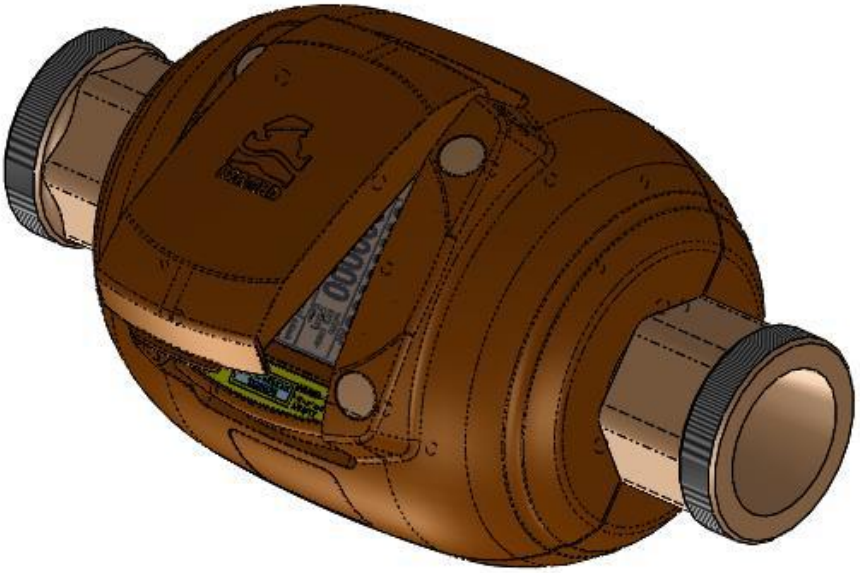
# OCEAN

**A Clever Ultrasonic Water Meter System by BERMAD-NISKO**



# Installation and User Manual

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# 1. Introduction

**Thank you very much for purchasing the Ocean "Ultrasonic Water Meter" (USWR). We have done our utmost to design and manufacture a flow meter that satisfies your requirements.**

**Please be sure to read this Installation and User Manual to use this product correctly and safety and to prevent failures.**

**Please arrange for operators who actually use this product to know the context of this Operation Manual surely. This Operation Manual becomes necessary for performing maintenance, too.**

## 1.1 Confirmation of Package Contains

**This product has been thoroughly inspected and tested before shipment and is ready for use.**

**After unpacking the meter, inspect for shipping damage before attempting to install, if any indication of mechanical damage is found, immediately contact the responsible transportation service or your local BERMAD-NISKO representative.**

## 1.2 Items Included

**One Ocean ultrasonic water meter, size as indicated on packaging box.**

## 1.3 Documents included

**Installation and User Manual**
**Report of Factory meter settings**
**Calibration data.**
**Assemblies drawing of USWR include Bill of Material**

## 2. Safety, Repair and Product Identification

**Safety instructions:**

**2.1 Do not install, operate or maintain this USWR without reading, understanding and following the factory supplied instructions.**

