TECHNICAP

SEDIMENTS TRAPS / OPERATING MANUAL

PIEGES A PARTICULES SEQUENTIELS

MANUEL D'UTILISATION

« PPS »

216 Chemin du Braousch - 06320 LA TURBIE / France

Tél : +33 (0)4 92 10 85 68 – Fax : +33 (0)4 92 10 82 98

technicap@wanadoo.fr / www.technicap.com

TECHNICAP

TECHNICAP - SEDIMENTS TRAPS FAMILY

TECHNICAP

INDEX

DISCLAMER / AVERTISSEMENT

Every care has been taken in compilation of the manual contained herein and in verification of its accuracy when published, however the content of this product manual is subject to change without notice due to factors outside the control of TECHNICAP and this manual should, therefore, be used as a guide only. For example, the products referred to in this publication are continually improved through further research and development and this may lead to information contained in this manual being altered without notice.

TECHNICAP makes no representations or warranties with respect to this manual or with respect to the products describes herein.

TECHNICAP shall not be liable for any damages, losses, costs or expenses, direct, indirect or incidental, consequential or special, arising out of, or related to the use of this material or the products described herein.

Do not perform operations other than specified in this instruction manual, do not remove or modify parts other than specified, and do not use parts other than specified.

Le plus grand soin a été apporté à la compilation du manuel contenu dans le présent document et à la vérification de son exactitude lors de sa publication. Toutefois, le contenu de ce manuel peut être modifié sans préavis en raison de facteurs indépendants de la volonté de TECHNICAP, par conséquent ce manuel doit être conservé, utilisé comme guide seulement. Par exemple, les produits auxquels il est fait référence dans cette publication sont améliorés en permanence grâce à des travaux de recherche et développement plus poussés, ce qui peut entraîner des modifications sans préavis dans les informations contenues dans ce manuel.

TECHNICAP ne fait aucune déclaration et ne donne aucune garantie quant à ce manuel ou aux produits décrits dans les présentes.

TECHNICAP ne peut être tenu pour responsable des dommages, pertes, coûts ou dépenses, directs, indirects ou accessoires, consécutifs ou particuliers, résultant de, ou liés à l'utilisation de ce matériel ou des produits décrits dans ce document.

N'effectuez aucune opération autre que celle spécifiée dans ce manuel d'instructions, ne retirez ou ne modifiez pas les pièces autres que celles spécifiées et n'utilisez pas de pièces autres que celles spécifiées.

TECHNICAP

PREPARATION OF THE TRAP / PREPARATION DU PIEGE

1) Dismantling of the « rotary disc / motor» assembly on trap

When dismantling a rotary disk for maintenance or cleaning, all of the parts must not be inverted with the parts of another rotary disk.

For PPS 4/3 and PPS 3/3:

- Place the trap on the closed crate or on two trestles.
- Put the hand guard on your wrist to prevent the motor from falling.
- Undo the «motor frame» block manually by unscrewing the white central screw M50. Place the «motor frame» block on a flat surface, with the motor spread out in such a way as to have access to the motor bolts.
- The motor is attached by 2 CHC M6 x 45 bolts to the base plate. Use the spanner 5mm supplied.

For PPS 6/2, PPS 5/2, PPS 4/3 – 24S, and PPS 3/3 – 24S:

- The motor is fixed onto the trap by 2 half clamps and 2 special M6 wing nuts.
- Holding the motor with the hand guard, partially undo the 2 wing nuts (a few turns) and slide the motor within its support in the opposite direction of the rotary disc.
- The rotary disc can be dismantled manually, independently of the motor by the white central screw M50.
- Given the weight of the rotary disc, a minimum of two people are required to life the parts and some of the heavy component parts – one holding the rotary disc while the other undoes the nut.

Démontage de l'ensemble « plateau moteur » sur piège

Lors du démontage d'un plateau pour maintenance ou nettoyage, l'ensemble des pièces ne doivent pas être interverties avec les pièces d'un autre plateau.

Pour PPS 4/3 et PPS 3/3 :

-Allongez le piège sur sa caisse fermée ou sur 2 tréteaux.
-Mettre la dragonne au poignet pour éviter la chute du moteur.
-Débloquez l'ensemble « plateau moteur » à la main en dévissant la vis centrale blanche M50. Posez l'ensemble « plateau moteur » sur une surface plate, le moteur allongé de façon à accéder aux vis moteur.
-Le moteur est fixé par 2 vis CHC M6 x 45 sur le plateau. Utilisez la clef de 5mm fournie.

Pour PPS 6/2, PPS 5/2, PPS 4/3 – 24S, et PPS 3/3 – 24S :

-Le moteur est fixé sur le piège par 2 demi-colliers et 2 écrous papillons spéciaux M6.
-Débloquez les 2 écrous papillons de quelques tours tout en retenant le moteur par la dragonne et faites glisser le moteur dans son support sens opposé au plateau.
-Le plateau peut être démonté à la main indépendamment du moteur par la vis centrale blanche M50.
-Vu le poids du plateau, il est impératif d'être 2 personnes pour manipuler les pièces lourdes : une tenant le plateau et l'autre dévissant la vis.

TECHNICAP

Opening and closing the motor housing.

- Unscrew completely the 4 bolts (M6 x 45) using a size 5mm Allen key.
- Take 2 of the bolts and screw them manually into the 2 holes at 45° to the closing position, until they simultaneously slot in to the motor block; the motor can then be extracted.
-Slide out the motor from the housing taking care not to scratch the inside of the housing.
- For use with the 24 samples rotary disc, do not unscrew the white PETP sprocket guide; never use the trap without this guide.

Ouverture et fermeture du boîtier moteur étanche.

- Dévissez complètement les 4 vis (M6 x 45) avec la clef Allen 5mm fournie.
- Prendre 2 des vis et les visser à la main dans les 2 trous à 45° de ceux de fermeture, opposés (sans lamage) jusqu'à leur appui simultané sur le bloc moteur et s'en servir comme extracteur.
-Glisser délicatement la tête du moteur hors du corps pour ne pas abimer la surface intérieure du boitier.
- Pour l'utilisation avec des plateaux 24 échantillons, il ne faut pas dévisser le palier guide de pignon en PETP blanc et ne jamais utiliser le piège sans ce palier.

Preferably use the black workshop motor mount to handle the motor.
Utiliser de préférence le support moteur atelier noir pour manipuler le moteur.

On the Table / Sur la table

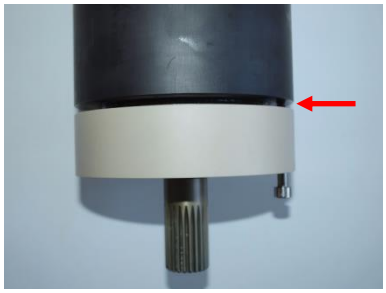



DO NOT LEVER ON THE JOINT SURFACES. DO NOT PUT THE MOTOR HOUSING ON THE JOINT SURFACE.
NE PAS POSER LE CARTER MOTEUR SUR LA PORTEE DE JOINTS, NI FAIRE LEVIER SUR CELLE-CI

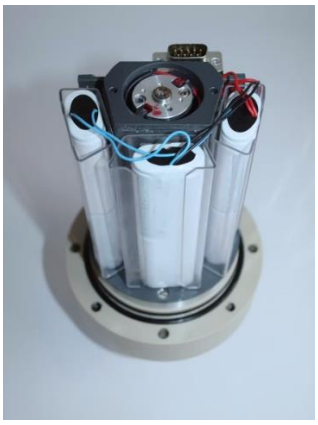
Installing the motor's batteries / Installation des batteries du moteur

Never disconnect the batteries before recovering the data that has been acquired with the motor during the assignment.





The batteries can now be installed / Les batteries peuvent maintenant être installées.


Installing or changing batteries

Alkaline (or Lithium on request) battery packs are supplied with the USB trap.
The maximum duration of use is 2 years rotation of a 24 samples rotary disc at the rate of one rotation per year.
In our opinion, given the cost of the batteries in comparison to the importance of the results, it is preferable to change them after each yearly assignment as a safety precaution.

Take care not to short-circuit the battery packs as this could cause overheating, burns or other injuries.

- Using a flat screwdriver (size 2) unscrew the transparent, polycarbonate plate held in place by the 2 TFF M3 x 16 bolts.
- Slide out the batteries and replace with the new battery pack.
- Connect the battery pack to the board until you feel it locking into place and put the surplus wire into the space available on the side.

Prior to any transmission, connect the board to the USB cable.
While not in use, the consumption of the board is a few micro amps; before prolonged storage of the motor unit, it's essential to disconnect the batteries and take them out of the waterproof case.

Installation ou changement des piles.

Les pièges USB sont livrés avec des blocs piles alcaline (ou lithium sur demande).
La durée d'utilisation maximale prévue est de 2 ans de rotations d'un plateau 24 échantillons à raison d'une rotation par an.
À notre avis, vu le coût des piles par rapport à l'importance des résultats, il est préférable de les changer à chaque mission d'un an pour avoir un coefficient de sécurité important.

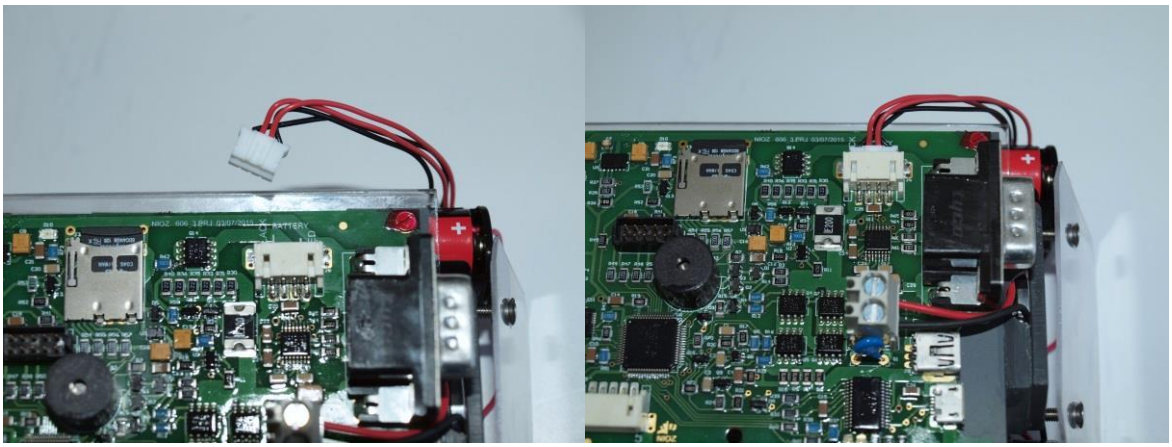
Faire attention à ne pas court-circuiter les blocs piles, cela risque d'entraîner une surchauffe, des brûlures ou autres blessures.

- À l'aide d'un tournevis plat (taille 2), dévissez la plaque polycarbonate transparente tenue par les 2 vis TFF M3 x 16.
- Faire glisser les piles dans son logement et remplacer par le nouveau bloc piles.
- Connectez le bloc piles à la carte jusqu'à sentir le verrouillage et ranger l'excédent de fils dans le vide latéral disponible.

Ne jamais déconnecter les piles avant la récupération des données effectuées par le moteur au cours de la mission.

Alimentez la carte avant toute transmission par le câble USB.
La consommation à vide de la carte est de l'ordre de quelque micro ampères, avant un stockage prolongé du bloc moteur, il est indispensable de déconnecter les piles et de les sortir du boîtier étanche.

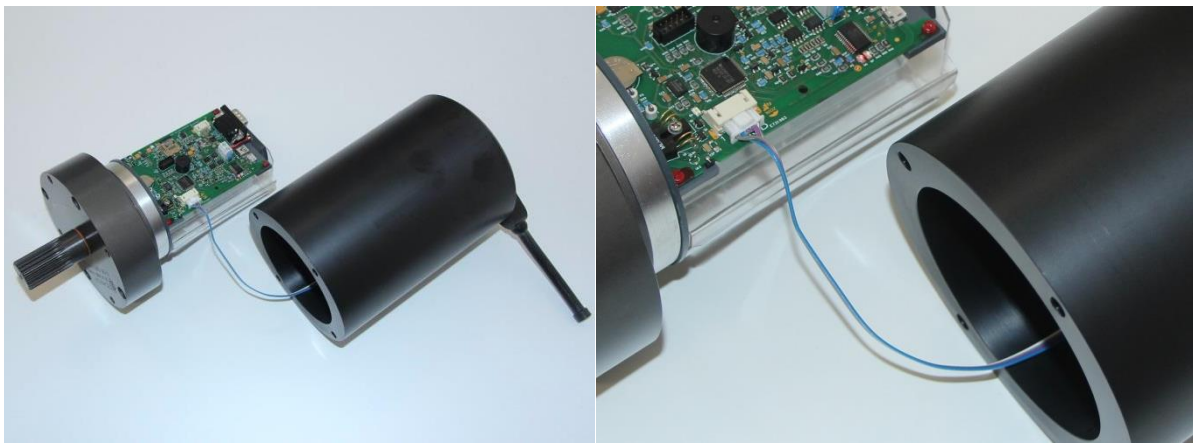
- Connect the battery pack to the circuit board connector.
- Connectez les batteries à la carte électronique.



Using the optional external housing connector/ Utilisation du connecteur externe

When using the external housing USB connector the battery replacement procedure is identical, however care must be taken when removing the motor from the housing to avoid damage to the connector cables.

Lors de l'utilisation du connecteur USB sur le boîtier externe, la procédure de remplacement de la pile est identique, mais il faut faire attention quand on sépare la tête du corps du boîtier pour éviter d'endommager les câbles du connecteur.



- Programming (configuring sampler)
  Programmation (configuration de l'échantillonneur)

Software / Logiciel

Before programming the motor the user must install the appropriate software. A suggested software to use is 'Tera term' and can be downloaded using the following link.

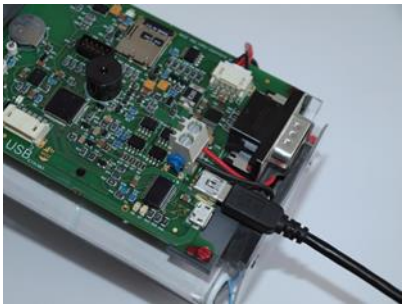
Avant de programmer le moteur, l'utilisateur doit installer le logiciel approprié. Un logiciel suggéré à utiliser est 'Tera term' et peut être téléchargé en utilisant le lien suivant.

http://ttssh2.osdn.jp/index.html.en

- Once the software has been installed connect the USB cable provided to the mini USB connection on the circuit board (The system is also equipped with a micro USB connector and serial connector that can be used to program the motor).

When using the external housing connector, unplug the protective plug and connect the supplied cable to the external connector.

Une fois le logiciel installé, branchez le câble USB fourni sur le connecteur mini-USB de la carte électronique (le système est également équipé d'un connecteur micro-USB et d'un connecteur série pouvant être utilisé pour programmer le moteur).
Lorsque vous utilisez le connecteur externe, débranchez la fiche de protection et connectez le câble fourni au connecteur externe.



