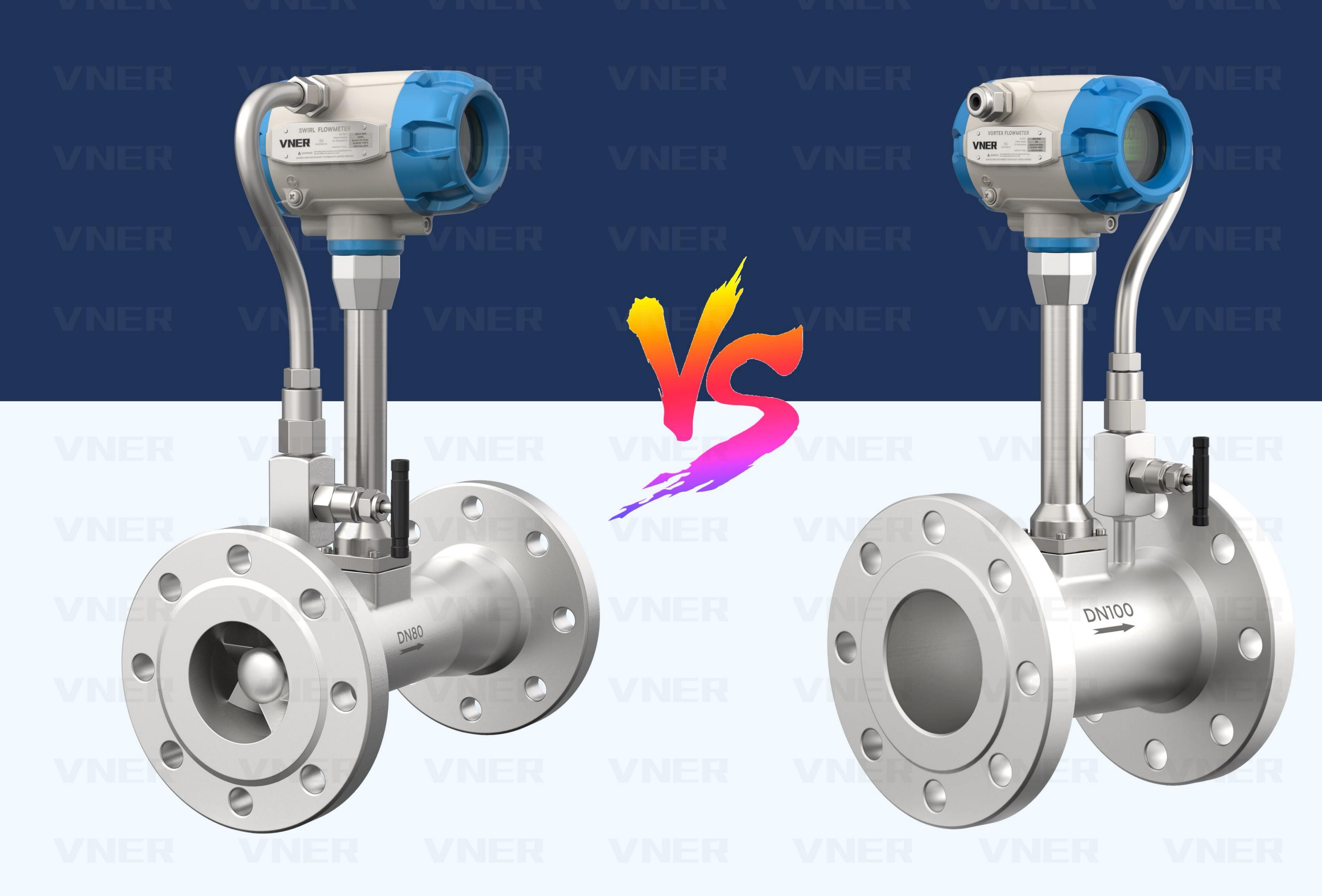


# SWIRL VERSUS VORTEX FLOWMETER TECHNOLOGY

SA80T SERIES VS MA80T SERIES



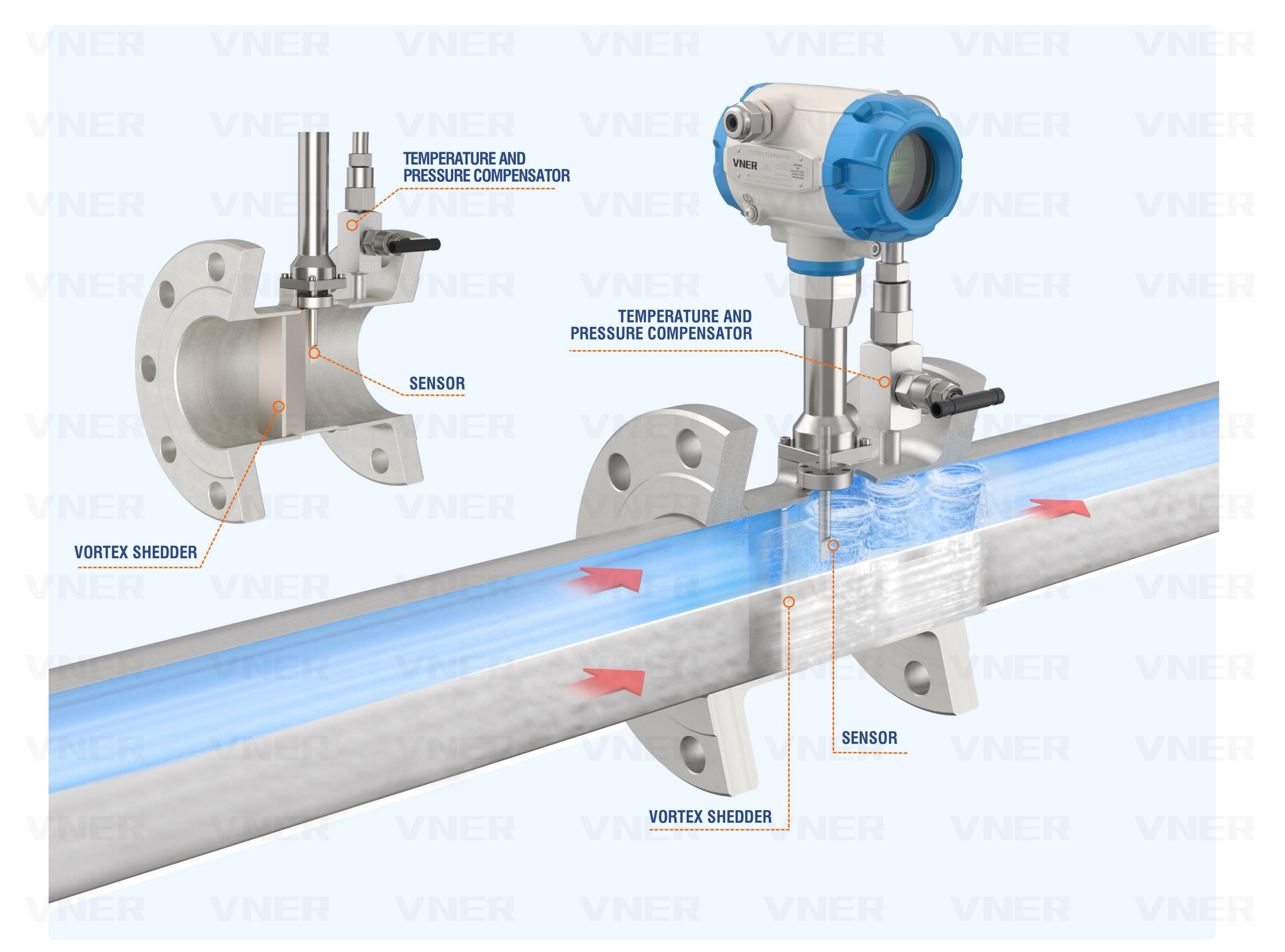
JIANGSU VNER ELECTRONIC TECHNOLOGY LTD



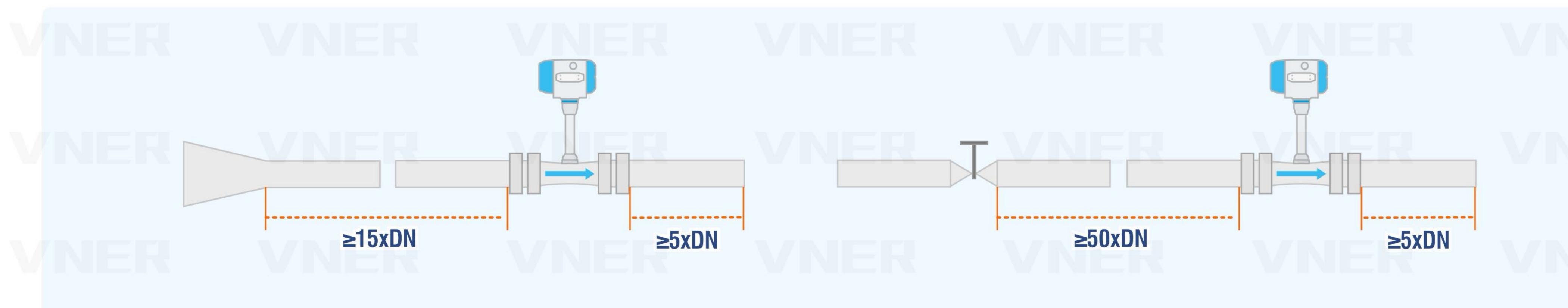
#### INTRODUCTION

Over the past thirty years, there has been a significant increase in the use of Vortex flowmeters in various industrial processes, particularly for measuring gas and steam flowrates. Despite their popularity, Vortex flowmeters may have certain limitations.



