

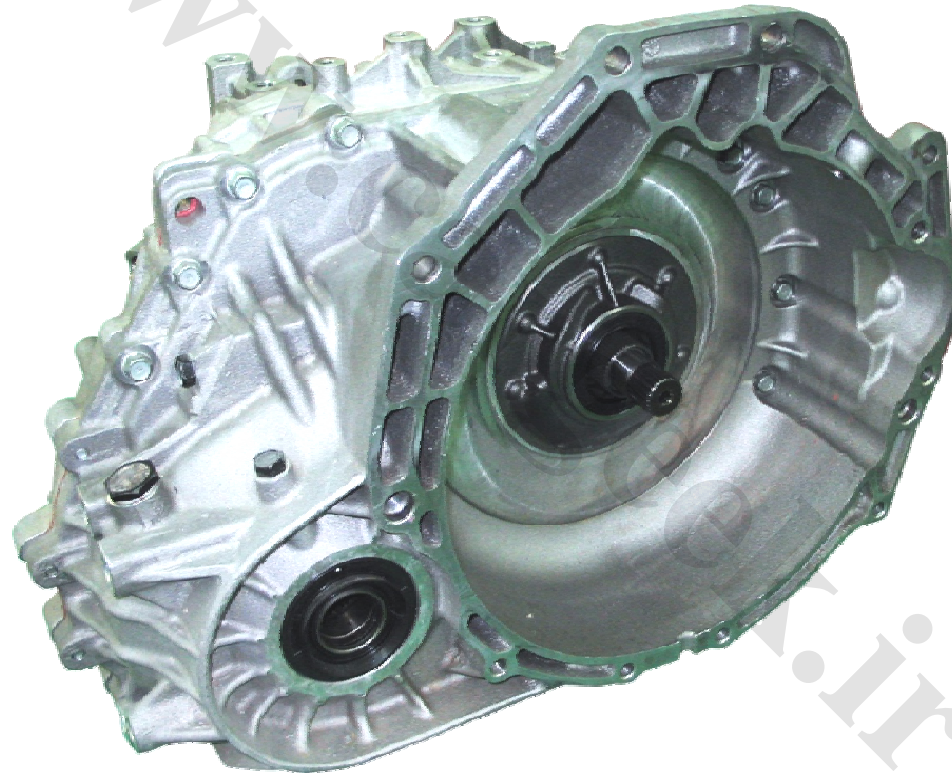
**Tucson  
ix35**

[www.CarGeek.ir](http://www.CarGeek.ir)



# Automatic Transmission

(A6LFx, A6MFx)



**Yalta 2012**

[www.cargeek.ir](http://www.cargeek.ir)

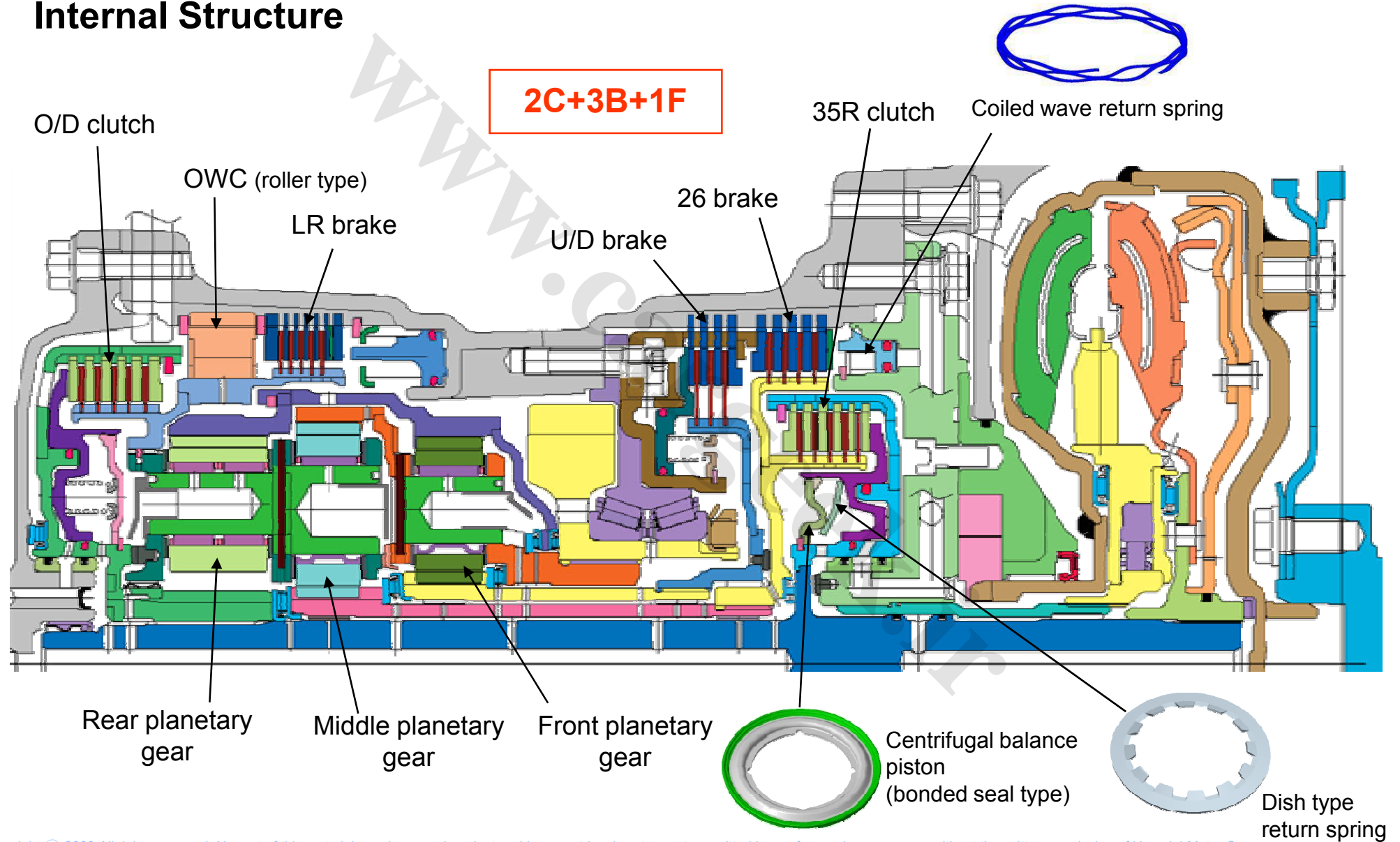
## Power-train

Category			Plant	Ulsan (#5)										KMS		BHMC(#2)	
			Area	DOM('09.8)		NA('09.10)		GEN('09.10)		Aust.('09.10)		GEN('10.4)		EU('10.2)		China('10.4)	
			Spec.	DOM		NA		GEN		Aust.		EU		EL(ix35)		China	
Engine			T/M	2WD	4WD	2WD	4WD	2WD	4WD	2WD	4WD	2WD	4WD	2WD	4WD	2WD	4WD
GSL	γ 1.6 GDI (Hwasong)	140/17.0 (PS/kg.m)	M5CF1-1 (HMMC)											● ('10.11~)			
	Θ-II 2.0 MPI (Asan)	161/19.8 (PS/kg.m)	M5GF1 (Ulsan)			○ ('10.4~)		●	●	●		●	●	●	●	●	
			A6MF1 (HPT)	●		○ ('10.4~)		●	●	●		●	●	●	●	●	
	Θ-II 2.4 MPI (Asan)	174/23.0 (PS/kg.m)	M6GF2 (Ulsan)			●	●										
			A6MF1 (HPT)			●	●		●		●		●			●	●
DSL	U2-1.7 VGT (Hwasong)	115/26.0 (PS/kg.m)	M6CF3-1 (HMMC)											● ('10.11~)			
	R-2.0 VGT (H) (Ulsan)	173/38.0 (PS/kg.m)	M6GF2 (Hwasong)	●	●			●	●			●	●	● (~'10.10)	● (~'10.10)		
			A6LF2 (HPT)	●	●			●		●		●		● (~'10.10)			
	R-2.0 VGT (L) (Ulsan)	136/32.0 (PS/kg.m)	M6GF2 (Hwasong)											●	●		
			A6LF2 (HPT)												● ('10.11~)		
Emission				06EM (GSL) EURO-5 (DSL)		2-ULEV SULEV		EURO-2/3/4 (GSL) EURO-3/5 (DSL)		EURO-4 (GSL) EURO-5 (DSL)		EURO-5		EURO-4/5 (GSL) EURO-3/4/5 (DSL)		EURO-4	

