



# MTX-StarWater

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Software User Guide

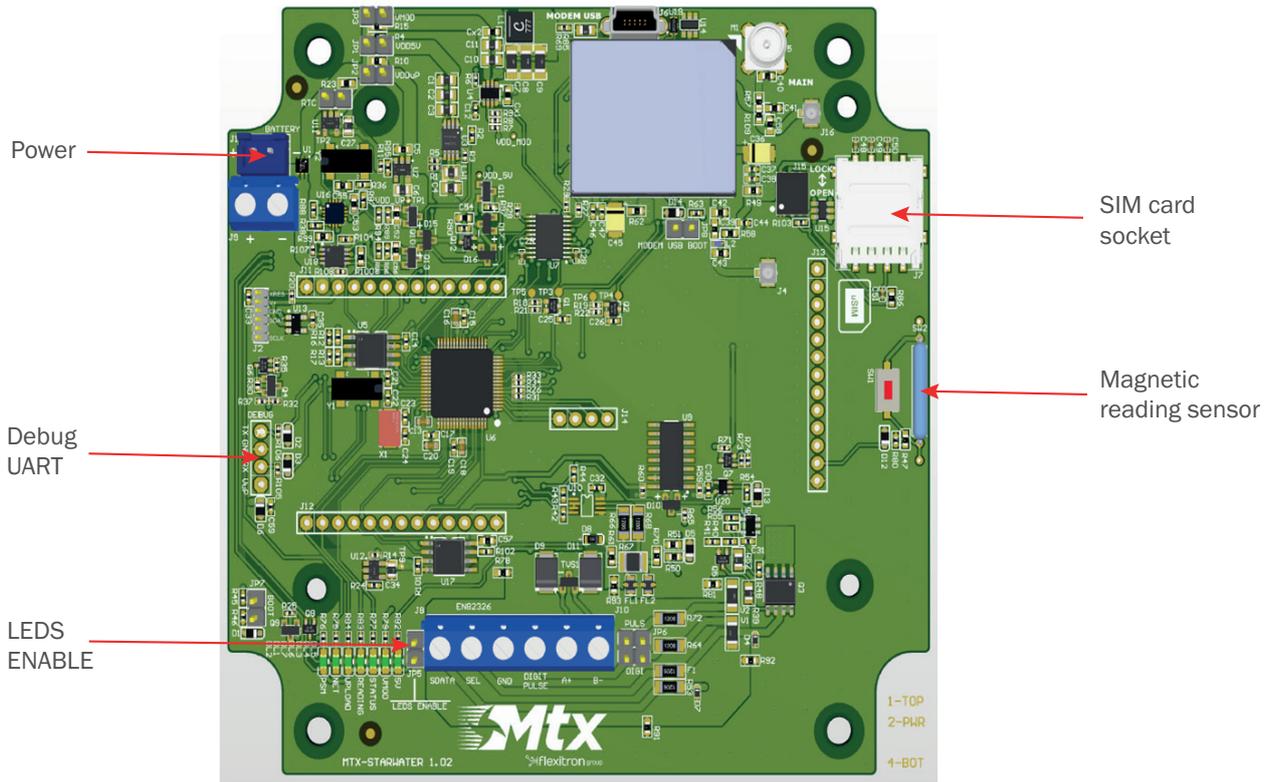
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# Quick Start

This document contains a series of instructions to start up the MTX-StarWater [NB/2- U-N] with UNE82326 bus.

## 1. Start Up



### 1.1 SIM Placement

Once the equipment is received, the first step will be to place the SIM card in the socket. The configuration of the SIM, if necessary, will be done with the configuration app or through the Cervello Stem platform (as seen in the Configuration section).

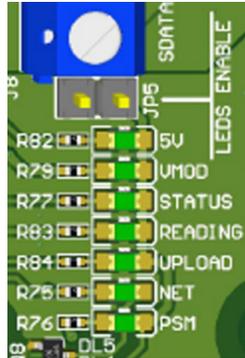
### 1.2 Power

After inserting the SIM, the device is powered by connecting the battery to the power connector. If tests are to be carried out, an external source with a voltage between 7v and 15v and a current of at least 500mA can be connected to avoid unnecessary battery consumption.

### 1.3 Enable/Disable LEDs

To increase the autonomy, the equipment has the LED indicator lights disabled by default. To enable them, the jumper must be set to LEDES ENABLE.

Once placed, you can see the status of the 5v source, the modem voltage, the status of the equipment, whether it is performing a reading or sending of data from the meters and the status of the network and PSM. After performing the functional checks, the jumper must be removed before closing the equipment in order not to impair autonomy. Leaving the LEDs enabled implies a drastic decrease in the autonomy of the equipment.



