cover, with the aluminium foil removed from the cable, the braid area of the two cables and cover with vulcanised tape, overlapping at least half the tape width on each turn.

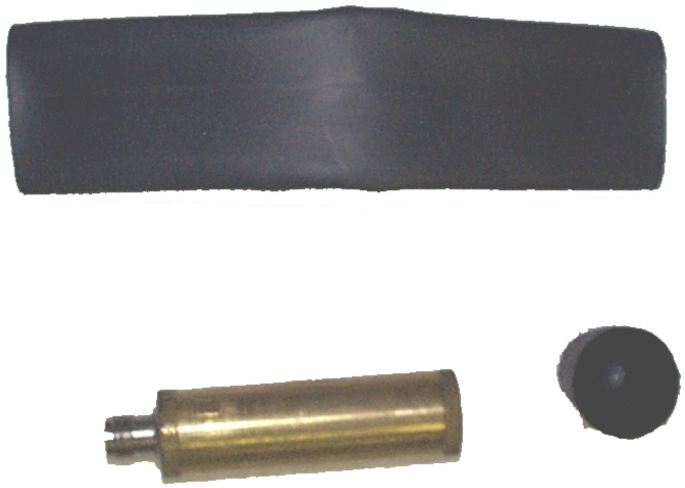
13) After positioning the heat-shrink over the joint, heat it until it is completely shrunk on to the joint.



14) The result should look similar to that shown in the following photo:

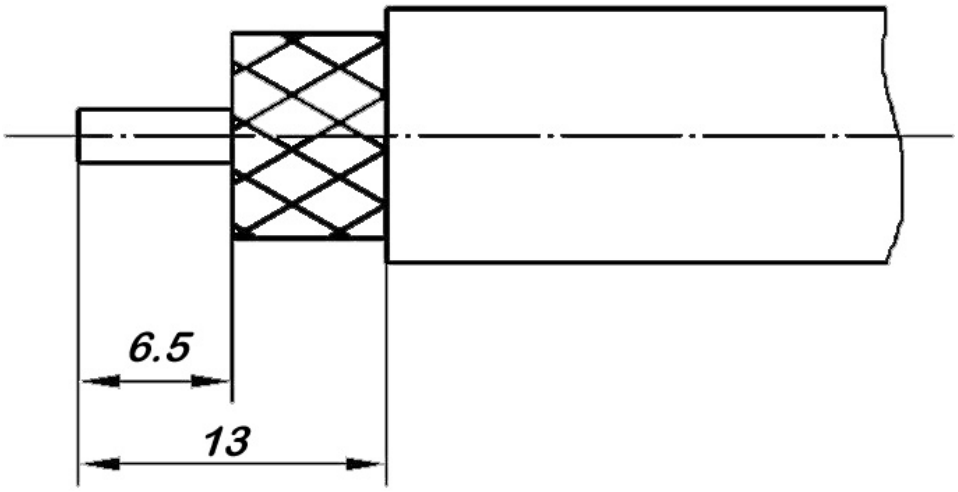
Termination Kit PRFC2006

To ensure correct operation of the completed system each zone (max 100m of sensitive cable) must be terminated with the appropriate kit PRFC2006.



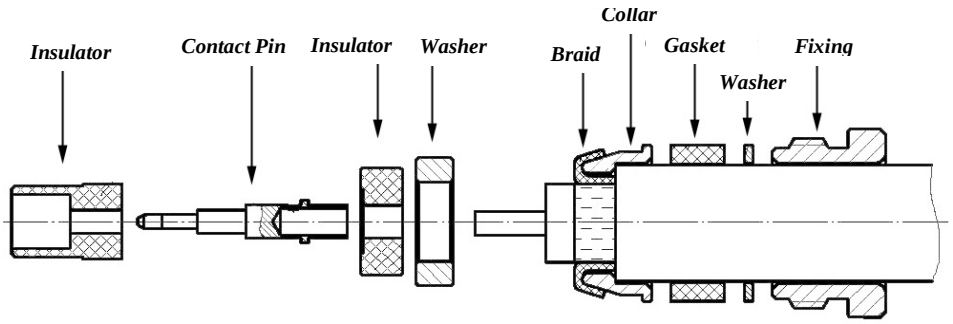
1. Mounting connectors on the sensitive cable PRFC2001 and on the non-sensitive cable PDPS2120

   a. Strip the cable for **13mm** as shown in the following figure:



b. Place the components of the connector in the following order:
   - Fixing;
   - Washer;
   - Gasket;
   - Collar;