Internal communications USB connection cable /
Communication interne Câble de connexion USB

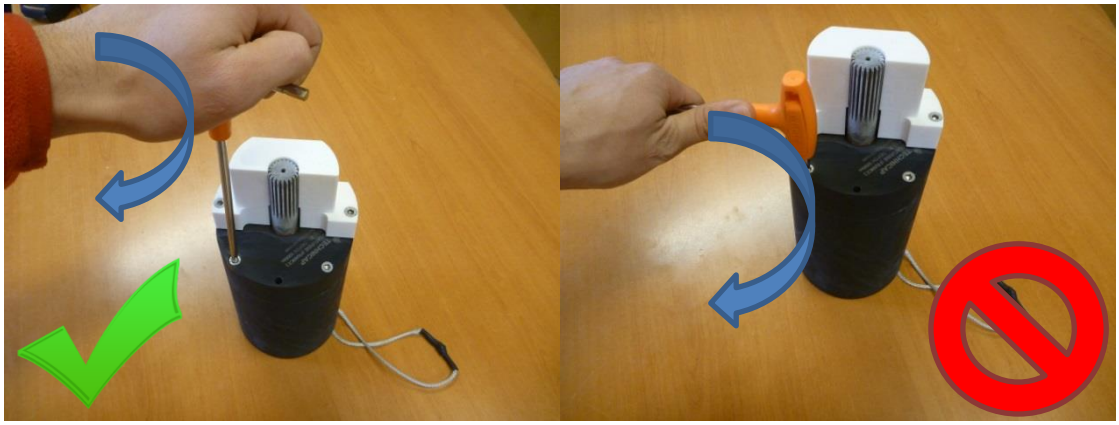
External communications USB connection cable /
Communication externe Câble de connexion USB

- When closing the casings, be careful that the cables from the batteries are well placed and do not hinder the closing. Check that the box and the two rubber seals are clean and well-greased
(ATTENTION for hairs, scratches and…).
- Place the motor vertically, with the 4 bolts in their holes and turn the head of the motor without tightening the screws until the alignment of the countersunk holes; press on the head until the seals slot into place.
Preferably use the black workshop motor support to handle the motor.
- Tighten the bolts with the spanner supplied, taking care not to over-tighten them.

- Pour la fermeture des boîtiers, faire attention que les fils des piles soient bien rangés et ne gêne pas la fermeture. Vérifiez le graissage et la propreté de la portée de joints du boîtier et des 2 joints toriques
(ATTENTION aux poils, cheveux, rayures etc …).
- Posez le moteur verticalement, les 4 vis dans leurs trous avec lamage et faites tourner la tête moteur sans les visser jusqu'à l'alignement des trous taraudés et appuyez à la main sur la tête jusqu'à l'emboîtement des joints.
- Bloquez les vis sans serrage excessif avec la clef fournie.

**ATTENTION TIGHTENING TORQUE ON PEEK HEAD SCREWS (PETP motor body)
IS MAXIMUM 2Nm**

**ATTENTION LE COUPLE DE SERRAGE SUR LES VIS DE LA TETE EN PEEK (corps du moteur en PETP)
EST MAXIMUM 2Nm**



Assembly of the «rotary disc / motor» on trap before putting it into the water

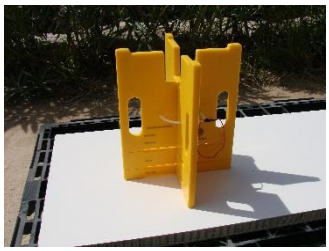
Montage de l'ensemble « plateau moteur » sur piège avant la mise à l'eau

For an easy assembling to the rotary disc, we have manufactured a yellow support.

- Put the support on the floor
- Put the rotary disc 24 samples on the support
- Put the sediment trap on the rotary disc
- Put the screw M50 to fix the rotary disc on the sediment trap.

Afin de faciliter le montage et démontage du plateau, nous avons fabriqué un support plateau jaune.

- Poser la pièce support au sol
- Poser le plateau 24 échantillons sur le support
- Poser le piège sur le plateau
- Visser la vis M50 pour fixer le plateau sur le piège à sédiments.



Filling bottles / Remplissage des bouteilles



*Set up bottles by means of the yellow support,
*Cross the black ribbon catching in the eye foreseen in the axis of the hole "O" of the rotary disc,
*Put the black ribbon around the 24 bottles and squeeze strongly.

*Mettre les bouteilles en place en se servant du support jaune,
*Passer le ruban noir auto agrippant dans l'œil prévu dans l'axe du trou « O » du plateau,
*Faire le tour des 24 bouteilles avec le ruban noir auto agrippant et serrer fortement.




- Don't forget to clean and fill bottles with some water distilled (or other solution) before using, for equilibrate pressure inside the bottles. To facilitate the manipulation, free 4 screw titanium CHC M10 and filling the bottles by the hole "O" and making turn the rotary disc put on the yellow support.
- Before assembling the motor, manually align the "0" position with the orifice of the cone.
To align the rotary disk with the "NIOZ" electronic card, you can position the rotary disk on the position "24" and approach a magnet near the junction between the head ant the motor body, which will trigger a rotation to the position "0".
- Viewed from the motor side, the small rotary disc are numbered 0 to 12, the big ones 0 to 24.

- Ne pas oublier de nettoyer et remplir les flacons avec de l'eau distillée (ou autre solution) avant la mise à l'eau, afin de mettre les flacons en équipression. Pour faciliter la manipulation, débloquer les 4 vis titane CHC M10 et remplir en faisant tourner le plateau fixe posé sur le support jaune.
-Avant le montage du moteur, faire tourner le plateau à la main jusqu'à ce que la position « 0 » soit alignée à l'orifice de sortie de cône.
Pour aligner le plateau avec les nouvelles cartes électronique « NIOZ », vous pouvez positionner le plateau sur la position « 24 » et approcher un aimant près de la jonction entre la tête et le corps du moteur, ce qui va déclencher une rotation jusqu'à la position « 0 ».
-Les petits plateaux sont numérotés de 0 à 12 et les gros plateaux de 0 à 24 vu du côté du moteur.

- For the 24 bottles rotary disc:
* Position the rotary disc on the yellow support.
* Slide the rotary disc under the M50 screw.
* Tighten the M50 screw while ensuring the rotary disc is centered under the cone, hand tighten only.
* Place the motor in position by sliding it carefully between the teeth of the rotary disc ensure the motor does not turn the rotary disc and block by hand the 2 nuts titanium of motor bridle. **When inserting the motor be careful not to create a rotation between the gear and the motor.**

- Pour les plateaux 24 bouteilles :
* Positionner la pièce jaune comme support de plateau et le poser dessus.
* Faire glisser l'ensemble plateau - support sous l'emplacement de la vis M50.
* Visser en positionnant le centreur sous le cône, jusqu'au serrage complet. Il n'est pas nécessaire d'utiliser d'outil.
* Positionner le moteur en le glissant délicatement entre les dents du plateau en faisant attention à ne pas faire tourner le plateau en ajustant les dents des pignons et bloquer à la main les 2 écrous titane des colliers moteur. **Lors de l'insertion du moteur attention à ne pas créer une rotation entre le pignon et le moteur.**

- For the dismantling, follow the reverse procedure described above
Pour le démontage, suivre la procédure inverse décrite ci-dessus.

2) Kit 500 ml

For PPS 4/3 and 3/3 with 500ml bottles:

*A polyester extension is to hooked on the end of the PPS

Pour les PPS 4/3 et 3/3 utilisant les bouteilles 500ml:

*Une rehausse en polyester est à accrocher à l'extrémité du PPS.

For PPS 4/3-24 S and 3/3-24S with 500ml bottles:

*A polyester extension in bolted to the end of the PPS

Pour les PPS 4/3-24S et 3/3-24S utilisant les bouteilles 500ml:

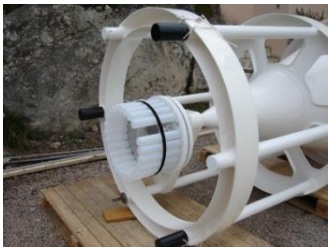
*Une rehausse en polyester est à boulonner à l'extrémité du PPS.

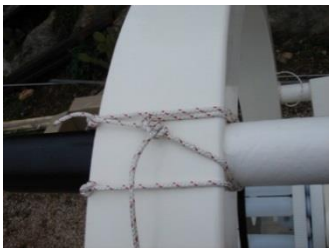
For PPS 5/2 with 500ml bottles:

*3 Black feet are to be added to the extremities of tubes.

Pour les PPS 5/2 utilisant les bouteilles 500ml:

*3 Pieds noirs sont à rajouter aux extrémités des tubes.





MAINTENANCE / ENTRETIEN.

1) **Anodic protection:** For PPS 12 samples manufactured before 2012 only.
   From 2012 included, the mooring bars are in titanium.

For aluminum housing motor only: check the condition of the anode mounted on the back of the motor housing with an M6 screw. After blocking the housing, it's best to use an Ohm meter and check the resistance between the anode and one of the CHC M6 x 45 locking screws as well as between the anode and the gear lock screw. The resistance must be less than 1 Ohm.

For the PPS 5/2 all the metal parts are made of titanium except the CHC M6 x 45 sealing screws of the motor casing, which are in 316L stainless steel. Titanium and PETP / PEEK are rustproof, there is no corrosion.

Protection anodique : Pour PPS 12 échantillons fabriqués avant 2012 seulement.
A partir de 2012 inclus, les barres d'amarrage sont en titane.

Pour les boîtiers moteurs en aluminium uniquement : vérifiez l'état de l'anode montée à l'arrière du boîtier moteur par une vis M6. Après blocage du boîtier, il est préférable d'utiliser un Ohm mètre et de vérifier la résistance entre l'anode et une des vis de fermeture CHC M6 x 45 ainsi qu'entre l'anode et la vis de blocage du pignon. La résistance doit être inférieure à 1 Ohm.

Pour les PPS 5/2 toutes les parties métalliques sont en titane sauf les vis de fermeture CHC M6 x 45 du boîtier moteur qui sont en inox 316L. Le titane et le PETP / PEEK étant insensible à la corrosion, il n'y a pas besoin d'anode.

2) **Changing the seals:**
   For both the low and high-pressure seals mounted on the head of the axis of the motor, we recommend they be changed every 5 years. This delicate operation should be carried out by SARL TECHNICAP, because a high-pressure water test is required after the seals have been changed.

For the 2 rubber seals on the motor, a visual check is sufficient for each before the trap is put into the water, but it's advisable to change them every 5 years.
Rubber seals: Nitrile 70 SHORE A - Dimensions: ø 88,5 x 3,53 and ø 82 x 3mm

Changement des joints :

Pour les joints basse pression et haute pression d'axe moteur montés sur la tête, leur changement est conseillé tous les 5 ans. Cette opération très technique doit être effectuée par la SARL TECHNICAP car elle nécessite un test d'étanchéité haute pression après la mise en place des nouveaux joints.

Pour les 2 joints toriques de fermeture moteur, un contrôle visuel suffit à chaque préparation de mise à l'eau mais il est conseillé de les changer également tous les 5 ans.
Joints toriques : matière Nitrile 70 SHORE A - Dimensions : ø 88,5 x 3,53 et ø 82 x 3mm

3) **Cleaning the material:**

Rinse the material thoroughly with fresh (not sea) water after use as quickly as possible.

Clean with water + washing-up liquid, scouring cream.

Do not use abrasive paper or sponge.

Nettoyage du matériel :

Rincer abondamment à l'eau douce le matériel après chaque utilisation le plus rapidement possible.

Nettoyage à l'eau + liquide vaisselle, crème à récurer.

Ne pas utiliser de papier ou éponge abrasive.

- ***USING OF THE BLACK SUPPORT FOR RECOVERY SAMPLES***
  Utilisation du support noir pour récupérer les échantillons


12 BOTTLES STAR – 500ml
ETOILE 12 BOUTEILLES 500ml



SUPPORT FOR RECOVERY SAMPLES
(Can be used for 12 or 24 samples carrousel and 250 or 500ml bottles)

SUPPORT POUR RECUPERATION DES ECHANTILLONS
(Utilisable pour plateaux 12 ou 24 échantillons et bouteilles 250 ou 500ml)

- ***SEDIMENT TRAP INSTRUCTIONS LEAFLET WITH NIOZ ELECTRONIC CARD***

Determining the USB port being used.

Prior to starting the software the USB port must be identified

From the Windows Start Menu– search the Control Panel for the device manager.

2. Open the device manager.

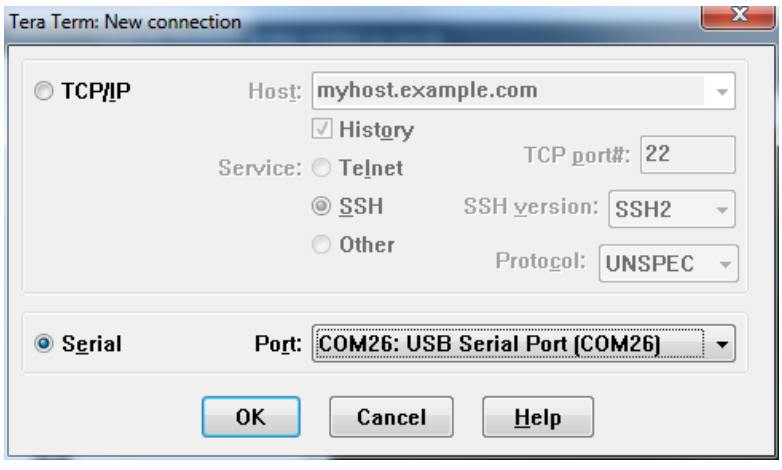
3. Scroll down to "Ports (COM & LPT)".

4. If you are using a USB to RS232 adapter and you see a device named USB Serial Port, you can verify this is your adapter by unplugging the adapter and waiting for it to disappear from the device manager COM Port list.

On your computer, download free "TERA TERM" or equivalent software.

