



STREGA LoRaWAN SMART-ACTUATOR

Mounting instructions (SV2 – Gen-2 models)

STREGA SMART-ACTUATOR AND VALVE MOUNTING INSTRUCTIONS



We thank you for purchasing our STREGA WIRELESS SMART-ACTUATOR SV2 (second generation). The SV2 is a wireless actuator to be combined on a brass or stainless-steel electro-actuated valve – solenoid or motorized technology. The LoRaWAN electronic actuator is capable of remotely opening and closing the flow that goes through it. While the valve itself is a robust piece of hardware, the electronics part of the system requires to get handled with caution.

SAFETY INFORMATION

This STREGA Smart-Actuator has been fully tested at the factory before shipment. To ensure correct use of the device, please read this manual thoroughly.

Regarding this Manual:

- This manual should be passed on to the Installer.
- Before use, read this manual thoroughly to comprehend its contents.
- The contents of this manual may be changed without prior notice.
- All rights reserved. No part of this manual may be reproduced in any form without STREGA's written permission.
- All reasonable effort has been made to ensure the accuracy of the contents of this manual. However, if any errors are found, please inform STREGA.
- STREGA assumes no responsibilities for this product except for the ones stated in the standard warranty.
- If the customer or any third party is harmed by the use of this product, STREGA assumes no responsibility for any such harm owing to any defects in the product which were not predictable, or for any direct and indirect damages.

Safety Precautions:

The following general safety precautions must be observed during all phases of installation, operation, service, and repair of this product. Failure to comply with these precautions or with specific WARNINGS given elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product.

STREGA assumes no liability for the customer's failure to comply with these requirements. If this product is used in a manner not specified in this manual, the protection provided by this product may be impaired.

Lithium Batteries Safety Precautions

Lithium batteries used by STREGA technology incorporate many safety features to achieve maximum safety.

However, lithium batteries are high energy systems and thus must be treated carefully.

Cells used in our equipment are equipped with appropriate safety devices such as blocking diodes and fuses.

Some basic precautions:

In any case of handling please note the following:

- ✓ Do not short circuit cells and batteries
- ✓ Do not incinerate cells and batteries
- ✓ Do not disassemble cells and batteries
- ✓ Do not charge cells and batteries
- ✓ Do not crush or puncture cells and batteries

General notes



This manual shall serve as an instruction guide for the **MECHANICAL INSTALLATION** at site of STREGA Smart-Actuators. For other technical specifications please see valid data sheet found on STREGA TECHNOLOGIES website (www.stregatechnologies.com) or ask your local Distributor. For the electronic and operation instructions of the Smart-Actuator, please refer to the SV2 Operation and User Manual.

It is the responsibility of the installer to ensure that approved materials are used and that the installation and maintenance work meets applicable rules, regulations and requirements. In case of problems which cannot be solved from information in this manual, your local Distributor shall be contacted for support. Note that most of the information in this manual concerns safety, so please read carefully before installation of the valve. Use appropriate protection equipment as well as right tools to mount the Smart-Actuator on pipes.



Only qualified service personnel should attempt to install or service this product. Serious injury may result from the improper Installation or use of this product.

Smart-Actuator Parts



Figure 1-mounting the Smart-Actuator must be made by qualified personnel

The STREGA Smart-Actuator is available in different sections, from 3/8" to 3" (from DN10 to DN80) for the solenoid versions and from DN10 to DN50 (2") for the Motorized versions. The SV2 (Gen-2) actuator is universal: the same electronics can drive either a solenoid valve or a motorized ball valve – the valve technology in use is simply configured through the HV-READER utility (see the SV2 Operation and User Manual).

The STREGA electronic enclosure is set aside the valve and connectivity to the valve is performed through one cable of wires which run across a sealing gland on the lower side of the enclosure.

Large size Smart-Actuator installation should be made by two persons due to the heavy weight of the device.

The electronic enclosure and the brass or Stainless Steel valve are delivered segregated with a one meter length cable.

The SV2 actuator operates on a single Type-D lithium battery (3 V / 3.6 V LiSOCl_2 or LiMnO_2 , providing a pulse discharge capacity of 3000 mA – or capable to drive a 12VDC motorized valve) or on an external 12 VDC supply when operating in LoRaWAN Class C. Only use battery models validated by STREGA – the list of validated models is given in the SV2 Operation and User Manual.



