



# About Churod Sensing

Churod Sensing Technologies (Suzhou) Co., Ltd.

Oct. 10, 2022

# Churod Sensing History

■ 2006-2009  
OEM Manufacturer



■ Jan. 2010  
CHUROD'S **First Plant**  
started production



■ Jun. 2016  
CHUROD's **Third Plant**  
started production



■ 2021  
CHUROD SENSING TECHNOLOGIES  
is founded



■ Oct. 2009  
CHUROD launched  
the brand



■ Jun. 2014  
CHUROD's **Second Plant**  
started production



■ Oct. 2021  
CHUROD's **Fourth Plant**  
started construction



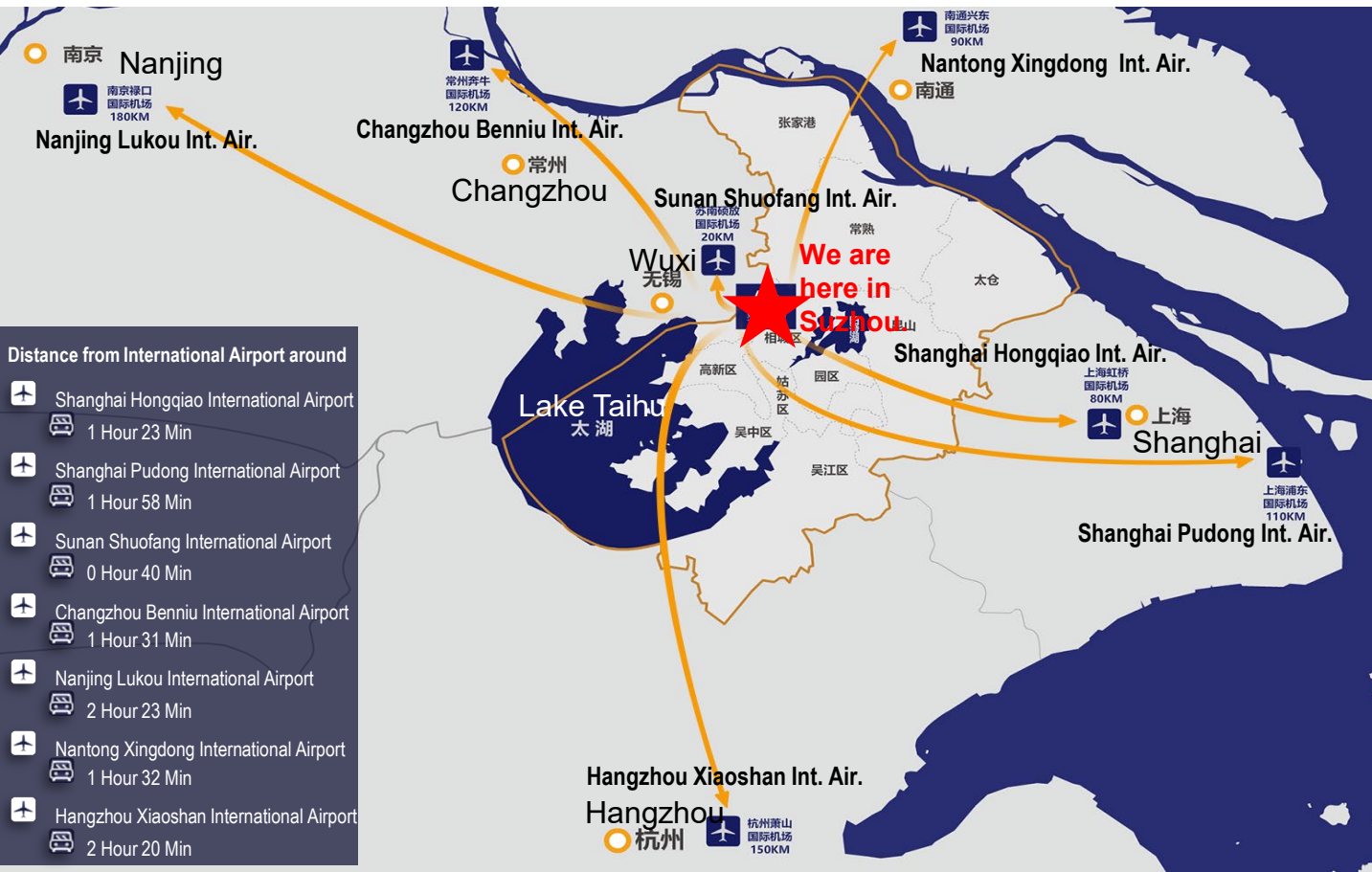
■ 2021  
CHUROD SENSING  
acquired **Sensata BPS**  
business

## R&D Center and Manufacturing Site

Churod Sensing Technologies located in Suzhou city, JiangSu Province.



