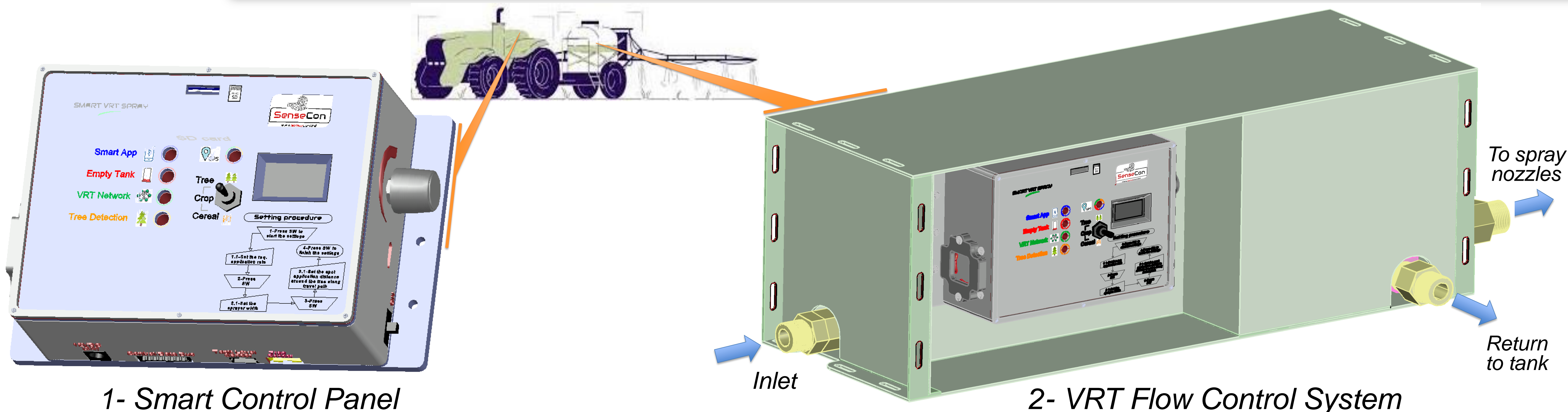


# SMART VRT SPRAY 60/100

version 1.0

A portable and easy-to-install variable flow control system for agricultural sprayers



## BRIEF TECHNOLOGY

Smart VRT Spray 60/100, a portable and easy-to-install flow control system for agricultural sprayers based on Variable Rate Technology (VRT), offers a game-changing solution for precision agriculture. It seamlessly integrates into existing sprayers, allowing farmers to achieve precise and targeted application of agrochemicals without complex modifications. The system combines a user-friendly Smart Control Panel and an advanced VRT Flow Control System connected through a secured Wi-Fi mesh network, enhancing resource efficiency and crop yield. It adapts to various crop types, provides real-time data for decision-making, and compensates for variable travel speeds. This innovation revolutionizes farming by simplifying precision agriculture and maximizing resource utilization.

## KEY FEATURES

- Easy integration into existing sprayers eliminating the need for complex modifications.
- From cereal to tree crops: One system fits all.
- Application of aqueous solutions of fertilizer and plant protection chemicals
- Real-time data logging.
- Intuitive controls for effortless operation.

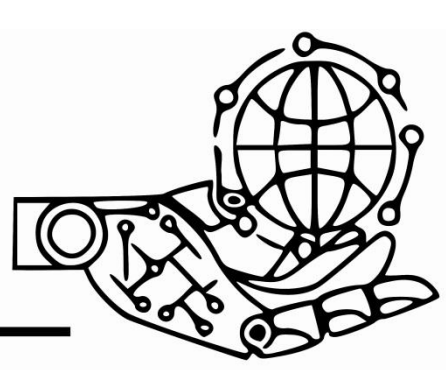
## SPECIFICATIONS

- Smart Control Panel (Component 1)**
  - Input power: 12VDC (1A).
  - GPS enabled.
  - Data logger (Removable micro SD card up to 32 GB).
  - 0.96" OLED display.
  - Product size: L×W×H = 175 mm × 108 mm × 60 mm
- VRT Flow Control System (Component 2)**
  - Input power: 12VDC (5A).
  - Low tank level sensor.
  - Ultrasonic tree detector (maximum range 2.5 m).
  - Better flow control from 2 to 60 L/min allowing the application rate of 29 to 857 L/ha (max. error ±2%) at a travel speed of 7 km/h using Smart VRT Spray 60.
  - Better flow control from 6 to 100 L/min allowing the application rate of 86 to 1429 L/ha (max. error ±4.2%) at a travel speed of 7 km/h using Smart VRT Spray 100.
  - Travel speed: 2 to 15 km/h (for details, consult the given charts).
  - Pipe fitting size: DN 20 (3/4").
  - Product size: L×W×H = 453 mm × 163 mm × 165 mm.