## 1.4 Bus Connection

To check the correct operation of the equipment, the RJ11 connector must be connected to a meter or meter bus. This step is not necessary if you only want to configure the equipment.



## 1.5 Switching On

To turn on the equipment, it is necessary to pass a magnet next to the magnetic reading sensor or, if the equipment is open, press the button labeled SW1 located next to the sensor.

Once the equipment is turned on, it will read the A/A+ frames of the meters connected to the bus and then connect to the platform to receive several configuration parameters (such as date and time, window configuration, etc.). After receiving the configuration parameters, the equipment will begin to send all the frames stored in memory and will go to sleep.

Just before going to sleep, the equipment consults the read and send windows stored in memory and configures the RTC that will wake up the equipment to carry out the pertinent operation.

If the LEDs are enabled, the Status LED will blink, indicating that the equipment is on, as well as the Read LED while reading the meters and the Net and Upload LEDs while connecting to the platform and sending of data.

## 2. Configuration

Configuration can be done through the desktop application through the debug UART or through the Cervello Stem platform.

Communication between the computer and the platform is done by executing remote AT commands through MQTT. After establishing the connection with the platform, it must execute at least the CCLK and NOREQUEST commands for correct operation. If you want to send several commands, you must make sure that you always end with the NOREQUEST command, since this command is in charge of telling the equipment that no more commands will be received. If it is not sent, the device will wait to receive it for one minute and then restart the connection.

### 2.1 AT Commands

The next section will detail all the commands available up to version 7.6.

#### 2.1.1 CCLK: Set Date/Time

The team updates the RTC with this data. The RTC will be used for the timestamp of the meter measurements.

```
AT + CCLK = "YY/MM/DD, HH: NN: SS"
```

```
OK/ERROR
```

Since version 5.X this command is also available:

```
AT^MTX=CCLK,"YY/MM/DD,HH:NN:SS"
```

```
OK/ERROR
```

#### 2.1.2 RESET: Equipment Reset

The equipment will start the complete reset process (micro and modem).

```
AT^MTX=RESET
```

```
OK/ERROR
```

#### 2.1.3 UPDATEFW: Running the OTAP Process

The equipment will start the firmware update process.

The microprocessor firmware is a \*.cyacd file with x lines of text (ASCII). This file must be transmitted from the platform to the equipment (before starting the physical firmware update process) to be stored in the non-volatile memory of the modem (BG95-BG95).

```
AT^MTX=UPDATEFW
```

```
OK/ERROR
```

Once the equipment finishes downloading the file, it will perform a reset and run in bootloader mode. The bootloader will be in charge of reading the file and recording it line by line in the microcontroller. Once recorded, the equipment will restart running the new firmware version.

## 2.1.4 DELETELOGGER: Clearing the Storage Memory

The equipment will erase all the frames stored in memory.

```
AT^MTX=DELETELOGGER
```

```
OK/ERROR
```

## 2.1.5 GETSTATUSAPP: Reading of the Equipment Application

The team will return a JSON with the general state of the team's application with the accumulated variables.

```
AT^MTX=GETSTATUSAPP
```

```
{  "FW": "<FW>",
  "LB": <LB>,
  "LA": <LA>,
  "LI": <LI>,
  "CP": <CP>,
  "NT": <NT>,
  "RO": <RO>,
  "RE": <RE>,
  "PR": <PR>,
  "VT": <VT>,
  "TA": <TA>,
  "DI": <DI>,
  "RT": <RT>
  "VBAT": <VBAT>} OK/ERROR
```

Where:

<FW>: FW version of the mic

<LB>: number of bus reads executed so far

<LA>: accumulated value of the duration in seconds of the bus reading phase

<LI>: number of smart reads (activated after collisions)

<CP>: number of connections to platform  
<NT>: number of transmissions (packets sent)  
<RO>: number of correct NB network registers  
<RE>: number of bad NB network registers  
<PR>: number of packets forwarded due to missing ACK  
<VT>: cumulative number of transmission windows executed  
<TA>: total accumulated time transmission windows  
<DI>: digital input value  
<RT>: medium RTT  
<VBAT>: battery voltage in mV

## 2.16 DELSTATUSAPP: Clear Application State Variables

The equipment will erase the accumulated state variables.

```
AT^MTX=DELSTATUSAPP
```

```
OK/ERROR
```

## 2.17 GETSTATUSNET: Reading the Status of Network Parameters

The team will return a JSON with the parameters of the state of the network.

```
AT^MTX=GETSTATUSNET
```

```
{  "RSRP":<RSRP>,  
  "RSRQ":<RSRQ>,  
  "<SNR>":<SNR>,  
  "<ECL>":<ECL>,  
  "<CELLID>":<CELLID>} OK/ERROR
```