The SV2 actuator communicates through LoRaWAN and Bluetooth and drives solenoid or motorized valves

Storage instructions

Store the Smart-Actuator indoors in a clean and dry place. High temperature and direct sunlight are not recommended and will shorten the service life of the Smart-Actuator.

Optimal storage condition is in covered pallets with ambient temperature of 5-20°C.

Pipe threads

Pipe threads of the valves you're using are provided according either to NPT (North America) or in BSPP - ISO228/1 standards and designated by the letter "G". Reducing pipe connections may cause faulty operation. Pipe strain should be avoided by proper support and alignment of piping. Pressure-tightness will be affected by interposing and compressing an appropriate jointing medium outside the threads.



Warning: when using tape or pipe compound, apply sparingly to male pipe threads only; if applied to valve threads, it may enter the valve and cause operational difficulty. Conical pipe connections must be tightened carefully to avoid body damage.

Flow and pressure

Your valves are rated to operate under strong pressure: PN25 (25 Bars/363 Psi) for pipe sections up to DN32 (1" 1/4) and up to 20 Bars (290 Psi) from DN40 (1" 1/2) and above. Pilot Assisted valves (PA) are designed with a "pilot assisted membrane" that will only operate if a minimal pressure differential is existing between the inlet and the outlet of the valve. Motorized valves are using a step motor to rotate a ball mechanism to operate the opening and closing.

Regarding solenoid valves, "PA" models require a minimal differential pressure of 150 mBar (2Psi) between the inlet and the outlet. The maximum differential pressure should also not be more than 10 Bars (145 Psi). **In a closed circuit** like District Cooling or District Heating (and water being incompressible), the "delta-P" will depend for most part upon the liquid **flow rate** passing the valve, but also from possible turbulences in the pipe, the fittings encountered (bends, tees, etc....) and any equipment being placed *after* the valve.

There is no minimal or maximal differential pressure required for Motorized models.

Form factor

Your SV2 Smart-Actuator is delivered in the “**segregated**” form factor: the valve is connected through a cable to the electronic actuator, both having a sealing gland. A one-meter cable is supplied as standard. The valve is operated in DC voltage: we recommend not exceeding 10 meters (30 ft) of cable between the actuator and the valve, using a good quality cable of appropriate section. Longer distances (field-proven up to 35 meters / 115 ft on motorized models) are possible using the capacitor solution described in the SV2 Operation and User Manual. Any cable cut or wire disconnection between the actuator and the valve is immediately reported as an alarm UPLINK.

Installation

The Smart-Actuators shall never be installed where service conditions could exceed the valve ratings concerning pressure, temperature or operating media. Failure to comply with this warning may result in personal injury or property damage.

In the pictures below, the Smart-Actuator is mounted facing down:



Installation of a Smart-Actuator in a ceiling cabinet

Caution

- Reducing the connections may cause improper operation or malfunction.
- For the protection of the equipment, install a strainer or filter suitable for the service involved in the inlet side as close to the product as possible.
- If tape, paste, spray or a similar lubricant is used when tightening, avoid particles entering the system.
- Use proper tools and locate wrenches as close as possible to the connection point.
- To avoid damage to the equipment, DO NOT OVERTIGHTEN pipe connections. Observe a maximum tightening torque of 5 to 7 Nm.
- Pipe connections should not apply any force, torque or strain to the product.
- To avoid damaging the equipment, make sure to prevent the liquid from solidifying at low temperatures and stay within the maximum and minimum temperature limits.
- Modifications to the equipment may only be made after consulting the manufacturer or his representative.
- Before installation, depressurize the piping system and clean internally.
- Never install the Smart-Actuator while the pipe is under pressure.
- Remove the battery from the enclosure while installing the valve on the pipe. IP68 sealing is only guaranteed once the enclosure is properly closed.
- For motorized valves, wire all 5 valve wires to the actuator BEFORE powering the device: at power-up the actuator performs a full opening and closing cycle to calibrate the valve torque.
- Make sure that proper flushing of the entire installation has been made prior to install the valve.



The Smart-Actuator is installed inside a cabinet in the false ceiling

SPOOL PIECE, FLUSHING

On a new installation, and prior to install the Smart-Actuator, a proper flushing to avoid any debris should be made with sufficient pressure and during enough elapsing time. A **spool piece** of pipe without the valve should be set during this operation.

