14.70 MDKOG (Torque Coordination for Overall Interventions)

See the *funktionsrahmen* for the following diagrams:

mdkog-main	Main function overview
mdkog-bbmdein	Sub-function BBMDEIN: active torque intervention conditions
mdkog-bbzwein	Sub-function BBZWEIN: active ignition angle intervention conditions
mdkog-mdbeg	Sub-function MDBEG: limit of the indicated torque
mdkog-mdbeg-diag	Sub-function MDBEG_DIAG: connection of the torque limit to the diagnosis
mdkog-mdabws	Sub-function MDABWS: stalling

MDKOG 14.70 Function Description

Coordination of the Requested Engine Torques

Through the torque coordination calculation, the indexed desired engine torque (misol_w) is used to calculate the fade out stage and/or the ignition angle adjustment. The externally-requested indexed torques from the cruise control (miasrs_w) and transmission protection (migs_w) and the internal torque requirements (e.g. driver requested torque, maximum engine speed or maximum load) will be converted into an indexed desired engine torque (misolv_w) via either a minimum or maximum range.

The desired torque for the ignition path is dependent on the enable condition B_zwvz (cf. BBMDEIN):

- When ignition angle interventions are enabled, mizsolv_w is calculated as follows:
The upper limit of the desired torque, misolv_w, is given by the product of optimal internal torque (including lambda influence) and ignition angle (miopt_w $\times$ etazwb), then the torque requirements of the idle control dmllr_w (only proportional and differential components) and the anti-judder feature, dmar_w are added.

- When ignition angle interventions are not required, the basic torque mibas_w is used as the desired torque which depends only on the stipulated ignition and mixture-application efficiencies. The anti-judder feature intervention is also considered in this case.

Sub-function BBMDEIN: Active Torque Intervention Conditions

In addition, via the traction control torque intervention, the condition flag B_msr is set so that overrun fuel cut-off is prohibited (see %MDRED). During cruise control intervention, the condition flag B_asr to cylinder suppression is possible (see %MDRED). The condition flag B_mdein is used to disable the misfire detection (see %DASE) and enable the anti-judder feature or idle speed control (for B_mdein = 0). The condition flags B_zwvz and B_zwvs are responsible for enabling the torque adjustment through ignition.

- B_zwvz is set when the time frame level detects the need for an intervention. This is the case at all operating points which require a torque reserve, i.e. idle, catalyst heating, short journeys and for the dashpot driveability functions, load shock attenuation, filtering for overrun fuel cut-off and short journeys. When the clutch is also immediately released to avoid revving the engine. All external intervention is detected by comparing mifa_w and misol_w.

An ignition angle enable can also be made via the code word CWMDKOG, when the desired the cylinder charge corresponds to the minimum cylinder charge. In addition, if the difference between the actual cylinder charge and the minimum cylinder charge is less than the delta value to be applied, data input to the code word for the ignition angle can be enabled.

- B_zwvs is set when either a timeframe intervention is submitted or a torque influence from the anti-judder feature is required. The desired value is not then switched to misol_w in the function %MDZW (torque influence on ignition), however, the influence is activated.

Sub-function MDABWS: Stalling

Should the engine speed during torque reduction through cruise control or transmission protection fall under NASNOTTM, miext is immediately set equal to MDIMX so that the two operations are prohibited. NASNOTKL is a function of engine temperature, tmot.

Sub-function BBZWEIN: Active Ignition Angle Intervention Conditions

see BBMDEIN

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Sub-function MDBEG: limit of the indicated torque

The two torque variables and misolv_w mizsolv_w are limited to the maximum indicated torque miszul_w (from %MDZUL). This is to ensure that monitoring in level 2 only becomes active when the desired (and possibly limited) torque is not converted correctly into an actual torque. The data input to KFMIZU will be aligned to the level 2 permitted torque. Particularly in the application phase this can prevent an unwanted torque monitoring response. By noting the value of B_mibeg it is possible to detect whether a limitation of the desired torque has been made.

To test the data monitoring, there is a counter cmibeg_w that counts the number of active limitations. The counter cmibeg_w is incremented with each rising edge of B_mibeg. The counter is not active when the driver releases the throttle pedal or the maximum value is reached (MAXWORD = 65,535). The value is cached and only an error path enable or a power failure resets it.

Sub-function MDBEG_DIAG: Connection of the Torque Limit to the Diagnosis

This function MDBEG_DIAG is part of the EGAS monitoring concept (level 1). The desired torque MDBEG is limited to a maximum permissible torque, miszul_w. If this limit is active, the bit B_mibeg is set. In certain operating conditions (e.g. very cold engine and idle), this level-1-limit will be active, but only for a short time. If the limit B_mibeg is active for a longer time (e.g. 10 minutes), there might be a fault in the system and a diagnostic entry is made.

MDKOG 14.70 Application Notes

Typical values:

MDIMX = 99.6%;

NASNOTKL

Engine temperature/°C	–30	0	30	60
NASNOT	1500	900	600	600

The engine speed threshold NASNOT must not be larger than 2550 rpm.