# Where Are We Located?



**Distance from International Airport around**

✈️ Shanghai Hongqiao International Airport	1 Hour 23 Min
✈️ Shanghai Pudong International Airport	1 Hour 58 Min
✈️ Sunan Shuofang International Airport	0 Hour 40 Min
✈️ Changzhou Benniu International Airport	1 Hour 31 Min
✈️ Nanjing Lukou International Airport	2 Hour 23 Min
✈️ Nantong Xingdong International Airport	1 Hour 32 Min
✈️ Hangzhou Xiaoshan International Airport	2 Hour 20 Min



# Our Vision

A world leading sensing solution provider to make the world smarter!

传感科技的引领者，让世界更智能！

# Our Values

Respect  
Responsibility  
Innovation  
Excellence

尊重  
负责任  
创新  
卓越

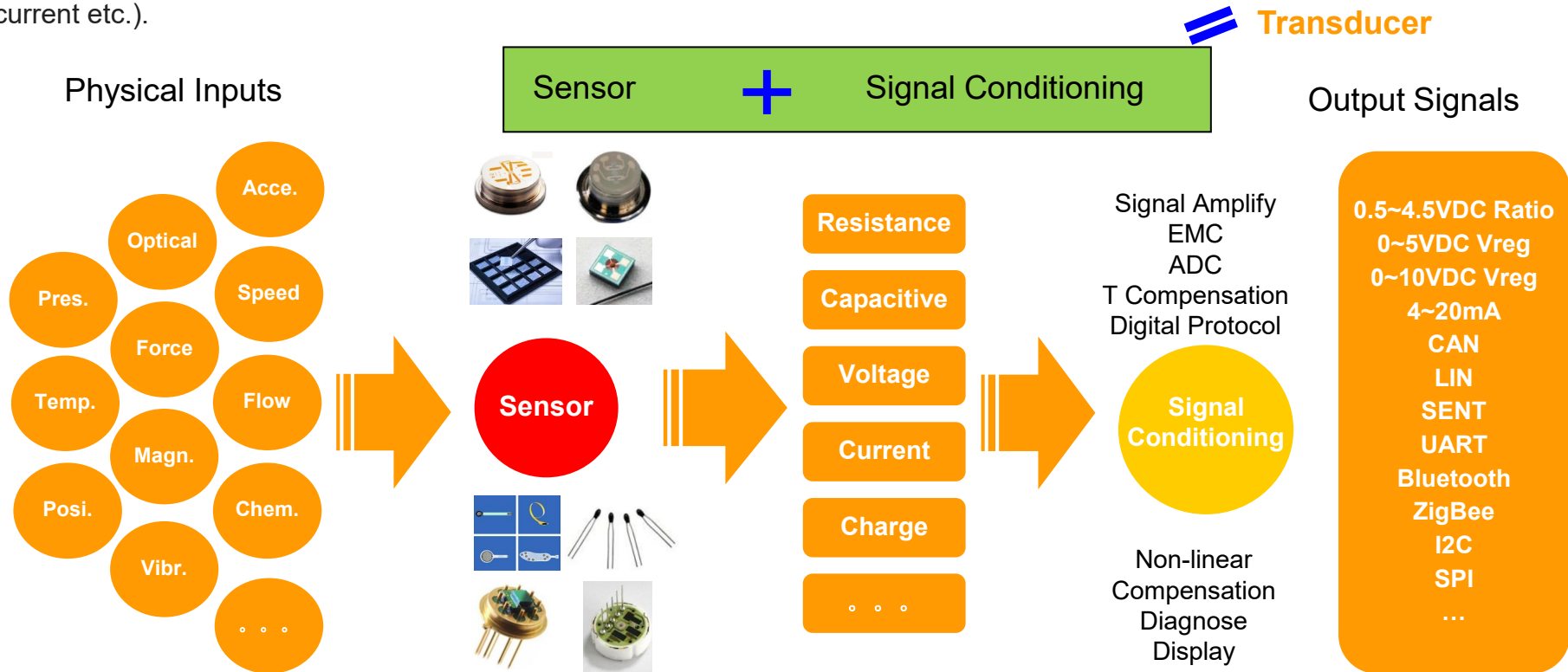


# VRF Sensor Introduction

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# What Is a Sensor or a Transducer?