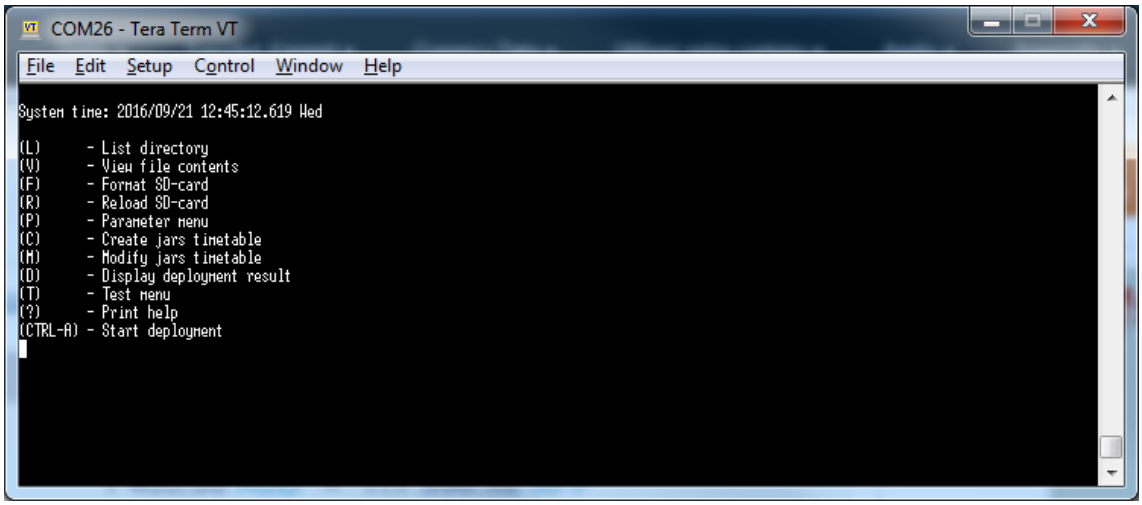
For TERATERM

- Open the software **'Tera Term'**
- Select **'Serial'**
- Select the **'Port'**: xxx (COM XXX : USB Serial Port (COM XXX) (The number of the port will vary depending on your computer
- Click **'OK'**



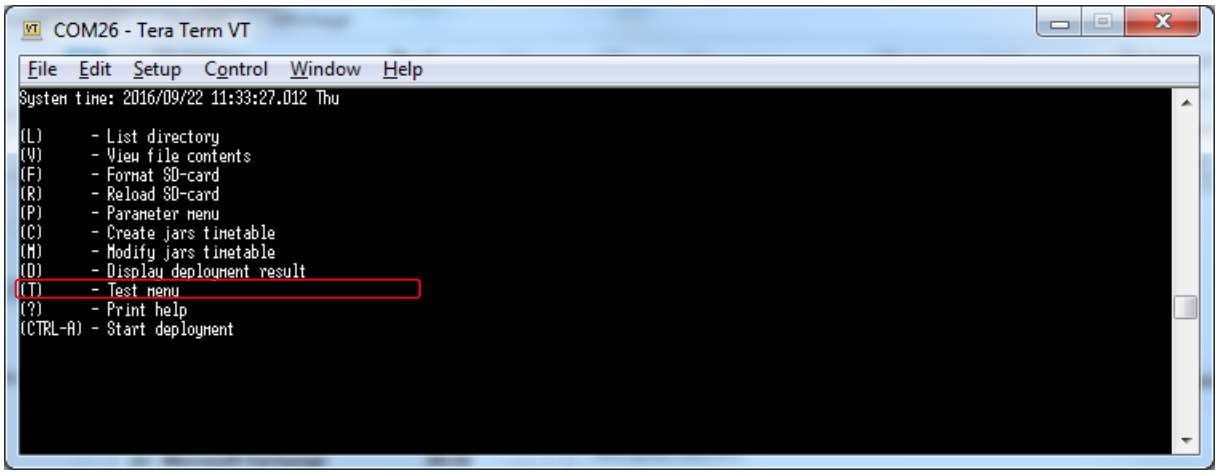
An empty window will open.

- Press **'ESC'** to open the menu.

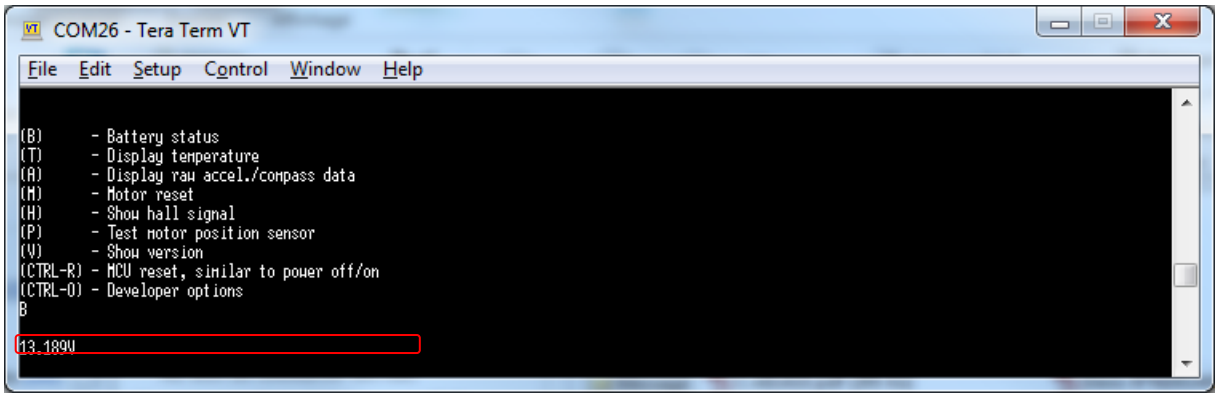


Before programming the motor it is recommended to check the battery voltage

- To check the battery voltage type **'T'** (Test menu)
- The test menu should now appear



- To check the status of the battery, type 'B' and the battery voltage will be displayed. The voltage should be close to 13.5 volts for a new set of batteries.



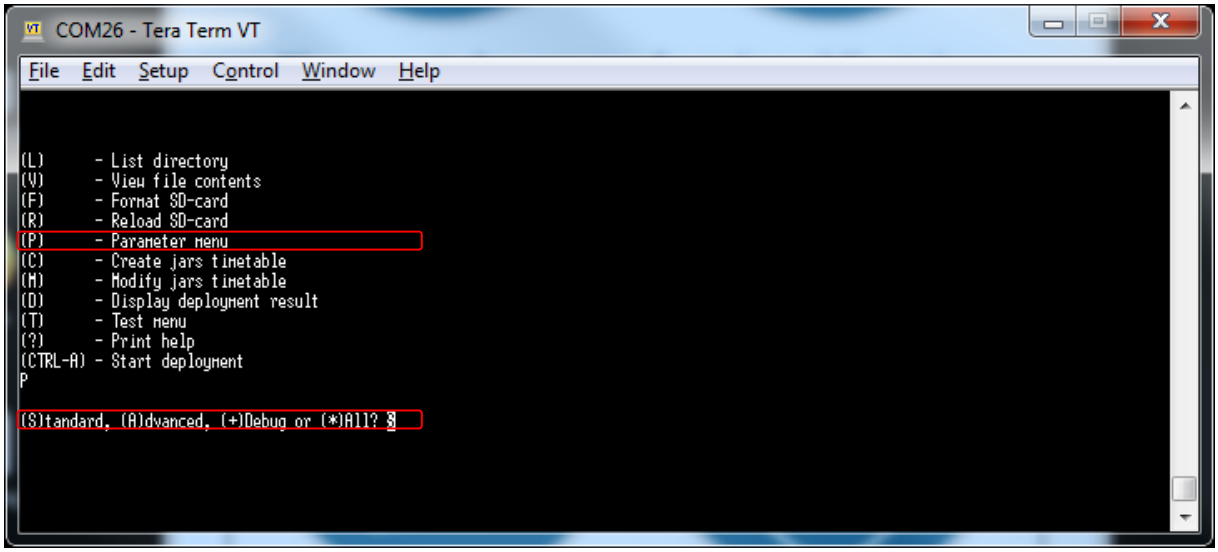
- To return to the original menu, press **'ESC'**

Setting the date and time

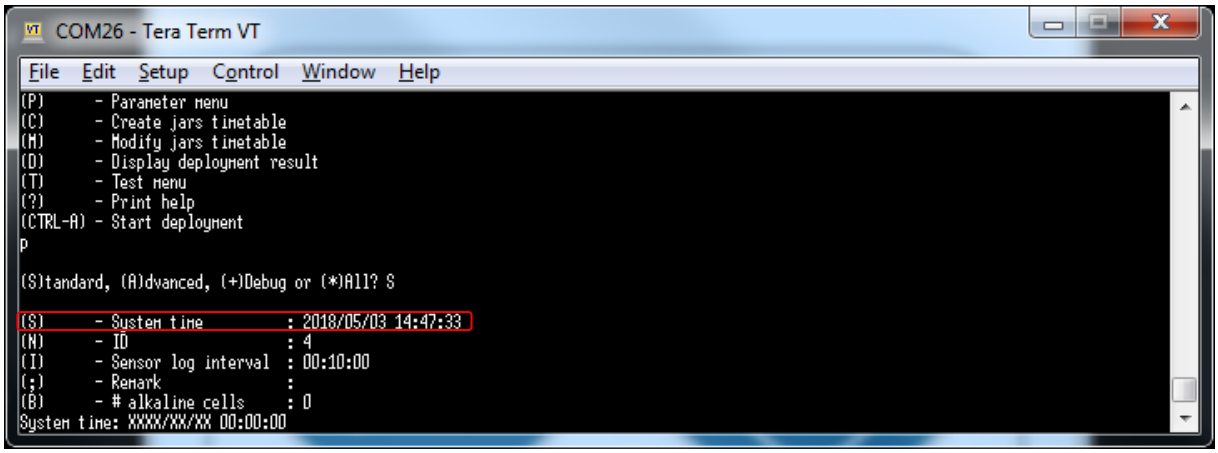
Setting the date and time

Before programming the deployment sequence please ensure that the date and time are set to those of the deployment location.

- To alter the date and time type **'P'** (Parameter menu)
- Type either **'S'** (for the standard parameter menu) or **'A'** (for the advanced parameter menu)



- From either of these menus type **'S'** (system time)
- Type the date and time **'XXXX/XX/XX 00:00:00'** (note the format is year/month/day/hour/minute/second)
- Press **'ENTER'**



The screen should now display the new time in the parameter window.

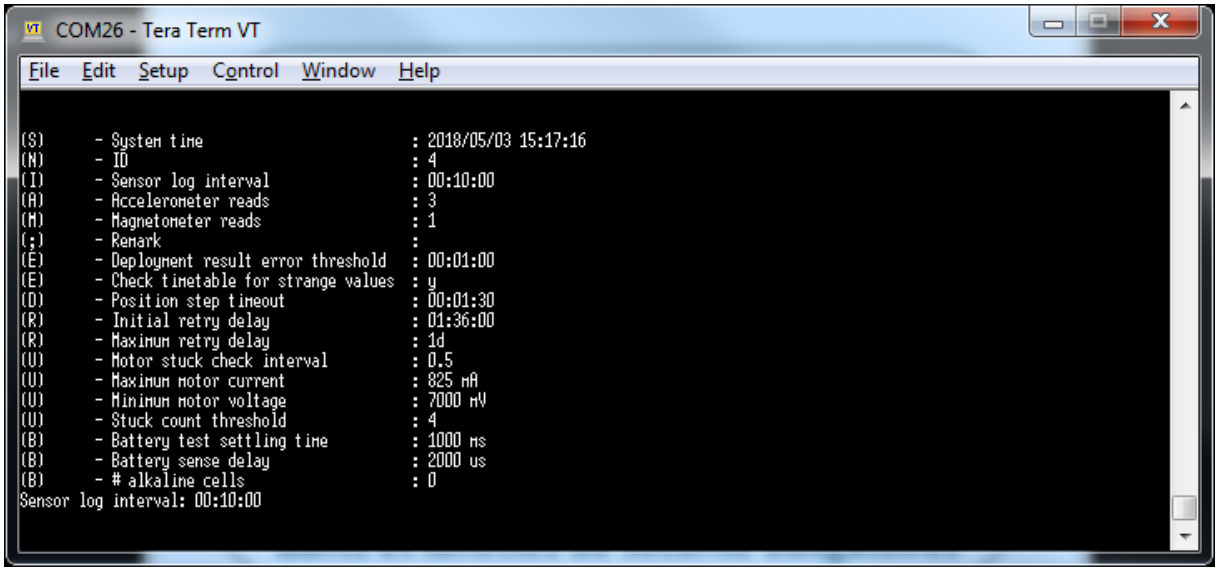
Configuring the inbuilt temperature logger

The motor is equipped with an in built temperature logger that records the ambient temperature at a frequency dependent on the users requirements.

- To alter the frequency of the temperature logging type **'P'** (Parameter menu)
- Type either **'S'** (for the standard parameter menu) or **'A'** (for the advanced parameter menu)
- From either of these menus type **'I'** (Sensor log interval)
- Type the frequency required **'00:00:00'** (note the format is hour/minute/second)
- Press **'ENTER'**

In the screen shot below the interval in 10 minutes.

ADVICE : If programming for a full year, consider adjusting the time interval between temperature measurements to avoid an excessive amount of data to process during recovery.



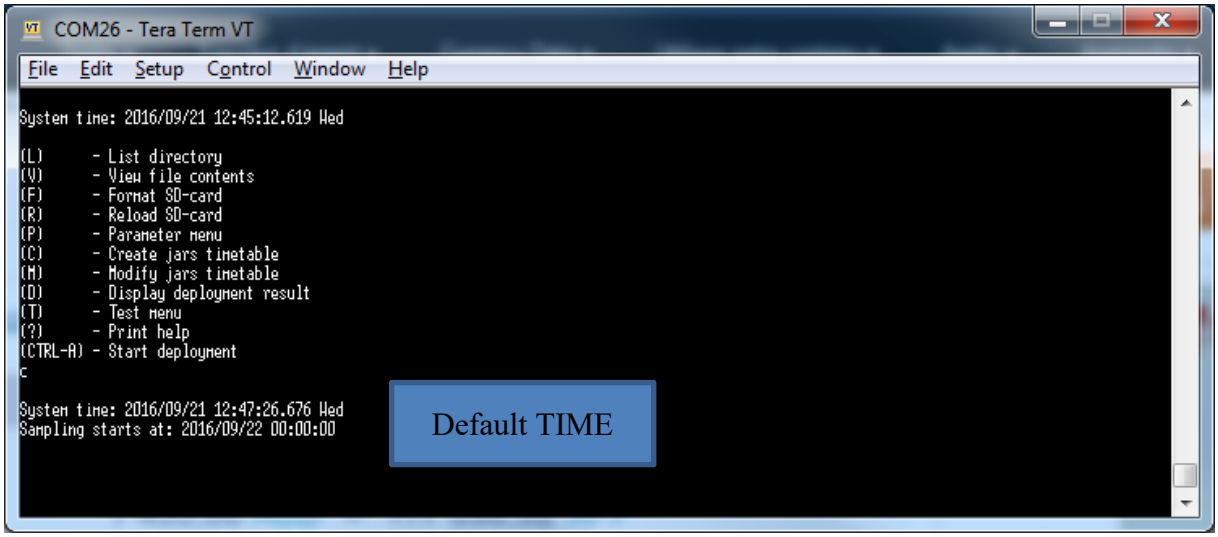
Programming the deployment sequence

To program the deployment sequence an example is given below:

Sequence example: 12 sample jars each to be exposed for a period of 4 days with the first sample jar being exposed on the 22/09/16 at midnight (00:00:00)

