WATER-INSIGHT

Irrigation Network Controller (INC)
Firmware Installation Guide

V1.2

Version Control

Document Name:	INC Firmware Installation v1.0
Product:	QIMS

Document Owner:	Water-Insight Ltd

Product Version:	QIMS V1.0
Date Updated:	

Version	Date	Author	Change Description
1.0	21.09.16	FZ	First version
1.1	26.10.16	GP	Prepare for external release
1.2	15.11.16	GP	Delineated Internal and external processes

Introduction

This document provides the procedures for upgrading the firmware of the INC. When upgrading INC firmware from versions prior to 3.00 then there is an additional step to the firmware upgrade process to be followed.

The document is in three parts:
1. Part I: Firmware upgrade process - for installers
2. Part II: Firmware upgrade process specific for upgrading firmware to version 3.x from an older version predating version 3.00 – for installers
3. Part III: Firmware upgrade process for upgrading the bootloader firmware – for Water-Insight use only or trained personnel.

Prerequisites

- The firmware release binary should be pre-loaded onto a standard SD Card supporting SDHC standard, SDCard speed class should be unimportant. The firmware is named in the form: INC-App.bin
- Firmware can be supplied by Water-Insight on application if required.

Setting Up Tools Required

- Stylus (if upgrading to V3.00 from previous versions)

PART I: - INC firmware upgrade procedure

Steps:
1. Verify the firmware binary is called INC-App.bin
2. Copy it to the SD card to the /firmware folder
3. Insert the SD card into the INC (the SD card reader slot is located on the top side)
4. Commence the update from the INC user interface (GUI):
    a. Go to the main menu (this normally has 6 buttons on the screen)
    b. Tap onto the **Settings** button (bottom right button)
    c. Tap onto the **Version** button (bottom left button in the **INC Settings** screen)
    d. A dialog box will pop up with the current firmware's version number; tap onto the **Upgrade** button (bottom left of the dialog box)
    e. Tap the **Yes** button
    f. At this point 3 lines of text appear briefly on the screen and the **ALM** and **OK** led lights will flash, then 2 more lines will be printed and finally the INC will reboot and show the main screen again (6 buttons view)

If the INC upgrade process appears to stall after displaying the first 3 text lines:
    g. eject the SD card (manually push it, hear the click, then release it)
    h. put the SD card back in (ensuring it clicks into place)
    i. At this point two more lines will be printed and finally the INC will reboot and show the main screen again (6 buttons view)

If the INC upgrade process continues to remain stalled do these additional steps:
    j. de-power the INC (carefully remove the green plug on the bottom holding the plug, not the wires)
    k. re-power the INC by reinserting the power plug
    l. Commence the FW upgrade procedure again (step 4a.)

PART II: -Upgrading the INC firmware to V3.00 from a previous version

V3.00 introduces the ability to reset the non-volatile configuration settings in the INC to factory defaults during the upgrade process. Access to the feature is only enabled after the device has been upgraded so in effect the upgrade process must be undertaken twice: first to enable the feature and second to reset the default values.

IMPORTANT: when clearing the memory all the settings (except clock calibration) will be deleted, including the screen calibration values; to calibrate the screen a stylus is needed.

Steps:
1. Make sure you have a stylus available for the screen calibration procedure.
2. Make a note of the communications (comms) settings before doing the upgrade.

INC Comms Settings		
Description	**Value**	**Notes**
Time Sync Period (hrs)		Default is 720hrs, that is 30 days; if you have IPCs that show lots of clock problems reduce to once or twice a week – that is 168 hrs
Status Period (hrs)		This depends on how many IPCs you have but at least once a day is recommended (that is 24)
Comms Gap (secs)		no less than 10 secs
Hops		4 or 8, a larger number means it could take longer to poll an IPC
Retries		3, up to 5 if you have IPC that take persistently longer to respond

