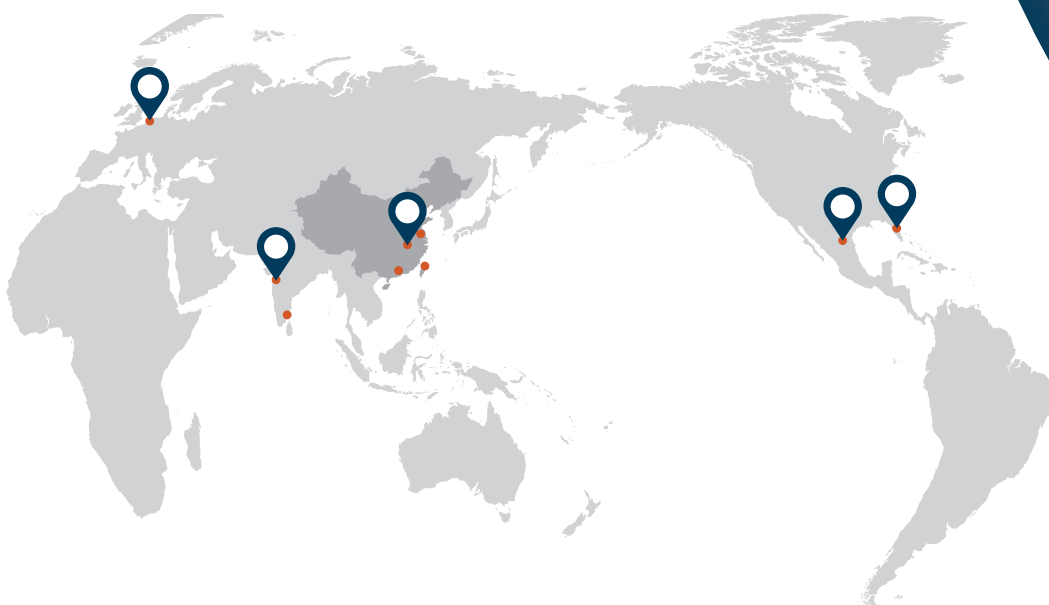
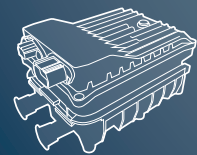
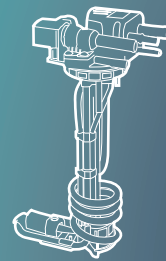
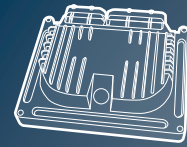


# KUS

*Sensing Quality, Gauging Success!*



# Company Profile







KUS is a global auto parts supplier providing R&D, manufacturing, sales, and service. The KUS Group focuses on providing application solutions for commercial vehicles, passenger vehicles, off-road machinery, and other industrial equipment. KUS produces DEF/AdBlue® Quality Sensors and Tank Assemblies, Fuel Level Sensors, Fuel Tank Assemblies, Gauges, and New Energy products.

The KUS Group has more than 5,000 employees across 10+ subsidiaries globally as well as an experienced R&D team, advanced laboratories, and Smart factories. Adhering to the corporate vision to “Make Breathing Cleaner”, KUS continues to focus on reducing emissions, optimizing efficient driving, and creating maximum value for our customers.

### **KUS AMERICAS**

Davie, Florida, USA



Escobedo, Mexico



### **KUS EUROPE**

Eindhoven, Netherlands



### **KUS ASIA**

Pune, India



Chennai, India



### **KUS ASIA**

Dongguan, China



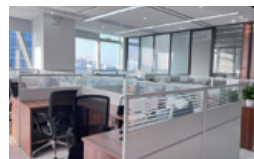
Hefei, China



Guangzhou, China



Shenzhen, China



Zhubei, Taiwan



## Milestones



**2004**

Established a company and became an integrated enterprise of manufacturing, sales, and research.



**2005-2007**

Passed ISO/TS 16949:2002, ISO 14001:2004, and received TÜV Nord and PED&AD2000 certifications.



**2008**

Introduced DEF/AdBlue® tank assembly products to the market.



**2010**

Relocated KUS Americas into a larger facility. Launched urea injection system accessories.



**2013**

Introduced DEF/AdBlue® quality sensors and high-precision liquid level sensors to the market.



**2014**

Set up a R&D center, Qianjun, in Taiwan, responsible for the research and development of TQS quality sensor.



**2015**

Formed a branch in the Netherlands as a service support center in Europe.



**2016**

Built KUS India Pvt Ltd. and Zhenggang Co., Ltd.



**2017**

Established a plant in Hefei; introduced DEF/AdBlue® tank integrated solutions.



**2019**

Established a factory in Mexico and introduced ISO 26262 and ASPICE.



**2020**

Accelerated global footprint: started production in the Mexico plant and built a second location in India.



**2021**

Started KUS Zhengyang Phase III foundation-laying construction and set up KUS Weifang.