STRAINER

Debris, sand, gravel, Teflon tape and all sorts of dirt in your pipes are not advised in any piping installation. The use of a simple and cost-effective strainer before the inlet of your valve can simplify your maintenance.

Y-Strainers are pipe fittings which remove particulates from liquids via a filtering element intersecting the main channel.

The filter leg connects to the main pipe at a diagonal angle, giving the strainer its “y” shape, and hence its name.

A cylindrical strainer element – usually wire mesh with some structural support - fits into the leg. The element traps material too large to fit through the filter openings which then settles at the bottom of the leg. Periodically, the cap on the leg is removed and the accumulated dirt/trash/undissolved solution can be cleaned from the system.

Y-strainers help protect valuable downstream equipment - like pumps, steam traps, regulators and measuring devices—and of course your Smart-Actuator which might be damaged by contaminants.

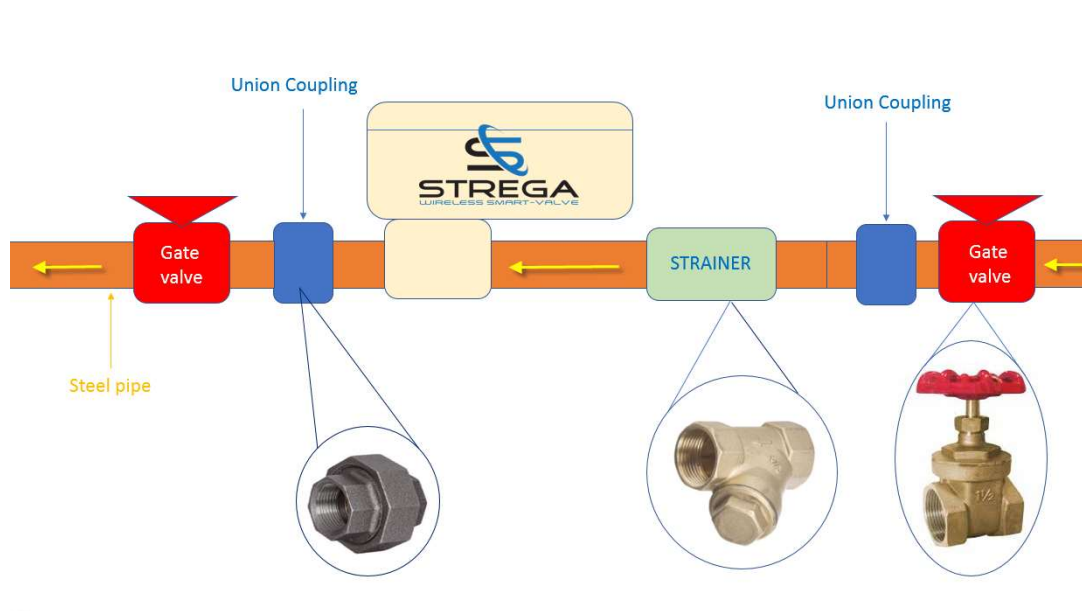
If you are not sure about the quality of your water, STREGA recommends inserting a **Y-Strainer at min.400µ** before the inlet of the valve.

Y-Strainers are most often used in applications which do not require frequent cleaning and where the amount of the materials to be removed is relatively low. For processes which gather more dirt and debris, the blow-off connection allows the screen to be cleaned without taking off the strainer cap.