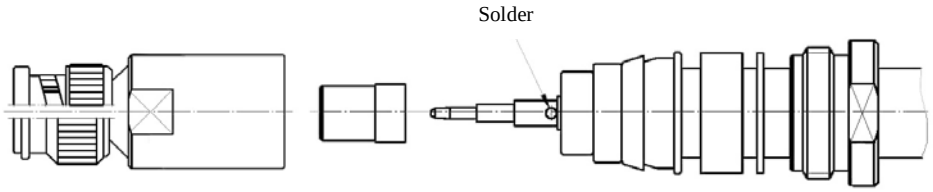
   Pull back the braid behind the collar as shown in the figure:



c. Solder the braid to the collar making sure that the overall dimensions are not increased too much.

d. Place the two washers on the central contact of the connector.

e. Solder the connector contact pin to the central core of the cable.



f. Place the insulator on the central contact.

g. Place the cable inside the body of the connector and screw the fixing until it is tight.

h. Check that there is no short circuit between the central contact and the external body of the connector.

1. Place the heat shrink on the cable.

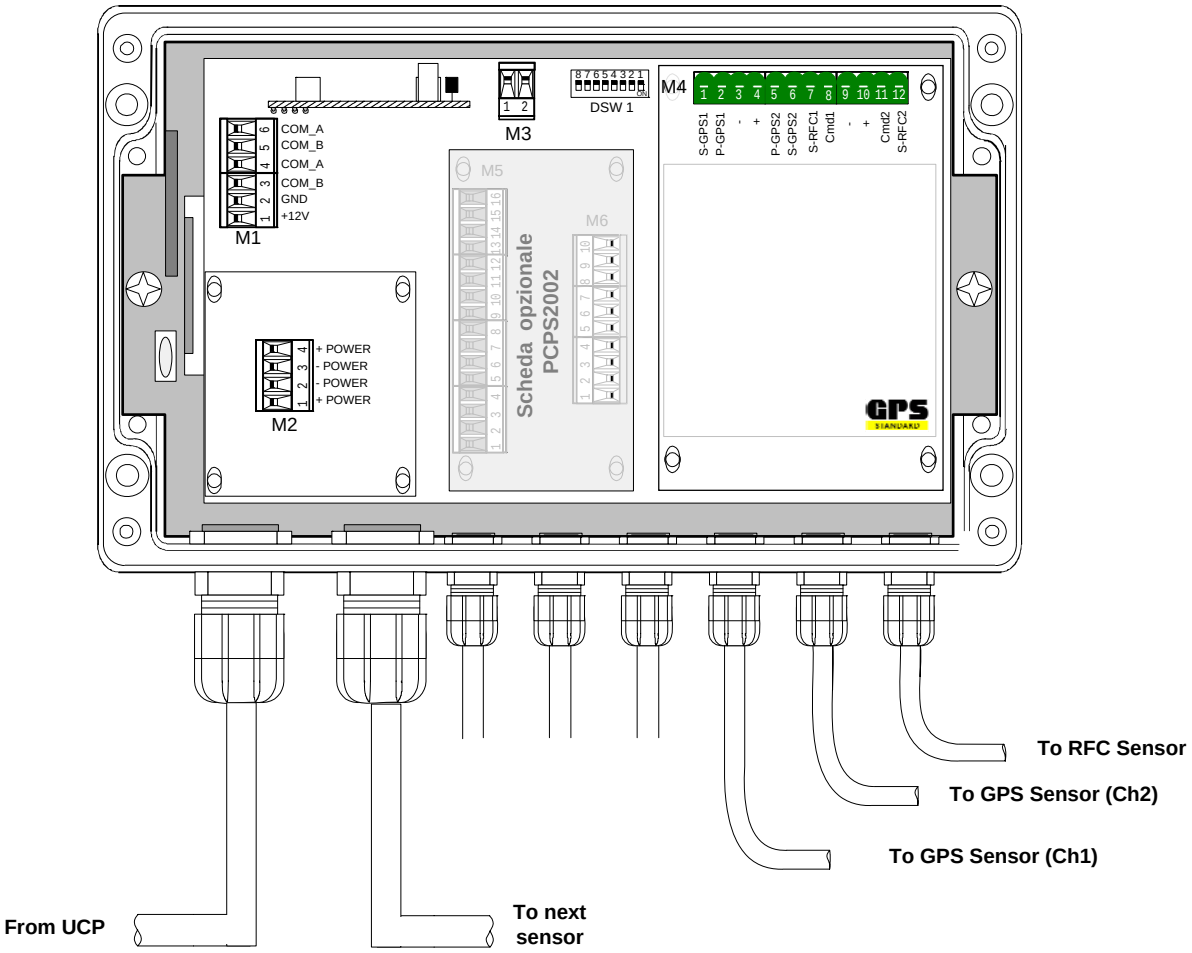
2. Lock the termination on the cable connector.

