Rev 02

AN36 – Pre-Season Checks for IPCs

Introduction

When there are IPCs reporting issues, such as out of contact or low battery, IMS can help with troubleshooting these. This is ideal for pre-season checks, but the method is equally valid at any time.
This document assumes some familiarity with IMS and EP3 operation.

Important Consideration when looking at Battery or IPC Replacement
If an IPC has had limited sun exposure over winter, the battery charge % may be low. As we move into Summer, the battery may very well recharge as expected.
A guide to specific IPC troubleshooting involving the use of an EP3 can be found in the appendix.

Identification and Navigation

Sprinklers of interest are easily identified via the status indication colours.
If there is mobile coverage on site IMS can also help guide you to the sprinklers of interest from your smart phone.

Select the sprinkler view, then tap the  icon and a yellow figure will be displayed on the map indicating your current position.

If you do not have an IMS gateway and active account you will need to identify which sprinklers may need looking at by other means, or check every sprinkler.

Prepare the EP3

The most thorough investigation will require the use of an EP3.

1. Check that your EP3 are not nearing flat and ensure you have spare batteries
2. Check that you have the latest revision of firmware on your EP3 (tap settings > info or settings >version). If it is not the latest version upgrade it. (see EP3 User Guide)
    a. As at 1/8/2019 the latest version is V5.04
3. Ensure you have access to the latest IPC list
    - Export the site configuration from IMS (Farm Settings > Advanced > Export)
    - Export podlist and schedules from scheduling tool
4. Transfer the exported podlist to a SD card
5. Load the podlist and schedules from the card to the EP3
6. Set the time on the EP3 to match the current time (Edit the time on EP3 - settings > time)
7. You can now go to site. You must have with you:
    a. EP3 (with card inserted)
    b. Magnet
    c. Your smartphone (showing your IMS farm site). If you don't have a phone or coverage, read how to produce a report of out of contact devices below.

Investigate each IPC in Turn

1. Visual checks

- Confirm solar panel is clean
- Solenoid wires are connected correctly
- Storage magnet is not installed
- No physical damage to IPC

2. Check serial number of IPC matches that in podlist(EP3)

- If not the IPC podlist will need updating on the EP3 and at the source (IMS or scheduling app)
- Refer to the EP3, IMS & scheduling app User Guides

3. Check if IPC is in hibernation

- LED flashes briefly every 10s

4. Briefly place a magnet on the IPC magnet label

- Confirm LED starts flashing quickly (entered bootloader mode)
- If LED does not start flashing the battery may be completely flat
  For IPCs with field replaceable batteries refer to ***Replacing an IPC Battery***
  For IPCs without field replaceable batteries, return to Water-Insight for service

5. (EP3) Send a Status request – wait for the LED to stop flashing first

- Confirm the IPC responds, check the **battery charge %**, **schedule matches** and **time is correct**
- **If IPC was in hibernation**, you will have ~30s after the LED stops flashing to get a status response

If the charge % is unexpectedly low, you may wish to replace the battery or replace/service the IPC

6. (EP3) If IPC does not respond to a status request, but did respond to magnet (fast flashing LED)

- First check the firmware version is as required for your site
- Upgrade firmware if required

7. (EP3) Confirm channel and/or FarmID (V5) are set correctly

- This is only likely to occur if the IPC has been replaced at some stage and has not communicated since
- Configure using IMS Deploy feature or with EP3 if required

8. Check Solenoid Operation

- Perform manual ON and OFF commands and confirm sprinkler starts/stops (if water available) or solenoid clicks (no water available)
- Refer to **Solenoid Operation** for more detailed description of behaviour

Solenoid Operation

An IPC controls a valve by passing current through the solenoid in one direction to turn the valve ON and in the opposite direction to turn the valve OFF, so the correct connection of the solenoid wires to the IPC is **critical**.

- When an IPCs internal clock matches it's scheduled on/off time (or if a manual on/off command is issued) it will send a **pulse** to the solenoid in the appropriate direction for an open/close operation.
  - There is no feedback of whether the solenoid plunger has moved or any indication the valve has actually operated as intended.
- At midnight (IPC time) all schedules are recalculated and solenoids are attempted to be switched to match intended scheduling
- After a timeset (e.g. global timeset to site) IPCs recalculate their schedule and solenoids are attempted to be switched to match intended scheduling (v5 firmware and above only)
- Valve ON (open) – solenoid plunger is pulled in; bonnet drain orifice is open
- Valve OFF (closed) – solenoid plunger is pushed out; bonnet drain orifice is closed

Quick Solenoid Check

To determine the correct solenoid wiring perform the following test:

1. De-Power the IPC by installing the power ON/OFF Magnet in the shipping position (i.e. **not** the end marked with the label "magnet")
2. Connect the IPC to the solenoid in use.
3. Apply water at operating pressure to the solenoid valve.
4. Remove the ON/OFF magnet from the IPC.
5. The IPC will power up, then after 10 seconds the IPC will turn the solenoid valve OFF.
6. If the solenoid turns ON then the solenoid connecting wires to the IPC need to be reversed.