**2.2 Read this instruction carefully before beginning installation and save them for future reference.**

**2.3 Observe all warnings instructions marked on the product.**

**2.4 Consider handling and lifting instruction to avoid damage.**

**2.5 Pay attention to the environment on the installation site.**

**2.6 Wear necessary protective equipment and follow all current safety regulations.**

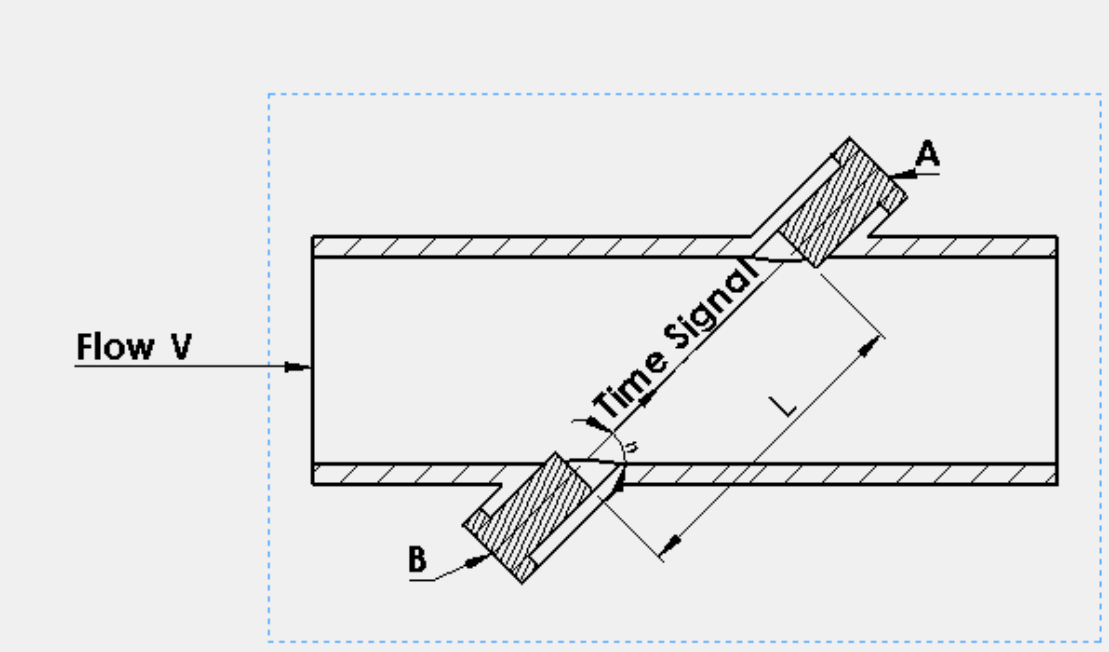
**2.7 Repair : Repair must only be made by BERMAD CS or NISKO Telematics Systems or by a service representative approved by BERMAD-NISKO.**

## 3. System description and Measurement Method

**Principle of Measurement**

**Ultrasonic Water Meters (USWR) is based on the measurement of the signal propagation times.**

**An ultrasound measurement path consists of two ultrasonic transducers A and B, mounted on opposite sides of the flow meter tube (see picture).**




**The transducers can be operated both as senders and receivers and therefore allow to reverse the direction or irradiation.**

**The time required by the ultrasound for passing the distance L between the two transducers is known as the propagation time of the sound in a standing water medium.**

**In the event that this time is measured in the direction of the water flow V or in the opposite direction the result will be shorter or longer because of the drag effect cause by the water flow.**

**By subtracting the reciprocal values of the propagation time and taking into account the angle of irradiation "n" and the length L, it is possible to calculate the average speed of the water flow.**

# 4. Mechanical Data

## 4.1 Body Physical Data

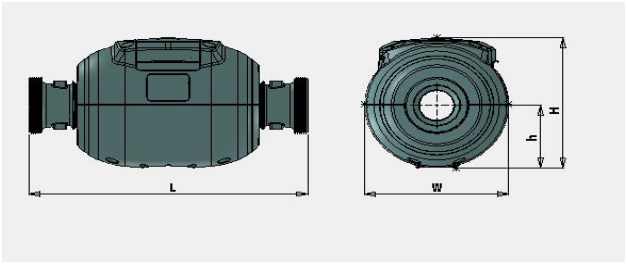
| | |
|---|---|
| **Maximum Working Pressure** | 16 bar |
| **Liquid Temperature** | 0.1 up to 50° C |
| **Precision Class** | Accuracy class 2 |
| **Configuration** | Jacket Protected – Unit built in Display |
| **Power Source** | 2 D size Li-Battery: up to 15 years life time |
| **Environmental Protection** | IP 68, Ambient operation temp. - 25° up to +55° C |
| **Volume Display** | 1. Net (Forward less reverse)<br>2. Forward only<br>3. Reverse only<br>4. Forward & Reverse alternating |
| **Data Logger** | Volumes and alarms data (48KB, 4130 data points) |
| **Connections** | 1½'' – 2" threaded: with couplings BSP<br>3" – 4" flanged: According ISO, BS 10 and ANSI 150 |
| **Severity Levels** | Mechanical class M1<br>Electromagnetic environment Class E1 |
| **Pressure Loss** | 0.1 Bar |
| **Standards** | ISO 4064 :2014/OILM R49,MID Certificate |

