



# ***MINI AGG PRO***

## ***User Manual***



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## 1. Introduction to the MiniAggPro

The MiniAggPro is a modular irrigation controller of up to 20 outputs (4 build in and 4 for each extension card, up to 4 extension cards), specially designed for agricultural applications which need **no volumetric** information. Managed by smartphone app via Internet or locally.

The 20 outputs can be flexibly allocated for the following uses:

- number of irrigation valves (up to 20)
- 1 main valve
- 1 pump
- up to 4 fertilizer injectors
- 1 booster pump
- Up to 19 backflush valves

The controller has the following inputs:

- 4 dry contact inputs for:
  - water meter
  - Digital DP
  - Pressure sensor
  - Start/Stop contact (can be set to start/stop program C)
- 1 Analog DP sensor
- 1 Analog sensor
- 1 freeze unit contact



**Fig 1** – photo of MiniAggPro controller

MiniAggPro is managed using smart phone app (in Android and iPhone),

smartphone app can access controller in two ways:

- Remote access via Internet (if controller has cellular or Wi-Fi modem installed)
- Local access via Direct Wi-Fi (build in)

The app allows the following: view controller current status via graphic display, configure controller, view past events and view accumulations.

For irrigation purposes there are 3 programs A, B and C.

All programs can be scheduled to start by time, but program C can also be triggered by a dry contact sensor (or analog sensor).

Irrigation days can be set in terms of **Days Cycle** or in terms of a **Week Run List**. **Days cycle** irrigates once every configured number of days (like once every 3 days), **Week Run List** tells on which day of the week irrigation will occur.

On each irrigation day the program can be configured to irrigate by 6 **Multiple** start times or instead irrigate by **Pulses**, 1 stop time is supported.

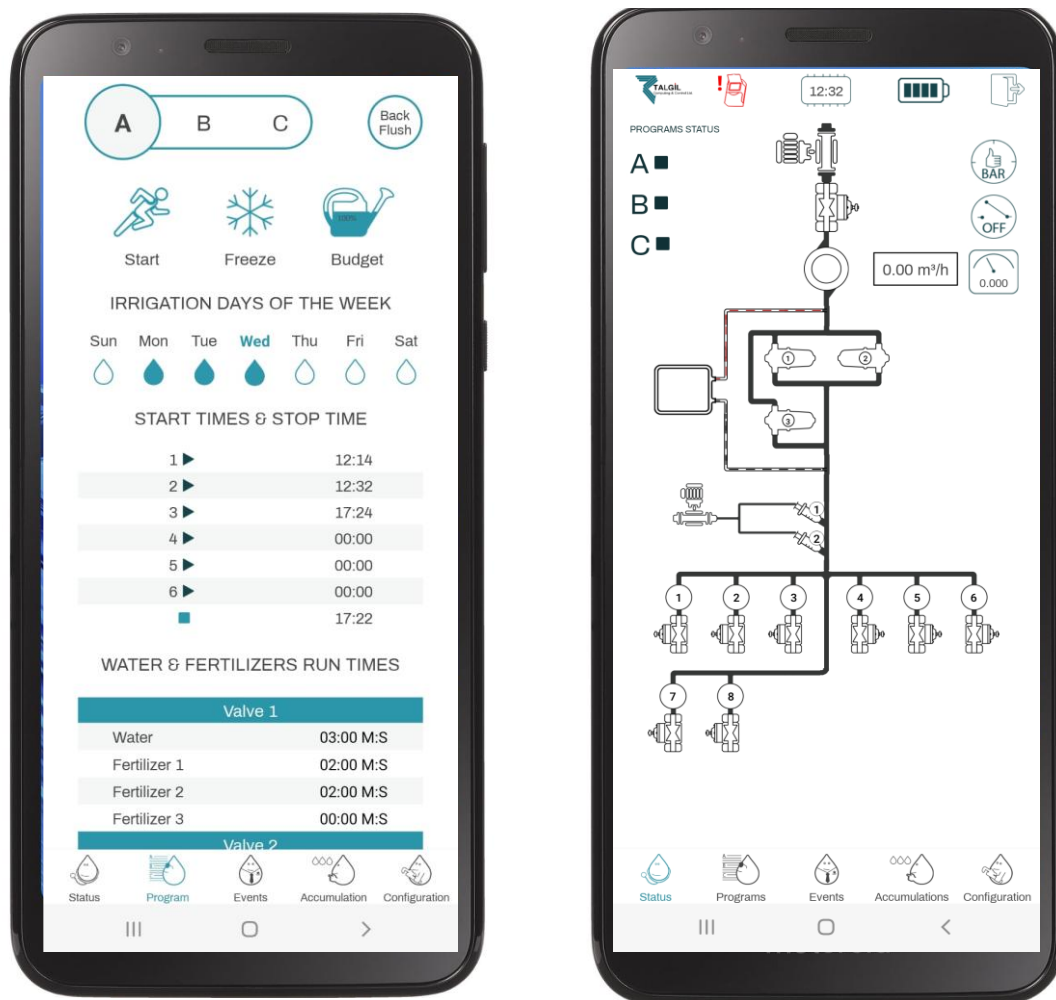


Fig 2 – Left: Program tab, Right: Status tab

## 2. MiniAggPro Brochure

### Irrigation features

- 3 independent irrigation programs
- Program can start by time of day (up to 6 start times and 1 stop time) or pulse (up to 999 pulses)
- Day of irrigation can be day of week or cycles
- Program C (3<sup>rd</sup> program) may function as regular program or as an emergency program started by dry contact or analog sensor, most suitable for handling frost protection or cooling procedures
- Irrigation is time based in units of hours/minutes or minutes/seconds selectable per program
- All water run times can be adjusted in between 20%-250%
- Irrigation by valve or group, up to 8 groups with up to 4 valves per group
- Main valve operation delayed, overlapped or together when opening or closing
- Valves can overlap or have delay
- Report flow on water meter
- No flow detection (on detection skip valve is performed)
- Water leakage detection

### Fertilization features

- Up to 4 fertilizers
- Booster opened together with fertilizers is supported
- Time based dosages for each fertilizer per valve or group
- Support for water before/after with manual per valve configuration or automatic

### Backflush features

- Flushing by digital DP, Analog DP, by time (can mix by time & DP) or manual
- Definable parameters: Flushing interval, dwell time, DP delay, flushing time
- Endless loop detection and prevention
- Accumulation of flushing by each start method (DP, time, manual)
- DP support ranges of 0..2.0 bar or 0..30 PSI

### Alarms & Events

- Detection of alarms with notification sent to phone
- Detection of following alarms: short, disconnect, low pressure, looping, water leakage, low batter, no-AC, step-up problem, freeze, configuration mode
- Event logging and viewing via phone

### Communication

- Support 4G cellular communication connection via Internet
- Support Direct Wi-Fi and serial port connection
- Support management of device via phone app available to android and iOS
- Support management of device via SMS

### **Additional features**

- Support accumulation report: total time, time per valve and total volume
- Support freeze of program or unit manually or by dry contact
- Support manual open/close of valves
- Support upgrade of firmware via OTA (Internet)
- Support user self-administration – a special user can assign other users to connect to device
- Password protected user connection to device

There exist DC and AC models.

The DC model can be powered either by 6v DC or 12v DC and it activates 2 wired 12v DC latching solenoids. The voltage for the solenoids switching is stored in a capacitor, boosted by a charge pump.

The AC model contains an internal transformer that can be powered by 110v or 220v from which it generates the 24v AC for powering the controller and the solenoids

### 3. MiniAggPro-board

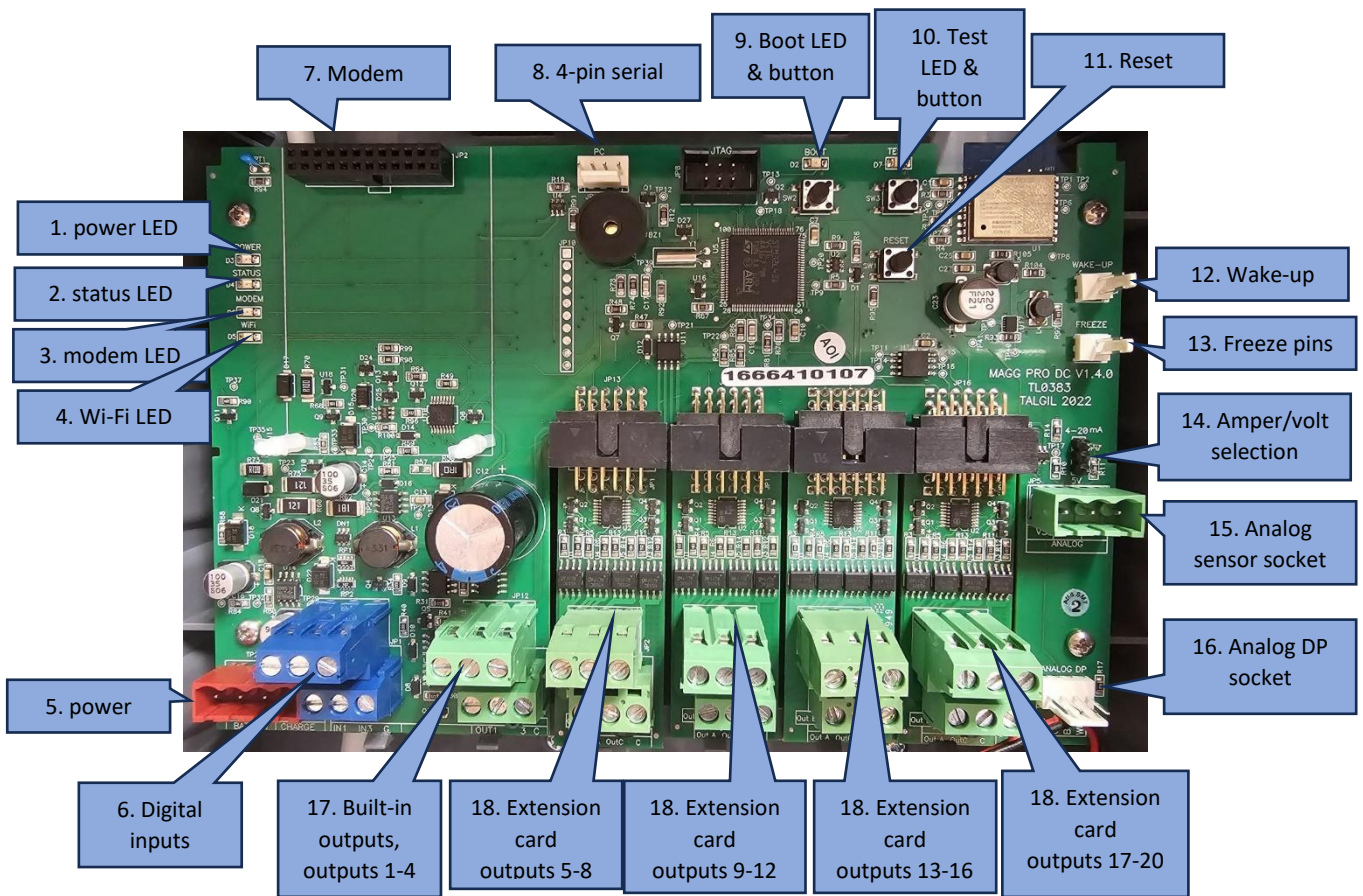
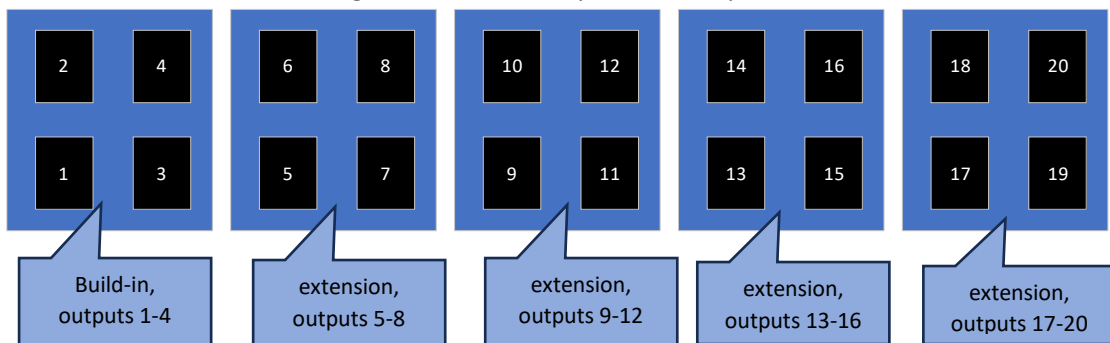


Fig 3 – MiniAggPro board

Fig details:

1. **Power LED** – ‘on’ when there is power to MiniAggPro.
2. **Status LED** – ‘on’ when firmware is up and running, ‘off’ otherwise.
3. **Modem LED** – ‘off’ when disconnected, ‘blinking’ when connecting to the server, ‘on’ when connected to the server.
4. **Wi-Fi LED** – ‘off’ when Wi-Fi AP is down, ‘blinking’ when AP is up but the user didn’t connect, ‘on’ when the user is connected to Wi-Fi AP.
5. **Power** – 4 pins; the 2 left pins should be connected to the battery, and the 2 right pins should be connected to the charger (solar charger or AC).
6. **Digital inputs** – Connect to 4 digital inputs; the inputs’ roles are always the same:
  - 1 – Water meter
  - 2 – DP
  - 3 – Pressure sensor
  - 4 – Stop/Start contact
7. **Modem socket** – The modem is inserted into this socket. Supported: cellular EG912 and Wi-Fi modem.
8. **4-pin serial** – Serial socket used for connecting with the programmer to the computer. The computer can communicate via the serial port with MiniAggPro using a serial tool program. It is also possible for the computer to upload a new firmware version with the tool CBoot.

9. **Boot LED & button** – ‘On’ if in boot mode, ‘off’ otherwise. Press and hold the boot button, then press and release the reset button (while continuing to press the boot button) to enter boot mode.
10. **Test LED & button** – The test button is used to test outputs. A long press on the test button will turn on test mode. In test mode, pressing the test button once will open the first valve; another press will close it. Subsequent presses will open and close other outputs one after the other until the last output closes, at which point test mode will end. If you want to end test mode before the last valve is closed, press and hold the test button.
11. **Reset** – Press to reset the controller. On reset, all outputs will close.
12. **Wake-up** – The wake-up button is connected to these pins. When the wake-up button is pressed, the Wi-Fi AP is activated. For further info See [Login via Wi-Fi direct](#).
13. **Freeze pins** – These pins are used by ‘freeze by contact’. Place a jumper on the pins to freeze the unit. See [Freeze unit by contact](#).
14. **Amper/Volt selection** – Used to set the work mode of the analog sensor. Has 3 pins. Place the jumper on the top and middle pins to set the analog sensor work mode to Amper. Place the jumper on the middle and bottom pins to set the analog sensor work mode to Voltage.
15. **Analog sensor socket** – The analog sensor is connected to this socket.
16. **Analog DP socket** – 4 pins, used to connect the analog DP to the board.
17. **Built-in outputs** – Outputs 1-4 are built-in on the board. For more outputs, extension cards are needed.
18. **Extension** – You can add extension cards for additional outputs. The extension cards are inserted from left to right. The farthest left extension card provides outputs 5-8; the next extension card provides outputs 9-12; the one after that provides outputs 13-16; and the farthest right extension card provides outputs 17-20.



In diagram above you can see how outputs are located on the extensions, for example:

output 10 is located on second extension card from left, at top left side of extension  
output 4 is located on build-in outputs top right.

## 4. Communication

After installing **MiniAggPro** physically in the field, the next task is how to connect to it. Connection to **MiniAggPro** is done using a phone app that can be downloaded from the App Store. Both Android and iOS are supported on phones and tablets.

After the app is installed on the phone, there are two ways to connect to **MiniAggPro**:

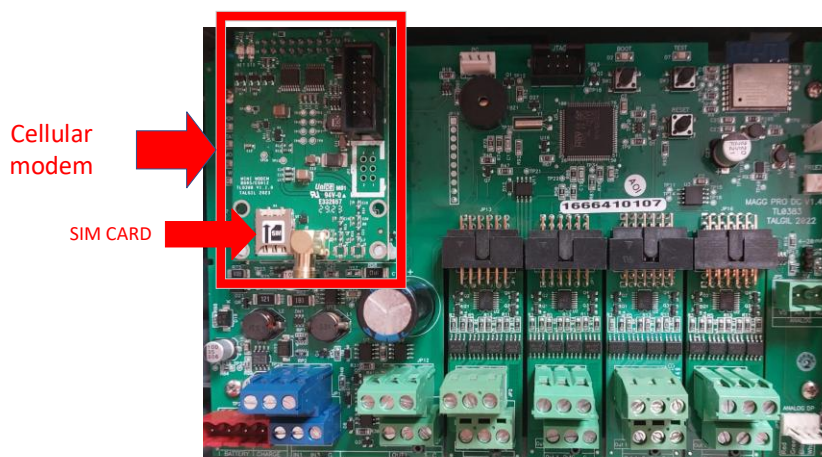
- **Locally:** via Wi-Fi Direct (built-in on board)
- **Remotely:** via the Internet (applicable when a cellular modem or Wi-Fi modem is installed on the device)

To connect remotely, the user may need to change some settings on the controller (like APN or Wi-Fi password, etc.). So, the first connection will be **local**, using Wi-Fi Direct.

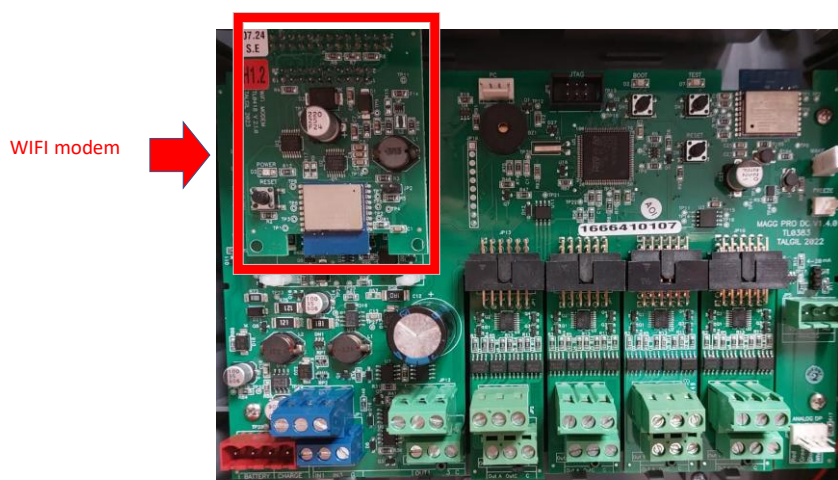
### Modems supported

Cellular modem

Cellular modem supports ELG912 modem with supported SIM card installed



Wi-Fi modem



**Fig 4 – pics of cellular and Wi-Fi modems**

## 5. Login via Wi-Fi Direct

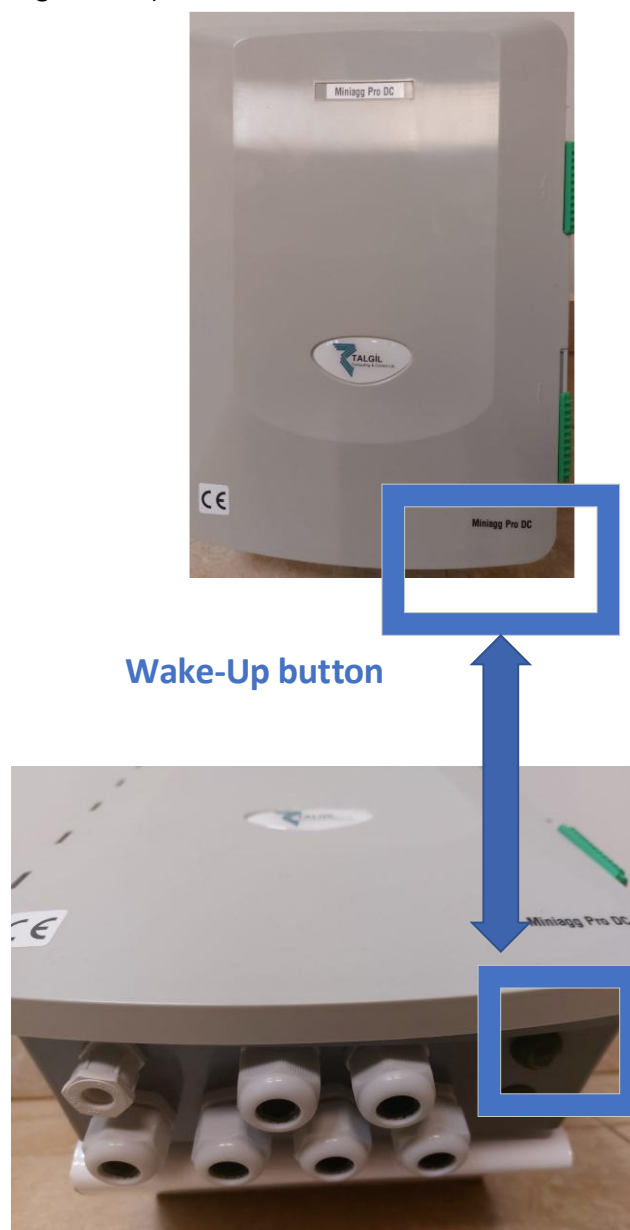
Wi-Fi Direct is used in order to connect to device locally when phone is physically near the controller (a few meters apart ) and it is convenient when:

- user don't have connections to internet and is located near the controller
- user needs to enter first time settings to device so that device will be able to connect to the internet.

In this mode of communication controller is acting as AP network hotspot and phone connects to this Wi-Fi network.

How to connect:

1. **Press button at the bottom right of controller case** to turn on Wi-Fi direct on (see Fig 5 below)



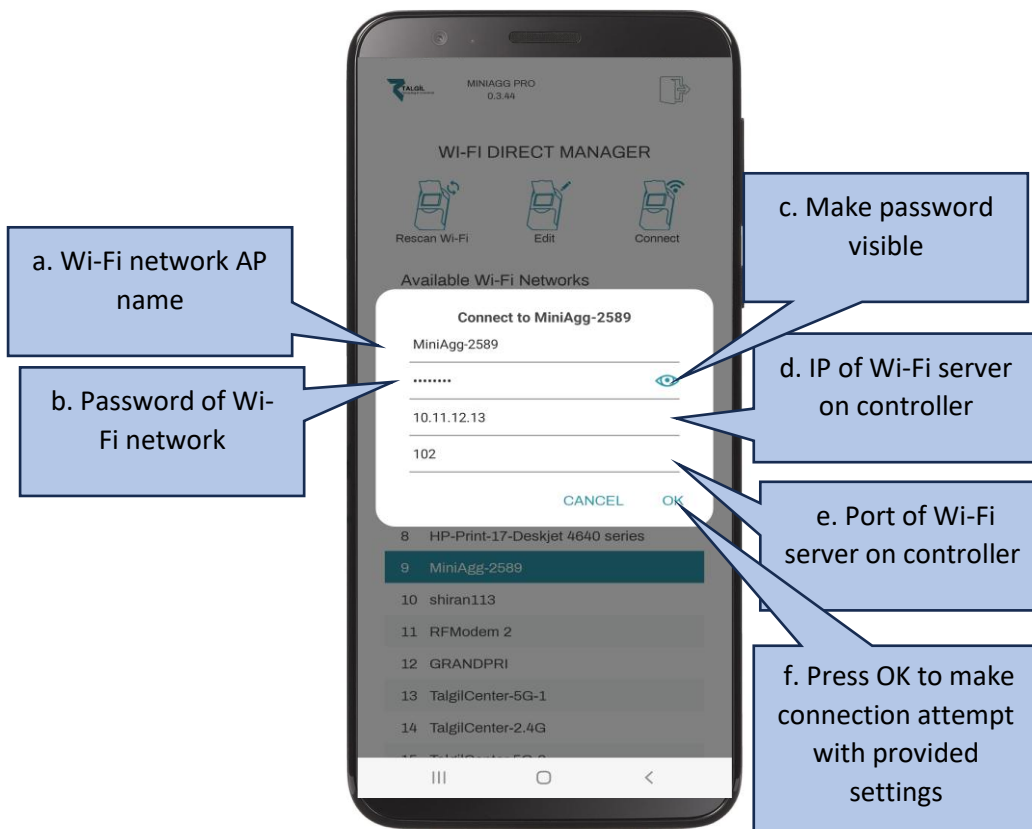
**Fig 5 – Wake-Up button location**

- In first screen that opens when phone app is opened select to connect via Wi-Fi direct.



**Fig 6 – connection screen**

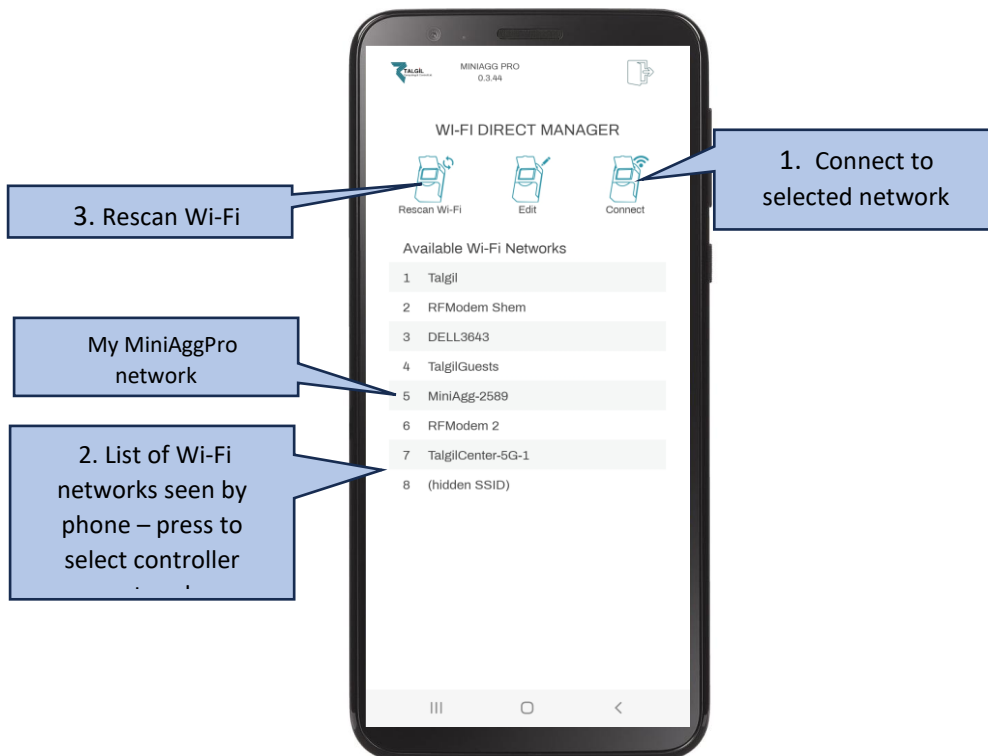
- (Optional stage) Select your network and press Edit to change settings (This step is needed if user changed Wi-Fi direct settings (otherwise skip and go to step 4))



**Fig 7 – Wi-Fi connection details**

Details of figure:

- a. **Wi-Fi network AP** – the name of controller Wi-Fi network (shouldn't change)
  - b. **Password of Wi-Fi network** – the password of Wi-Fi network on controller. Default is 12345678. To change default password, look at [Special setting for Wi-Fi direct](#).
  - c. **Eye** to make password entered visible.
  - d. **IP of Wi-Fi server**. The IP of Wi-Fi server on controller. Default is 10.11.12.13. To change default password, look at [Special setting for Wi-Fi direct](#).
  - e. **Port of Wi-Fi server**. The port of Wi-Fi server on controller. Default is 102. To change default password, look at [Special setting for Wi-Fi direct](#)
  - f. **OK button**, press in order to connect to device. If login is successful connection will be made if not you will return to previous screen in order to select different network.
4. Select your network which will be named as MiniAgg-XXXX by default (where XXXX the last 4 digits of device ID) see Fig 8. And press **Connect** to device.