## Variation

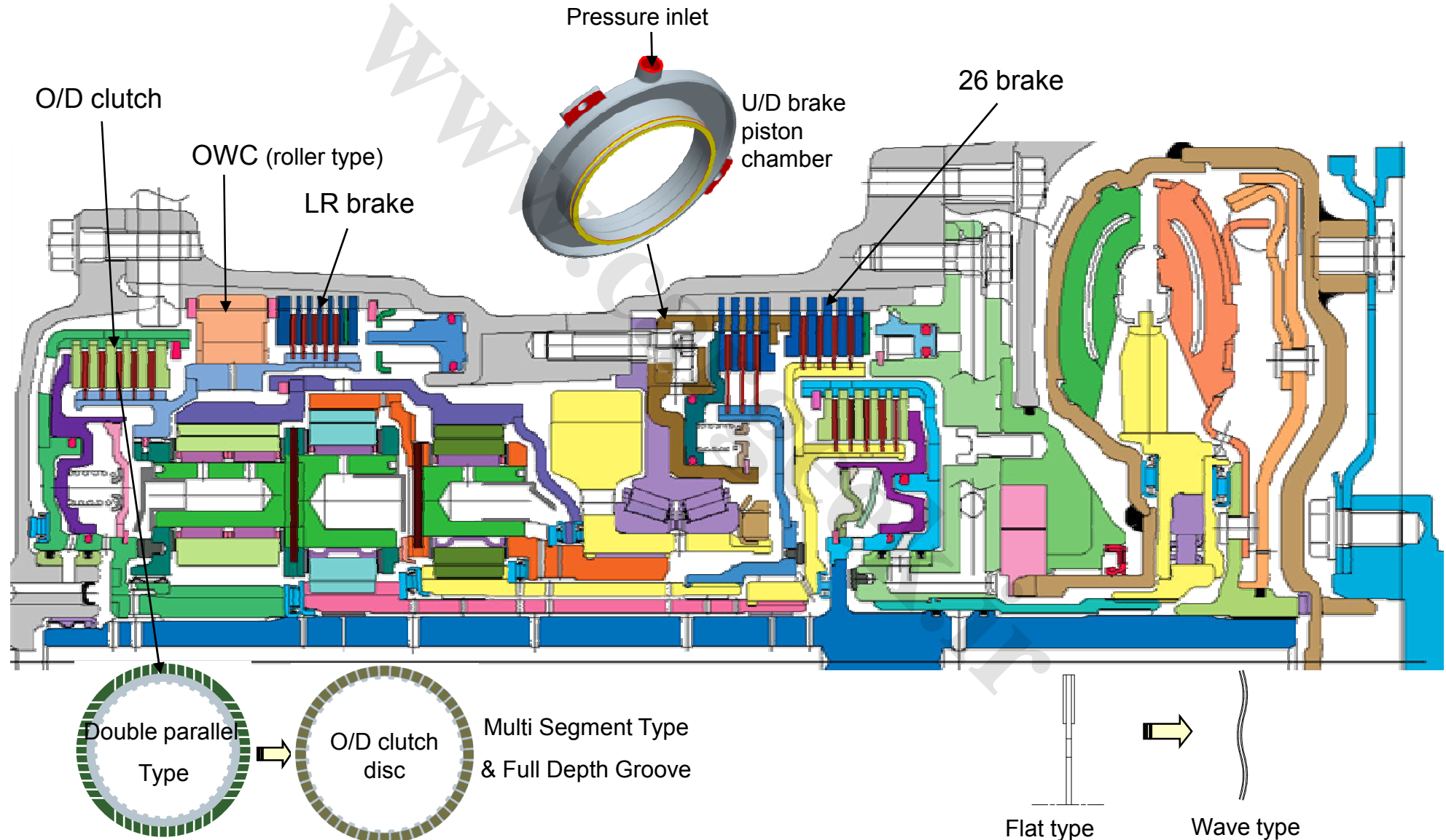
Category	$\lambda$			$\Theta, \mu$			
	A6LF1	A6LF2	A6LF3	A6MF1		A6MF2	
Engine	$\lambda 3.3$	$\lambda$ -II 3.5 $\lambda 3.8$ R2.0	$\lambda$ -II 4.0 R2.2	$\Theta$ -II 2.0/2.4		$\mu 2.7$ $\Theta$ -II 2.4	
				2WD	4WD	2WD	4WD
Max. Torque (kgf·m)	33.5	36.5	40.0	23.5		28.5	
Length (mm)	386	389	402	376.4		386.4	
Distance between shafts (mm)	207			189	204	197	204
Applied model	TG F/L GH F/L	LM TG F/L GH F/L CM F/L	CM F/L PO XM	LM YF TG F/L CM F/L GH F/L	LM CM F/L	XM VG TAXI	XM

## Internal Structure





## Internal Structure



## Specification

Category		A6LFx		A6MFx		A5HF1
Engine		λ3.3, 3.8 / λ-II 3.5, 4.0 R2.0, 2.2		Θ-II 2.0, 2.4 / μ2.7		λ3.3, 3.8
Gear ratio	Type	*WIDE	*CLOSE	*WIDE	*CLOSE	-
	1 <sup>ST</sup>	4.651	4.252	4.639	4.212	3.789
	2 <sup>ND</sup>	2.831	2.654	2.826	2.637	2.065
	3 <sup>RD</sup>	1.842	1.804	1.841	1.800	1.421
	4 <sup>TH</sup>	1.386		1.386		1.035
	5 <sup>TH</sup>	1.000		1.000		0.728
	6 <sup>TH</sup>	0.772		0.772		-
	R	3.393		3.385		3.808
ATF	Spec.	SP-IV				SP-III
	Q'ty	About 7.8ℓ		About 7.1ℓ		About 10ℓ
	Service	Maintenance free (Harsh condition: 100,000km/60,000miles)				100,000km / 40,000km
TCM/PCM Maker		TCM (KEFICO; Separated): μ, λ, R PCM (DELPHI): λ-II PCM (CONTINENTAL/SIEMENS): Θ				DELPHI PCM

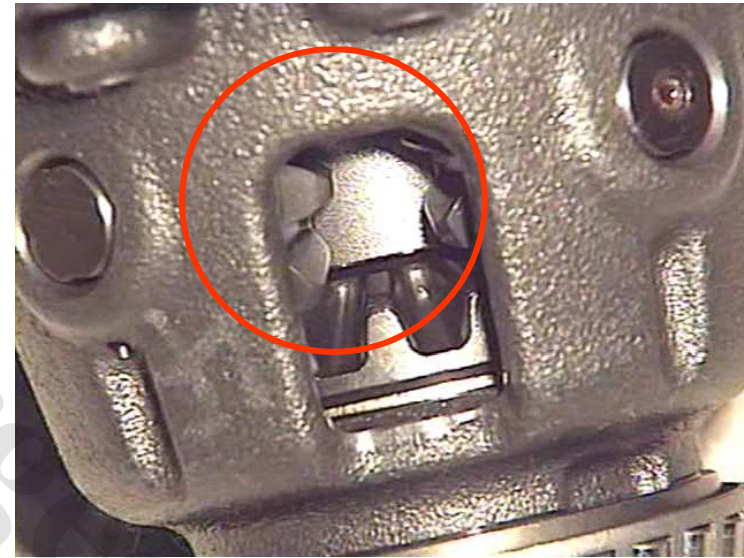
**\* LM (EL): Wide type (R-2.0), Close type (Θ-II 2.0/2.4)**

## New Features

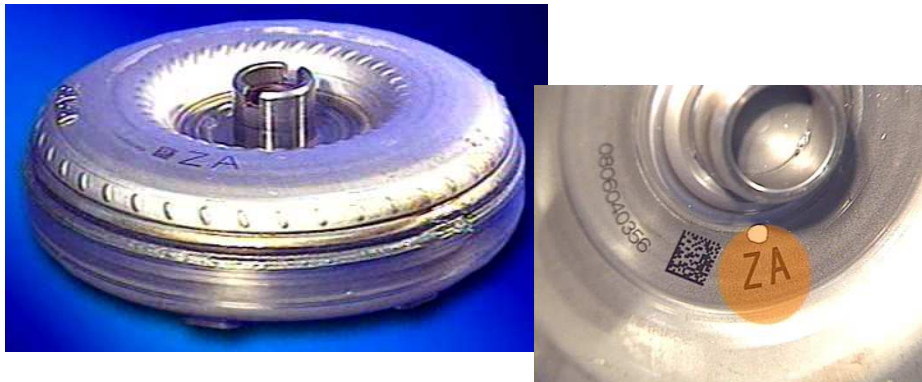
**Roller type One-way Clutch**



**4 pinion differential gear assembly**



**Flat type torque converter**



**4 pinion type  
(A6LMFx)**

**2 pinion type  
(HIVEC)**

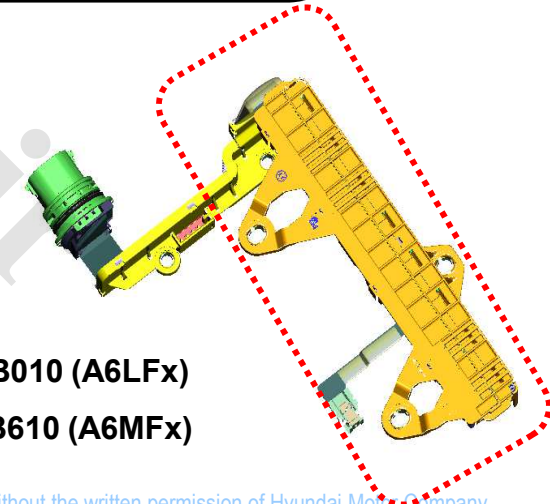
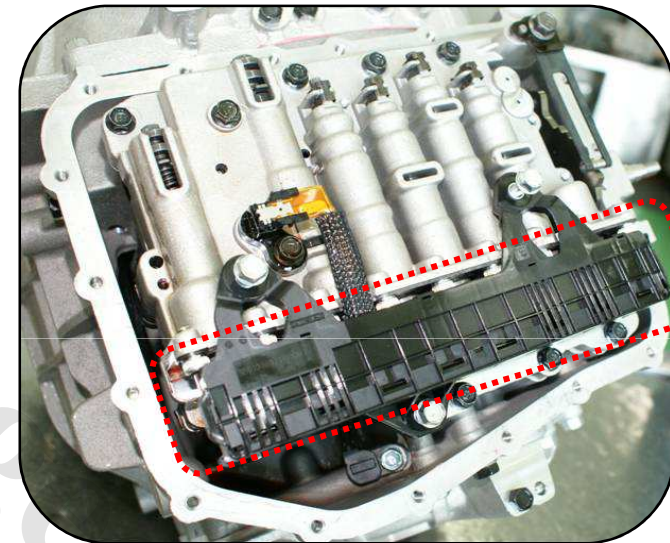