DELRL < 2%
THDMB = 1 sec
CWMDKOG = 2

Bit	7	6	5	4	3	2	1	0
CWMDKOG	*	*	*	*	Note 4	Note 3	Note 2	Note 1

Note 1. Ignition angle enable with rlsol = rlmin
Note 2. Ignition angle enable with B_mibeg
Note 3. Ignition angle enable with rl – rlmin_w ≤ DELRL
Note 4. !B_mibegl kill data input

Parameter	**Description**
CDCMDB	Codeword CARB: torque limitation desired torque
CDKMDB	Codeword Client: torque limitation desired torque
CDTMDB	Codeword Tester: torque limitation desired torque
CLAMDB	Codeword Error Class: torque limitation desired torque
CWMDKOG	Codeword: MDKOG: ignition angle retardation via vacuum limitation
CWTEZW	Codeword: ignition angle intervention via fuel tank breather valve check
CWZWVMX	Codeword: ignition angle intervention via speed limitation
DELRL	Delta relative cylinder charge for enabling ignition angle intervention
FFTMDB	Freeze frame table: torque limitation desired torque
MDIMX	Maximum indexed engine torque
NASNOTKL	Characteristic curve for stall protection speed threshold
THDMB	Healing debounce time of the entry error in long-term torque limitation
TMVER	Debounce time detection of a long-term torque limitation
TSFMDB	Error summation period: torque limitation desired torque
TVLDSZW	Duty cycle ignition angle enable via recharge effect

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TVMIBEG	Debounce time for ignition angle enable via torque limitation
BLOKNR	DAMOS source for block number
B_ASR	Condition flag: cruise control active
B_BEMDB	Condition flag: tape end functions requirement torque limitation
B_BKMDB	Condition flag: torque monitoring (long-term limitation) active
B_CLMDB	Condition flag: cancellation of long-term torque limitation
B_DASH	Condition flag: dashpot-adjustment limit active
B_FIL	Condition flag: PT1-filter for overrun fuel cut-off/reinstatement active
B_FTMDB	Condition flag: error input from tester for torque limitation
B_KH	Condition flag: catalyst heating
B_KUPPLV	Condition flag: delayed clutch actuation
B_KW	Condition flag: catalyst keep warm
B_LDSUA	Condition flag: charge air recirculation valve active (open)
B_LL	Condition flag: idle
B_LLREIN	Condition flag: idle control active
B_LSD	Condition flag: positive load change damping active
B_MDEIN	Condition flag: torque intervention active
B_MDMIN	Condition flag: minimum achievable indexed torque achieved
B_MGBGET	Condition flag: torque gradient limitation active
B_MIBEG	Condition flag: torque limitation active
B_MIBEGL	Condition flag: torque limitation cylinder charge path active
B_MNMDB	Fehlertyp min.: torque monitoring long-term limitation
B MSR	Condition flag for torque slip control
B_MXMDB	Error type: maximum permissible desired torque is exceeded permanently
B_NPMDB	Implausible error: torque monitoring long-term limitation
B_PWF	Condition flag: power fail
B_SA	Condition flag: overrun fuel cut-off
B_SIMDB	Error type: torque monitoring long-term limitation
B_STEND	Condition flag: end of start conditions achieved
B_ZWGET	Ignition angle intervention through transmission intervention
B_ZWNGET	Ignition angle intervention not through transmission intervention
B_ZWVS	Condition flag: for quick exit of ignition angle intervention in the torque interface
B_ZWVZ	Condition flag: for ignition angle intervention in the torque interface
B_ZWVZVB	Condition flag: for ignition angle intervention in the torque interface for limitation
CMIBEG_W	Counter for active limitations of the internal torques
DFP_MDB	ECU internal error path number: torque monitoring long-term limitation
DMAR_W	Delta engine speed (anti judder)
DMLLR_W	Demanded torque change for idle control (P & D components)
DMRKH	Torque reserve for catalyst heating
DMRKT_W	Torque reserve for short journeys
DMRLLR_W	Torque reserve for idle control
DMZMS_W	Difference between the indexed desired torque and the allowed desired torque
ETAZWB	Ignition angle efficiency of the basic ignition angles
E_MDB	Error flag: torque monitoring long-term limitation
MIASRL_W	Indexed desired engine torque (cruise control), slow intervention
MIASRS_W	Indexed desired engine torque (cruise control), fast intervention
MIBAS W	Indexed basic torque
MIBEG_W	Torque limit
MIBGR_W	Indexed desired torque for input-dependent clutch torque limitation
MIEXTV_W	For external demanded torque for stall protection
MIEXT_W	For external (cruise control, transmission protection, etc.) demanded indexed engine torque
MIFAB_W	Limited indexed driver’s desired torque
MIFA_W	Indexed driver’s desired torque
MIGS_W	Indexed desired engine torque for transmission protection, fast intervention
MILRES_W	Torque requirement for air path with all reserves
MIMAX_W	Maximum achievable indexed torque
MIMSR W	Indexed desired engine torque, traction control
MINMX_W	Torque requirement of the speed limiter
MIOPT W	Optimum indexed torque
MISOLP_W	Indexed desired torque for torque limitation, local variable
MISOLV_W	Indexed resulting torque for torque limitation
MISOL_W	Indexed resulting desired torque

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MISZUL_W	Maximum possible indexed torque
MITEBG_W	Torque target for minimum filling fuel tank breather
MIVMX_W	Indexed desired torque for speed control
MIZSOLV_W	Indexed resulting desired torque for ignition angle intervention for torque limitation
MIZSOL_W	Indexed resulting desired torque for ignition angle intervention
NASNOTTM	Speed threshold for stall protection as a function of engine speed
NMOT	Engine speed
RLMIN_W	Minimum possible relative cylinder charge
RLSOL_W	Desired cylinder charge
RL_W	Relative cylinder charge (word)
SFPMDB	Error path status: torque monitoring, long-term limitation
TMOT	Engine temperature
WPED W	Normalised throttle pedal angle
Z MDB	Cycle flag: torque limitation, long-term limitation