

## Test cell 1, Main specifications

### Speed and torque control.

Load unit	Measurement range	Accuracy
AVL Alpha 500 eddy current dynamometer AVL EMCON 400 Control system	0 – 500 kW from 2 380 – 8 000 RPM 0 – 2 000 Nm from 1160 – 2 380 RPM Mass moment of inertia, 3,64 kgm <sup>2</sup>	± 0.2 % of full scale for the total system

### 53 Analogue input channels for temperature, pressure, voltage, measurements.

Sensor / signal	Measurement range	Accuracy	Measurement rate Values / second
Up to 45 Thermocouple possible.	-270 to 2 320 °C Depending on TC type	0,1 %	≤600
Pt 100, Pt 1 000	-270 to 850 °C Depending on Pt type	-50 to 200 °C ± 0,1 °C 200 to 650 °C ± 0,2 °C	≤600
Voltage	±10V	0,01 %	

### 15 built in pressure sensors

Sensor / signal	Number of sensors	Measurement range	Accuracy	Measurement rate Values / second
Pressure	11	-1 to 3,0 bar	For ambient Temp. -20 to 80 °C ± 0.1 % FSO	≤600
	3	0 to 10 bar		
Barometric press.	1	800 to 1 200 mbar	± 0.5 mbar	

### 8 analogue inputs for high measurement rate

Sensor / signal	Measurement range	Accuracy	Measurement rate Values / second
Voltage	± 156 mV ± 10 V	0,01 %	≤50 000

### 4 Digital input channels for speed and frequency measurement.

Sensor / signal	Measurement range	Accuracy	Measurement rate Values / second
Frequency	≤30 kHz	± 10 Hz	≤600

### 2 digital outputs

Sensor / signal	Max. switching voltage and current	Accuracy	Measurement rate Values / second
Voltage	50 V DC 2,5 A DC		

### Environmental sensor, Vaisala HMI 33.

	Measurement range	Accuracy
Relative humidity	$\phi$ %-rh 0 – 100 %	$\pm 1$ % rh
Temperature	°C -40 -- 160	$\pm 0,5$ °C

### Air mass flow meter

Measuring principle	Measurement range	Accuracy
Hot film anemometer	0 – 2 400 kg/h (Different ranges are available)	$\pm 1$ %

### Dynamic fuel meter (AVL 735)

Measuring principle	Measurement range	Accuracy
Coriolis principle	0-125 kg/h	$\pm 0,1$ %

### Diesel exhaust smoke measurement.

Measuring principle	Measurement range	Accuracy
AVL Opacimeter 439	Light absorption 0 – 10 / m	$\pm 0.0025$ / m
	Opacity range 0 – 100 %	$\pm 0,1$ %

### AVL emission bench for exhaust gas measurements.

Exhaust component	Measurement range	Accuracy
CO	0 – 2 500 ppm	Repeatability 1 % FS Linearity 1 % FS
	0 – 5 %	
THC	0 - 540 ppm	Repeatability 1 % FS Linearity 1 % FS
	0 – 1 000 ppm	
NO / NOx	0 – 1 500 ppm	Repeatability < 0.5% FS Linearity < 1 % FS
	0 – 10 000 ppm	
CO2	0 – 16 %	Repeatability 2 % FS Linearity 1 % FS
CO2 EGR (for EGR meas.)	0 – 16 %	Repeatability 1 % FS Linearity 1 % FS
O2	0 – 25 %	Repeatability < 1 % FS Linearity < 1 % FS

### Additional equipment available for any test cell

Equipment	Type
NH3 measurement	NEO laser for NH3 measurements
Particulate measurement	Control System Pss-20 Mini dilute tunnel
NOx analyser	Additional stand alone NOx analyser
Particulate weighing chamber	Temperature and humidity controlled
Micro soot sensor	AVL 483
Urea injection and control system	Air assisted atomization. PWM and frequency controlled dosing
HC injection and control system	Air assisted atomization. PWM and frequency controlled dosing
Exhaust cooler	Tubular heat exchanger