## New Features

### Eliminated oil level gauge



### Harness assembly

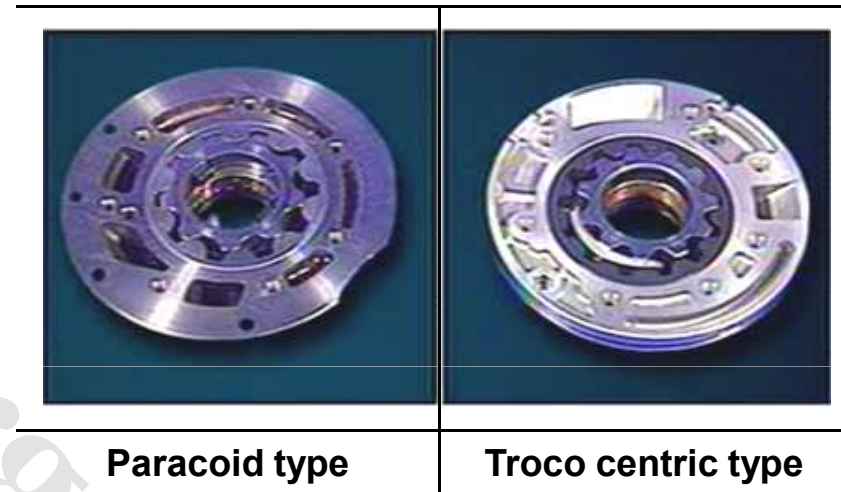
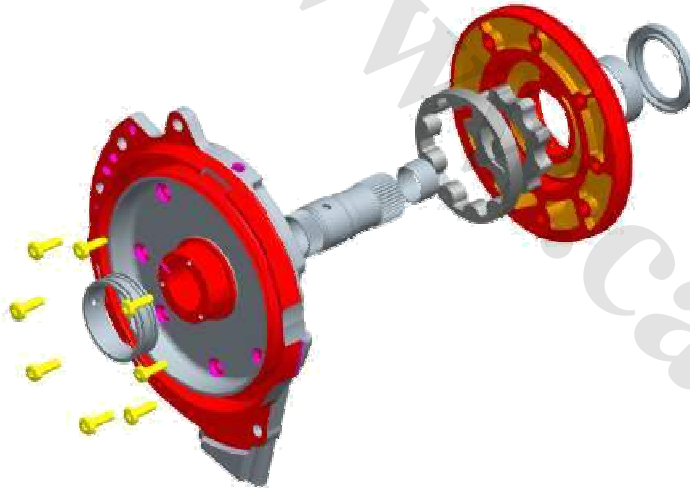


46307-3B010 (A6LFx)

46307-3B610 (A6MFx)

