



## FUEL FLOW METER PUM

### Product highlights

- **Compact** ultrasonic flow meter suitable for fuel flow measurement in various motorsport categories
- **Ultrasonic** flow meter with no moving parts subject to wear
- High **accuracy** and **repeatability**
- Variable Flow **measurement frequency** up to 4 kHz
- **Anti-aliasing** features
- **Long lifetime** under rough operating conditions

### Applications

- Motorsports
- Motorbikes
- Quads
- Snowmobiles
- Karts
- Injectors monitoring systems
- On-board Testing (WLTP)

### Description

The **Allengra PUM fuel flow meter** is tailored for operation in the fuel line of internal combustion engines under high vibrations and quick pulsating flow conditions. Without moving parts or components subject to wear, a long lifetime can be guaranteed.

## 1. Technical data

### 1.1. FLOW MEASUREMENT

Measurement element:	Ultrasonic transducers	
Measurement range:	+/- 5 – 8000 ml/min	+/- 0.3 – 480 L/h
Accuracy:	< +/- 0.5% of measured value	
Repeatability	< +/- 0.25%	
Response time:	< 3 ms	

### 1.2. TEMPERATURE MEASUREMENT

Measurement element:	2x Platinum chip resistor (PT1000)	
Measurement range:	0 – 110°C	
Accuracy:	0.3K	
Repeatability:	0.15K	
Response time:	T95 <2s	

### 1.3. PRESSURE MEASUREMENT

Measure element	2 x Monolithic pressure sensor	
Measurement range:	-0.1 – 10 barG	
Accuracy:	± 0.1 bar	
Repeatability:	± 0.01 bar	
Response time:	< 100 ms	
Differential Pressure Accuracy	± 0.03 bar	

## 2. Environmental data

### 2.1. OPERATING CONDITIONS

Mediums:	All types of gasoline blends
Operating liquid temperature:	0 – 80°C
Ambient temperature:	0 – 80°C
Thermal shock:	Up to 100 °C
Storage temperature:	- 40 – 80°C (without freezing liquids inside)
Operating pressure:	- 0.1 – 10 barG
Over pressure:	15 barG
Burst pressure:	25 barG
Protection class:	IP68
Relative humidity:	< 95% rh
Lifetime:	> 5 years (inspection > 1 year)

### 2.2. SUSTAINABILITY

RoHS:	Compliant
Reach:	Compliant

### 2.3. MATERIALS

Wetted parts:	AISI304, AISI316, PEEK, FKM
Non-wetted parts:	AISI304

### 3. Electrical data

Supply voltage:	5.5 – 24 VDC
Current consumption:	<70 mA @ 12V <150mA @ 5.5V
Electrical connector:	Deutsch ASDD006-09-PA-FI-952K
Mating connector:	Deutsch ASDD606-09SA-FI-952K
PIN assignment:	1 – Supply +ve 2 – CAN +ve 3 – CAN -ve 4 – Reserved 5 – Reserved 6 – RS485 (ModBus A) 7 – RS485 (ModBus B) 8 – CAN Select (Loom resistor) 9 – GND

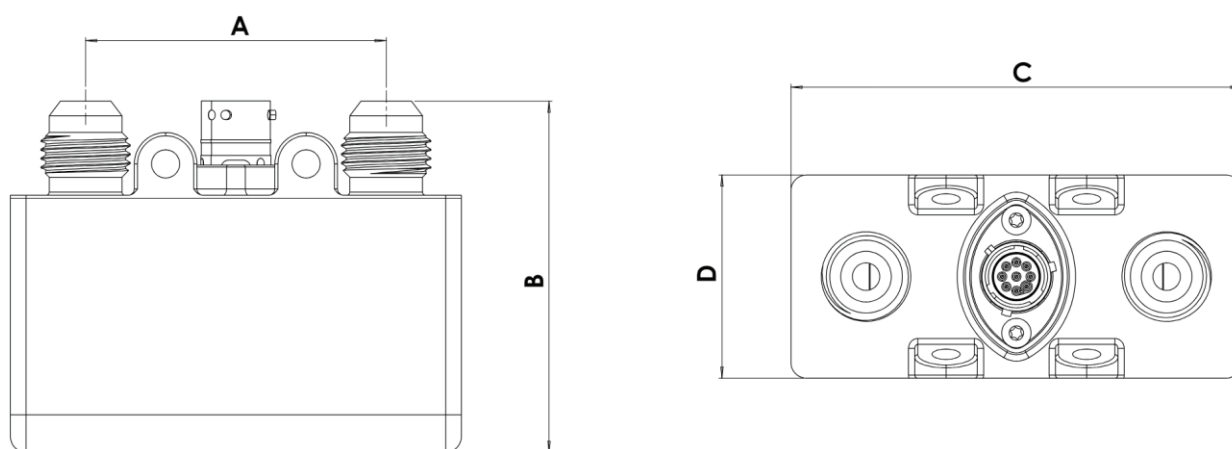
#### 3.1. OUTPUT SIGNALS

CAN/CAN-FD	
Standard:	ISO 11898-2 (high-speed applications)
Message format:	2.0A (11 bit identifier)
Baud rate:	1 Mbit/sec
Termination resistor:	open
Base ID:	0x190
Encryption:	AES128 CBC
Encrypted Base Address	0x390
RS485	
Designation:	Firmware update and configuration