- The **sensor** is a device that measures the physical quantity (i.e. Heat, light, sound, etc.) into an easily readable signal (voltage, current etc.).



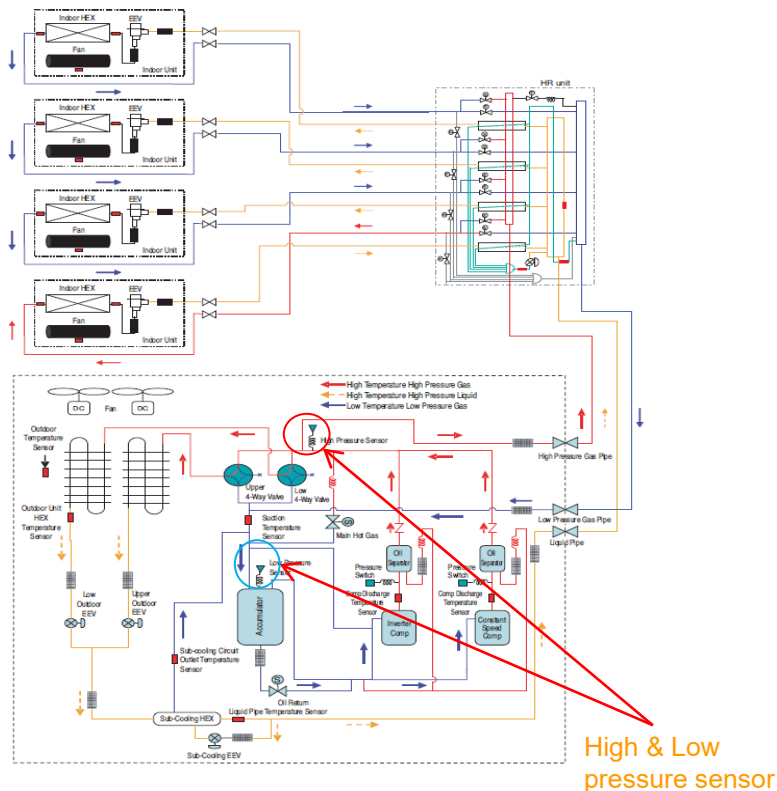
# Where Are the Sensor Used?



Sensors are everywhere.



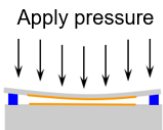
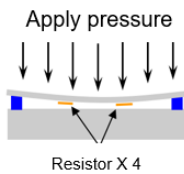
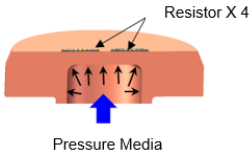
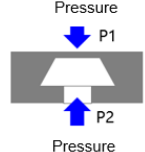

# Sensor Requirement for VRF System



- Variable refrigerant flow (VRF) can effectively reduce energy consumption.
  - Usually there is one or more variable speed compressors
  - Multiple indoor evaporators
  - Achieve heating and cooling at the same time
- Pressure sensors need to be installed separately on the high and low pressure sides to achieve complex system control.
  - Sensor installation outdoor and need to meet lightning and high/low temperature requirement
  - Easy installation
  - Stable performance, Long life, High reliability
  - No Refrigerant leakage (R22→R410a→R32→...)
  - . . .