3. Cover the termination and connector with vulcanised tape, overlapping at least half the tape width on each turn:

4. After positioning the heat shrink over the termination heat it until it is completely shrunk:

5. The result should look similar to that shown in the following photo:

System Connections for PDPS2002



M1

6	**COM_A**	Communication (COM115) from UCP or pervious sensor
5	**COM_B**	Communication (COM115) from UCP or pervious sensor
4	**COM_A**	Communication (COM115) to next sensor
3	**COM_B**	Communication (COM115) to next sensor
2	**GND**	Screen
1	**+ 12V**	Power Supply 12V (Power supply output)

M2

4	**+55V**	Positive Input power supply (55Vdc)
3	**–**	Negative Input power supply (55Vdc)
2	**–**	Negative Input power supply (55Vdc)
1	**+55V**	Positive Input power supply (55Vdc)

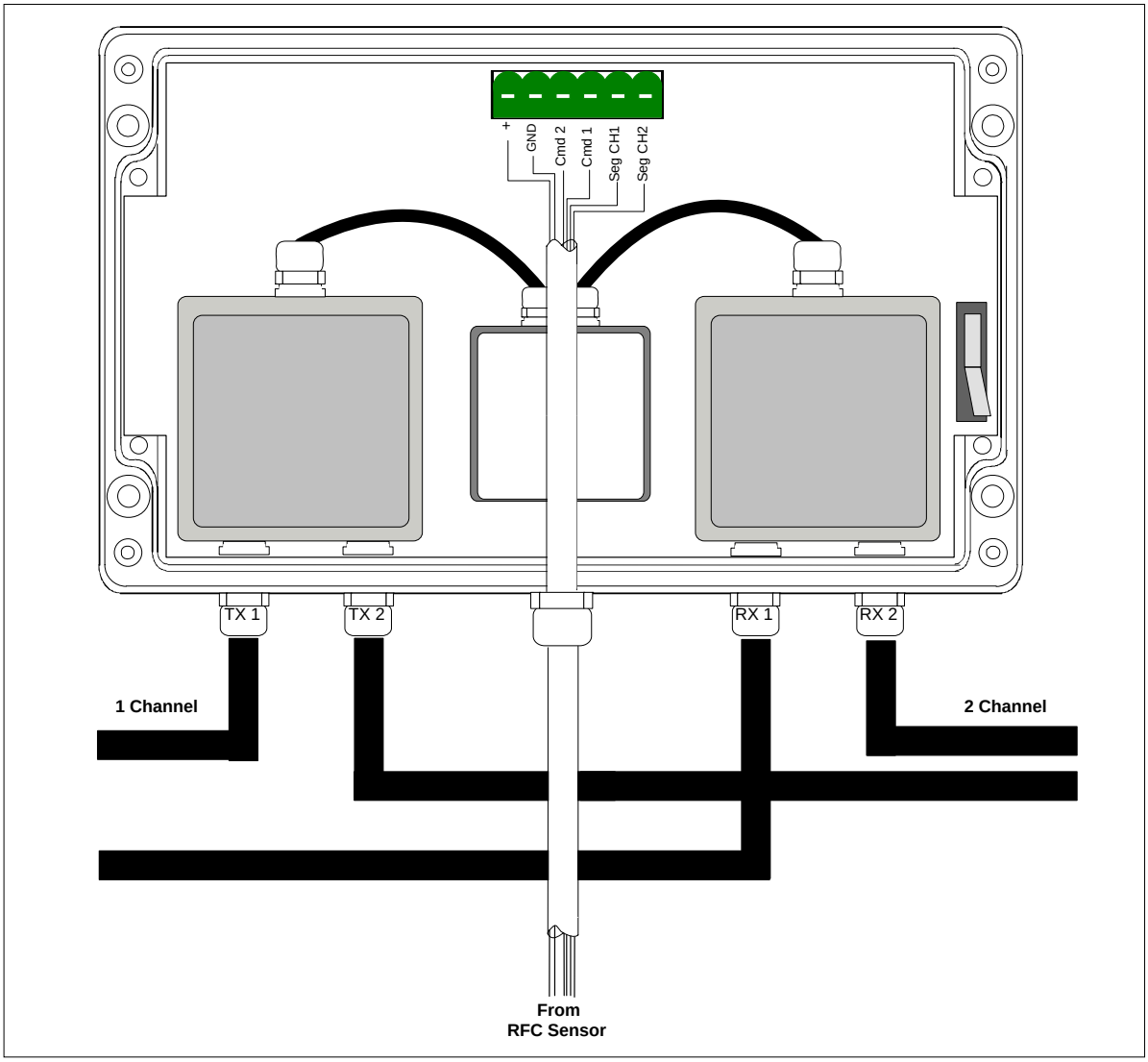
M3

1	**GND**	Ground
2	**Tamper**	Tamper Input N.C.

M4

1	**S-GPS1**	Signal Input GPS Ch1
2	**P-GPS1**	Pressure Input GPS Ch1
3	**-**	Negative Power supply for GPS Sensor
4	**+**	Positive Power supply for GPS Sensor
5	**P-GPS2**	Pressure Input GPS Ch2
6	**S-GPS2**	Signal Input GPS Ch2
7	**S-RFC1**	Signal Input RFC zone 1
8	**Cmd1**	Command 1 RFC
9	**-**	Negative Power supply for RFC Sensor
10	**+**	Positive Power supply for RFC Sensor
11	**Cmd2**	Command 2 RFC
12	**S-RFC2**	Signal Input RFC zone 2

RFC SENSOR (PRFC2005)

