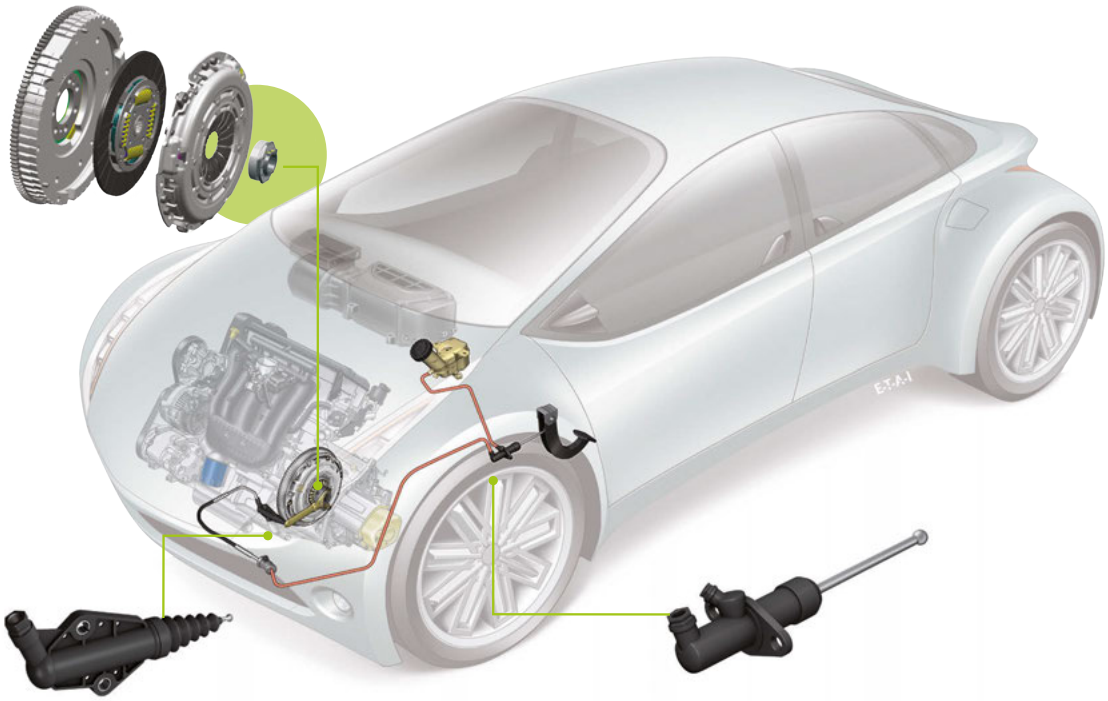
Transmission Systems

Clutch Hydraulics

Valeo clutches, expertise & innovation dedicated to customer satisfaction

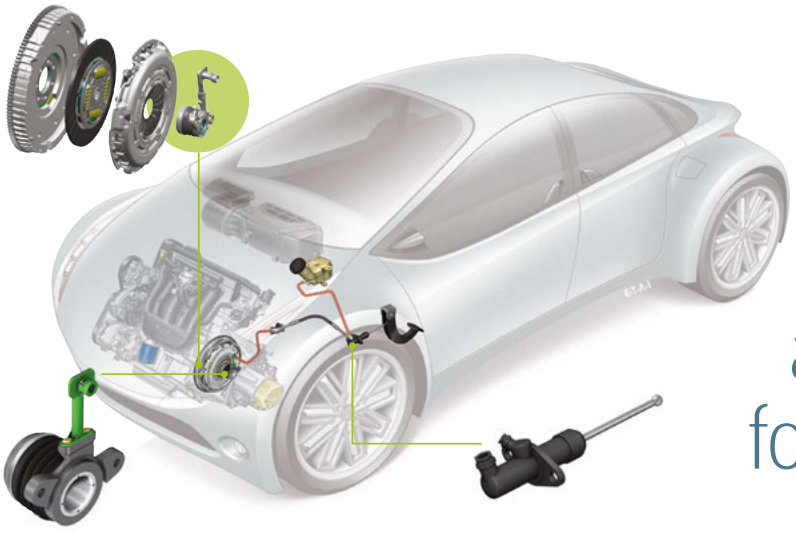


Clutch release cylinder (CRC)

Clutch master cylinder (CMC)

A growing market

93% of new vehicules in Europe are equipped with hydraulic technology.



Clutch slave cylinder (CSC)

Clutch master cylinder (CMC)

Make the difference! Choose Valeo

Valeo offers you a complete solution for hydraulic systems

Valeo

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Foreword

Our Multi-specialist expertise is rooted in our genes.