# CONTENTS

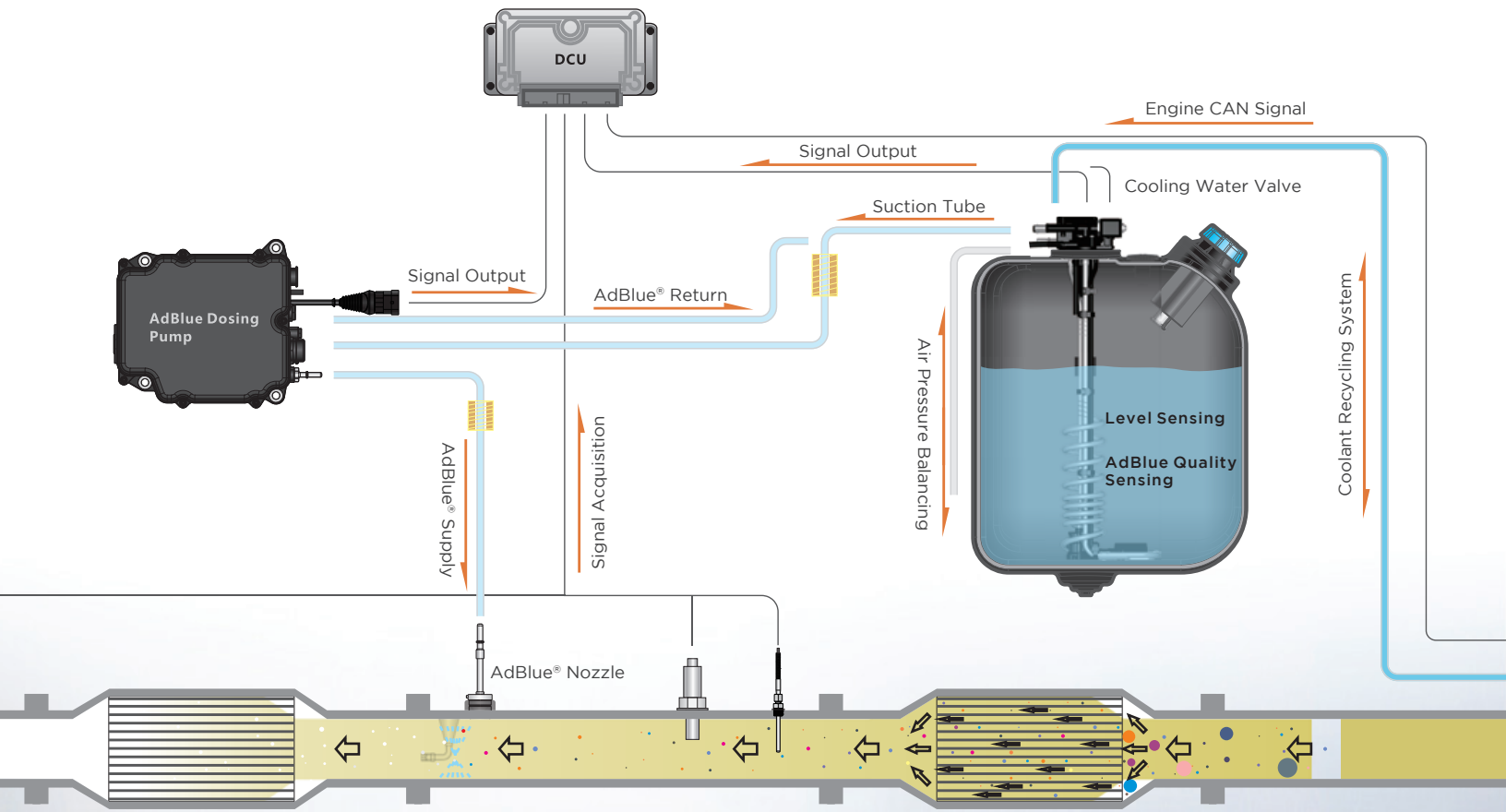


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# CHAPTER

## SCR System Application

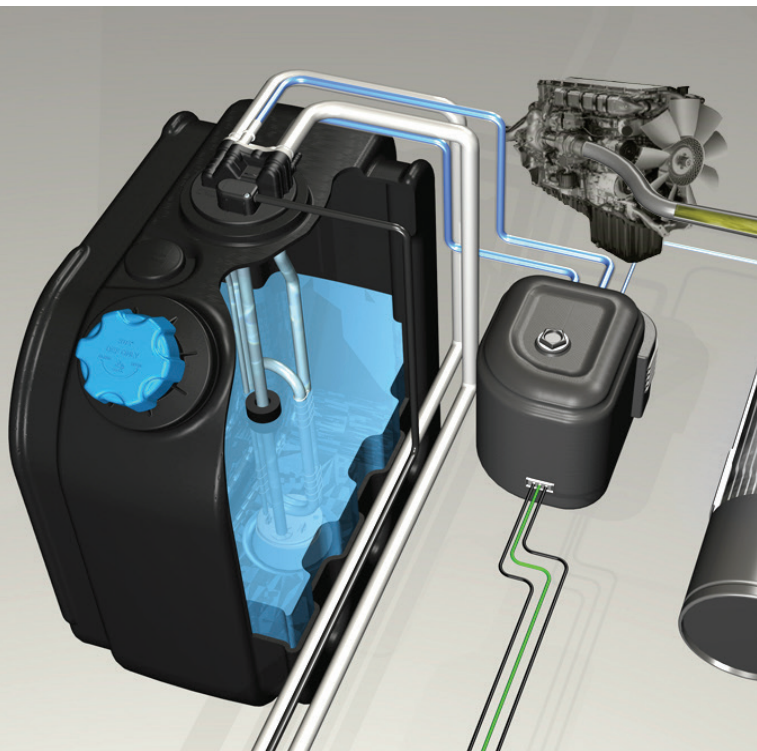
SCR (Selective Catalytic Reduction) exhaust treatment systems are implemented worldwide to reduce air pollution and emissions from traditional diesel applications. Through the reaction of the DEF/AdBlue® solution with NOx, the SCR system helps to generate clean and harmless N2 and H2O.



