

**Test cell # 1: AVL EMCON 400 test system equipped with following measurement and control modules.**

**Speed and torque control.**

Load unit	Measurement range	Accuracy
Zöllner eddy current dynamometer	0 – 350 kW from 2200 – 10000 RPM 0 – 1500 Nm from 1600 – 2200 RPM	± 0.2 % of full scale for the total system

**30 input channels for temperature, pressure, voltage, resistance and current measurements.**

Sensor / signal	Measurement range	Accuracy	Measurement rate Values / second
Pt100, Pt 1000	-50 to 650 °C	-50 to 200 °C ± 0,1 °C 200 to 650 °C ± 0,2 °C	-800
Thermocouple Type K Other types;J,R,S,T,B,E	-200 to 1370 °C	± 0,5°C	
Voltage	± 11 V	1 mV	
Current	± 20 mA	10 µA	
Resistance	20 to 200 Ω	± 0,2 Ω	
	200 to 2000 Ω	± 2 Ω	

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	-800
	3	0 to 10 bar		
Barometric press.	1	800 to 1200 mbar	± 0.5 mbar	

Strain gage	Max. bridge Detuning	Accuracy	Supply voltage	Measurement rate Values / second
120 Ω	± 35 mV/V	± 5 µV/V	0.58 V	-800
35 Ω	± 15 mV/V	± 2,5 µV/V	1.34 V	
3,5 Ω	± 8 mV/V	± 1.25 µV/V	2.63 V	

**8 input channels for indicating measurement.**

Sensor / signal	Measurement range	Accuracy	Measurement rate Values / second
Voltage	± 11 V	1 mV 10 µA	-50000
Current	± 20 mA		

## 11 input channels for speed and frequency measurement.

Sensor / signal	Measurement range	Accuracy	Measurement rate Values / second
Frequency	1 Hz to 300 kHz	25 ppm	-800
	10 Hz to 300 kHz		
	100 Hz to 300 kHz		
Period	< 10 s	25 ppm	-800
	< 1 s		
	< 0.5 s		
	< 0.01 s		

## 20 digital outputs for processing digital control signals.

Input voltage	5 – 24 VDC
Relays	5 A, 50V

## 2 analog outputs for demand value setting from the automation system.

Specification	Output signal type	
	Voltage	Current
Signal range	-10 to 10 V	± 25 mA
Resolution (14 bit)	336 µV	763 nA
Max. error at 25 °C	± 2 mV	± 10 µA
Max. error from 0 to 45 °C	± 4 mV	± 12 µA
Setting time	3.5 ms on 0.1 %	
Load	≥ 1100 Ω	≤ 500 Ω

## Diesel exhaust smoke measurement.

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

## Air mass flow meter

Measuring principle	Measurement range	Accuracy
Hot film anemometer	0 – 2400 kg/h	± 1 %

## Dynamic fuel meter (AVL 735)

Measuring principle	Measurement range	Accuracy
Corioris principle	0-125 kg/h	± 0,1 %