## USEFULNESS & APPLICATION

- Precision Agriculture:** This technology is a cornerstone of precision agriculture, enabling farmers to precisely target the application of agrochemicals for maximum crop yields.
- Crop Diversification:** It is versatile, adaptable for various crop types, including cereals and tree crops, making it valuable for diverse farming operations.
- Resource Optimization:** The system optimizes the use of resources such as fertilizers, and pesticides, reducing waste and environmental impact.
- Efficiency in Farming:** Enhancing efficiency in resource use, it minimizes operational costs while maximizing productivity.
- Sustainable Farming:** The technology aligns with sustainable farming practices, reducing chemical runoff and promoting eco-friendly agriculture.
- User Accessibility:** Its user-friendly interface makes it accessible to a wide range of operators, from seasoned farmers to newcomers in the industry.
- Real-Time Data Logging:** Real-time data logging supports informed decision-making and troubleshooting during field operations.
- Future Prospects:** This technology represents the future of precision agriculture, with the potential to revolutionize farming practices and promote sustainable food production.

CEREAL CROPS															TREE CROPS														
Units of Smart VRT Spray 60 required for application rate of 400 L/ha @ ≤1.2 Mpa															Units of Smart VRT Spray 60 required for application rate of 400 L/ha @ ≤1.2 Mpa														
Travel speed (km/h)→	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Travel speed (km/h)→	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Width of sprayer (m)↓															Width of sprayer (m)↓														
11.3	1	1	1	1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
12.2	1	1	1	1	1	1	2	2	2	2	2	2	2	3	1.5	1	1	1	1	1	1	1	1	1	1	1	1	1	
13.7	1	1	1	1	1	2	2	2	2	2	2	2	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	
15.2	1	1	1	1	2	2	2	2	2	2	3	3	3	3	2.5	1	1	1	1	1	1	1	1	1	1	1	1	1	
16.8	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1	
20	1	1	1	2	2	2	2	2	3	3	3	3	4	4	3.5	1	1	1	1	1	1	1	1	1	1	1	1	1	
24	1	1	2	2	2	2	3	3	3	3	4	4	4	4	4	1	1	1	1	1	1	1	1	1	1	1	1	1	
30	1	1	2	2	2	3	3	4	4	4	4	5	5	5	4.5	1	1	1	1	1	1	1	1	1	1	1	1	1	
36	1	2	2	3	3	4	4	4	5	5	6	6	6	6	5	1	1	1	1	1	1	1	1	1	1	1	1	1	
40	1	2	2	3	3	4	4	4	5	5	6	6	7	7	5.5	1	1	1	1	1	1	1	1	1	1	1	1	1	
							Selectable	Recommended	Not recommended																				
Units of Smart VRT Spray 100 required for application rate of 400 L/ha @ ≤2 Mpa															Units of Smart VRT Spray 100 required for application rate of 400 L/ha @ ≤2 Mpa														
Travel speed (km/h)→	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Travel speed (km/h)→	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Width of sprayer (m)↓															Width of sprayer (m)↓														
11.3	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
12.2	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1.5	1	1	1	1	1	1	1	1	1	1	1	1	1	
13.7	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	
15.2	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2.5	1	1	1	1	1	1	1	1	1	1	1	1	1	
16.8	1	1	1	1	1	1	2	2	2	2	2	2	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	
20	1	1	1	1	1	1	2	2	2	2	2	2	2	2	3.5	1	1	1	1	1	1	1	1	1	1	1	1	1	
24	1	1	1	1	2	2	2	2	2	2	2	3	3	3	4	1	1	1	1	1	1	1	1	1	1	1	1	1	
30	1	1	1	2	2	2	2	2	3	3	3	3	3	3	4.5	1	1	1	1	1	1	1	1	1	1	1	1	1	
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40	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5.5	1	1	1	1	1	1	1	1	1	1	1	1	1	
							Selectable	Recommended	Not recommended																				