# CHAPTER

## DEF/AdBlue® Quality Sensors

As the world's leading manufacturer of DEF/AdBlue® sensors, headers, and tanks, KUS products conform with international emission regulations including Euro VI, Tier IV F, EPA2019, and Stage V/VI. KUS products are used in SCR systems worldwide for on-road and off-road equipment. The DEF/AdBlue® quality sensor can accurately monitor the concentration of DEF/AdBlue® solution and alert the user if there are issues with concentration deviation or contaminated fluids in the tank. To ensure vehicle emissions are following emission standards and regulations, the KUS DEF/AdBlue® systems utilize advanced integrated solutions, such as DEF/AdBlue® quality detection, liquid level detection, advanced urea thawing, and the DEF/AdBlue® systems can also be customized based on different requirements from customers. Various solutions have been designed to support functionality in different climates and environments.



● Measuring Principles: Ultrasonic, Analog, and Thermistor

### Advantages:

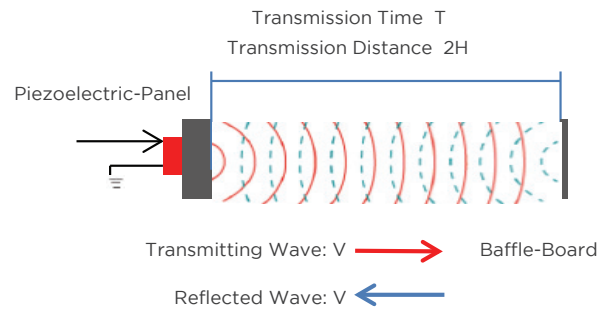
- Signal output with high precision and accuracy
- Stable and continuous output
- Resistant to environmental variations
- Integrated key features and designs
- Various lengths subject to users' application
- Options for different electronic connectors
- Custom design potential/optimization for different tank shapes or unique

## Principle of Ultrasonic Wave

Ultrasonic waves in different concentrations of liquid have varying propagation speeds. By using ultrasonic waves to travel a fixed distance in the liquid, then comparing that difference vs. time, the concentration value of a liquid can be obtained.

- Signal: CAN (SAE J1939)
- Accuracy:  $\pm 2\%$  (25%~36% AdBlue®),  $\pm 1\%$  available\*  
 $\pm 3\%$  (<25% AdBlue®, >36% AdBlue®)
- Resolution: 0.25% AdBlue

\*Contact us for more information



## DEF/AdBlue® Quality Sensor with Coolant Control Valve

- Sensor head includes valve (CCV) integrated, which can reduce the SCR hose connections, lower the leakage risks, and save costs
- Reduces the installation space of the CCV with a simple layout
- The integrated CCV maintenance is easier and more convenient
- World-Recognized valve supplier, with superior quality

## Spiral Shape DEF/AdBlue® Quality Sensors

DEF/AdBlue® solutions will freeze at temperatures of  $-11^{\circ}\text{C}$  /  $12^{\circ}\text{F}$ , which will negatively affect the operation of the SCR system. We recommend a coil design DEF/AdBlue® header for cold region operation. The spiral design provides better heating efficiency to thaw frozen DEF/AdBlue® and to allow the SCR system to work properly within the required time after cold engine start. KUS provides a variety of mounting methods including bayonet, SAE screw pattern, and venting or non-vented options depending on customer need.



CS9ET



CS8MT



CS9AT



CS9CT



# CHAPTER

## DEF/AdBlue® Sending Units



DCL8CT

CL9BS



CN8CT



RD8AT

RD8CR

### L-Shape DEF/AdBlue® Quality Sensors

L-Shaped DEF/AdBlue® sensors are developed for customers with large DEF/AdBlue® tanks. The L-shaped tubes extend the heating area of the DEF/AdBlue® sensor and help to thaw frozen liquid and ensure the SCR system works properly. KUS produces a variety of mounting methods including bayonet, SAE screw pattern, and vented or non-vented options depending on customers' needs.

### DEF/AdBlue® Quality Sensors without Heating Function

For warmer locations, where the SCR system does not require a heating function, the DEF/AdBlue® sensors only provide level monitoring and integrated suction/return for DEF/AdBlue®. KUS produces a variety of mounting methods including bayonet with air venting or non-vented options depending on customers' needs.

### DEF/AdBlue® Quality Sensors with Rubber Head

DEF/AdBlue® Sensors with rubber heads are used on narrow tanks, with smaller header mounting ports. The sensor is fixed securely with a clamp, making it easy to install and service, with no special tools required.

**DEF/AdBlue® Reservoir Assemblies**

KUS DEF/AdBlue® Tank Assemblies are produced with high density polyethylene (HDPE) plastic. KUS tanks are engineered with high-impact strength and alkali-resistant properties. Due to various vehicle mounting requirements, we offer different shapes, orientations, and volumes. All tanks are in compliance with ISO-22241 requirements.

KUS offers 10L to 150L (2.6 gal to 39.6 gal) DEF/AdBlue® tanks. Tank size and shape can be customized based on customer requirements or preferences.

KUS DEF/AdBlue® tank functions include liquid storage, pressure balance, manual and automatic refilling control and shut-off, and ISO nozzle compatibility. Sensors are matched with different tanks to best perform in various applications and intense environments.

