Installation, maintenance and use of the evaporimeter tank

Document:	INSTUM_003544_en
Revision:	1
Date:	06/05/2020
Pages:	8

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1. Purpose

The aim of this document is to describe the installation and maintenance of the evaporimeter tank, but are few rules that allow you to calculate the evaporation more accurately and with less likelihood of errors during sampling.

2. Installation of the evaporimeter tank

- Place the bowl in a non-shaded site throughout the day and free of obstructions such as buildings that could hinder the wind to reach the tub;
- Follow the instructions for the mechanical and electrical installation;
- If the filling of the tank is automatic, make sure that the water pressure is sufficient to maintain closed the opening of the water valve (if the pressure is not sufficient, the valve does not remain perfectly closed);
- E 'advisable to put a piece of pipe at the outlet of the valve that goes to touch the bottom of the tank, in such a way that during filling to avoid creating turbulence in the water level; Always fill the whole tank up to the overflow.

3. Data logger configuration

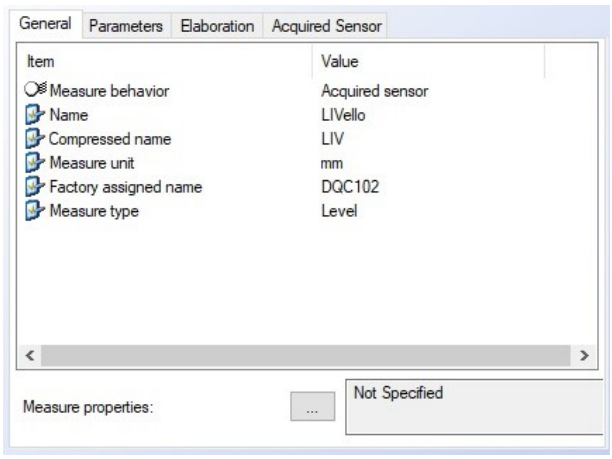
Ultimate the electrical connections and the configuration of the evaporation and level with tools, check and possibly change the following parameters:

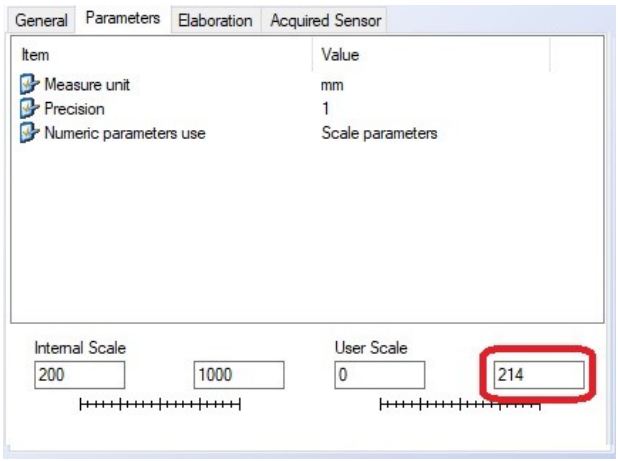
3.1 ALIEM / E-Log (starting from V. 2.38.00)

Using 3DOM program:
- Add DQC102 sensor in the measurement list. Select it from the 3DOM sensors library.
- Add evaporation calculation as new channel (derived parameter)

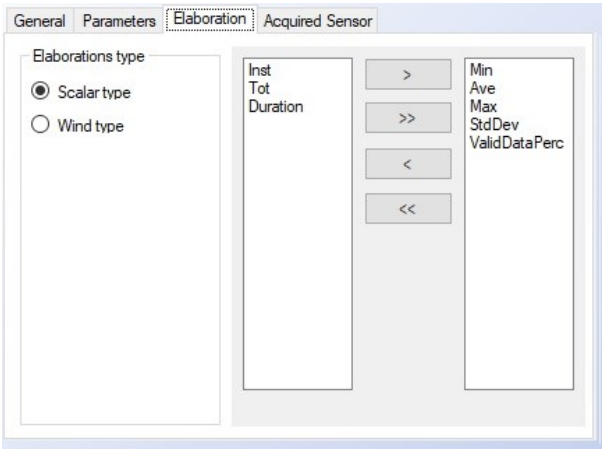
Here the configuration parameters for both channel:

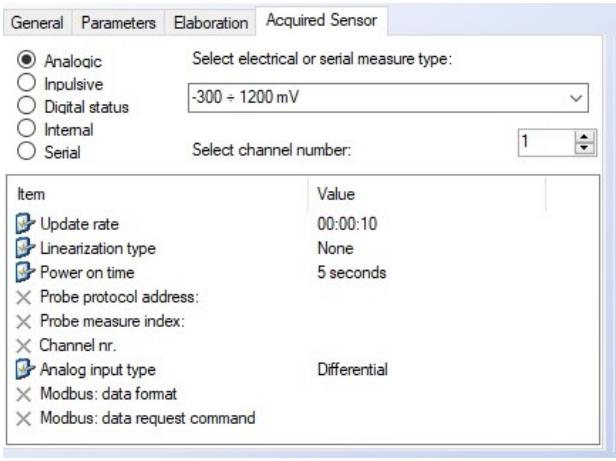
DQC102 sensor



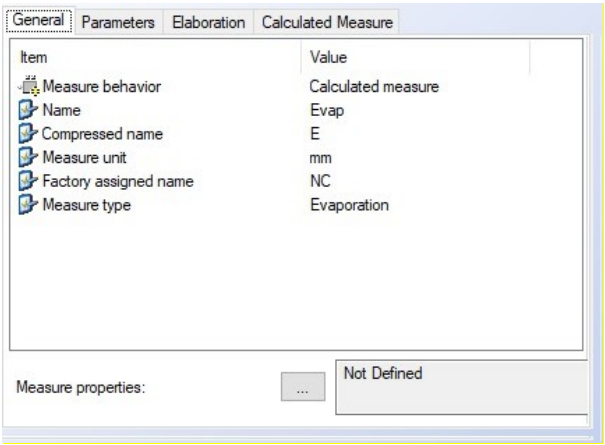


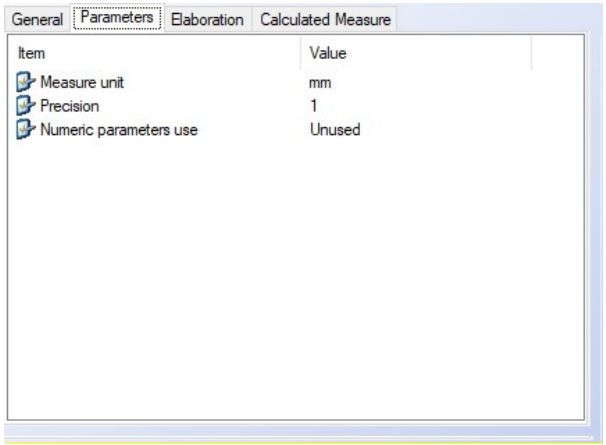
Enter the user full scale parameter as the overflow level of the tank (214 mm for DYA010 pan)

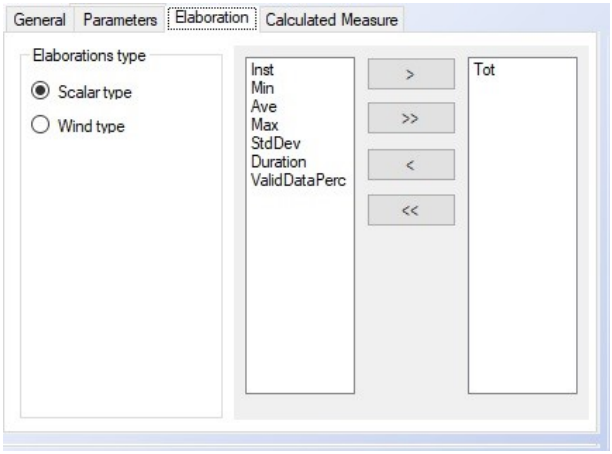


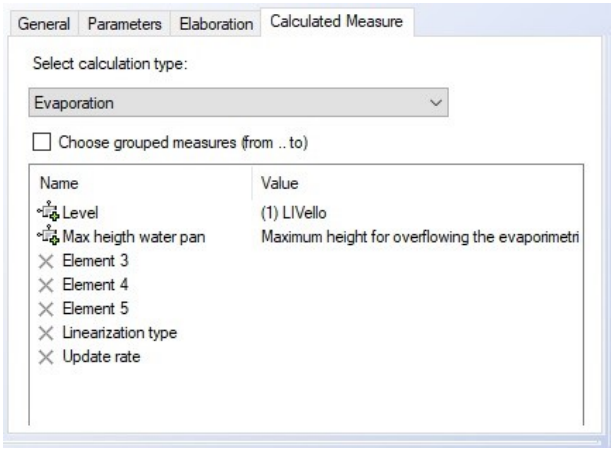


Change the acquisition rate of the sensor to 10 sec (default= 1 min)