**SenseCon**

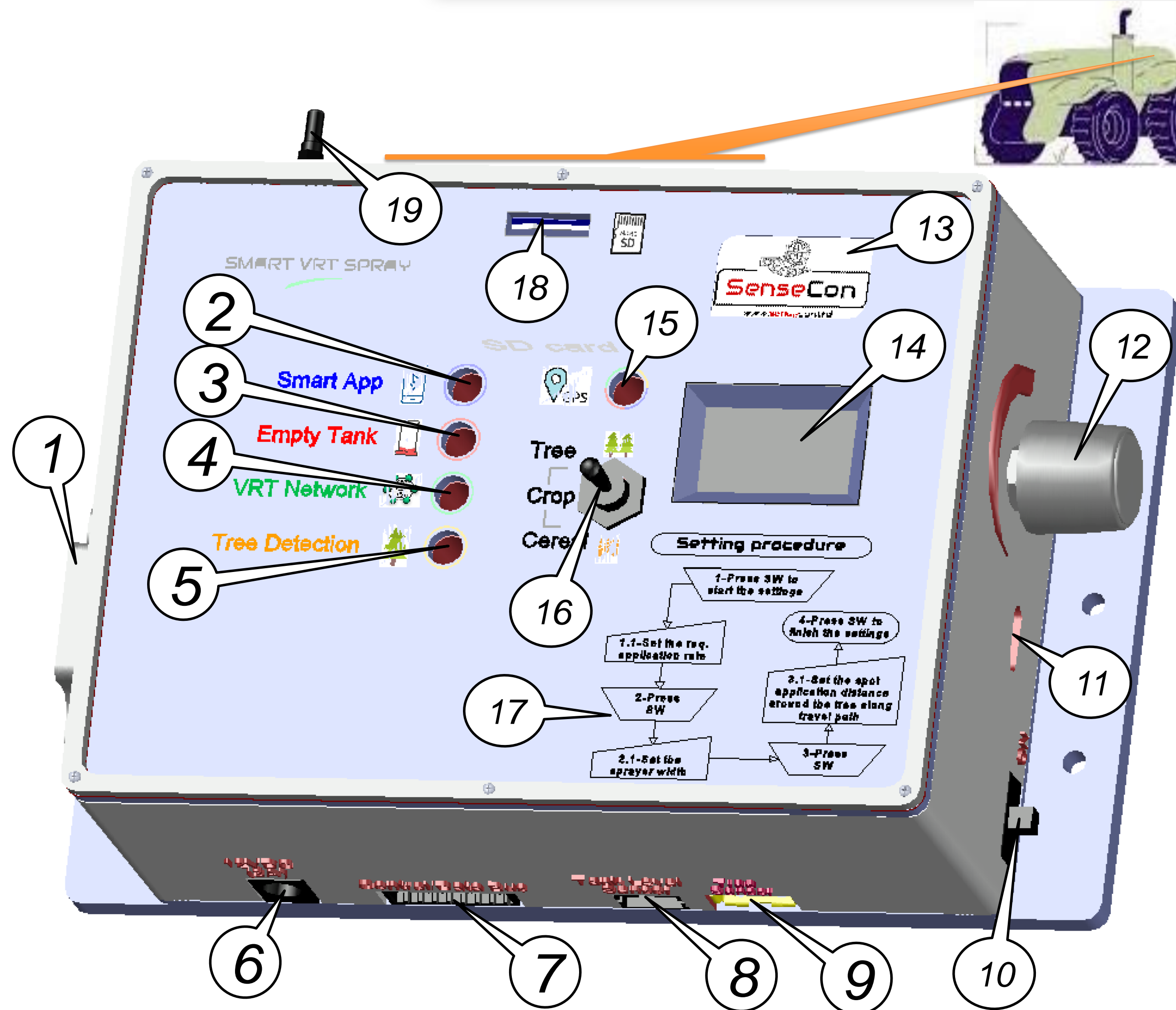
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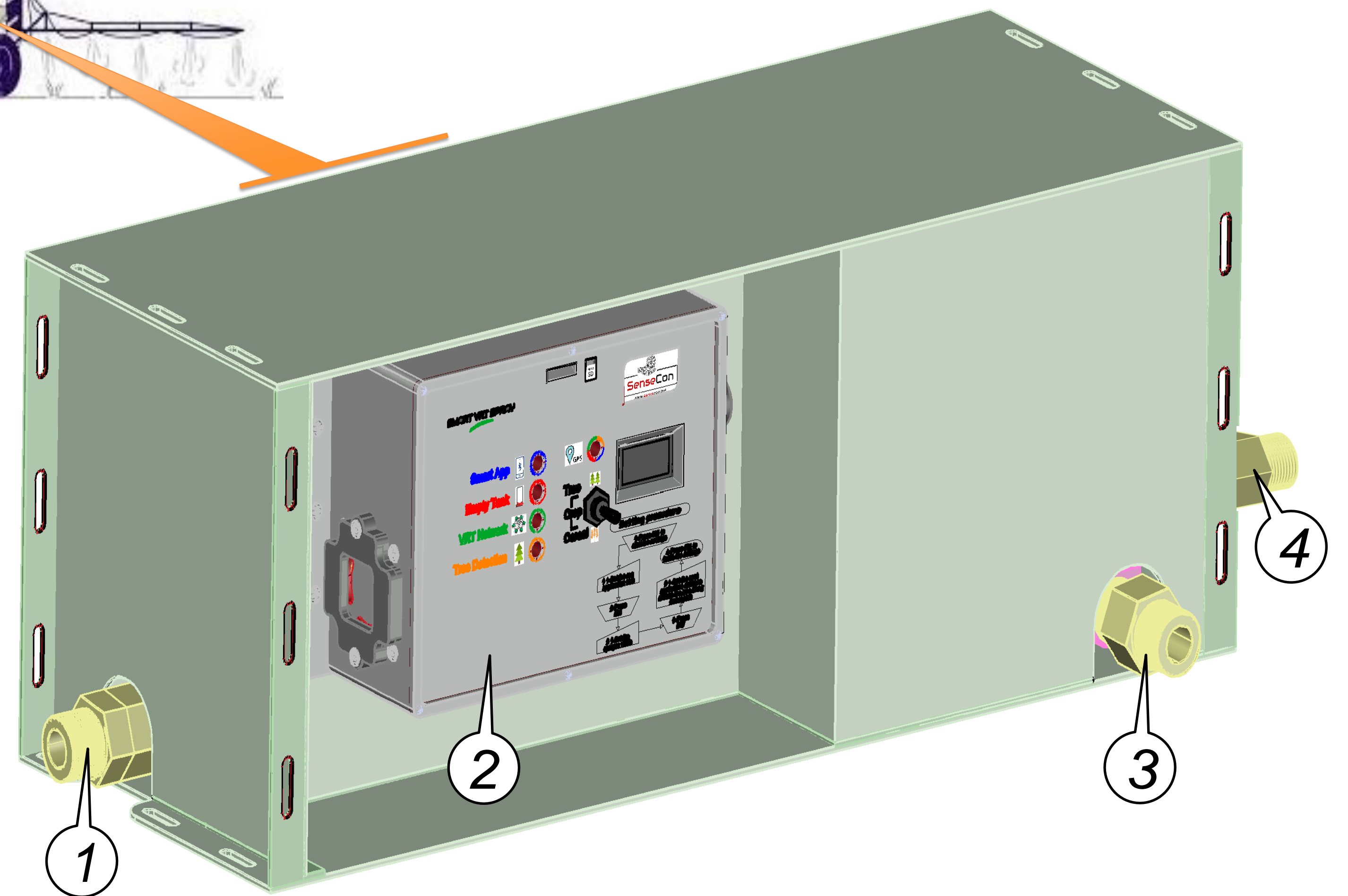
**SMART VRT SPRAY 60/100**