## New Features

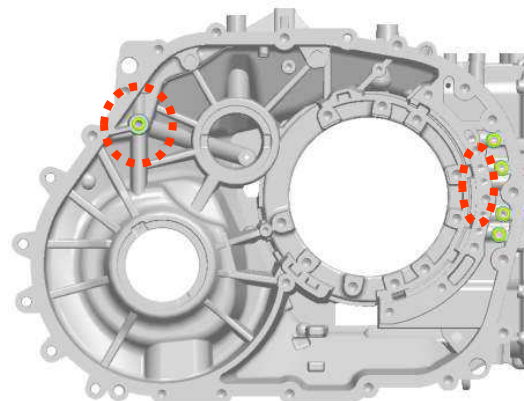
### Oil pump



### Pipe seal



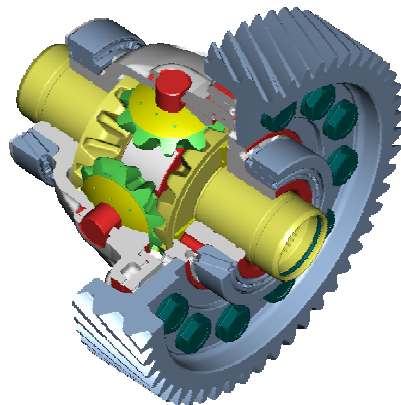
Φ12



Φ8

## New Features

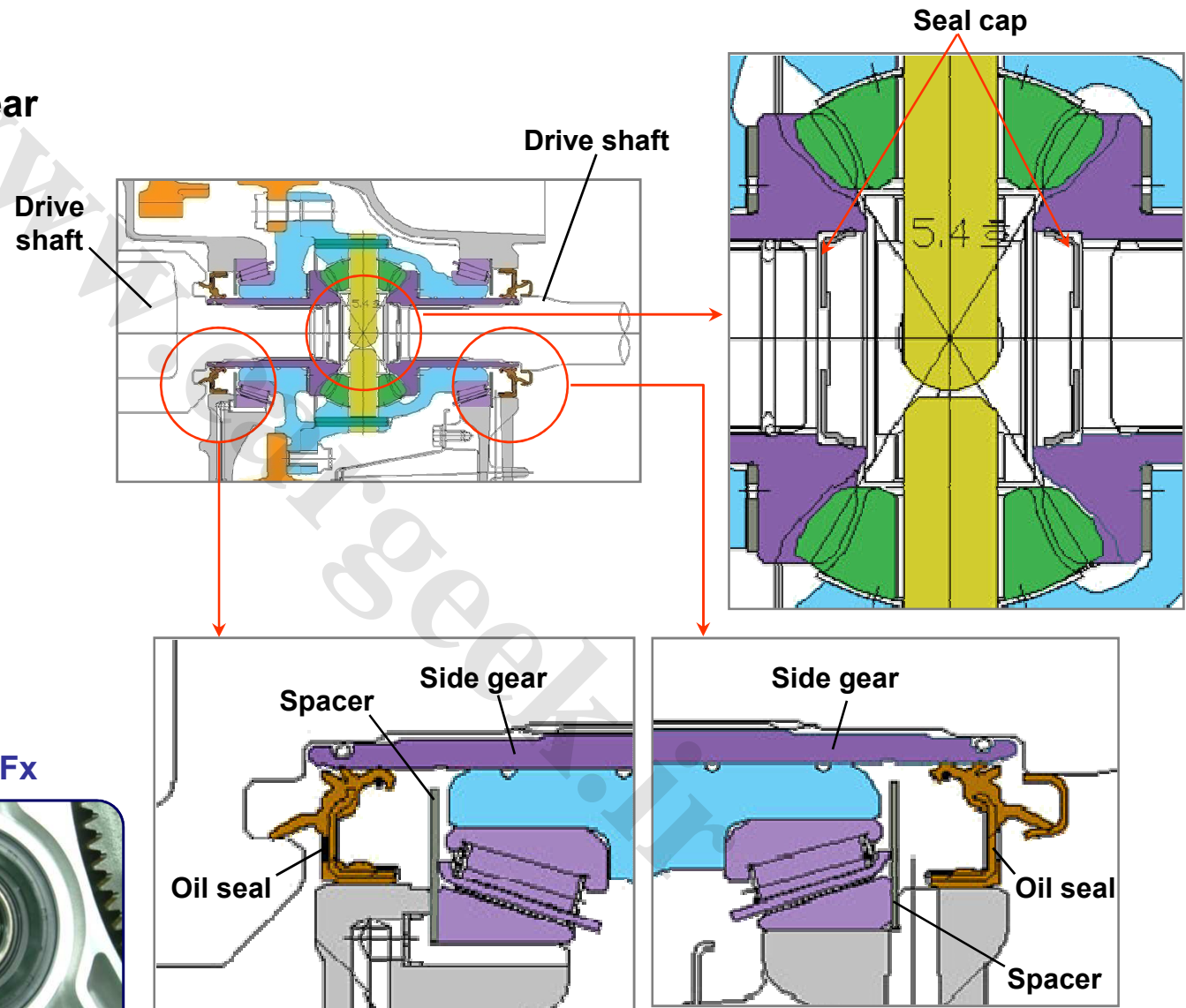
### Close type differential gear



Other than  
A6LMFx



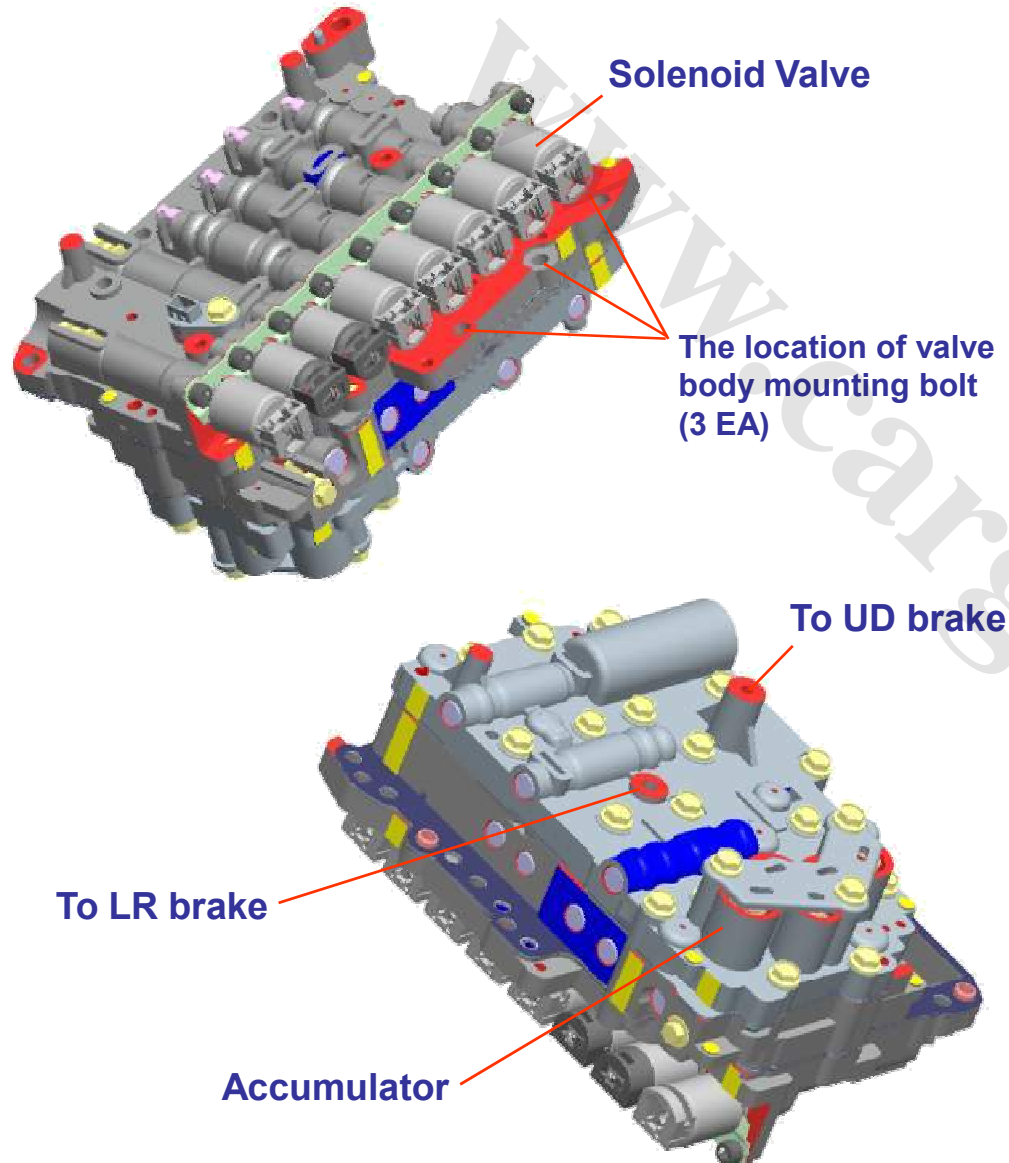
A6LMFx



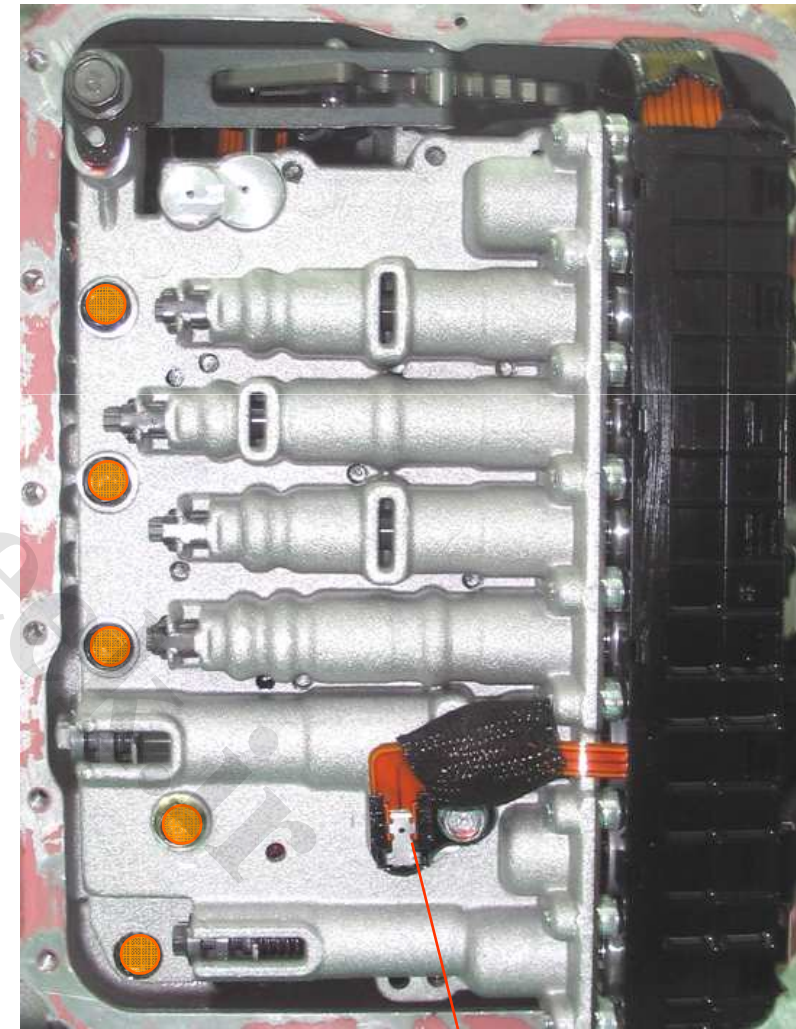
**Very long side gear → it directly contacts with the oil seal.**



## Valve Body



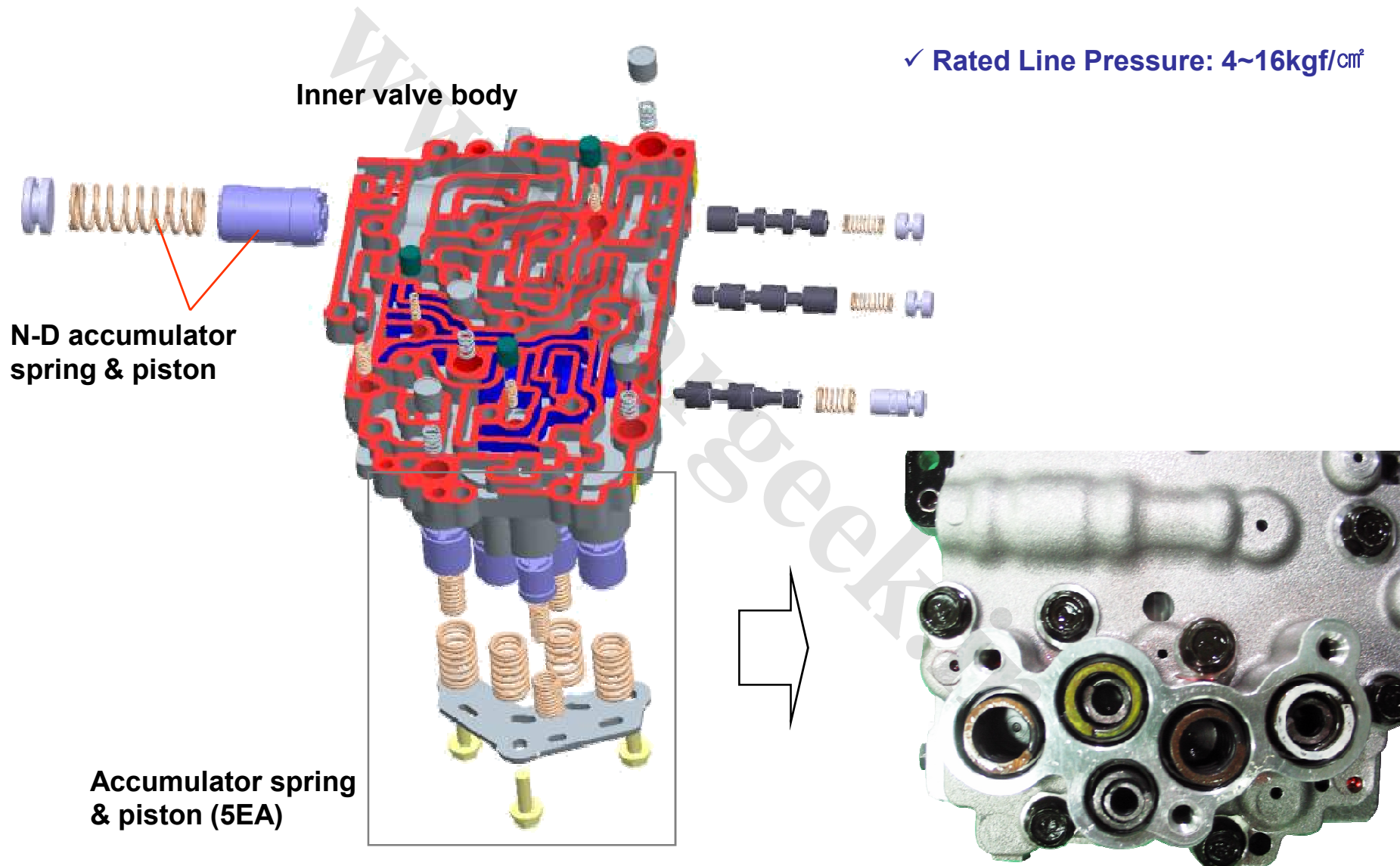
● The location of valve body mounting bolt (5 EA)