**Fig 8 – Wi-Fi AP list**

**Fig details:**

1. **Connect to device button** – press to make connection with selected Wi-Fi network
2. **List of Wi-Fi networks** sensed by phone, select the network of MiniAggPro that you will connect to. MiniAggPro network will be named by default as MiniAgg-XXXX (where XXXX the last 4 digits of device ID)
3. **Rescan Wi-Fi** – press to make rescan of available Wi-Fi networks – use if you don't see your network when you should.

### a. Special Settings for Wi-Fi direct

All the settings for Wi-Fi direct of your device can be changed after connecting to device, the settings are located in 'Configuration tab->Connection' section



Fig 9 – configuring Wi-Fi Direct connection details

#### Fig details:

1. **Wi-Fi direct-network** – The Wi-Fi network name (name of AP), this is the name of network that is listed when phone performs a scan for available Wi-Fi networks.
2. **Wi-Fi direct password** – The password needed to enter for connecting to Wi-Fi direct network
3. **Wi-Fi direct IP** – The local IP of server on controller (rarely should be touched)
4. **Wi-Fi direct port** – The port of server on controller (rarely should be touched)

## 6. Login via Internet - Settings

Login via internet is used if you want to connect to device remotely. It can be used if the controller has appropriate cellular or Wi-Fi modem installed.

When connecting via the Internet, the user doesn't connect directly to MiniAggPro controller but first connects to Talgil CloudWire server as user.

Controller also connects to Talgil CloudWire server via Internet.

The server acts as midpoint in communication between user and controller.

The server also manages which controllers can be connected by which users.

To setup login via internet, you will need to perform these steps **FOR FIRST TIME ONLY**:

1. Configure cellular or Wi-Fi modem communication settings via Wi-Fi-direct
2. Configure server IP/port controller connects to (Defaults should suffice in most cases)
3. Configure server IP/Port user connects to (Defaults should suffice in most cases)
4. Register new user who will connect to CloudWire Server
5. Add controller to current user

In next sections these steps are explained in more detail

### a. Login via Internet – Step 1 for cellular: Configuring cellular modem settings

To work with cellular modem, you may need to change the cellular communication settings if defaults are not supported by the SIM card provider.

If you need to change the default settings, follow these steps:

1. Connect to the controller via Wi-Fi Direct.
2. Go to the **Configuration** tab → **Connection Settings** (the settings below will appear only if a cellular modem is installed).



**Fig 10** – configuring APN connection details

#### Fig details

1. **APN** – Access point name, set this to the name provided by the SIM provider, default: internet
2. **APN user** - enter the username provided by the SIM provider, default: blank
3. **APN password** – enter the password provide by the SIM provider, default: blank

## b. Login via Internet – Step 1 for Wi-Fi modem: Configuring Wi-Fi network

To work with Wi-Fi modem you need to remember that Wi-Fi modem on controller should connect to nearby Wi-Fi network which has Internet access. You will need to provide the Wi-Fi network AP name and password. *(the below setting will appear only if Wi-Fi modem is installed)*



**Fig 11** – configuring Wi-Fi modem details

### Figure details

1. **Wi-Fi network** – the Wi-Fi network Wi-Fi modem will connect to
2. **Wi-Fi password** – the Wi-Fi password of the network

**c. Login via Internet – Step 2 Configuring Server IP/port - controller side**

It is possible to change the IP/port of the server controller connects to. This is rarely needed as default server should be enough (*may be needed when default server is down and Talgil provides another server to connect to*)



**Fig 12 – configuring controller side server IP/port details**

**Fig details:**

1. **Server IP** – the DN or IP of the server controller connects to
2. **Server port** – the port of the server controller connects to

#### d. Login via Internet – Step 3 Configuring Server IP/port – user side

It is possible to change the server that the user connects to (this should only be done if instructed by Talgil). In most cases, this isn't necessary since the default server is the correct one.

To change the server IP/port the user connects to, go to the first screen when the app opens and press **Server Settings**.



**Fig 13** – configuring user side server IP/port details

#### Fig details

1. **Api host** – the IP user uses to connect to CWS server. Default: cws.talgil.com
2. **Api port** – the port of the server user connects to. Default: 3050

### e. Register new user that will connect to CloudWire Server

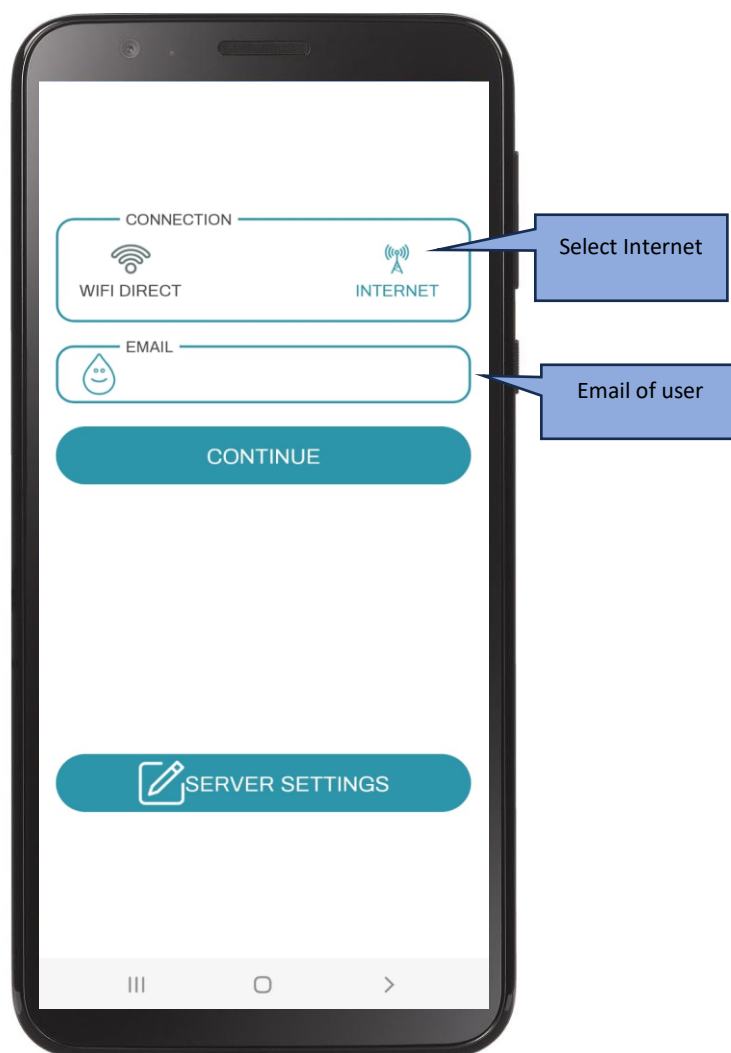
After app is opened for first time user is prompted to do registration of new user (even if the user exists but used on different phone).

Here are some rules regarding users:

- User is attached to phone so there cannot be the same user on two different phones.
- Entering exiting user on new phone will detach it from old phone on confirmation.
- You can create new user for free using simple registration process.

To register new user:

1. Select in first screen, that app opens with, connect via Internet
2. Enter email of new user and press continue



**Fig 14** – login via internet with e-mail

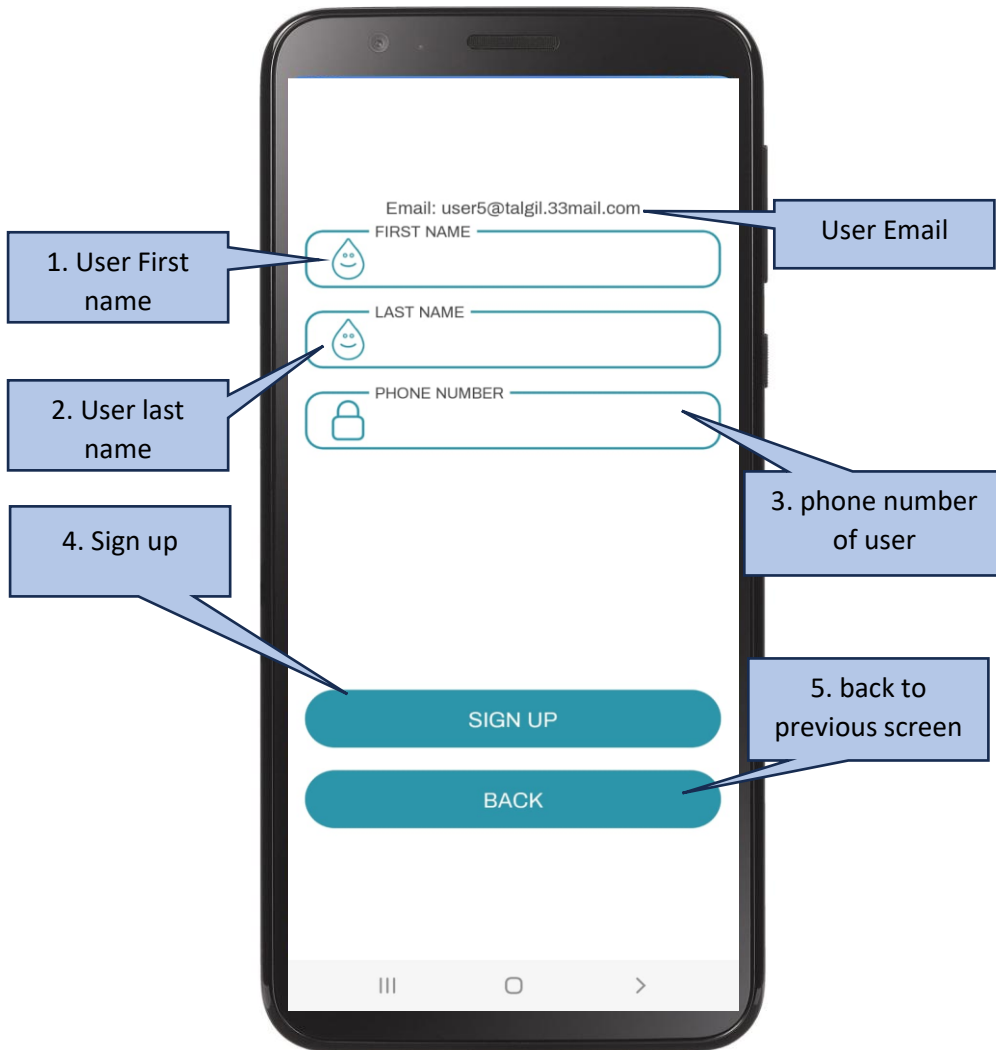
#### **Fig detail**

**Email of user** – Users are identified uniquely by their email.

Press 'continue' to go to next screen, two outcomes are possible:

- The email is new for server and user is promoted to enter registration data for it (see step 3)
- The email is of user that already exists on server so user is asked if he want to detach the existing user and attach it to this phone instead (if Yes then user is directed to enter confirmation, see step 4)

3. Enter details of new user (see Fig below) and press sign up



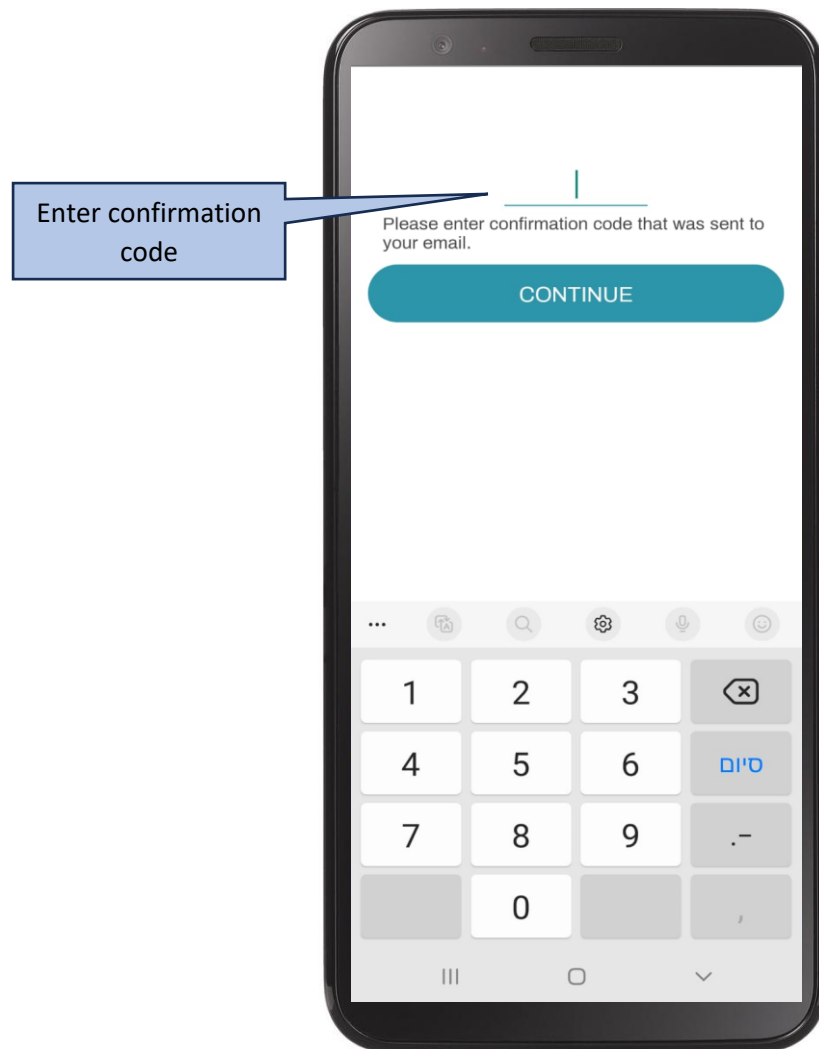
**Fig 15** – entering new user details

**Fig details**

1. Enter user first name here
2. Enter user last name here  
Note: Users are defined by their email. So email is unique you cannot have two users with the same email. But you can have 2 users with same first and last name.
3. Enter user phone number. Phone number is used for sending notifications of alarms to provided phone number. Please enter full phone number including country prefix (i.e like +9725241111111 where +972 is Israel prefix)

4. Press to confirm user settings and continue to confirmation screen
5. Press to go to previous screen (Fig 14 screen)

4. Enter the confirmation number (see Fig below) you received via email (using email from step 2)



**Fig 16** – entering confirmation code

**Fig details:**

On this screen, you need to enter the confirmation code you received to your mailbox (the email address entered in Step 2)

Press continue will create the user on the server, and you will proceed to the **Device Manager** screen, where you can select device to connect to

**Remark:** User registration is done only once. After completing the registration, the device registration step will not appear in future launches of the program. Instead, you will be taken directly to the **Device Manager** screen on startup

## 7. Phone app – device manager screen

After user registration is completed (this is done only once), the first screen displayed when opening the app is the **Device Manager** screen (see the figure below).

On this screen, you can add new devices, edit existing devices, and connect to available devices. Once a device is added, you can connect to it using your user account to manage it

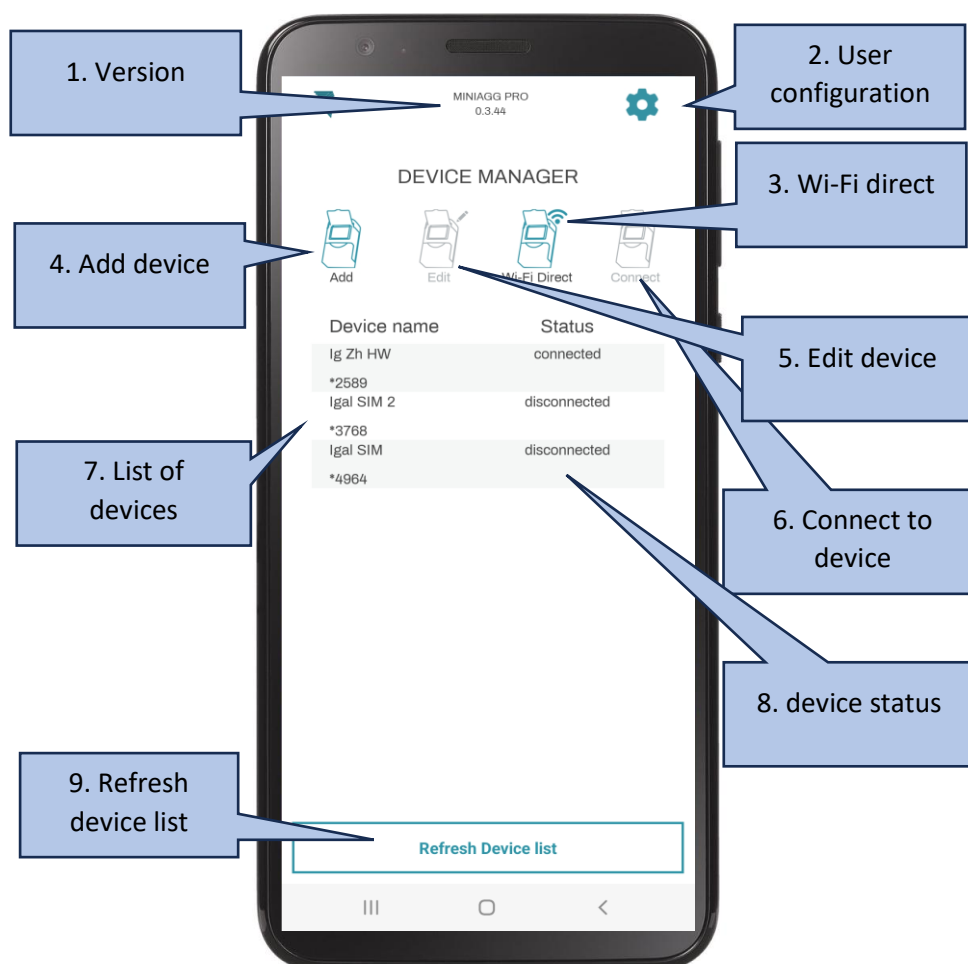


Fig 17 – device manager screen

### Fig details

1. **Version** – Displays the version of the mobile application.
2. **User configuration** – Edit user settings such as username, phone number, and API server.
3. **Wi-Fi direct** – Press the icon to connect to a device using Wi-Fi Direct. See the section [Login with Wi-Fi Direct](#) for more details.
4. **Add device** – Add a new device to the list. The user role must be **Master** or **Dealer**, so this option cannot be used if the device already has a **Master** or **Dealer** assigned.
5. **Edit device** – Modify device settings, including notification preferences. If the user is a **Master** or **Dealer** then there will be additional settings that manage which users can connect to the device.
6. **Connect to device** – connect to selected device

7. **List of devices** – Displays all devices the current user can connect to.
8. **Device Status** – Indicates whether the device is connected or disconnected. Additionally, an icon represents the current state of the device, such as irrigation, fertigation, or an active alarm.
9. **Refresh device list** – Updates the device list to display the most recent status

## 8. Explanation of user role for device

Each user has a role for a device. A user can be a Master, Dealer, or Client of a device. If a device is purchased through a dealer, the dealer will assign a customer as the Master of the device. The Master can then grant access to other users, who will have the Client role.

*For dealers only:* After purchasing a device from Talgil, if the device has no users attached to it (i.e., a brand-new device), the dealer can add the device in either the Dealer or Master role via the **Add** option in the **Device Manager** screen (see [Adding device using add device](#)).

A user with the Dealer role can add another user as a Master, and vice versa. Each device can have only one Dealer and one Master, but there can be an unlimited number of Client users.

### **Client** (of a device)

- Can connect to and communicate with the device.
- Receives alarm notifications from the device.

### **Master** (of a device)

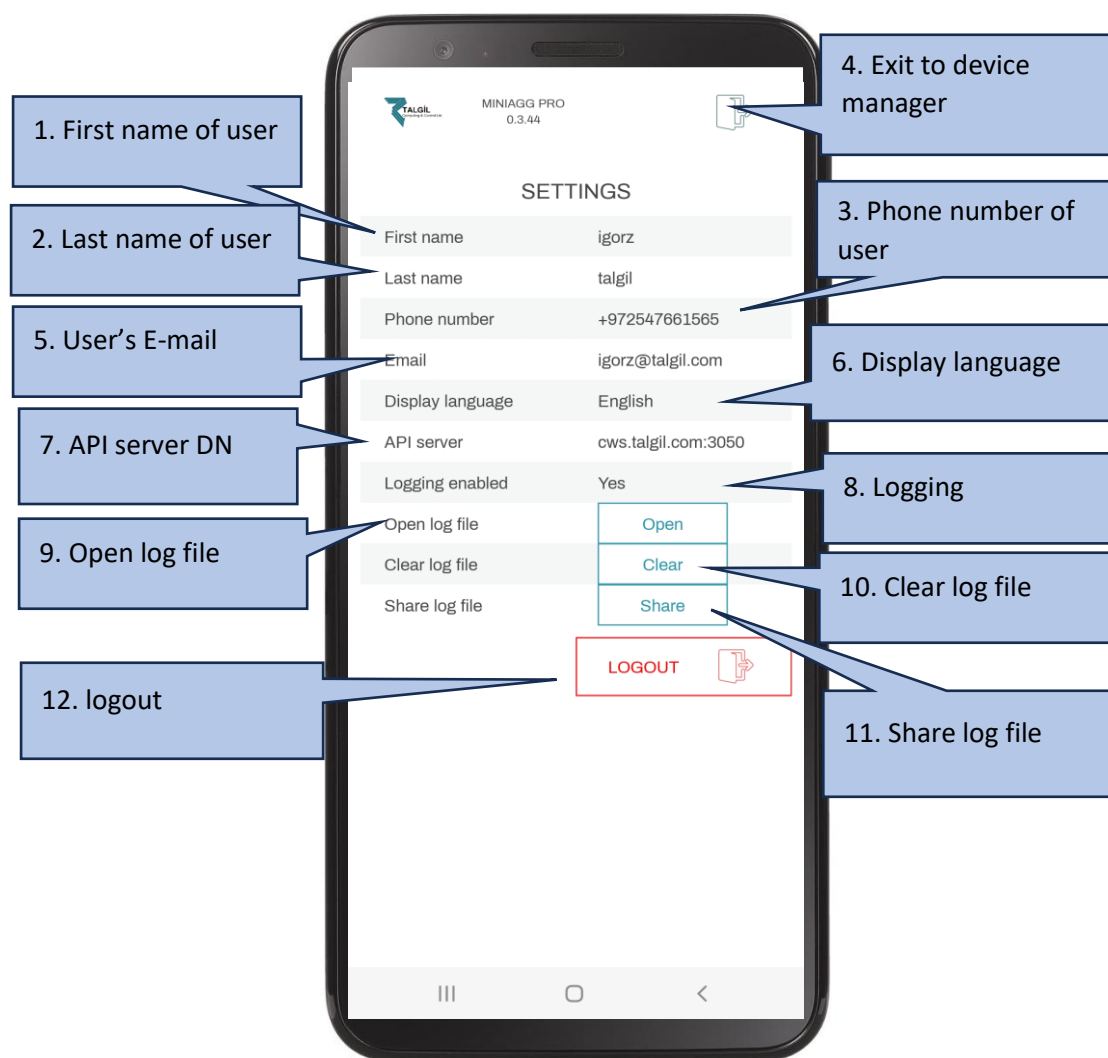
- Can do everything a Client can do.
- Can also manage the list of users attached to the device (attach/detach/change roles).
- Receives alarm notifications from the device.
- Device can have only one user that is master.

### **Dealer** (of a device)

- Can connect to and communicate with the device.
- Can assign a Master to the device, but only if no Master is currently assigned.
- Does not receive alarm notifications from the device.
- A device can have only one Dealer.

## 9. Phone app user configuration – change settings + log for debugging

You can access user configuration from the **Device Manager** screen. This allows you to update user settings provided during registration, such as your name and phone number.



**Fig 18** – edit user setting screen

### Fig details

1. **First Name** – Tap to edit (same as provided during new user registration).
2. **Last Name** – Tap to edit (same as provided during new user registration).
3. **Phone Number** – Tap to edit. This is used to receive notifications, and it is recommended to enter the phone number of the device where this app is installed.
4. **Exit to Device Manager** – Returns you to the Device Manager screen (see Fig. 7).
5. **User's Email** – Displays the user's email address.
6. **Display Language** – Select the language for the app interface.
7. **API Server DN** – Tap to edit the URL and port of the server this app connects to. This should only be changed if instructed by Talgil.
8. **Logging** – Enables logging for all devices this user connects to. This is used upon Talgil support request to help debug issues with the app.

9. **Open Log File** – (Shown if logging is enabled) Opens the log file (a text file) on the current device.
10. **Clear Log File** – Deletes the current log file and starts a new one. This is used to clear previous log data.
11. **Share Log File** – Share the log file via various methods (email, WhatsApp, or other platforms) with other users, typically the Talgil support team.
12. **Logout** – Logs the user out of the app, allowing the phone to be attached to a different user.

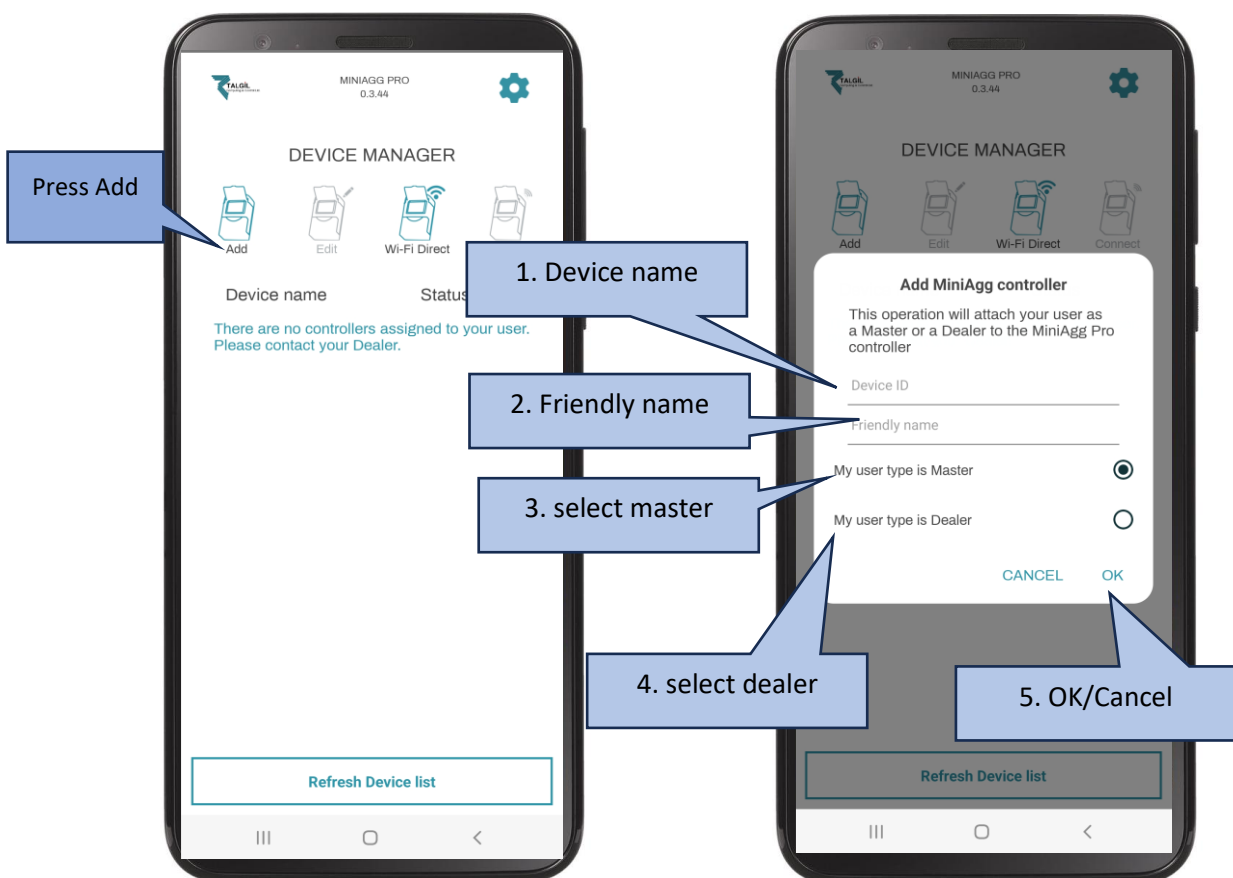
## 10. Adding new device to user

After registering new user for first time, device manager list of devices will be most likely empty. There are two ways to add device to your user:

- Using **add device** button in device manager. Works if your role for device is master or dealer.
- Another user which is master or dealer of device add you as client of his device

### a. Adding device using add device

If you have device that is fresh without any users attached to it before, you can add this device to your device list in device manager using **add device** button. On attaching you can select the role of user for device: master or dealer.



