State of Power Transmission of Gearbox including Drive-off Element and Gearbox Core for all Gearbox Types

State of coupling element

State of coupling element	State String	Signal qualifier	State Hex	State Dez	Amount of torque transmitted	Distance between friction / meshing elements
open	open		0H	0	zero	greater zero
open_touch	open_touch		1H	1	almost zero	almost zero
slip_controlled	slip_controlled		2H	2	setpoint dependent	almost zero
slip_micro	slip_micro		3H	3	almost full	almost zero
closed	closed	vld	4H	4	full	zero
not_determined	not_determined		5H	5	unknown	unknown
hydrodynamic	hydrodynamic		6H	6	velocity dependent	zero
not_used	not_used		7H… DH	7… 13	-	-
init	init	init	EH	14	-	-
error	error		FH	15	-	-

Legend

X	Regular state
(X)	Special optional state, typically not used
- / Ne	State not existing or not used
()	Theoretically possible but no application known

not_determined = in normal operation only. The available sensor information is not sufficient to determine the state of the coupling element. In case of error or must not be confused with erroneous information from the sensors
Examples for not determined: Clutch with 1 clutch switch only, located in the area where the clutch is for sure closed. If the clutch is not for sure closed it can be open, slipping or still closed. The state is not_determined.
slip_controlled covers closed loop controlled and open loop controlled

Drive-off element

State of drive-off element (without gearbox core), TrsmDrvOffElmSt

signal	string value		open	open_touch	slip_controlled	slip_micro	closed	not_determined	hydrodynamic	init	error
	physical value		0	1	2	3	4	5	6	14	15
drive-off element type	clutch	MT	X	-	-	-	X	X	-	X	X
	clutch	AMT	X	(X)	(X)	(X)	X	X	-	X	X
	converter with converter clutch	ATC	-	-	X	X	X	-	X	X	X
	converter without converter clutch	ATC	-	-	-	-	-	-	X	X	X
	clutch	CVT	X	X	X	(X)	X	X	X	X	X
	two clutches	DCT	X	X	X	X	X	-	-	X	X
	Amount of torque transmitted		zero	almost zero	setpoint dependent	almost full	full	unknown	velocity dependent		
	Distance between friction / meshing elements		greater zero	almost zero	almost zero	almost zero	zero	unknown	zero		

Gearbox core

State of (clutches in) **gearbox core** (without drive-off element), TrsmGbxCoreSt

signal	string value		open	open_touch	slip_controlled	slip_micro	closed	not_determined	hydrodynamic	init	error
	physical value		0	1	2	-	4	5	-	14	15
	applicable for friction clutch		Y	Y	Y	-	Y	(N)	-	Y	Y
	applicable for dog clutch		Y	N	N	-	Y	Y	-	Y	Y
transmission type	manual	MT	X	-	-	-	X	X	-	X	X
	automated manual	AMT	X	-	-	-	X	-	-	X	X
	step shift automatic	ATC	X	X	X	-	X	-	-	X	X
	continuous variable	CVT	-	-	X	-	X	-	-	X	X
	double clutch	DCT	X	-	X	-	X	-	-	X	X
	usecase		full decoupling	standstill decoupling	creep control / gearshift slip phase	-	gear engaged	gearshift	-	init	error
	Amount of torque transmitted		zero	almost zero	setpoint dependent	-	full	unknown	-		
	Distance between friction / meshing elements		greater zero	almost zero	almost zero	-	zero	unknown	-		

Gearbox: All gearbox types, TrsmGbxSt

State of drive-off element (without gearbox core), TrsmDrvOffElmSt

	string value		open	open_touch	slip_controlled	slip_micro	closed	not_determined	hydrodynamic	init	error	usecase
	physical value		0	1	2	3	4	5	6	14	15	
State of (clutches in) **gearbox core** (without drive-off element) TrsmGbxCoreSt	open	0	open	open	open	open	open	open	open	init	error	full decoupling
	open_touch	1	open	open_touch	open_touch	open_touch	open_touch	not_determined	open_touch	init	error	standstill decoupling
	slip_controlled	2	open	open_touch	slip_controlled	slip_controlled	slip_controlled	slip_controlled	slip_controlled	init	error	creep control / gearshift slip phase
	slip_micro	3								init	error	
	closed	4	open	open_touch	slip_controlled	slip_micro	closed	not_determined	hydrodynamic	init	error	gear engaged
	not_determined	5	open	not_determined	not_determined	not_determined	not_determined	not_determined	not_determined	init	error	gearshift
	hydrodynamic	6								init	error	
	init	14	init	init	init	init	init	init	init	init	error	init
	error	15	error	error	error	error	error	error	error	error	error	error

Possible values		Gearbox type						
Gearbox state		All	ATC w/o CC	ATC w CC	DCT	AMT	MT	CVT
open	0	Y	Y	Y	Y	Y	Y	Y
open_touch	1	Y	Y	Y	Y	Y	N	Y
slip_controlled	2	Y	Y	Y	Y	Y	N	Y
slip_micro	3	Y	N	Y	Y	Y	N	Y
closed	4	Y	N	Y	Y	Y	Y	Y
not_determined	5	Y	(N)	(N)	(N)	Y	Y	Y
hydrodynamic	6	Y	Y	Y	N	N	N	Y