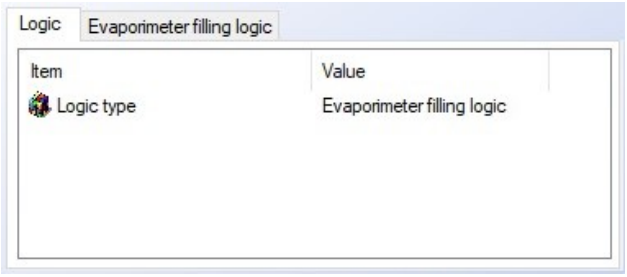


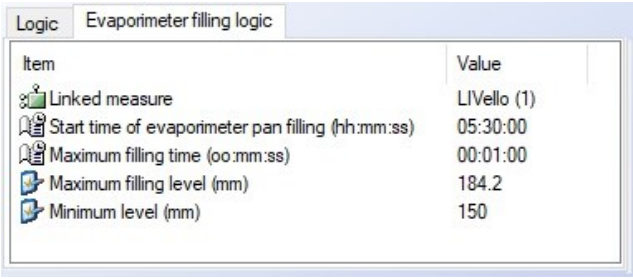


4. Water topping up

If the DYI012 solenoid valve is used, the data logger can be configured so that topping up takes place automatically at the set time.

Set the Overflow height of the evaporimetric pan, (General parameters -> Standard) whose default value is 184.2. Set the top-up logic. Example:





The parameters must be set taking into account the solenoid valve water flow rate and the time used for filling. Set a night-time so when that evaporation is absent. Setting up:

- Maximum fill level (overflow level) : default 184.2
- Minimum level:

Liv. Min <Lev. Max - Daily Evap.

4.1 Babuc ABC / E-Log (up to V. 2.37.00)

- The absolute level value read on the instrument display must not necessarily be equal to the true level of the water in the tub, because the evaporation is calculated on the delta of the relative values of the various levels;
- Reading on the display the value of the water level with a completely full tank and set the bed level:
    a) If E-Log change in the general parameters -> Standard on the Height value of the overflow evaporimeter tank currently 184.2 with the bed level value on the display;
    b) If ABC modify System-> List & Modif.CodOp-> 177Evaporazione-

> Ingegnerizzazione-> Param2i and Param2u currently 184.2 with the bed level value on the display

- Set the acquisition rate of the level: this time depends on the climatic zone: if there is a lot of wind slow acquisitions, the acquisition typically occurs every minute; in any case not fall below the minute, in order to avoid the calculation of evaporation bogus values, and in case you notice any abnormal evaporation values, progressively increase the acquisition rate, while still having the foresight to allow the instrument to the execution of at least 4 acquisitions in the instalment set processing;
- Change, if they exist, the parameters of the filling logic of the tank and set the following default values:
  a) Start time filling the tank 6:00:00 pm;
  b) maximum filling time: this depends on the size of the water pipe, it is assumed about 10 minutes, but it is good to verify that the overflow of excess water will not cause damage to building structures or systems of another kind;
  c) Minimum level for filling: set the value to 1 mm below the top-up value. Ex .: if topping = 184.2 set 183;
  d) Maximum level to stop the pump: set 0.1 mm below the filling value. Ex .: if topping = 184.2 184.1 set;
  e) Check the operation of the filling logic.
- According to the WMO the water level must be between 5 and 7 mm below the edge of the tub, as the horizontal wind acts in a minor way on the water surface and in the morning and evening the shaded portion increases.

5. Evaporimeter tank maintenance

For a proper functioning of the evaporation calculation, it may want to keep clean the bathtub algae, leaves, etc. It should be checked at least once a week, possibly in the morning, in such a way as to be able to fill the tank when it is not very hot. The recommended procedure to prevent incorrect acquisitions and calculation of evaporation is not true is the following:

- Plug the hole of the refilling, fill the tub in such a way that the level exceeds the refilling, clean the tub, making sure that the level does not fall below the filling level in such a way as not to have evaporations. After cleaning, remove the filler cap;
- Another method, but longer, completely empty the tank, clean it and refill.

6. Evaporation error

- Place the bowl in unsuitable sites (shaded, slightly windy);
- Fill the tank with the cascade cane, but immerse the rod in the bottom of the tub;
- Fill the tub during the middle of the day; the tank water cooling involves an evaporation error because the water will take longer to warm up and then to evaporate;
- Fill the tub with excessive water pressure: the system may calculate evaporation untrue;
- Remove dirt, leaves or algae from the tank without having filled beyond the maximum level: this determines the evaporation calculation is not true;
- In case of absence of automatic filling, the tank still has to be maintained with a suitable water level;

- For the manual filling with buckets; try to empty the buckets enough floor and possibly fill the tank in a continuous manner (prepare more buckets then empty them slowly into the tank), it is recalled that after 3 acquisitions the level value is stored, both uphill and downhill;
- Do not fill the tub up to overflow, water ripple eventually fill, if it lasts more than 3 acquisitions could give evaporation.