Oil temperature sensor

## Accumulator

✓ Rated Line Pressure: 4~16kgf/cm<sup>2</sup>

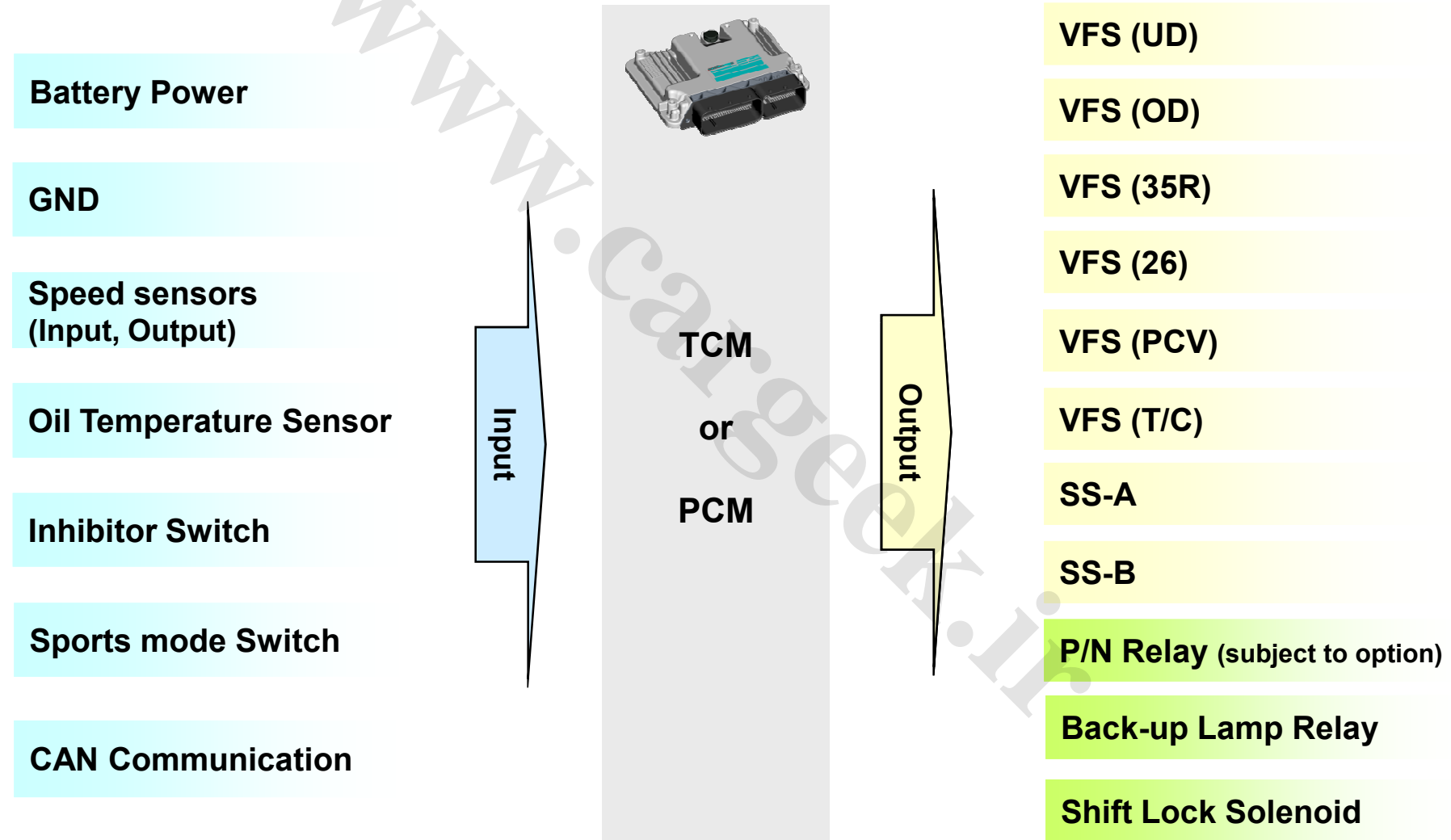


## Clutch &amp; Brake Operation Table

Range		Brake			Clutch		OWC
		LR	UD	26	O/D	35R	
P/N		▲					
NC		▲	▲				
R		●				●	
S	1 <sup>ST</sup>	●	●				
D	1 <sup>ST</sup>	● → X	●				●
D/S	2 <sup>ND</sup>		●	●			
	3 <sup>RD</sup>		●			●	
	4 <sup>TH</sup>		●		●		
	5 <sup>TH</sup>				●	●	
	6 <sup>TH</sup>			●	●		

●: Hydraulic pressure is applied. ▲: Hydraulic pressure is applied but no power is transmitted.

## Inputs & Outputs

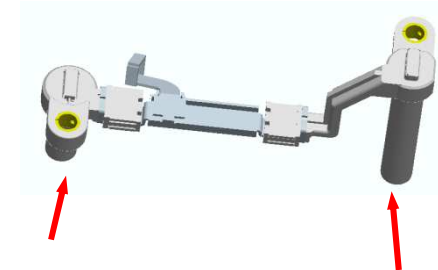




## Input and Output Speed Sensor

- ✓ Integrated one unit for input & output speed sensor
- ✓ Hall Effect Sensor, 2pins (Power: **9V**, Signal)
- ✓ Differential current type (low: 7mA, high: 14mA)
- ✓ **Failsafe: 4<sup>th</sup> gear hold (D), 2<sup>nd</sup> ~ 4<sup>th</sup> manual shift (S)**