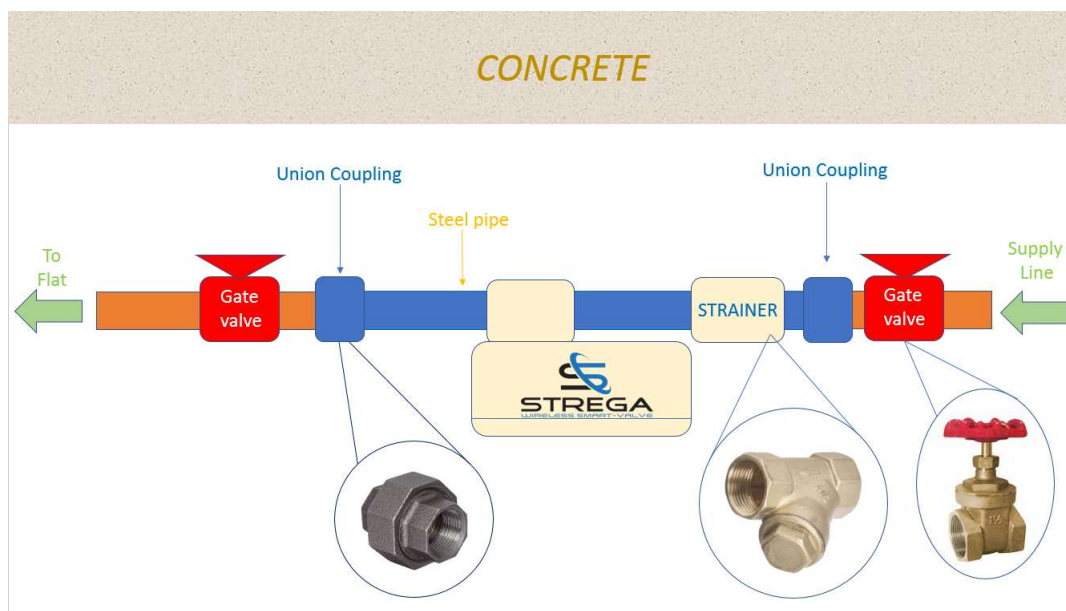
Recommended piping setup

The following setup should be prepared before installing the valve at site. This recommended piping topology below will ease the installation as well as future maintenance.



The Valve is set in horizontal position, electronic enclosure facing up

Or, if plumbing is located on the ceiling side:



The Valve is set in horizontal position, electronic enclosure facing down

Installation procedure

1. After proper flushing and chemical cleaning of the installation to ensure that no unwanted debris are still running in the pipes, one should remove the spool piece of tube and start installing the valve, then the actuator aside.



Warning: The valve should **only** be installed after a complete flushing and all chemical dosing/cleaning of the installation properly performed. The valves identified with such debris will come out of STREGA product warranty.

2. Make sure the wall has sufficient support in order to prevent vibrations and load weight from damaging the Smart-Actuator
3. Make sure pipes are aligned
4. Double check the valve flow orientation: this is marked by an arrow on the valve (solenoid versions).
5. Check that the pipes are clean and, if possible, fit a filter before the valve
6. The valve section must be equivalent to the pipe section
7. Make sure the pipe flanges and valve sealing faces are clean from any debris
8. When connecting the valve to the pipes, make sure that no foreign matter and sealing materials such as tape and jointing paste (pipe dope) get inside the valve as this could obstruct the internal pilot holes



The arrow under the valve indicates the flow direction

9. Install the valve with the flow direction as indicated **by an arrow** on the body of the valve (solenoid versions).
10. Although the valve will work in any attitude, the optimum position is with the coil uppermost so that solids do not accumulate in the armature. It is recommended that a strainer and isolation valve (gate valve) be installed close to the inlet side and outlet side to provide protection and assist with servicing.

Installing STREGA Motorized valves

The STREGA motorized model does not need to be mounted in a specific direction as the ball valve does not matter about the flow direction. It can be mounted in any possible direction. We recommend, however, to keep the motor up or aside the valve rather than underneath.

The motorized valve provides two limit switches which report the fully-open and fully-closed positions to the actuator, in addition to the motor wires: all 5 wires must be connected to the actuator **BEFORE** powering the device. When powered for the first time (or after pressing the reset button), the valve performs a full opening and closing cycle: this is made to calculate the exact power requirement of the valve operation. Wiring diagrams for the supported motorized valve models are given in the SV2 Operation and User Manual.



a motorized valve installed with motor facing upwards



Commissioning: installing the battery and boot sequence

Install the battery only after the valve has been mechanically installed on the pipe. Insert the battery observing the polarity marked on the battery holder: incorrect polarity prevents booting. IP68 sealing is only guaranteed once the enclosure is properly closed.

Once the battery is inserted, the device first accesses its internal Real Time Clock: a short blink of both RED + GREEN LEDs (located close to the manual override push button) indicates that the processor is accessing the RTC. A GREEN slow-blinking sequence then indicates the BOOT procedure and the LoRaWAN channel initialization, followed by a RED flash while the radio module is being initialized. If equipped with the Bluetooth option, the BLUE LED will also blink for a default period of 120 seconds.