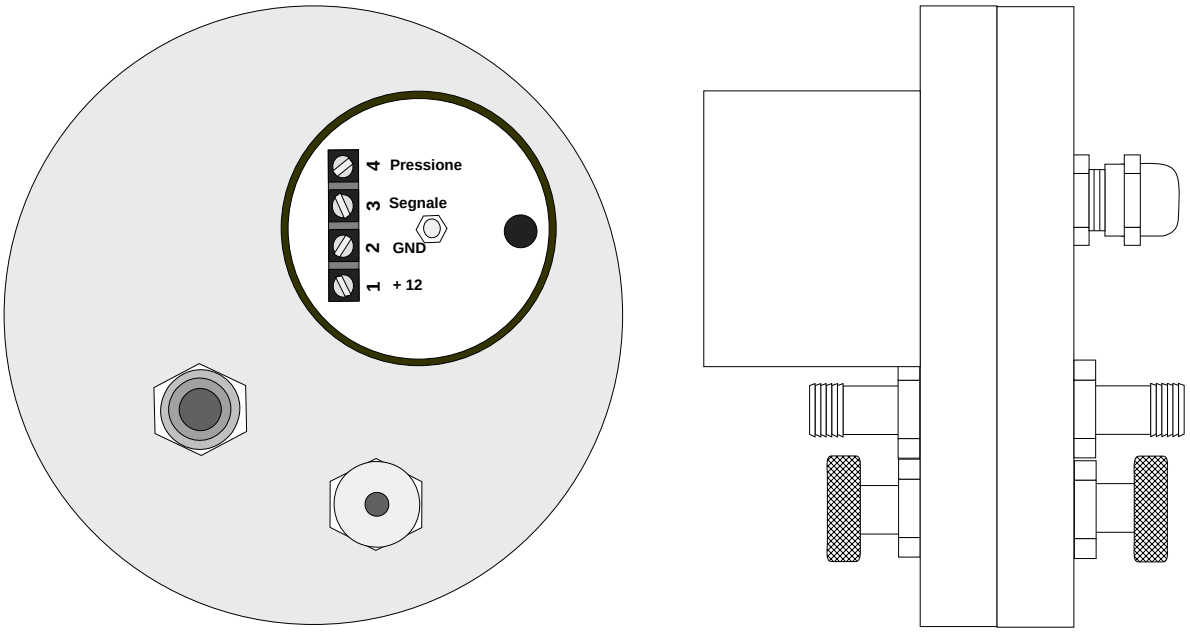


M1 (Power and Signal **RFC**)

1 =	[**+**]	Positive Power Supply **RFC** Sensor
2 =	[**-**]	Negative Power Supply **RFC** Sensor
3 =	[**Cmd2**]	Command **RFC** zone **2**
4 =	[**Cmd1**]	Command **RFC** zone **1**
5 =	[**Seg Ch1**]	Signal Output **RFC** zone **1**
6 =	[**Seg Ch2**]	Signal Output **RFC** zone **2**

To connect the **RFC Sensor** to the Concentrator uses the special cable PGPS2116. Ensure that the screen is continuous throughout the length and that it is connected to negative at the concentrator and left free at the sensor.

GPS SENSOR (PGPS2001/2)



Connection Details (Power and Signal **GPS**)

4 = Pressure Signal
3 = Signal Sensor GPS
2 = Negative Power Supply GPS Sensor
1 = Positive Power Supply GPS Sensor

To connect the **GPS Sensor** to the Concentrator uses the special cable PGPS2116. Ensure that the screen is continuous throughout the length and that it is connected to negative at the concentrator and left free at the sensor.

Set-up and Commissioning of the DPS System

For information on setting up and commissioning the **DPS MULTIPLEX** system make reference to the **On-Line HELP** in the management software running under the **Windows® 95/98/2000/NT** operating systems (art. **PUCP2000SW**).

- Conclusions.
  - The steps contained n this manual are intended to support the installation of the **DPS** system in the most common configurations.
  - It is always true that careless installation (insufficient attention to tube/cable layouts, ..etc) can compromise and limit the performance of the system.

In case of difficult situations or particular requirements it is recommended to contact Technical Support at GPS Standard.

FINAL CONSIDERATIONS

Summary Of The Principal Installation Steps

- Make the system connections:
  - as per all of the instructions in the **SYSTEM CONNECTIONS** section;
  - ensure they are all correct to prevent system malfunction.
- Commission the system:
  - The definition of the parameters is possible by connecting to the serial line and using a personal computer running the management software (**PUCP2000SW**) in a **Windows® 95/98/2000/NT** environment. The **DPS** Multiplex system (Art. **PDPS2002**) has a COM115 type serial interface and it is necessary to use the optional converter RS232 **- COM115** (with the PUCP2000SW software) to interconnect between the sensor and the Personal Computer.