**Extended Fill DEF/AdBlue® Tank**

- DEF/AdBlue® tanks designed for remote or extended fill properties are available upon request
- Can integrate fill port to specific locations to help meet customers’ fill requirements
- These DEF/AdBlue® tanks are widely used on light-duty vehicles, SUVs, and pickup trucks



80L (21 gal)



55L (14.5 gal)



45L (12 gal)



35L (9.3 gal)



25L (6.6 gal)



20L (5.3 gal)



16L (4.2 gal)



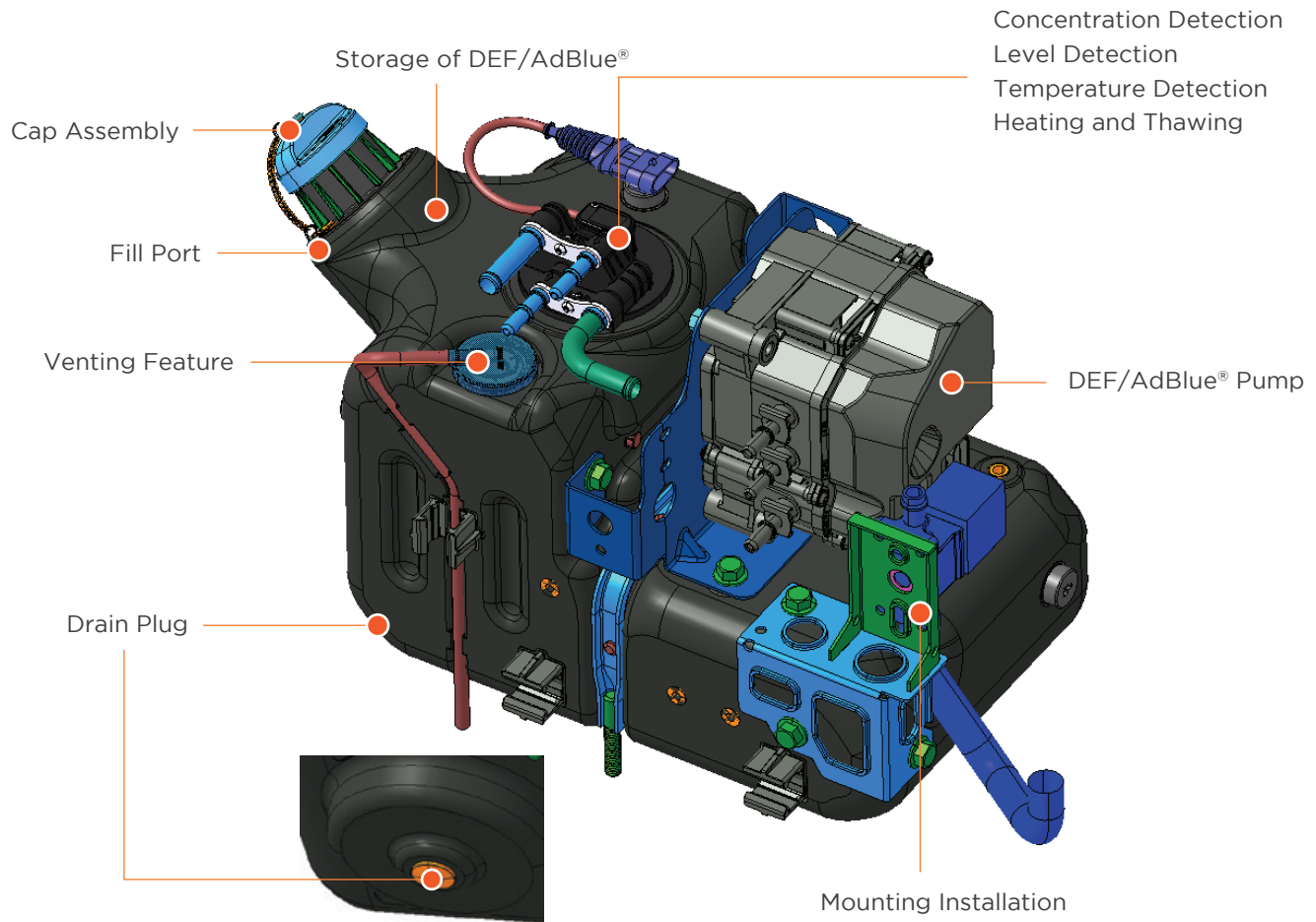
10L (2.6 gal)



12L (3.1 gal)

# CHAPTER

## DEF/AdBlue® Tank Assemblies



KUS DEF/AdBlue® tanks can integrate complex and diverse designs through various molding processes.

### DEF/AdBlue® Tank Parameters

DEF/AdBlue® Tank Parameters		
Storage Medium	DEF/AdBlue®	Corrosive, low temperature crystallization
Material	HDPE	High strength and corrosion resistance
Color	Black	Prevents algae growth and DEF decomposition
Molding Processes	Blow Molding/ Rotational Moulding	Blow molding production capacity is high; Roto molding can produce complex shapes.



