QLS-PL Series In Tank Urea Sensor



- **All-in-one solution for DEF tank:**
  - Urea level (sensor length 300mm to 900mm)
  - Urea temperature
  - Urea concentration
  - Detection of unauthorized fluids
  - Urea suction line (with integrated filter)
  - Urea return
  - Tank thawing (using engine cooling system)
  - Tank vent
- **Factory calibrated in compliance with** DIN70070 / ISO 22241 standards
- **Sensor design compliant to** Cummins AEBs 21.112 and 21.79
- **Data output compliant to:** SAE J1939, CAN 2.0A or CAN 2.0B, Cummins AEBs 15.139, 15.140, 15.141 and 15.149

DESCRIPTION

Our range of UREA/DEF sensors offers design engineers reed switch reliability. The design allows for sensing liquid level along with UREA/DEF temperature and quality. Available in a range of customizable lengths and resistance value outputs to meet your specific tank requirements.

The integrated Urea Quality Sensor (UQS) is a sensor that directly and simultaneously measures the chemical properties of aqueous urea solution. Relying on an optical NIR technology, the measurements of urea concentration and temperature enable users to determine if the quality of employed reducing fluid will enable Selective Catalytic Reduction systems to achieve optimal performance. In-tank real time urea analysis allows high performance algorithm to provide both SCR system protection, by differentiating unauthorized fluids, and direct feedback to urea feed control systems or ECMs to optimize emission control for NOx reduction. The UQS is an important tool for meeting regulated OBD compliance to confirm urea presence and concentration and security signal communication. A universal digital CAN J1939 compliant protocol provides easy to connect interface to main control systems (i.e., ECM, SCR feed control, OBD bus). A simple 4 pins connector allows cost effective mounting options.

The NIR chemical analysis technology relies on the measurement of fluid chemical bonds to detect unauthorized fluids and allows identification of proper fluid.

FEATURES

- High reliability and long term stability
- Optimized for OEM specifications
- Urea resistant DIN7070/ISO22241
- In-tank mounting
- Freezing resistant
- Range of sizes to suit your application
- High reliability reed switch technology
- Urea feed and return in the header
- Integrated filter

APPLICATIONS

- Diesel Engines
- Passenger Vehicles
- Buses & Trucks
- Commercial On and Off Highway Vehicles

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PERFORMANCE SPECIFICATIONS

MAXIMUM RATINGS

Ratings	Symbol	Value	Unit
Supply voltage (peak)	Vcc	36	Vdc
Ambient Operating Temperature (electronics) *	Te	-40 to +125	°C
Ambient Operating Temperature (fluid) **	Tf	-40 to +90	°C
Storage Temperature	Tstg	-50 to +125	°C
Input current @ 12 VDC (in rush)	Ipk	600 (t<200ms)	mA
Vibration (peak)		20	Grms

Peak conditions: less than 10% of the operating time.

* Ambient Operating Temperature: Service temperature range at which the sensor and its electronics can operate securely

** AdBlue / DEF classically freeze at temperature inferior to -11°C and quickly de grades at temperature superior to 40°C

METROLOGICAL CHARACTERISTICS

Measurement ranges QLS	Symbol	Min	Typ	Max	Unit
Urea concentration	%urea	0	32.5	62.5	%mass
Response time urea concentration sensing @ 25°C			<20	120	s
Urea concentration accuracy (in the 0-40% range and 0 +60°C range)		-2		+2	%mass
Urea concentration accuracy (out of the previous described range)		-3		+3	%mass
DEF Fluid Temperature *	T	-11		70	°C
Fluid Temperature **	T	-40		90	°C
Response time temperature sensing @ 25°C			<20		s
Temperature Accuracy	T		+-1		°C
Urea level sensing range		300		900	mm
Response time urea level sensing @ 25°C	t		<20		s
Urea level sensing resolution***		12		22	mm

* AdBlue / DEF fluids classically freeze at temperature inferior to -11°C and quickly degrades at temperatures superior to 40°C.

** Temperature sensor is capable within the -40 to 125°C range with a 1°C accuracy.

*** Accuracy +/-5mm

ELECTRICAL CHARACTERISTICS

(@Vcc=12 Vdc, ambient temperature)

