

Instructions to Configure a Wisen System

Wisen Innovation Ltd
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1. Warning!!

- 1) All preparations must be completed before an installation on site;
- 2) All the PREPARATIONS and DEPLOYMENT PLANNING specified in this document must be completed and as many steps as possible carried out indoors, where it is convenient and under no customer pressure.
- 3) Any electrical work must be carried out by a certified professional and this person must be authorised by the client to carry out such work on-site.
- 4) Battery Notifications:
 - A. Only use Wisen batteries or Wisen recommended batteries;
 - B. Only buy batteries that are properly stored and tested before being shipped;
 - C. No more than 3 months old (from the labelled date), unless it is stored in the specified condition as requested by Wisen.

2. Wisen Principle

- 1) **Complete all the fine and detailed (e.g. electrical) tasks indoor;**
- 2) **Fix the units accurately onto structures according to installation planning;**

So we can:

- 1) Protect our installation team from any unnecessary technical problems and work hazards during on-site installations;
- 2) Provide the highest quality user experience and the most valuable data to our clients.

Notice: We have seen numerous unnecessary problems and work hazards while out on site and our installation team was trying to:

- A. Power on a node but couldn't find the switch due to pressure from clients being present or heavy vehicle movement;
- B. Open a sensor node in the rain causing the circuitry to fry;
- C. Leave screws on lid untightened due to time constraints;
- D. Drop a washer in the dark and hit on head when looking for it on ground;
- E. Nodes malfunctioning, because they were not checked prior to delivery;
- F. 3rd party batteries causing problems, due to poor quality/charge;
- G. Incompatibility of VW nodes, because a different system is used or sensors are not compatible;

3. Indoor Preparation

3.1 External Parts Setup

1) Basic tools:

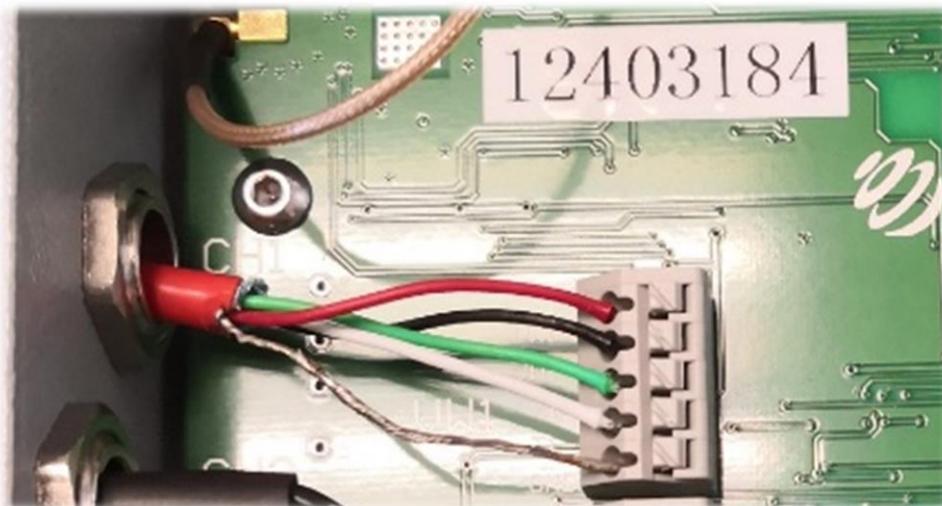
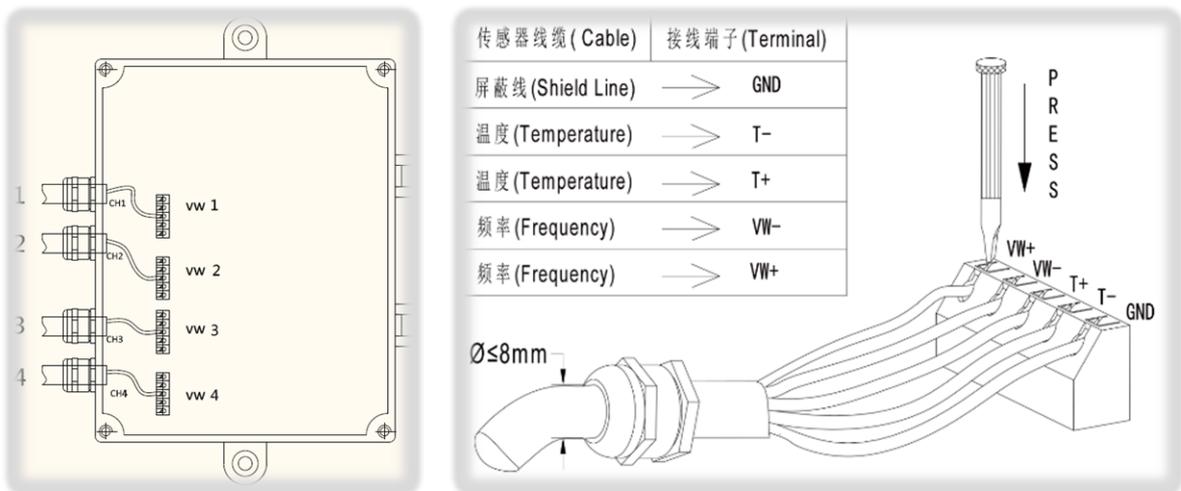
A. For Lid & Brackets:

- Hand-held electrical drill with Allen Key size for M4 bolts, M6 bolts.
- Sheffield Allen Keys (T type);
- Adjustable spanner for the cable gland (if any);

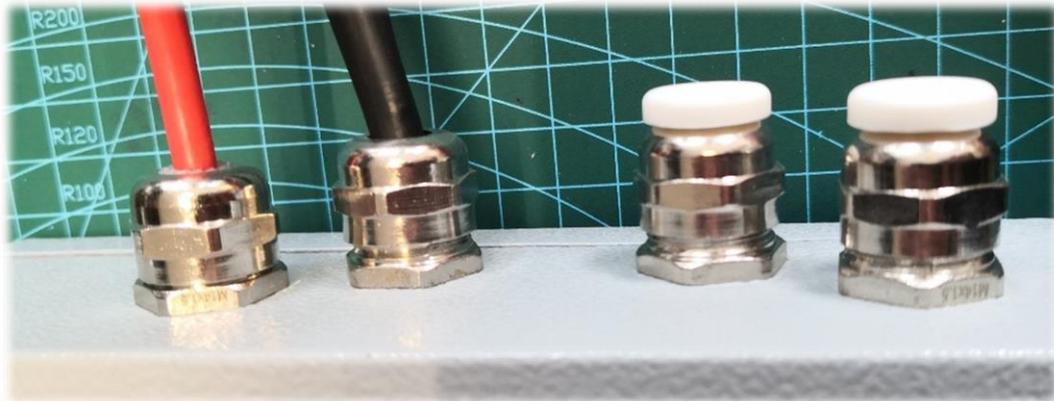
B. Fixing unit onto a structure:

- Drill for M10x70 stainless steel anchor bolt;
- Adjustable spanner for nuts tightening.

2) Connect all the external sensors, if any, e.g., VW Strain Gauge sensor to VW Interface Node;



- 3) Seal any cable glands that are not in use;
- 4) Tighten the glands at cable entry points to the unit. Be careful not to overtighten the gland sealing nut as the cables may become crushed;