If the actuator is connected to a motorized valve, the device first performs a full opening and a full closing to calibrate the necessary torque – wiring must therefore be completed before powering. The boot procedure takes about 8-10 seconds on EU868 and AS923 frequencies, and up to 20+ seconds on US915 versions as 8x more radio channels must be initialized.

The device can be reset at any time by pushing the blue RESET button. With a solenoid valve, the valve closes prior to the BOOT sequence (if already closed, it stays closed). With a motorized valve, the actuator performs a full opening then a full closing, and stays in CLOSE position prior to sending its first uplink.



A single Type-D lithium battery powers the SV2 actuator – observe the polarity marked on the holder

Magnet control

The opening/closing of the valve can be toggled with a magnet, without opening the enclosure: place the magnet close to the “M” marking on the enclosure. Approaching the magnet for a brief period (1 second) also awakens the Bluetooth communication (if your device is equipped with this option). If the magnet control has been disabled in the configuration, applying the magnet performs a forced UPLINK instead. Refer to the SV2 Operation and User Manual to enable or disable this feature.

Powering the actuator in Class C

Devices operating in LoRaWAN Class C should be powered by an external 12 VDC power supply. Use only a Class I power supply, where the 0 VDC is internally connected to the AC ground: a non-grounded (Class II) adapter causes inconsistent operation. A minimum rating of 10 Watts is recommended to cover the peak requirement at start-up.

A battery can be kept inside the enclosure as an automatic backup: in case of mains failure, the device switches to battery operation and notifies it by an immediate UPLINK. When the 12 VDC source comes back, the device automatically resumes on external power.

WARNING: never power the device through the USB port.

Mounting inside a valve box

When the STREGA actuator is installed inside an in-ground valve box, it sits below the surface. This affects two things: the LoRaWAN radio signal (RSSI) and the exposure to any water that collects in the box.

- **Signal (RSSI):** every inch of soil and box material between the actuator and the surface attenuates the LoRaWAN signal. Mounting under the lid minimizes that path and gives the best achievable RSSI for the installation.
- **Water ingress:** valve boxes commonly collect water from pipe or fitting leaks, irrigation overspray, or rain. Water pools at the bottom first: an actuator mounted low can end up fully submerged, while one mounted at the lid stays clear of all but a complete flooding.

How to mount it:

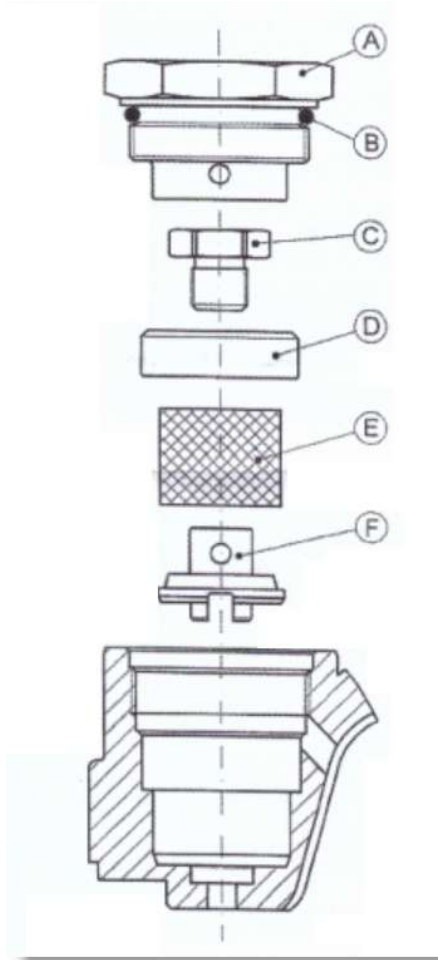
- Fix the actuator to the underside of the lid with a bracket, mounting clip, or zip ties through the lid ribs – do not let it rest loose at the bottom of the box.
- Route the cable down to the valve with slack (a service loop) so the lid can be lifted without disconnecting the actuator.
- If the lid is metal, offset the actuator from large metal surfaces where possible – metal can add extra signal blocking on top of the depth effect.
- Check that the mounted position stays above the highest water level you would expect in the box, including a worst-case pipe or fitting leak.

Outdoor installation

The SV2 Smart-Actuator is rated IP68 and designed for possible outdoor use. IP68 means the device is completely dust-proof and weather resistant; it is however not meant to be permanently submerged. If your topology is hilly or contains many obstacles, install the STREGA device at a high point to gain communication range: as a rule, the higher the device is installed from the ground surface, the better the radio range.