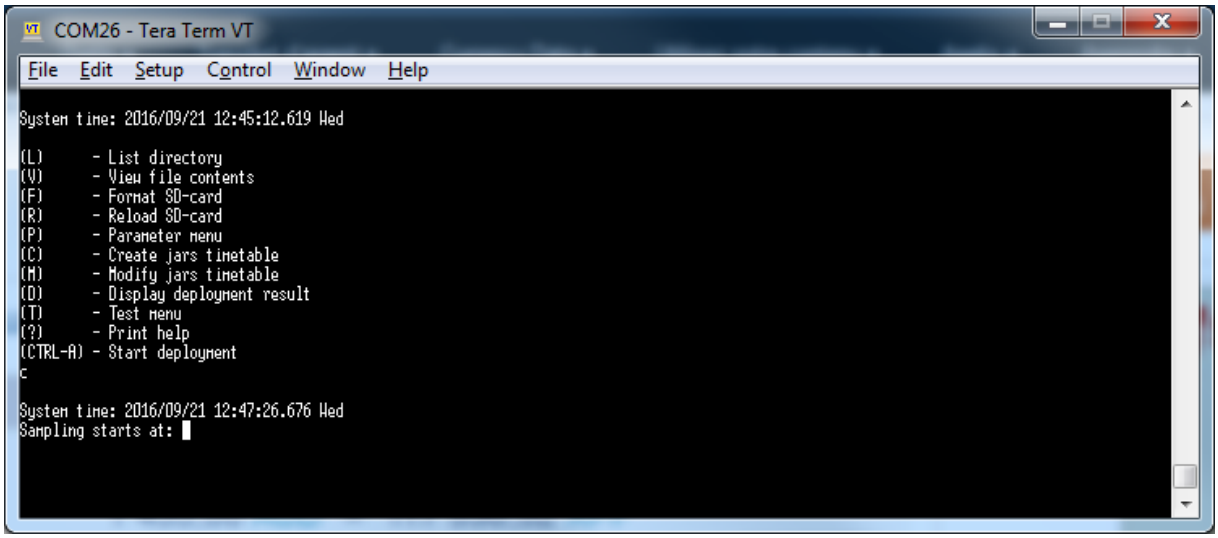
- Type **'C'** (Create jars timetable)

The sampling start time will be displayed, (the default time is the following day at midnight)



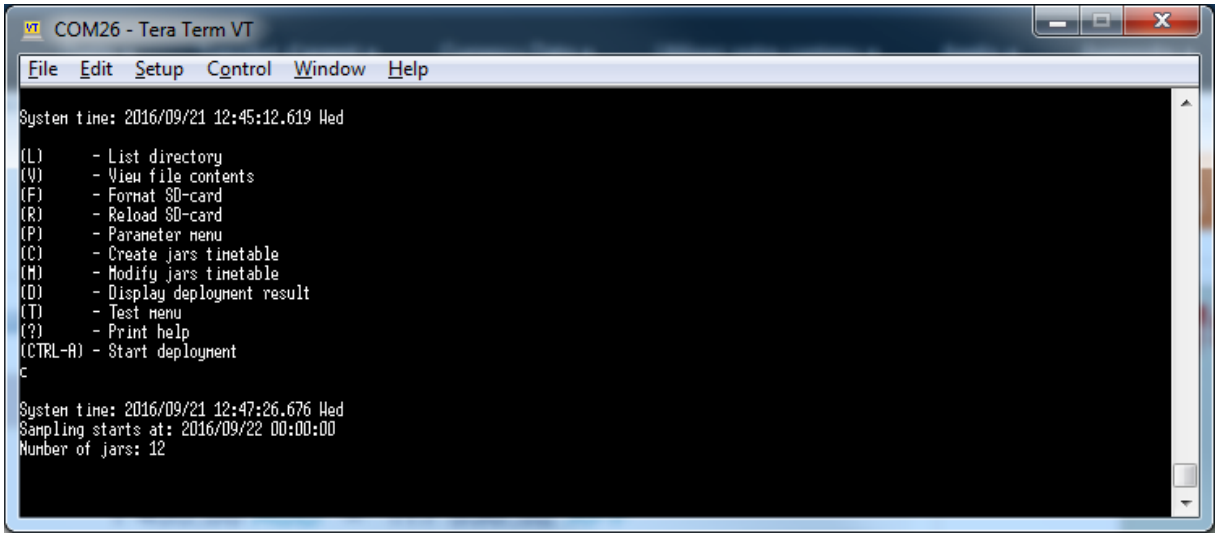
To change the starting time delete the date and replace it with the date and time you wish to have the first sample jar exposed. For the example given above sampling would start at mid-night on the 22 of September:

- Type **'2016/09/22 00:00:00'** (note the format is year/month/day/hour/minute/second)
- Press **'ENTER'**



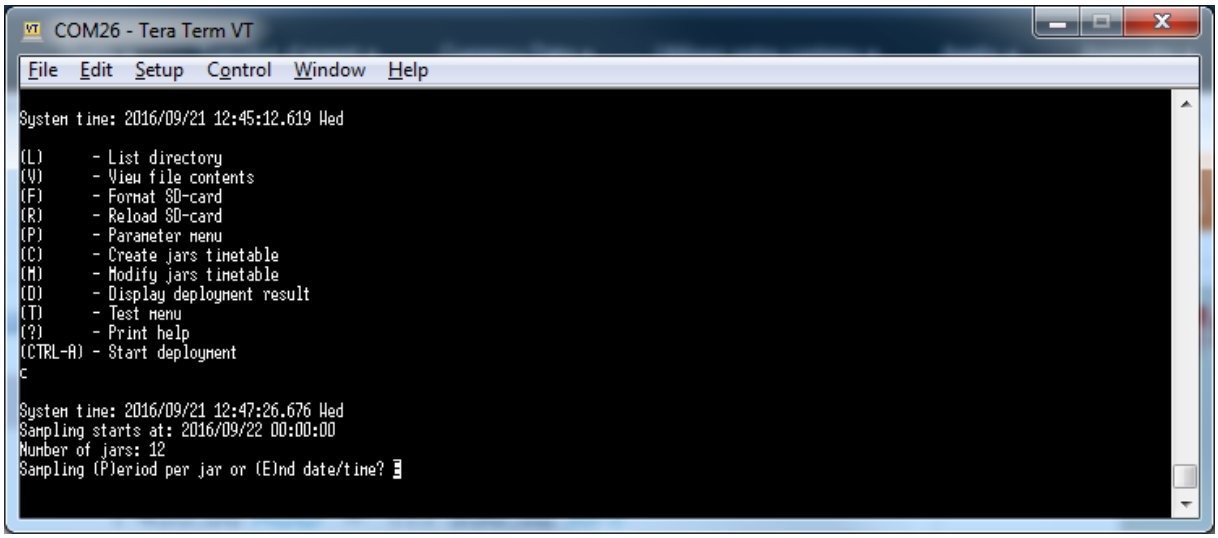
The prompt will ask you to type in the number of jars.

- Type **'12' (For a 24 sample jar system type '24')**
- Press **'ENTER'**



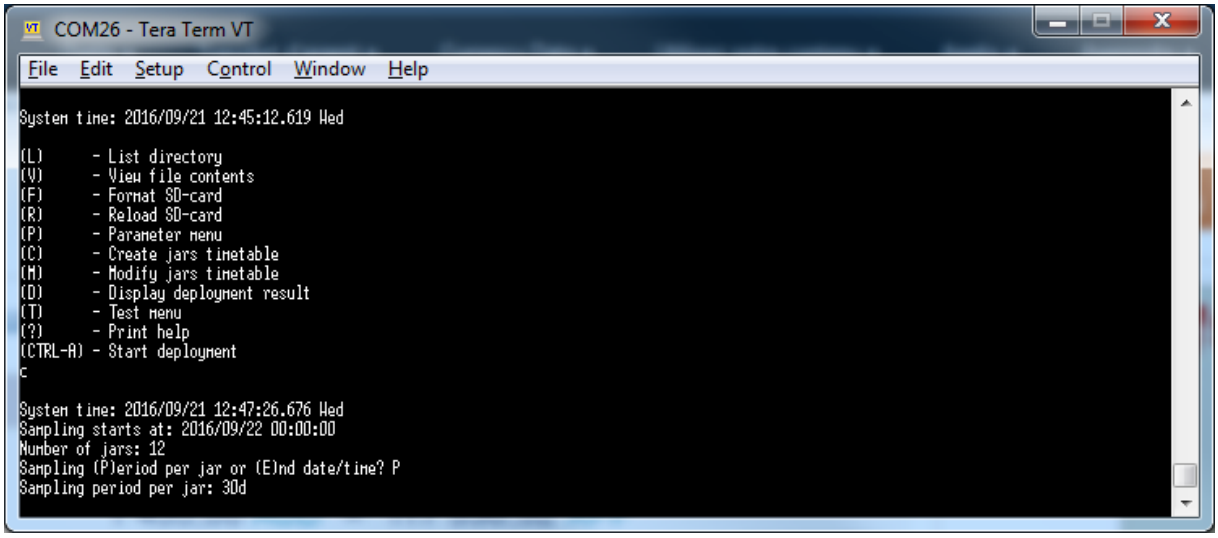
The exposure time of each sample jar can be specified by either, determining the exposure period for each sample jar (period per jar = P) or by specifying the end date of the sequence (End date = E).

- Select **'P'** or **'E'**
- Press **'ENTER'**



Programing by sampling period (P)

Selecting 'P' the sampling period must be added. The default value of 30 days (30d) will be shown. The sampling period can be written in seconds or days (d= days, example: 4d = 4 days, or in seconds (example: 120 =2 minutes).

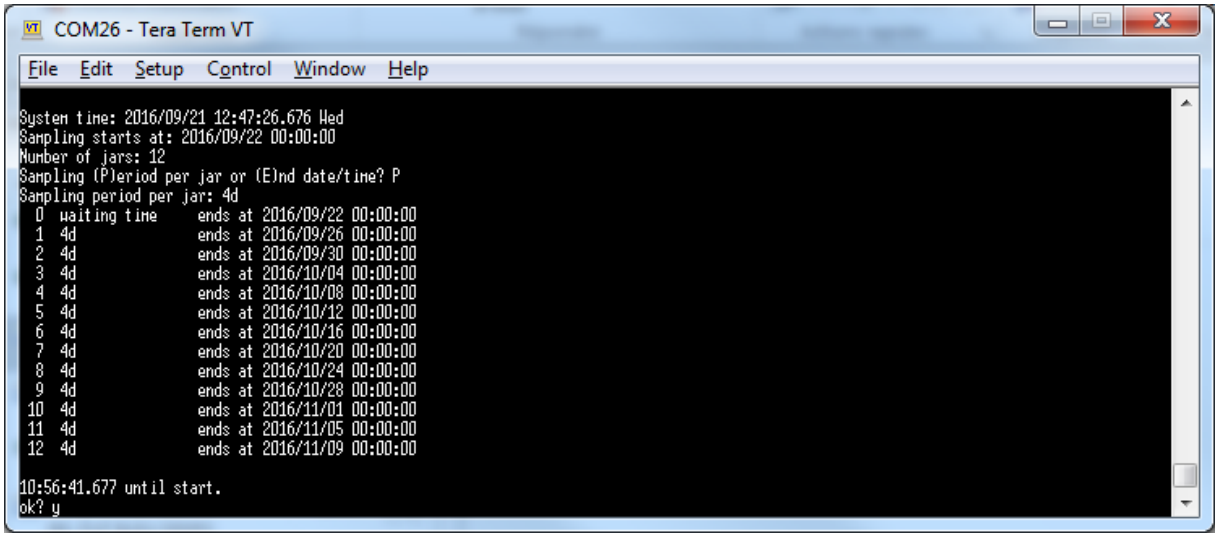


Delete 30d and replace with the sampling period required. In this example 4 days has been chosen.

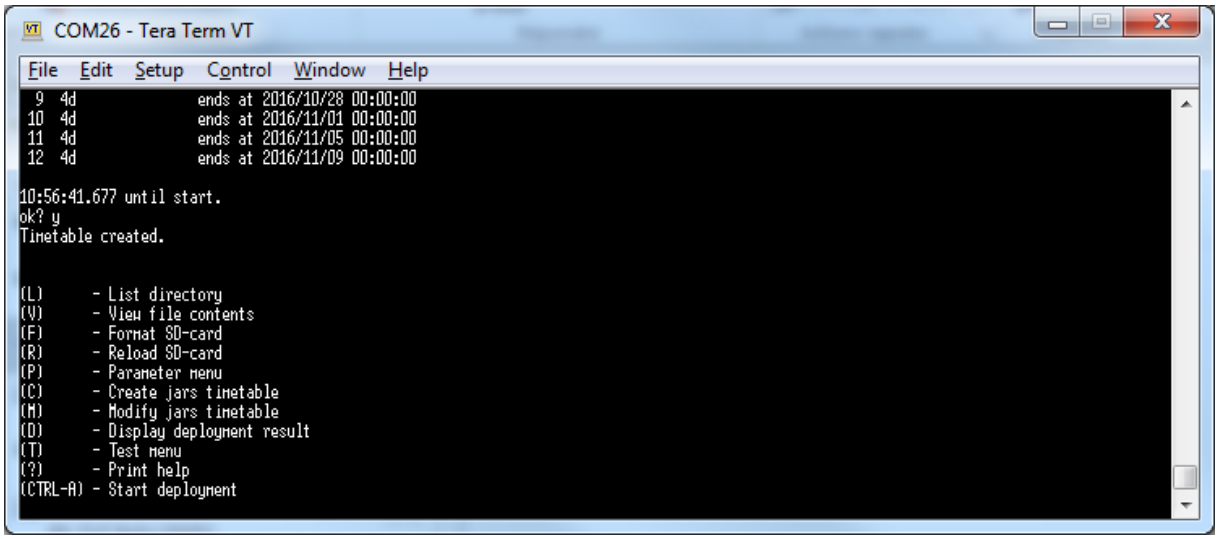
- Type **'4d'**
- Press **'ENTER'**

The window will now display the deployment sequence for each sample jar and the time remaining before the sequence will start.

- Press **'ENTER'** to accept the sequence



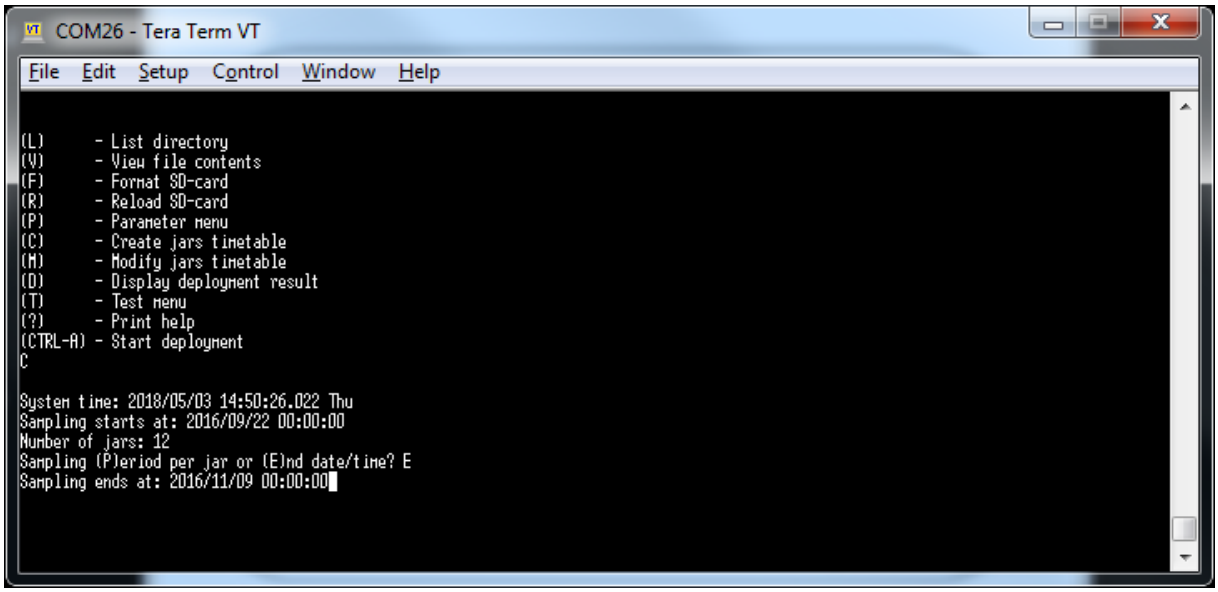
The software will now confirm the sequence has been created by displaying 'Timetable created'



Programing by sampling end date (E)

Selecting 'E' the end date must be added. Add the end date (year/month/time 00:00:00).