CC = Converter clutch
w = with, w/o = without

ATC without converter clutch, TrsmGbxSt

state drive-off element = converter, TrsmDrvOffElmSt

signal	string value		(open)	(open_touch)	(slip_controlled)	(slip_micro)	(closed)	(not_determined)	hydrodynamic	usecase		Gearbox state	Used
	physical value		0	1	2	3	4	5	6				
state of gearbox core TrsmGbxCoreSt	open	0							open	full decoupling		open	Y
	open_touch	1							open_touch	standstill decoupling		open_touch	Y
	slip_controlled	2							slip_controlled	creep control / gearshift slip phase		slip_controlled	Y
	slip_micro	3										slip_micro	N
	closed	4							hydrodynamic	gear engaged		closed	Y
	(not_determined)	5							(not_determined)	(gearshift)		not_determined	(N)
	hydrodynamic	6										hydrodynamic	Y

ATC with converter clutch, TrsmGbxSt

state drive-off element = converter in parallel to converter clutch, TrsmDrvOffElmSt

signal	string value		(open)	(open_touch)	slip_controlled	slip_micro	closed	(not_determined)	hydrodynamic	usecase		Gearbox state	Used
	physical value		0	1	2	3	4	5	6				
state of gearbox core TrsmGbxCoreSt	open	0			open	open	open		open	full decoupling		open	Y
	open_touch	1			(open_touch)	(open_touch)	open_touch		open_touch	standstill decoupling		open_touch	Y
	slip_controlled	2			slip_controlled	slip_controlled	slip_controlled		slip_controlled	creep control / gearshift slip phase		slip_controlled	Y
	slip_micro	3										slip_micro	Y
	closed	4			slip_controlled	slip_micro	closed		hydrodynamic	gear engaged		closed	Y
	(not_determined)	5			(not_determined)	(not_determined)	(not_determined)		(not_determined)	(gearshift)		not_determined	(N)
	hydrodynamic	6										hydrodynamic	Y

DCT, TrsmGbxSt

state of drive-off element = one of the two clutches, TrsmDrvOffElmSt

signal	string value		open	open_touch	slip_controlled	slip_micro	closed	(not_determined)	hydrodynamic	usecase		Gearbox state	Used
	physical value		0	1	2	3	4	5	6				
state of gearbox core TrsmGbxCoreSt	open	0	open	open	open	open	open			full decoupling		open	Y
	open_touch	1								(standstill decoupling)		open_touch	Y
	slip_controlled	2								(creep control / gearshift slip phase)		slip_controlled	Y
	slip_micro	3										slip_micro	Y
	closed	4	open	open_touch	slip_controlled	slip_micro	closed			gear engaged		closed	Y
	(not_determined)	5								(gearshift)		not_determined	(N)
	hydrodynamic	6										hydrodynamic	N

AMT including MT with automatically acutated clutch, TrsmGbxSt

state of drive-off element = clutch - (Continuous) clutch position or drive train reaction available, TrsmDrvOffElmSt

signal	string value		open	open_touch	slip_controlled	slip_micro	closed	(not_determined)	hydrodynamic	usecase		Gearbox state	Used
	physical value		0	1	2	3	4	5	6				
state of gearbox core TrsmGbxCoreSt	open	0	open	open	open	open	open			full decoupling		open	Y
	open_touch	1								(standstill decoupling)		open_touch	Y
	slip_controlled	2								(creep control / gearshift slip phase)		slip_controlled	Y
	slip_micro	3										slip_micro	Y
	closed	4	open	open_touch	slip_controlled	slip_micro	closed			gear engaged		closed	Y
	(not_determined)	5	open				not_determined			(gearshift)		not_determined	Y
	hydrodynamic	6										hydrodynamic	N

MT, TrsmGbxSt

state of drive-off element = clutch (Availabilty of states open and closed depends on available sensor information), TrsmDrvOffElmSt

signal	string value		open	(open_touch)	(slip_controlled)	(slip_micro)	closed	not_determined	(hydrodynamic)	usecase		Gearbox state	Used
	physical value		0	1	2	3	4	5	6				
state of gearbox core TrsmGbxCoreSt	open	0	open				open	open		full decoupling		open	Y
	open_touch	1								(standstill decoupling)		open_touch	N
	slip_controlled	2								(creep control / gearshift slip phase)		slip_controlled	N
	slip_micro	3										slip_micro	N
	closed	4	open				closed	not_determined		gear engaged		closed	Y
	(not_determined)	5	open				not_determined	not_determined		gearshift		not_determined	Y
	hydrodynamic	6										hydrodynamic	N

CVT, TrsmGbxSt

state of drive-off element (Type of drive-off element determines which states exist), TrsmDrvOffElmSt

signal	string value		open	open_touch	slip_controlled	slip_micro	closed	not_determined	hydrodynamic	usecase		Gearbox state	Used
	physical value		0	1	2	3	4	5	6				
state of gearbox core TrsmGbxCoreSt	open	0								(full decoupling)		open	Y
	open_touch	1								(standstill decoupling)		open_touch	Y
	slip_controlled	2								(creep control / gearshift slip phase)		slip_controlled	Y
	slip_micro	3										slip_micro	Y
	closed	4	open	open_touch	slip_controlled	slip_micro	closed	not_determined	hydrodynamic	gear engaged		closed	Y
	(not_determined)	5								(gearshift)		not_determined	Y
	hydrodynamic	6										hydrodynamic	Y