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## Project: MSS54

### Module: Adaptation filling controller

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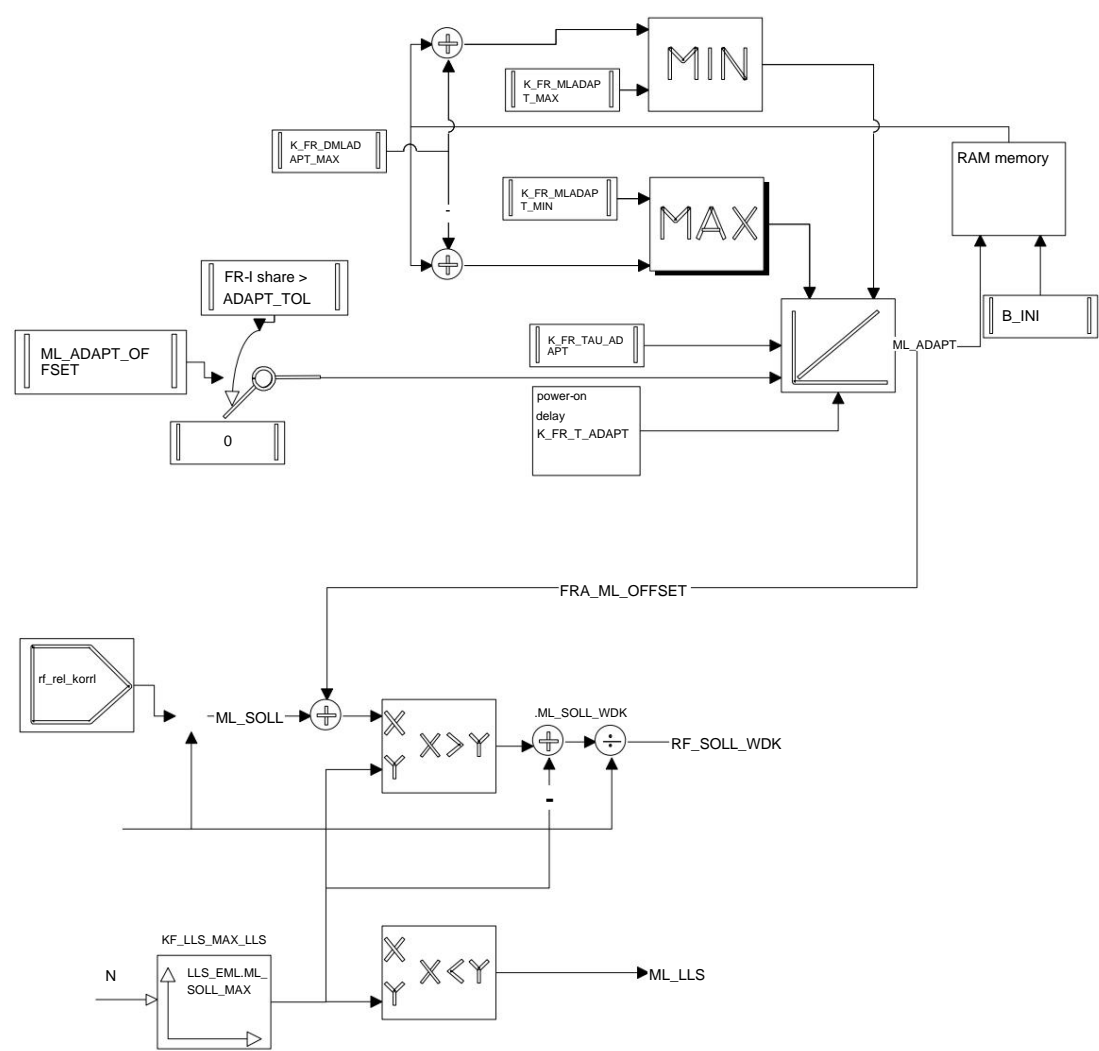
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1      **adaptation filling regulator**

The task of the charge regulator adaptation is to compensate for the **stationary** pressure fluctuations caused by assembly and production variations of the throttle valves (different leakage air in different vehicles).  
To compensate for differences between the calculated target control and the actual filling measured using HFM. This deviation should be determined by the FR adaptation and remedied by **correcting the calculated ml\_soll**.