version 1.0

**(USER'S GUIDE)**



**Smart Control Panel**



**VRT Flow Control System**

1. Cooling fan (only for VRT control system).
2. Connection LED of smart android application (for future version of smart control panel).
3. Empty tank indicator LED.
4. Connection LED of VRT network; this LED blinks once in a while when no component of the system is connected. This LED blinks twice in a while after the VRT spray components are successfully connected to one another.
5. Tree detection indicator LED to indicate the presence of a tree when a tree crop is selected (only for smart control panel).
6. Power input pin; for powering up the unit at 12 VDC.
7. Control/data bus connector (only for VRT control system).
8. Connector of tank level sensor (only for VRT control system).
9. USB Connector of tree sensor (only for VRT control system).
10. Power switch to turn on/off the system.
11. Micro USB connector to obtain real-time data like date, time, sprayer width, current application rate, required application rate, application rate error, travel speed, latitude, longitude, altitude, direction of travel, no. of tracked satellites, spot application distance and tank level status (only for smart control panel).
12. Rotary encoder with press switch (SW) to apply the necessary settings on the smart control panel (only for smart control panel).
13. Glowing logo.
14. OLED display to show the settings and essential data in real-time (only for smart control panel).
15. GPS connection indicator LED. It starts blinking when GPS receiver of the smart control panel tracks the satellites (only for smart control panel).
16. Crop selector switch to select the tree or cereal crop for spot or continuous application of agrochemical respectively (only for smart control panel).
17. Setting procedure; for the quick guidance of user (only for smart control panel).
18. Micro SD card slot to insert the micro SD card (up to 32 GB) for data logging (only for smart control panel).
19. Power (12VDC) output pin to share the power connection with multiple smart control panels when multiple Smart VRT Spray units are installed on the sprayer for simultaneous application of various agrochemicals like aqueous solutions of N as Urea, P as Triple Super Phosphate and/or K as Murate of Potash (only for smart control panel).