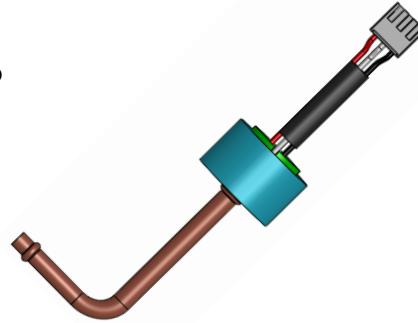
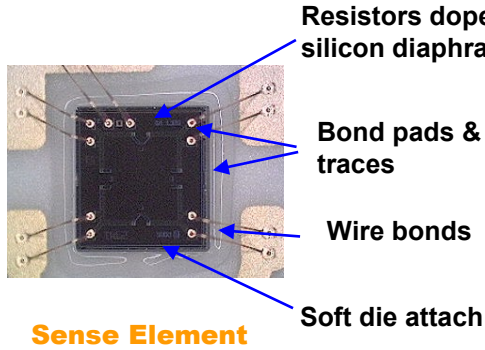
# Pressure Sensor Solution Comparison

➤ Various solutions for pressure sensing technology

Sensor type	Ceramic capacitor	Ceramic resistor	Glass micro-melting	MEMS	Oil-filled MEMS
Principle					
Hermetic design	N (O-ring)	N (O-ring)	Y	N (Gel / Brazing)	Y
Pressure range applicability	Y	Y	N	Y	Y

- **No Perfect O-ring to meet different refrigerant environment.** There will be sealing leakage issue, especially due to Refrigerant pressure increase.
- Pressure range applicability for different sensor type is important to ensure the product accuracy.

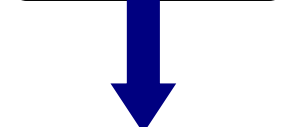
# Sensing Technology



- Pressure across diaphragm results in tensile stress in center, compressive stress at edge
- Strain-sensitive piezo resistors are implanted in silicon substrate and connected in a full bridge configuration
- Applied pressure results in a bridge imbalance that is amplified and compensated in signal conditioning electronics

## Sense Element

FORCE / PRESSURE



MECHANICAL DEFLECTION/ STRESS



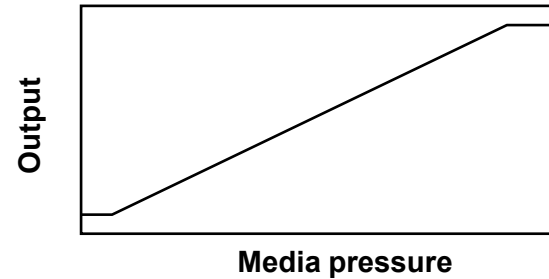
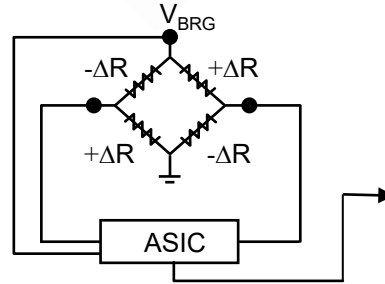
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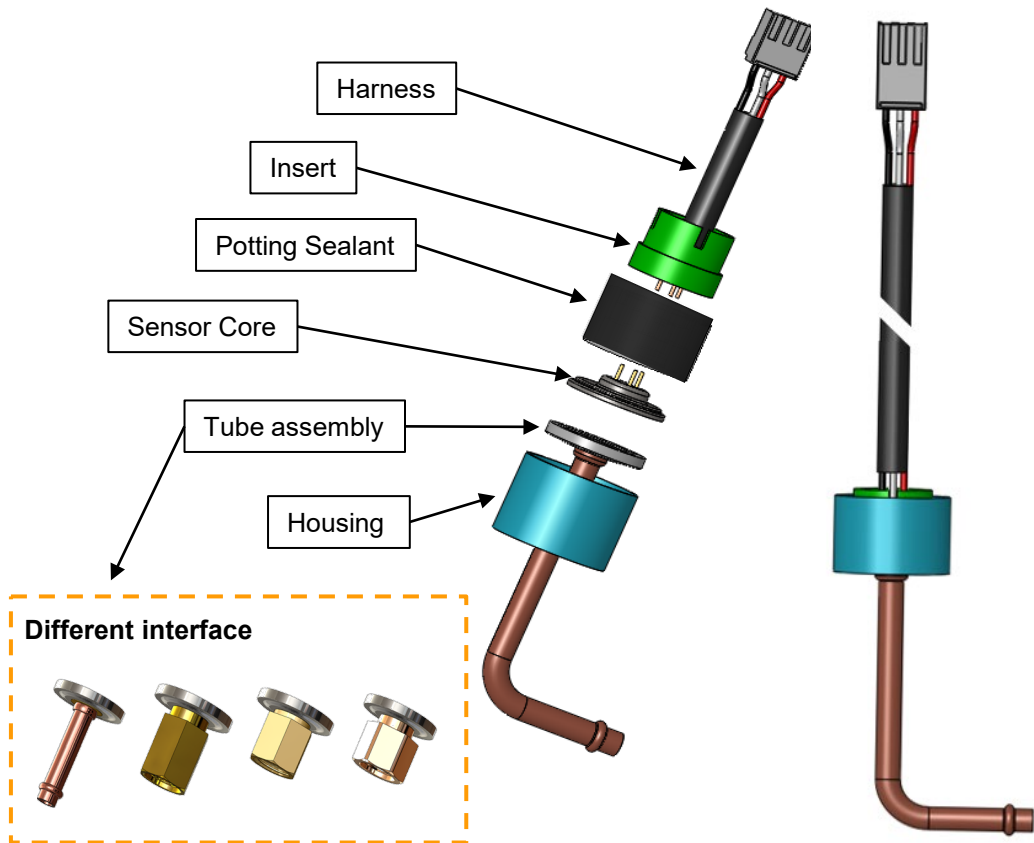
CONDITIONING ELECTRONICS



