Engine test beds (braking dynamometers) SE with MP Computer

Common properties

In the following the basic design is described. A wide variety of standard functions is additionally available.

In basic design the engine test bed is not supposed to be run unattended, if internal faults of the test bed or external faults may lead to dangerous situations.

Loading system:	water-cooled eddy current brake
sense of rotation	clockwise seen from the engine to the brake

The engine test bed consists of the braking and measuring unit (dynamometer) and of the control unit (evaluation, display and control unit with MP Computer). The control unit can be a separate control desk, which is connected by cables and plugs to the braking and measuring unit, or it can be fixed to the braking and measuring unit.

If the braking and measuring unit is not secured by additional lateral supports, it must be screwed either to the floor or to the support of the engine to be tested.

If the support of the engine to be tested is not screwed to the floor, it must be screwed to the braking and measuring unit. Mobile supports (truck RWB or universal engine support) holding the engine are moved to the braking and measuring unit and fixed to it by one or two screws. While moving the engine on its support to the braking and measuring unit, the engine is connected to the brake by sliding together the multiple-spline parts of the cardan shaft.

The cardan shaft is positioned in a solid protective housing fixed to the braking and measuring unit.

Requirements to the cooling water supply

Common for every size:

Supply pressure	max. 4.1 bar	
Temperature at the input	max. 32 °C	at min. allowed water flow
Temperature at the output	max. 60 °C	
Acidity (pH)	7.4 ... 8.4	
rel. content of suspended particles	max. 0.001	
size of suspended particles	max. 0.4 mm	

depending on the size	min. input pressure [bar]	min. water flow [l/min]
SE 10		
SE 20	1.5	14
SE 30	0.8	36
SE 80	1.0	57
SE 150	1.0	107
SE 250	1.6	178
SE 400	2.4	280
SE 500	2,4	350
SE 720	2,7	510

Requirements to the ambience

Air temperature	20 ... 30 °C	recommended with respect to torque measuring accuracy
Air temperature	- 10 ... + 60 °C	only allowed for the braking and measuring unit at or below 0°C anti-freeze required Observe the allowed temperature range of the control unit !
relative humidity of air	max. 90%	Condensation not allowed for the braking and measuring unit (for the control unit partial protection for the case of condensation is offered)

The above indications for the air temperature are valid in case there is no strong heat radiation.

Anti freeze fluid glycol is allowed. In case of another anti freeze fluid compatibility must be clarified.
The effect of anti freeze fluid on the cooling capacity must be observed.

In case of testing combustion engines an exhaust gas evacuation is required.

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Control and measurement

The control unit contains:
the MP Computer,
the control circuits for the eddy-current brake and
the required supply devices.

Protection class of the control unit: IP 55

Rotational speed n, torque M, power P, work (energy) W

Loading of the engine by the brake is controlled by limiting the brake speed. This is mainly achieved by manually entering the desired speed value (analog input) at a manually operated input potentiometer. This potentiometer acts through a fast response analog control circuit with thyristor amplifier. The amplifier controls the current magnetizing the eddy current brake.

If the control unit shall be close to the braking and measuring unit, the input potentiometer is installed in a separate control housing and connected to the control unit via a spiral cable in such a way, that it can be operated from any point near the engine.

If the control unit shall stand in a separate room, the input potentiometer is installed in the operator's panel of the control unit.

A speed-stabilizing function of the MP Computer with numerical input of the desired value can be optionally superimposed to the manual speed adjustment and allows fast and precise adjustment of the speed.

Additional functions of the brake control depend on the application.

Speed measurement: digital incremental pick-up non-sensitive for sense of rotation

Torque measurement: analog measurement of the reactive torque at the stator of the brake by strain gage load cell

The MP Computer displays the following measured and calculated values simultaneously via LEDs 20 mm high:

Speed in rpm	Torque in Nm	Power in kW		and	
Work (energy)	display range (automatic change-over)			9.999	kWh
			or	99.99	kWh
			or	999.9	kWh
			or	9999	kWh
	corresponding display resolution			0.001	kWh
			or	0.01	kWh
			or	0.1	kWh
			or	1	kWh

Setting On/Off of the work counter controls at the same time the

determination of the specific fuel consumption (additional equipment).

Surveillance equipment

The braking and measuring unit contains a flow monitor for the coolant flow.

In configuration with temperature surveillance the control unit contains additionally displays and evaluation circuits for the temperatures of the bearings, the loss plates and the returning coolant with warning and stop function.

Subject to change !

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