## DEF/AdBlue® Tank Assemblies

### Integrated Coolant Control Valve



Solenoid Valve

- MOV: DC24V ( $\leq 20.4V$ )/ DC12V ( $\leq 10.2V$ )
- MOPD:  $\geq 2.5Bar$
- Voltage: DC24V/ DC12V
- Power: 11.5W (DC12V)/ 13W (DC12V)
- Main Material: Copper/stainless steel
- Flow: 15L/min ( $\pm 10\%$ ), Pressure difference 1Bar
- Maximum Particle Size Allowed in the Fluid: 200 $\mu m$
- Work Pressure: 0-5Bar
- Internal and External Leakage:  $\leq 2cc/min$  air, Test pressure AT 7Bar  $\pm 5\%$
- Ambient Temperature: -40-85°C/-40-185°F
- Fluid Temperature: -40-90°C/-40-194°F

### Tank Bracket



### Integrated Filter



Filter

# CHAPTER

## DEF/AdBlue® Accessories

### Extended Filler Neck



### Cap and Filler Neck Accessories



AdBlue® Tank Cap



Magnetic Filler Neck

### Balanced Pressure Function



Vent Valve

### Drain Cleaning Function



Drain Screw

### Integrated Pump Function



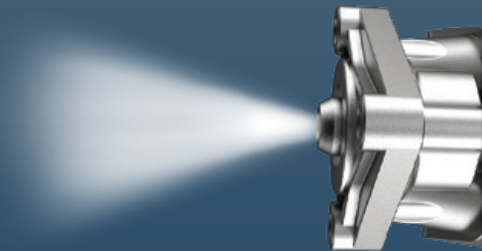
## Nozzle

KUS is staffed with a leading R&D team and state-of-the-art manufacturing capabilities. KUS can assist customers to develop DEF/AdBlue® nozzles for different applications.

- Experienced nozzle production and complete production line
  - Comprehensive verification capability
  - Efficient production of samples
  - Experienced team of technicians
  - Optimized structure and performance capabilities
  - Competitive cost objectives
- 
- Various production processes: hose production, bending, stamping, CNC, welding, brazing, etc.
  - Brazing line that meets AWS C3.6, ASME 2750, etc.
  - Fast production and delivery capabilities







### Electronically Controlled Nozzle

#### Specifications

- Nominal Voltage: 12V/24V
- System Pressure: 9Bar
- Frequency: 10Hz
- Spraying Angle:  $\pm 30^\circ$
- Atomized Particle Size: SMD(D3,2) < 60um
- Working Temperature: -40-120°C/ -40-248°F
- Flow Range: 100g/h-6800g/h
- The diameters of the urea hose and the cooling water hose joint are  $\varnothing 7.89$  mm and  $\varnothing 9.49$  mm, which conforms to the SAE J2044-2009 standard.

Annular cooling water channel, uniform cooling

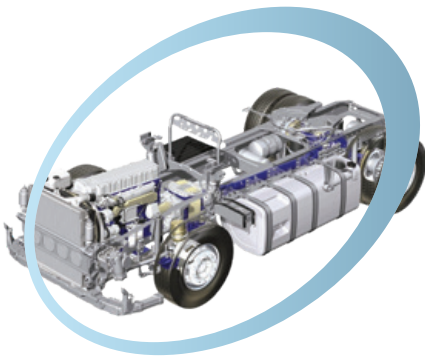
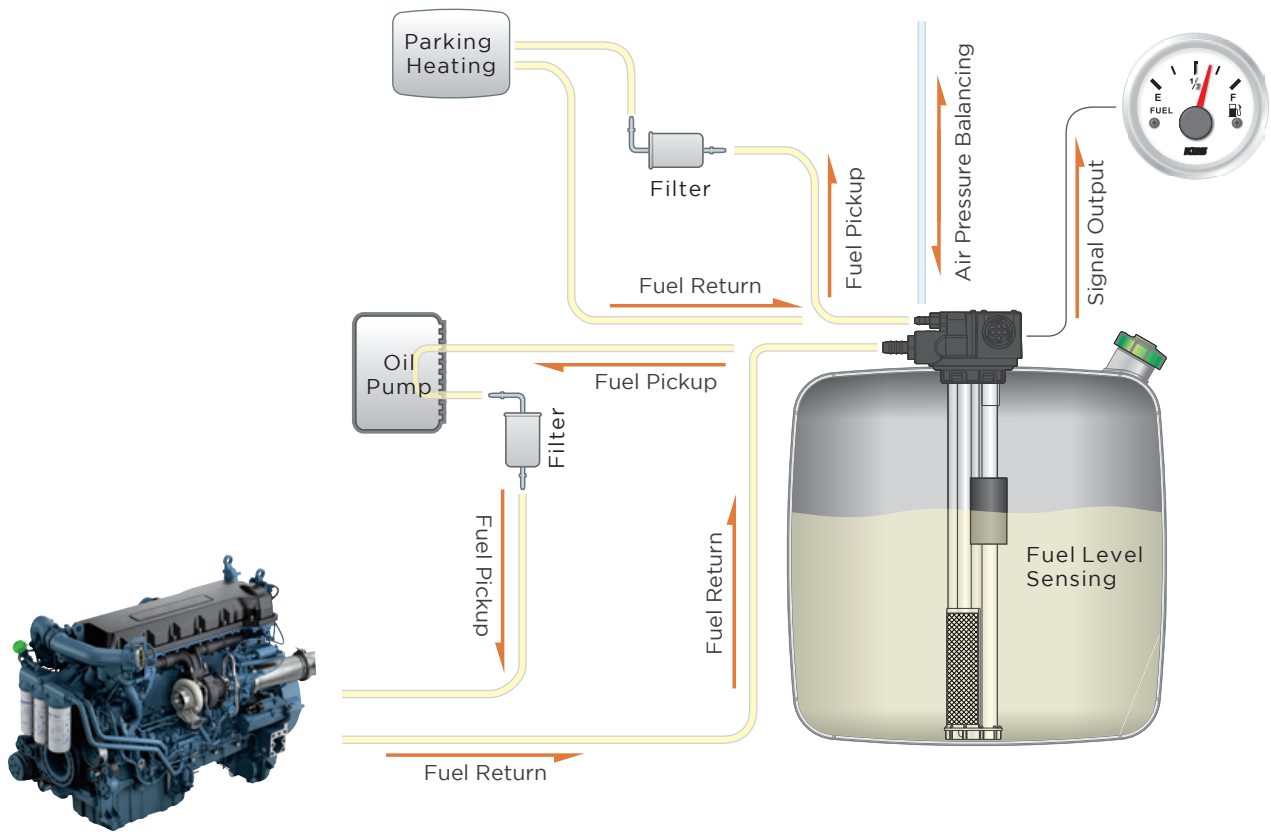
Favorable spraying effect