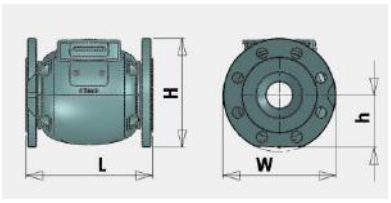
### 4.1.1 Outputs

| | |
|---|---|
| **Analog Output** | **4-20mA - option** |
| **Digital Output** | **TBD** |
| **Dry Contact Output - 2 * Pulse output – open collector** | |
| **Modbus Protocol Output/M-Bus** | |
| **Output Extension Cable TBD** | |

## 4.2 Meters Dimension Data

| Model | OCEAN | | | | |
|---|---|---|---|---|---|
| Nominal Size millimeter | 40 Threaded | 50 Threaded | 50 Threaded | 80 Flanges | 100 Flanges |
| Body Material | Polymer | Polymer | Cast Iron | Cast Iron | Cast Iron |
| L – Length without Couplings | 300 | 300 | 300 | 225 | 250 |
| W – Width | 155 | 155 | 155 | 200 | 220 |
| H - Height | 161 | 161 | 161 | 192 | 220 |
| h - Height | 75 | 77 | 77 | 92 | 105 |
| Weight (kg) | ? | ? | ? | ? | ? |




## 5. Mechanical Installation

Mounting location:

• To obtain a stable and accurate flow measurement, it is very important that the water meter is mounted correctly in the pipe system

• There must be no flow fluctuations

• Avoid locations where vacuum can occur;

• Avoid locations with vibrations from for example pumps

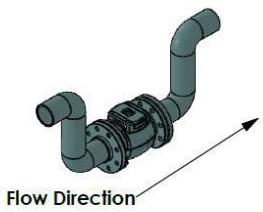
• Avoid locations with extensive temperature changes

• Avoid corrosive environments and locations with a great risk of condensation, or consult factory for special builds for these locations

• IMPORTANT: Observe that the correct flow direction is set in the **USWR.**

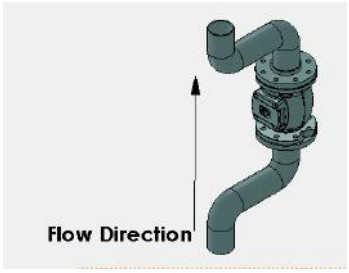
## 5.1– Register position

### 5.1.1 – Preferred Register Placement

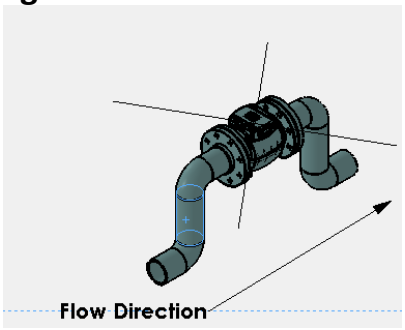




If the meter is placed in a vertical pipe section, the flow direction shall be upward.