- Type the end date **'XXXX/XX/XX 00:00:00'**
- Press **'ENTER'**



The window will now display the deployment sequence for each sample jar and the time remaining before the sequence will start.

- Press **'ENTER'** to accept the sequence

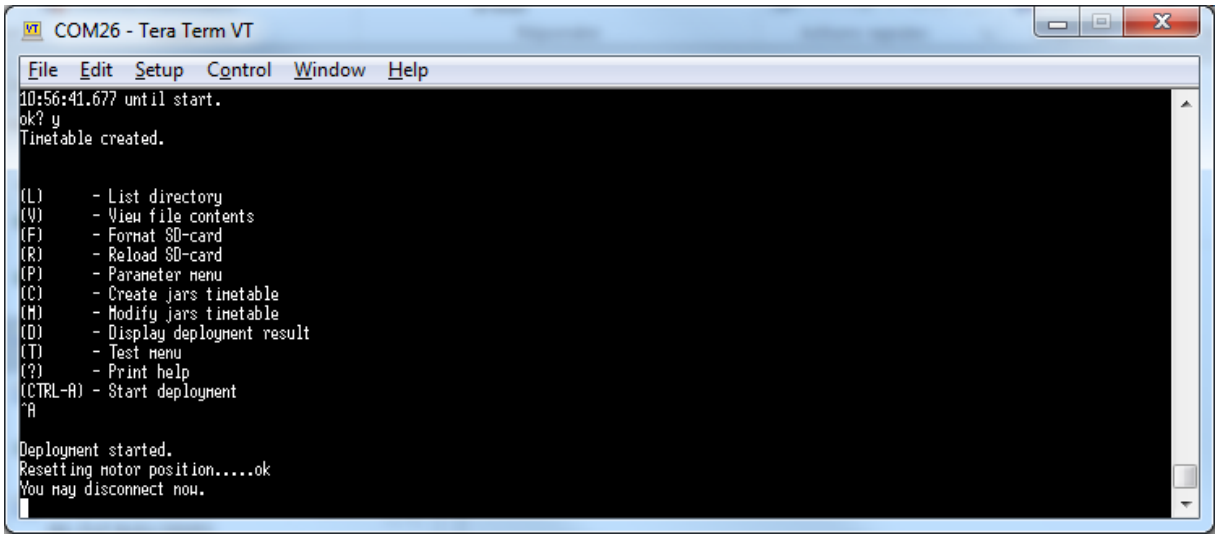
The software will now confirm the sequence has been created by displaying 'Timetable created'

Starting the sequence

After programing by either sampling period (P) sampling end date (E) the sequence needs to be started.

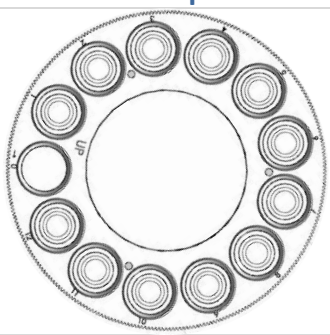
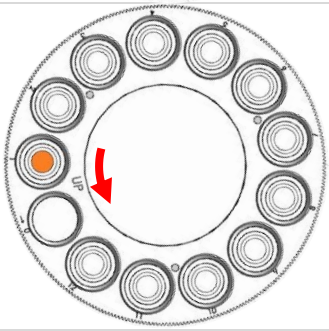
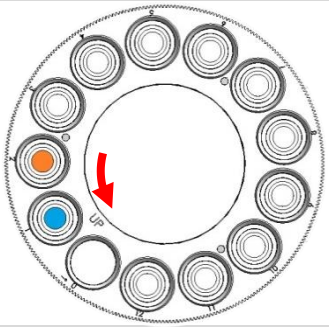
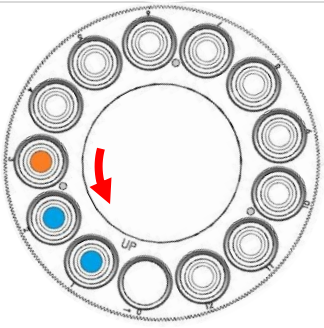
- Type **'CTRL-A'** to start the sequence
- Press **'ENTER'**

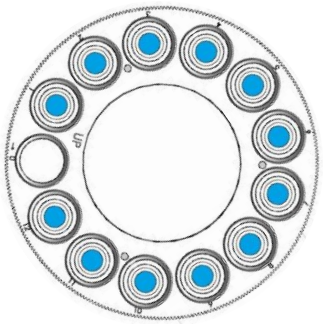
The deployment sequence will be confirmed with 'Deployment started'
The motor axel will turn to reset the position and 'Resetting motor position…….ok 'will be displayed
The software will now say the motor can be disconnected.



You can now disconnect the USB cable and close the housing if using an internal USB connection or when using the external housing connector replace the USB connector with the plug.

An example of a typical program is shown below:

Carrousel position	Programming step
	Sediment trap in standby mode. All sample jars remain isolated.
	Sampler wakes up on the 22 September 2016 (22/09/16) at midnight (00:00:00) Sample jar 1 is exposed for 4 days. 11 non exposed sample jars remain isolated.
	Sample jar 1 isolated after exposure. Sample jar 2 is exposed for 4 days 10 non exposed sample jars remain isolated.
	Sample jars 1 and 2 isolated after exposure. Sample jar 3 is exposed for 4 days 9 non exposed sample jars remain isolated.
.....	Sequence continues….



After the last sample jar is exposed for 4 days the sediment trap returns to sleep mode by returning the carrousel to the initial starting position (In the given example this occurs on the 9 October 2016 (09/11/16) at midnight (00:00:00)
All sample jars 1 to 12 remain isolated after exposure until recovery of the sampler can be carried out.

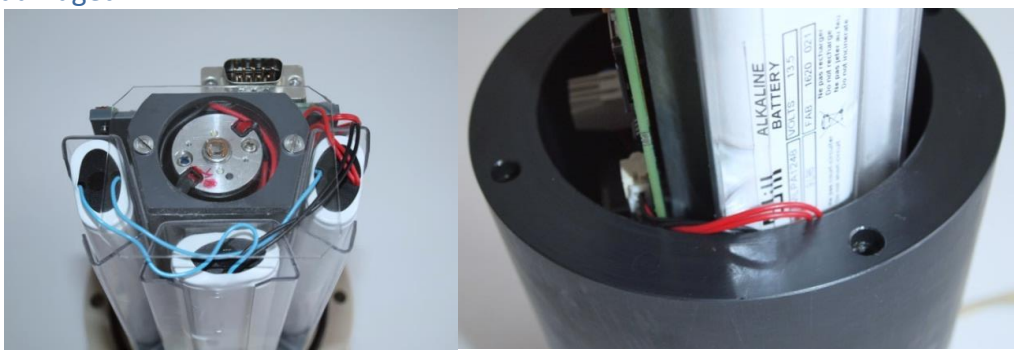
CLOSING THE MOTOR HOUSING

O-ring maintenance and correct placement is critical to keeping the housing from leaking. Incorrect O-ring placement or the use of worn or damaged O-rings may result in water ingress and damage to the motor and circuitry.

Water damage from incorrectly placed or maintained O-rings can void the sampler warranty.

Closing the motor housing

- Check to ensure there is no foreign material, cracks, grit, sand, or hair present. Clean O-rings and lubricate with a thin coating of silicone O-ring grease before deployment.
- Before sealing the controller housing, confirm the two O-rings are seated in the radial grooves correctly.
- Carefully slide the motor into the housing ensuring none of the battery wires are sticking out and become damaged.



- Place the housing upright and gently push down the motor head.
- Once the head is seated correctly screw in the 4 bolts (M6 x 45mm) using a size 5mm Allen key

STORAGE and maintenance

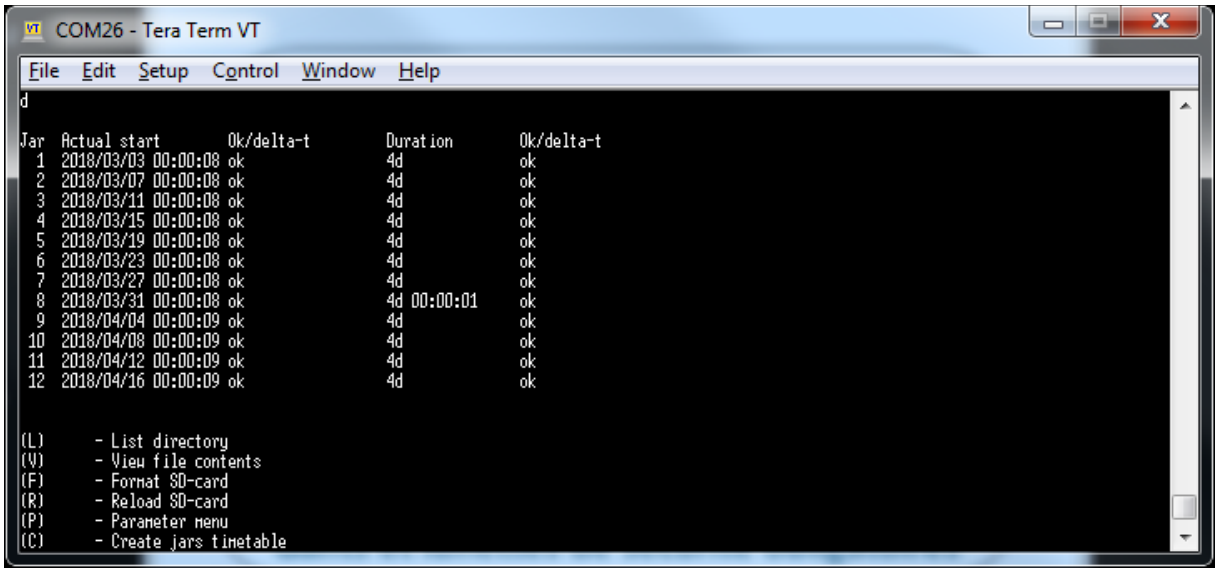
Proper maintenance after every deployment is critical for ensuring smooth operation and long instrument life for your sediment trap.
Always remove the drop-in battery pack from the motor housing when the sampler is not in use. Batteries left in the controller housing during shipping or storage can leak, causing damage that can void the sampler warranty.
The shipping crate is a reusable international freight container that is ISPM-15 compliant for international transport.

OFFLOADING DATA

Data is stored during the deployment of the sampler on a microSD card. This includes: the Deployment results, in the form of a table which indicates the deployment time and duration for each DGT device. Also, if any problems have occurred during the deployment these will be displayed.
To display and retrieve data from a particular deployment using TERATERM:

- Type **'V** to view the file contents (list of files)
- Press **'ENTER'** to display all the files
- To display at the file data type the file name then press **'ENTER'**

All the data for that file will be displayed in the program.
The data can also be retrieved by removing the microSD card and downloading the specific .TXT file
Below is an example the results obtained for a deployment.



TECHNICAP

- *ORIGINAL INSTRUCTIONS FOR NIOZ ELECTRONIC CARD*

NIOZ / Table of Contents

Functional Description

The controller board software executes a user defined time table for controlling a carousel motor. This time table is created using a PC based interface via a serial or USB cable. The carousel holds either 12 or 24 collecting jars and has one additional (usually) vacant position called the zero position. The software assumes that the sediment trap will be assembled starting at the zero position. Deployment mode must be started and stopped manually using the PC interface. Upon start, the software will create a new log file with name "*iii-nnnn*.TXT" on its micro SD card where *iii* is the controller identification number and *nnnn* is automatically incremented. This log file is used for recording time-stamped events such as starting and stopping the carousel motor and for recording the internal temperature and tilt (by measuring 3D acceleration).

Stuck carousel recovery

When the motor draws too much current for too long (or the battery voltage collapses as a result) then controller board software will detect a "motor stuck" condition: it will stop and rotate backward to the old position (if movement has been detected). The software will recognize a secondary stuck condition in the reverse direction too. The rotate forward operation will be retried after a delay with exponential back-off up to a maximum delay time. The standard delay sequence after reset starts with 1/15th of a day, doubling after every attempt with a maximum of 1 day between retries. 1/15 + 2/15 + 4/15 + 8/15 is exactly 1 so the first 24 hours the software will execute 4 retries and after that only once per day. This and many other parameters are configurable using the PC interface. When retrying takes longer than a collecting jar period then any intermediate jars will be skipped when the motor successfully rotates forward again.

Manually rotating the carousel

When the controller board detects a (strong) magnet then the carousel motor will rotate to the next position. This is useful for closing the current collecting jar when the sediment trap is recovered before the time table has finished. After assembling the sediment trap but before the first time table event the carousel can be rotated similarly to a new zero position.

PC Interface

The controller board can be connected to a PC with one RS232 or USB cable using 9600 baud 8N1 (8 data bits, no parity, 1 stop bit). Communication with the controller board is text-based and will work with most terminal emulator programs. It is recommended to have at least a 44 lines 80 columns wide emulation screen (See section **PC Requirements** for more information). The software implements a hierarchical menu system which is controlled by single key-presses (no command-line input). The **Esc** (escape) key is the general "get me out of here" key. It will cancel any parameter question and return from a sub-menu, whatever is applicable. The **spacebar** will reprint the current menu. The **Backspace** key is used for correcting parameter input.

There are two operating modes: either the menu system is active or the software is in deployment mode. Pressing a key (preferably **Esc** or **spacebar**) in deployment mode will respond with

```
Deployment active, type CTRL-H for help.
```

When the menu system is active then pressing **Esc** will respond with:

```
System time: 2015/07/27 13:54:27.324 Mon
```

```
(L)       - List directory
(V)       - View file contents
(F)       - Format SD-card
(R)       - Reload SD-card
(P)       - Parameter menu
(C)       - Create jars timetable
(M)       - Modify jars timetable
(D)       - Display deployment result
(T)       - Test menu
(?)       - Print help
(CTRL-A)  - Start deployment
```

It is safe to explore the menu system, creating time-tables and adjusting parameters. The test menu has a **CTRL-R** command which performs a MCU reset, similar to switching power off and on. It will erase time-table, last deployment result and set standard parameter values. Files on the micro SD card are not affected. Typical use of the menu system is described in two sections: **Recovery Checklist** and **Deployment Checklist**.

Deployment Checklist

⚠ Walk through the **Recovery Checklist** first, if applicable.