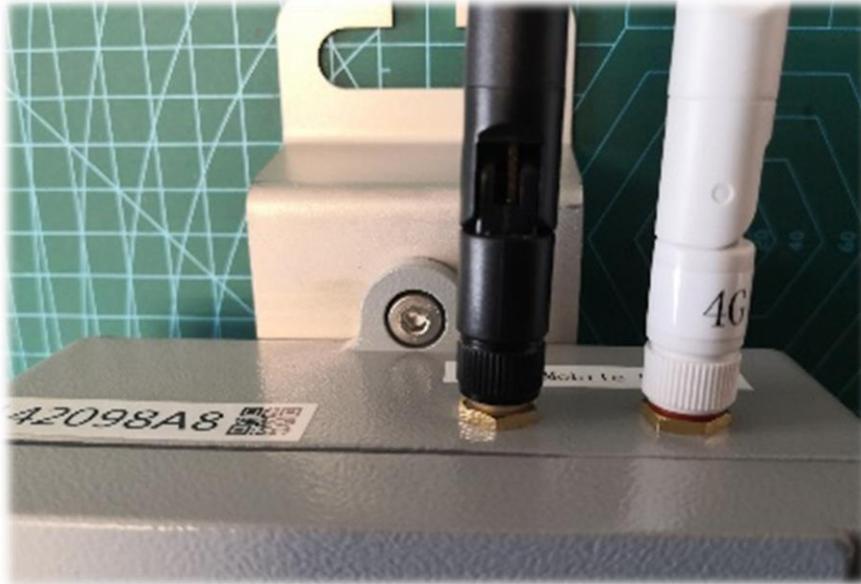


- 5) Fix brackets onto all units;