### 5.1.2 – Wrong Installation

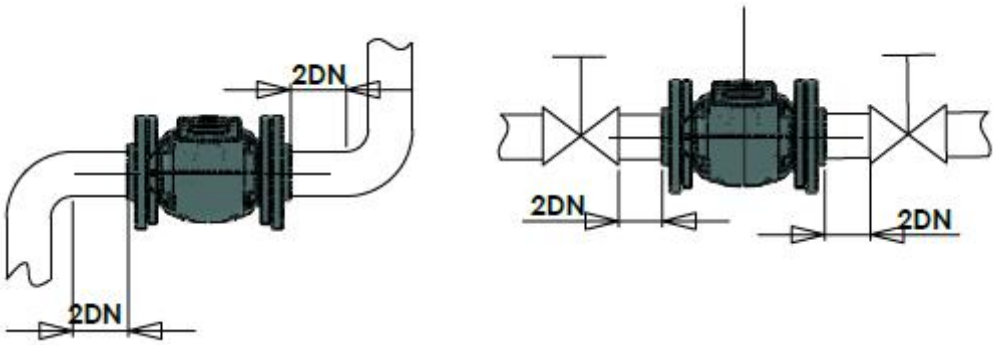



**Not Recommended:**

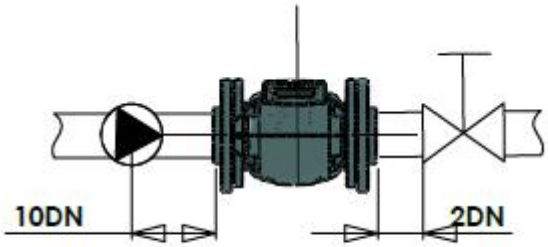
- To place the meter at the highest piping section.
- In cases of placement in a vertical piping section, with the fluid flow direction downwards, in particular if a discharge opening anywhere near at the register output side.
- Observance of this rule will prevent measurement errors due to increased air bubble concentration inside the sensor place.

## 5.2– Straight piping section length before and after Register

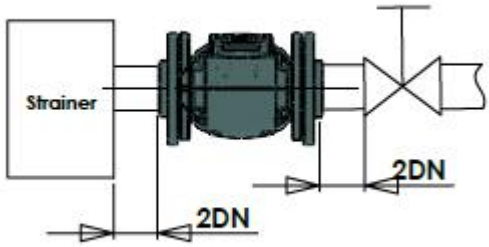
### 5.2.1 – Straight piping with or without valves 2DN




### 5.2.2 – Elimination the effect of pumps 10DN




### 5.2.3 – Straight piping with strainer 2DN




## 6. Pressure loss

The pressure loss is described in the diagram below:

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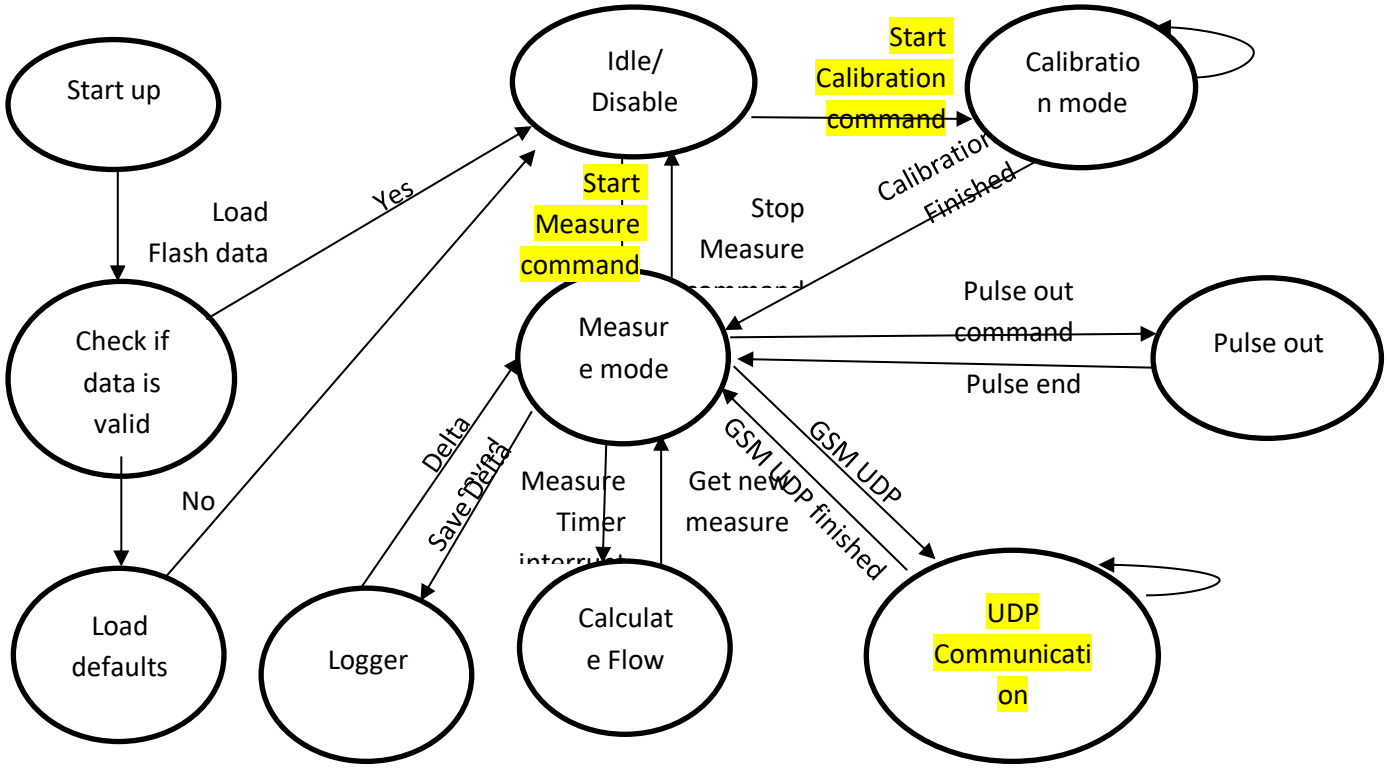
## 7. Accuracy Curve