1. Inlet (DN 20) to be connected to an outlet of the liquid distributor of sprayer.
2. VRT control system to control the function of VRT flow control system.
3. Outlet (DN 20) to return the flow to the tank of sprayer. It works when a tree crop is selected.
4. Outlet (DN 20) of VRT control system which should be connected to the booms of sprayer having spray nozzles through handle valves.

### **! SAFETY PRECAUTIONS**

#### **☐ Emergency Shutdown:**

- ✓ In emergency situations, deactivate the system by turning off the sprayer's pump promptly.
- ✓ For added safety, the Smart Control Panel can be switched off, and the power supply to the VRT Flow Control System can be disconnected from the tractor's cabin if necessary.

#### **☐ Secure Power Cables:**

- ✓ Regularly inspect and ensure that power cables for the Smart Control Panel and VRT Flow Control System are securely connected, avoiding any loose connections.

#### **☐ Secure Installation of VRT Flow Control System:**

- ✓ Safeguard the VRT Flow Control System from damage by securely and horizontally installing it on the sprayer using appropriately sized screws and spring washers.

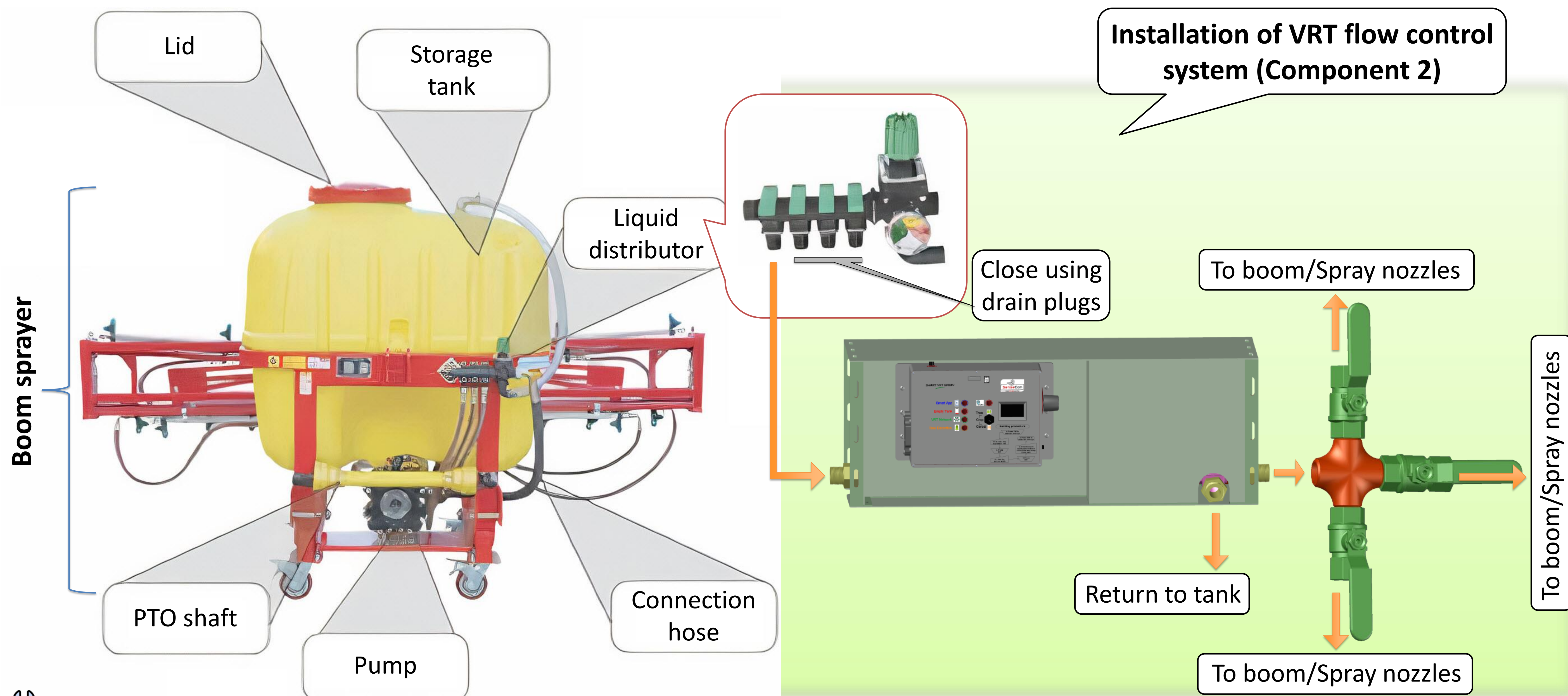
#### **☐ Secure Installation of Smart Control Panel:**

- ✓ Prevent damage to the Smart Control Panel by securely installing it in the tractor's cabin using suitable screws and spring washers.