Image: Filling regulator adaptation



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## 1.1 adaptation conditions

To activate the adaptation, the following conditions must be met:

B\_FRA =                      B\_LLR                      ; Idle control state active (see LLR state machine)  
and  $t_{mot} > K_{FR\_TMOT\_ADAPT}$  ; engine temperature greater than threshold  
and !B\_TMOT\_FEHLER and !                      ; error-free  $t_{mot}$  recording  
B\_HFM\_FEHLER and !                      ; error-free ml recording  
B\_KATH\_AKTIV and no                      ; Cat heating not active  
error in the EGAS system

During the development and test phase, the complete FR adaptation can be switched off using the control byte K\_FRA\_CONTROL. All adaptation values are then equal to zero.

## 1.2 States of FR adaptation

The control of the FR adaptation can be described as a state machine.

### adaptation inactive

Condition:                      B\_FRA not fulfilled

Mark:                      fra\_flags = 0 (inactive)

Adaptation values:                      fra\_mladapt (t) = fra\_mladapt (t - 20 ms)

### Lockout time monitoring for FRA active

Condition:                      B\_FRA fulfilled  
and fra\_timer != 0  
(Lockout period not yet expired)

Mark:                      fra\_flags = 1 (lock time)

Adaptation values:                      fra\_mladapt (t) = fra\_mladapt (t - 20 ms)


### adaptation is underway

Condition:                      B\_FRA  
and fra\_timer == 0 (lock time expired)  
and  $| \text{fra\_mladapt} - \text{fra\_mlstart} | \leq K_{FR\_DMLADAPT\_MAX}$   
(adaptation path not limited)

Mark:                      fra\_flags = 3 (adapted)

Adaptation values:                      fra\_mladapt (t) = fra\_mladapt (t - 20 ms) +  
 $K_{FR\_MLADAPT\_OFFSET} * K_{FR\_TAU\_ADAPT}$   
(without taking into account any limitation)

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#### adaptation value limited

Condition:                      B\_FRA  
   and fra\_timer == 0  
   and | fra\_mladapt - fra\_mlstart | > K\_FR\_DMLADAPT\_MAX  
   (adaptation path limited)

Mark:                              fra\_flags = 7 (limited)

Adaptation values:              fra\_mladapt (t) = fra\_mlstart  $\ddot{y}$  K\_FR\_DMLADAPT\_MAX

Note:                              If the difference between the calculated adaptation value and the starting value at the beginning of the adaptation phase becomes smaller than the maximum adaptation path, the system switches back to the "Adaptation in progress" state.

### 1.3 FR adaptation data

Description of the variables:

name	Description	type	resolution
fra_timer	remaining adaptation blocking time	uw	0.02 sec.
fra_mladapt	value of the adaptation integrator	sw	Def_rf 320
fra_mlstart	Value of the adaptation integrator at the beginning of a new adaptation phase	sw	Def_rf 320
fra.flags	Flags for adaptation Value 0: Adaptation inactive Value 1: Lockout time running Value 3: adapted Value 7: Adaptation path limited	uc	--
fra_ml_offset	output of the FR adaptation		Def_rf
fra_sperren			

Description of the application data:

name	type	Meaning
K_FR_MLADAPT_OFFSET	FW	adaptation offset
K_FR_ADAPT_TOL	FW	Tolerance band of the filling controller, below no adaptation ie OFFSET = 0
K_FR_TAU_ADAPT	FW	time constant for adaptation
K_FR_DMLADAPT_MAX	FW	max. adaptation path per adaptation phase
K_FR_T_ADAPT	FW	adaptation blocking time
K_FR_MLADAPT_MIN	FW	lower adaptation value limit upper
K_FR_MLADAPT_MAX	FW	adaptation value limit control size
K_FRA_CONTROL	FW	(switching the adapt on/off)
K_FRA_RF_ABREG	FW	rf clamp for regulating the offsets Factor
K_FRA_RF_FAKTOR	FW	for regulating the offsets from b. rf

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**1.4      Non-volatile storage**

In the control unit's run-on phase, the current value

fra\_mladapt

the FR adaptation is stored non-volatilely in the E²PROM of the control unit

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