PWM/CAN/LIN/ Analog OUTPUT PROPORTIONAL TO MECH. INPUT



# Product Design and Parameter



No.	Item	Parameter for low pressure	Parameter for high pressure
1	Operating Pressure	0 ~ 2MPa	0.448~4.5MPa
2	Input voltage	DC 4.5 ~ 5.5V	DC 4.5 ~ 5.5V
3	Output voltage	DC 0.5 ~ 4.5V	DC 0.5 ~ 4.5V
4	Reverse voltage	-14V	-14V
5	Accuracy	±1.5%FS	±1.5%FS
6	Operating Temp.	-40 ~ 120°C	-40 ~ 120°C
7	Media Temp.	-40 ~ 130°C	-40 ~ 130°C
8	Proof Pressure	4MPa	9MPa
9	Burst pressure	6MPa	13.5MPa
10	Max. Voltage	DC 20V	DC 20V
11	Current	<10mA	<10mA
12	Load Resistance	> 10kΩ	> 10kΩ
13	Insulation Resistance	100MΩ	100MΩ
14	Dielectric strength	AC 1500V, 1min AC 1800V, 1s	AC 1500V, 1min AC 1800V, 1s
15	IP level	IP66	IP66

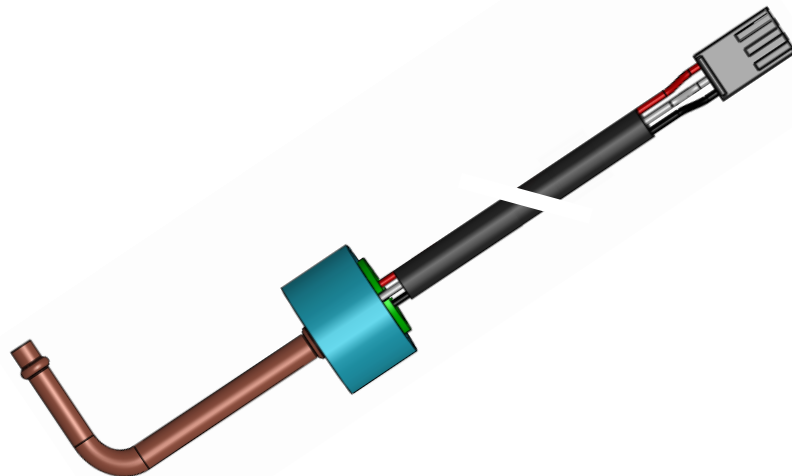
## Product Characteristic

### ➤ Product Characteristic

- Oil-filled MEMS technology, **true hermetic design** and no rubber parts to **avoid leakage risk**
- Platform design, Compact structure, small size, flexible installation
- Digital temperature and pressure compensation: **high accuracy**
- Customized mechanical interface: Brazing, threaded connections, etc.
- Wide range of harness interface options
- Different output type: Voltage & Current etc.
- Excellent electronic performance
- Excellent cold media compatibility
- **Provide customized design**

