

# GSM Commander Case Studies

## Agriculture

### Case Study 2: Basic Pump & Tank Control



#### Background information

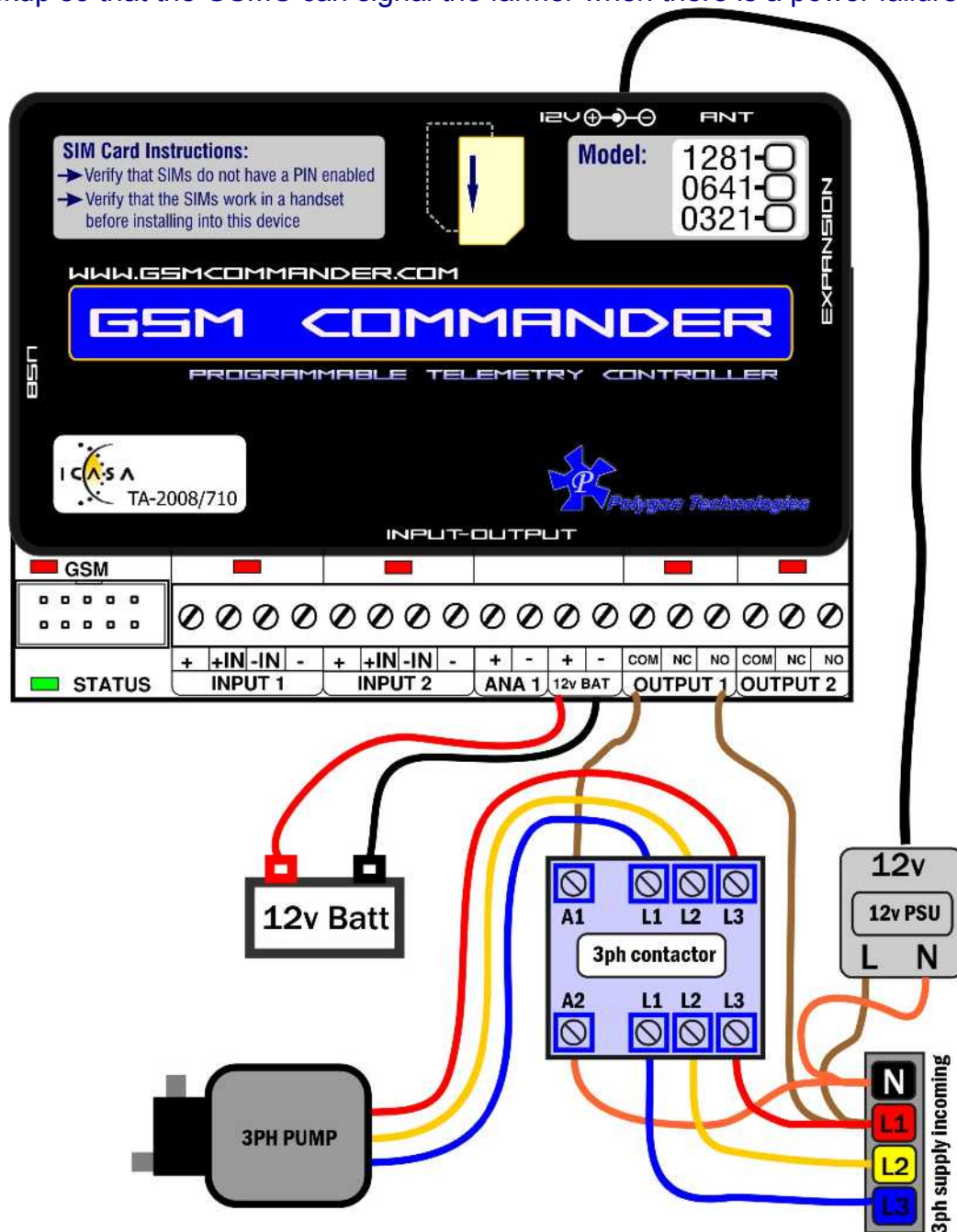
Oom Frik the farmer has a remote pump that needs to be switched on to supply water to a remotely located tank system. The tank has a float switch to determine when the tank reaches 1/3 of capacity, and it is required that the pump be started when the tank level falls below the float level. The system used to have a cable running to the tank, but some “friends” borrowed the cable without telling Oom Frik, who is now not too keen on installing another cable from the pump to the tank, lest his friends come to help themselves yet again, this time with brand new cable. When the tank is at 1/3, the pump typically takes 45 minutes of running time to fill the tank to capacity.