Parameter	Value	Remarks
Nozzle Holes	3	
Nozzle Angle	120°	
Conical Atomization ( $\alpha$ )	20°±5°	DEF/AdBlue® pressure 900kPa Ambient temperature 21±2°C
Radial Deviation Angle ( $\delta$ )	--	
Axial Deviation Angle ( $\gamma$ )	--	
Atomization Particle Size (D32)	60um	Deionized water Pressure 900kPa

# CHAPTER

## Fuel System Application

KUS has a variety of solutions available for fuel and water level detection. Reliable and customized solutions can be developed with our strong R&D capabilities. KUS sensors and gauges are recognized by OEMs for superior quality and performance.



# CHAPTER

## Fuel Level Sensors



SAP



SAF



SAG



SAD



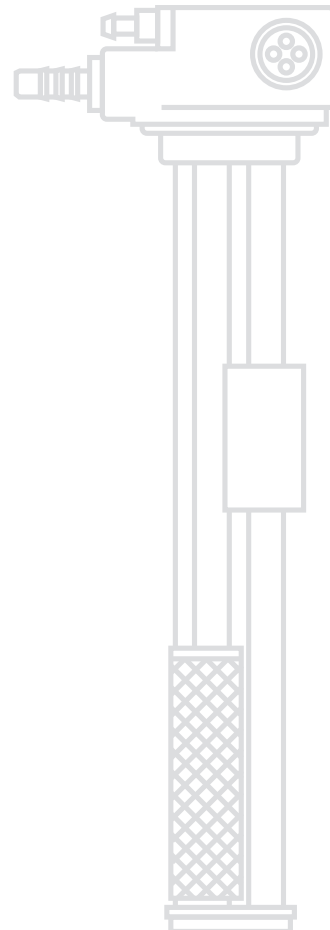
SADH

### Aluminum Sensors

KUS Aluminum sensors are used in applications such as trucks and buses. In addition to measuring fuel level, SAP sensors are equipped with engine inlet/outlet, parking heating system inlet/outlet, and air valves to balance the pressure inside and outside the tank to prevent fuel leakage during rolling over.

- Main Material: High quality aluminum alloy
- Installation: Bayonet twist for easy assembly
- Signal Output: Resistance, voltage, current or CAN-BUS signal

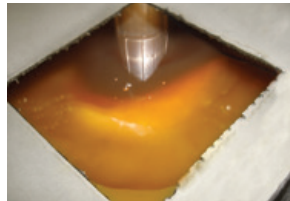
### Other Multi-function Fuel Sensors





### Heating Fuel Sensors

Heating Fuel Sensors adopt PTC heating or engine coolant circulation which has high heating efficiency and can autonomously control the temperature. Combustion efficiency can be increased by 5% while reducing exhaust emission pollution.



### High Resolution Integrated Level Sensors

High Resolution Integrated Level Sensors combine multi-functions such as measuring liquid level, suction/return hoses for engine and vehicle heating systems, balancing pressure of the tank and atmosphere, and temperature alarm.

- Main Material: High quality aluminum alloy
- Resolution: 1mm
- Accuracy: 2mm
- Measuring Principle: AMR Capacitance
- Signal Output: Resistance, Voltage, CAN, SENT,

The Capacitance Level Sensor (CLS) is used to continuously detect fuel level by measuring the capacitance variations as the level changes. The Capacitance Level Sensor combines strong stability with long service life.

- Sensor length range is 300mm-1500mm and can be customized
- Installation: SAE standard 5-hole flange, other installation methods are available



SPEHH



SAH



KAB



SADR



CLS2



CLS4

# CHAPTER

## Fuel Level Sensors



TN

### Stainless Steel Sensors

The TN series are used for light trucks, construction machinery, and yachts. Besides measuring the fluid level, an additional suction/return hose or air ventilation for engine can be customized.

Main Material: Stainless steel

Installation: SAE standard 5-hole or 6-hole flange, bayonet twisted is also available

Signal Output: Resistance, voltage, current or CAN Bus signal



PS5D

PS5

S5

S3

### Single-Tube Sensors

The S5 & S3 series are widely used in various fuel, water, or chemical tanks. Offering a simple yet reliable structure, the S5 and S3 sensors are offered in lengths from 4 to 90 inches.