Where:

<RSRP>: reference signal received power (use AT+QCSQ)  
<RSRQ>: reference signal received quality (use AT+QCSQ)  
<SNR>: signal to noise ratio (use AT+QCSQ)  
<ECL>: Coverage Enhancement Level (AT+QCFG = "celevel")  
<CELLID>: cell ID (use AT+QENG = "servingcell")

## 2.18 NOREQUEST: The Platform Does Not Require More Communications

The team may decide to close the communication window with the platform, as the platform will not send any more data. Once this command is received, if there is no data pending to be sent by the equipment, it closes communications and goes to sleep.

```
AT^MTX=NOREQUEST
```

```
OK/ERROR
```

## 2.19 DELETEWINDOWS: Clearing the Read and Send Windows

The equipment will erase all the configuration windows for meter reading and sending windows.

```
AT^MTX=DELETEWINDOWS
```

```
OK
```

## 2.1.10 SETREADWINDOW: Setting Up a Reading Window

The equipment will configure a reading window. It is exactly the same as AT ^ MTXTUNNEL = SETPARAM, but in a single command.

```
AT^MTX=SETREADWINDOW,<id>,<enabled>,<start>,<end>,<period>,<mask>,<wDay>, <mDay>
```

```
OK
```

Where:

id: (0... 7 indicates the reading window ID)

enabled: (0=not enabled, 1=enabled)

start: (0... 23)

end: (0... 23)

period: (300... 86400 seconds)

mask: (0... 7 type of frame to request -> 1: A/A +; 2: B; 4: C)\*

wDay: (7 bits, one for each day of the week)\*

mDay: (31 bits, one for each day of the month)\*

\* For backward compatibility, if the mask, wDay and mDay fields are set to 0, it is interpreted as a request for A/A+ frames every day of the month and of the week.

Examples:

Mask	Bit 2	Bit 1	Bit 0
Type	C	B	A/A+

I want to request frames A/A+ and B -> bits 0 and 1 have to be set to 1, leaving 0b011, so the value to be put in "mask" is 03.

wDay	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Week day	Sunday	Saturday	Friday	Thursday	Wednesday	Tuesday	Monday

I want to request frames on Mondays and Wednesdays -> Bits 0 and 2 have to be set to 1, leaving 0b0000101, so the value to be put in "wDay" is 05.

mDay	Bit 30	Bit 29	...	Bit 3	Bit 2	Bit 1	Bit 0
Day	Day 31	Day 30	...	Day 4	Day 3	Day 2	Day 1

I want to request frames on the 10th and 25th of each month -> Bits 9 and 24 must be set to 1, leaving 0x00100200, so the value to be set in "mDay" is 00100200.

### 2.1.11 SETSENDWINDOW: Send Window Settings

The team will set up a submission window. It is exactly the same as AT ^ MTXTUNNEL = SETPARAM, but in a single command.

```
AT^MTX=SETSENDWINDOW,<id>,<enabled>,<start>
```

OK/ERROR

Where:

id: (0... 7 indicates the send window ID)

enabled: (0 = not enabled, 1 = enabled)

start: (0 ... 23)

### 2.1.12 GETREADWINDOW: Reading Settings From a Reading Window

The team will return a JSON with the configuration of the requested reading window.

```
AT^MTX=GETREADWINDOW,<id>
```

```
{ "data": {  
  "RW":<id>,  
  "EN":<en>,  
  "ST":<start>,  
  "ED":<end>,  
}
```

```
    "PR":<period>,  
    "MK":<mask>,  
    "WM":<wDay>,  
    "MM":<mDay>}  
} OK/ERROR
```

The meaning of each field is the same as that described in SETREADWINDOW.

### 2.1.13 GETSENDWINDOW: Reading the Configuration of a Send Window

The team will return a JSON with the configuration of the requested submission window.

```
AT^MTX=GETSENDWINDOW,<id>
```

```
{  
  "data": {  
    "RW":<id>,  
    "EN":<en>,  
    "ST":<start>,  
  }  
} OK/ERROR
```

The meaning of each field is the same as that described in SETSENDWINDOW.

### 2.1.14 SETMODE: Test Mode

The equipment will be configured for operation mode 1 - 5.

```
AT^MTX=SETMODE,<mode>
```

```
OK
```

Where:

<mode>: (1... 5 indicates the operating mode)

Mode 1: read/send windowless operation mode. Only configured for pushbutton operation. Check last pages of document (test1).

Mode 2: hourly reading of 15 meters (window 0 -23 with 1 hour period). 1 transmission window per day. Be careful that the transmission window will coincide with the reading window. Tip: if transmission window matches reading window, suspend transmission window until reading window ends. Check last pages of document (test2).