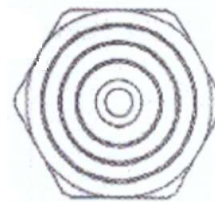
Water Hammer regulation kit (solenoid models)

In specific cases, a rapid closing of the valve can create a water hammer effect in the pipe. It can be reduced by changing a specific piece, called the “nozzle”, provided with large size valves (DN65 & DN80). The default nozzle has a hole diameter of Ø1.2 which should fit most cases. You can recognize the nozzle diameter section by the number of circular lines on top of the nozzle.



Pos.	Designation
A	Nozzle nut
B	O-ring 2068 - NBR
C	Nozzle: Ø0.8 – Ø1.2 – Ø1.5
D	Filter plug
E	Stainless steel filter
F	Filter base

Top view of the nozzle



Ø hole	Number of lines
Ø 0.8	1
Ø 1.2 (default)	2
Ø 1.5	3



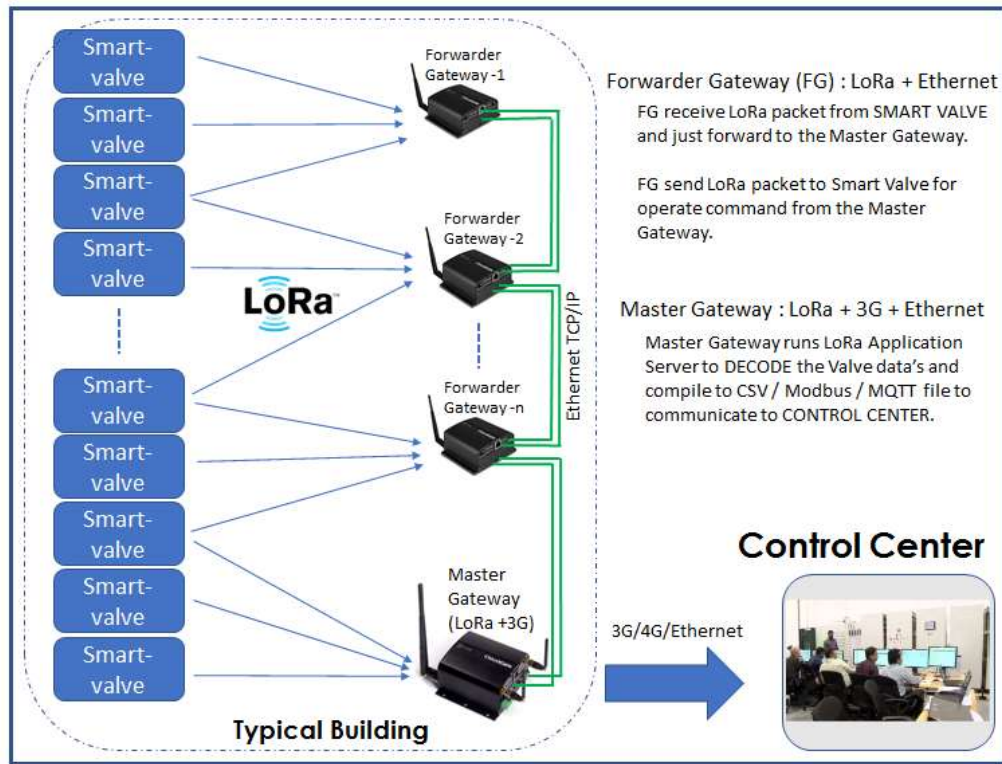
Correct installation with appropriate insulation (district cooling example)



Large size pipe sections should use flanges (DN65 shown)

Annex- 1 Forwarders Gateways and Master Gateway connectivity

Typical installation inside a building using the LoRaWAN gateways.



The Forwarder Gateway (FG) Panels

FG panels are placed typically every 6-10 floors in the building in a Zig Zag pattern to ensure that all LoRaWAN signals coming from the Smart-Actuators are captured. A Power (pai) cable (24VDC) of Communication (CAT6) cables are run to each FG from the ETS room Master Panel.

