The new WSX53 Precipitation Detector

The new WSX53 is a robust electronic precipitation detector designed for controlling many systems where there is need to respond to external weather conditions.

Such systems include

- Building Automation
- Plant Automation
- Commercial and Residential Homes
- Weather Centres
- Sprinkler Control
- Agricultural use, etc.
- De-icing and drying systems

It may be required to activate things such as

- Blowers
- Pumps
- Heaters
- Boilers
- Door or window closers
- Shutters, or other items in response to external weather conditions.

With its wide operating temperature range and leak proof IP66 enclosure, it is suitable for use in many inhospitable situations.

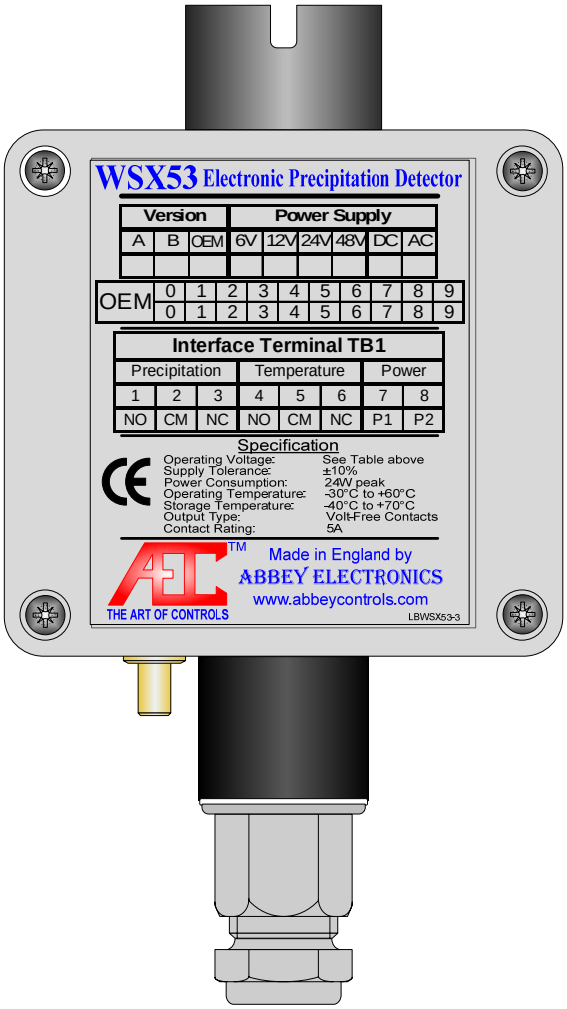

Figure 1 - WSX53 Precipitation Detector.

Principle of Operation
The detector consists of two essential parts (see Figure 2). There is a humidity sensor which senses any precipitation without discrimination, that is, rain, snow, hailstone, sleet are all detected the same.

The humidity sensor is complemented by an ambient temperature sensor which is used to sense snow point and thus discriminate between rain on the one hand and snow, sleet or hailstone on the other. Precipitation at or below snow point is interpreted as “Snow”.

The WSX53 is fully self contained and requires only the application of an external low voltage power supply to be operational. Its outputs are a pair of volt-free contacts which are independent of each other.

One set of contacts (S1) is closed if the precipitation sensor detects any precipitation, i.e. when there is water or moisture on it. Otherwise it remains open. To make sure that the sensor still works in case of dry precipitation (hailstone and dry ice), it has a built in heater which maintains the sensor’s temperature always above freezing point.

This means the sensor is always kept clear and no frozen water or ice is allowed to accumulate on it over any length of time.

The other set of contacts (S2) is closed when the controller senses an ambient temperature below snow point. Otherwise, the contacts remain open.

Sensor
The WSX53 has a proprietary design sensor combining an ingenuous design with a special drive algorithm to ensure long sensor life and effective detection.