**Fig 19** – adding user with master/dealer role to device

## Fig details

1. **Device Name** – The ID of the unit. Check the package box for the ID; it is a 10-digit number. This is the most important configuration, as it is the only identifier used for the device.
2. **Friendly Name** – Any name you prefer. This name will appear in the Device Manager list and helps easily identify the controller.
3. **Set User as Master** – Assigns the user the Master role for the device (see the explanation of user roles for devices).
4. **Set User as Dealer** – Assigns the user the Dealer role for the device (see the explanation of user roles for devices).
5. **OK/Cancel** – Pressing OK will attempt to add the device with the provided settings. Pressing Cancel will close the popup.

### b. Adding device in client role using master/dealer user

If a device already has a **Master** or **Dealer** user, they can grant access to other users, who will have the **Client** role. Once the **Master** or **Dealer** adds a new user to the device, that user will be able to connect to it.

#### Steps to Add User

1. On the **Master** or **Dealer** phone, select the device from the device list and click **Edit**.
2. If you are a **Master** or **Dealer** for the device, you will see a **Users** section. Press **Add User**.

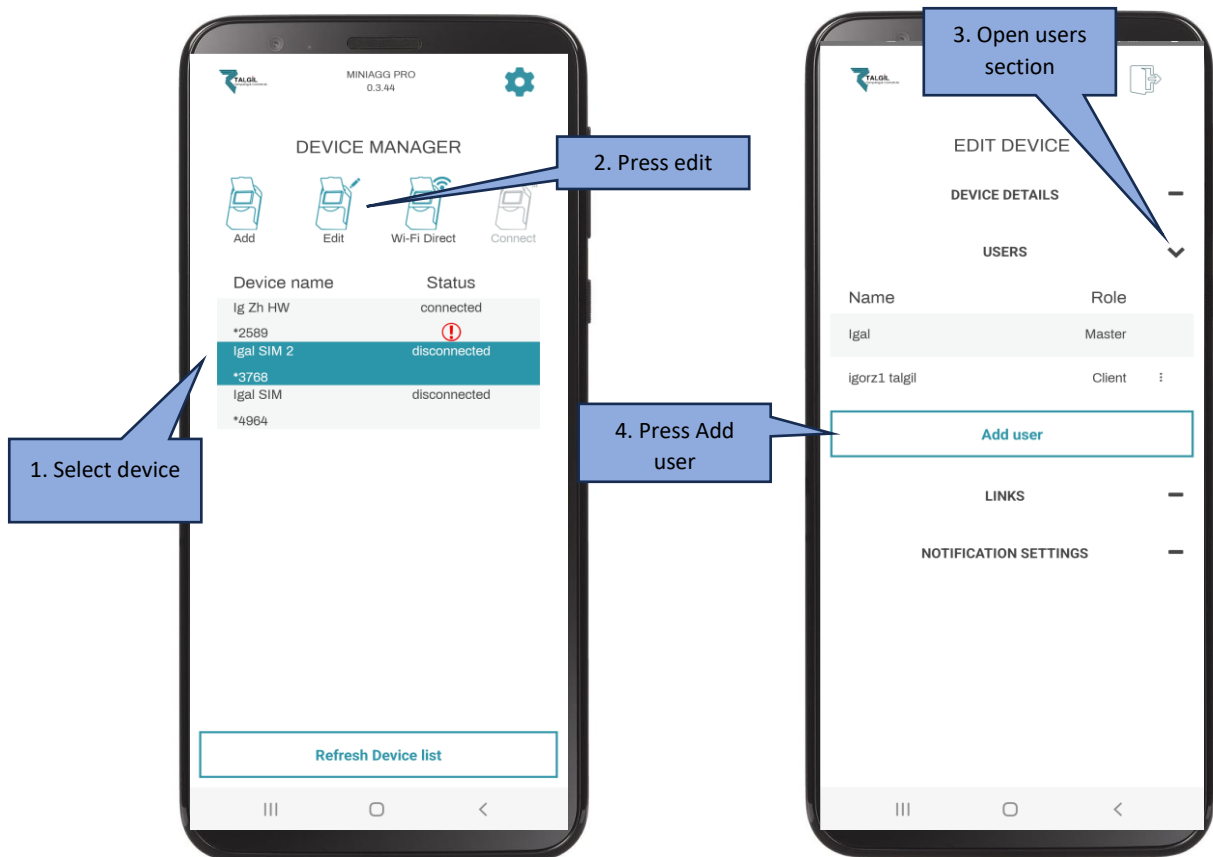
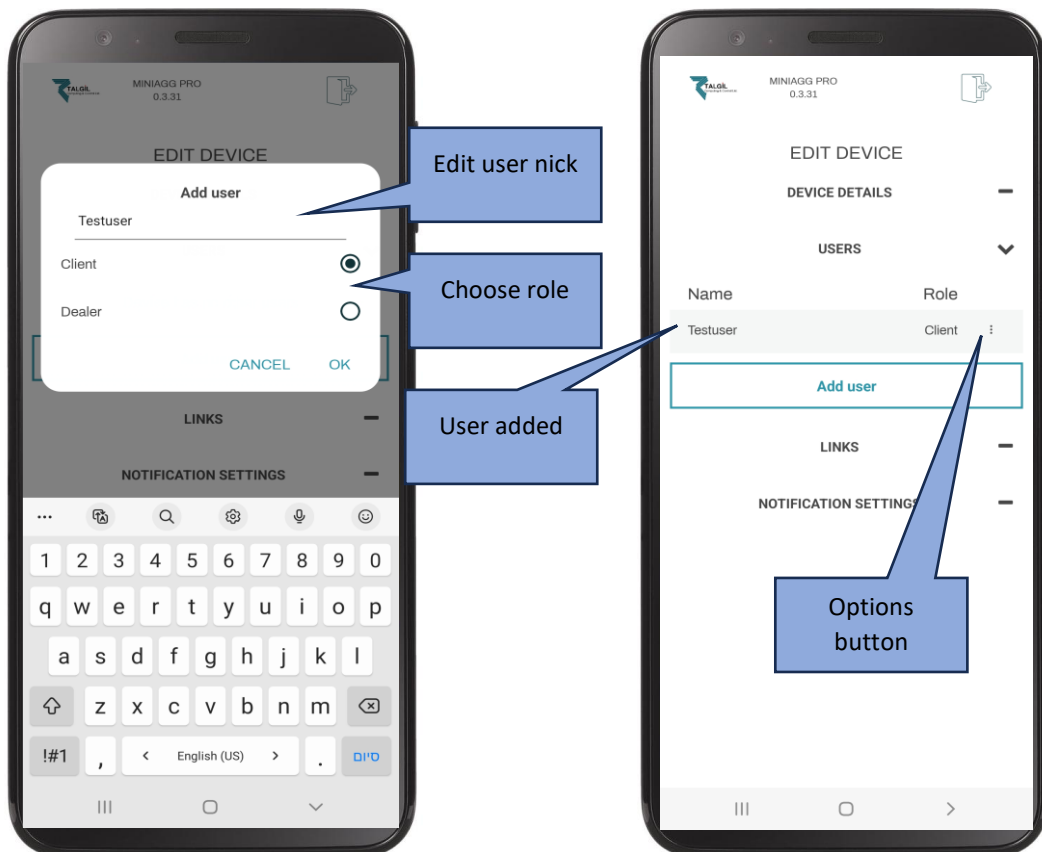


Fig 20 – adding new user to device

3. In the pop-up window, enter the email of the user you want to grant access to, then press **OK**
4. In the next pop-up window, select the user's role: **Client** or, if no **Master** or **Dealer** has been assigned to the device, you can assign them as **Master** or **Dealer**. You can also edit the user's nickname



**Fig 21** - adding new user to device – continue

5. To delete a user or edit their settings, press the **Options** button and select the desired action (see the figure above for the location of the **Options** button)

## 11. Phone app – general – navigating between tabs

After connecting to a specific controller via Direct Wi-Fi or Internet, the first screen displayed is the **Status** Tab screen, which graphically represents your current configuration.

You can navigate between screens by:

- Swiping left or right to switch to the next or previous screen.
- Using the button panel at the bottom of the screen to go directly to the desired screen

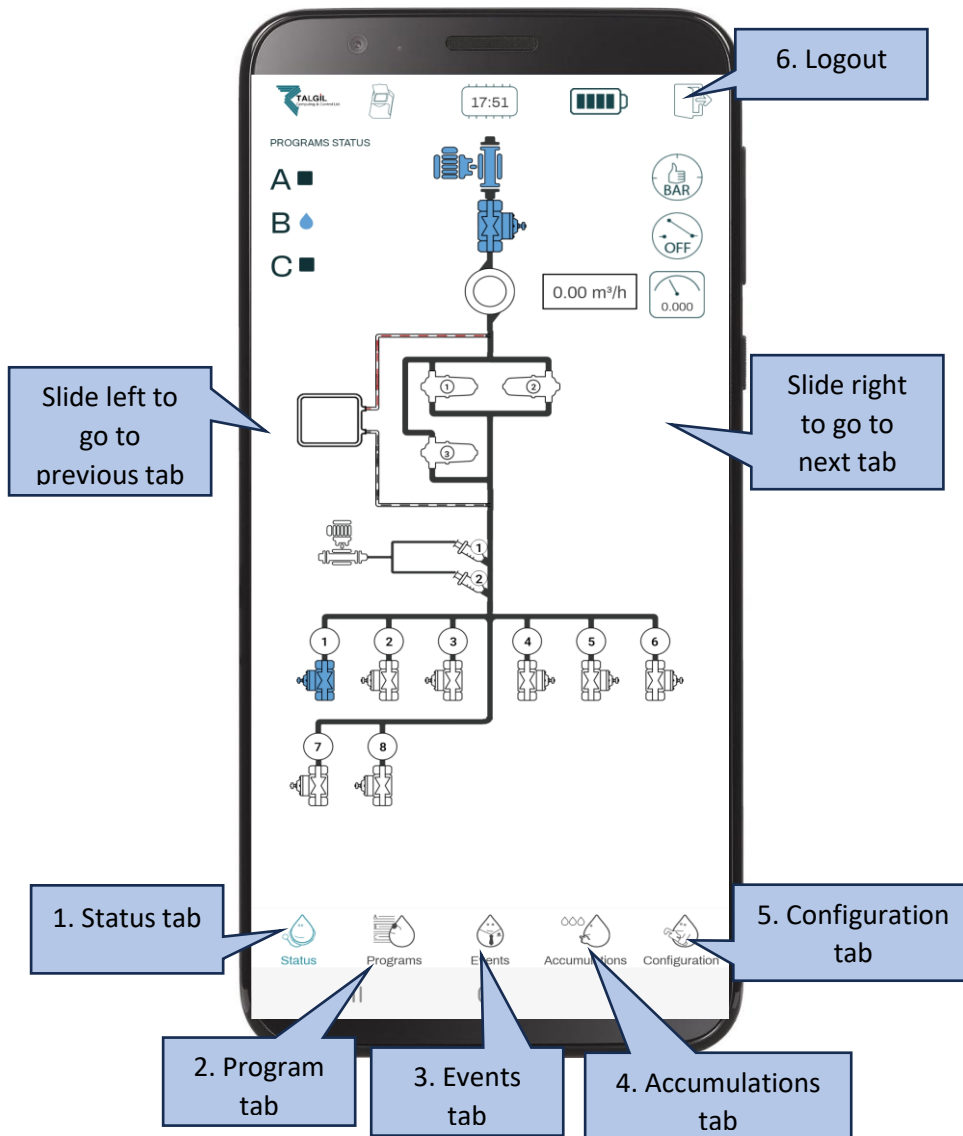


Fig 22 – navigating GUI explanation

Fig details:

1. **Status Tab** – Displays the current status of the irrigation system, including which program is running, etc.
2. **Program Tab** – Used to manage programs and configure irrigation times and dosages. Backflush configuration is also available here.

3. **Events Tab** – Shows past events related to the device, such as program start/stop actions and various alarms.
4. **Accumulation Tab** – Displays the current accumulation time for each valve. If a water meter is present, it also shows the total amount of water used.
5. **Configuration Tab** – Provides access to various device settings and configurations.

## 12. Status tab

When you connect to a device, the first screen you see is the Status Tab. This tab displays the current state of the system.

- All outputs are represented as icons.
- There are icons for the three programs and four inputs.
- Clicking on an icon opens a popup with additional information.

The outputs are white when closed, blue when open, red when on alert, green for open ferters

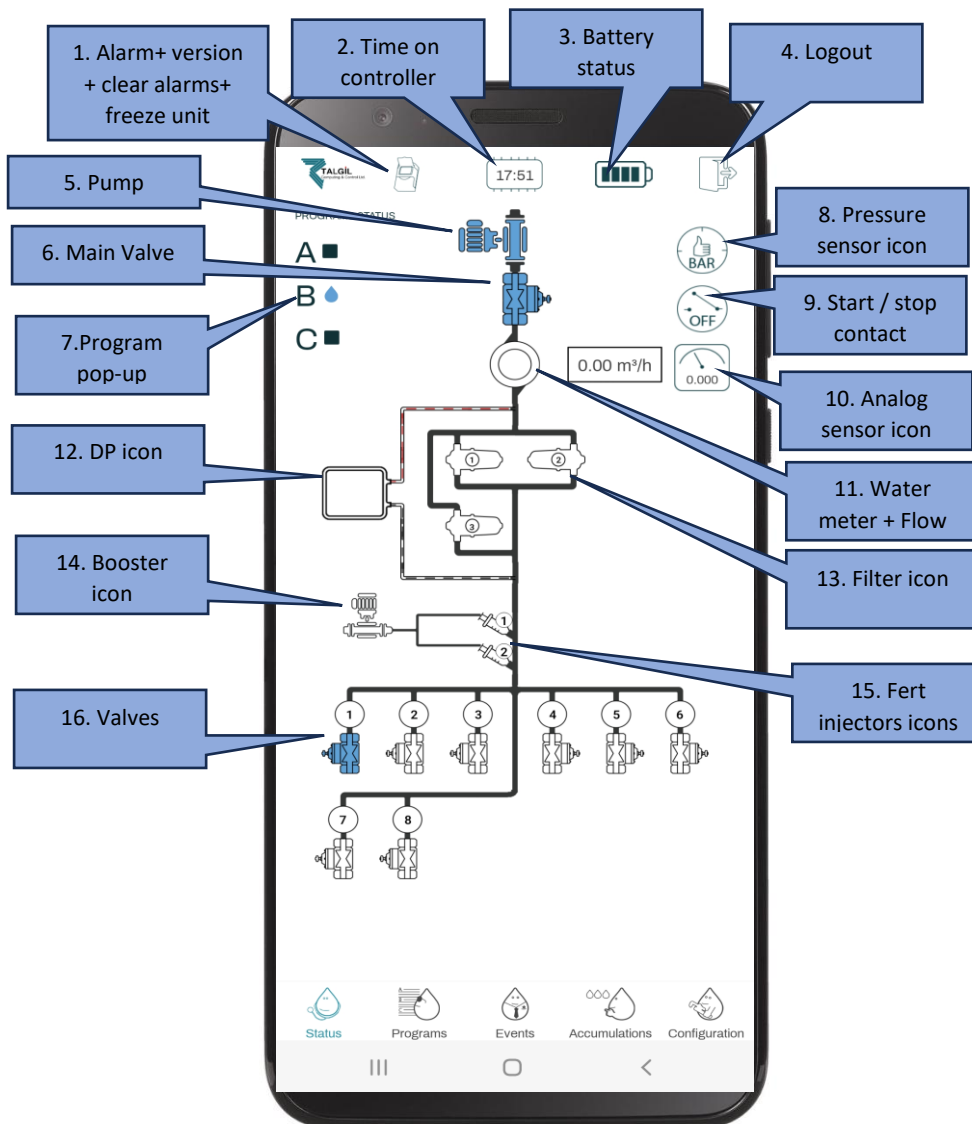


Fig 23 – status tab

## Fig details

1. **Alarm + Version + Freeze Unit** – This icon is red when an alarm is active on the device and white otherwise. Press to open a popup displaying the friendly name and firmware build version. If alarms are present, they will be listed here with an option to clear alarms. Additionally, you can freeze the unit by pressing the "Freeze the controller" text.
2. **Time on Controller** – Displays the device's current time. This may differ from your phone's time if you are connecting from a different time zone.
3. **Battery Status** – Indicates the charge level of the device's battery.
4. **Logout** – Press to log out from the current device and return to the Device Manager screen (if connected via the Internet) or the Wi-Fi Connection screen (if connected via Wi-Fi).
5. **Pump** – If the irrigation network includes a pump, this icon will appear. Press the icon for more details and actions related to the pump.
6. **Main Valve** – If the irrigation network includes a main valve, this icon will appear. Press the icon for more details and actions related to the main valve.
7. **Program Popups** – Press to open popups containing detailed status information for each program and available actions (such as starting a program manually).
8. **Pressure Sensor Icon** – Displays the current pressure:
  - Thumbs Up – Pressure is OK
  - Thumbs Down – Low Pressure
  - (Only shown if a pressure sensor is configured.)
9. **Start-Stop Contact** – Input #4. Displays the status of the start-stop contact (Closed or Open).
10. **Analog Sensor Icon** – The number inside the icon represents the converted value measured by the analog sensor. Press for more details. (Shown only if an analog sensor is configured.)
11. **Water Meter + Flow** – Displays the water meter icon:
  - Blue – Water is flowing
  - White – No flow detected
  - The number next to it represents the flow measurement.
12. **DP (Differential Pressure) Icon** – Shown if DP is present:
  - Blue – DP is open
  - White – DP is closed
  - Red – alarm on DP like looping
  - Press for backflushing and DP details.
13. **Filter Icon** – Shown if filters are configured:
  - Azure – Filter is open
  - White – Filter is closed
  - Press for more details and actions related to the filter.
14. **Booster Icon** – Shown if a booster is configured:
  - Green – Booster is open
  - White – Booster is closed
  - Press for more details and actions related to the booster.
15. **Fertilizer Injector Icons** – Shown if fertilizer injectors are configured:
  - Green – Injector is open
  - White – Injector is closed
  - Press for more details and actions related to the injectors.
16. **Valves** – Displays the status of valves:
  - Blue – Valve is open

- Red – Alert detected on the valve
- White – Valve is closed
- Press on a valve icon for more details and actions.

## 13. Setup configuration

### a. Defining Irrigation Network

When connecting to the device for the first time, all outputs will be set as valves, as shown in the Status Tab. The user can edit outputs and define additional elements instead of having only valves.

The output number assigned to each element is automatically managed by the system and can be viewed by clicking on the element in the Status Tab (physical output is connected to output location on board with the index equals to output number). The system assigns outputs in the following order:

Valves → Filters → Fertilization Injectors → Booster → Main Valve (MV) → Pump

- Valves start from Output 1
- The Pump is the last output

*(The total number of outputs may vary depending on the number of extension cards installed on the device.)*



Fig 24 – irrigation network details

Fig details:

1. **Valves** – Select the number of valves in the system. The system must have at least one valve, and the maximum number of valves cannot exceed the number of outputs.
2. **Water Pump** – Select "Yes" if the system has a water pump (optional). *(Only one pump can be present in the system.)*
3. **Main Valve** – Select "Yes" if the system has a main valve (optional). *(Only one main valve can be present in the system.)*
4. **Filters** – Select the number of filters in the system. The system can have between **0** and **(number of outputs - 1)** filters *(since at least one output must be a valve).*
5. **Fertilization Injectors** – Select the number of fertilization injectors in the system. The system can have between **0** and **4** injectors.
6. **Booster** – Select "Yes" if the system has a booster (optional). *(Only one booster can be present in the system.)*
7. **Pressure Sensor** – Select "Yes" if the system has a pressure sensor (optional). *(Only one pressure sensor can be present in the system.)*
8. **Water Meter** – Press to select the water meter ratio. Enter **0.0** to indicate that the system does not have a water meter.
9. **DP Sensor** – Press to select if the system has a **Digital DP, Analog DP, or None.**

## b. Define time + GMT on controller

The controller's time is updated in two ways:

- Each time the user connects to the controller, the controller's time is synced with the time on the user's phone.
- Periodically, the controller updates its time based on the server's time (only if the controller has an internet connection via a modem and communication with the server).

The default time zone for the controller is GMT+0. You need to set the correct GMT according to the controller's location to display the correct time.

Winter time offset is also supported and must be adjusted manually by the user.

To set the time zone and winter offset on the controller, go to:

**Configuration → Time & Day**



**Fig 25 – time & day details**

Fig details

1. **First day of the week** – This option determines whether the week starts on Sunday or Monday. It affects the display of weekdays when using multiple options in the program tab.
2. **Day of the week** – Displays the current day of the week on the controller.
3. **Current time** – Shows the current time on the controller.
4. **Time zone** – The GMT configured on the controller. This should be set by the user.
5. **Daylight saving time** – The user should set this to "Yes" if daylight saving time is currently in effect. If set to "Yes," the DST offset will be added to the current time. This should be used in countries that observe daylight saving time in winter or summer.
6. **DST offset** – When daylight saving time is set to "Yes," this field determines how much time will be added or subtracted. In most countries, this is one hour

### c. Define Display Units Used

You need to decide which units you use on your controller: metric or imperial.  
Units affect the following:

- **Units of Water meter:** THG per hour (imperial), m<sup>3</sup> per hour (metric)
- **How times are displayed:** AM/PM (imperial), 24h (metric)
- **Accumulation:** THG (imperial), m<sup>3</sup> (metric)
- **Various configurations**

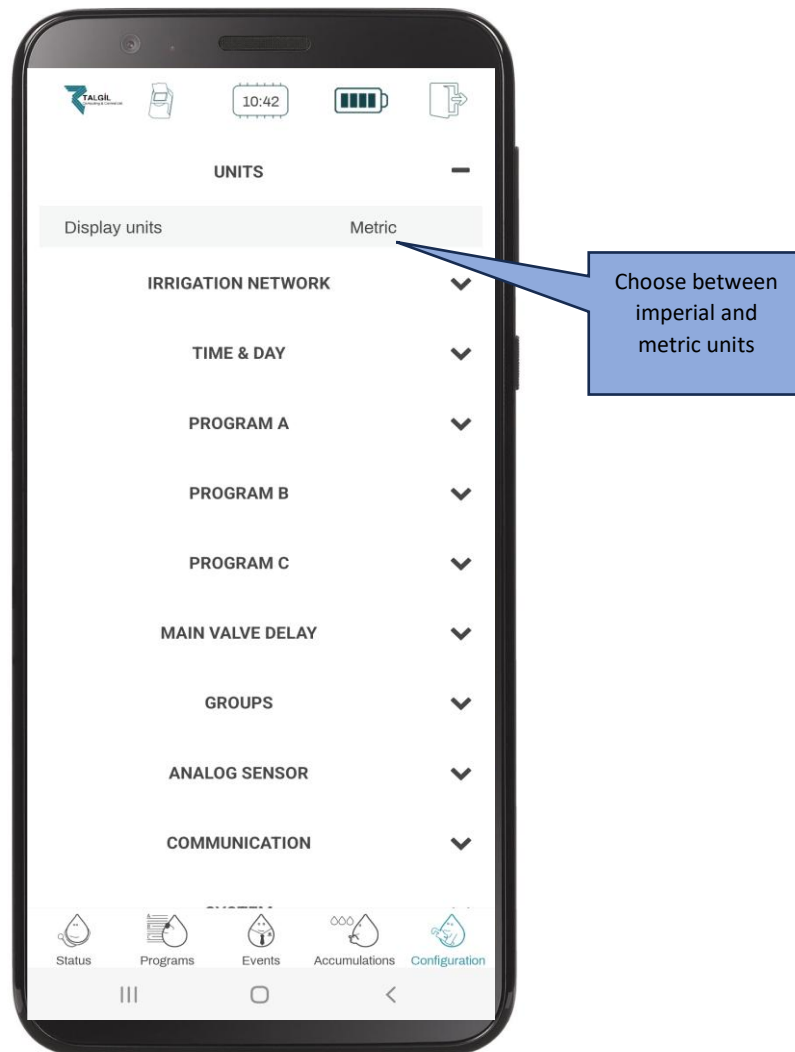


Fig 26 – displaying/changing units

## 14. Irrigation – configuring program settings

There are three programs in MiniAggPro. The first thing to configure for each program is when it will run: you can set the program to start by time or start it manually.

When setting a program to start by time, you need to choose the days on which the program will run and the specific time(s) it will start on. There are two options for scheduling a program on specific days:

- **Irrigation by day of the week** – Select which days of the week the program should run. For example, Program B can be set to irrigate every Monday.
- **Cycles** – The program will run at a configured interval of days. For example, if the program is set to run every third day, it will irrigate on a given day, remain inactive for two days, then run again, continuing in this cycle.

After selecting the irrigation days, you need to set the start times for those days. There are two options:

- **Multiple** – You can set up to six start times. On each start time, the program will run (if it is an irrigation day).
- **Pulse** – You specify one start time and the number of pulses, along with the interval between them. For example, setting a start time of 14:00 with three pulses and a five-minute interval means the program will start at 14:00, irrigate, wait five minutes, irrigate again, wait another five minutes, and irrigate one last time (for a total of three irrigation cycles).  
**Note:** For pulse irrigation, no other program can run between pulses.

After setting the start times, it is time to configure the dosage for the program. Before doing so, you can choose the dosage unit:

- **H:M (Hour:Minute)** – Specify how long each dosage lasts in hours and minutes (up to a maximum of 24 hours).
- **M:S (Minute:Second)** – Specify how long each dosage lasts in minutes and seconds (up to a maximum of 60 minutes).

Finally, you can configure the program to run in one of two modes:

- **Single valve** – One valve irrigates at a time. When it finishes, the next valve irrigates, and so on.
- **Groups** – A group of several valves (up to four) irrigates together. Once that group finishes, the next group in the sequence irrigates.

