

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	vld	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		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	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 the 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		
transmission type	applicable for friction clutch	Y	Y	Y	-	Y	(N)	-	Y	Y		
	applicable for dog clutch	Y	N	N	-	Y	Y	-	Y	Y		
	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	
	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										
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		
State of gearbox core (clutches in) (without drive-off element) TrsmGbxCoreSt	open	0	open	open	open	open	open	open	init	error		usecase 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	not_determined	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 state	Gearbox type						
		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				
	physical value	0	1	2	3	4	5	6				
state of gearbox core TrsmGbxCoreSt	open							open				usecase full decoupling
	open_touch							open_touch				standstill decoupling
	slip_controlled							slip_controlled				creep control / gearshift slip phase
	slip_micro											
	closed								hydrodynamic			gear engaged
	(not_determined)								(not_determined)			(gearshift)
	hydrodynamic											hydrodynamic

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

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

Gearbox state	Used
open	Y
open_touch	Y
slip_controlled	Y
slip_micro	Y
closed	Y
not_determined	(N)
hydrodynamic	N

AMT including MT with automatically acuated 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				
	physical value	0	1	2	3	4	5	6				
state of gearbox core TrsmGbxCoreSt	open		open	open	open	open						usecase full decoupling
	open_touch											(standstill decoupling)
	slip_controlled											(creep control / gearshift slip phase)
	slip_micro											
	closed		open	open_touch	slip_controlled	slip_micro	closed					gear engaged
	(not_determined)						not_determined					(gearshift)
	hydrodynamic											hydrodynamic

Gearbox state	Used
open	Y
open_touch	Y
slip_controlled	Y
slip_micro	Y
closed	Y
not_determined	Y
hydrodynamic	N

MT, TrsmGbxSt		state of drive-off element = clutch (Availability 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)				
	physical value	0	1	2	3	4	5	6				
state of gearbox core TrsmGbxCoreSt	open		open			open	open					usecase full decoupling
	open_touch											(standstill decoupling)
	slip_controlled											(creep control / gearshift slip phase)
	slip_micro											
	closed		open				closed	not_determined				gear engaged
	(not_determined)		open				not_determined	not_determined				gearshift
	hydrodynamic											hydrodynamic

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

Gearbox state	Used
open	Y
open_touch	Y
slip_controlled	Y
slip_micro	Y
closed	Y
not_determined	Y
hydrodynamic	Y