Output Configuration
Each set of contacts will independently sense either Precipitation (S1) or **S**now **P**oint **T**emperature or **SPT** (S2). To sense only frozen water (snow or hailstone), connect S1 and S2 in series. To sense either Precipitation or **SPT**, connect S1 and S2 in parallel. Use the contacts independently for separate Precipitation and **SPT** functions.

Time Delay
The two contacts, S1 and S2, have a post operative delay timer. The delay timer can be activated by setting two

switches inside the control housing to be either 0 (no delay), 15 minutes, 30 minutes or 45 minutes (see Table 1). Following the end of detection of precipitation or snow point temperature, the contacts would normally open immediately. However, with the delay timer set, the contacts will be kept closed for the duration of the delay timer. The time delay switches determine the delay time for both the precipitation and snow point contacts (S1 and S2) although the two contacts can start and end their delay at different times depending on when they are de-activated by external events.

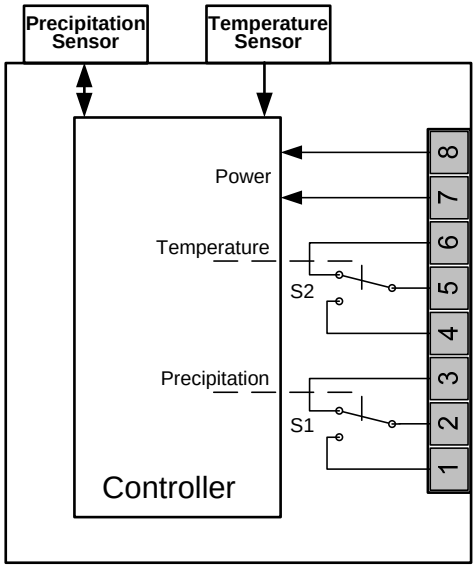

Figure 2 WSX53 - Functional diagram

The delay feature is useful in situations where the weather is very unstable such as in several short busts of rain interrupted by brief periods without rain. Thus it can be ensured, for example, that shutters are not constantly being opened and shut or that heaters and/or blowers are left on long enough to have dried the previous precipitation, etc.

Table 1 - Switch setting for time delay

Delay (minutes)	Switch Setting	
	S1	S2
0 (Default)	Off	Off
15	On	Off
30	Off	On
45	On	On

(S1 and S2 are found on the 4-way DIL switch inside the WSX53. This is normally either red or blue. S3 & S4 are reserved for future use)

Mounting

The WSX53 can be mounted in two different ways. First, it can be mounted on a conduit pole or mast using the integral M20 conduit mounting adaptor. To mount the WSX53 in this way, remove the hexagonal cable gland attachment by unscrewing it from the mounting adaptor on the detector[1]. The conduit will then screw directly into the adaptor in place of the cable gland.

Alternatively, it can be mounted on a vertical flat surface using four mounting screws. The lid of the WSX53 will have to be removed to gain access to these four mounting holes which are hidden inside the box. See Figure 4.

In either mounting position, it should be ensured that the WSX53 is mounted such that the precipitation sensor is upright and vertical. Ensure that there is no obstruction around it that could interfere with precipitation reaching it. Also, it is best to avoid exposing the temperature sensor under the detector to direct sunshine as this may give a false temperature indication.

Testing the WSX53

You may want to test that your WSX53 is working or not prior to installation. This is very easily carried out as follows.

You will need the following;

1. An appropriate power source. Consult the specification for the actual rating but this is usually either 12V or 24V AC or DC rated at least 5W average but capable of a peak of 24W.
2. A digital multimeter set to continuity range
3. Aerosol freezer (available from most electronic component distributors.
4. Cotton swabs

1. Connect the yellow and white wires to the 24V power source and switch on.

2. Check that the following conditions exit:
   a. Pins 1 and 2 open circuit.
   b. Pins 2 and 3 short circuit.
   c. Pins 4 and 5 open circuit.
   d. Pins 5 and 6 short circuit.

   Moisten the cotton swab and apply a drop or two of water on the precipitation sensor. You will hear a “click” as the precipitation relay energises. Confirm this by checking for continuity between Pins 1 and 2.