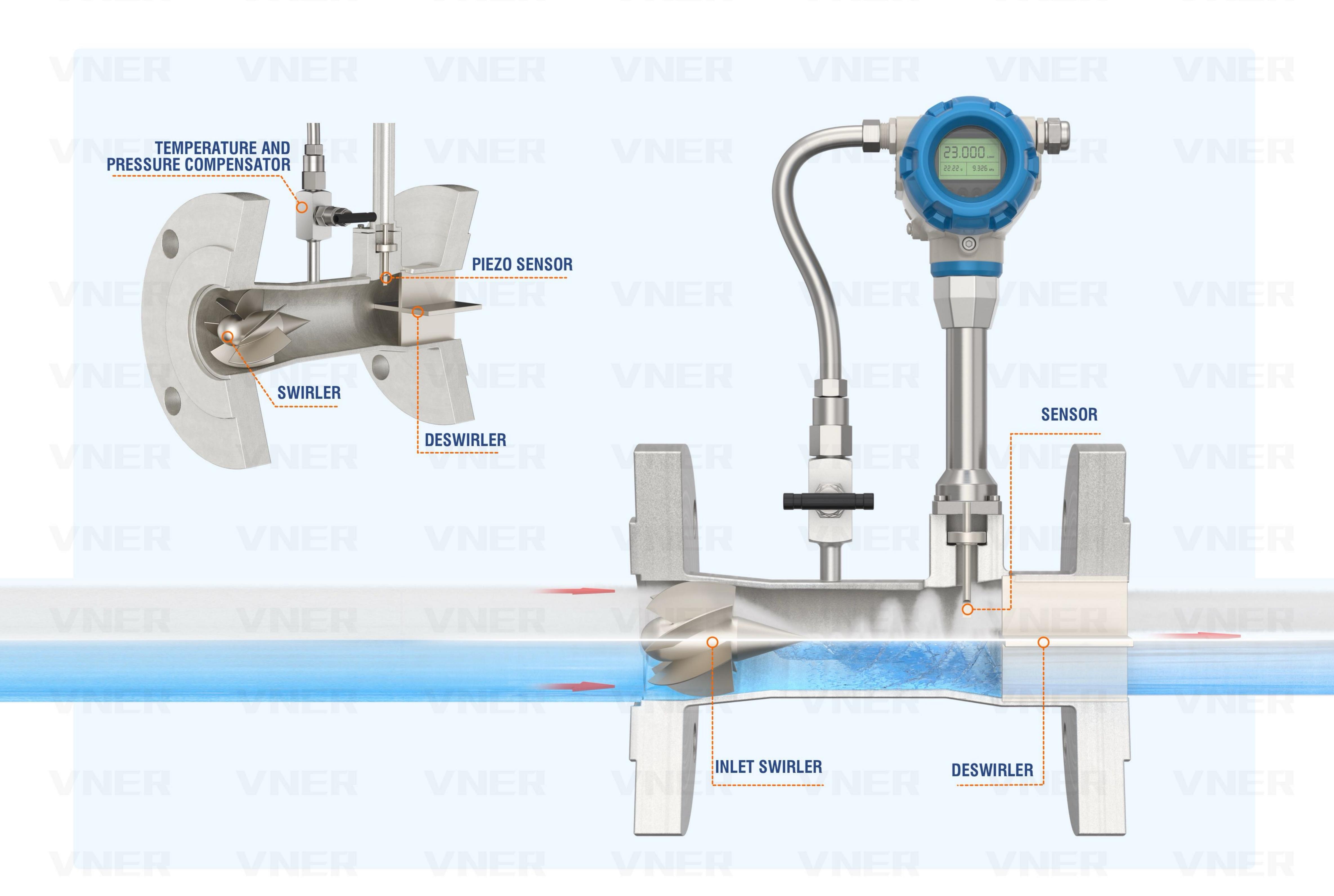


Vortex flowmeters are a popular choice for measuring the flow rate of fluids in pipes. To ensure accurate readings, it is important to have a proper flow profile. For this, a minimum of 15 upstream and 5 downstream diameters are required after a reduction. This means that the pipe should be straight with no bends or obstructions for at least 15 times the diameter of the pipe before the flowmeter and 5 times the diameter after the flowmeter. If the flowmeter is installed after a control valve, a minimum of 50 diameters is required downstream to allow for proper flow profile development and accurate readings.



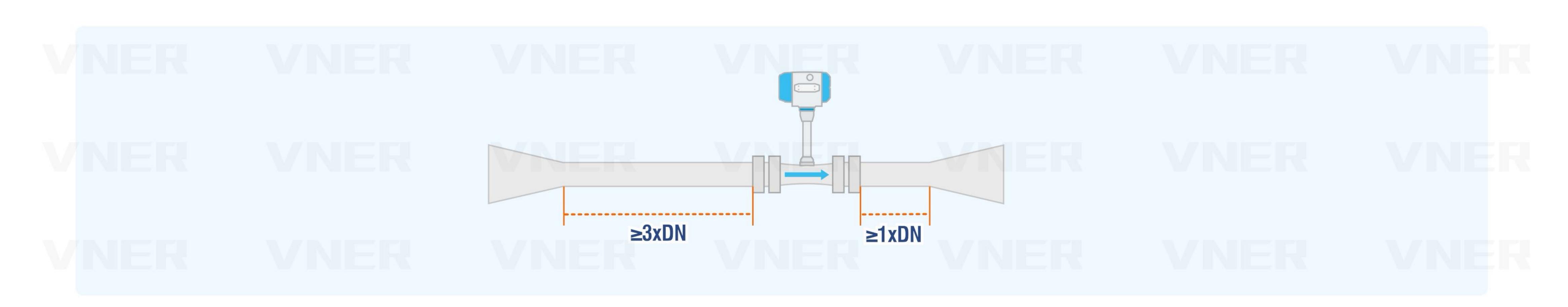
#### VORTEX FLOW METER UPSTREAM/DOWNSTREAM REQUIREMENT

- Swirl flowmeters, exemplified by the VNER SA80T series, operate on principles akin to Vortex flowmeters. However, they possess a distinct advantage over the latter by generating their own flow profile within the meter.
- A turbine-shaped inlet section forces the axial flow entering the flow meter into a rotational movement. A vortex core forms in the center of the primary rotation. A secondary rotation forms in the vortex core producing thread-like spirals.
- The frequency of this secondary rotation is linearly proportional to the flow rate over a wide Reynolds Number range. Pressure variations resulting from the secondary rotation are detected by a piezo sensor and converted into electrical pulses.
- These pulses are processed in the DSP converter into scaled analog and digital signals which display the measured flow value.



Compared to Vortex flowmeters, Swirl flowmeters require a significantly shorter upstream straight pipe run of only three diameters following a pipe reduction, and a fivediameter run after a control valve, with only one diameter downstream. This is in contrast to Vortex flowmeters, which necessitate a longer straight pipe run.





This means that they can be used in tighter spaces and configurations, which may be crucial in certain applications. Additionally, Swirl flowmeters can provide accurate and reliable measurements, even in low-flow conditions.

### COST OF OWNERSHIP AND LONG TERM SAVINGS:

Due to the higher cost of the primary element, the investment for the Swirl flowmeter is higher than a conventional vortex flowmeter. But when it comes to a cost of ownership calculation, the higher initial capex can quickly convert into significant savings over its lifetime.

#### SAVINGS DUE TO HIGHER ACCURACY:

Swirl flowmeters offer a higher degree of accuracy, up to 0.5 % which is better than all vortex flowmeters in all applications.

#### SAVINGS OF PIPE RUN AND REDUCTION:

When applying vortex flowmeters, the user typically have to choose a flowmeter reduced by one or two pipe sizes from the process pipeline size. This ensures that the flowmeter experiences the higher velocities required across the desired flow range, but adds piping reduction and expansion costs.