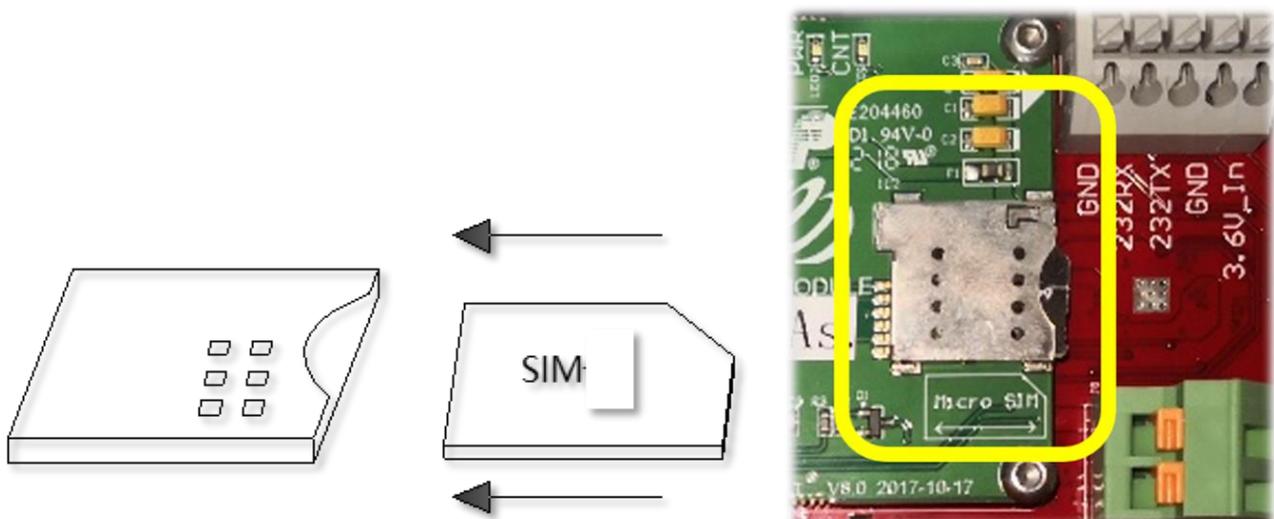


3.2 Gateway Setup

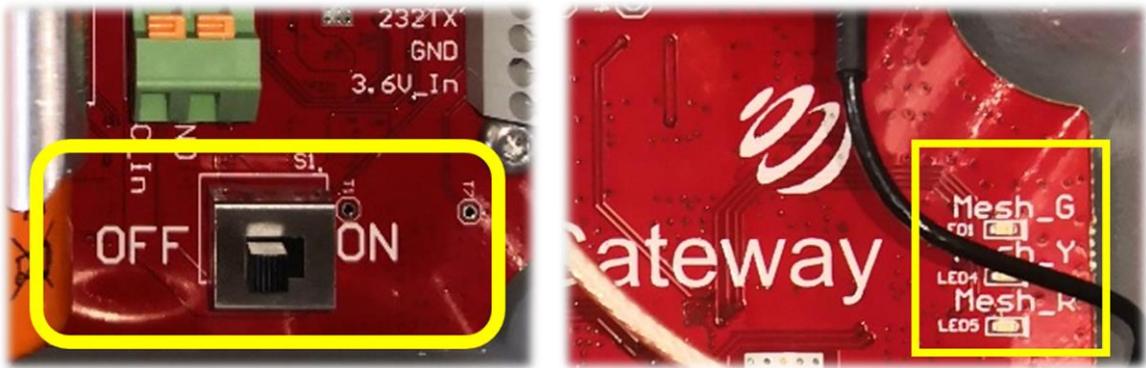
- 1) Screw mesh antenna and 4G antenna onto gateway;



- 2) Ensure the current gateway location is having a good 4G/3G signal of the SIM card used;
- 3) Insert a sim card and ensure it is the right way around (i.e., the sim chip is pointing downward and the cut-corner bit is pointing outward to the card slot);



- 4) Insert the internal batteries and plug in the DC power cable (if any). Ensure that the positive "+" and negative "-" are correctly connected, then switch On the gateway;
Note: during the test period, we would recommend customers to use the DC power adapter that Wisen provides in order to preserve battery life.



Upon a successful power On! You should see three Mesh LEDs flashing 3 times, then green LED on for 1s, then a quick flash on the 3 LEDs, then Off. If not, power off a node, and leave it off for 180s before the next powering-on.

- 5) On the 4G daughter board, “PWR” turns on, “CNT”: slow flashes (meaning searching for a valid network), then quick flashes (meaning registering to the found network).
On the main board, “NET” LED turns to solid green (meaning a successful connection to the cloud sever was established).



- 6) By now a customer will be able to view the data in the Wisen Visualisation Platform via the login provided by Wisen or created by your local distributor. By factory default, Time Interval is set to T=3min, meaning it will be 2T until you can see real time data on the web. So leave the gateway running for 10mins, then do a refresh.
- Web Link: <http://un-project.wisencn.com/control/login.html>
 - Enter user name and password, then click on the blue 'Go' button.



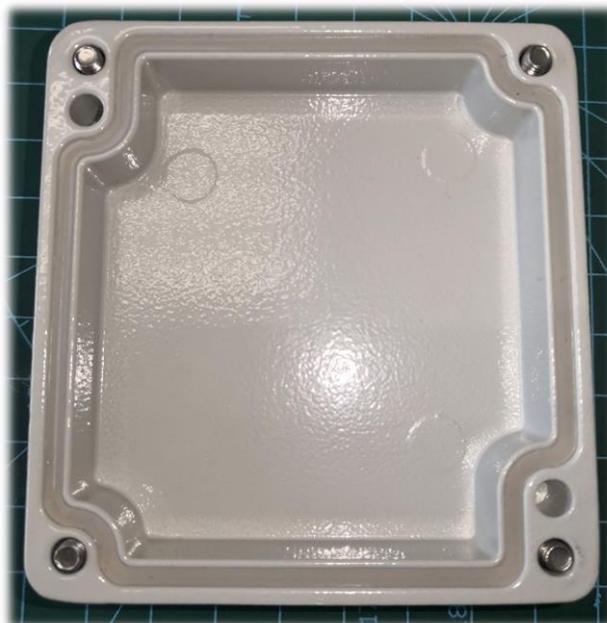
Upon a successful power On! You should see three Mesh LEDs flashing 3 times, then green LED on for 1s, then a quick flash on the 3 LEDs, then Off. If not, power off a node, and leave it off for 180s before the next powering-on.

- 3) Ensure all sensor values are matching to the specifications from Wisen and any 3rd party (e.g., Vibrating Wire Strain Gauge reading in Hz).

Note: Please refer to the “Specification” for detailed unit type features.