All the mentioned settings are configured in configuration->program (A,B or C) section



**Fig 27** – program configuration details

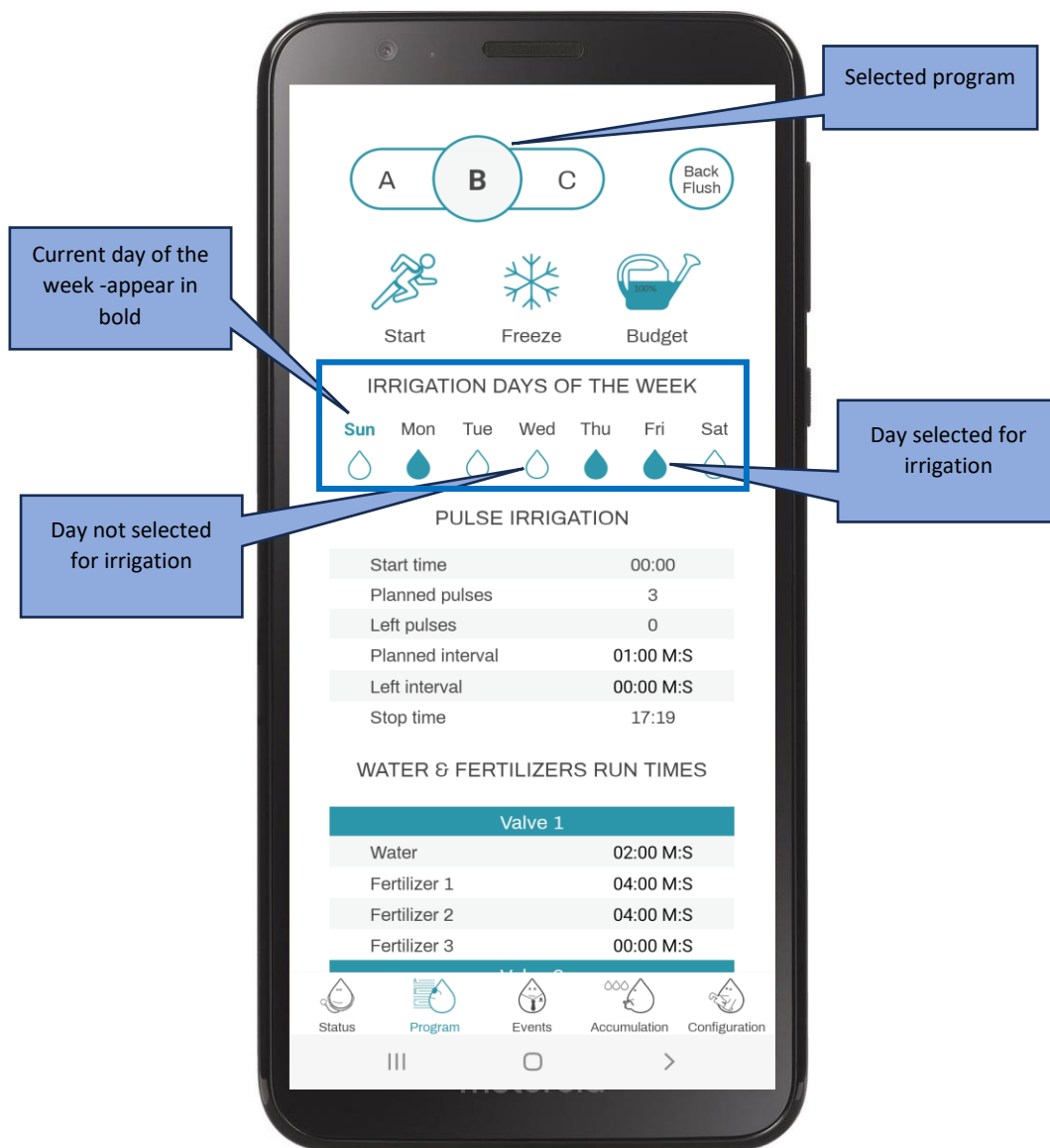
Fig details

1. **Days** – select between irrigation by days of week or cycles
2. **Starts** – select between Multiple or Pulse irrigation
3. **Units** – set program dosage units to H:M or M:S
4. **Irrigation** – select between irrigation by single valves or groups

### a. Irrigation – by days of week

To configure a program with irrigation by days of week , follow these steps:

1. Configure the program to irrigate by days of the week in the configuration tab (see the previous section: [Irrigation – Configuring Program Settings](#)).
2. In program tab select program for which you want to configure the settings.
3. For selected program select which days of the week program will start at.



**Fig 28 – days of week details for program B**

#### **Fig details**

- Current day of the week is listed in bold
- Day selected is indicated by full drop
- Day not selected is indicated by empty (white) drop
- You select/unselect days for irrigation by pressing on the appropriate drop

## b. Irrigation – by cycles

To configure program with irrigation by cycles, follow these steps:

1. Configure the program to do irrigate by cycles in the configuration tab (see previous section: [Irrigation – configuring program settings](#))
2. In program tab, select the program for which you want to configure settings. For selected program, enter planned cycles.



Fig 29 – Irrigation by cycle details for program A

### Fig Details

1. **Planned Cycles** – The length of cycle. Example: if it set to three then irrigation day will occur once every three days.
2. **Left cycles** – Displays how many days remain until the next irrigation day. It starts from *Planned Cycles* - 1 and counts down to zero. When *Left Cycles* reaches zero, it indicates that today is an irrigation day. You can adjust this value above or below the planned cycle to make the current cycle longer or shorter. After reaching zero, a new cycle will start with a value equal to the planned cycle, and the countdown will restart.

### c. Irrigation – multiple

If you want the program to start at exact times on irrigation days, then your best option is multiple starts. To configure it, follow these steps:

1. Configure the 'Starts' field in **Configuration tab → Program (A, B, or C)** to **Multiple**.
2. Go to the **Program** tab, select the program, and set the times for the available six start times of the day. The order of the times isn't relevant, so a time in slot 5 can be earlier than the time in slot 2. At these times, the controller will attempt to start the program. The times are displayed in either **AM/PM** format or **24-hour** format, depending on the selected unit. To edit a time, press on it. (*00:00 or 12:00 AM are used to indicate that the slot is empty.*)
3. You also have an optional **Stop Time**. At this time, the controller will stop the program if it is running. However, the program may still start again after this time if triggered by a start time or manually.

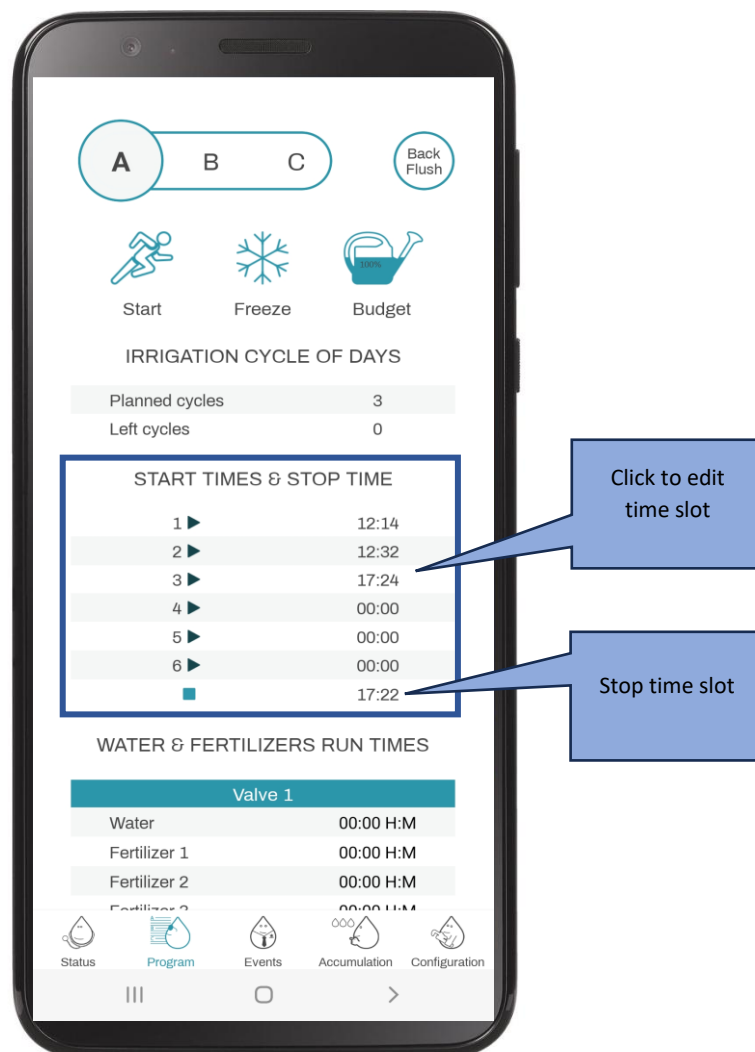


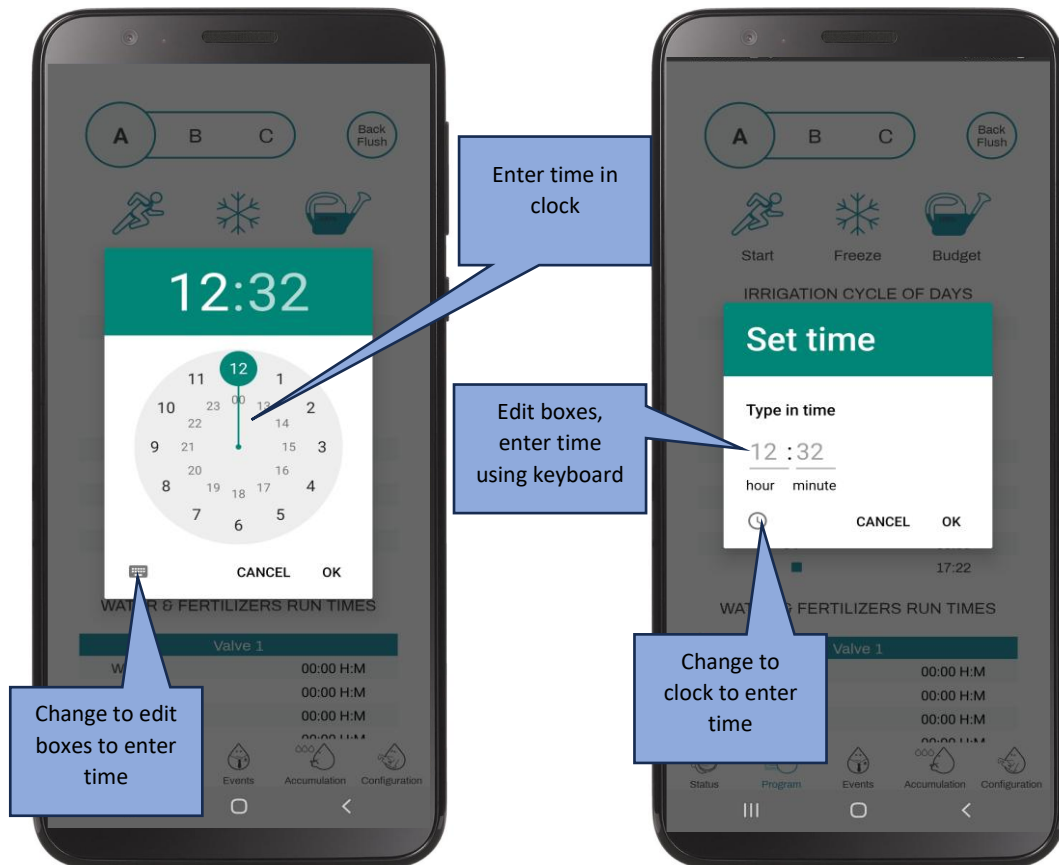
Fig 30 – start times & stop time details for program A

Fig Details:

**Start time slots** – click here to edit start time. The start times given here will cause program to attempt to start on entered time during irrigation days.

**Stop time** – click here to edit stop time

After clicking on start or stop time slot you can enter the time using two ways: selecting from shown clock or by inputting into edit boxes (clock is shown first)



**Fig 31** – setting start time *Left: by using clock, Right: by entering with keyboard*

**Fig details:**

When entering time using clock first you select hours in clock and then minutes.

Press OK to confirm and set the time

#### d. Irrigation – Pulse

If you want to set a program to start at a specific time and then perform a series of pulses with equal intervals between them, you can choose pulse irrigation.

**NOTE:** Other programs cannot run between pulses.

In pulse irrigation, you need to configure the start time of the first pulse, the number of pulses to be performed, and the interval between pulses



**Fig 32** – configuring pulse irrigation details for program B

#### Fig details

1. **Start time** – The start time of the first pulse, press to edit.
2. **Planned pulses** – The number of pulses to be executed when the program starts.
3. **Left pulses** – When the program is running, this field shows how many pulses remain. You can edit this field during the program run to add more pulses or reduce the number of remaining pulses.
4. **Planned interval** – The idle time between pulses, press to edit.

5. **Left interval** – When the program is idle between pulses, this field counts down the time until the next pulse. You can edit it to lengthen or shorten the idle time of the current countdown.

**e. Irrigation – setting dosages**

Setting dosages for a program is done in the **Program** tab. Go to the **Program** tab, select the program you want to enter dosages for, and scroll to the bottom of the screen to reach the Dosages section.

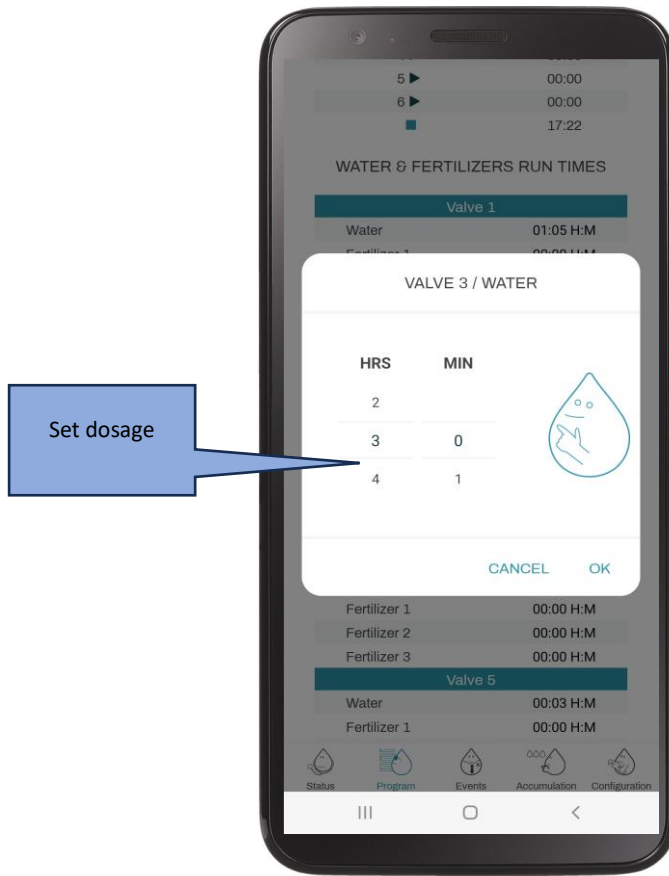
If you have fertilizer injectors, you can also set dosages for them.

The dosages are time-based; you enter the duration that a valve or group will remain open during irrigation. The program sequence follows the index of the valve or group (e.g., Valve 3 will irrigate before Valve 5, and Group 2 before Group 4).

Dosages are entered in units of H:M (hours:minutes) or M:S (minutes:seconds), depending on the program's configuration (see the previous section: [Irrigation – Configuring Program Settings](#))



**Fig 33 – editing dosages for program B**



**Fig 34** – setting dosage in time units for valve 3

Remark: if you want to set dosage in minutes/seconds change program units in **Configuration** tab to M:S (see section configuring program settings)

## 15. Start/Stop program manually

After configuring dosages for program you can start/stop it manually in three ways:

1. From **Status** tab press on program you want to start, choose in popup action 'Start normally' and press OK. Alternatively, if you want to stop program choose action 'Stop'

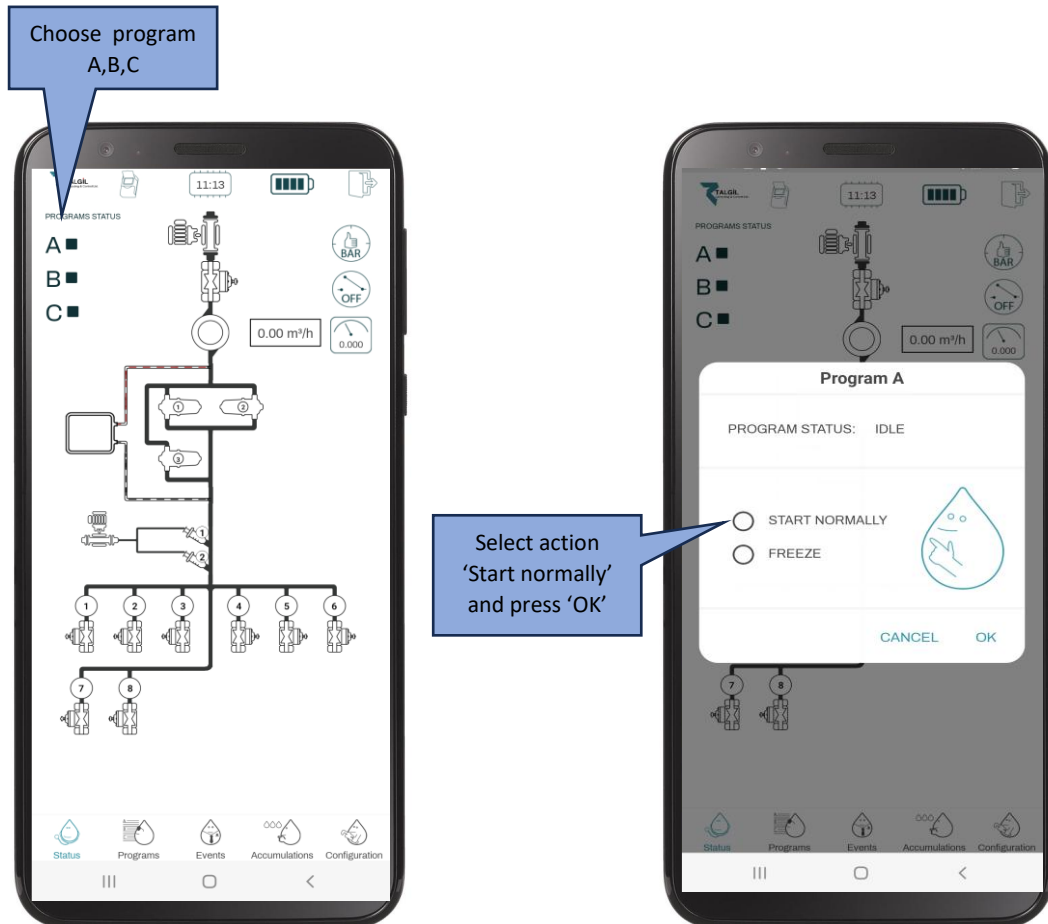


Fig 35 – starting program A manually from status tab

- From **Program** tab select program and press on icon 'Start', choose in popup action 'Start normally' and press OK (if program running instead of icon 'Start' you will have icon 'Stop' press on it and choose action 'Stop')



**Fig 36** – starting program manually from program tab

- You have option to start program from left – which will continue program from the last point it was stopped before.

## 16. Fertilization – general

MiniAggPro supports up to four fertilization injectors plus a booster.

If a booster is configured, it will activate whenever fertilization occurs (i.e., when at least one fertilization injector is open) and will deactivate when fertilization ends.

Dosages for the fertilizer injector are provided under the "**Water & Fertilizers Run Times**" section, as discussed in the previous section (see [Irrigation – Setting Dosages](#)). For each water valve dosage, corresponding fertilizer dosages can be configured.

A valve with a fertilizer dosage will have three irrigation phases:

1. **Water Before** – The time from the start of valve irrigation until the fertilizer injectors open.
2. **Fertilization** – The time during which both the valve and the fertilizer injectors are open.
3. **Water After** – The time from the end of fertilizer injection until the end of valve irrigation.

There are two modes for setting *Water Before* and *Water After*:

- **Automatic Mode** – The controller automatically calculates *Water Before* and *Water After* so that fertilization always occurs in the middle of the irrigation dosage (*Water Before* will be equal to *Water After*).
- **Custom Mode** – The user manually sets *Water Before* and *Water After* for each valve. The controller enforces these settings, ensuring that the configured *Water Before* and *Water After* always occur when a valve has a fertilizer dosage (water before can be different from water after).

You should choose custom mode if water before and after should always be enforced.

### a. Fertilization – configuring automatic/customize mode

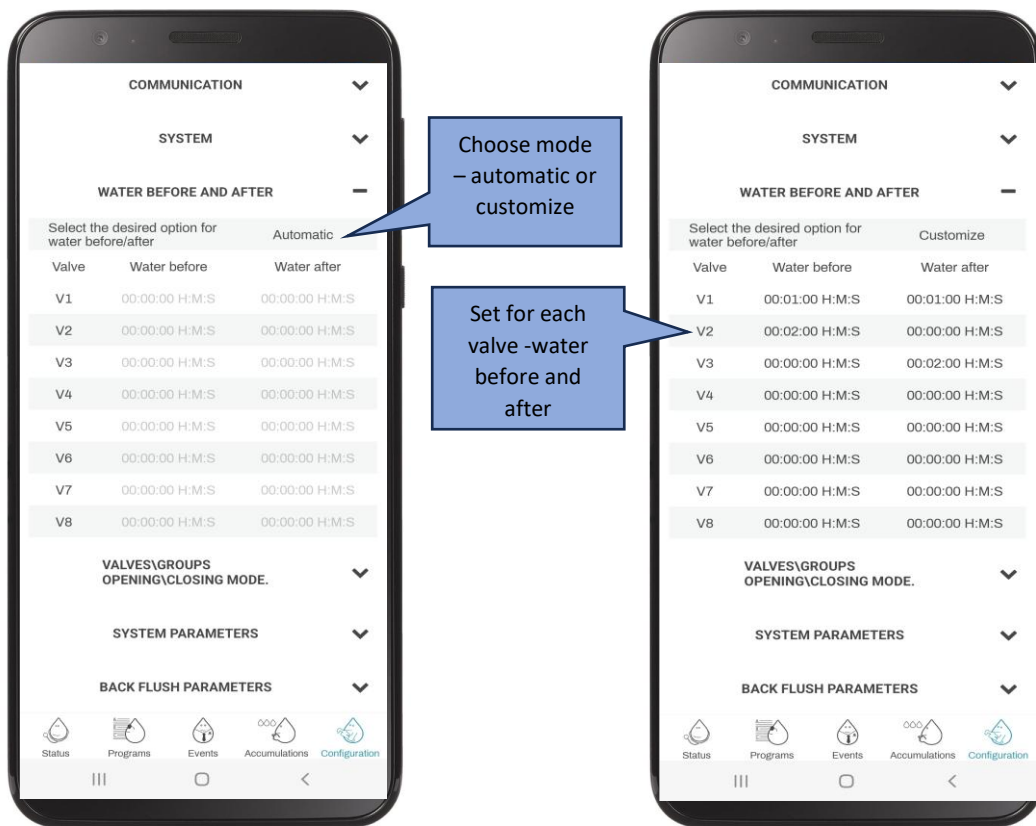
Choose **Automatic Mode** if you want *Water Before* and *Water After* to always be equal, based on the comparison of the water dosage for a valve to the fertilizer injector with the longest dosage for that valve. In **Automatic Mode**, *Water Before* will always equal *Water After*.

In Automatic Mode, there may be cases where *Water Before* and *Water After* do not occur. For example, if the water dosage is equal to the fertilizer dosage, no additional watering will take place before or after fertilization.

If it is essential to enforce *Water Before* and *Water After*, choose **Customize Mode** instead. In **Customize Mode**, fertilization starts only after the configured *Water Before* time has passed, and *Water After* will always be at least the configured duration.

In Customize Mode, you configure the *Water Before* and *Water After* durations separately for each valve. These times will always be enforced, even if the total water dosage is equal to the fertilizer dosage.

By default, the controller is set to **Automatic Mode**, which requires no additional configuration. If you want to switch to **Customize Mode**, go to the **Configuration Tab** → **Water Before and After** section.



**Fig 37** – configuring fertilization mode and dosages

*Remark regarding groups and customization:* If a group is configured with several valves that have different Water Before and Water After settings, then the Water Before duration for the group will be determined by the valve in the group with the longest configured Water Before duration (the same applies to Water After).

## 17. Irrigation – budget

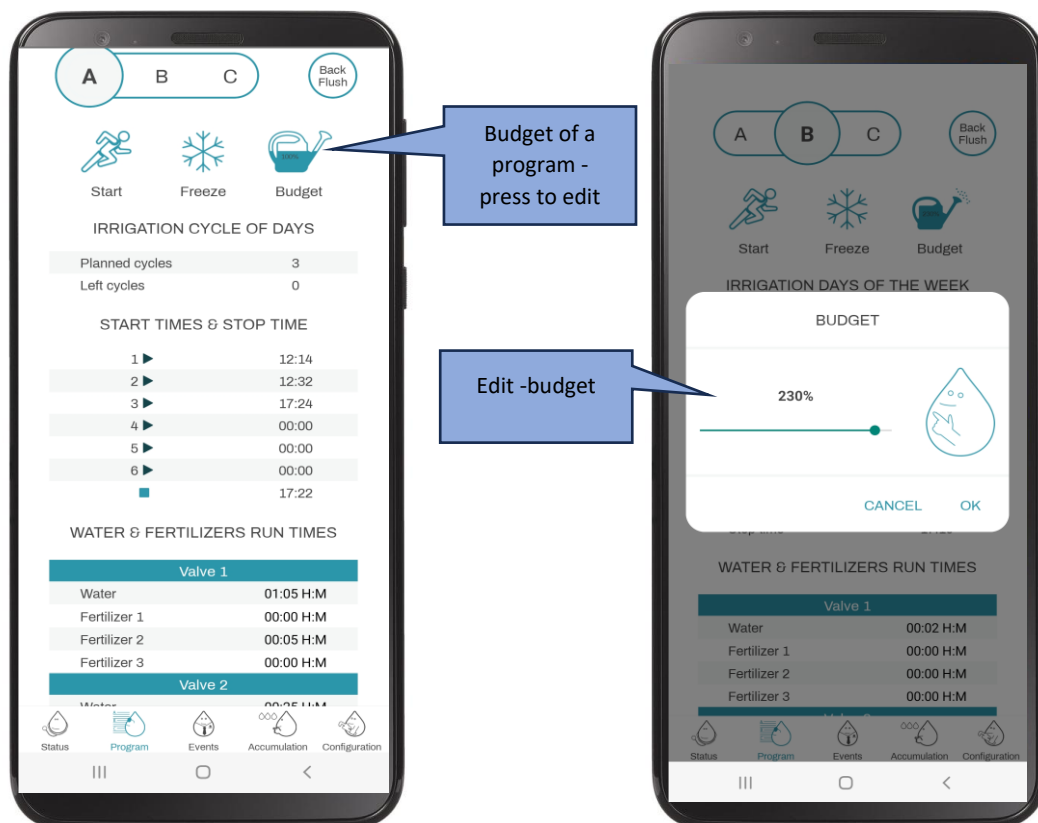
For every program, there is an option to increase or decrease the program's water dosages by a constant multiplier. This is called **budget**, and it allows water dosages to be adjusted within a range of **20% to 250%** of the defined doses.

This is a **convenient** way to change all water dosages at once instead of editing them one by one.

**Remark:** This can be done even while the program is running. In this case, the budget change will apply starting from the next valve in sequence.

Also, dosages for fertilization injectors are **NOT** modified.

The budget setting is located in the **program tab** for each of the three programs and appears as an icon depicting a **bucket**.



**Fig 38** – setting budget

## 18. Backflush – general

The system supports backflushing, which helps clean filters in the system.

To enable backflushing, some outputs must be defined as filters. You can configure the number of filters in the **Configuration** tab (see *Defining Irrigation Network*).

Backflushing supports three modes of operation:

1. **OFF** – Backflushing is disabled.
2. **DP** – Backflushing starts when triggered by a DP sensor or manually by the user.
3. **DP + Time** – Backflushing starts at a predefined interval (time-based), when triggered by DP, or manually by the user.

**Note:** If no DP sensor is configured, the user can still set backflushing to start at a predefined interval (time-based).

DP sensors can be either digital or analog.

Backflushing by DP or time occurs only when an irrigation program is running.

Backflushing is performed sequentially, meaning that one filter is flushed at a time. Once one filter closes, the next one opens. A delay, called **dwelling time**, can be set between closing one filter and opening the next.

### Flush Cycle Stages:

1. **DP Delay** – This stage begins when the DP sensor is closed (or a value above the set point for an analog DP). If the DP remains to be closed (or above the set point) for the duration configured in *DP Delay*, flushing starts.
2. **Flush** – The active stage when a filter is open for cleaning.
3. **Dwell Time** – The waiting period between the closing of one filter and the opening of the next.
4. **DP Dead Time** – After the last filter has been flushed, there is a waiting period equal to *DP Delay*. During this time, the system determines whether a new flush cycle should begin. If the DP remains closed (or above the set point) throughout the dead time, a new flushing cycle starts. If the DP opens, flushing ends.

Flushing parameters can be configured in two locations:

- **Program Tab → Backflush Screen**
- **Configuration → Backflush Parameters Section**

### Looping Mode:

MiniAggPro supports **Looping**, a state where no new flush cycles occur, even if the DP remains closed. This prevents continuous flushing when DP remains closed over multiple consecutive cycles.