- Material: SS 316 & SS 304
- Installation: SAE standard 5-hole, BSP or NPT thread

The PS5 & PS5D sensors are widely used in fuel tanks, water tanks, and other liquid tanks. This sensor has the advantages of lightweight and competitive cost.



### Fuel Tank Caps

KUS Fuel Tank Caps balance the air pressure between the interior and exterior of the tank. The cap can be made of engineering plastic or metal, and can be equipped with lock and key, and with ventilation or without ventilation based on customer preference.

## TPMS-Nozzle Type

- Simple and quick installation
- The air nozzle is locked and fixed in place to eliminate the risk of becoming loose
- Standard size air nozzle, commonly used and easy to fit with most applications
- The sensor position is clear and easy to identify
- Installed in the concave position of the rim; without protrusions, there is a lower risk of damage



TPMS-Nozzle Type

## TPMS-Strap Type

- The external antenna signal is stable, and the flexible design makes the antenna resistant to breakage
- The antenna is independent of the rim
- Installation is not limited by the structure of the gas nozzle



TPMS-Strap Type

## Tire Pressure Monitoring Receiver

Inside the tire pressure monitoring receiver is a single chip microcomputer, an antenna, and a bus chip. After receiving the information from the sensor or the repeater, the receiver will perform data analysis, and fault and location judgment. Then the receiver communicates the information to the display terminal. Can communicate with the vehicle network through the CAN protocol.

The receiving box has an integrated antenna and housing design. This allows the unit to be small and waterproof while remaining consistent and stable.



Tire Pressure Monitoring Receiver

# CHAPTER

## New Energy Products



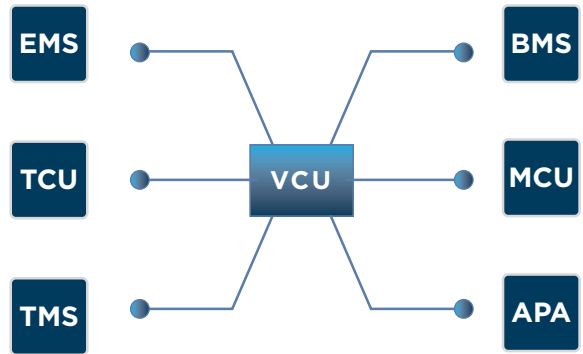
Vehicle Control Unit



PTC Heater Unit

### Vehicle Control Unit

A Vehicle Control Unit (VCU) is the central controller of the power system in electric and hybrid vehicles. It manages various functions such as torque coordination, operation and gear-shift strategies, charging control, on-board diagnostics (OBD), monitoring, thermal management, as well as safety performance and more. By processing the signals collected from the accelerator, braking system, power steering mechanism, and other components, the VCU controls vehicle functions and handles tasks in complex wired systems.



### PTC Heater Unit

PTC Heater Units (coolant/water, or air) are used in electric, hybrid, and fuel cell vehicles. These PTC Heaters help to provide heat sources for in-vehicle air conditioning systems and battery thermal management. PTC Heaters increase electrical resistance at temperatures above a set value, which enable them to maintain a constant heating temperature during load and supply voltage changes, while maintaining a high safety factor. The overall structure is composed of radiators (including PTC heating packs), coolant flow channels, a main control board, high/low pressure connector, and an upper shell. It ensures stable heating power, high heating efficiency, and constant temperature control for various applications and designs.

### Applications

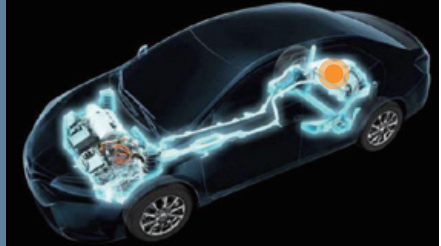
HFCV



EV



HPA





### Pressure Sensor Series

KUS pressure sensors are controlled and manufactured under strict processes to ensure high quality and performance. The fitting threads and output resistance are customizable.



### Temperature Sensor Series

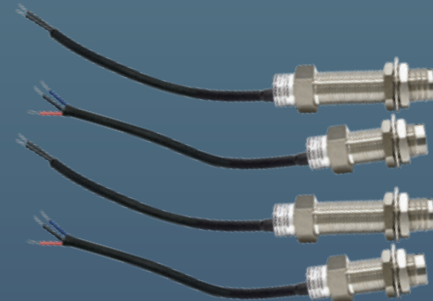
KUS water and oil temperature sensors are compatible with other major gauge brands. Compatibility makes it easy for customers to change subparts. A temperature alarm to prevent overheating can also be added.



### Tacho Sensor Series

KUS tacho sensors are used for measuring gear rotational speed. The shell appearance, material, and thread fitting can be customized.

- Measuring principle: Holzer, Magnetolectric



### Water Level Switch Series

The KUS water level switch includes a low liquid level alarm function. When the liquid level is lower than the preset position, the alarm switch signal is sent to the external device after a 10 second delay. The alarm delay is integrated to prevent the liquid level from deviating and causing a false alarm. Alarm duration is 0-25s (factory setting).