Swirl flowmeters work at lower flow velocities for proper operation, and so usually may be sized the same as the process pipe size - no pipe change necessary.

| SPECS                  | VORTEX FLOWMETER | SWIRL FLOWMETER |
|------------------------|------------------|-----------------|
| ACCURACY               | ±1%              | ±0.5%           |
| UPSTREAM               | 50D 50D          | 3D              |
| DOWNSTREAM             | 5D               | 1D              |
| ACCURACY IMPROVEMENT   |                  | 2x              |
| PIPE REDUCTION SAVINGS |                  | 51Dx \$/D       |

#### **TURNDOWN RATIO & FLEXIBILITY:**

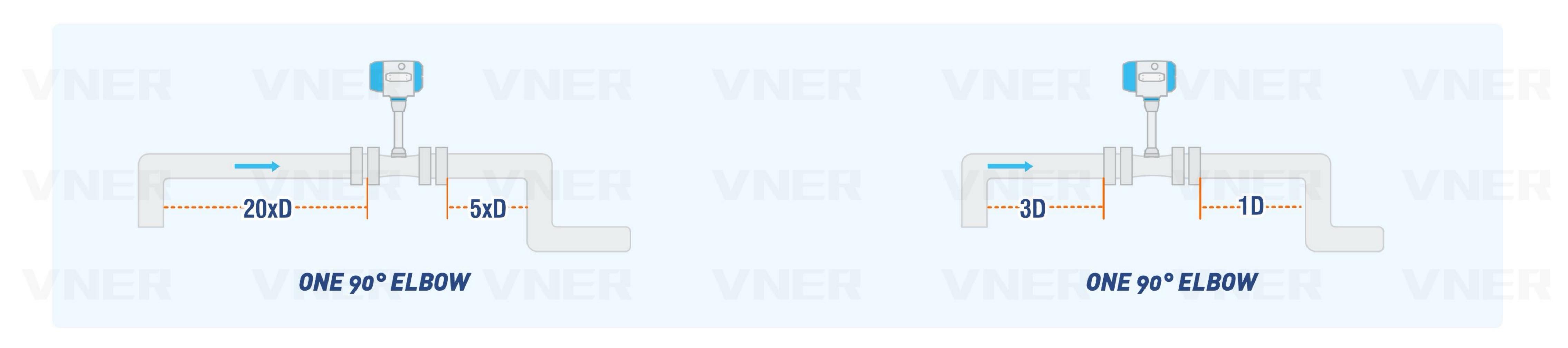
VNER

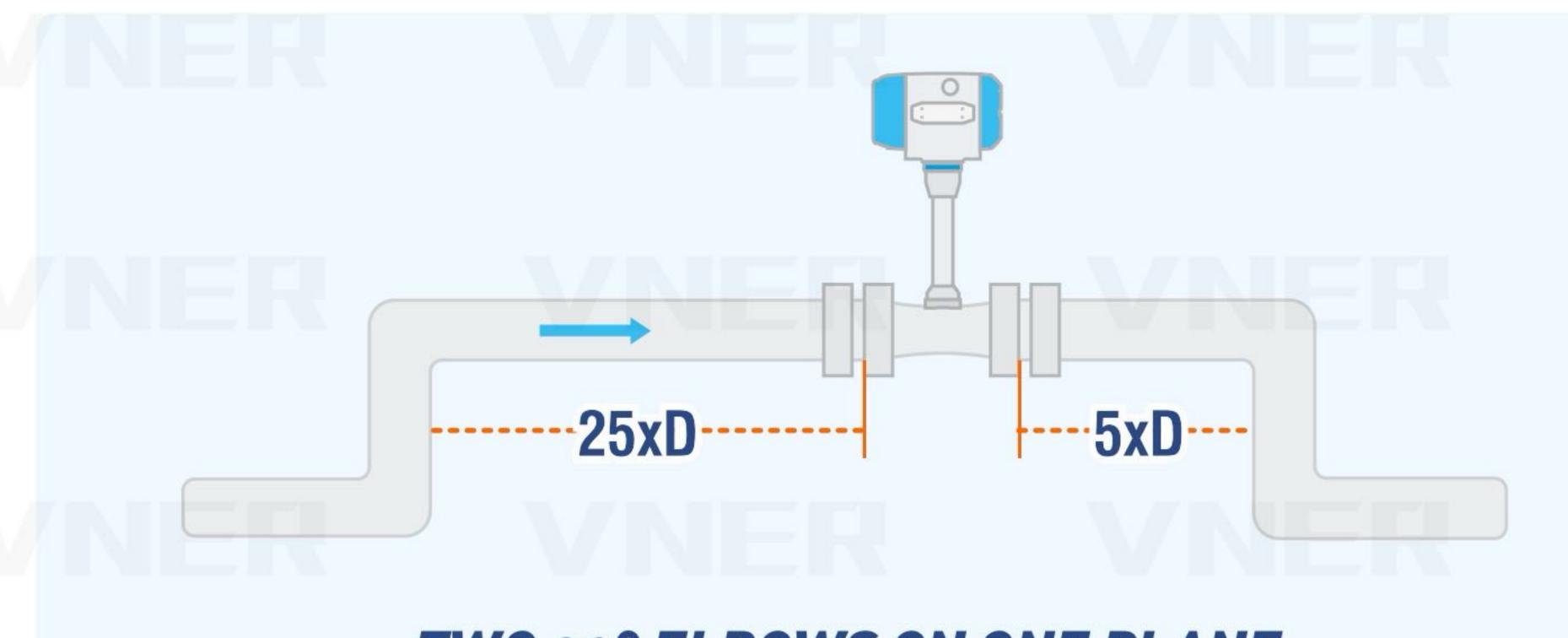
Swirl meters have a turndown ratio of up to 30:1, while most vortex meters are limited to 20:1 turndown ratios.

Additionally, Swirl meters can perform to viscosities of up to 30 cp while vortex meters are generally limited to 8-10 cp maximum.