## 4. Mechanical

Hydraulic connections:	2x 6AN male
Pressure drop:	~170 mBar @ 100 l/h, 25°C (depending on gasoline type)
Weight:	~240g (dry)
Fixation:	2x $\Phi$ 4.2mm
Inlet/Outlet:	Marked on sensor

### 4.1. DIMENSIONS



A	48 mm
B	56 mm
C	72 mm
D	32.4 mm

## 5. CAN Details

### 5.1. CAN Select (Loom resistor)

Loom detect resistors	Base ID
Open	0x190
10k	0x1A0
5k6	0x194
3k3	0x1A4
1k8	0x198
470R	0x19C

### 5.2. CAN message structure

Base ID + 0								
Message description:		Mass flow, Volume flow, Mass total						
Message ID:		Base ID + 0						
Message format:		Big Endian (MSB First)						
Message rate:		100 Hz						
Message Type:		Continuous Transmit @ message rate						
Filter:		Filtered flow values (4th order low pass Butterworth with 25Hz – 3dB cut-off frequencies)						
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	
Volume flow (16 bit signed integer MSB first)		Mass flow (16 bit signed integer MSB first)		Total mass (32 bit signed integer)				
Base units: 0.5 ml/min per bit		Base units: 0.5 g/min per bit		Base units: 1g per bit				
Max: 16,384.0 ml/min Min: -16,384.0 ml/min		Max: 16,384.0 g/min Min: -16,384.0 g/min		MSB		LSB		
BASE ID + 1								
Message description:		Multiplexed debug and diagnostics message						
Message ID:		Base ID + 1						
Message format:		Big Endian (MSB First)						
Message rate:		100 Hz						
Message Type:		Continuous Transmit @ message rate						
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	
Speed of sound, 0.1 m/s/bit		0	CAN ID select (1, 2, 3, -)	Fuel temperature (0.01 degC/bit signed)	PCB temperature (0.1degC/bit signed)			
		1	CPU 1 SW Version	Min fuel temperature (0.01degC/bit signed)	Max fuel temperature (0.01degC/bit signed)			
		2	CPU 2 SW Version	Min PCB temperature (0.1degC/bit signed)	Max PCB temperature (0.1degC/bit signed)			
		3	Boot SW version	Hardware version (unsigned)	Supply voltage (0.1V/bit unsigned)			
		4		Diagnostics bitword (unsigned)	Seconds from hardware reset (s unsigned)			
		5	SW programming counter	Latched diagnostics bitword (unsigned)	Total time with flow / Service Indicator (min unsigned)			
		6	Manufacturer calibration counter	Manufacturer status bitword (unsigned)	Elapsed time indicator (min unsigned)			
		7	Third party calibration counter	Sensor serial number (unsigned)	resistor sense input voltage (0.01V/bit unsigned)			
		8	Density calibration counter	CPU 1 software checksum (unsigned)	density calibration checksum (unsigned)			
		9	Reserved	Bootloader checksum (unsigned)	density value in use (0.1kg/m3/bit, unsigned)			
		10 (A)	Product identification	Configuration checksum (unsigned)	Reference density at a reference temperature (0.1kg/m3/bit, unsigned)			
		11 (B)		Calibration checksum (unsigned)	Reference temperature for density calibration (0.1degC/bit unsigned)			
		12 (C)		Third party calibration checksum (unsigned)	Slope (Density vs temperature) (0.001 kg/m3/degC/bit signed)			
		13 (D)			PCB serial number			
		14 (E)			CPU 2 software checksum (unsigned)			
		15 (F)			X axis accelerometers ABS integral (1g.s/bit signed)			
		16 (10)			Y axis accelerometers ABS integral (1g.s/bit signed)	Z axis accelerometers ABS integral (1g.s/bit signed)		
		17 (11)			Pressure 1 (0.01 barG/bit signed)		Pressure 2 (0.01 barG/bit signed)	
		18 (12)			ΔPressure (0.001 barG/bit signed)			
	19 (13)							



## About Allengra

Allengra GmbH based in Germany and Romania, founded in 2005, is capable to develop and produce standard or OEM devices for ultrasonic flow sensors and control valves for liquids and gases, tailored on the end client application.

The complete development and manufacturing processes are carried out in our company and we are able to transform an idea into a robust serial product thanks to the various engineering departments and prototyping skills.

The core technology of Allengra, ultrasonic metering has been refined over the years to a level where both integration into high-end devices and cost-effective applications are possible.

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Do you have a project that needs a flow, temperature, pressure measurement or an electric valve?

Do not hesitate to contact us at [info@allengra.eu](mailto:info@allengra.eu) for a solution.

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