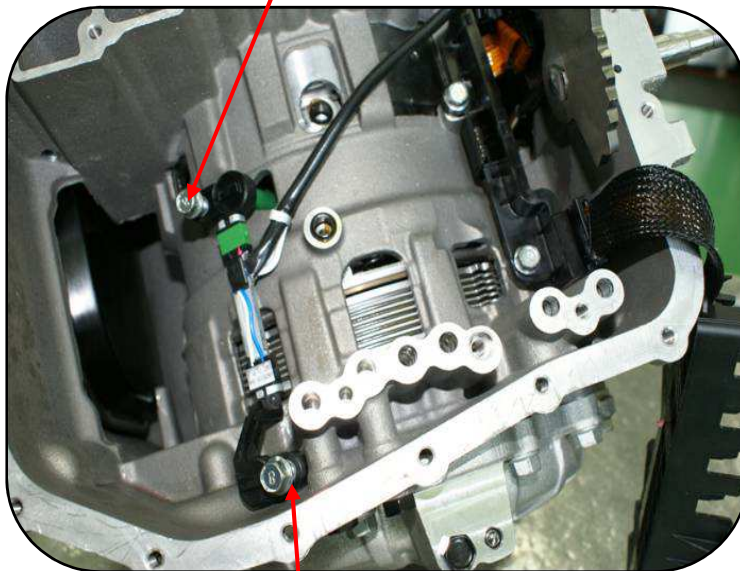
Embedded in transmission



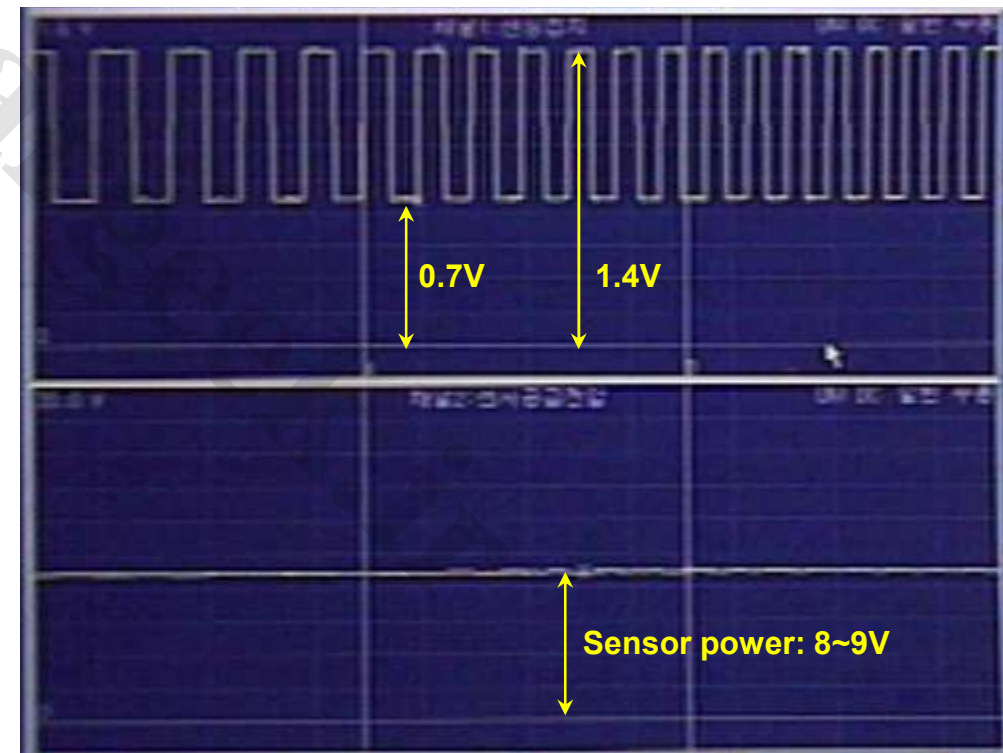
Output speed sensor

Input speed sensor

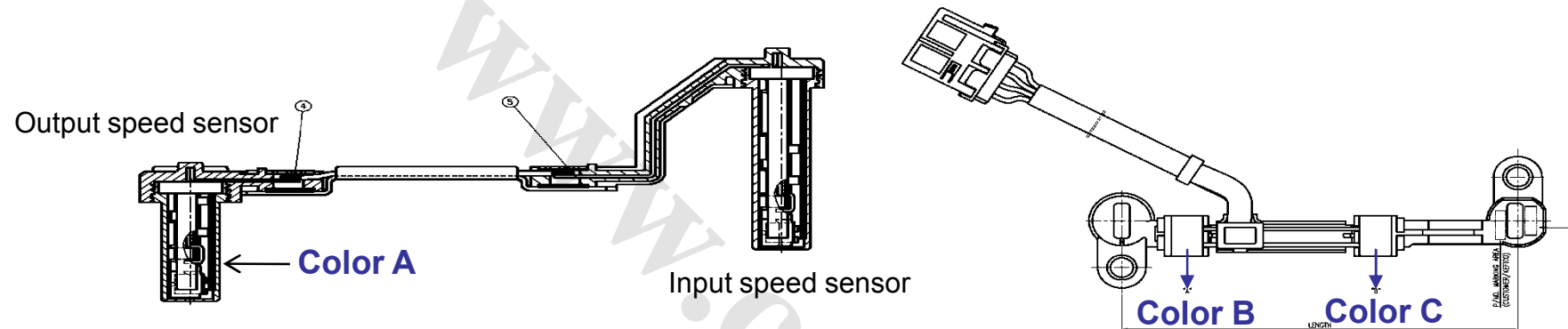
Output speed sensor



Input speed sensor



## Input and Output Speed Sensor



Model	Part Number	Variant		
		Color A	Color B	Color C
A6LF1/2	42620-3B100	Black	←	←
	42620-3B110	Green	←	←
A6LF3	42620-3B300	Black	←	Green
	42620-3B310	Green	←	Black
A6MF1/2	42620-3B600	Blue	←	←
	42620-3B610	Brown	←	←
	42620-3B620	Gray	←	←



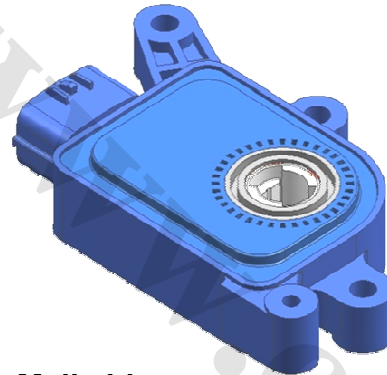


# Automatic Transmission

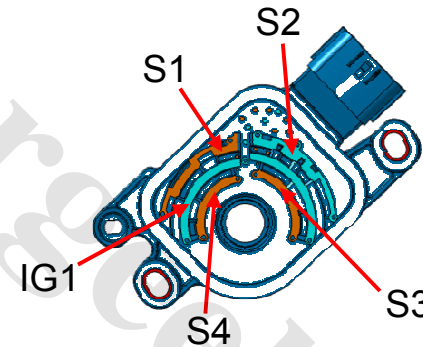
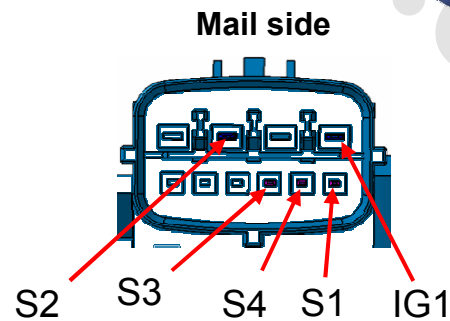
## Inhibitor Switch



42700-3B000



- ✓ Combination of output signals from 4 terminals
- ✓ Power supply: 12V
- ✓ Range detection: 7-position (P, R, N, D, X, Y, Z)
- ✓ **Failsafe: 1<sup>st</sup>, 2<sup>nd</sup> gear is prohibited.**



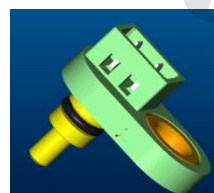
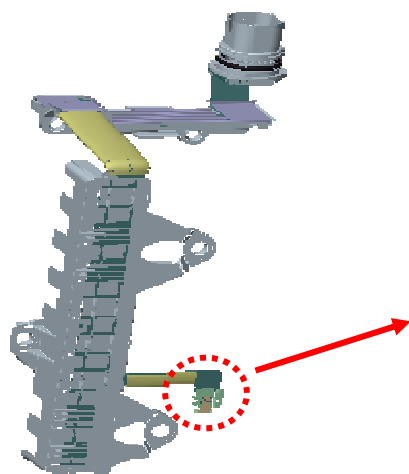
	P	P-R	R	R-N	N	N-D	D	D-X	X	X-Y	Y	Y-Z	Z
S1	1	0	0	0	1	1	1	1	1	1	0	0	0
S2	0	0	0	1	1	0	0	1	1	0	0	1	1
S3	1	1	0	0	0	0	0	0	1	1	1	1	1
S4	1	1	1	1	1	1	0	0	0	0	0	0	1



# Automatic Transmission

## OTS (Oil Temperature Sensor)

- ✓ Negative Thermal Coefficient Type
- ✓ -40°C ~ 165°C (4.68KΩ~43 Ω)
- ✓ **Failsafe: Oil temperature set to default value (80°C).**

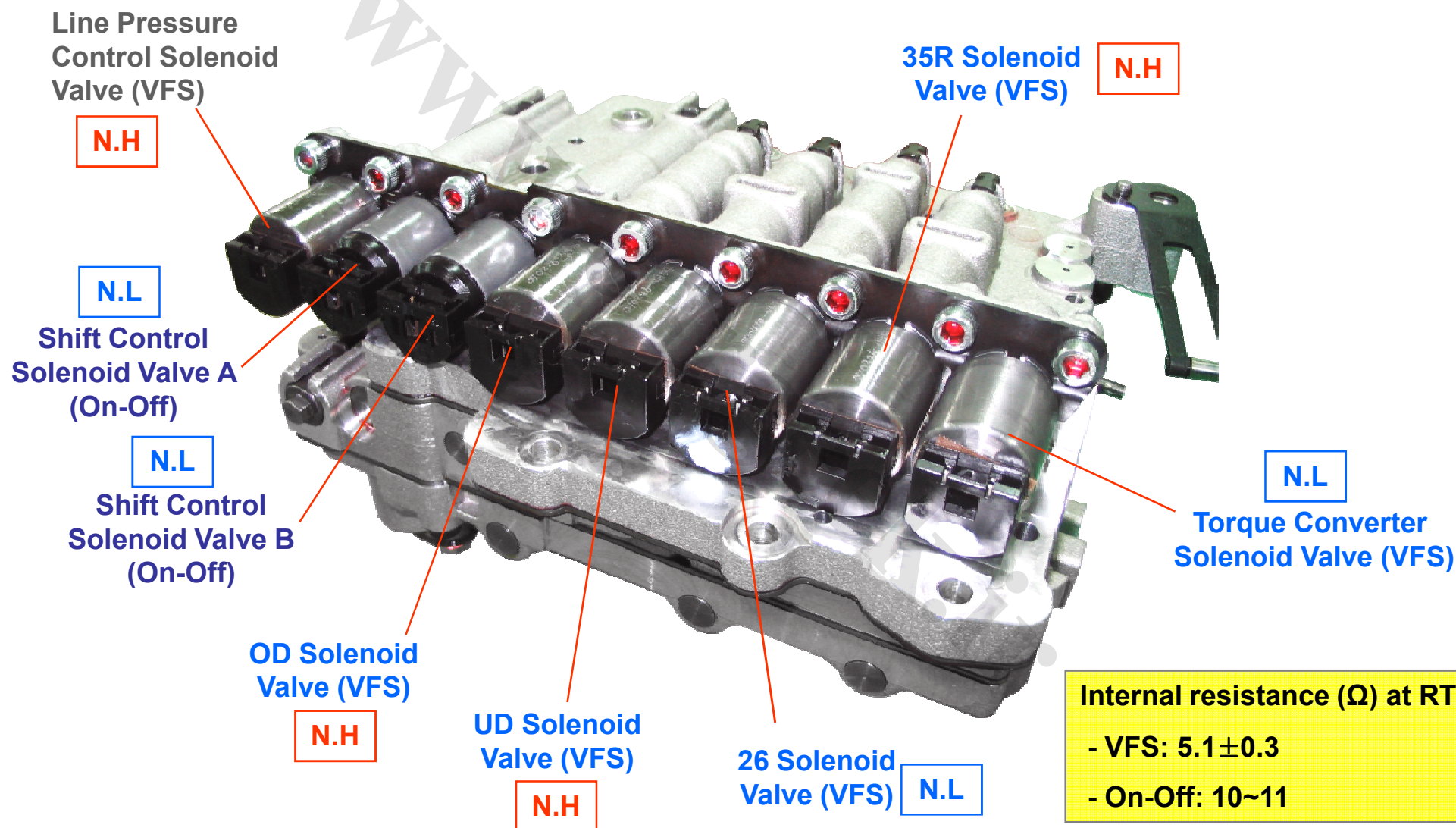


46386-.B000



DTC		Description	Failsafe
P0712	OTS Short to Ground	<Condition> Eng. RPM > 400 - OTS > 180°C for 5sec or more.	- MIL ON (2DC) - Set to 80°C
P0713	OTS Short to B+ or Open	<Condition> Eng. RPM > 400 - OTS < -40°C for 5sec or more.	