SYSTEM CHARACTERISTICS

GENERAL DATA

General Data		
➢ Versions Available	**art. PDPS2002**	DPS Multiplex System
➢ Options	**Art. PCPS2002**	Local relay Board and Logic Inputs for GPS Plus Multiplex System (**art. PDPS2002**)
➢ System ➢ Applications	External	
➢ Maximum System Coverage	**200 m** approx (two 100 metre zones)	
➢ System Parameter Setting	Via **USB** port, using Personal Computer	
➢ Parameter ➢ Memory	On **EEPROM** (non volatile RAM)	
➢ Firmware	Resident on Flash upgradeable via Serial line	

Mechanical Data	
➢ Cabinet	Metallic Container (tamper protected) completely weatherproof to **IP65** Dimensions: [L] **260**x [H] **160**x [D] **90mm** Weight: **2 Kg** Colour: **grey**

Environmental	
➢ Operating Temperature	**- 30°C ÷ + 70°C** Relative Humidity **90%**

Electrical Data		
➢ Power Supply	**Art. PDPS2002**	**24** - **55 Vdc** (48 Volt nominal)
➢ Current	**Art. PDPS2002**	**100 mA** (max) @ **48 Vdc**
➢ Outputs	**Art. PDPS2002**	**8** relay contacts **NC** (optional)
➢ Relay rating	**12 V** (max), **100 mA** (contact **NC**, **22 Ohm** in series)	
➢ Inputs	**Art. PDPS2002**	**8 NC** / **NO** (optional) **2 Analogue**
➢ Input/Output Circuit Protection	Using Varistors	
➢ Auto protection in case of atmospheric interference	Using **Watch – Dog** (External/ Internal)	

MILANO
Via De Lemene, 37
20151 Milano (MI)
Tel. (+39) 02 38010307
Fax (+39) 02 38010302
info.milano@gps-standard.com

VERONA
GPS Triveneto s.r.l.
Via Apollo XI, 14
37057 San Giovanni Lupatoto (VR)
Tel. (+39) 045 8776000
Fax. (+39) 045 8753497
info.verona@gps-standard.com
P. Iva e Cod. Fiscale: 01052290077

BOLOGNA
Via Piero Jahier, 2
40132 Bologna
Tel. (+39) 335 7416723
Fax (+39) 051 3370957
info.bologna@gps-standard.com

FIRENZE
Via Svezia, 7
57128 Livorno
Tel. (+39) 334 6042074
Fax (+39) 05 86859318
info.firenze@gps-standard.com

ROMA
GPS Lazio s.r.l.
Via del Casale Agostinelli, 140
00040 Morena (ROMA)
Tel. (+39) 06 79810077
Fax. (+39) 06 79846980
info.roma@gps-standard.com
P. Iva e Cod. Fiscale: 01052280078

BARI
Via O. Marzano, 28
70125 Bari (BA)
Tel. (+39) 080 5021142
Fax. (+39) 080 5648288
info.bari@gps-standard.com

PALERMO
Via Croce Rossa, 33
90143 Palermo (PA)
Tel. (+39) 091 518886
Fax (+39) 091 6785921
info.palermo@gps-standard.com

LONDRA
GPS Perimeter Systems LTD.
14 Low Farm Place, Moulton Park
NORTHAMPTON – NN3 6HY – U.K.
Tel. (+44) 1604 648344
Fax (+44) 1604 646097
sales@gpsperimeter.co.uk
www.gpsperimeter.co.uk

PECHINO
Building 1, Rm 5114, No.1 Sanlihe Rd,
HaiDian District, BeiJing 100044
Tel. (+86) 10 88365095
Fax (+86) 10 88365096
info@gps-sh.com
www.gps-sh.com

SISTEMA DI GESTIONE PER LA QUALITÀ CERTIFICATO UNI EN ISO 9001:2008 SINCERT DNV

GPS STANDARD
Committed to security.

AOSTA
Sede Legale e Stabilimento
GPS Standard SpA
Fraz. Arnad Le Vieux, 47 - 11020 Arnad (AO) - Italia
Tel. (+39) 0125 968611 - Fax (+39) 0125 966043
info@gps-standard.com
www.gps-standard.com
Partita Iva e Codice Fiscale: 00473450070

N° doc.: T-DPS/205/11 - February 2011