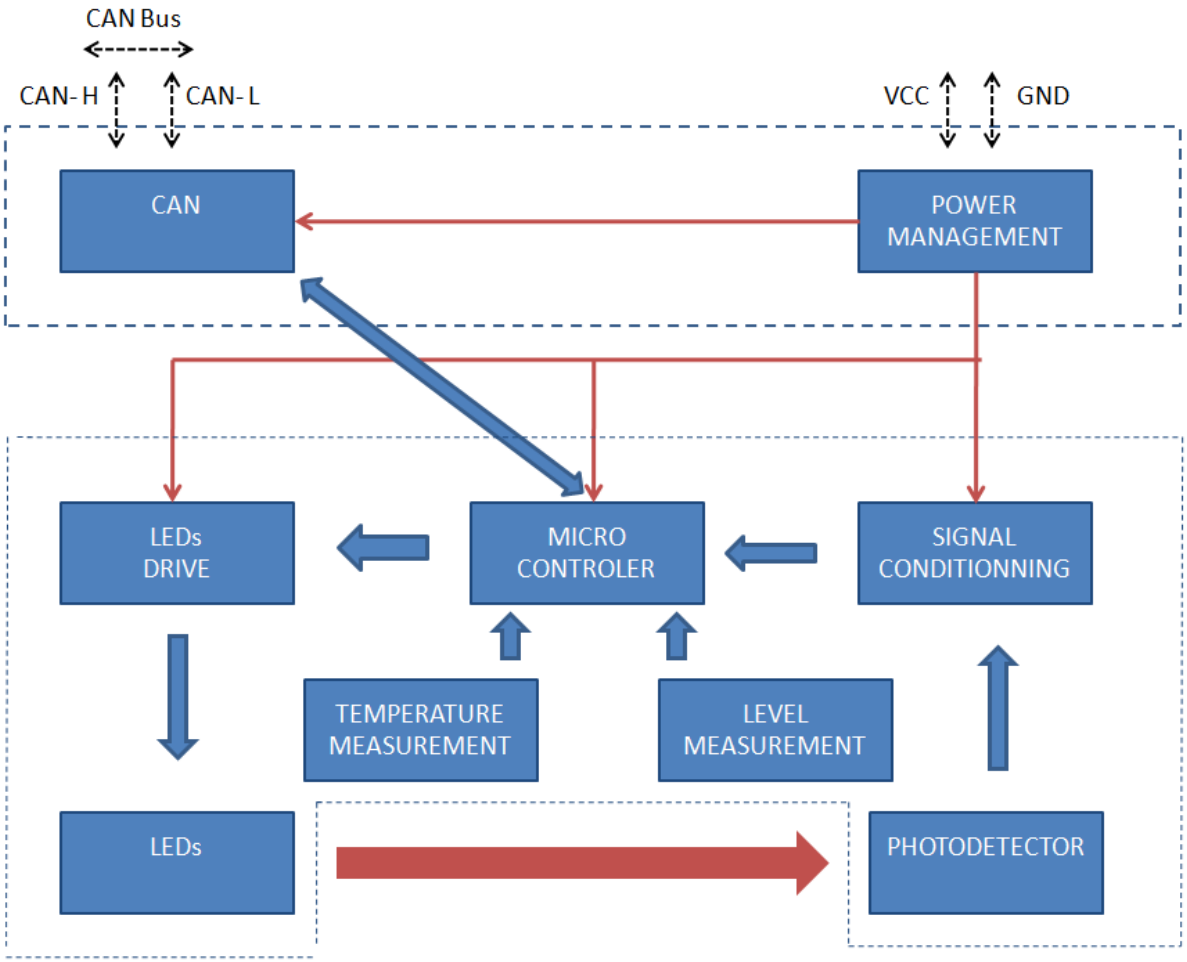
Electrical characteristics	Symbol	Min	Typ 1	Typ 2	Max	Unit
Supply Voltage	VBatt	9	12	24	36	Vdc
Supply Current @ Vbatt (steady state)	Iavg	45	35	25	18	mA

CONNECTION & MECHANICAL PACKAGING

LEVEL AND PICK UP UNIT

Mounting	Vertical
Housing Material	Stainless Steel/ Rubber
Float Material	Buna N
Fitting	90 mm Ø with band clamp or customized
Level, heating and pick- up tubes	Stainless Steel
Filter	Gradient depth media
Filter geometry	100 µm (Optional 40µm)
Sealing Components	Rubber Header
Connection Type	FCI 4 Pole or Deutsch DT04
IP Rating	IP 67

BLOCK DIAGRAM



TRANSMISSION DATA

UREA QUALITY LEVEL SENSOR J1939 STANDARD SPN AND STANDARD PGN

PGN 64923 is related to catalyst reagent properties

CAN Frame description

Baud rate = 250 Kbit/s or 500Kbit/s (auto-baudrate detection)

Catalyst Reagent Temperature: SPN 3515	Min	Typ	Max
Limits (°C)	-40		125
Limits (DATA)	0x00		0x9F
Resolution (°C per bit)		1	
Offset (°C)		40	
Byte position		1	
Update rate (s)		1	
Catalyst Reagent Concentration : SPN3516	**Min**	**Typ**	**Max**
Limits (%)	0		62.5
Limits (DATA)	0x00		0xFA
Resolution (% per bit)		0.25	
Offset (%)		0	
Byte position		2	
Update rate (s)		1	
Catalyst Reagent Tank Level : SPN 1761	**Min**	**Typ**	**Max**
Limits (%)	0		100
Limits (DATA)	0x00		0xFA
Resolution (% per bit)		0.4	
Byte position		1	
Update rate (s)		1	

Catalyst Reagent Type : SPN3521	This parameter indicates what reagent is in the SCR system
0011	Proper fluid
0010	Diesel
1101	Not able to determine catalyst reagent type
1110	Error detected with urea reagent type detection
1111	Not available

Failure status and diagnostic of the sensor are defined by SPN 3519,3520 and 3532.

Operating Condition / Failure Mode	SPN 3516 %	SPN 3520 FMI %	SPN 3521 Type	SPN 3515 & 3031 T°C	SPN 3519 FMI T°C	SPN 1761 LEVEL	SPN 3532 FMI LVL
Fluid T°C > 125°C	0xFB	31	0xE	125°C	15	0xFB	31
Fluid T°C < -40°C	0xFB	31	0XE	-40°C	17	0xFB	31
Fluid T°C < -8°C	0xFB	31	0xF	X	31	0xFB	31
Fluid T°C short circuit	0xFB	31	0xF	0xFE	4		
Fluid T°C open circuit	0xFB	31	0xF	0xFE	3		
Optical data incorrect	FE	2	0xE				
%urea < 0%	0%	17	0xX				
%urea > 62,5%	62,5%	15	0xX				
Level short circuit						0xFE	4
Level open circuit						0xFE	3
LVL < 0%						0%	17
LVL > 100%						100%	15
AdBlue detected	X	X	0x3				
Diesel detected	0xFB	31	0x2				
No Flag	X	31	0xD	X	31	X	31

ORDERING INFORMATION

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