#### **☐ Protection from Rainwater:**

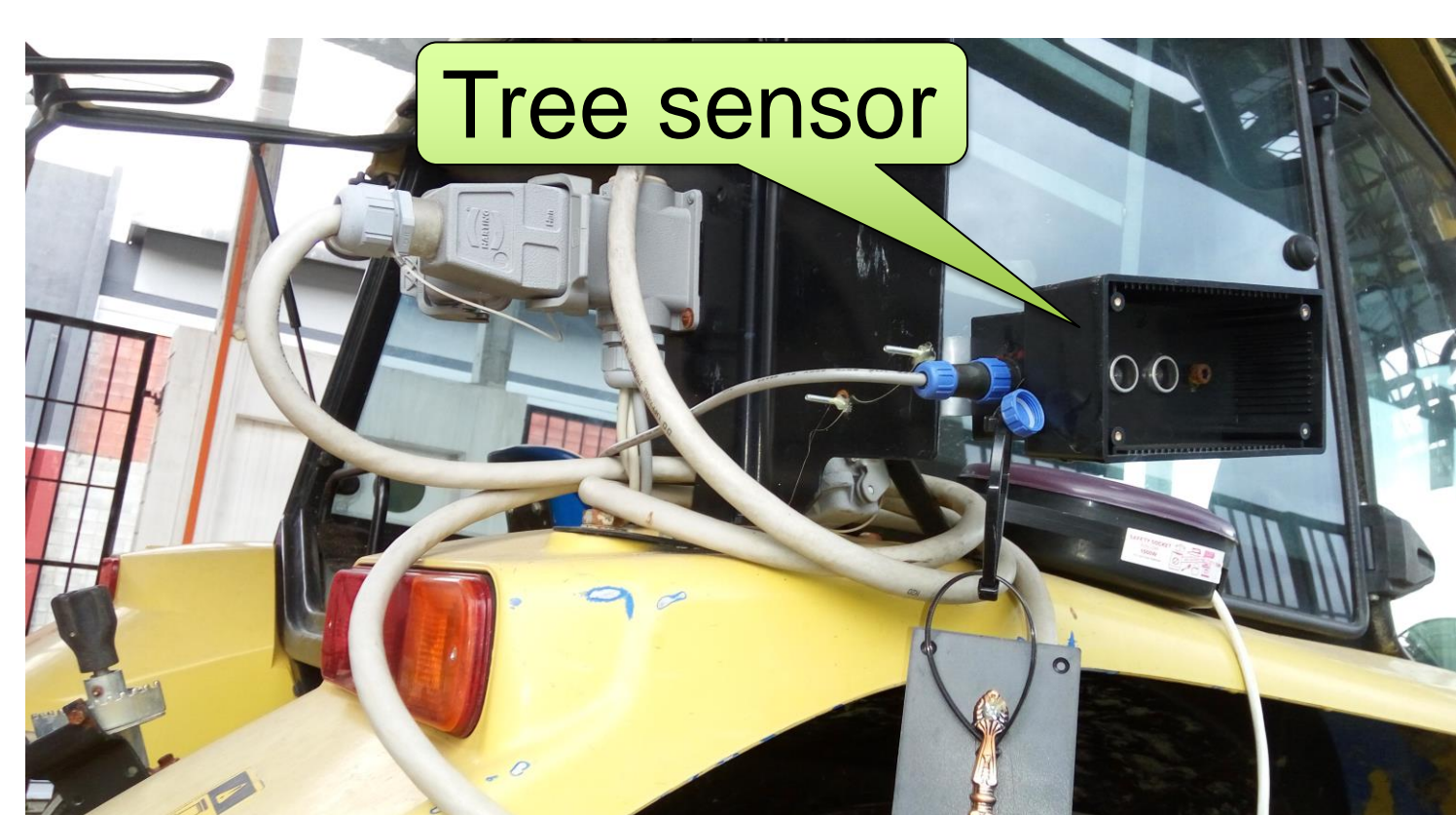
- ✓ Shield the Smart Control Panel and VRT Flow Control System from direct exposure to rainwater to avoid potential damage. Consider using protective coverings if needed.

These safety measures collectively aim to enhance the reliability and longevity of the product.