Looping places a limit on the number of flush cycles triggered by a closed DP. It ends when manually cleared or when the DP opens. While in looping mode, manual flushes and time-based flushes can still occur, but DP-triggered flushes will not resume until looping ends.

### a. Backflush – Digital DP

A Digital DP is any DRY CONTACT type DP sensor that closes when the pressure difference in the system exceeds a certain value and opens otherwise. It is essentially a dry contact sensor used to detect when filters in an irrigation system need cleaning via backflushing.

The Digital DP is connected to input number 3 of the digital inputs on the board.

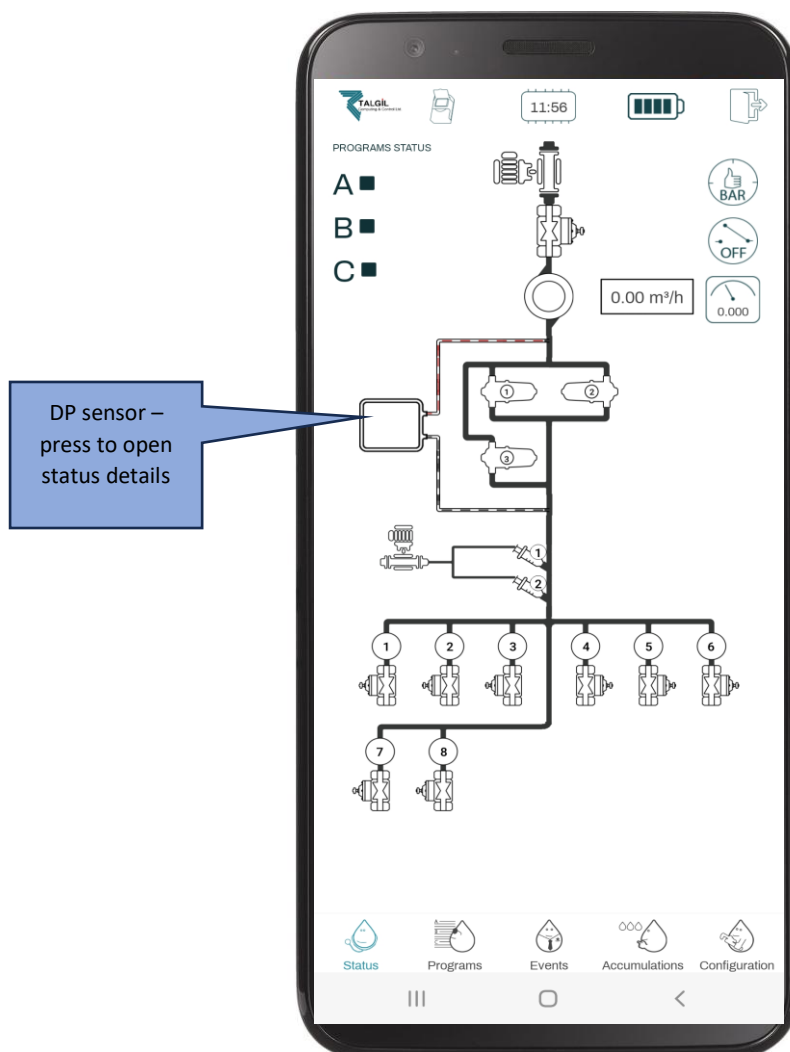
The Digital DP has two states:

- Closed
- Open

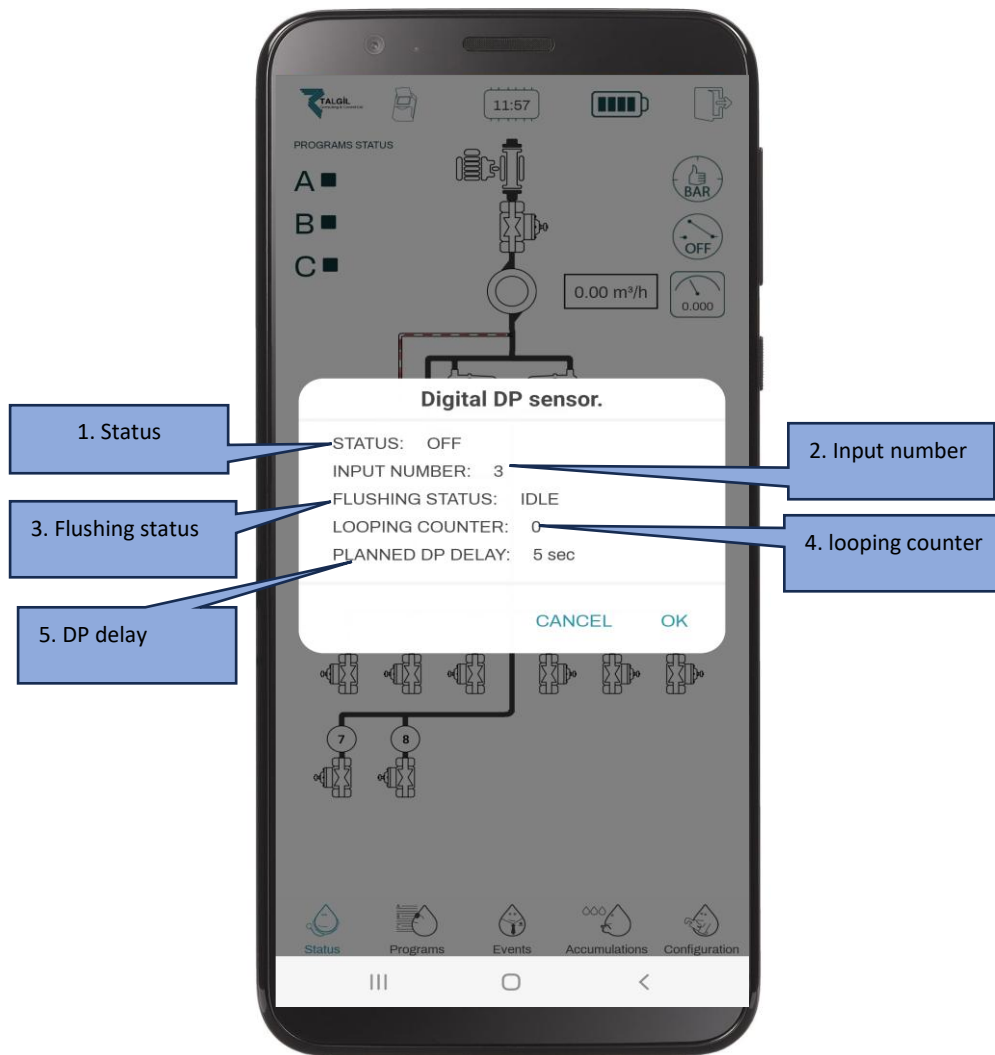
If a program is running and the Digital DP remains closed for longer than the configured DP delay, the backflush process will start.

If the DP remains closed after the first flush, additional flush cycles will occur repeatedly until the DP opens or the looping limit is reached.

In the Status tab, there is an icon representing the Digital DP. Tap on it to check the DP status. The DP sensor icon appears blue when the DP is closed and white when it is open.



**Fig 39 – DP sensor in status tab**



**Fig 40 – digital DP sensor details**

**Fig details**

1. **Status** – shows if DP is opened ('OFF') or closed ('ON')
2. **Input number** – the number of input on board, always 3
3. **Flushing status** – The status of backflush
  - IDLE – backflush is currently not occurring
  - FLUSHING – backflushing is occurring some filter is open
  - IN DWELL PERIOD – wait between valves period
  - DP DEAD TIME – flushing ended wait to see if start another cycle
  - WAIT FOR PRESSURE – system was stopped because of low pressure, flushing will resume when pressure restored
  - LOOPING – looping is reached
4. **Looping counter** – counter of how many flushes cycles occurred one after the other until now (when looping counter reaches looping limit, looping occurs)
5. **Planned DP delay** – shows the configured DP delay discussed earlier

DP delay makes sure that short jumps of contact from 'Off to 'ON' and then back to 'Off' don't trigger full backflush but are ignored instead. Configure in your system for how long DP should be in 'ON' before backflush is started. This configuration is found in 'Configuration tab->Backflush parameter' section together with looping limit.

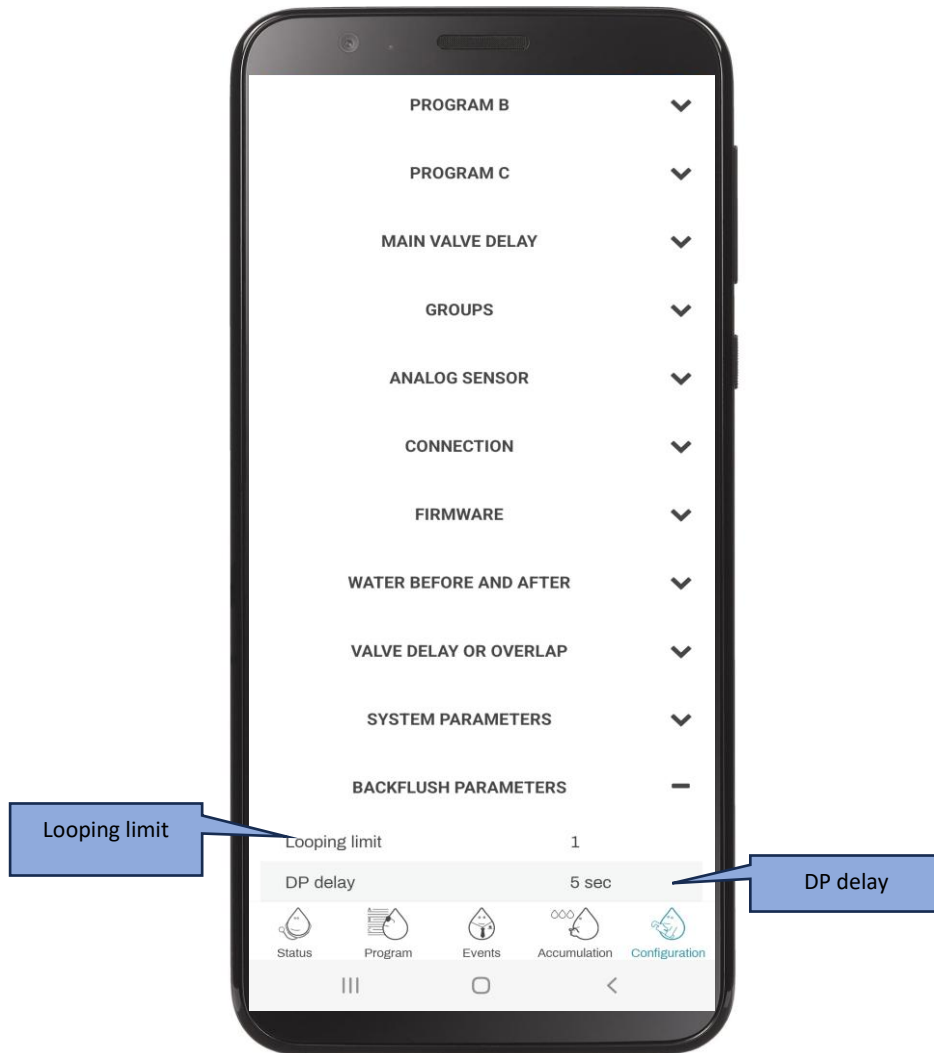


Fig 41 – configuration tab->backflush parameters

## b. Backflush - Analog DP

An analog DP sensor measures the difference in pressure before and after the filter. It returns pressure as voltage. The advantages of an analog DP over a digital DP are:

1. You can know the exact pressure
2. You can easily change the set point remotely, above which backflushing will start.

### *Configuring analog DP:*

If you use an analog DP instead of a digital one, you need to indicate this in the **Configuration tab** → **Network** section (see the [Defining Irrigation Network](#) section).

### *Connecting analog DP to Board:*

On the board, the analog DP connector is located at the bottom right (see the [Board Connection](#) section)

### *Setting display units:*

The units for the analog DP are 0.0 to 2.0 BAR (for metric) or 0 to 30 PSI (for imperial). To set the unit type, refer to the [Define Display Units Used](#) section.

After completing the above steps, you can now view the analog DP value measured by MiniAggPro. The value is displayed in two locations:

1. **Status tab** – The value of the analog DP will appear inside the DP icon.
2. **Program tab** → **Backflush** screen (see the figure on the next page).

### *Configuring DP set:*

To use an analog DP, you need to configure the DP Set Point, which is the pressure threshold above which backflushing is required.

**Note:** If the DP Set Point is set to zero, the analog DP is disabled.

The DP Set Point is configured in the **Program tab** → **Backflush** screen (see the figure on the next page).

After configuring the DP Set Point, the Analog DP will have two states:

- **Above Set Point** – When the analog DP value is above the configured DP Set value.
- **Below Set Point** – When the analog DP value is below the configured DP Set value.

If the DP value is above the DP Set Point (and a program is running), backflushing will start after the DP delay.

If the DP value is below the DP Set Point, backflushing will remain idle.

If the DP value drops below the DP Set Point in the middle of a backflush cycle, the current cycle will continue until completion. Afterward, backflushing will remain idle.

Clicking on the DP icon in the Status tab will show DP sensor and flushing information. The information is the same as for a digital DP, except that the status will be displayed as Above Set Point or Below Set Point.

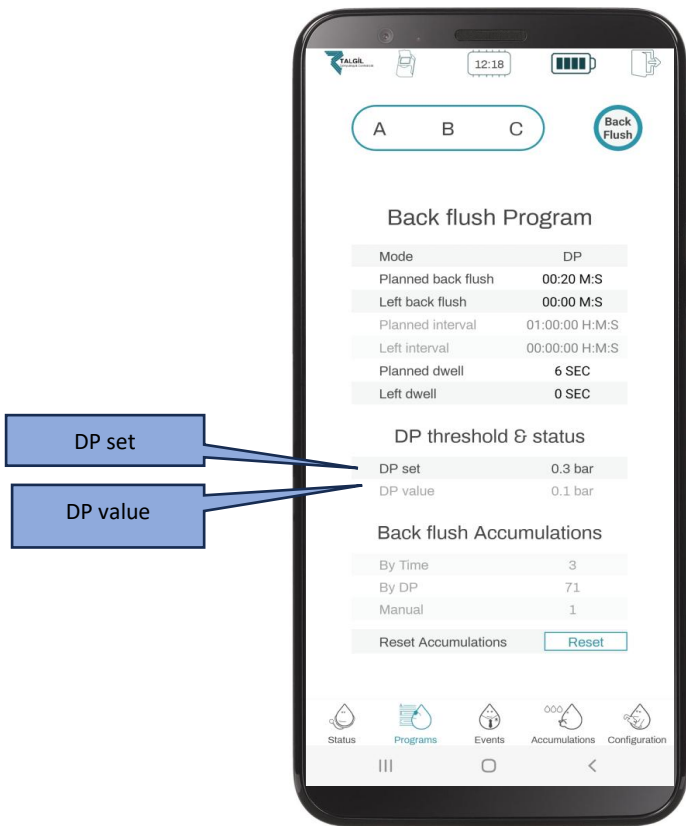
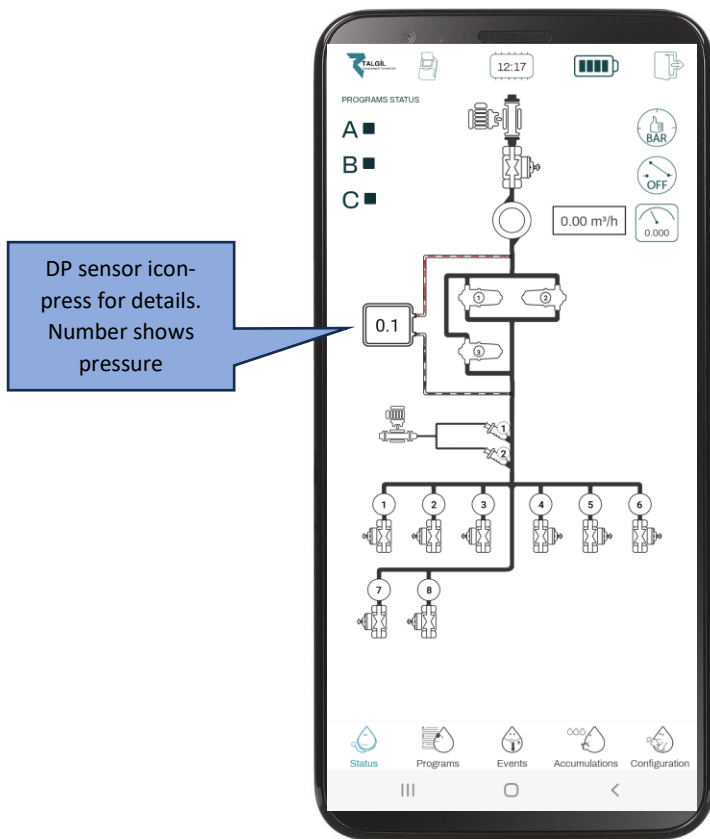


Fig 42 – Analog DP above: icon, below: program->backflush tab

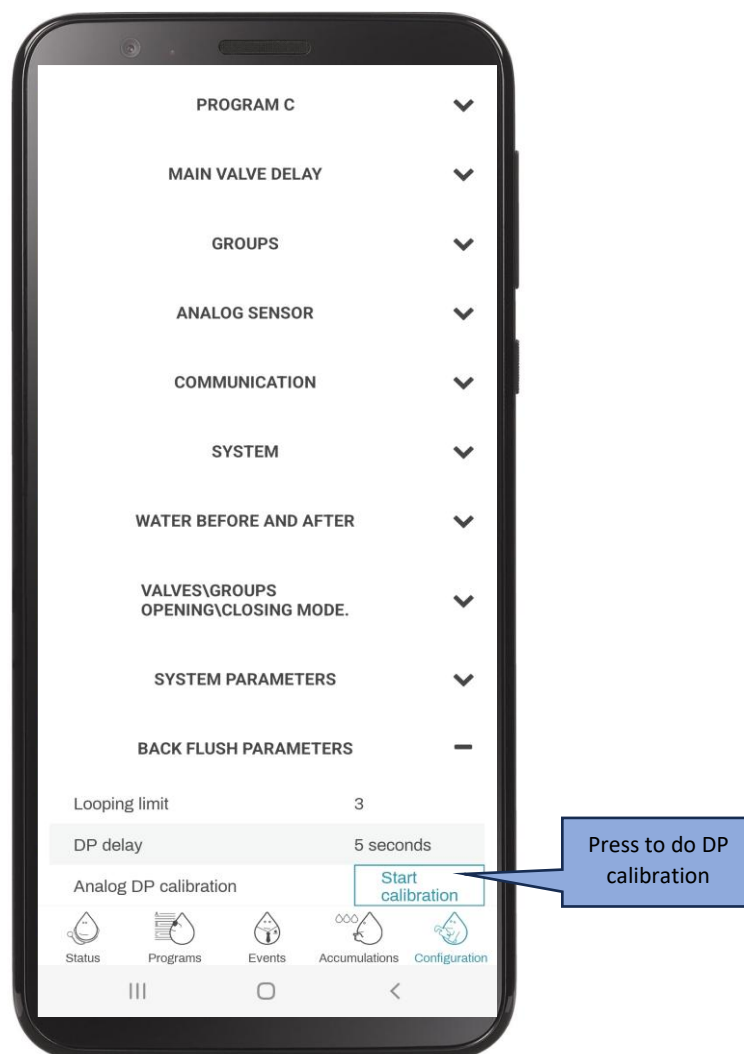
Before starting work with an analog DP sensor, calibration may be required. Calibration is necessary when you know the pressure is zero, but the sensor displays a different value.

For example, if the pressure is zero but the sensor shows 0.1 bar, calibration will adjust the readings so that 0.1 bar is recognized as zero, and all other values will be scaled accordingly to display the correct pressure.

**To perform calibration:**

1. **Ensure zero differential pressure** by disconnecting both pipes from the DP sensor.
2. Check the MiniAggPro DP value (it should display a pressure close to zero).
3. Go to the **Configuration tab → Backflush Parameters** and press the **'DP Calibration'** button.

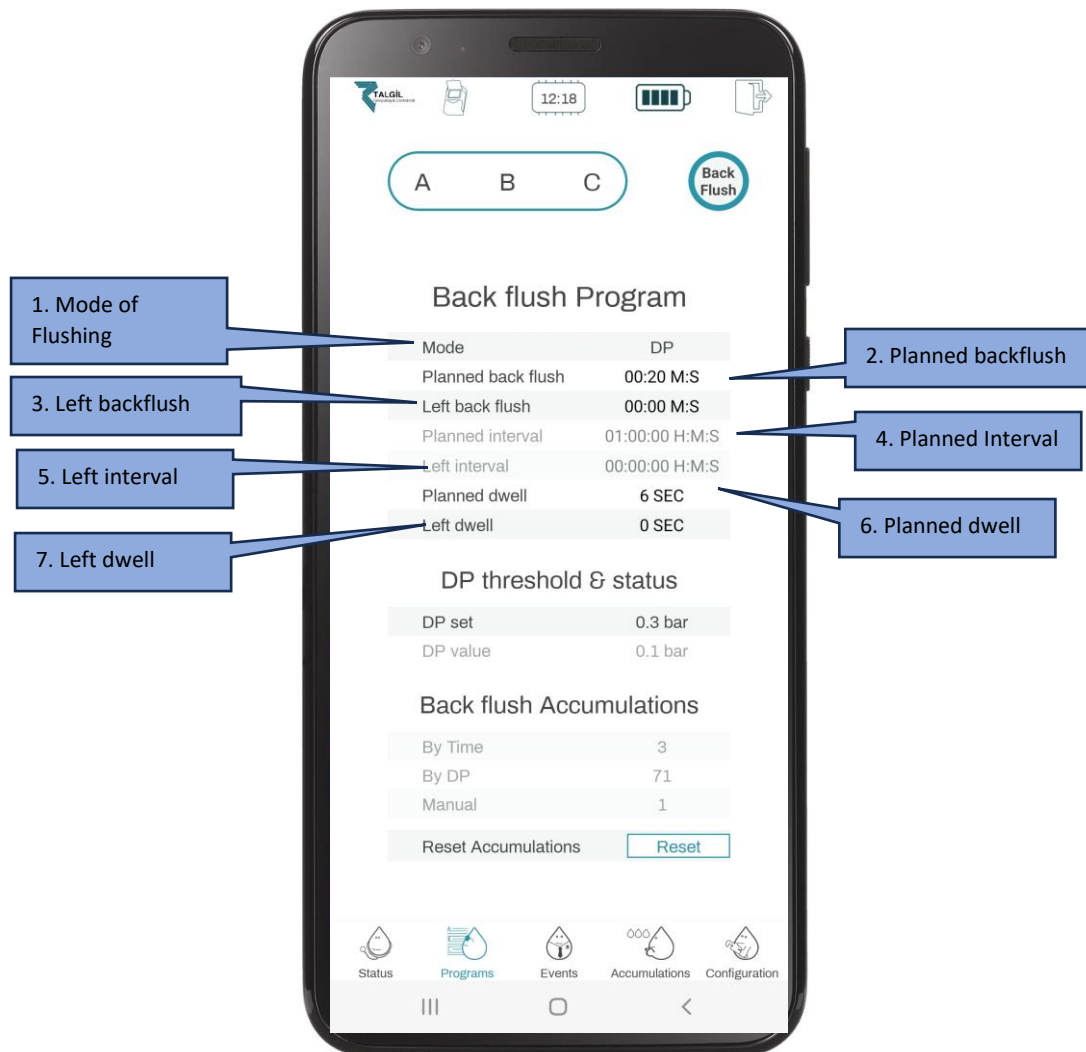
After calibration, confirm that the DP value displays zero.



**Fig 43 – DP calibration location**

### c. Backflush program parameters

For backflushing to be performed, you need to configure the backflush program parameters found in **Program Tab → Backflush Section**.



**Fig 44 – program tab->backflush section details**

Fig Details

1. **Mode of Flushing** – Has three possible values:
  - **OFF** – Backflushing is disabled.
  - **DP** – Backflushing is started by the DP sensor or manually by the user.
  - **DP+Time** – Backflushing is started at a configured interval (start by time), by DP, or manually by the user.
2. **Planned Backflush** – The duration each filter will remain open during backflushing.
3. **Left Backflush** – If backflushing is in progress and a filter is open, this field shows how much time remains before the filter closes. The value starts from the **Planned Backflush** time and counts down to zero. You can edit this value to shorten or extend the time the current filter remains open.
4. **Planned Interval (DP+Time only)** – If the mode is set to **DP+Time**, this defines the interval between backflush cycles.

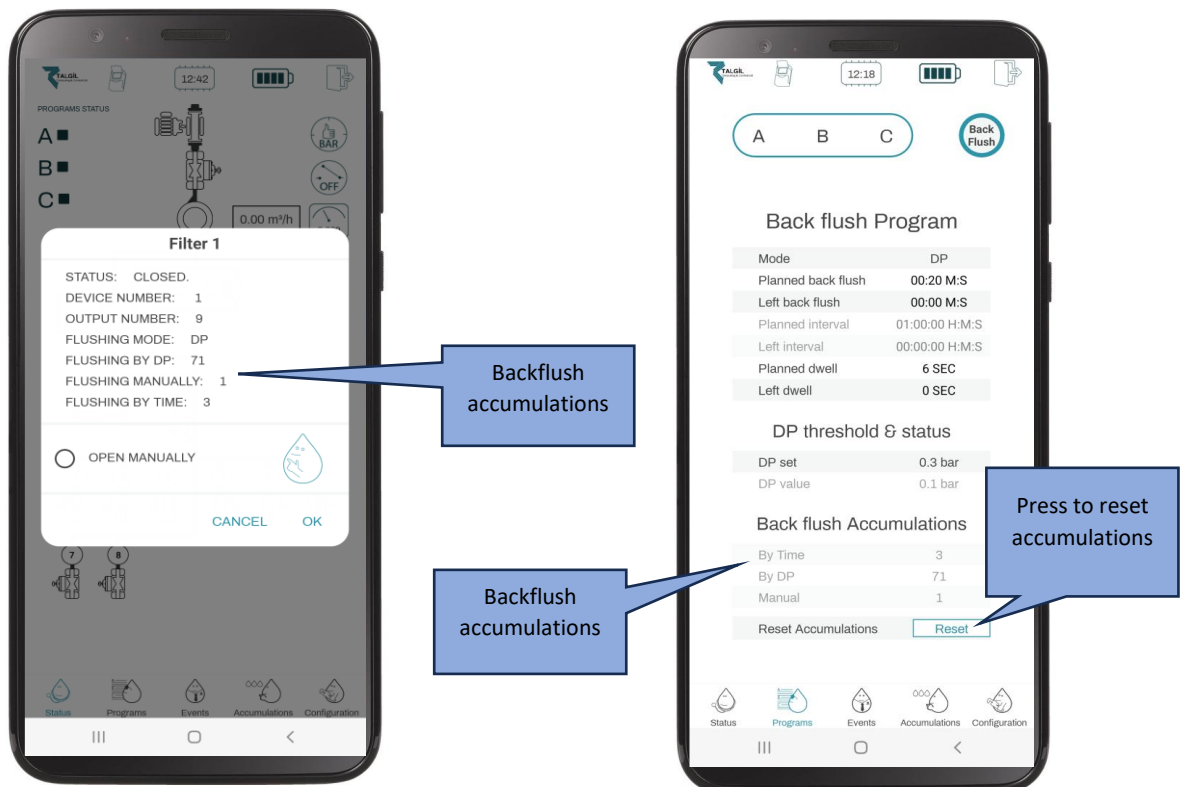
5. **Left Interval (DP+Time only)** – A countdown showing the remaining time until the next scheduled backflush starts (**start by time**). It begins at the **Planned Interval** value and counts down to zero, at which point backflushing starts. You can edit this value to adjust the time until the next backflush.
6. **Planned Dwell** – The wait time between the closure of one filter and the opening of the next during backflushing.
7. **Left Dwell** – A countdown that starts when one filter closes and reaches zero when the next filter opens. It counts down from the **Planned Dwell** time. You can edit this value to adjust the current dwell time.