Connect one RS232 or USB cable between the controller board and a PC with a terminal emulator using 9600 baud, no parity, 1 stop-bit. Set the terminal emulator window to at least 44 lines, 80 columns.

- Press **Esc** to make the main menu appear.
- Type **T** for the test sub-menu followed by **CTRL-R** to reset the controller board. It should report something like

```
delay.c: 262140 iterations take 98 ms (2674/ms).
Loading FAT filesystem...OK
System time: 2015/07/30 13:28:32.175 Thu
```

- Optional: Type **F** to format the SD card, removing all files (this is an SD card write test too).
- Type **P** to enter the parameter sub-menu followed by **Enter** for standard level and adjust the System time if necessary. See the **Parameters** section for more information.
- Return to the main menu by pressing **Esc**.
- Type **C** to create a basic timetable for the collecting jars. The software will ask a couple of questions.
- Optional: Type **M** to review and/or modify the timetable, followed by **Esc** to return to the main menu again.
- Type **CTRL-A** to start deployment. The software should respond with

```
Deployment started.
Resetting motor position.....ok
You may disconnect now.
```

Recovery Checklist

Connect one RS232 or USB cable between the controller board and a PC with a terminal emulator using 9600 baud, no parity, 1 stop-bit. Set the terminal emulator window to at least 44 lines, 80 columns.

- Press **Esc** a couple of times to get a response. It should respond with

```
Deployment active, type CTRL-H for help.
```

Type **CTRL-Z** to stop the deployment, returning to the main menu. When the menu system was already active then deployment may have been stopped prematurely due to a critically low battery.

- Type **D** to view a summary of the deployment result. This should display a table with start time and duration for every collecting jar together with either "**ok**" or a delta time when the deviation is suspiciously large (more than one minute). Capture this output (Copy-Paste or via terminal emulator logging).
- Type **L** to see the files on the SD card. Files can be viewed with **V** and captured but it may be better to use an SD card reader to copy files of interest to a PC. The controller board software creates one file for every deployment. Type **R** (reload) after inserting the SD card back into the controller board.

Parameters

The parameter sub-menu starts with the question

```
(S)tandard, (A)dvanced, (+)Debug or (*)All?
```

Choosing **S** for a standard parameter selection is usually the best choice. The other choices incrementally show more parameters. The advanced selection includes parameters which typically don't need any adjustment after reset. When pressing a key to change parameters, the menu system will print the current value: use the **Backspace** key to change it. Press **Enter** to commit the new value or press **Esc** to cancel. When an out of range value is entered then the parameter system will print the valid range and ask again. When there is a syntax error then the parameter system will print the expected syntax.

The syntax for short times, time intervals (or more precise: relative times) is basically the number of seconds in fixed point notation with millisecond precision. Alternative syntax is *HH*:*MM*:*SS* with an optional fraction and *MM*:*SS*.*ms* but not *XX*:*YY* (as this could mean either *HH*:*MM* or *MM*:*SS*). All parameters will be written to the log file on the SD card upon start of a deployment.

An MCU reset (see the test menu) will set standard values for all parameters except controller identification number (preserved in internal MCU flash memory) and system date and time (provided by a battery backed real time clock chip).

Standard Parameters

These are:

```
(S)     - System time          : 2015/07/30 13:01:10
(N)     - ID                   : 11
(I)     - Sensor log interval  : 00:10:00
(;)     - Remark               :
(B)     - # alkaline cells     : 0
```

System time

Wall clock time without time zone offset, i.e. UTC. By pressing **Enter** or **Space** in the parameter menu it will show an updated system time. Synchronization works best by setting the value 10..30 seconds in the future, wait until the exact moment and then press **Enter**. The battery backed real-time clock on the main controller board will be re-synchronized when leaving the parameter menu.

ID

Controller identification number (0..999). The log file name will start with this to avoid mixing up log files from different trap motor controllers. This parameter is not affected by a controller board reset (it is preserved in flash memory internal to the MCU). The **ID** is typically derived from some externally visible number (serial number, equipment tracking number for example).

Sensor log interval

At every *sensor log interval* the software will save on-board sensor readings in the log file on the SD card. Sensors are for temperature (0.1°C precision), 3D acceleration for sediment trap orientation and 3D magnetic field strength. Acceleration (±2 G) and magnetic field strength (±1.3 Gs) are read from an **LSM303DLHC** chip and logged as-is in decimal X,Y,Z format. The motor position and internal state are saved too. The standard *interval* is 10 minutes.

Remark

One line of text (up to 80 characters).

alkaline cells

The number of cells in series, zero for non-alkaline battery packs. The test menu contains a battery status option which will estimate the remaining battery capacity as a percentage by measuring the total voltage under constant load. The capacity estimation requires knowledge about the exact number of cells and works only for alkaline battery packs

Advanced Parameters

All standard parameters are included:

```
(S)     - System time                          : 2015/07/30 13:18:23
(N)     - ID                                   : 11
(I)     - Sensor log interval                  : 00:10:00
(A)     - Accelerometer reads                  : 3
(M)     - Magnetometer reads                   : 1
(;)     - Remark                               :
(E)     - Deployment result error threshold    : 00:01:00
(E)     - Check timetable for strange values   : y
(D)     - Position step timeout                : 00:01:30
(R)     - Initial retry delay                  : 01:36:00
(R)     - Maximum retry delay                  : 1d
(U)     - Motor stuck check interval           : 0.5
(U)     - Maximum motor current                : 825 mA
(U)     - Minimum motor voltage                : 7000 mV
(U)     - Stuck count threshold                : 4
(B)     - Battery test settling time           : 1000 ms
(B)     - Battery sense delay                  : 2000 us
(B)     - # alkaline cells                     : 0
```

Accelerometer reads

The number of 3D acceleration sensor readings in a row at every *sensor log interval*. Every sensor reading is logged separately and log file post-processing could for example use averaging for a more precise readout. Standard value is 3.

Magnetometer reads

Similar as **Accelerometer reads** explained in the previous section but for reading the magnetic field strength.

Deployment result error threshold

It takes time for motor and carousel to rotate so the deployment result will show actual times which differ from the scheduled times. When the time difference is less than the error threshold the result will show an **ok** instead of the time difference. This improves deployment result readability. The standard threshold is 1 minute. The deployment result will be saved to the log file using the error threshold at deployment start. The **D** (Display deployment result) command in the main menu will use the current threshold value.

Check timetable for strange values

By default a deployment is refused when the first collecting jar would be opened within 10 minutes or the last collecting jar would be closed more than 2 years in the future.

Position step timeout

When it takes longer than 90 seconds (standard value) to rotate the carousel to the next position a “motor stuck” condition occurs (see section **Functional Description**).

Initial retry delay

When the controller board senses a “motor stuck” condition while rotating the carousel to the next position it will retry the operation after the *Initial retry delay* has expired. When it fails again the delay will be doubled. The standard *Initial retry delay* is 1/15 of a day (96 minutes). See also section **Functional Description**.

Maximum retry delay

The delay before retrying to rotate the carousel will never be longer than the *Maximum retry delay.* The standard value is one day.

Motor stuck check interval

This is the interval at which the software will check the motor current and voltage to decide if the motor is stuck. When the motor current is higher than *Maximum motor current* or the voltage is less than *Minimum motor voltage* then an internal counter is incremented. When this counter reaches the *Stuck count threshold* then the motor is considered “stuck” and the operation will be retried as explained in the section **Functional description**. The standard interval is 0.5 s.

Maximum motor current

Standard value is 825 mA. See *Motor stuck check interval.*

Minimum motor voltage

Standard value is 7000 mV. See *Motor stuck check interval.*

Stuck count threshold

Standard value is 4. See *Motor stuck check interval.*

Battery test settling time

The remaining battery capacity is estimated by measuring its voltage after activating an on-board dummy load, assuming AA alkaline cells. The discharge curve of battery cells with this chemistry permits such estimations. The *Battery test settling time* is the time the dummy load needs to be activated before measuring the voltage. Standard value is 1000 ms.

Battery sense delay

The circuit for measuring the battery voltage must be switched on and this implies a delay before the actual measurement can be done. Standard value is 2000 µs (microseconds).

Board Description

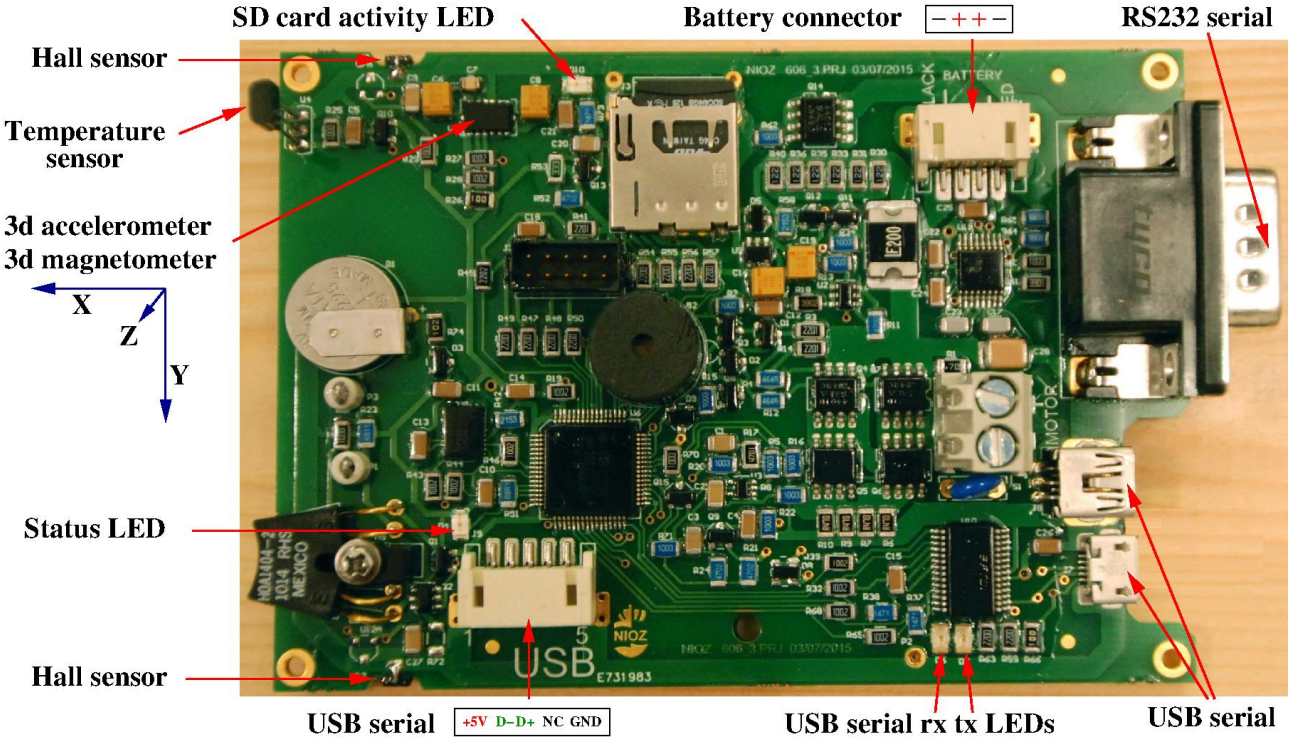
The controller board has LEDs to indicate USB communication (blue), micro SD card activity (red) and the general status of the controller (amber). The general status LED will blink briefly either once or twice every 3 seconds. One blink indicates that the menu system is active, twice means the unit is in deployment mode.

Two hall sensors are mounted on opposite sides of the controller board for detecting the presence of a (strong) magnet. Their function is identical: rotate the carousel to the next position and keep on doing this as long as the magnet is detected. This works through titanium housings. When a sediment trap is recovered before the last collecting jar has been closed then a magnet induced rotation behaves the same as the corresponding time table event: software will record current jar closing (and next jar opening) times. A magnet can also be used to set a new zero position. Before the first time table event has occurred a magnet induced rotation will just rotate the carousel while retaining position zero in software.

A buzzer is present for acknowledging a rotate request received by one of the hall-sensors. The buzzer will also beep after a MCU reset, either by interrupting power or via the menu system.

The controller board uses the micro SD/SDHC card for detailed logging of motor operations and for storing on-board sensor readings at regular interval. Sensors included are for temperature (0.1°C precision) and 3D acceleration for sediment trap orientation. Operation without SD card is possible but not recommended: when the power runs out prematurely the SD card still provides a log of what has happened. (RS 232 optional)

On the electronic board it'll recommended to change the lithium battery welded every 5 years.



Replacing the SD card

The system can handle micro SD and SDHC cards up to the maximum SDHC size (32GB). When inserting an SD card, press until a mechanical/audible click and release: the card should move back slightly (about 1 mm).

In case of doubt, push the card out- and in again without taking the card out. After replacing the SD card it is required to do a format (F) in the main menu. This rewrites the MBR and partition table and creates a FAT32 file-system which is optimized for large files and low power use (one FAT table and maximum cluster size). When the newly inserted SD card has been formatted before by the system and contains data which must be preserved then do a reload (R) instead. Formatting is preferred because it is also a write test.

⚠ Do not replace or take out the SD card while in deployment mode (the amber status LED should blink only once every 3 seconds before proceeding).

Log File Format

The log file consists of text lines all starting with a date and time stamp. The first line contains **START** and the last line contains **STOP**. Right after the starting line all parameters including undocumented ones are written to the log file (See appendix **Log File Example**). Sensor readings are saved at every *sensor log interval*:

```
2014/11/06 08:29:00.001 P=0 state=0,0
2014/11/06 08:29:00.055 T=21.7
2014/11/06 08:29:00.094 A=3,-20,1065
2014/11/06 08:29:00.111 M=-773,-342,-1009
```

The characters P, T, A, M are abbreviations for “motor/carousel **P**osition”, “**T**emperature”, “**A**cceleration” and “**M**agnetic field strength” respectively. Temperature is expressed in degrees Celsius. Acceleration and magnetic field strength are logged in decimal X,Y,Z format. The valid range for X, Y and Z is -2048..2047. This represents ±2G for acceleration and ±1.3Gs for magnetic field strength. The “state” consists of two numbers indicating the internal software state of the motor control state machine. They are nonzero when there is any motor activity or activity pending in case of a stuck motor condition.

Electrical Characteristics

Absolute maximum voltage	19V
Operating voltage range	8..16V
Minimum voltage for logging	6V
Idle current (12V, menu system active, no USB/serial cable attached)	35µA
Deployment current (12V, 10 min. sensor log interval, motor idle)	40µA (350 mAh/year)

The recommended battery configuration is 8..10 AA alkaline cells in series.

Appendix

PC Requirements

The controller board contains a **FT232R** USB 2.0 to serial UART Converter IC from FTDI (www.ftdichip.com) which is used in many USB serial converter cables and equipment of various brands. Despite being pretty standard not all operating systems (or versions thereof) support this out of the box. It might be necessary to (let the operating system) install a driver from the Internet when connecting for the first time to the controller board via USB.