3.4 Sealed Enclosure

- 1) Ensure the seal inside the lid is evenly positioned in the slot;



- 2) Tighten all the M4x20 screws on a lids properly on all units so that IP protection rating is applicable. [Note: in terms of torque force, we normally set it between 7th to 8th gear on an electrical hand drill, however, this may vary between manufacturers, so we use a T shape Sheffield Allen Key, demonstrated below **as standard recommendation**];



- 3) Once all nodes have joined in the gateway and viewed from the web, change “Time Interval” command to T=30min to reserve battery power;
- 4) Carefully store all units into boxes next to each so that all the nodes are communicating with the gateway (Tips: Special care is required on all the antennas, which are already screwed on the units, as they are fragile);
- 5) Safe transportation to the site and execute the installation work;
- 6) View the data from the web and ensure all units are displayed in real time and all sensor readings are matching to the specifications. (If needed, change Time Interval to fast frequency to assist the on-site data reviewing.)

un-project.wisencn.com/web_ext/integratedinfo.html?sameUserLogId=51770&proid=755

Local Time Zone: UTC+0800 User: admin_gammon Project: Tanah_Merah_MRT_SG User: No Warning System: No Warning Technical Support (1)

Project List Data Setup Diagnostics Download **Technical Support** Logout

Current Location: / Data / Show Table Language: English Page Refreshed: 2020-11-07 12:08:53

Node Combined Calculation

Show RefID Show Mesh Data Show Field Download Table Below Diary

SN	Last Seen	Type	T (min)	Signal Threshold (dBm)	Mesh_Batt_V	Temp (°C)	GSM_Timestamp / GSM_DC_In_V / GSM_Batt_In_V				
14209897	--	1005-C-GW	--	--	--	--	--	--	--	--	--
SN	Last Seen	Type	Batt_V	CH1 (KQ)	CH1 (Hz)	CH2 (KQ)	CH2 (Hz)	CH3 (KQ)	CH3 (Hz)	CH4 (KQ)	CH4 (Hz)
103030E1	--	1A05-4xVW	--	--	--	--	--	--	--	--	--
1240316B	--	1A05-4xVW	--	--	--	--	--	--	--	--	--
12403190	--	1A05-4xVW	--	--	--	--	--	--	--	--	--
124031F8	--	1A05-4xVW	--	--	--	--	--	--	--	--	--
12403209	--	1A05-4xVW	--	--	--	--	--	--	--	--	--
1240322A	--	1A05-4xVW	--	--	--	--	--	--	--	--	--
12403250	--	1A05-4xVW	--	--	--	--	--	--	--	--	--
12403265	--	1A05-4xVW	--	--	--	--	--	--	--	--	--