#### Goal

To install a GSM Commander at the pump house, and another at the tank. The tank unit must signal the pump unit when to switch on. The pump unit will be powered from the 220V supply that is available at the pump, while the unit at the tank will rely on battery and solar power. The system will alert Oom Frik if there is a problem with power at the pump, or if the float does not register a rising water level, even after 15 minutes of pumping.

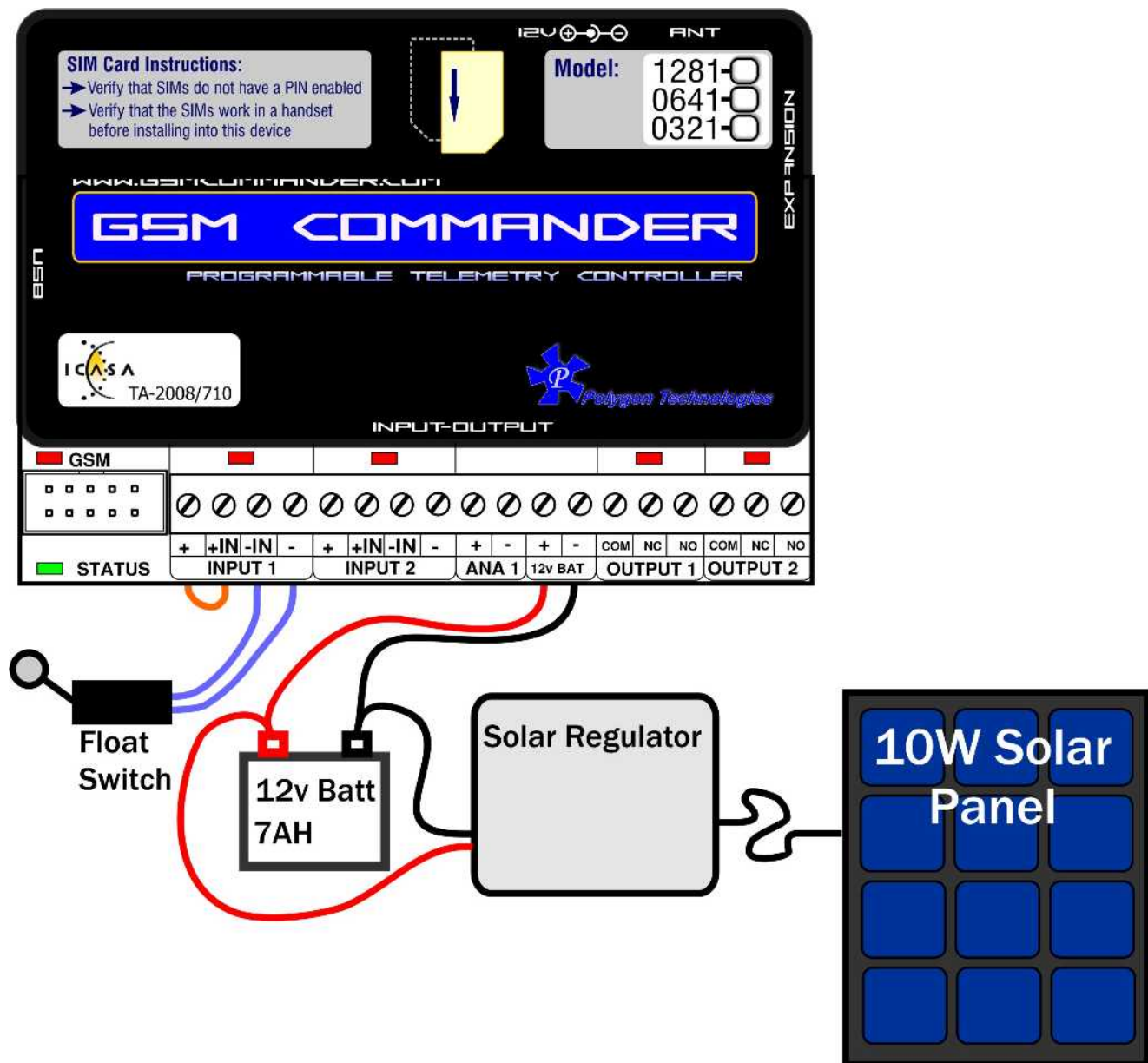
### Pump GSM Commander Wiring

The GSMC unit is installed inside the pump house, and its output 1 is connected such that it will activate a 3phase contactor, which in turn will activate the pump. The unit is powered from a simple 12v linear power supply that in turn is powered from the mains supply. It also has a battery backup so that the GSMC can signal the farmer when there is a power failure.