## CHAPTER

## Gauge Series



## Multifunctional Digital Instrument KMG Series

- For NMEA2000, the signal sequence number can be set on KMG
- Compatible with J1939 & NMEA 2000
- Supports 4 different analog signal inputs: Tacho sensor, Fuel, Water temperature, and Oil pressure
- IP67 protection rating
- Fast running speed, low power consumption, high frequency operation

## Digital Instrument Panel KMB Series

The KMB instrument panels are integrated data monitors with an advanced TFT (Thin Film Transistor) screen. The unit is compatible with J1939 and NMEA 2000 systems. The KMB displays real time network information including engine output, fluid levels, and speed. KUS can also customize the unit to meet customer requirements.

## Single Instrumentation Gauges Sea Q Series

- Can be used in trucks, busses, engineering machinery, generators, etc.
- Material: Stainless steel bezel with reverse polarity connection protection
- Double layered anti-fog lens
- Connection: 6.3\*0.8mm terminal strip, can be connected quickly
- Backlights: Red and yellow options available
- Display Accuracy: <math><3^\circ</math>
- Protection Grade: Surface IP67

## **KUS GROUP**

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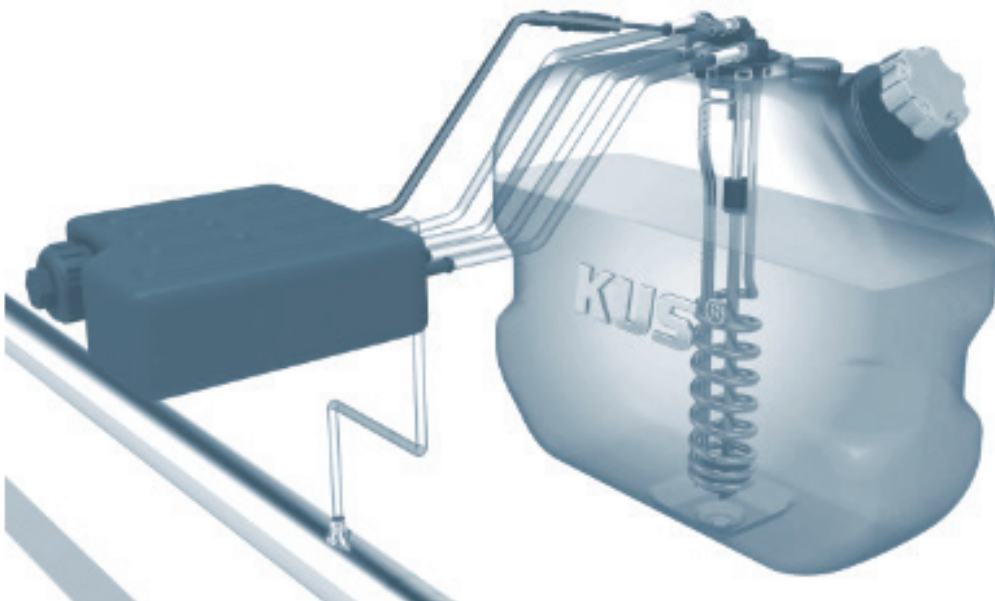
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# CHAPTER

## Manufacturing Capabilities

KUS has various advanced production processes and equipment: German TÜV certificated tube manufacturing line, more than 80 sets of injection machines, over 240 sets of CNC machines, advanced blow molding machines, high quality brazing lines, automatic SMT, and high-performance automatic soldering, etc. More than 95% of the key parts are made in-house which gives KUS the flexibility to customize parts specific to customer requirements.

The Manufacturing Execution System (MES) introduced by the KUS Group reports real-time activities, such as MES guidance, initiation, and response, during production. It allows our production respond quickly to change and increases the efficiency of operations.

**DEF Quality Sensor Automated Production Line****DEF Quality Sensor Automated Production Line****SMT****Hose Forming****Wave Soldering****CNC Machining****Injection Molding****Internal Mixer****Brazing****Tooling Manufacturing****Blow Molding**



# CHAPTER

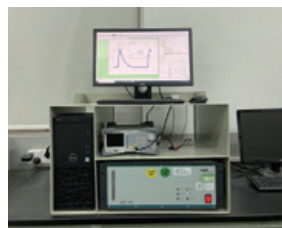
## R&D Capabilities



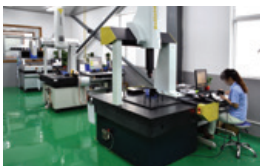
**Environment Test Laboratory**



**Vibration Laboratory**



**Electronic Laboratory**



**Measurement Center**



**Lifetime Test Laboratory**



**Chemical Laboratory**



**Physics Laboratory**

KUS has continuously pursued innovation. With more than 30 years of automotive electronic component design and manufacturing experience and 200 patents, KUS' strong R&D capabilities have laid the groundwork for KUS Group's high-tech enterprises. From concept to application solution, KUS has produced products for the world's leading OEMs.

KUS R&D team has nearly 500 people. With the introduction of international cooperation concepts, KUS conducts product development and testing with the world's leading commercial vehicle and off-road vehicle manufacturers to provide customers with optimized product solutions.

To ensure R&D activities conform to V-model development, APQP, and other related processes, the KUS equips the R&D department with product lifecycle and software management tools such as PLM and ALM utilization, and code testing tools such as Tessy, Polysapce, LDRA, IQ-RM Pro, DFMEA, and PFMEA reviews. The KUS labs, which are comprised of an are more than 1,600 square meters, have passed the ISO 17025 certification and obtained CNAS authorization. The lab has test rooms for environmental, vibration, electronic, aging, physical, chemical and measurement tests. The labs professionals have expertise in fields like machinery, automation, electronics, and materials.