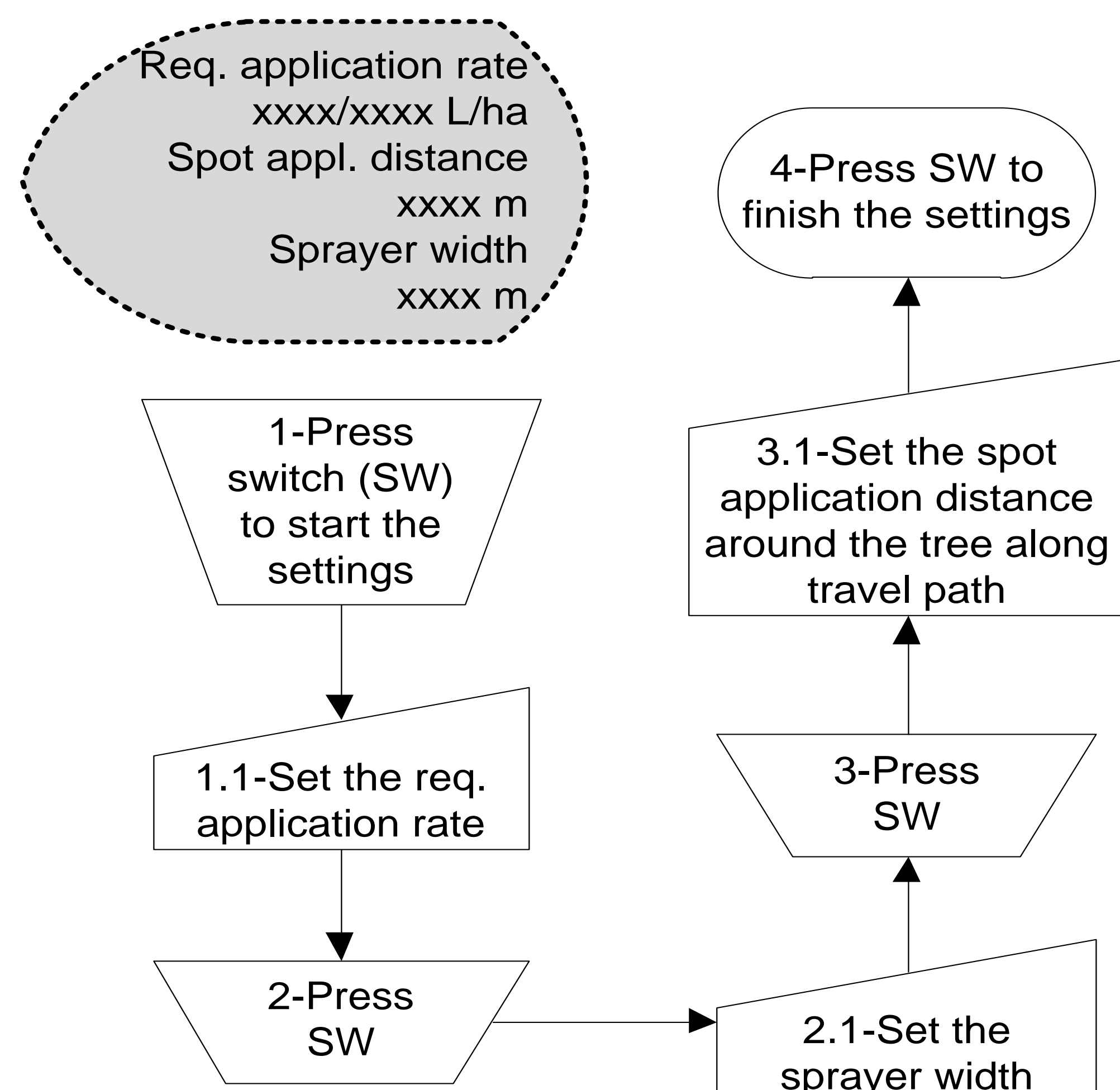


## INSTALLATION

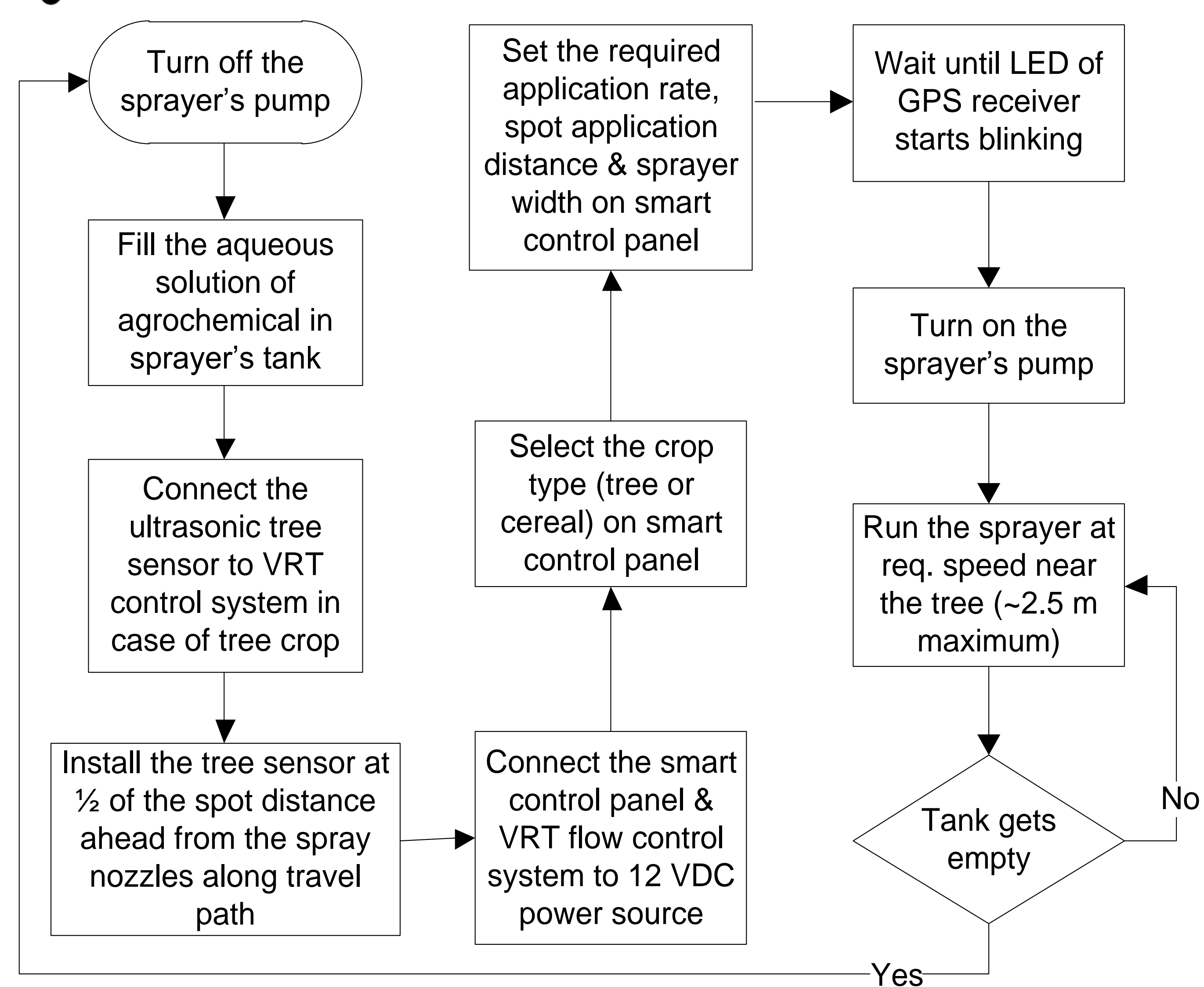
- ❑ **Smart Control Panel (Component 1):**
  - ✓ Install in the cabin of a tractor at any visible and accessible place in the front of tractor operator.
- ❑ **VRT Flow Control System (Component 2):**
  - ✓ Install on an agricultural sprayer horizontally as shown in above diagram i.e. It should be connected to an outlet of the liquid distributor while closing all other outlets of the booms. Outlet of VRT flow control system should be connected to the booms having spray nozzles via handle valves.
  - ✓ For tree crops, there is a need of installing the tree sensor at ½ of the spot application distance ahead from the boom/spray nozzles along travel path probably on the mud guard of the tractor, in case of a tractor operated boom sprayer.



## SETTING PROCEDURE FOR SMART CONTROL PANEL



## OPERATION



## TROUBLESHOOTING

- Smart VRT spray is not working. **Reason:** 1- Settings have not been made on smart control panel. 2- VRT network connection not established due to long distance or faulty micro SD card. 3- GPS receiver did not track the satellites. **Solution:** 1- Apply the necessary settings on smart control panel. 2- Insert the good micro SD card only if data recording is needed or decrease the distance between smart control panel and VRT control system until VRT network connection is established and network LED blinks twice in while instead of once in a while. 3- Wait until GPS receiver tracks the satellites and LED of GPS receiver starts blinking.
- VRT flow control system is connected to VRT network but not spraying. **Reason:** GPS receiver did not track the satellites yet. **Solution:** Wait until GPS receiver tracks satellites and LED of GPS receiver starts blinking.
- Empty tank indication. **Reason:** Tank is empty. **Solution:** Fill the tank.
- Tree is not detected. **Solution:** Make sure that USB cable is working and tree sensor is properly connected to VRT control system.
- Tree sensor is giving the tree detection signal continuously. **Solution:** Remove the lid of tree sensor and avoid other obstacles near the tree sensor up to 2.5 m distance. Preferably, disable the function of system during preparation by turning off the sprayer's pump and turn on when sprayer is ready.