#### d. Backflush Accumulations

You can view backflush accumulations, i.e., the total number of times backflushing was performed. The number of backflush cycles is shown separately for each start reason (manual, by DP, or by time). You can reset these counts to zero by pressing 'Reset' in the **program tab** → **Backflush** section.

The accumulations appear in two places:

- **Status tab** → **Filter pop-ups**
- **Program tab** → **Backflush accumulations**

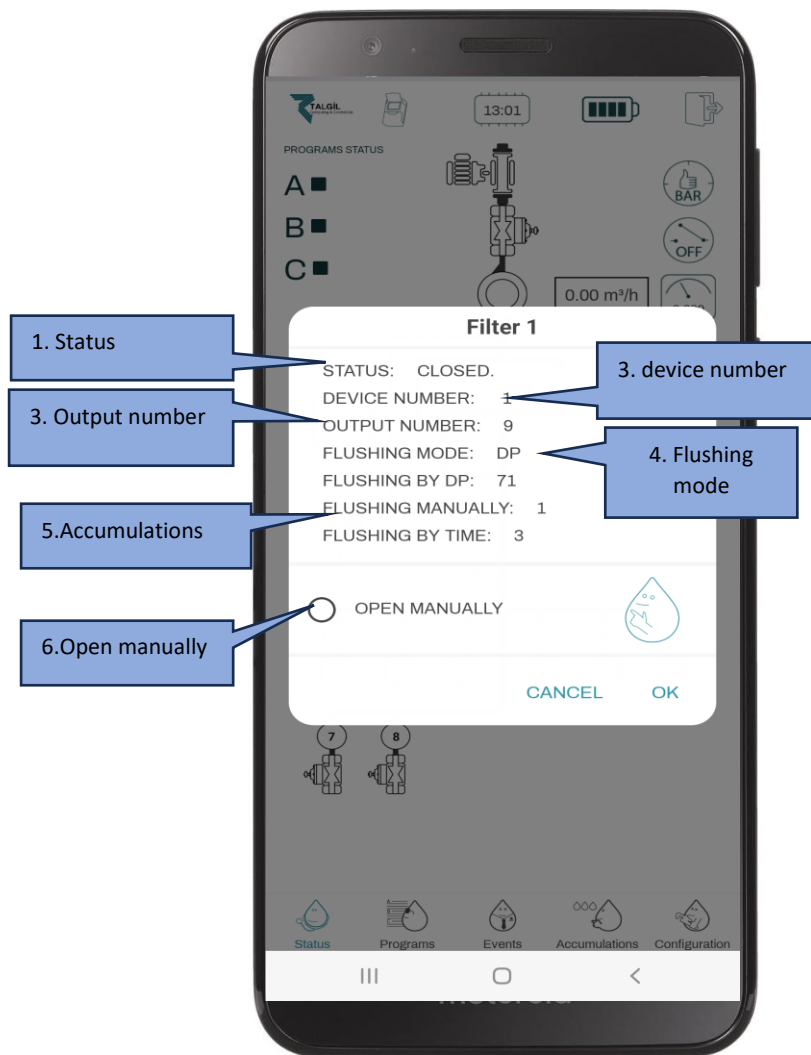


**Fig 45** – backflush accumulations, Left: filter popup Right: backflush section

### e. Filter popup

In the **Status** tab, you can view the current system status (which outputs are open or closed) and, in particular, which filter is open while backflushing is in progress (the open filter will be highlighted in azure).

You can press on filter to get more details on it



**Fig 46 – filter popup details**

Fig details

1. **Status** – shows if filter is closed or open (can be open by program or manually)
2. **Device number** – Index of the filter. Starting from 1 for filter with lowest output number and counting up.
3. **Output number** – which output number on board this filter belongs to. To this output physical filter should be connected.
4. **Flushing mode** – This is the mode of backflush the same as in backflush program parameters (OFF,DP,DP+Time):
  - OFF – backflushing is disabled
  - DP – backflushing is started by DP sensor or manually by user

- DP+Time – backflushing is started every configured interval (start by time) or by DP or manually by user
5. **(Flushing) Accumulations** – the total times backflush is done grouped by start reason (Manual, DP, Time)
  6. **Open manually** – choose this action and press OK in order to open filter manually. This option won't be shown if some program is running (start backflush will be shown instead)

## f. Starting Backflush

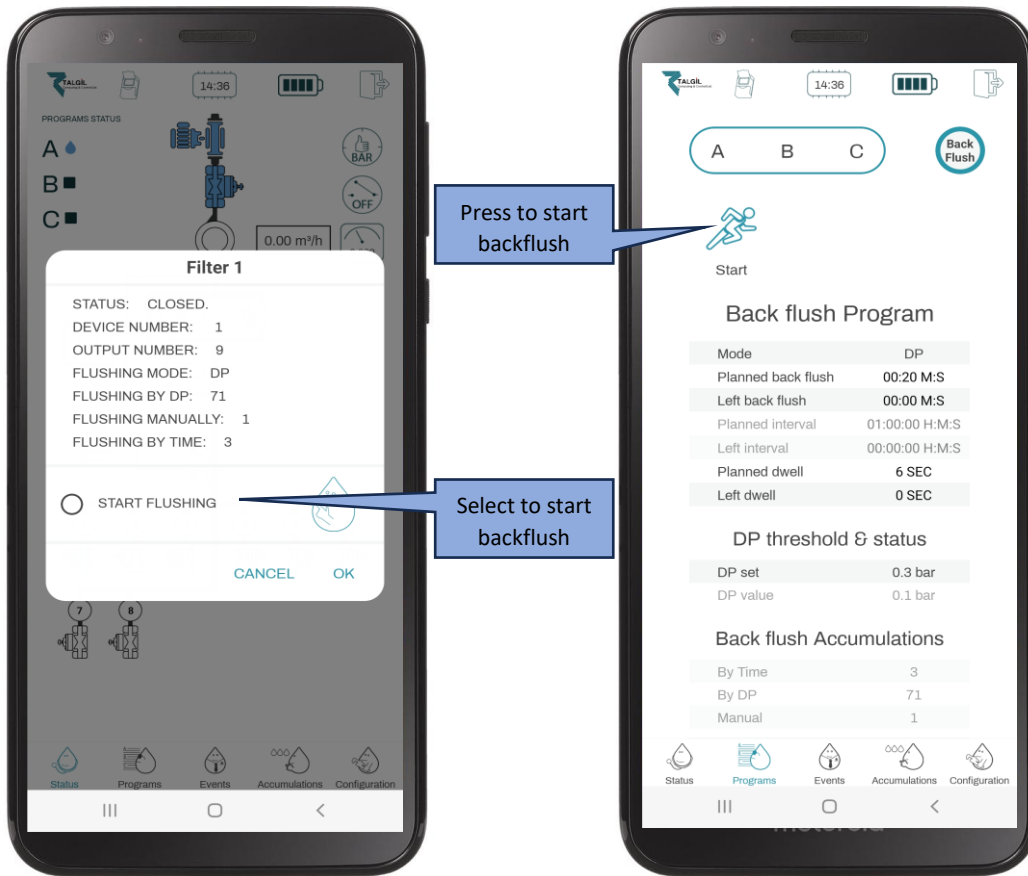
Backflush can start by three reasons:

1. **Manually** by user
2. **By DP.** Analog or Digital. This happens when DP status causes backflush to start. Look at digital and analog DP section for configuration details.
3. **By time** – every once in configured interval flushing will start. See [backflush program parameters](#) for details.

Backflush start by DP or by time were covered in previous sections. To start backflush manually you have two options. While **program is running** you can start backflush by:

- In status tab open filter pop-up there will be command '**start flushing**' choose it and press OK (the action is shown only if some program is running)
- In **program tab->backflush** section there will be icon to start backflush on top of screen (the icon is shown only if some program is running)

This option will be shown only if some program is running.



**Fig 47** – starting backflush manually from Left: filter popup Right: backflush section

### g. Backflush – Looping

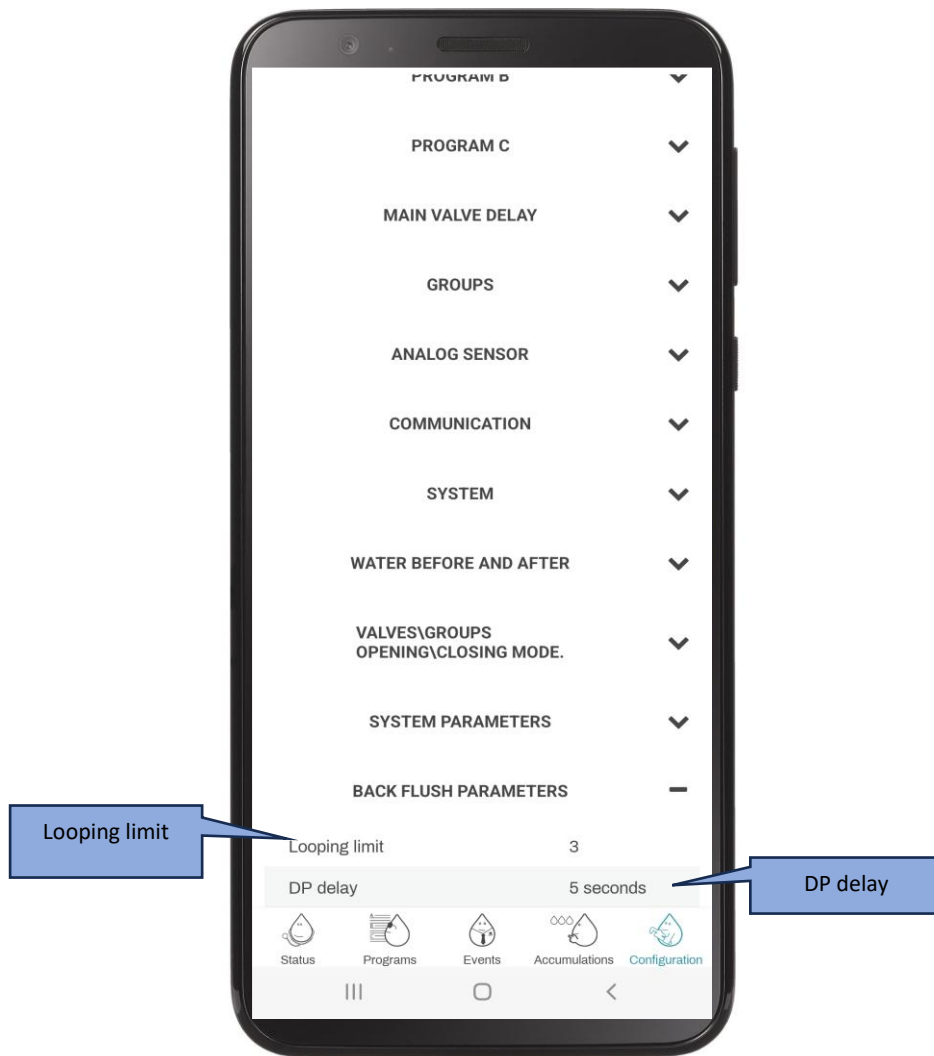
Configure looping to avoid a situation where flushing occurs endlessly, one cycle after another, because DP is closed (DP may malfunction, or backflushing may fail to restore normal pressure in the filters).

The controller counts how many consecutive flushes have been performed, and when the looping limit is reached, it stops further flushes from occurring. (If backflushing by time is configured, flushes by time will still occur even if looping is active.)

A looping limit of zero has a special meaning. When the looping limit is set to zero, looping will not occur, and flushes can continue indefinitely as long as DP remains closed.

When looping is triggered, an alarm and event are generated. Optionally, you can also configure notifications to be sent to your phone.

To configure the looping limit, go to **Configuration tab -> Backflush parameters section**.



**Fig 48 – backflush parameters section**

After looping occurs there are three ways to end it:

- When DP contact opens (or analog DP value falls below the set point) , looping ends
- You can open DP pop-up and choose option to end looping
- Choose option to clear alarms (see Alarm section)

Option to end looping will appear only when looping happens, see fig below

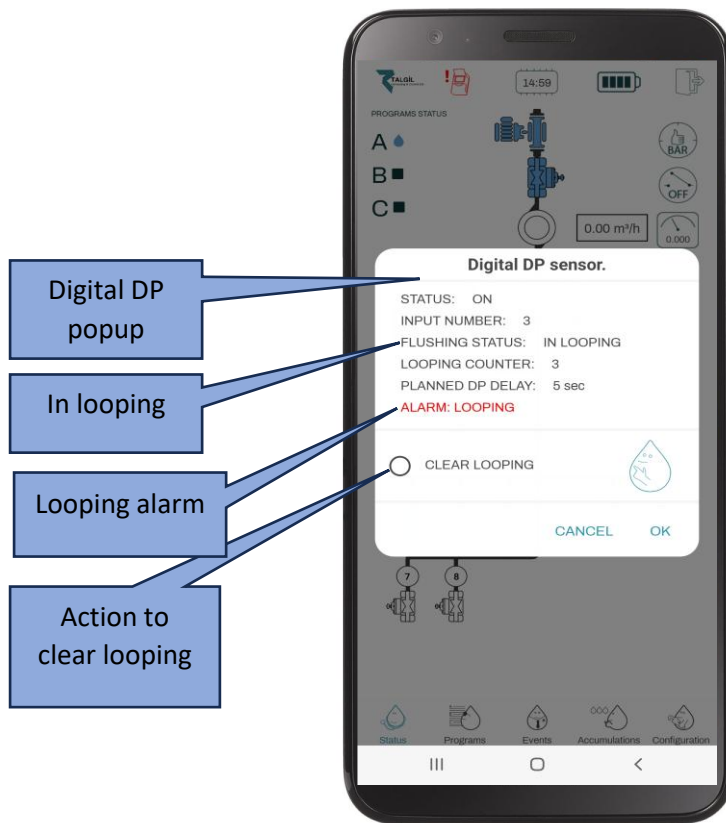


Fig 49 – digital DP in looping state



Fig 50 - analog DP in looping state

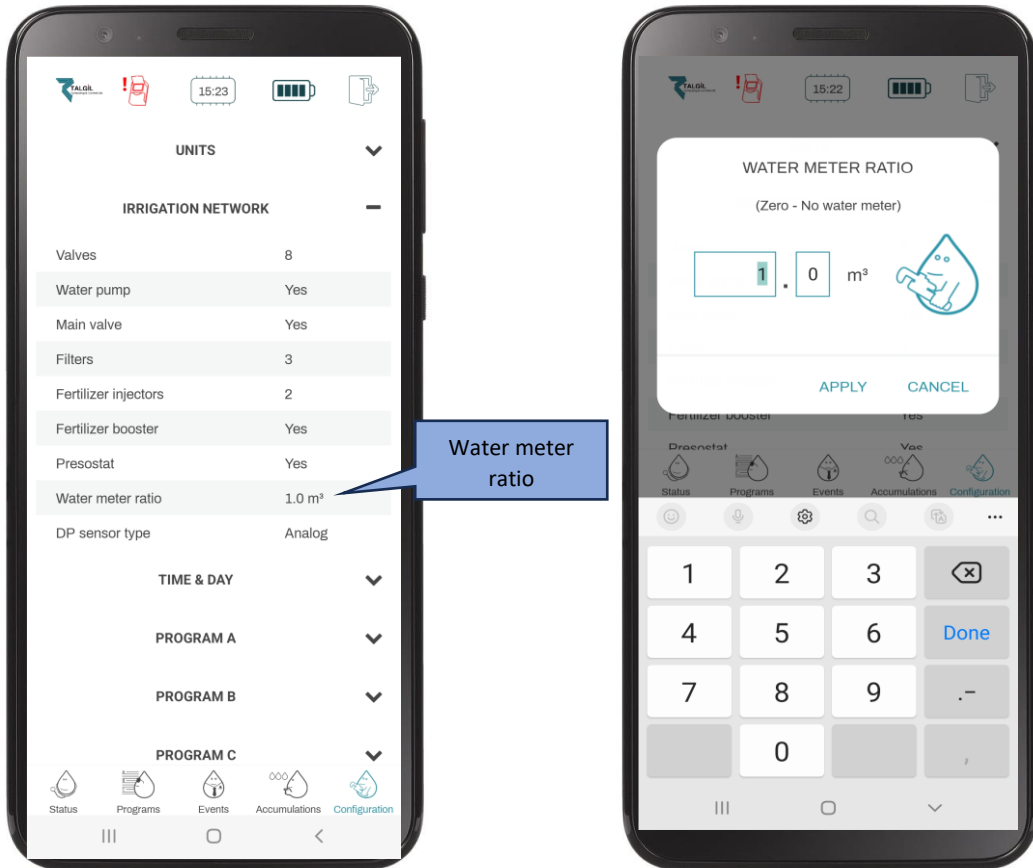
## 19. Inputs: Water meter

You can add one water meter to the system.

The water meter input is located on the board along with the other digital inputs, and its number is 1 (see board details for more information).

After adding the water meter, you need to configure its **ratio**—i.e., you must specify how much volume of water corresponds to one pulse of the water meter.

To configure the water meter ratio, go to **Configuration tab** → **Irrigation Network** and press on **Water Meter Ratio** to edit.



**Fig 51** – water meter ratio configuration

The units of water meter are  $m^3$  (for meter) or THG (for imperial), see define display units.

### a. Inputs: water meter detect no-flow

If you have a system with a water meter, you have the option to configure no-flow detection.

No-flow occurs when a valve or group of valves does not have water flow for a pre-configured time during program irrigation.

When no-flow happens, the current valve (or group) skips execution, and the next valve begins irrigation. The valve for which no-flow occurred will appear in red in the status tab.

A 'No Flow' alarm is generated when no-flow is detected.

The 'No Flow' alarm will remain until the user chooses to clear alarms (see the Alarms section).

A valve that experienced no-flow will be colored red until flow resumes or the alarms are cleared.

It is possible to configure a notification to be sent to the user when no-flow occurs (see the Notifications section).

No-flow detection time is the duration within which, if no pulse of water is detected, no-flow will be triggered. Its configuration is located in the **Configuration tab** → **System Parameters section**.

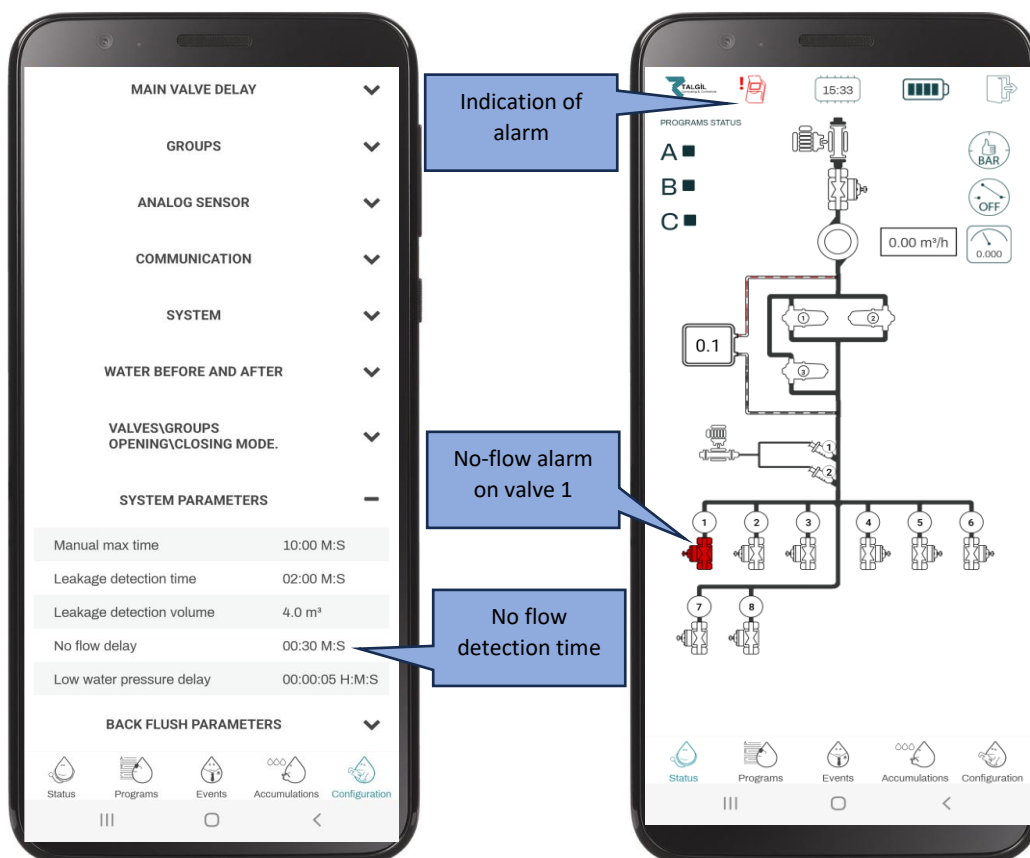


Fig 52 – no flow, Left: detection time, Right: alert

## b. Inputs – water meter detects water leakage

If you have a water meter, you have the option to detect water leakage in the system. Water leakage is detected if there is water flow through the water meter when no flow should occur.

For example, if no program is running, all outputs are closed, and pulses from the water meter are still being registered, a water leakage will be detected.

To configure water leakage detection, you need to set appropriate values for '**Leakage Detection Volume**' and '**Leakage Detection Time**'. Water leakage will be detected when no water should be flowing, but the '**Leakage Detection Volume**' passes within a time span shorter than the '**Leakage Detection Time**'. If configured, the user will receive a notification alert.

To configure '**Leakage Detection Volume**' and '**Leakage Detection Time**', go to **Configuration Tab → System Parameters**.



Fig 53 – leakage detection parameters

## 20. Inputs: Pressure Sensor

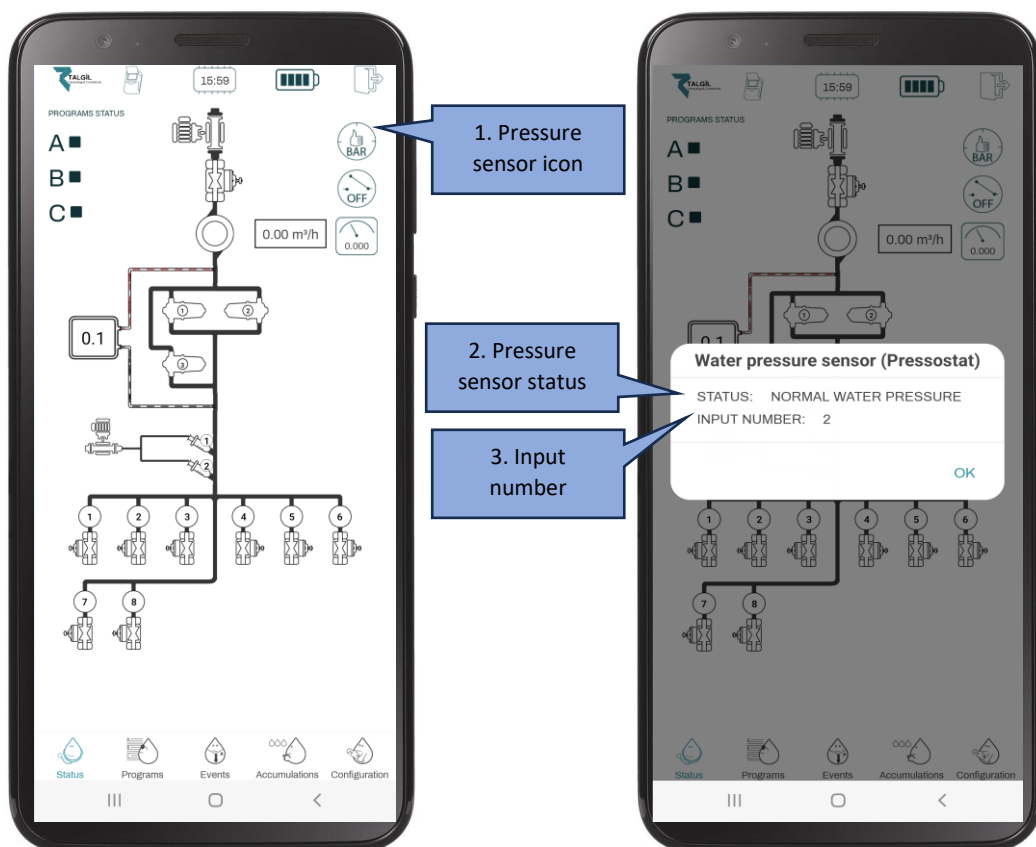
If your system has a pressure sensor, you can configure 'low pressure' detection. The pressure sensor is always connected to input number 2 in the digital inputs on the board (see the board details section).

The pressure sensor is a dry contact type. When it is closed, it indicates low pressure; when it is open, it indicates that the pressure is OK.

When the pressure sensor closes to indicate low pressure, after the configured '**pressure response time**', all current programs will be put in a waiting state.

An alarm for 'low water pressure' will be generated, and a notification will be sent if configured.

You can view low-pressure contact details by pressing the low-pressure icon in the status tab.



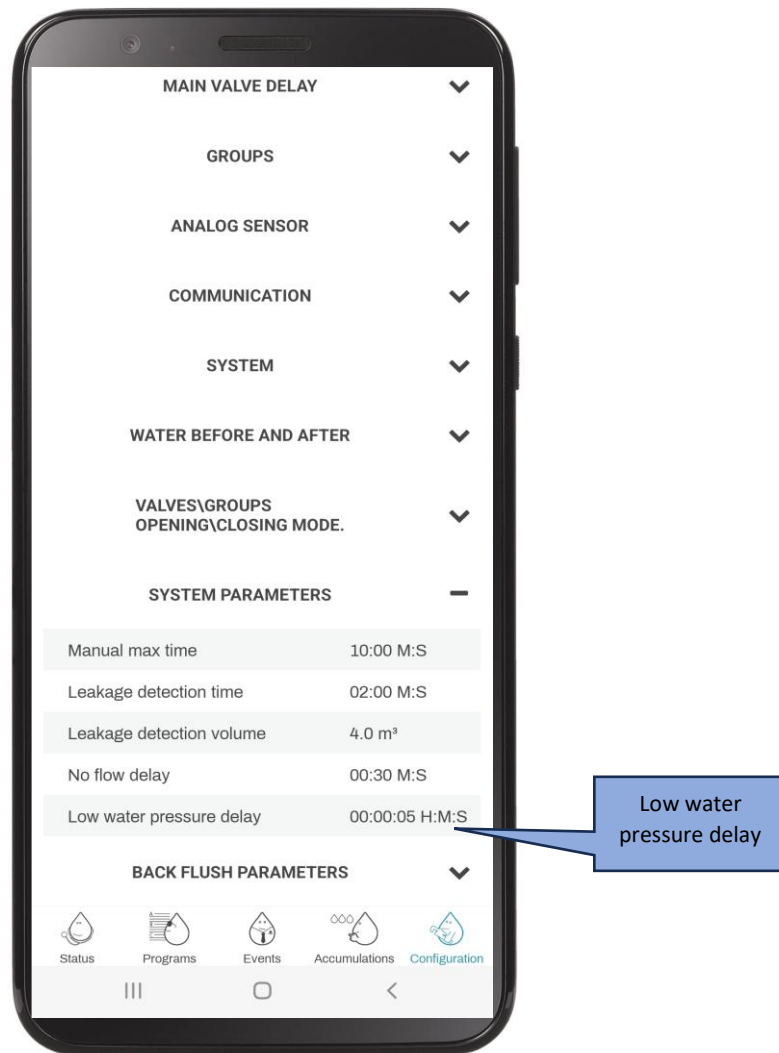
**Fig 54** – pressure sensor icon & popup

Fig details:

1. **Pressure sensor icon** - Displays that pressure is OK when the thumb is up and indicates low pressure when the thumb is down. Press on it to open the pressure sensor pop-up
2. **Pressure sensor status** – has two values. **Normal water pressure** or **Low water pressure**.
3. **Input number** – indicates location on board for digital **input - pressure sensor**. Always 2.