## Solenoid Valve



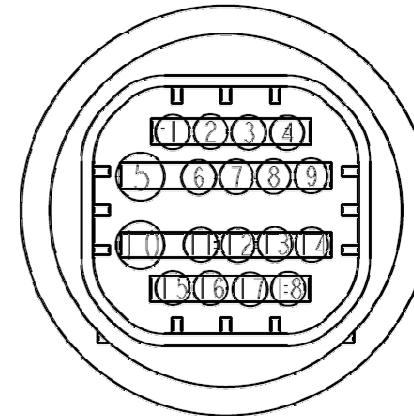
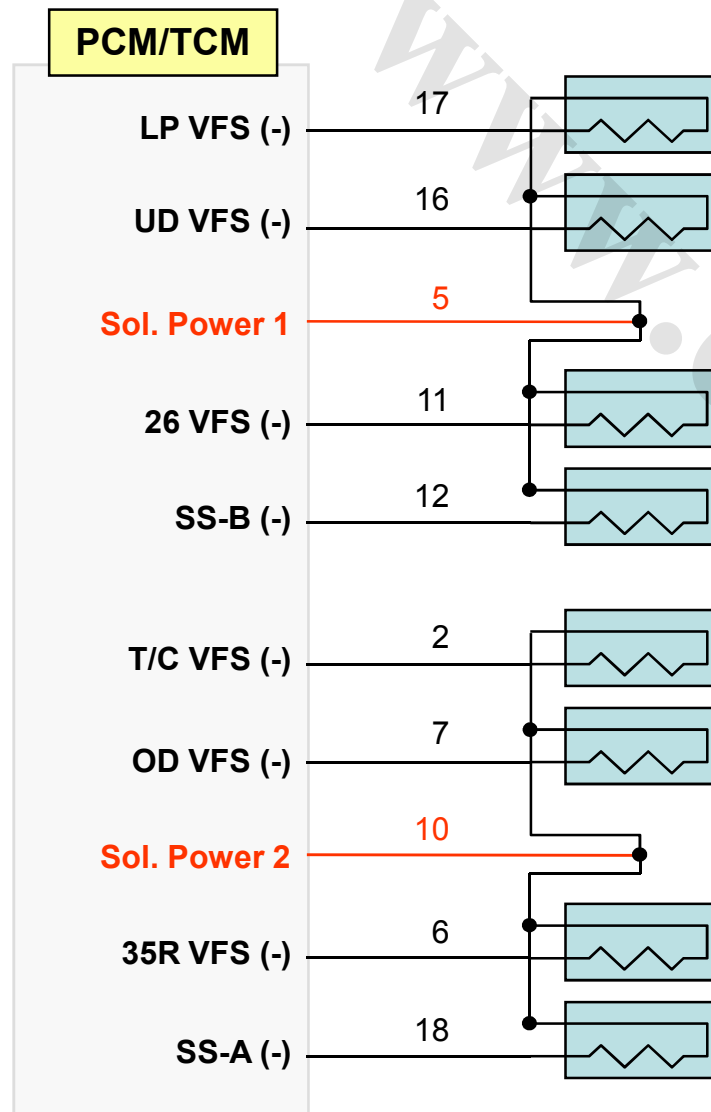
## Solenoid Valve Operation Table

● Solenoid is energized.  
 ▲ ON (8kph↑), OFF (6kph↓).  
 F: Feedback control

Range		VFS				On-Off	
		UD	OD	35R	26	SSA	SSB
		Normal High			Normal Low		
P/N		●		●		●	
NC		F		●		●	
R		●				●	●
S	1 <sup>ST</sup>			●		●	
D	1 <sup>ST</sup>		▲	●		●	
D/S	2 <sup>ND</sup>		●	●	●		
	3 <sup>RD</sup>		●				●
	4 <sup>TH</sup>			●			
	5 <sup>TH</sup>	●					●
	6 <sup>TH</sup>	●		●	●		

**Failsafe of solenoid valve failure: 4<sup>th</sup> gear hold.**

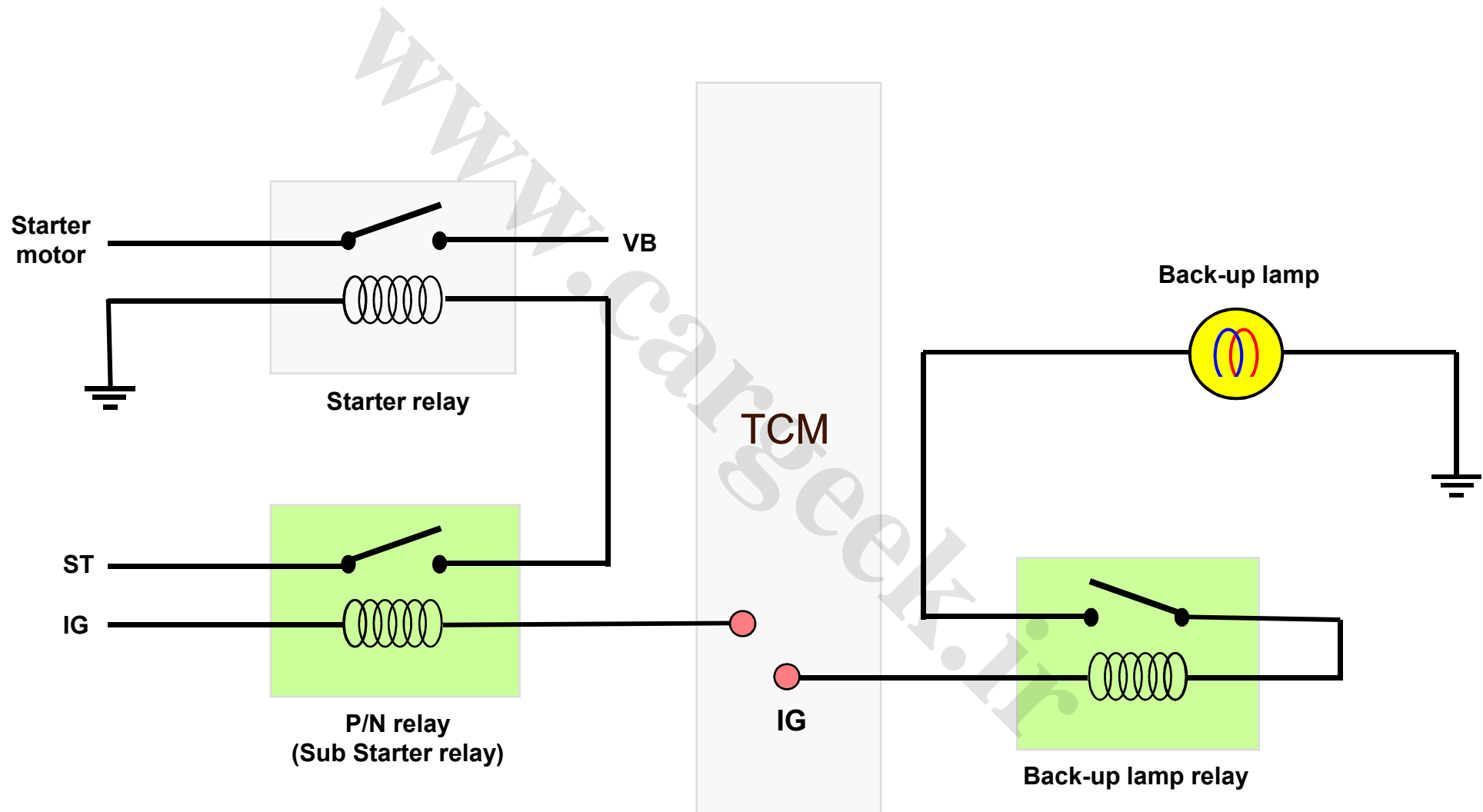
## Solenoid Valve Interface



**18 pin connector  
(Male side connector)**

Pin	Description	Pin	Description
1	-	10	Solenoid power 2
2	T/C VFS (-)	11	26 VFS (-)
3	Power (output speed)	12	SS-B (-)
4	Signal (output speed)	13	OTS (-)
5	Solenoid power 1	14	Power (input speed)
6	35R VFS (-)	15	-
7	OD VFS (-)	16	UD VFS (-)
8	Signal (input speed)	17	Line pressure VFS (-)
9	OTS (+)	18	SS-A (-)

