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Project: MSS54

Module: Cat temperature model

	Department	**Date**	**name**	**Filename**
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X.   cat temperature model

x.1   Calculating the Cat Temperature

The catalytic converter temperature is calculated every 100 ms depending on the measured exhaust gas temperature and the air mass ml.
The calculation distinguishes between the cases of the engine running and the engine stopped:

a) Engine running

If the exhaust gas temperature is higher than that of the catalyst temperature model, then the catalyst is heated up.
This is done by multiplying the temperature difference (tabg to tkatm_oex) by the
Value of the characteristic curve KL_TKATM_AUFHEIZ (depending on ml) is multiplied

If the exhaust gas temperature is lower than that of the catalyst temperature model, then the catalyst is cooled down.
This is done by multiplying the temperature difference (tabg to tkatm_oex) by the
Value of the characteristic curve KL_TKATM_ABKUEHL (depending on ml) is multiplied

If the model temperature without exothermic component (tkatm_oex) is greater than the constant K_TKATM_ANSPRING, the catalytic converter is activated. The exothermic component is regulated up to K_TKATM_EXOTHERM_MAX via a ramp K_TKATM_EXO_DELT_AUF.   (tkatm_ex)

The exothermic component is reduced when tkatm_oex < (K_TKATM_ANSPRING-K_TKATM_AUS_HYS). The ramp is called K_TKATM_EXO_DELT_AB.

b) Engine is stopped

a calculation can only be made if the combi provides the relative time t_relative, otherwise the cat temperature model remains frozen
with a known service life, an adjustment to the intake air temperature takes place
tkatm_oex_int = tkatm_off * tkatm_oex_factor + tan
the factor follows from the characteristic curve KL_TKATM_STAND depending on t_motor_steht;
tkatm_off is the value of the catalyst temperature model when the engine is switched off

x.2   initialization of the exhaust gas temperature

The initialization is divided into two stages.
During the first initialization, the real time data from the combi is not yet available. Therefore, the catalytic converter temperature model is pre-initialized with the exhaust gas temperature.
If a second initialization (approx. after 140ms) is carried out via the CAN, the model temperature is calculated once, as when the engine is stopped.

x.3   variables

tkatm	temperature of the cat model
tkatm_oex	Temperature of the cat model without exothermic component
tkatm_ex	temperature exothermic component

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x.4   applicable constants

K_TKATM_ANSPRING   light-off temperature of the catalytic converter
K_TKATM_AUS_HYS   hysteresis of the light-off temperature
K_TKATM_EXOTHERM_MAX Maximum exothermic fraction
K_TKATM_EXO_DELT_AUF Controller ramp exothermic component
K_TKATM_EXO_DELT_AB Exothermic component reduction ramp

x.5   applicable characteristics

KL_TKATM_AUFHEIZ   Heating factor of the catalytic converter depending on the air mass ml
(multiplied by the diff. tabg-tkatm_oex gives the heating per minute)

KL_TKATM_ABKUEHL Cooling factor of the catalytic converter depending on the air mass ml
(multiplied by the diff. tabg-tkatm_oex gives the cooling per minute)

KL_TKATM_STAND   Adjustment factor of the temperature difference between tabg and tkatm in
dependence of the engine's service life