Mode 3: reading 15 counters every 5 minutes in a 2 hour window (ie 8 windows per day) followed by a transmission window. That is, blocks of 3 hours, where the first 2 hours is a reading window and the next one starts a transmission window. Check last pages of document (test3).

Mode 4: reading of A/A+ frames every hour every day, reading of B frames once a day (00h), reading of C frames once every Monday (00h) and reading of A/A+, B and C frames once the 1st of each month (00h). Shipping every day at 08h.

Mode 5: reading of A/A+ frames every 5 minutes from 3:00 to 00:00, reading of A/A+ and B frames every 15 minutes from 00:00 to 09:00, reading of A/A+, B and C frames every hour from 09:00 to 10:00, reading of A/A+ frames every 5 minutes from 10 am to 11am, reading of A/A+ and B frames every 15 minutes from 11am to 12 noon, reading of A/A+, B and C frames every hour from 12am to 1pm, reading of frames A/A+ and B every 15 minutes from 1:00pm to 2:00pm, reading of frames A/A+, B and C every hour from 2:00pm to 3:00pm.

### 2.1.15 SETPARAM: Modifying Configuration Parameters

The equipment will save this configuration parameter in memory. The new value will not take effect until a device reset is performed.

```
AT^MTX=SETPARAM,<paramName>,<paramValue>
```

```
OK/ERROR
```

The next section will list all the parameters available for configuration.

### 2.1.16 GETPARAM: Read Configuration Parameters

The equipment will return this configuration parameter stored in memory.

```
AT^MTX=GETPARAM,<paramName>
```

```
<paramValue>
```

```
OK/ERROR
```

The next section will list all the parameters available for configuration.

## 2.1.17 Configurable Parameters

The following table describes all the configurable and readable parameters with SETPARAM and GETPARAM.

paramName	DESCRIPTION
NET_APN	Operator APN
NET_USERNAME	Operator user name
NET_PASSWORD	Operator password
NET_DNS1	DNS1 to use
NET_DNS2	DNS2 to use
NET_OPERATOR	Operator code to use
NET_NWSCANMODE_PARAM	Operating technology
NET_NWSCANSEQ_PARAM	Scan sequence
NET_IOTOPMODE_PARAM	Category of the network to search
MQTT_BROKER	URL broker connection
MQTT_ID	Broker ID
MQTT_USERNAME	Username for broker
MQTT_PASSWORD	Password for broker
MQTT_ATTOPIC	AT command subscription topic
MQTT_ATRTOPIC	AT command response topic
MQTT_ATTOPIC	Topic attribute
MQTT_DATATOPIC	Topic for sending data from the logger
CLAC_BUTTONENABLED	0=not enabled, 1=enabled
CLAC_READWINDOWENABLED0	Reading start window 1 enabled (0=no, 1=yes)
CLAC_READWINDOWSTART0	Reading start window 1 (0... 23)
CLAC_READWINDOWEND0	End of reading window 1 (0... 23)
CLAC_READPERIODO	Window reading period (300... 86400 seconds)
CLAC_READMASK0	Type of frame to read (0... 7) hex
CLAC_READWEEKDAY0	Day of the week the reading is done (0... 7F) hex
CLAC_READMONTHDAY0	Day of the month the reading is done (0... 7FFFFFFF) hex
...	
CLAC_READWINDOWENABLED7	Window 8 start reading enabled (0=no, 1=yes)
CLAC_READWINDOWSTART7	Window 8 start reading (0... 23)
CLAC_READWINDOWEND7	Wnd of reading window 8 (0... 23)
CLAC_READPERIOD7	Window reading period (300... 84600 seconds)
CLAC_READMASK7	Type of frame to read (0... 7) hex

CLAC_READWEEKDAY7	Day of the week the reading is done (0... 7F) hex
CLAC_READMONTHDAY7	Day of the month the reading is done (0... 7FFFFFFF) hex
CLAC_SENDWINDOWENABLED0	Send start window 1 enabled (0=no, 1=yes)
CLAC_SENDWINDOWSTART0	Send start window 1 (0... 23)
...	
CLAC_SENDWINDOWSTART7	Send start window 8 enabled (0=no, 1=yes)
CLAC_READWINDOWSTART7	Send start window 8 (0... 23)
CLAC_SENDWINDOWMAX	Maximum delivery window duration (default 10 minutes)

## 2.2 Configuration Via App

The configuration of the equipment can also be done through the desktop application. To do this, the computer must be connected to a PC by connecting a UART cable to the debugging port.



To avoid accidents, sensitive parameters are password protected. This password is “0000” by default, although it can later be changed to another string with a maximum of 32 alphanumeric digits.

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