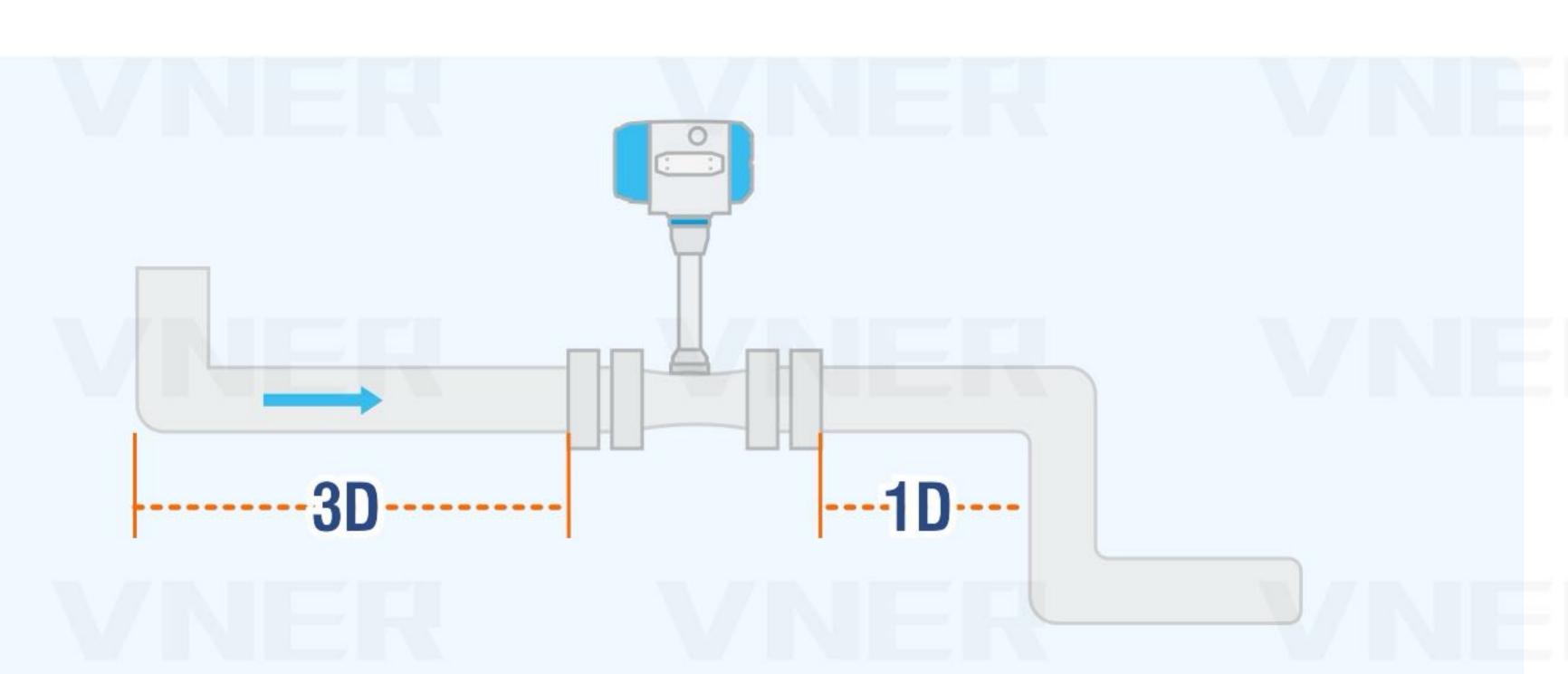


## VORTEX FLOWMETER VS SWIRL FLOWMETER STRAIGHT PIPE COMPARISON

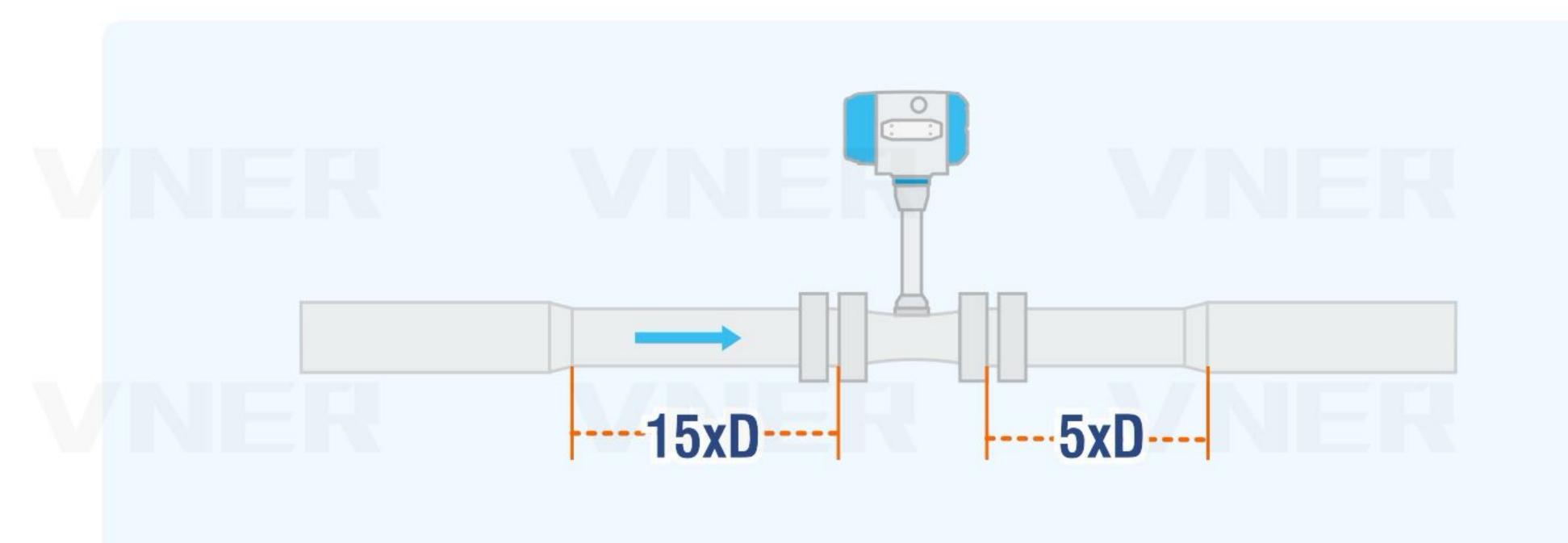




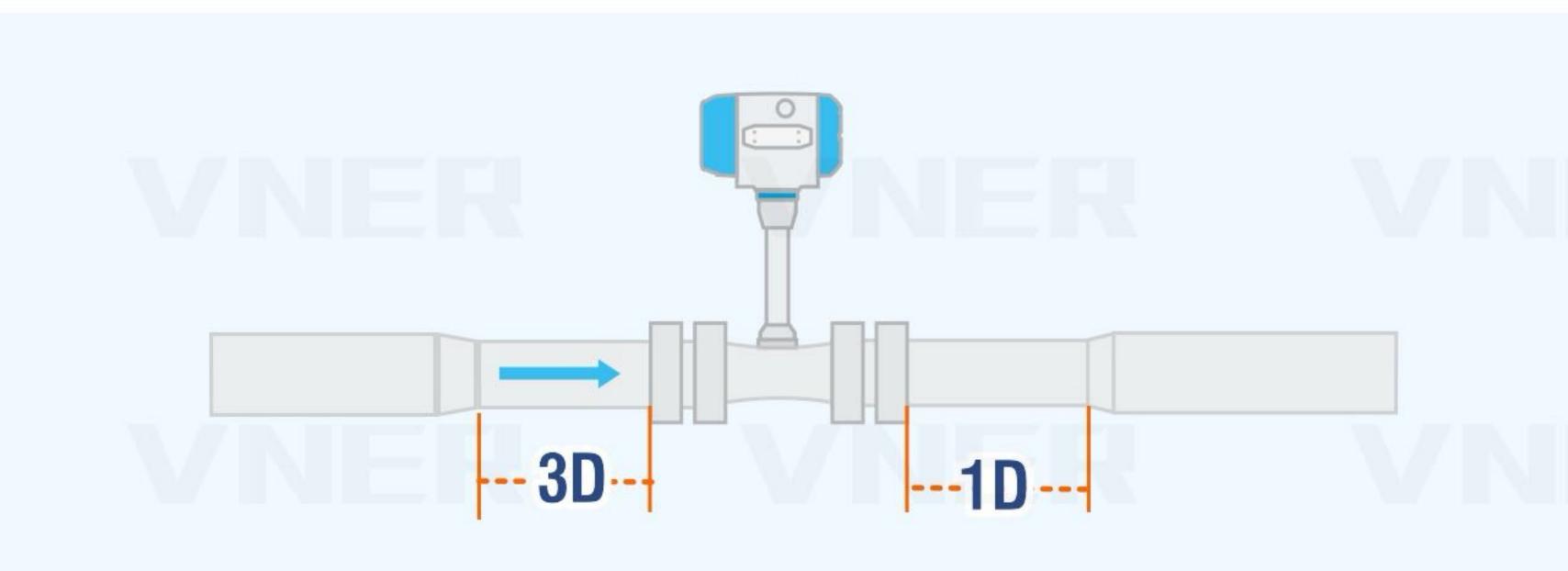
TWO 90° ELBOWS ON ONE PLANE



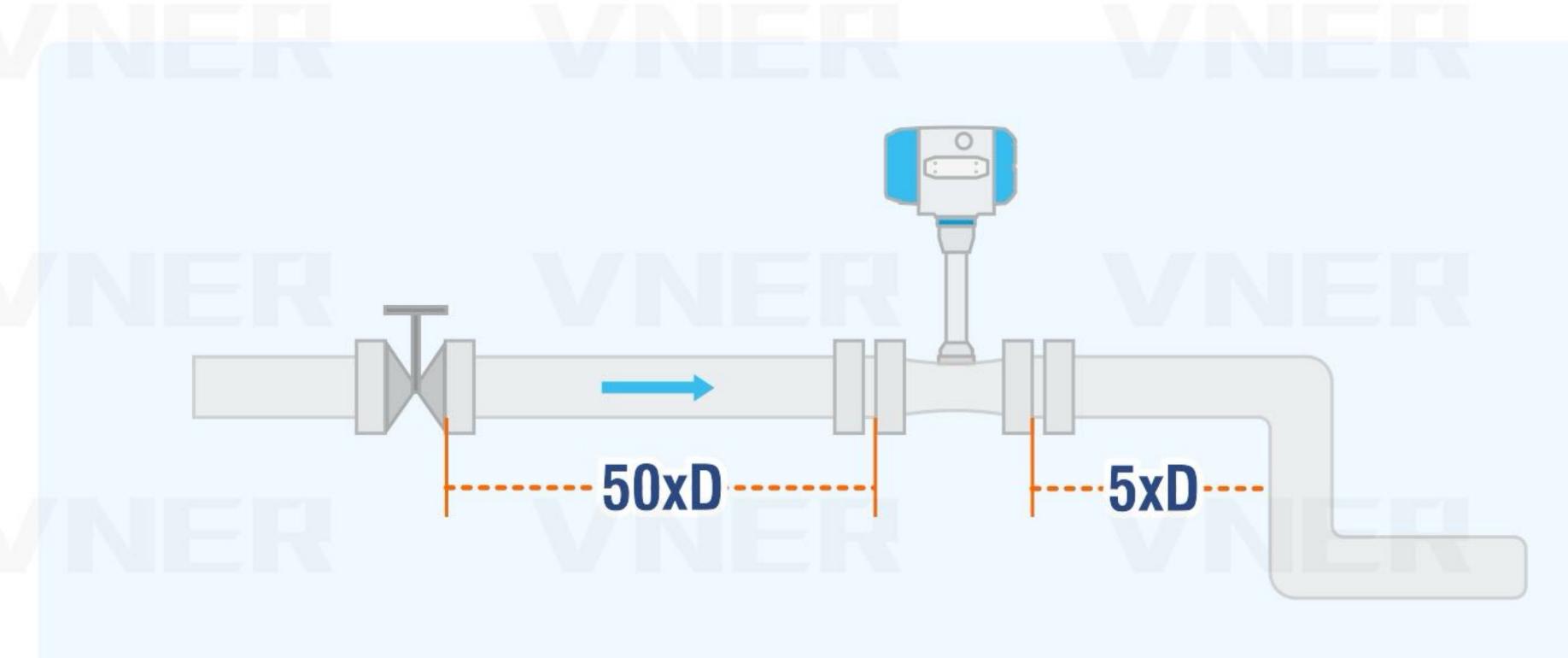
TWO 90° ELBOWS ON DIFFERENT PLANES



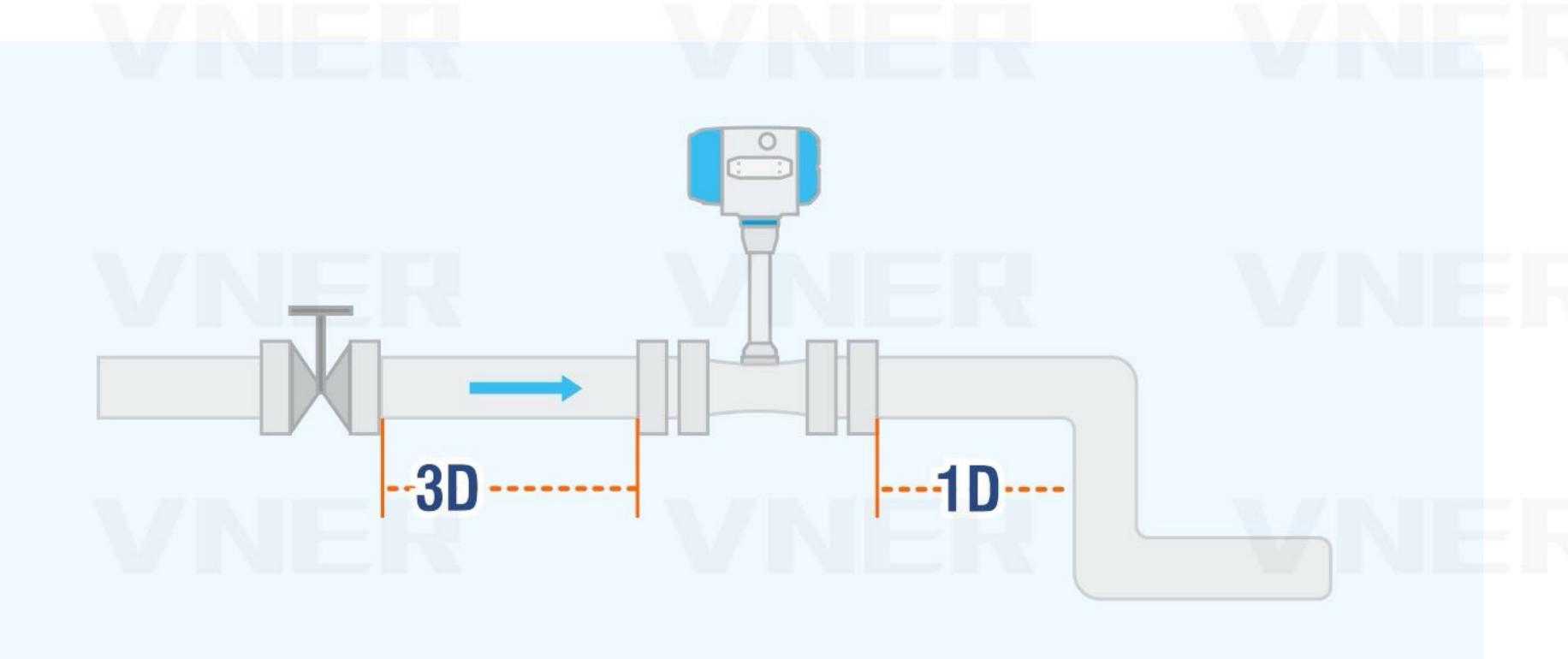
CONCENTRIC CONTRACTIVE FULL-OPEN VALVE



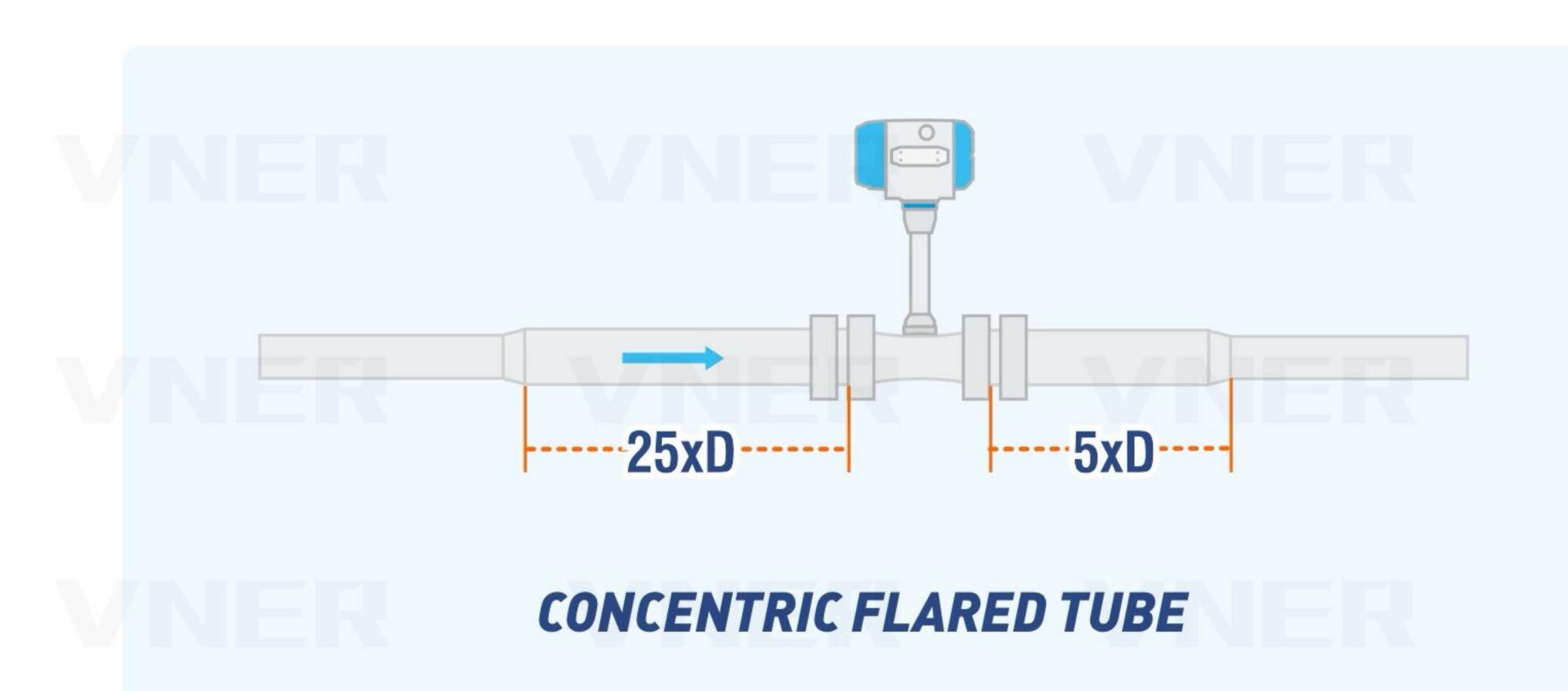
CONCENTRIC CONTRACTIVE FULL-OPEN VALVE



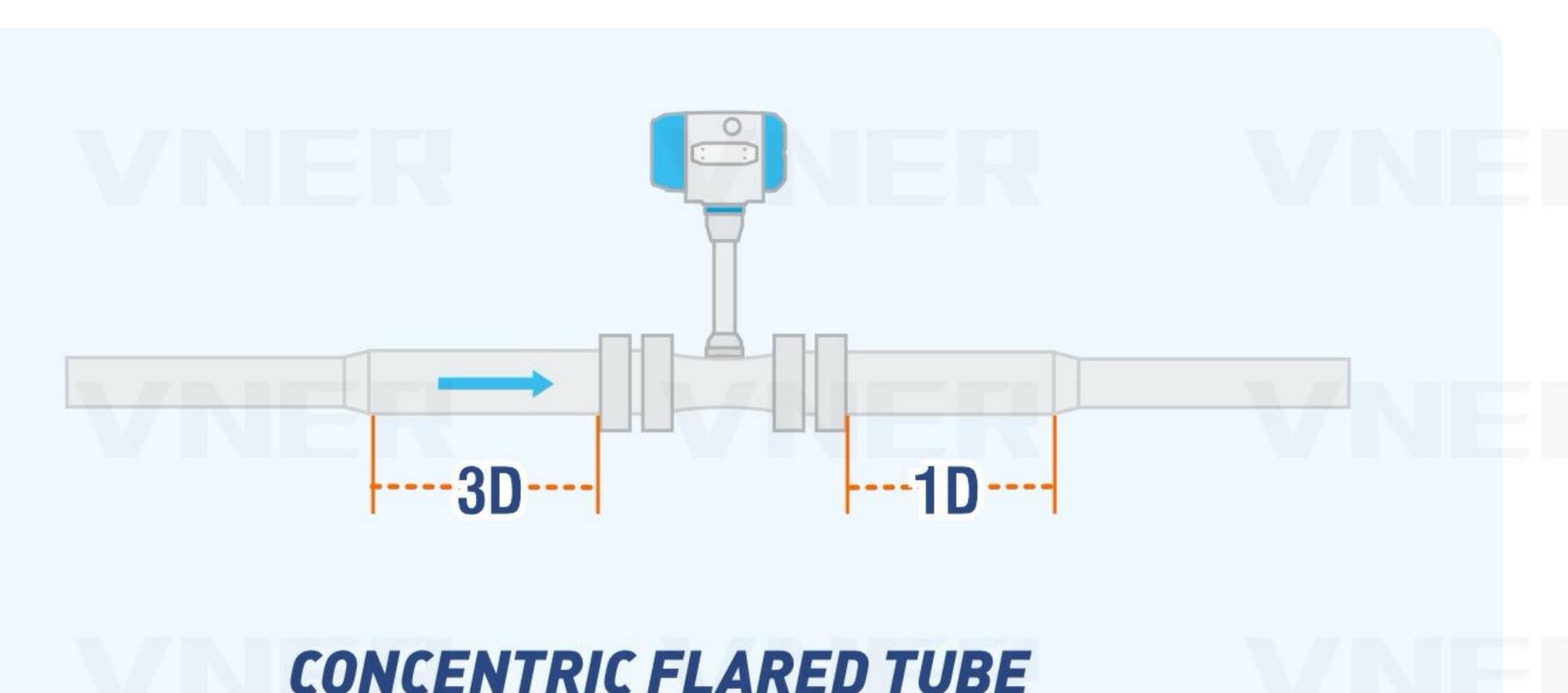