Total: 1+8

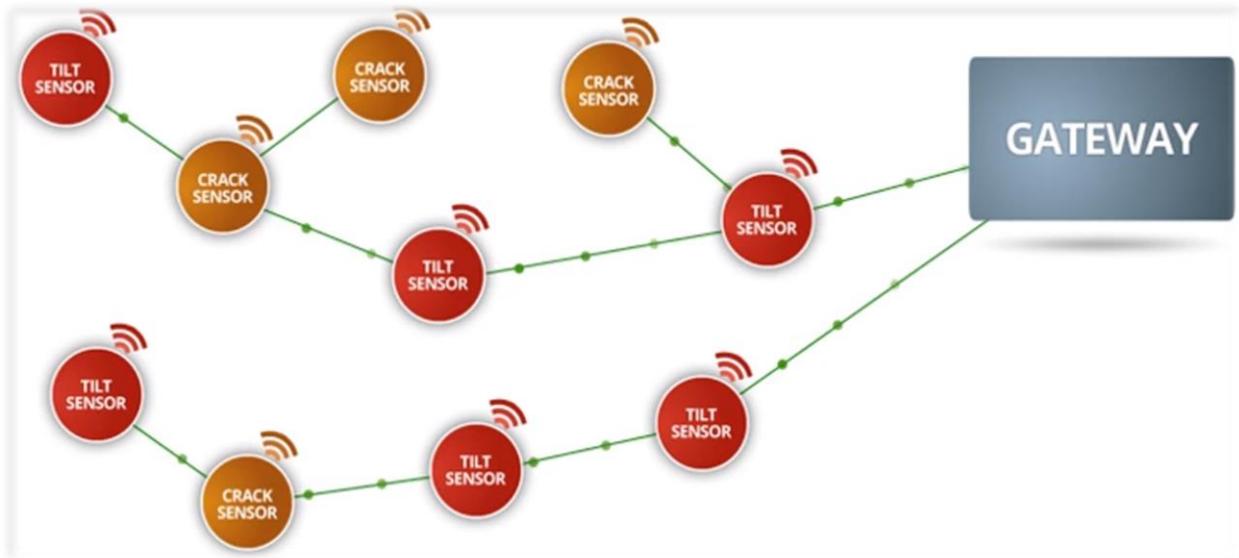
1005-C-GW	1
1A05-4xVW	8

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4. Deployment Planning

4.1 Wisen Mesh Network Principle

- 1) All nodes must send its data via different routes to a gateway;
- 2) Each node is functioning as both a sensor data collector (for itself) and a radio message redirector (i.e., a relay or a sub-gateway to other nodes).



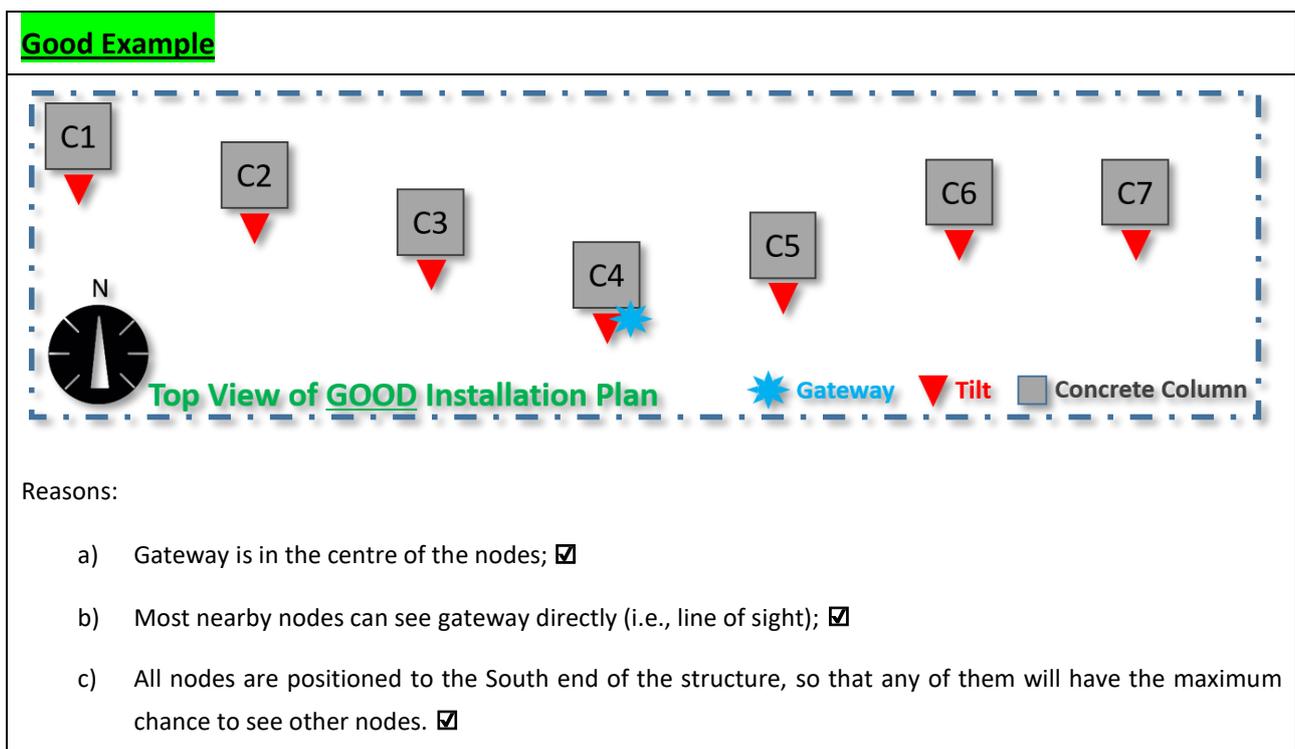
- 3) This leads to the principle of guidance for the planning:
 - A. The stronger signal strength to a gateway, the better chance a node can join a gateway;