3. Now spray the temperature sensor with the aerosol freezer for a couple of seconds each time until you hear a “click” indicating that the snow point relay has energised. Confirm this by checking for continuity between Pins 4 and 5.

4. Wipe off any remaining water from the precipitation sensor and the precipitation relay will de-energise (unless the timer has been set in which case it will de-energise after the set time has elapsed).

[1] A locknut for the cable gland is supplied with the WSX53 which means it can be re-used elsewhere in the project.

5. The snow point relay will similarly de-energise once it warms up above the snow point temperature.

Taking care of your WSX53

The WSX53 is designed for outdoor operation and should provide you with many years of trouble free operation if taken care of properly. It should not be thrown about or subjected to excessive shocks. In particular, the humidity sensor should not be subjected to any solvent, abrasive or corrosive substance. If dirt film accumulates on the sensor, this could affect reliable operation of the detector. In this case, rinse the sensor with warm soapy water and gently wipe dry with cotton swabs. It is recommended that this process is carried out at least once every 12 months.

WSX53A – For General use

WSX53B – For agricultural, sprinkler or irrigation use

Whilst the WSX53A is for general use, the WSX53B is specifically designed for controlling sprinklers, irrigation pumps or similar applications.

It is, at best, embarrassing to have sprinklers or irrigation pumps working overtime when it is raining or has just finished raining. In reality though, this represents a needless waste of valuable resources. With the WSX53B sensing when it is, or has been raining, it can be used to suppress irrigation systems to avoid unnecessary operation. The temperature sensing contacts can also be used to prevent operation when it may be too cold for irrigation to be of any use.

The WSX53B is designed to accumulate water from rain (or snow) and evaporate it slowly over time. How long this takes will depend on the environmental factors of temperature, wind and humidity. However it does mean that the length of time it suppresses irrigation for will, up to a point, be proportional to how much rain has fallen. It is advisable to set the internal configuration switches for the delay timer in order to prevent constant stopping and starting on days that are characterised by intermittent light showers that only last for a few moments each time.

It is advisable to mount the WSX53B in a place where it can not be affected by sprays from the sprinkler to avoid undesirable negative feedback.

Table 2

Specification[2]

Parameter	Quantity	Unit	Tol	Comment
Power Supply	24[3]	V	±10%	AC/DC
Power Consumption	5	W		Average
	24	W		Peak
Contacts rating	3[4]	A	Max	@ 230V AC
Enclosure rating	IP66		---	
Operating Temperature	-40 to +60	°C	---	
Snow point setting	3.5	°C	±1.5	
Dimensions	82 x 80 x 55	mm	---	
Weight	275	g	±5	
Cable Gland Size	Ø4.0 to Ø7.0	mm		

[2] The WSX53 is supplied with a protective cap on the humidity sensor which should be removed after installation.
[3] Also available in 12V version. Add 12 to the end of the part number e.g. WSX53A12 or WSX53B12.
[4] To drive loads requiring more than 3A, use the output contacts to drive a suitable external relays or contactors. This way the WSX53 can be used to control unlimited load.