To configure the 'Low Water Pressure Delay', go to the **Configuration** tab -> **System Parameters** section.

This is the amount of time that must pass from the moment the dry contact for low pressure closes until the low-pressure status is triggered. It prevents unnecessary program halts due to brief low-pressure fluctuations (i.e., instances where the contact closes for a short time and then reopens).



**Fig 55** – pressure response time

## 21. Inputs: start/stop contact

Digital input number 4 on board (see board section) is reserved for start/stop contact. Start/stop contact can be configured to start/stop program C (see specialness of program C section)

Start/stop contact can be connected, for example, to frost protection in order to start program C when temperature below zero is detected.

Program C takes priority when started by contact.

You can view the current state of start/stop contact in status tab top right. See Fig below.

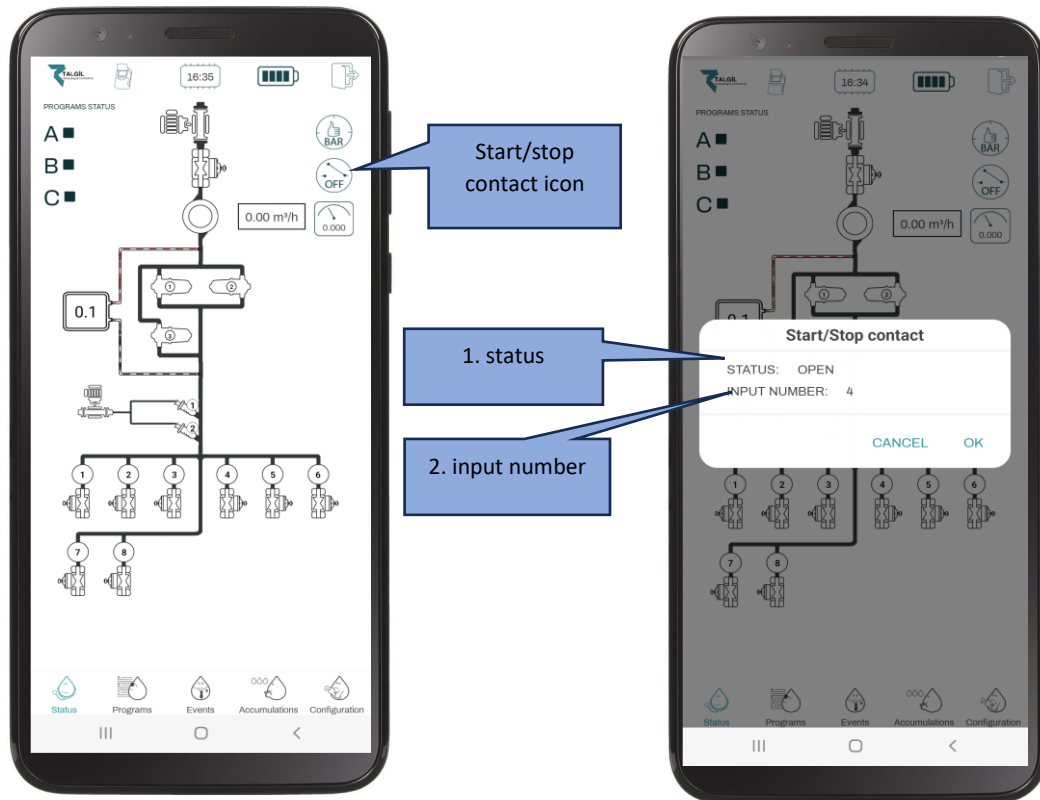


Fig 56 – start/stop contact icon & popup

Fig details:

1. **Status** – open or closed. Shows current state of start/stop contact
2. **input number** – indicates location on board for digital input start/stop contact, always 4.

## 22. Inputs: analog input

MiniAggPro has one analog input on the board, located on the right side. The analog sensor is used to read an analog value for display or to start Program C (see the specialness of Program C).

The analog input supports both current-based and voltage-based input types. The selection of the input type is done via a jumper on the board (the jumper is located near the analog input connector; see the board section for details).

- **Current-based input** supports a range of **4 - 20mA**.
- **Voltage-based input** supports a range of **0 - 5V**.

### **If input is current based:**

The user needs to provide values for two points: **Minimum value (4mA)** and **Max value (20mA)**.

All other values will be determined linearly based on these two points.

The default values are **4** for **4mA** and **20** for **20mA**.

The linearly determined value will be referred to as the **converted value**.

### **If input is voltage based:**

The user needs to provide values for two points: **Minimum value (0V)** and **Max value (5V)**.

All other values will be determined linearly based on these two points.

The user may also define the **unit name** for the analog input, which will be displayed in the appropriate places.

Negative values for the **4mA** and **20mA** points can also be entered if needed.

The analog sensor is sampled at a user-defined interval, called the **sampling rate**.

The configuration for the analog sensor is located in the **Configuration tab → Analog Sensor section** (see the figure on the next page).

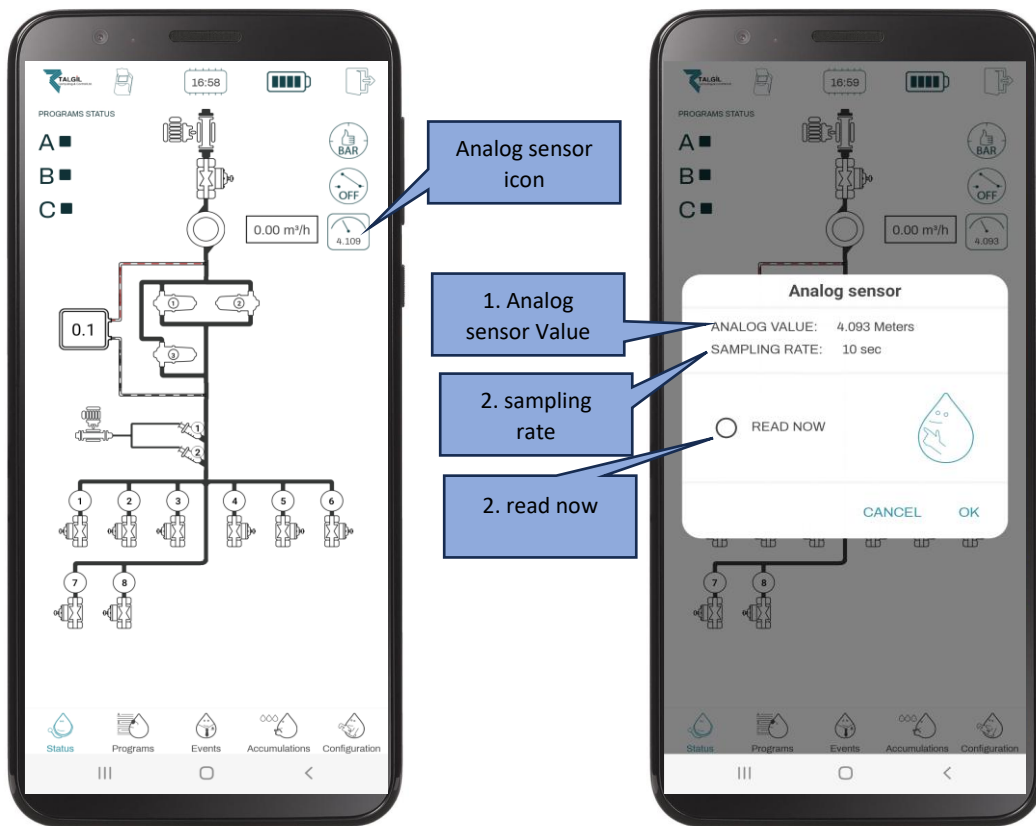


**Fig 57 – Analog sensor configuration details**

Fig details

1. **Sampling rate** – The interval in seconds between samplings of the analog sensor. Supported range: 0 – 5999 seconds. A value of 0 seconds disables the analog sensor (measurements won't be taken).
2. **Analog input type** – Current or voltage. Indicates the type of analog sensor as selected by the jumper on the board.
3. **Minimum value (4 mA)** – The value assigned to the analog sensor when the current is 4 mA.
4. **Max value (20 mA)** – The value assigned to the analog sensor when the current is 20 mA. All other values will be determined linearly between these two points.
5. **Units** – The units for the analog value (displayed in appropriate locations)

The analog sensor value can be viewed in the **Status** tab inside the analog sensor icon. You can press the icon to open the analog pop-up for additional sensor information.



**Fig 58 – Analog sensor icon & popup**

**Fig details**

1. **Analog sensor value** – the converted value measured by analog sensor + units
2. **Sampling rate** – the interval between samplings of the analog sensor
3. **Read now** – read analog sensor value immediately (without waiting for next cycle of sampling rate)

## 23. Specialness of program C - priority program

Program C has a special property: it can be started by a contact or an analog sensor value. When started this way, it takes priority over the other two programs.

This feature can be used for starting emergency programs or cooling procedures. Priority means that if Program A or B is running, and Program C is started by a contact or an analog sensor, Programs A and B will be put into a waiting state, and Program C will take priority and run instead.

You can also configure Program C to stop using a contact or an analog sensor value.

### Sensor Response Time:

Program C can be set to start or stop after a delay called **sensor response time**. This ensures that the contact or analog sensor remains in a specific state for a set period before Program C starts or stops. This prevents small, brief state changes from affecting the system.

For example, if the **sensor response time** is set to 10 seconds and Program C is configured to start when the contact closes, the contact must remain closed for **10 seconds** before Program C starts.

To configure Program C to start/stop using a contact or analog sensor, go to: **Program tab → C tab → Sensor Start/Stop section** (located before the **Water & Fertilizer Run Times** section).

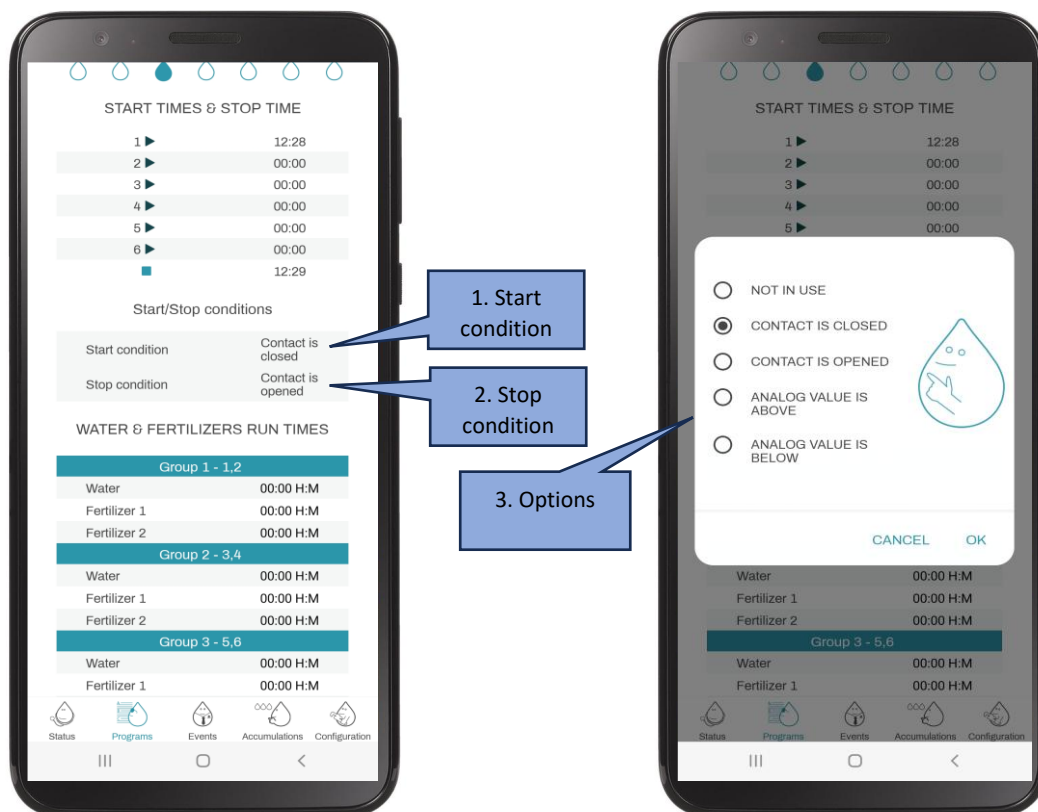


Fig 59 – sensor stop/start section

Fig details

1. **Start Condition** – Choose an option for Program C to start based on:

- **Contact is closed** – Program C will start when the contact remains closed for at least the configured response time.
- **Contact is open** – Program C will start when the contact remains open for at least the configured response time.
- **Analog value is above** – Program C will start when the analog sensor value exceeds the configured threshold and maintains this state for at least the response time. The threshold value is configured under the start condition.
- **Analog value is below** – Program C will start when the analog sensor value drops below the configured threshold and maintains this state for at least the response time. The threshold value is configured under the start condition.
- **Not used** – Program C will not be affected by the analog sensor or contact.

2. **Stop Condition** – Has the same options as the start condition. All options function similarly but will stop the program instead of starting it



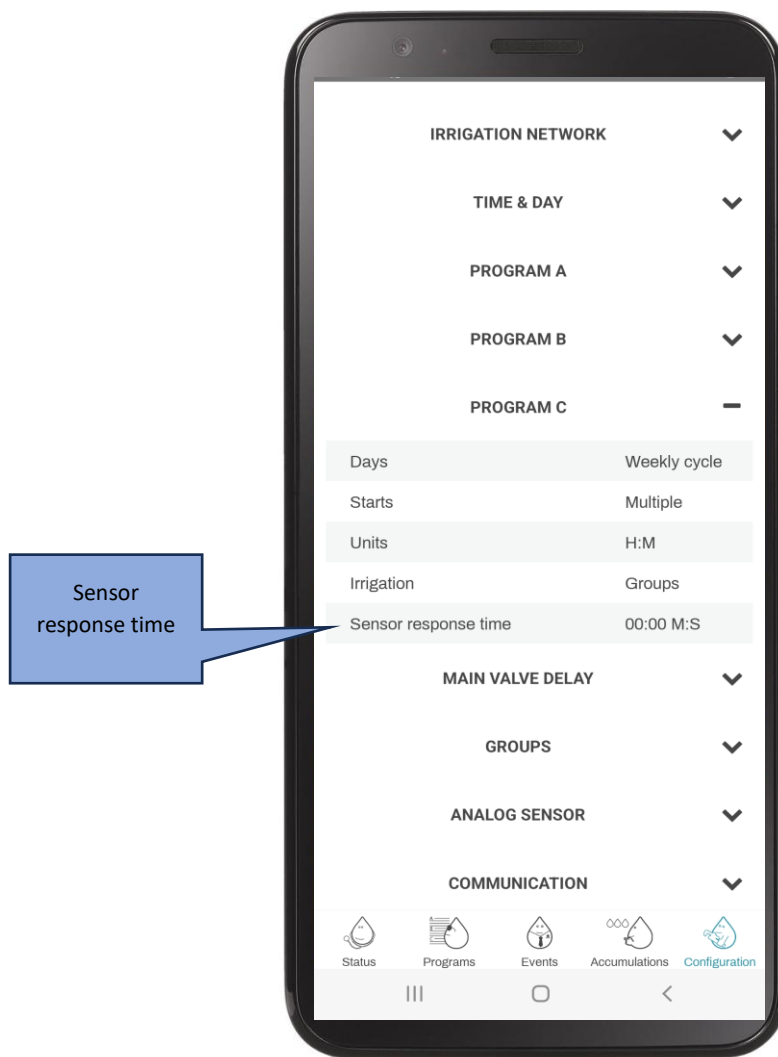
Fig 60 – Analog sensors start/stop configuration

In the figure above, under **'Start Condition'**, there is a **'Start When'** field that specifies the value above (for "Analog Value is Above") or below (for "Analog Value is Below") which the program will start.

Similarly, under **'Stop Condition'**, the **'Stop When'** field indicates the value above (for "Analog Value is Above") or below (for "Analog Value is Below") which will stop the program.

The **'Start When'** and **'Stop When'** fields are displayed only when the selected condition is either **'Analog Value is Above'** or **'Analog Value is Below.'**

Finally, the sensor response time setting (discussed above) is located in the **Configuration Tab → Program C** section.



**Fig 61 – sensor response time**

## 24. Program irrigation – Groups

By default, all programs are configured to irrigate using single valves. However, you can change the configuration to use groups instead.

Groups allow multiple valves to irrigate together. MiniAggPro supports up to 8 groups, with each group containing a maximum of 4 valves. This means you can have up to 4 valves open simultaneously while a program is running.

Before configuring groups, you must have at least one program set to use groups. To do this, go to **Configuration tab → Program A, B, or C section**, and select **"Groups"** in the **"Irrigation"** field (see figure below).

To define which valves belong to each group, navigate to **Configuration tab → Group section**. (This section will only be visible if at least one program is set to use groups.) Click on a group and select the valves to include in that group.

Once groups are configured, you can go to your program and assign dosages to them in the same way as for single valves.

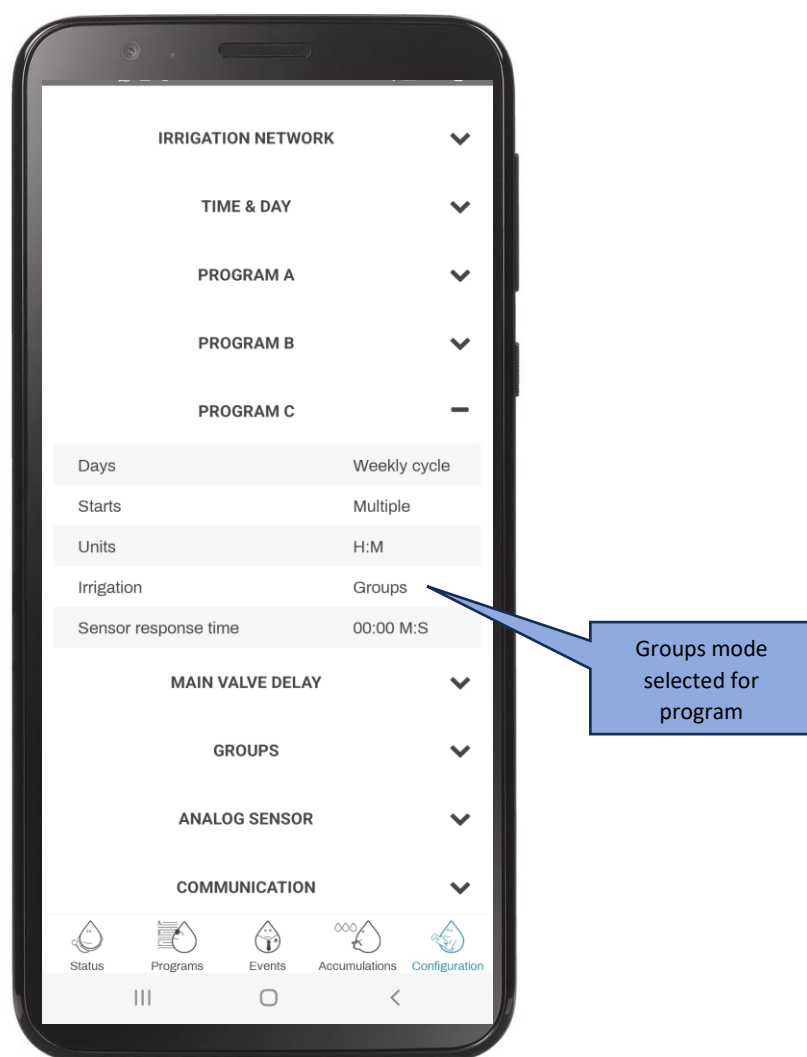


Fig 62 – setting groups for program C



Fig 63 – defining valves in each group

## 25. Irrigation – opening outputs manually

It is possible to open all output types manually, including the pump, main valve, valves, fertilizer injectors, booster, and filters.

To open an output manually:

1. Go to the **Status** tab.
2. Press on the output you want to open.
3. Select the **"Open Manually"** option and press **OK**.

Once an output has been opened manually, you will have the option to close it.

### Note:

- Outputs can only be opened manually when **no program is running**. As soon as a program starts, all manually opened outputs will close automatically.
- Manually opened outputs remain open for **10 minutes by default** before closing automatically.
- To change this duration, edit the **"Manual Max Time"** setting in the **Configuration tab → System Parameters** section.
- If **Manual Max Time** is set to **zero**, the output will remain open **until closed manually** or until a program starts (i.e., no countdown, no automatic closure).

To check how much time is left before a manually opened output closes, press on the manually opened output in the **Status** tab

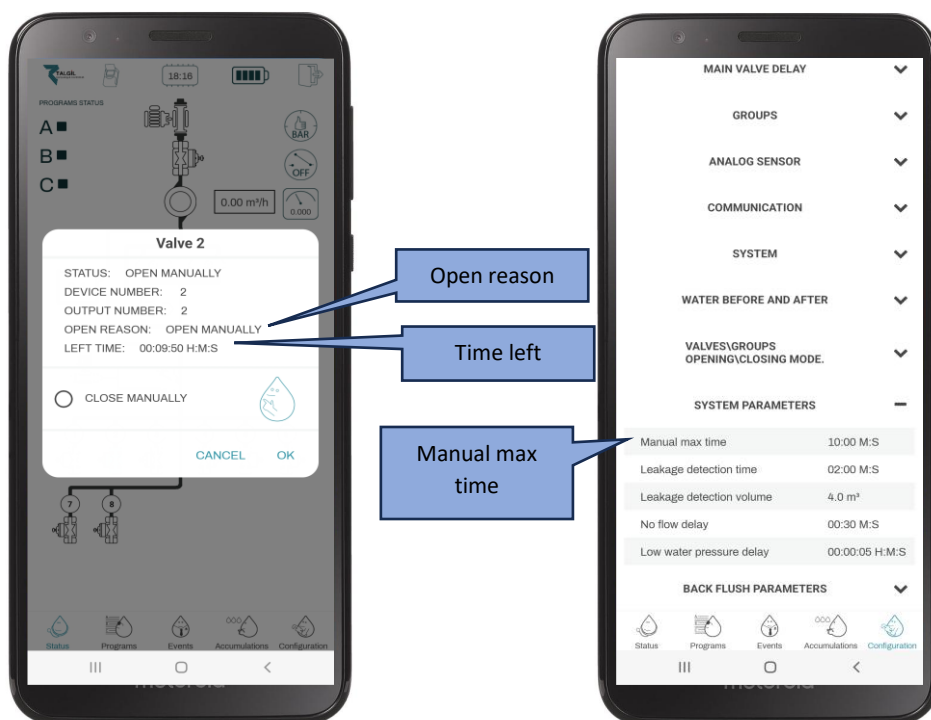


Fig 64 – open manually valve status & max time

Fig details

In fig above you see that valve 2 was opened manually (see open reason) and it is 9 minutes and 50 second until it will automatically close.

## 26. Configuration – Main Valve delay

It is possible to set a delay for the main valve when a program starts and when it ends.

The available delay options are:

- **Open Before** – When the program starts, the main valve (MV) opens, and after the delay, the first valve of the program opens.
- **Open After** – When the program starts, the first valve opens immediately, but the MV opens after the delay.
- **Close Before** – When the program ends, the MV closes immediately, but the last valve remains open for the delay duration.
- **Close After** – When the program ends, the last valve closes immediately, but the MV closes after the delay.

The configuration for the delay type and its duration can be found in the **Configuration tab** → **Main Valve Delay** section.



Fig 65 – main valve delay section

Fig details

1. **Opening mode** – This option allows you to choose the delay type when the program starts:

- **Together** – No delay.
- **Before** – The main valve (MV) opens first, and after the delay, the valve is opened.
- **After** – The valve opens first, and after the delay, the MV is opened.

2. **Open delay** – The duration of the "Open main valve" delay.

3. **Closing mode** – This option allows you to choose the delay type when the program ends:

- **Together** – No delay.
- **Before** – The MV closes before the last valve (the last valve remains open for the delay period).
- **After** – The MV closes after the last valve (first, the last valve closes, and after the delay, the MV closes).

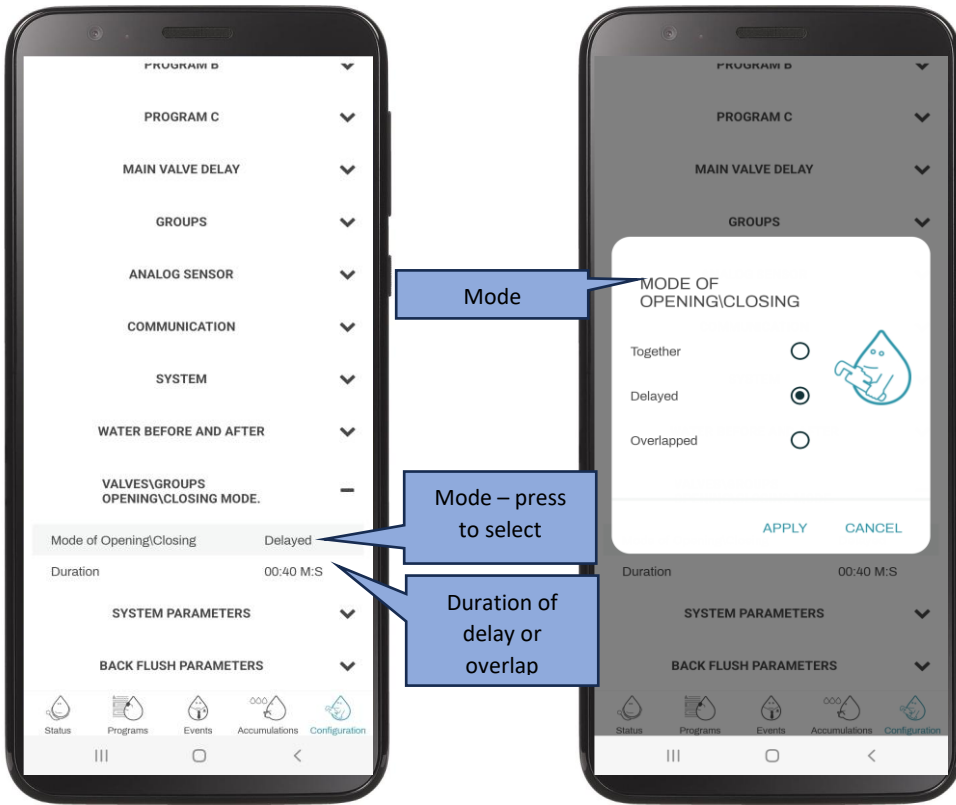
4. **Close delay** – The duration of the "Close main valve" delay.

## 27. Configuration – Valve delay or overlap

It is possible to configure a delay between valves or an overlap.

- **Delay between valves** means that when one valve finishes irrigation and closes, the next valve in sequence will open only after the configured delay.
- **Overlap between valves** means that when a valve finishes irrigation, it will remain open together with the next valve in sequence that opens. This way, two valves will irrigate together for the configured delay, and after the delay, the first valve will close.

For programs that use groups, both delay and overlap behave the same way. When one group finishes irrigation, the first valve in that group will close, and the first valve in the next group will open. After the delay, the second valve in the first group will close, and the second valve in the next group will open, and so on until all valves in the first group are closed and all valves in the next group are open



**Fig 66 – valve delay or overlap**

## 28. Freeze program or unit

MiniAggPro has the option to halt the operation of a program or multiple programs and then restore operation from the point it was halted. This is called freeze and restore.

You may want to perform a freeze when conducting maintenance on the device, encountering an abnormal situation that requires stopping irrigation, or for other reasons.

A program can be frozen while idle. In this case, if a frozen program is scheduled to start, it will remain frozen. Once restored, it will start as usual.

The end of a freeze is called a restore. Upon restoring, a program that was frozen in the middle of execution will continue from the last point. However, if you want the program to restart from the beginning instead of continuing from the last point, there is an option for that as well.

There are three types of freezes that can be performed:

- **Freeze program:** This freezes an individual program, while other unfrozen programs can continue executing.
- **Freeze unit by command:** This freezes all programs and is initiated by the user.
- **Freeze unit by contact:** This freeze is activated by closing the FREEZE contact located on the board using a jumper.