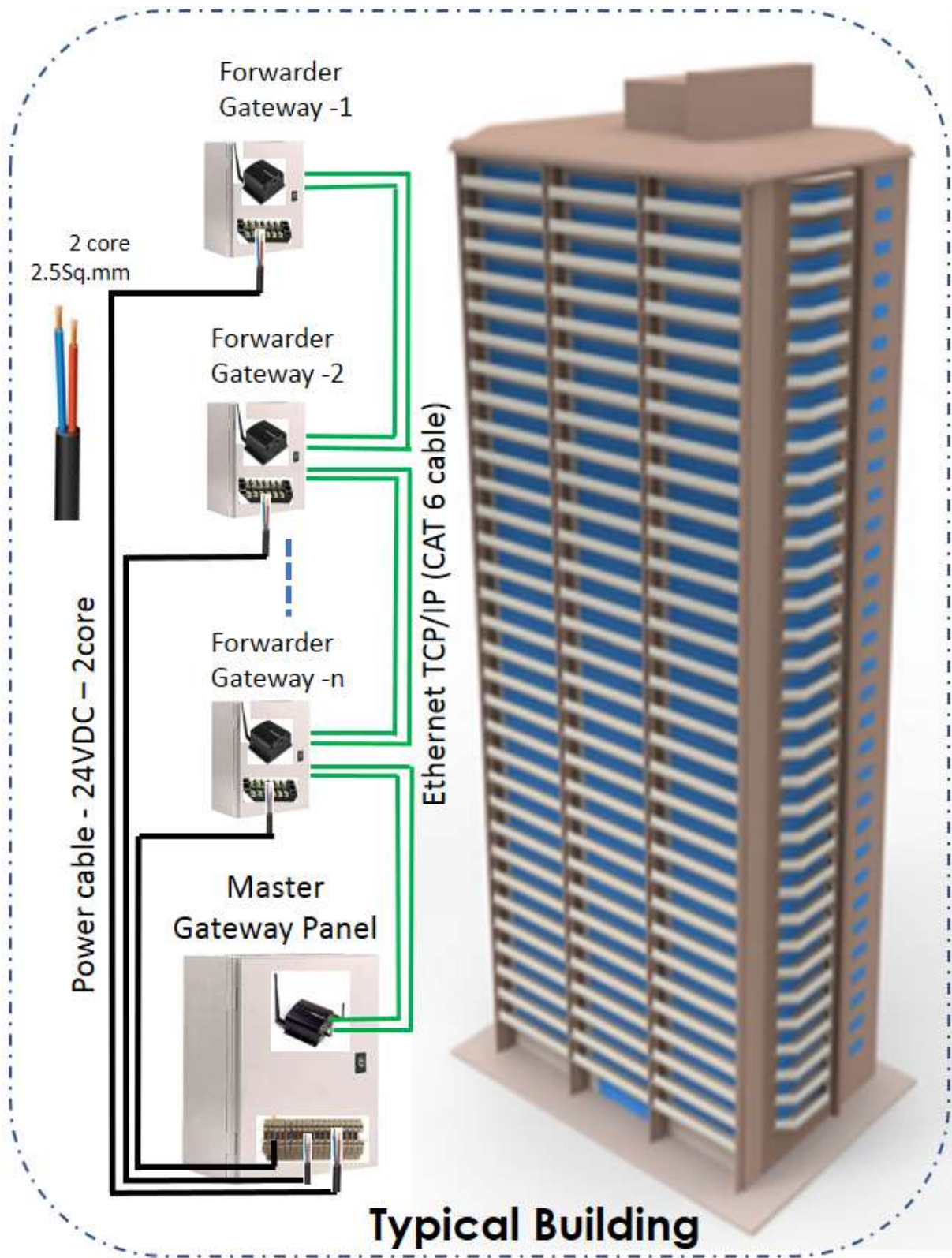
Cat6 cable is looped, where power cable is individually run to each FG.

Numbers of FG required will vary depending upon the building layout and structure (depends on LoRa signal penetration capability).

The Master Gateway (MG) panel

The MASTER GATEWAY hosts the LoRaWAN Application Server for processing all LoRa packets forwarded by the various FGs. This Application Server decrypts each Smart valve *payload* and compress into any one of CSV / MQTT / Modbus format. This file is transmitted to the Control center at frequent intervals.

MG panel is placed in the ETS room, mounted with Gateway, Ethernet switch and Power supply. The MG panel will have power distribution arrangements to provide 24VDC power to the various FG panels.



Forwarder gateway panels and Master gateway panel in a building