3. Perform the firmware upgrade to version 3.00 (or higher) following the steps outlined above (INC firmware upgrade procedure).
4. Start the firmware upgrade procedure again, but after tapping the **Upgrade** button make sure you check the **Defaults** checkbox this time.
5. Before booting up the INC will guide you through the screen calibration process, follow the indications and tap the stylus on the small dots that appear on the screen, try to keep the stylus pinpointed vertically on the dot.
6. Once the INC has booted, check RTC (clock)
   a. set time and date
   b. set watering cycle parameters (day of cycle/cycle length)
7. Load the pod list from SD card
   a. From main menu tap **Settings**
   b. Tap **IPC files**
   c. Select from the window the desired file (default name pod-config.ini) using the up/down buttons if there is more than one file
   d. Tap the **load** button, (F2 led flashes while loading) wait until message box says loaded xx IPCs.
   e. Tap **OK** to return to main menu
8. Load schedule (from SD card)
   a. From the main menu tap **Schedules**
   b. Tap the **folder** button
   c. Select the folder using the up/down buttons
   d. Tap **load,** until the message box with "schedule list loaded xx schedules" appears
   e. Tap **OK** then **back** and **back** to return to main menu
9. Restore the comms settings (**Settings** > **Comms**)
   a. Time Sync Period (hrs)
   b. Status Period (hrs)
   c. Comms Gap (secs)
   d. Hops
   e. Retries

PART III: – Upgrading the INC bootloader

Occasionally the bootloader software requires updating, this enables new firmware to be loaded.

ONLY UPGRADE THE BOOTLOADER AFTER CONSULTING QTECH.

Equipment required:
1. INC that is to be upgraded.
2. SD Card that has the INC Application firmware.
3. USB Cable.
4. Laptop with:
   a. Flash Magic installed
   b. The INC Bootloader firmware.

Procedure:
1. Remove the power and antenna cables from the INC
2. Remove all terminal connectors and the SD Card.
3. Open the INC case and ensure that the two OPT jumpers (located under the LED display board ribbon cable) are OFF.
4. Ensure that the two ISP mode jumpers are ON.
5. Power up the INC and connect the USB cable to the laptop.
6. Run Flash Magic. The Desktop contains a shortcut to a folder named "INC Firmware Upgrade" which includes a shortcut to run Flash Magic.
7. The configuration settings should be retained from last run, but it not then load the settings from the ".fms" settings file in that folder.
8. Press the "Start" button. You should see in the status bar the progress as it connects, erases, programs, and verifies the device. The INC Bootloader has now been reprogrammed.
9. Using these settings, Flash Magic will not erase the application image, so once the upgrade has finished, the INC will reboot and run the application.
10. Remove the USB cable and power from the INC and remove the ISP jumpers.
11. Now repower the INC, and then insert the SD Card that contains the latest INC application.
12. On the INC menu go to Settings->Version->Upgrade, and trigger the INC to upgrade. You should see the Bootloader re-flash the application image.

Notes:
The two OPT jumpers can be used to alter the way that the INC Bootloader operates.
- When OPT1 jumper is ON that forces the INC Bootloader to re-flash the INC Application.
  In this situation it is hardcoded to use the file named "/Firmware/INC-App.bin".
- When OPT2 jumper is ON, the INC Bootloader will bypass the checks it normally does to work out whether the Application should be re-flashed. This includes the application image verification process, and checking if the application has requested an upgrade. That means that if OPT2 jumper is ON then application initiated upgrades are not possible.

Some INCs have an LPC1768 processor while others have an LPC1767. If Flash magic complains about invalid device signature, then change that setting.

If Flash magic doesn't connect then check that the correct USB com port setting is used.

Troubleshooting

How to open the INC case:
1. Gently unplug the power supply cable (green plug on the bottom side)
2. Remove the SD card (push it until a click is heard then pull it out)
3. Lift the cover from the sides near the antenna side and slowly raise it paying attention to the ribbon cables and ground cord that connect the cover to the INC board
4. Take extreme care that the side of the case does not catch the SDCard holder and damage it.

INC clock loses the time settings when the INC is unpowered: make sure that the **BAT** jumper is closed

User Notes and Installation Details

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