### How to perform each freeze:

A program freeze can be performed in two ways:

- In the **status tab**, click on the program and choose the action **Freeze**.
- In the **program tab**, click on the freeze icon and choose the action **Freeze**.

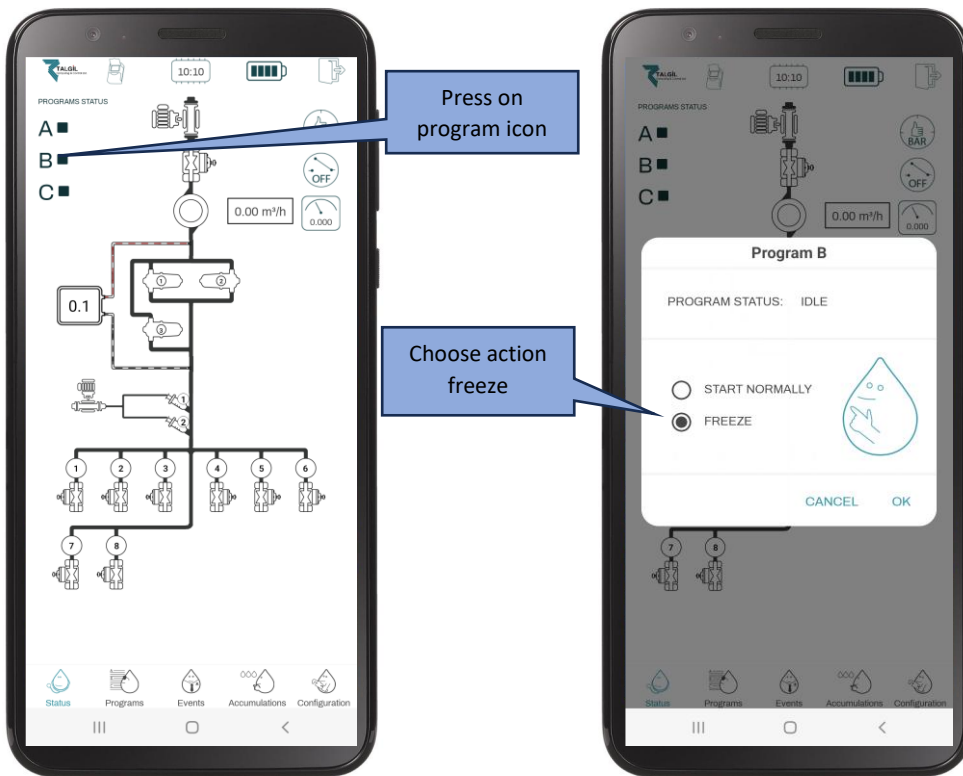


Fig 67 – Freeze program from status tab

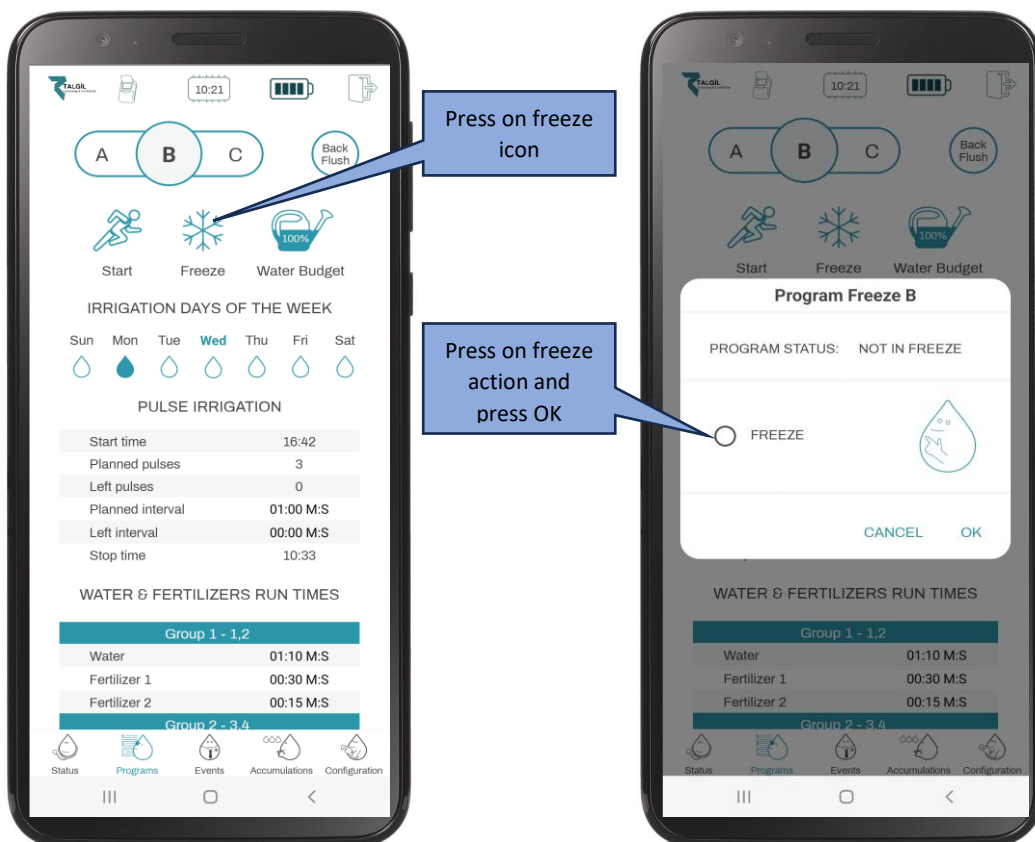


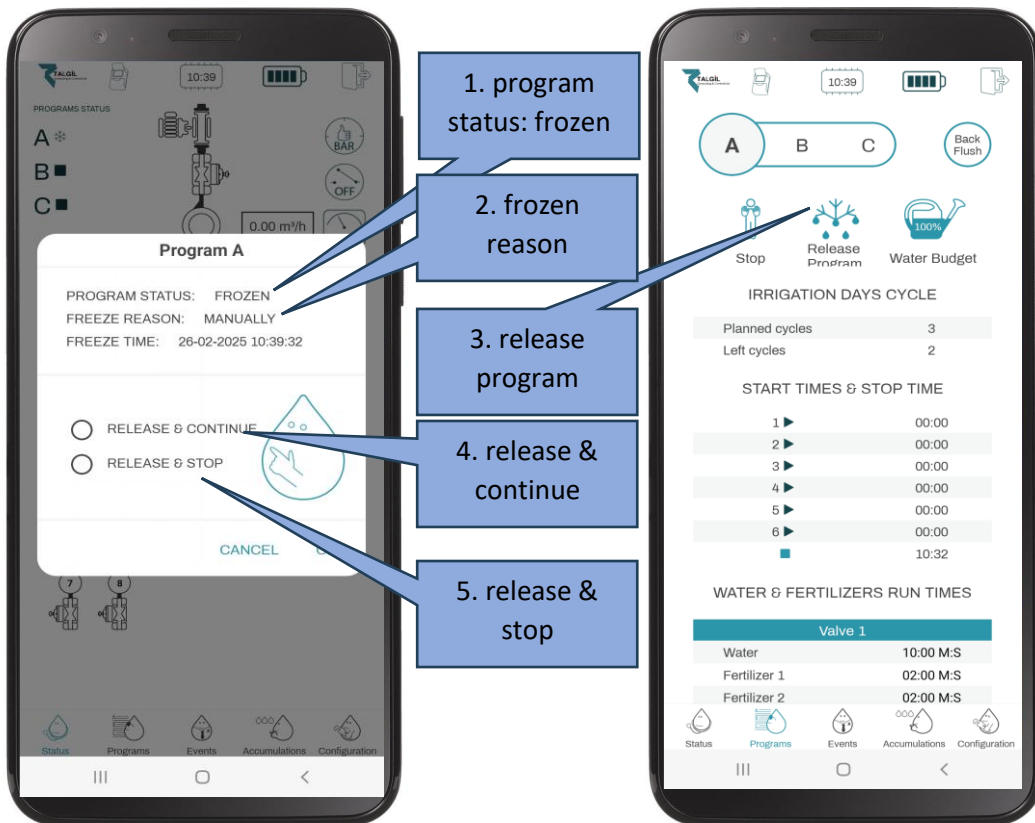
Fig 68 – freeze program from program tab

While a program is frozen, you will see indications in the following locations:

- A snowflake icon will appear next to the program letter in the Status tab. Press on the program to view details, such as when it was frozen. In the action menu, you will have the option to release the program.
- In the Program tab, there will be a "Release Program" button. Pressing it will display the time the program was frozen and allow you to choose to unfreeze it.

**Release Program options:**

- **Release & Continue** – The program will resume operation from the moment it was frozen.
- **Release & Stop** – The program will be restored but remain stopped. If you want to continue, you can start it manually from the beginning or the last position.



**Fig 69** – unfreeze program from: Left- status tab Right- program tab

**Fig details**

1. **Program status** – The status of the program; it will be marked as "Frozen" for a frozen program.
2. **Frozen reason** – The reason why the program was frozen:
  - **Manually** – The program was frozen by the user selecting the freeze option or freeze unit option

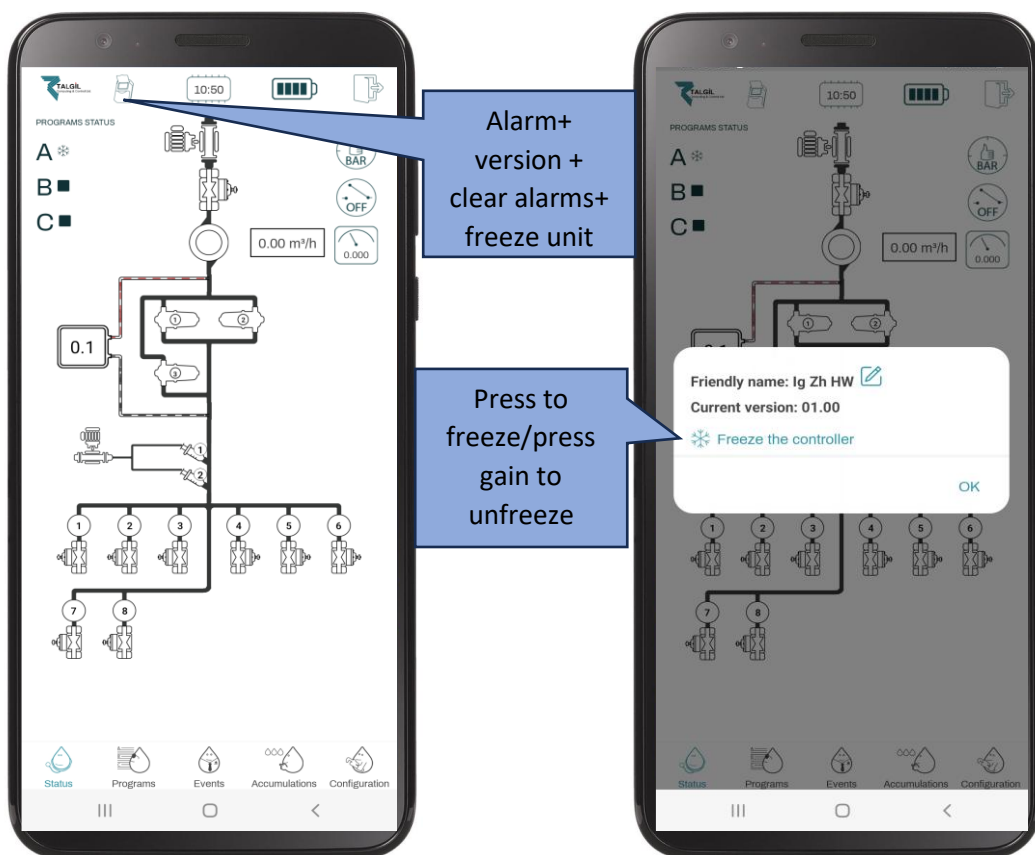
- **Contact** – The program was frozen due to the freeze contact being closed (via jumper).
- 3. **Release program** – Press this button to view information such as the time the program was frozen. You can also choose an action: **Release & Continue** or **Release & Stop**.
- 4. **Release & Continue** – Select this option to release the program; it will resume from the moment it was frozen and continue irrigating.
- 5. **Release & Stop** – Select this option to release the program, but it will stop irrigation. If you want to continue, you can manually restart it from the beginning or the last point.

You can also freeze all programs at once by choosing to freeze the unit. To freeze the unit, click on the **'Alarm + Version + Clear Alarms + Freeze Unit'** icon in the top left of the status tab. In the popup that opens, click on **'Freeze'**.

To restore, select **'Release & Continue'** or **'Release & Stop'** in the popup.

- **'Release & Continue'** will release the unit and resume program irrigation from the point it was halted
- **'Release & Stop'** will release the unit and stop program that irrigated before halt.

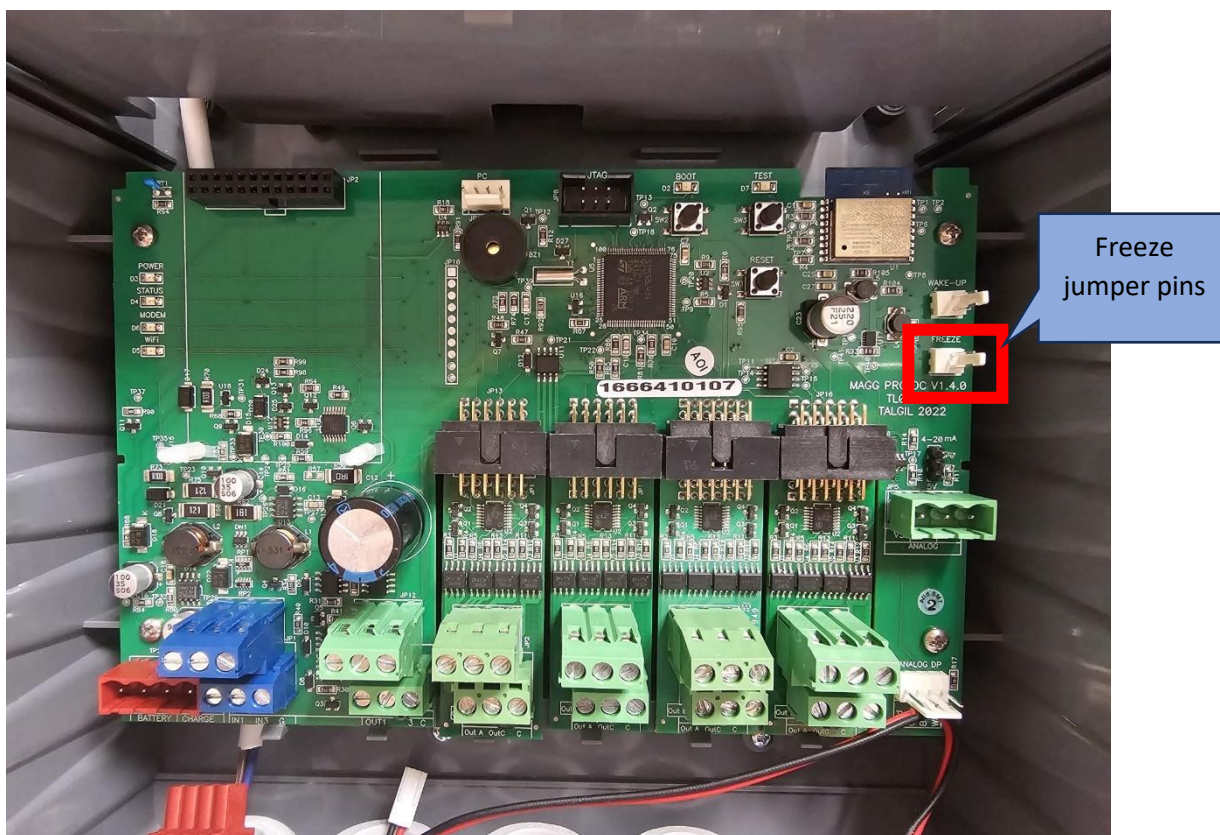
While frozen, the icon in the top left of the status tab will display a snowflake. Any program that is scheduled to start by time or by contact (Program C) will be frozen instead.



**Fig 70** – freeze unit

## 29. Freeze unit by contact

If you are near the board, it is possible to freeze the unit by short-circuiting the 'FREEZE' jumper pins (with a jumper, for example), located at the top right of the board.



**Fig 71** – freeze unit by contact location on board

Freeze by contact ends when the jumper is removed from the pins.

The behaviour of freeze by contact is the same as freezing the unit. When it is closed, all programs are frozen. If any program is scheduled to start by time or contact, it will be frozen instead. After the contact is opened, irrigation programs will return to the state they were in when they were "frozen."

### 30. Irrigation: skip valve/group

During the execution of a program, it is possible to skip the currently open valve/group and open the next valve/group in sequence. This can be done manually by the user. Open the program pop-up (in the status tab) of the currently running program and choose the "Skip" action. When the skip action is performed, the currently open valve will close, and the next one will open. The same applies to groups—if a group is skipped, the existing group will close, and the next one will open.

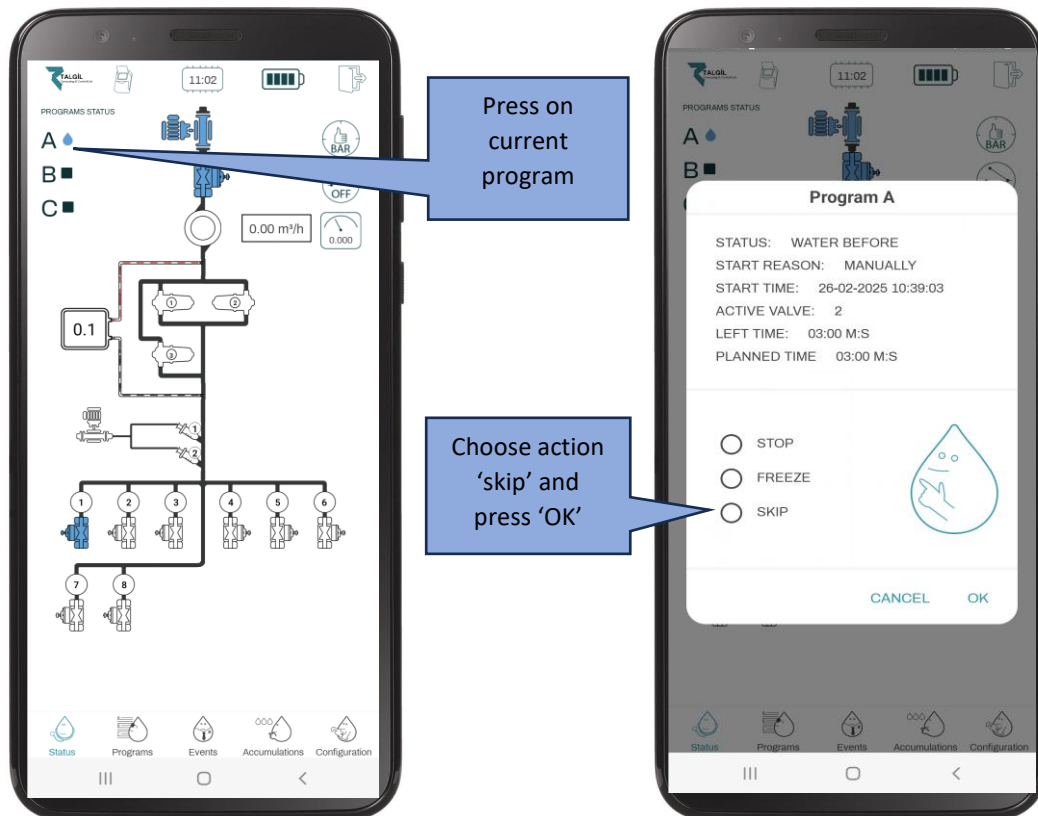


Fig 72 – skip valve

### 31. Events tab

You can view past events in the **Events** tab. MiniAggPro stores events related to program start/stop actions and various alarms that have occurred. When opening the **Events** tab, the most recent events are displayed first. To view older events, press the **Load More** button. Each time you press **Load More**, a block of past events will be loaded, allowing you to access further historical data.



**Fig 73** – clear event tab

## 32. Accumulation tab

You can view accumulations tab for the following:

- Total time system irrigated
- If water meter is present, the volume of water passed has passed through it is shown
- The time each valve was open
- The time each fertilizer was open per valve

It is also possible to reset accumulation to zero



Fig 74 – Accumulations tab

### 33. Notifications

It is possible to configure the controller to send notifications to a phone when an alarm occurs. This allows the user to stay updated when a problem occurs on MiniAggPro.

For the controller to send notifications, you need to:

- Enter the phone number that will receive the notifications.
- Configure notifications for the specific alarms you want to receive alerts for.

The phone number used for receiving notifications is the one configured for the user. You can edit it in user settings (accessed from the device manager screen). See below

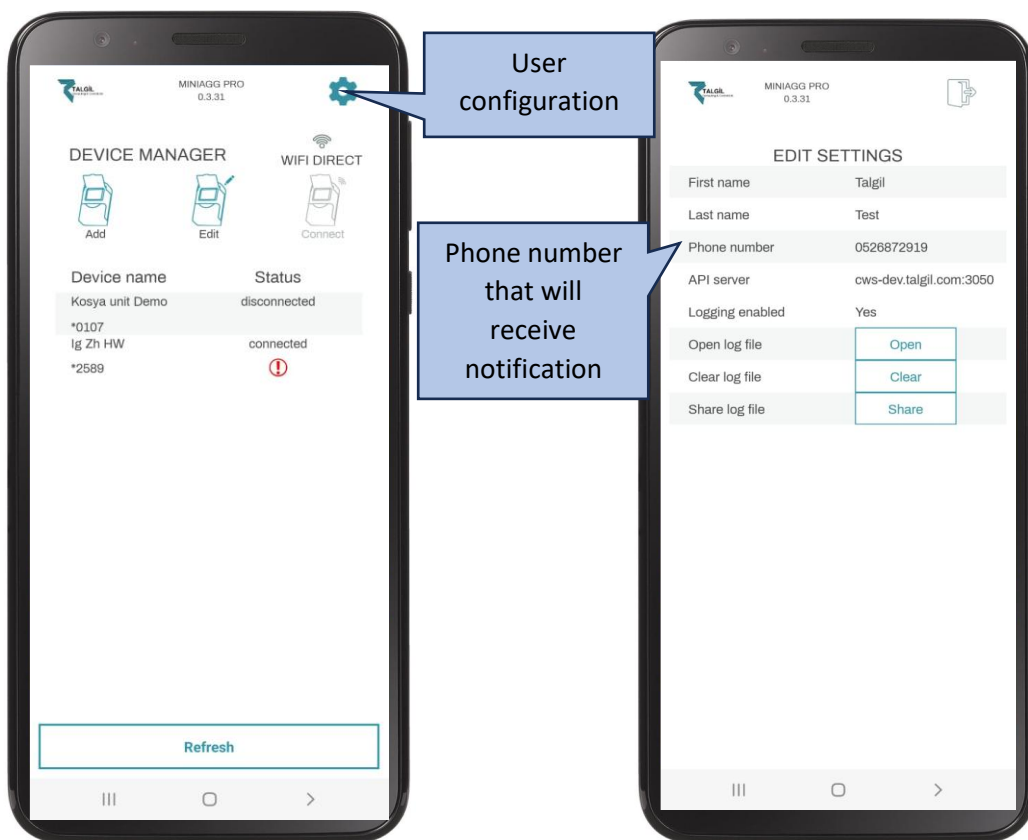
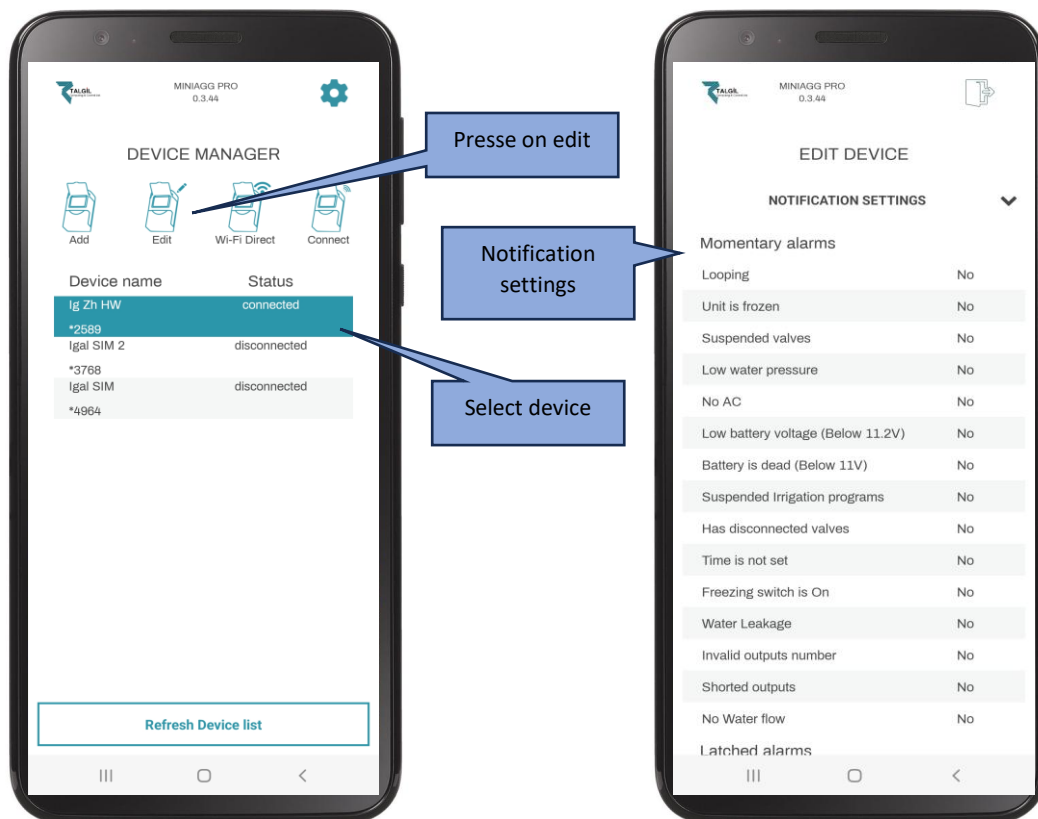


Fig 75 – setting notification phone

To configure which alarms you want to receive notification for, go to device manager screen and select **Edit** for your device. Notification list is located at the bottom of screen.



**Fig 76** – notification settings

If you want to receive notification, change the value to 'Yes' in the notification settings

Here is explanation of each alarm in notification settings:

1. **Looping** – Occurs if looping is reached while the unit is flushing. See the [Backflushing looping chapter](#).
2. **Unit is frozen** – Occurs if the unit was frozen by command or contact. See the [Freeze Program or Unit chapter](#).
3. **Has suspended valves** – Not implemented yet.
4. **No pressure** – Occurs if low pressure is detected.
5. **No AC** – For AC boards only. Indicates that no AC power is being supplied to the board.
6. **Low battery** – For DC models only. Indicates that the battery charge level is low (below 11.2V).
7. **Battery is dead** – For DC models only. Indicates that the battery level is critically low (below 11V).
8. **Has suspended programs** – Not implemented yet.
9. **Has disconnected valves** – Not implemented yet.
10. **Time is not set** – Indicates that the time on MiniAggPro was lost (can happen after a power loss).

11. **Freezing switch is On** – Not implemented yet.
12. **Water leakage** – Occurs if a water leak is detected in the system. See [Inputs → Water Meter Detects Water Leakage](#).
13. **Invalid outputs number** – Occurs if the number of outputs on the board is different from the configured number of outputs. This happens when an extension card is removed or added.
14. **Shorted outputs** – For AC models only. Indicates that one of the outputs has short-circuited.
15. **No flow** – Occurs if a no-flow alarm is triggered. See '[Water Meter No-Flow](#).'
16. **Hardware problems detected** – Occurs if a hardware issue is detected with the board.
17. **Time correction is too big** – Occurs if the controller adjusts the time by more than 15 minutes (the controller syncs time with the connected phone and server).