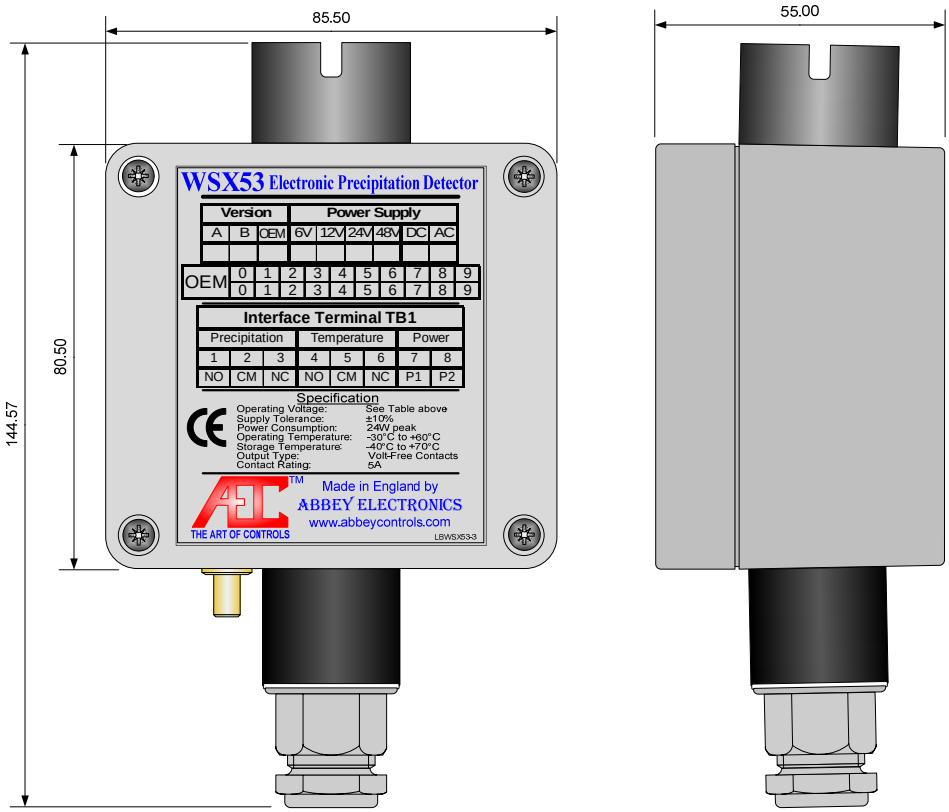

Figure 3 WSX53 external dimensions.

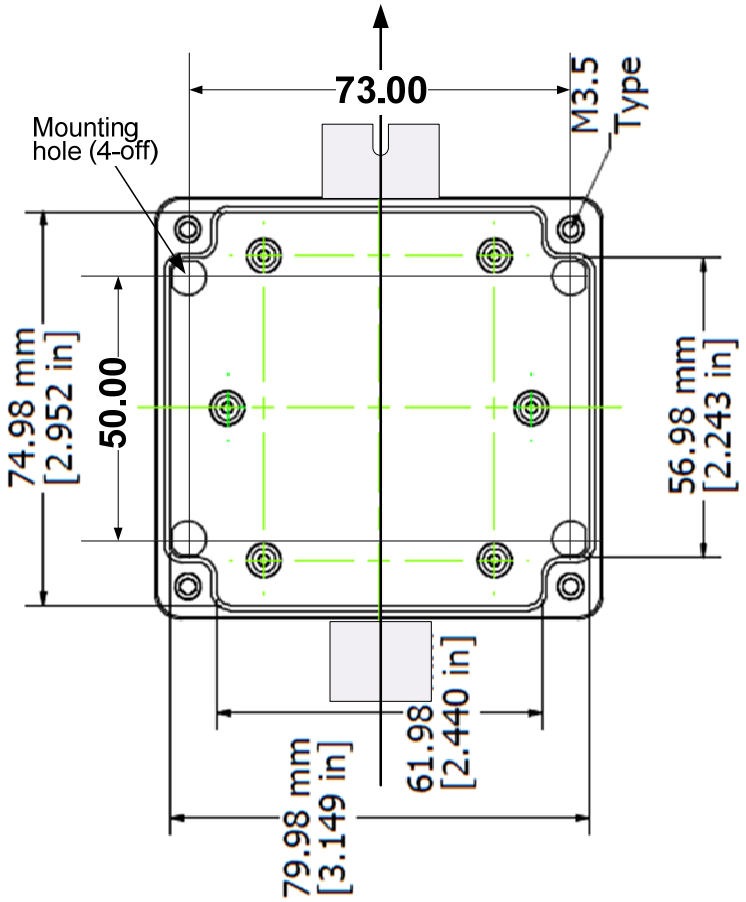

Figure 4 WSX53 internal dimensions.