HALF-OPENED ADJUSTMENT VALVE



HALF-OPENED ADJUSTMENT VALVE



Vortex Flowmeter



CONCENTRIC FLARED TUBE



Swirl Flowmeter

This means that they can be used in tighter spaces and configurations, which may be crucial in certain applications. Additionally, Swirl flowmeters can provide accurate and reliable measurements, even in low-flow conditions.

VNER

# SWIRL FLOWMETER TYPICAL APPLICATIONS





CHEMICALS



FOOD & BEVERAGE



**PHARMACEUTICAL** 



OIL & GAS



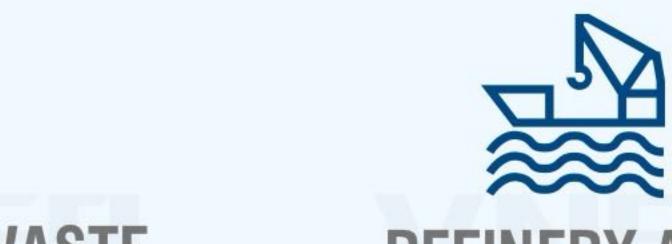
FIRE PROTECTION SYSTEM



AUTOMOTIVE **INDUSTRY** 



WATER AND WASTE WATER MANAGEMENT



REFINERY AND PETROCHEMICALS



MEDICAL **EQUIPMENT** 



METALLURGY



ELECTRONIC MANUFACTURING



SHIPBUILDING **INDUSTRY** 



ELECTRICITY **INDUSTRY** 



MUNICIPAL ENGINEERING

















| N 2 | INDUSTRY          | APPLICATIONS APPLICATIONS                                    |
|-----|-------------------|--|
|     | CHEMICAL          | Acids, solvents, specialty gases,vinyl chloride, steam       |
|     | PETROCHEMICAL     | Additives, petrol, ethylene, TiO2,anti-fouling agents, steam |
|     | PLANT ENGINEERING | Compressed air, steam  |
|     | FOOD              | CO2, sludge water, steam                                     |
|     | PULP AND PAPER    | Compressed air, steam  |
|     | METAL             | Coolant circuits, air,protection gases                       |
|     | PHARMACEUTICAL    | Deionized water  |
|     | POWER PLANTS      | Steam, condensate, natural gas                               |