[Practically, it means: line of sight to a gateway (i.e., no obstacle in between to block the signal), install both gateway and nodes at higher locations (so the radio wave can propagate in full and predicted power.)]
 - B. The more other nodes (in number) a node/a gateway can see, the better chance a node/a gateway can assist other nodes to reach the gateway.

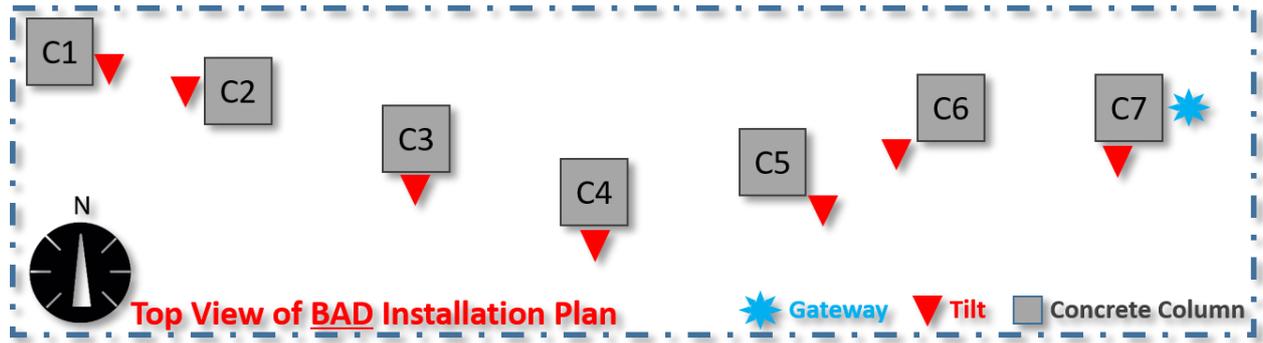
4.2 Practical Guidance

- 1) Basics: All units must be installed:
 - A. in the area specified by the installation plan;
 - B. at the position, which reflects the best true values in order to serve the monitoring purpose;
 - C. be firmly attached to the structure with the appropriate fixing brackets;

- D. unless specified otherwise, $\geq 1.5\text{m}$ above ground, for good radio reception to all the rest units (including nodes and gateways). However, the higher the better to avoid damage;
- 2) Gateway Guidance:
 - A. should be installed at the centre of the monitoring installation;
 - B. should have the maximum chance to have line of sight to as many nodes as possible, especially the ones in near region. (Together with 2.D, each node/gateway can talk to any of node/gateway within 100m range.)
- 3) Node:
 - should have the maximum chance to have line of sight to as many nodes as possible, especially the ones in close proximity to the gateway. (Together with point 2.D, each node/gateway can talk to any of node/gateway within 100m range.)
- 4) If nodes are mounted to a peg or similar, it is important that the fixture and monument are stable in itself, as to not pick up false movement;
- 5) Axis and the concept of mm/m or other units need to be understood, the lid needs to be aligned with the axis description as per diagram on daughter board in each node.
- 6) Example on bridge column tilt monitoring installation:



Bad Example



Reasoning:

- a) Gateway is not in the centre of the nodes; so most nodes don't have line of sight to communicate to the gateway directly; ☒
- b) All the nodes are facing to different directions, so they have minimum chance to assist each other to be able to reach a gateway/a node closer to a gateway. ☒

5. Looking for Additional Help?

- 1) Visit the Visualisation Platform, under /Download/Document & Software;
- 2) Visit the Visualisation Platform, under /Technical Support/, send us an instant message;
- 3) Email Support: support@wisencn.com;
- 4) Talk to our local representative.