7. Calculation Logic evaporation in E-Log

7.1 ALIEM / E-Log (starting from V. 2.38.00)

Evaporation is given by the sum of the differences in the water level measurements inside elaboration time base. It is calculated as follows:

$$Evap_0 = Livel_{-1} - Livel_0$$

Here an example of calculation using 10 minutes as elaboration time base.

Elaboration time	Level (mm)	$Level_{-1}$ - $Livello_0$	Evaporation (mm)
…	…	…	…
13:30	156,0	-	-
13:40	155,9	156,0 – 155,9	0,1
13:50	155,7	155,9 – 155,7	0,2
14:00	155,5	155,7 – 155,5	0,2
…	…	…	…

During the water topup operation the calculation is interrupted and kept as 0 value

7.2 E-Log (up to V. 2.37.00 version)

The evaporation calculation logic comprises the following variables or definitions:

1. E = evaporation;
2. LivelloPrima= level value stored at the end of the refilling occurs or when an E;
3. LivelloMax= level value stored + 0.5 mm at the end of the refilling occurs or when an E;
4. LivelloOra= actual value of the acquired level.

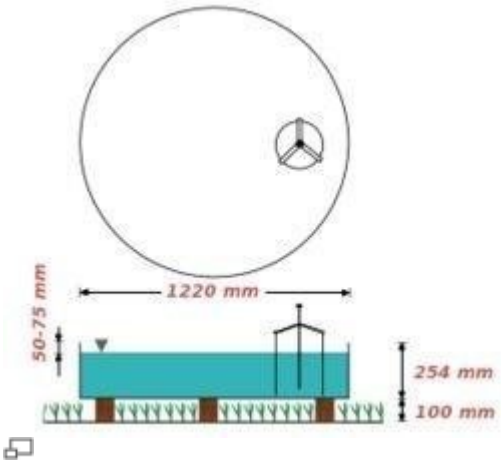
The evaporation logic:

1. The starting level for the calculation of E is the filling level (default 184.2);
2. The calculation of E is always carried out by the difference between LivelloPrima stored for topping up or last E and LivelloOra, if it exceeds a delta of 0.5 mm for at least 3 acquisitions; LivelloOra is stored in LivelloPrima and LivelloMax +0.5, which will then serve for comparison with subsequent levels acquired if the value of E exceeds 3 mm, the measurement will be discarded, as E abnormal;
3. The calculation also includes the filling; if the LivelloOra exceeds the LivelloMax for 3 acquisitions (delta 0.5), LivelloOra is stored in LivelloMax + 0.5 and in LivelloPrima.

8. Evaporimeter tank mechanical dimensions

The measures of the tank are: diameter 1207 mm, height 254 mm, 1,143 m2 area.

9. Some notes retrieved from the Internet



- It 'a tank used in Evaporimetric agrometeorology for the estimation of 'evapotranspiration. It consists of a circular tank in steel anodized, standard size (1220 mm in diameter and 254 mm in height). The device is positioned generally in a meadow grasses, possibly in an agro-meteorological observation station, on a wooden base to 10 cm in height from the ground.
- The tank contains water, with the free surface maintained at 5.0 to 7.5 cm from the edge (typically restores the level once per day). It is provided with a calm cockpit in which daily detects the lowering of the level by means of a micrometre screw or an electric sensor.
- It is a simple application system and fairly reliable if it has been calibrated properly in the environment in which it operates. This method correlates the standard potential evapotranspiration with the amount of evaporated water, during the period of observation, from a Evaporimetric tub (evaporimeter) That meets the standard requirements about size, workmanship and location. The decrease in the level of the liquid surface during the period considered, said evaporated is expressed in millimetres and is related to the unit of time (usually one day interval).
- The principle on which the report is based consists in the fact that intensity of evapotranspiration and evaporation intensity by a mirror of water at the free surface are determined by the same climatic factors. The evaporated it is not identified with the evapotranspiration (potential or actual) for the following reasons:

1. there reflection on a plant cover is typically 4-5 times higher than in a body of water, so the net radiation that arrives on a liquid surface is greater;
2. the accumulation of heat in the water of the evaporimeter causes the evaporation continues even during the hours of darkness, while in these hours perspiration stops for the closure of the stomats;
3. evapotranspiration factors is biological and soil factors that generally have not reflected on the evaporation from a free mirror.