| | | Ocean: Metalic body | | | Ocean: Polymeric body | |
|---|---|---|---|---|---|---|
| **Nominal diameter DN** | **inch** | **4''** | **3''** | **2''** | **2''** | **11/2''** |
| **Permanent flowrate $Q_3$** | **$m^3/h$** | **63** | **63** | **40** | **40** | **40** |
| **Minimum flowrate $Q_1$** | **$m^3/h$** | **0.126** | **0.126** | **0.08** | **0.08** | **0.08** |
| **Transitional flowrate $Q_2$** | **$m^3/h$** | **0.2016** | **0.2016** | **0.128** | **0.128** | **0.128** |
| **Overload flowrate $Q_4$** | **$m^3/h$** | **78.75** | **78.75** | **50** | **50** | **50** |
| **Ratio $Q_3/Q_1$** | - | **500** | **500** | **500** | **500** | **500** |
| **Ratio $Q_2/Q_1$** | - | **1.6** | **1.6** | **1.6** | **1.6** | **1.6** |

## 8. Polymeric Ocean Installation – General Instruction

**להשלים**

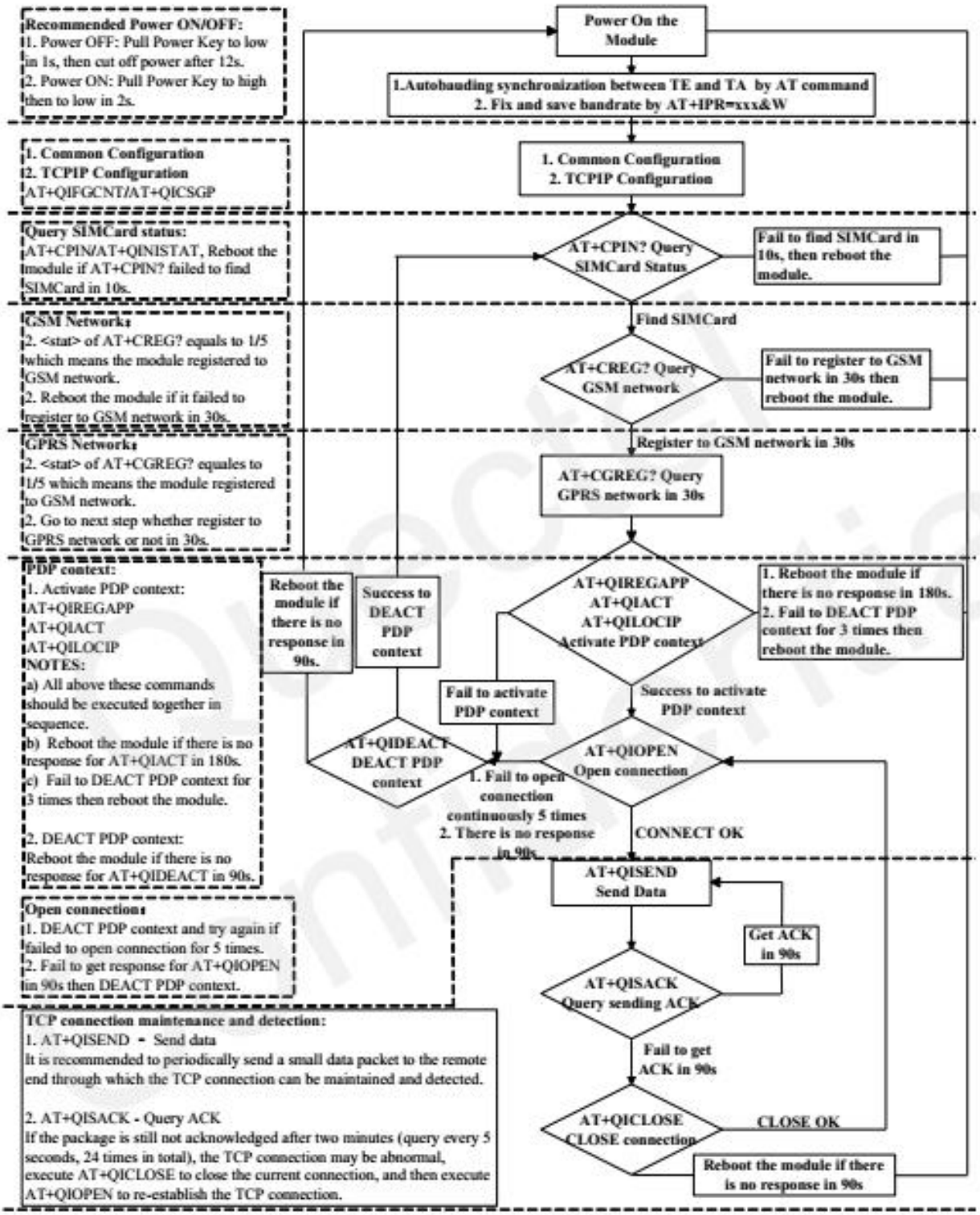
## 9. Software design




1. **Startup -** when the program is starting up, it setup's all the configuration and load data from the flash.
2. **Check if data valid**- If the data from the memory is valid or not, if it is valid the program goes to the Idle mode- main loop.
3. **Load defaults**- if the data from memory is not valid, the program loading default value, and goes to idle mode.
4. **Idle/disable mode**- the program don't do nothing, except from BT communication.(need to implement)
5. **Measure mode**- Measuring water flow with max35103, each time the timer interrupt occurs, we starting ne measure with the opposite max35103, and calculate the flow.
6. **Calibration mode**- include calibration for zero flow, and semi-automatic calibration for different flow points.
7. **Calculate flow**- The data that we get from the max35103 going through Median filter, and then according to the calibration table we get the current flow.