Either a terminal emulator application or a serial line communication program running inside a terminal window is required. The window should display at least 44 lines, 80 columns to get a complete view on the collecting jars timetable and menu. A large scroll buffer is useful too. Many programs for this are available for free on the Internet and can easily be found using one of the popular search engines (some keywords: teraterm, miniterm.py, picocom). The Tera Term project home page can be found at `http://ttssh2.osdn.jp/index.html.en`

Estimations for required battery capacity

During a deployment with standard parameters for logging, the controller board uses 350 mAh/year. The battery capacity used by the motor for carousel rotation is in addition. An example motor (see **Log File Example**) uses approximately 50mA for 8 seconds but this is under ideal conditions without mechanical load. 24 (jars) x 50 (mA) x 8/3600 (hour) = 2.7 mAh. A more realistic example is 24 (jars) x 500 (mA) x 15/3600 (hour) = 50mAh. Two deployments during one year would cost 100 + 350 = 450mAh. AA type alkaline cell capacity typically exceeds 2000mAh but even if only half of the capacity is available (aging, temperature effects, battery quality) then it should be possible to do 4 deployments in 2 years (2 x 450 = 900mAh).

With standard parameter settings a motor stuck condition is detected when the current exceeds 825mA but also when the time for rotating to the next position exceeds 90 seconds. The deployment result shows a table with either **ok** or a **delta-t** when rotating to the next position took more than 60 seconds. So, even if the deployment result does not show any anomaly (all **ok**) the capacity used by the motor alone could be as high as 24 (jars) x 825 (mA) x 60/3600 (hours) = 330 mAh but this is very unlikely.

Log File Example

(12 jars, sampling period is 1 minute per jar)

```
2015/07/30 12:18:37.975 START
2015/07/30 12:18:38.013 System time                          : 2015/07/30 12:18:38
2015/07/30 12:18:38.017 ID                                   : 11
2015/07/30 12:18:38.021 Sensor log interval                  : 00:10:00
2015/07/30 12:18:38.025 Temperature read retry               : 3
2015/07/30 12:18:38.028 Accelerometer reads                  : 3
2015/07/30 12:18:38.032 Magnetometer reads                   : 1
2015/07/30 12:18:38.035 Remark                               :
2015/07/30 12:18:38.040 Deployment result error threshold    : 00:01:00
2015/07/30 12:18:38.043 Check timetable for strange values   : y
2015/07/30 12:18:38.047 Reversed motor wiring                : n
2015/07/30 12:18:38.051 Position step timeout                : 00:01:30
2015/07/30 12:18:38.055 Sensor IRQ debounce time             : 1.0
2015/07/30 12:18:38.059 Centering time                       : 0.075
2015/07/30 12:18:38.063 Motor Break time                     : 0.5
2015/07/30 12:18:38.067 Retry delay                          : 0.0
2015/07/30 12:18:38.071 Initial retry delay                  : 01:36:00
2015/07/30 12:18:38.075 Maximum retry delay                  : 1d
2015/07/30 12:18:38.079 Motor debug                          : 0
2015/07/30 12:18:38.083 Motor stuck check interval           : 0.5
2015/07/30 12:18:38.087 Maximum motor current                : 825 mA
2015/07/30 12:18:38.091 Minimum motor voltage                : 7000 mV
2015/07/30 12:18:38.095 Stuck count threshold                : 4
2015/07/30 12:18:38.098 Power log interval                   : 1.0
2015/07/30 12:18:38.103 Battery test settling time           : 1000 ms
2015/07/30 12:18:38.138 Battery sense delay                  : 2000 us
2015/07/30 12:18:38.141 # alkaline cells                     : 0
2015/07/30 12:18:38.145 Logger debug                         : 0
2015/07/30 12:18:38.149 Logger queue slack                   : 503
2015/07/30 12:18:38.153 trampoline debug mask                : 0
2015/07/30 12:18:38.156 motor: reset
2015/07/30 12:18:38.161 motor: reverse
2015/07/30 12:18:40.165 motor: break
2015/07/30 12:18:40.168 motor: forward
2015/07/30 12:18:42.177 motor: at 0
2015/07/30 12:18:42.180 motor: break
2015/07/30 12:18:42.683 motor: disconnect
2015/07/30 12:20:00.001 P=0 state=0,0
2015/07/30 12:20:00.054 T=24.5
2015/07/30 12:20:00.092 A=34,-26,1055
2015/07/30 12:20:00.104 A=34,-27,1047
2015/07/30 12:20:00.116 A=32,-25,1055
2015/07/30 12:20:00.133 M=-228,-287,-871
2015/07/30 12:30:00.000 motor: setpos 1
2015/07/30 12:30:00.003 motor: forward
2015/07/30 12:30:00.007 P=0 state=2,1
2015/07/30 12:30:00.060 T=24.3
2015/07/30 12:30:00.098 A=-17,-22,1088
2015/07/30 12:30:00.110 A=71,71,1052
```

2015/07/30 12:30:00.122 A=4,56,1235
2015/07/30 12:30:00.139 M=-167,-385,-929
2015/07/30 12:30:02.010 motor: 47mA 11930mV
2015/07/30 12:30:03.016 motor: 46mA 11938mV
2015/07/30 12:30:04.021 motor: 47mA 11973mV
2015/07/30 12:30:05.028 motor: 47mA 11957mV
2015/07/30 12:30:06.034 motor: 47mA 11902mV
2015/07/30 12:30:07.040 motor: 47mA 11973mV
2015/07/30 12:30:08.079 motor: at 1
2015/07/30 12:30:08.082 motor: break
2015/07/30 12:30:08.585 motor: disconnect
2015/07/30 12:31:00.001 motor: setpos 2
2015/07/30 12:31:00.004 motor: forward
2015/07/30 12:31:02.010 motor: 47mA 12024mV
2015/07/30 12:31:03.017 motor: 47mA 12005mV
2015/07/30 12:31:04.022 motor: 47mA 12005mV
2015/07/30 12:31:05.029 motor: 47mA 11981mV
2015/07/30 12:31:06.035 motor: 48mA 11961mV
2015/07/30 12:31:07.041 motor: 49mA 11949mV
2015/07/30 12:31:08.045 motor: at 2
2015/07/30 12:31:08.048 motor: break
2015/07/30 12:31:08.551 motor: disconnect
2015/07/30 12:32:00.001 motor: setpos 3
2015/07/30 12:32:00.004 motor: forward
2015/07/30 12:32:02.009 motor: 51mA 12005mV
2015/07/30 12:32:03.016 motor: 52mA 12005mV
2015/07/30 12:32:04.023 motor: 51mA 12009mV
2015/07/30 12:32:05.029 motor: 52mA 11985mV
2015/07/30 12:32:06.035 motor: 56mA 11993mV
2015/07/30 12:32:07.041 motor: 60mA 11969mV
2015/07/30 12:32:08.075 motor: at 3
2015/07/30 12:32:08.078 motor: break
2015/07/30 12:32:08.582 motor: disconnect
2015/07/30 12:33:00.000 motor: setpos 4
2015/07/30 12:33:00.003 motor: forward
2015/07/30 12:33:02.010 motor: 54mA 12016mV
2015/07/30 12:33:03.016 motor: 51mA 11961mV
2015/07/30 12:33:04.022 motor: 49mA 11965mV
2015/07/30 12:33:05.028 motor: 50mA 11961mV
2015/07/30 12:33:06.034 motor: 50mA 12009mV
2015/07/30 12:33:07.040 motor: 49mA 11922mV
2015/07/30 12:33:08.076 motor: at 4
2015/07/30 12:33:08.078 motor: break
2015/07/30 12:33:08.582 motor: disconnect
2015/07/30 12:34:00.000 motor: setpos 5
2015/07/30 12:34:00.003 motor: forward
2015/07/30 12:34:02.009 motor: 48mA 11945mV
2015/07/30 12:34:03.015 motor: 49mA 11941mV
2015/07/30 12:34:04.021 motor: 50mA 11981mV
2015/07/30 12:34:05.027 motor: 49mA 11969mV
2015/07/30 12:34:06.033 motor: 49mA 11934mV
2015/07/30 12:34:07.039 motor: 49mA 11949mV
2015/07/30 12:34:08.068 motor: at 5

```
2015/07/30 12:34:08.071 motor: break
2015/07/30 12:34:08.573 motor: disconnect
2015/07/30 12:35:00.000 motor: setpos 6
2015/07/30 12:35:00.003 motor: forward
2015/07/30 12:35:02.009 motor: 49mA 11938mV
2015/07/30 12:35:03.015 motor: 49mA 11993mV
2015/07/30 12:35:04.021 motor: 49mA 11997mV
2015/07/30 12:35:05.027 motor: 49mA 11961mV
2015/07/30 12:35:06.034 motor: 49mA 11981mV
2015/07/30 12:35:07.039 motor: 49mA 11941mV
2015/07/30 12:35:08.051 motor: at 6
2015/07/30 12:35:08.054 motor: break
2015/07/30 12:35:08.557 motor: disconnect
2015/07/30 12:36:00.000 motor: setpos 7
2015/07/30 12:36:00.003 motor: forward
2015/07/30 12:36:02.011 motor: 49mA 12009mV
2015/07/30 12:36:03.016 motor: 49mA 11973mV
2015/07/30 12:36:04.023 motor: 49mA 11934mV
2015/07/30 12:36:05.029 motor: 49mA 11973mV
2015/07/30 12:36:06.035 motor: 49mA 12024mV
2015/07/30 12:36:07.041 motor: 50mA 11981mV
2015/07/30 12:36:08.038 motor: at 7
2015/07/30 12:36:08.041 motor: break
2015/07/30 12:36:08.544 motor: disconnect
2015/07/30 12:37:00.000 motor: setpos 8
2015/07/30 12:37:00.003 motor: forward
2015/07/30 12:37:02.011 motor: 49mA 11973mV
2015/07/30 12:37:03.017 motor: 49mA 11945mV
2015/07/30 12:37:04.023 motor: 49mA 12013mV
2015/07/30 12:37:05.030 motor: 49mA 11989mV
2015/07/30 12:37:06.035 motor: 49mA 11985mV
2015/07/30 12:37:07.041 motor: 48mA 11934mV
2015/07/30 12:37:08.036 motor: at 8
2015/07/30 12:37:08.039 motor: break
2015/07/30 12:37:08.543 motor: disconnect
2015/07/30 12:38:00.001 motor: setpos 9
2015/07/30 12:38:00.004 motor: forward
2015/07/30 12:38:02.009 motor: 49mA 11973mV
2015/07/30 12:38:03.016 motor: 48mA 11922mV
2015/07/30 12:38:04.021 motor: 49mA 12016mV
2015/07/30 12:38:05.028 motor: 49mA 11989mV
2015/07/30 12:38:06.034 motor: 49mA 12009mV
2015/07/30 12:38:07.040 motor: 54mA 12013mV
2015/07/30 12:38:08.039 motor: at 9
2015/07/30 12:38:08.041 motor: break
2015/07/30 12:38:08.544 motor: disconnect
2015/07/30 12:39:00.001 motor: setpos 10
2015/07/30 12:39:00.004 motor: forward
2015/07/30 12:39:02.010 motor: 49mA 11961mV
2015/07/30 12:39:03.016 motor: 49mA 11997mV
2015/07/30 12:39:04.023 motor: 49mA 12032mV
2015/07/30 12:39:05.030 motor: 50mA 11993mV
2015/07/30 12:39:06.035 motor: 49mA 11945mV
```

```
2015/07/30 12:39:07.041 motor: 50mA 12028mV
2015/07/30 12:39:08.045 motor: at 10
2015/07/30 12:39:08.048 motor: break
2015/07/30 12:39:08.551 motor: disconnect
2015/07/30 12:40:00.001 motor: setpos 11
2015/07/30 12:40:00.004 motor: forward
2015/07/30 12:40:00.007 P=10 state=2,1
2015/07/30 12:40:00.060 T=24.5
2015/07/30 12:40:00.098 A=61,1,1114
2015/07/30 12:40:00.110 A=84,61,1069
2015/07/30 12:40:00.122 A=29,68,1157
2015/07/30 12:40:00.139 M=-169,-325,-929
2015/07/30 12:40:02.009 motor: 49mA 11949mV
2015/07/30 12:40:03.015 motor: 50mA 11953mV
2015/07/30 12:40:04.021 motor: 50mA 11969mV
2015/07/30 12:40:05.028 motor: 51mA 12024mV
2015/07/30 12:40:06.035 motor: 49mA 11997mV
2015/07/30 12:40:07.042 motor: 49mA 11949mV
2015/07/30 12:40:08.033 motor: at 11
2015/07/30 12:40:08.036 motor: break
2015/07/30 12:40:08.539 motor: disconnect
2015/07/30 12:41:00.001 motor: setpos 12
2015/07/30 12:41:00.004 motor: forward
2015/07/30 12:41:02.011 motor: 48mA 11961mV
2015/07/30 12:41:03.017 motor: 49mA 11969mV
2015/07/30 12:41:04.023 motor: 49mA 12009mV
2015/07/30 12:41:05.029 motor: 49mA 11961mV
2015/07/30 12:41:06.035 motor: 49mA 11989mV
2015/07/30 12:41:07.042 motor: 49mA 12009mV
2015/07/30 12:41:08.029 motor: at 12
2015/07/30 12:41:08.032 motor: break
2015/07/30 12:41:08.535 motor: disconnect
2015/07/30 12:42:00.001 motor: setpos 13
2015/07/30 12:42:00.004 motor: forward
2015/07/30 12:42:02.011 motor: 49mA 11981mV
2015/07/30 12:42:03.017 motor: 48mA 11949mV
2015/07/30 12:42:04.024 motor: 49mA 11985mV
2015/07/30 12:42:05.030 motor: 48mA 11985mV
2015/07/30 12:42:06.037 motor: 48mA 11938mV
2015/07/30 12:42:07.043 motor: 49mA 12036mV
2015/07/30 12:42:08.034 motor: at 13
2015/07/30 12:42:08.037 motor: break
2015/07/30 12:42:08.540 motor: disconnect
2015/07/30 12:46:20.385 Jar  Actual start        Ok/delta-t         Duration  Ok/delta-t
2015/07/30 12:46:20.392   1  2015/07/30 12:30:08 ok                 00:01:00        ok
2015/07/30 12:46:20.399   2  2015/07/30 12:31:08 ok                 00:01:00        ok
2015/07/30 12:46:20.406   3  2015/07/30 12:32:08 ok                 00:01:00        ok
2015/07/30 12:46:20.413   4  2015/07/30 12:33:08 ok                 00:01:00        ok
2015/07/30 12:46:20.420   5  2015/07/30 12:34:08 ok                 00:01:00        ok
2015/07/30 12:46:20.427   6  2015/07/30 12:35:08 ok                 00:01:00        ok
2015/07/30 12:46:20.434   7  2015/07/30 12:36:08 ok                 00:01:00        ok
2015/07/30 12:46:20.441   8  2015/07/30 12:37:08 ok                 00:01:00        ok
2015/07/30 12:46:20.448   9  2015/07/30 12:38:08 ok                 00:01:00        ok
```

2015/07/30 12:46:20.456 10 2015/07/30 12:39:08 ok 00:01:00 ok
2015/07/30 12:46:20.463 11 2015/07/30 12:40:08 ok 00:01:00 ok
2015/07/30 12:46:20.470 12 2015/07/30 12:41:08 ok 00:01:00 ok
2015/07/30 12:46:20.473 STOP

TECHNICAP

DATA PROCESSING with TERA TERM

To obtain a graph of Temperature, Inclinometer and time of exposure of samples.