## P/N Relay & Back-up Lamp Relay

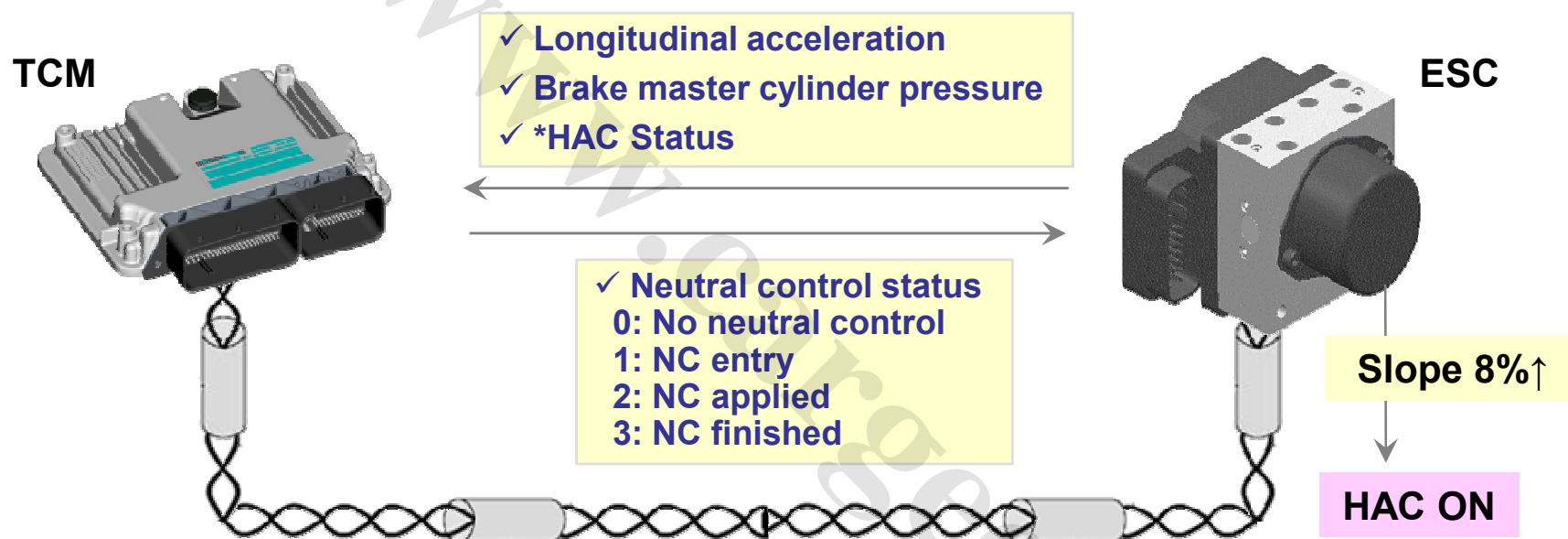




# Automatic Transmission

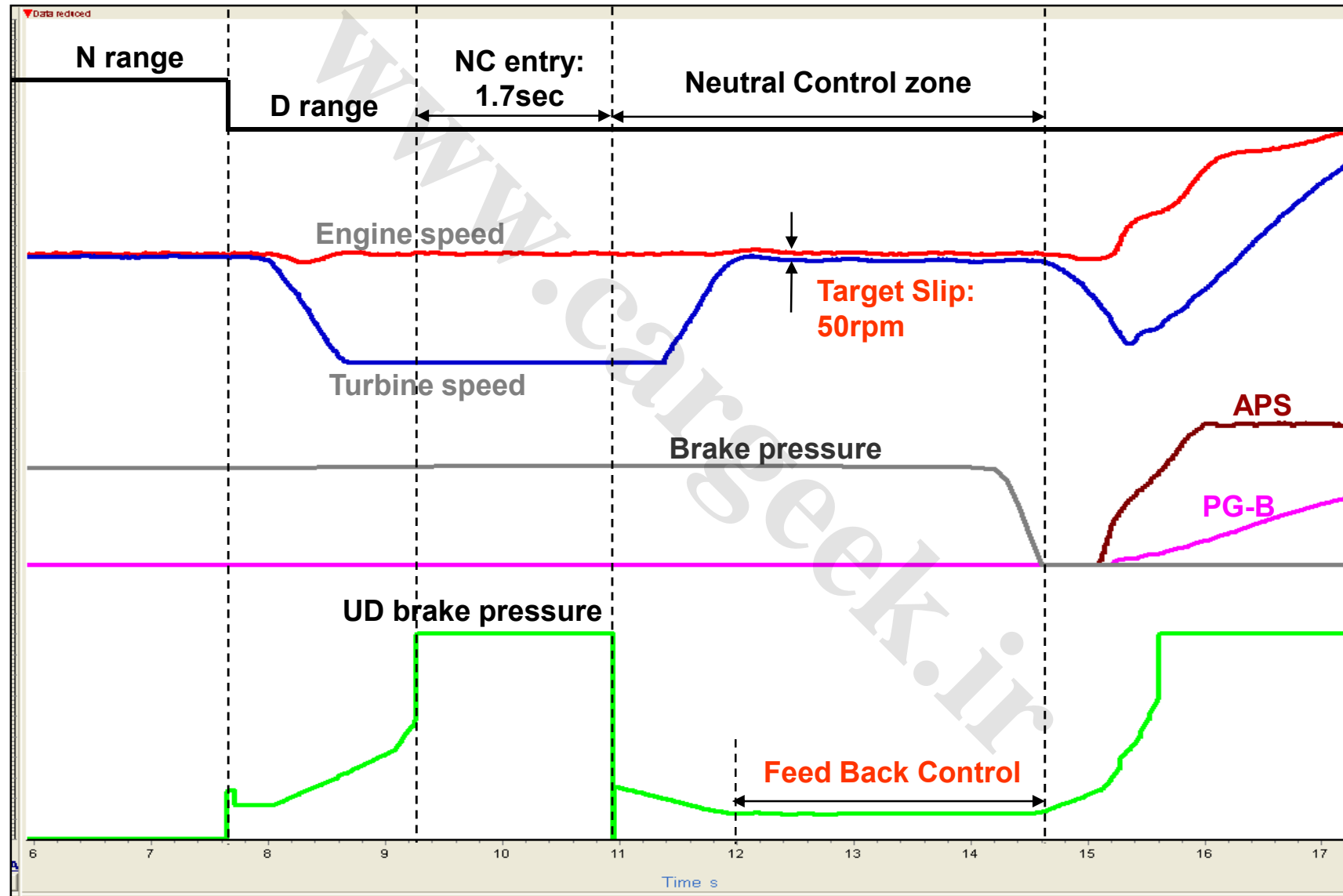
## Neutral Control

\*HAC: Hill start Assist Control



NC entry (AND) (must maintain over 2sec)	NC release (OR)
Foot brake ON & APS=0% D range 1 <sup>st</sup> gear Engine warm up VS=0kph	Foot brake OFF or APS>0% Other than D-1 <sup>st</sup> Engine cold condition VS > 0kph

## Neutral Control

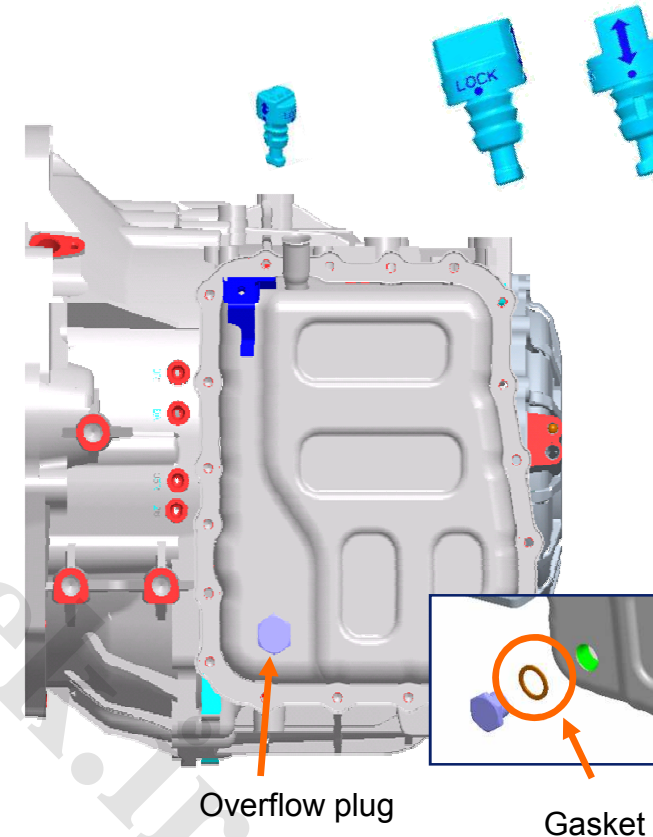


## Oil Level Adjustment

1. Open the oil filler cap and **add 700cc of ATF (SP-IV) at first.**
2. Start the engine and keep **idle** speed.  
(Do not warm up by stall test)
3. Warm up until oil temperature is **55°C (50~60°C)**  
(Using the scanner)
4. Move the shift lever from P to D two times and put on P range.
5. Lift up the vehicle and remove the overflow plug.
6. If oil drops, assemble the overflow plug because it is normal.
7. Otherwise, add some oil and repeat from step 1 until it drops.

※ If oil was totally drained, pour 5ℓ and then perform the above procedure.

※Oil Filler Cap  
 Close: Parallel to oil pan.  
 Open: Perpendicular to oil pan.



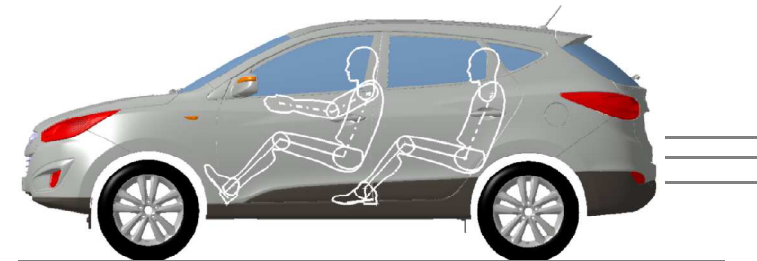
### [Caution]

- Overflow gasket should be replaced with new one.
- Tightening torque of overflow plug: 3.5~4.5 Nm
- Tightening torque of drain plug: 3.9~4.9Nm

## TCM Learning

Time to perform TCM Learning:

- ✓ A/T assembly replacement
- ✓ TCM replacement
- ✓ TCM reprogramming



Category	Shift	Conditions	Repeat	Common Conditions
UD/B	N→D	Engine speed < 700RPM. Stay in N for more than2 sec	3~4 times	Oil Temp. = 40~90℃ There must be no APS change during shifts (within 3%).
26/B	1→2	APS = 10~30% (15~20% recommended)		
35R/C	2→3			
OD/C	3→4			

Questions?

End of Presentation

Thank you.