8. **Pulse out**- Each time that the volume counter has changed, according to the programed value(1,10,100,1000), we do pulse out according to programed time(50ms,100ms,150ms etc.).
9. **UDP communication**- Every 24 hours, the Quectel M95 is power up, and starting to communicate with web server in UDP protocol.
10. **Logger**- 2 data loggers, one for 4000 readings (every X minutes, as programed), and the other is 48 readings (every hour). After each write, the next place is set to 0xFFFF, so if we will get power lose or reset the next time the program will start it will know where to put the pointer.

## 10.A flow diagram of the logic showing the functions of the electronic devices

Following is the flow chart of TCPIP recommended process.




**NOTES:**

1. Ensure that TE and TA are correctly synchronized after rebooting the module. Send 15 AT commands continuously following the constraint that sleep 500ms after each AT command input, then fix and save bandrate configuration by AT+IPR=xxx&W after synchronized.
2. Please note that you need to wait for the final response (for example OK, CME error, CMS error) of the last AT command you entered before you enter the next AT command. You can reboot the module if the module failed to get response in 60s.
3. Reboot the module if the module has no response of AT+QIACT in 180s or no response of AT+QICLOSE and AT+QIDEACT in 90s .
4. The module CAN NOT be rebooted frequently. You can reboot the module immediately at first, then reboot the module after 10 minutes, 30 minutes, 1 hour, etc if the module is repeatedly abnormal.

**Pictures:**

**11/2" plastic**

**2" Plastic**

**2" Metal**

**3" Metal**

**4" Metal**

**All meters:**