Install the « **R** » file:
Copy the « **R** » file of the USB key to the computer in C:\Program Files
In C:\Program Files\R\R-3.5.1 start the application: R-3.5.1-win.exe

Recovery a program:
After getting the program on TERA TERM:
*Select all the file
*Copy in a new « .txt » document (right click – new – text document.txt)
*Rename, preferably with the program name (Example: Trapmotor_Lang.txt or 044-0004.txt)
*Delete all lines **before** the START line
*Copy this « .txt » file in the file C:\Program Files\R\R-3.5.1
*Launch the « **R** » application
File
Open a script
Open: C:\Program Files\R\R-3.5.1 and select: read and split sedtrap file 2018.R
1st line, verify the good location where the script has to get its information:
C:\Program Files\R\R-3.5.1
2nd line, enter the file name, for example Trapmotor_Lang.txt or 044-0004.txt
Edition
Run all
Wait a moment (depending on the file size and the computer power, it can take several minutes)
The graphs appear on the screen

ATTENTION: DO NOT DELETE ANY ELEMENT OR FILE PRESENTS IN THE « **R** » FILE DURING THE INSTALLATION.

TECHNICAP

TRAITEMENT DES DONNEES avec TERA TERM

Pour obtenir un graphique de Température, Inclinomètre et temps d'exposition des échantillons.

Installer le dossier « **R** » :
Copier le dossier R de la clef USB vers l'ordinateur dans C:/Programmes
Dans C:/Programmes/R/R-3.5.1 lancer l'application : R-3.5.1-win.exe

Récupération d'un programme :
Après avoir récupéré le programme sur TERA TERM :
*Sélectionner tout le fichier
*Copier dans un nouveau document « .txt » (click droit – nouveau – document texte.txt)
*Renommer, de préférence avec le nom du programme (Exemple : Trapmotor_Lang.txt ou 044-0004.txt)
*Supprimer toutes les lignes **avant** la ligne START
*Copier ce fichier « .txt » dans le dossier C:/Programmes/R/R-3.5.1
*Lancer l'application « **R** »
Fichier
Ouvrir un script
Ouvrir : C:/Programmes/R/R-3.5.1 et sélectionner : read and split sedtrap file 2018.R
1er ligne, vérifier le bon emplacement où le script doit aller chercher ses informations :
C:/Programmes/R/R-3.5.1
2ème ligne, entrer le nom du fichier, par exemple Trapmotor_Lang.txt ou 044-0004.txt
Edition
Exécuter tout
Attendre (selon la taille du fichier et la puissance de l'ordinateur, cela peut prendre plusieurs minutes)
Les graphiques apparaissent à l'écran.

ATTENTION : NE PAS SUPPRIMER D'ELEMENT OU FICHIER PRESENTS DANS LE DOSSIER « **R** » LORS DE L'INSTALLATION.

NOTICE TECHNIQUE PPS 4/3 ET PPS 3/3
TECHNICAL MANUAL PPS 4/3 AND PPS 3/3

Préparation du collecteur des pièges à particules TECHNICAP
Preparation of the TECHNICAP sediment trap collector

ETAPE 1 / STEP 1

Présentation du matériel / Presentation of the material

Matériel nécessaire pour la manipulation des plateaux + moteur :

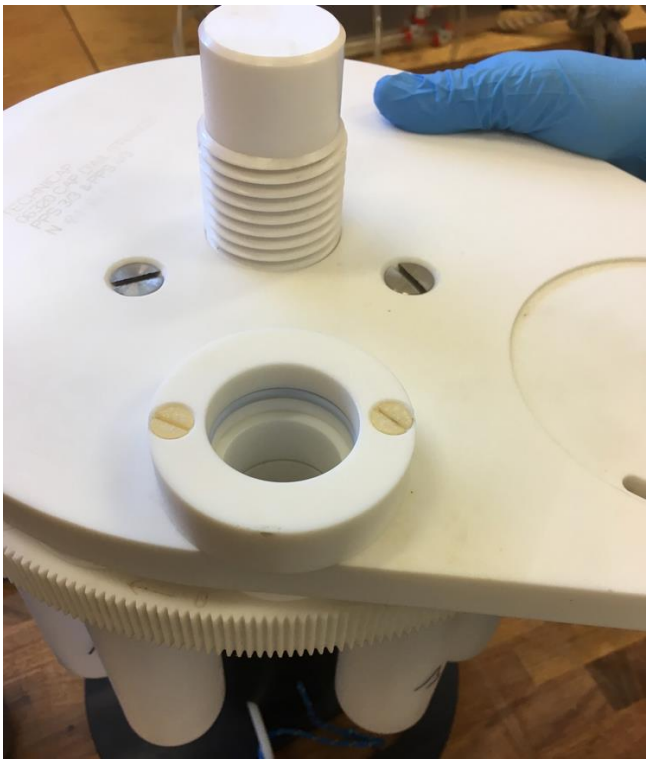
Material needed for handling the rotary disk + motor:

- Clé 6 pans 5mm / 5mm hex key
- Tournevis plat / Flat screwdriver
- Bécher 2l / Beaker 2l
- Gants Nitrile, Néoprène ou Butyle / Nitrile, Neoprene or Butyl gloves
- Masque FFABE1P2 D (Masque 3m 4277) / Mask FFABE1P2 D (Mask 3m 4277)

ETAPE 2 / STEP 2

Serrage et réglage du plateau

Tightening and adjusting the rotary disk

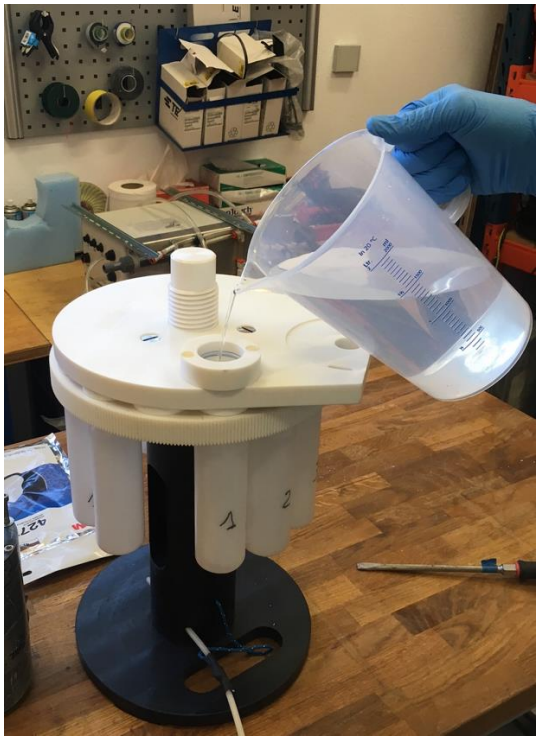


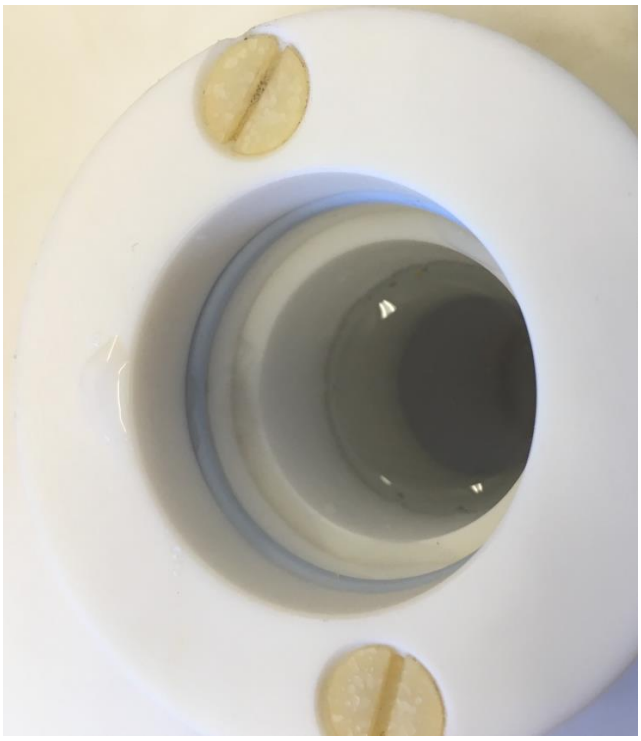
Avant le remplissage des flacons, bien s'assurer du serrage des trois vis du plateau. Il ne doit pas être bloqué mais opposer une légère résistance lorsqu'on le fait tourner manuellement.

Before filling the bottles, make sure that the three screws on the plate are tight. It should not be blocked but put up a slight resistance when turned manually.

ETAPE 3 / STEP 3

Remplissage des flacons / Filling the bottles





Faire tourner manuellement le plateau (sans le moteur !!) jusqu'au 1er flacon à remplir. Le remplissage de chaque flacon se fait jusqu'au trait séparant les 2 disques du plateau en le dépassant légèrement.

Faire tourner le plateau manuellement jusqu'au flacon suivant.

Tous les flacons étant remplis, le trou de remplissage doit alors se trouver entre les flacons 12 et 1.

Le plateau est alors ouvert entre ces flacons et est prêt à recevoir le moteur.

Pour la nouvelle carte « NIOZ » avec inclinomètre et thermomètre, il est conseillé de remplir les flacons de 1 à 12 manuellement. Dans cette position n° 12 insérer le moteur délicatement, le fixer avec les 2 vis et approcher un aimant près de la jonction entre le corps et la tête du moteur, ce qui entraine une rotation jusqu'au « 0 ».

Manually rotate the rotary disk (without the motor !!) until the 1st bottle to fill.

The filling of each bottle is done up to the line separating the 2 disk from the rotary disk, slightly exceeding it.

Manually rotate the rotary disk to the next bottle.

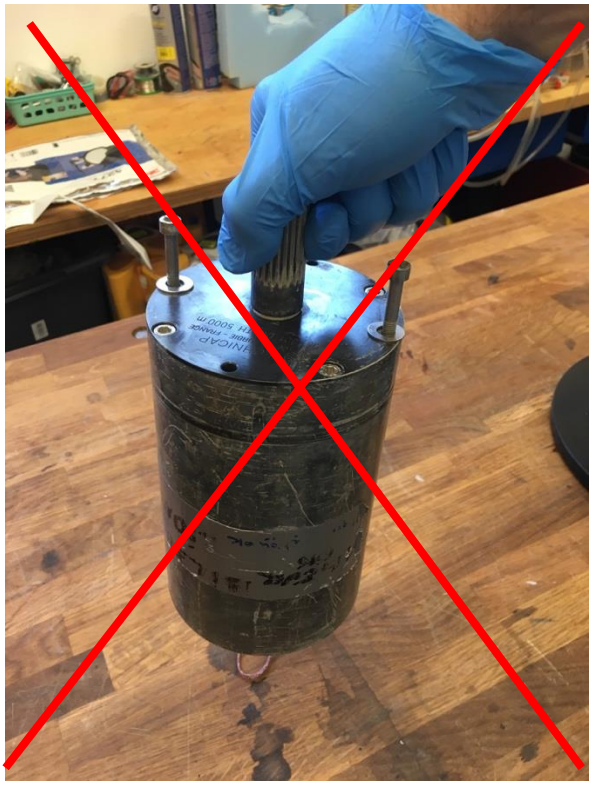
All the bottles being filled, the filling hole must then be between the bottles 12 and 1.

The plate is then open between these bottles and is ready to receive the motor.

For the new "NIOZ" card with inclinometer and thermometer, it is advisable to fill the bottles from 1 to 12 manually. In this position n ° 12 insert the motor delicately, fix it with the 2 screws and bring a magnet near the junction between the body and the head of the motor, which causes a rotation to "0".

ETAPE 4 / STEP 4

Prise en main du moteur / Motor handling



Pour toute manipulation du moteur, ne jamais risquer une rotation, quelle qu'elle soit, sur l'axe après test (remise à 0 de l'axe) et programmation.

Le risque est de perdre la position 0 de l'axe et lors de la première rotation du premier flacon, il s'arrêtera à la position 0, avec les quelques degrés occasionnés par la mauvaise manipulation. Le résultat sera alors un décalage dans le temps de tous les flacons (le premier flacon collectant les sédiments sera le 2e flacon programmé) et le piège remontera ouvert sur le dernier flacon programmé.Le risque est encore plus grand avec les nouvelles cartes électroniques, l'axe offrant moins de résistance.

Noter le numéro de série du moteur et plateau, ainsi que la position du piège sur la ligne de mouillage.

When handling the motor, never risk rotating the axis of any kind after testing (resetting the axis to 0) and programming.

The risk is to lose the 0 position of the axis and during the first rotation of the first bottle, it will stop at the 0 position, with the few degrees caused by improper handling. The result will then be a time lag of all the bottles (the first bottle collecting the sediment will be the 2nd programmed bottle) and the trap will go back open to the last programmed bottle. The risk is even greater with the new electronic boards, the axis offering less resistance.

Note the motor serial number and rotary disk, as well as the position of the rotary disk on the mooring line.

ETAPE 5 / STEP 5

Mise en place du moteur / Positioning the motor

Présenter le moteur sur son emplacement, trou des 2 vis en face des 2 larges trous du plateau, en veillant tout particulièrement à :

- lentement, le faire glisser dans les dents de l'engrenage du plateau

- **ne jamais faire une rotation manuelle du moteur** (raisons à l'étape 4), surtout au contact des dents. Si l'axe denté ne s'enclenche pas, remonter le moteur, sortir l'axe du contact des dents du plateau et le tourner légèrement pour enclencher le moteur correctement.

Present the motor in its location, hole of the 2 screws opposite the 2 large holes in the rotary disk, paying particular attention to:

- slowly, slide it into the teeth of the chainring gear

- **never manually rotate the motor** (reasons in step 4), especially when in contact with the teeth. If the toothed axle does not engage, reassemble the motor, pull the axle out of contact with the teeth of the chainring and turn it slightly to engage the motor correctly.

Serrage du moteur / Motor tightening


Présenter les 2 vis/rondelles et bien serrer.

Present the 2 screws / washers and tighten securely.

ETAPE 6 / STEP 6

Montage du plateau et moteur sur le piège

Mounting the rotary disk and motor on the trap

Incliner le PPS, en évitant au maximum de le laisser à l'horizontal.

Présenter le plateau en face des 3 trous (vis centrale, moteur, ouverture du corps du PPS).

Une 2e personne peut saisir le cordon du moteur en passant la main dans le large trou latéral du corps du PPS.

Bien visser la vis centrale jusqu'à ce que le trou du corps soit emboité dans le trou ouvert du plateau.

Dernière étape : bien vérifier que le trou central du PPS est libre, sans flacons !

Tilt the PPS, taking care not to leave it horizontal.

Present the rotary disk opposite the 3 holes (central screw, motor, opening of the PPS body).

A second person can grab the motor cord by passing their hand through the large side hole in the PPS body.

Tighten the central screw until the hole in the body fits into the open hole in the rotary disk.

Last step: check that the central hole of the PPS is free, without bottles!