### Tank GSM Commander Wiring

The GSMC unit is installed inside a weatherproof enclosure, together with a battery and a solar charger system. Input 1 on the GSM Commander is connected to the float switch such, that if the level falls below 1/3, the input on the GSMC will be active.



**GSM Commander Setup (Tank side)**

The following statements were implemented. The statements speak for themselves, but we have included a bit of a commentary with each statement.

Name	Time Constraints or delays	Behaviour Text
St1	None	IF Input 1 becomes Active, remaining Active for longer than 30 seconds, THEN place a voicecall to 0831231234
This statement will call the pump side GSMC (at 0831231234) if the float shows the tank is less than 1/3 full. The GSMC on that side will recognise the number of this GSMC, and start the pump for 45 minutes. Note that it will only do this if the input remains active for longer than 30 seconds. This helps to prevent false starts from wave action or from baboons fiddling with the float. (Yes it happens!)		
St2	None	IF Battery voltage < 10v, THEN send "Battery at tank" to Oom Frik. (every 12 hours)
This will monitor the status of the battery, and will notify Oom Frik of any problems.		
St3	None	IF Input 1 becomes Active, remaining Active for longer than 15 minutes, THEN send "Tank not filling!" to Oom Frik.
Statement 1 should cause the tank to start filling as soon as the pump is started on the other side. If after 15 minutes, the float still shows the tank to be less than 1/3 full, we know that there is something really wrong, and Oom Frik should be notified. Faults could include a burst pipe, broken pump or a power failure at the pump.		
St4	None	If Date/Time is: Every day at 8:00AM, THEN send Status message to Oom Frik
Oom Frik needs his peace of mind. A status message from his tank every morning assures him that everything is still fine, and also prevents the cellphone network from de-activating the GSM simcard because of non-use.		
St5	None	IF Airtime goes below 21 units THEN send "Airtime running low" via SMS To Oom Frik
This statement will notify Oom Frik if airtime is running low		

### GSM Commander Setup (Pump side)

The following statements were implemented. The statements speak for themselves, but we have included a bit of a commentary with each statement.

Name	Time Constraints or delays	Behaviour Text
St1	None	IF VoiceCall is received from 0831112222, THEN Activate Output 1 for 45 minutes.
This statement will start the pump for 45 minutes, if it receives a call from the GSMC located at the tank (whose number is in this case 0831112222)		
St2	None	IF Power Failure detected, send "POWER FAIL PUMP" to Oom Frik.
This will notify Oom Frik if the pumphouse power fails. This helps to detect cable theft too..		
St3	None	IF Power Restore detected, send "POWER RESTORE PUMP" to Oom Frik.
This will notify Oom Frik if the power is restored to the pumphouse.		
St4	None	If Date/Time is: Every day at 8:00AM, THEN send Status message to Oom Frik
Oom Frik needs his peace of mind. A status message from his pump every morning assures him that everything is still fine, and also prevents the cellphone network from de-activating the GSM simcard because of non-use.		
St5	None	IF Airtime goes below 21 units THEN send "Airtime running low" via SMS To Oom Frik
This statement will notify Oom Frik if airtime is running low		

### Futher Clever ideas..

Obviously the exact setup will depend on the installation.

By adding a few additional bits and pieces, the installation can be made very clever indeed.

Some ideas include:

- Add water pressure sensor after the pump.  
If the GSMC starts the pump, and does not detect pressure within a few seconds, it will switch the pump off to protect it.
- Add water sensor before the pump.  
Some pumps will burn out if there is no water available to pump. One could setup the GSMC to only start the pump if there is water available. (and to stop the pump if water should run out)
- Install flow meter. A flow meter can be installed at the pump, and the GSMC can be used to count the pulses. Oom Frik can request a tally from the unit to determine the amount of water used. The information can also be used to detect problems. If the flow rate is lower than expected, it shows there is a problem (pinched pipe / blocked filter etc)