### ➤ Application

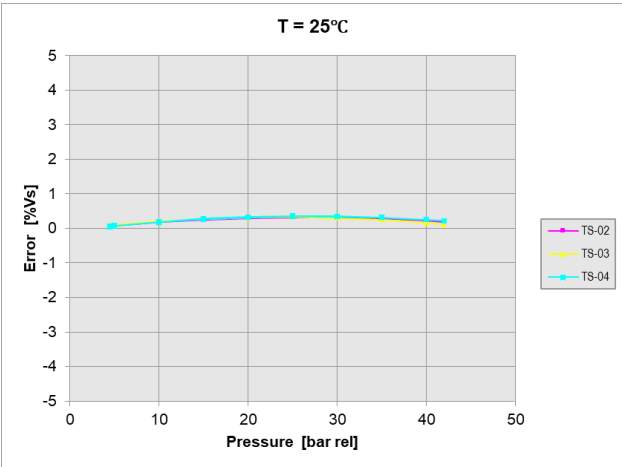
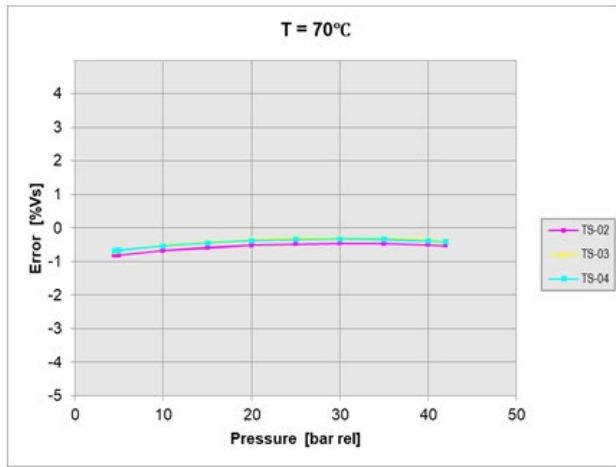
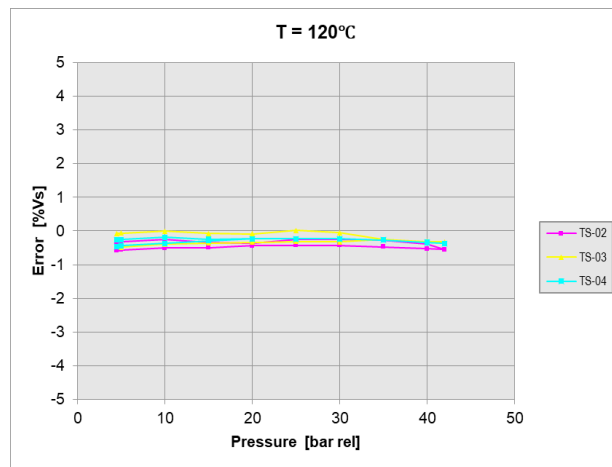
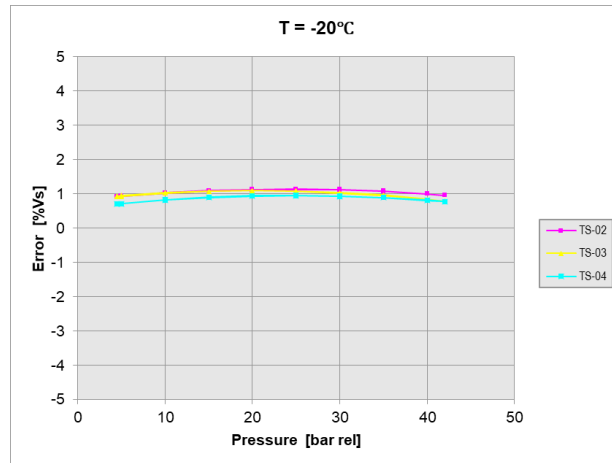
- Variable frequency air conditioning
- Variable frequency hydraulic control system
- Variable frequency air compressor
- Cold storage and refrigeration systems



# Product Durability Accuracy

Product Thermal shock test: 2200 hrs: Achieve 1% Vcc at all temperatures.

1. -40~140°C,
2. Keep 30min for each temperature.



Thanks!