Unexpected Valve Behaviour

- Query the IPC for its Status

If the valve state reports as **OFF** (but valve is still **ON**) then the IPC **has tried** to turn the valve off

- At the time of the off signal (pulse), for some reason the solenoid could not move the solenoid plunger
- Solenoid is wired incorrectly
- Some other physical reason for valve not turning off

If the valve state reports as **ON**, but is scheduled to be **OFF**

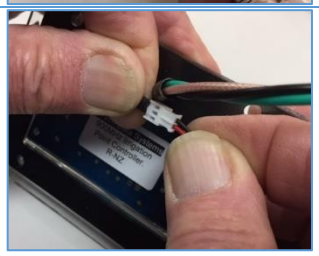
- The IPC has **not tried** to turn the valve off

This could be because

- The IPC internal time is not as expected (confirmed in the status reply), so has not reached the scheduled off time
- IPC schedule is not as expected – reports as wrong in the status reply
  - The comparison is against the schedule the has been loaded in the EP3
- A **manual ON** command has been issued

Replacing an IPC battery

Installing an IPC Battery

Step	Process	Note
1.	- A syringe of Silicon water proofing grease is provided with a replacement battery package. - Inject a small amount of silicon grease into the battery cable connector housing.	
2.	- Hold the battery socket and plug connectors by the wires and align the polarizing ridge on the plug with slot in the connector. - Push the plug into the socket by the wires. Note: Do not push the connectors together by the connector housing as this can push out the connector pins.	

Removing an IPC Battery

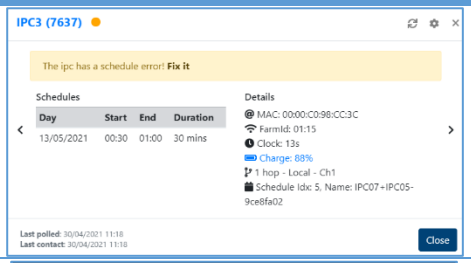
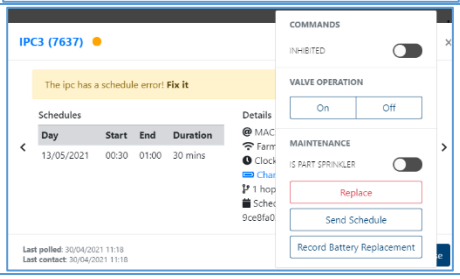
Step	Process	Note
1.	- To remove the battery, grasp the battery connector plug and socket and pull out the battery plug. Note: Do not pull the battery connector socket and plug apart by the wires as this will tear the wires out of the connectors.	

Confirm IPC Operation

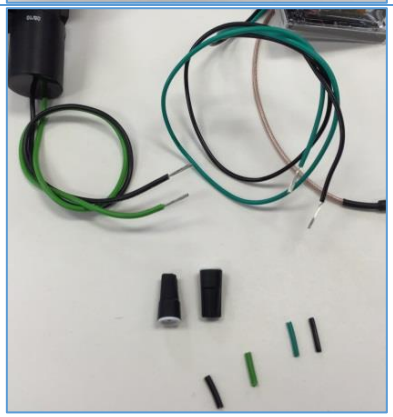
- Status response received (EP3/IMS)
- Confirm/set IPC clock(time)
- Confirm/send schedule

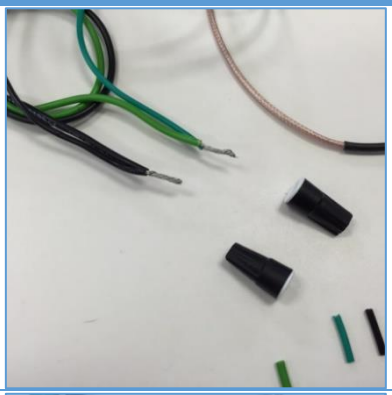
- Confirm solenoid operation with manual ON/OFF commands

Record Battery Replacement in IMS

Step	Process	Note
1.	- Select the sprinkler of interest from the Sprinklers view or search for it by name or serial number using the search icon . - Select **open card** (sprinklers view) or the search result to display the sprinkler card.	
2.	- Open the options menu - Select **Record Battery Replacement**	

IPC to Baccara Solenoid Valve Jointing

Step	Process	Note
	A typical IPC and a typical solenoid valve	
1.	Remove any existing insulation and straighten the wires If necessary strip back the wire insulation by 15mm with a wire stripper	

Step	Process	Note
2.	Carefully twist the 2 black wires tightly together. Then repeat for the 2 green wires	
3.	Screw the silicon filled wire joiners onto each of the green and black wire joints (the wire joiners screw onto the wired in joint in a clockwise direction). Silicon grease will extrude from the joiners as shown	

IPC Battery Magnet

An IPC is supplied with an external magnet installed that turns the IPC Power Supply OFF to preserve the battery during storage and transit.

When removing the IPC from operation for storage or for transit, the Battery Magnet should be re-installed to conserve the power supply battery.

For more information email support@waterinsight.co.nz