As one of the leading automotive system designers and manufacturers, nothing is more natural for Valeo than to deliver 14 product lines for passenger cars and 8 products lines for heavy-duty vehicles, serving all distribution channels from car makers' networks to independent aftermarket and modern distribution, in more than 120 countries all over the world.

Valeo Transmission Systems' mission is to be the supplier of choice for all powertrain architectures with innovative technologies developed for efficient and comfortable power transfer from the engine to the transmission, whilst reducing fuel consumption.

All Valeo clutches are manufactured to Valeo's highest quality standards, making Valeo products efficient and reliable and ensuring full customer satisfaction.

Efficient because Valeo's expertise in research and development allows the reduction of clutch noise and vibrations along with enhanced driver comfort through better gear changes, giving consumers a smoother and more comfortable ride.

Reliable because Valeo clutches are able to perform in the most hostile operating environments. Valeo aftermarket customers benefit from this Original Equipment (OE) expertise, rigor and quality.

The worldwide vehicle car parc consists of 69% passenger cars and is growing by 3.9% per year.
More and more car manufacturers demand new clutch technologies to increase comfort for the driver. This is one of the reasons why clutch hydraulics became popular in production by 90s, reducing pedal load and increasing efficiency of the release system.

Since 1998 Valeo has been producing clutch hydraulics to the car manufacturers worldwide. This handbook is the opportunity to explain you the design, composition and the related advantages of the clutch hydraulics. You will find as well a diagnosis, the instructions to install the hydraulic components and to bleed air from the hydraulic circuit. Last but not least, the most frequently asked questions will be addressed.

Valeo - from original equipment leadership to aftermarket excellence

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Valeo, your Transmission Systems Multi-specialist

Valeo is an automotive supplier, partner to all automakers worldwide. As a technology company, Valeo proposes innovative products and systems that contribute to the reduction of CO_2 emissions and to the development of intuitive driving.

In 2013, the Group generated sales of €12.1 billion euros and invested over 10% of its original equipment sales in research and development. Valeo has 124 production sites, 16 research centers, 35 development centers and 12 distribution platforms, and employs 74,800 people in 29 countries throughout the world.

Valeo consists of 4 Business Groups: Powertrain Systems, Thermal Systems, Comfort and Driving, Assistance Systems and Visibility Systems.
Together, these 4 Business Groups comprise 16 Product Groups and supply both the Original Equipment (OE) market and the aftermarket.

The Transmission Systems product portfolio is part of Valeo's Powertrain Systems Business Group.

Valeoscope library

Technical handbooks

Air Conditioning
Ref: 998321

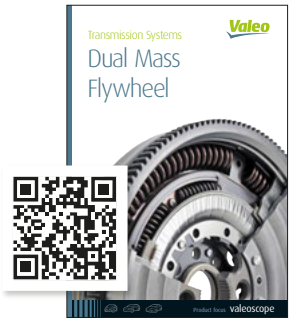
Lighting Systems
Ref: 998542

Product focus

Transmission Systems
Clutch HEC-SAT
Ref: 998121

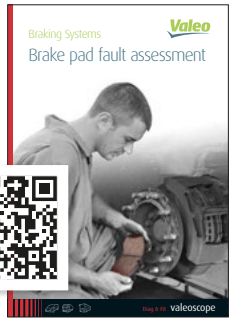
Transmission Systems
Clutch Hydraulics
Ref: 998123

Transmission Systems
Clutch KIT4P
Ref: 998102



Transmission Systems
Dual-Mass Flywheel DMF
Ref: 998120

Diag & Fit



Truck Brake Pad
Ref: 957100

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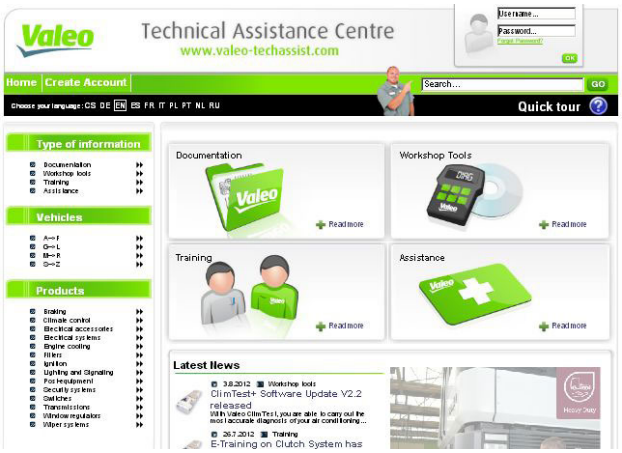
valeo-techassist.com



Valeo TechAssist is a web-based application, specifically developed for repair workshops, automotive spare parts distributors and technical trainers.

Valeo TechAssist is available at any time, and 10 languages are implemented to date. Just connect to the website www.valeo-techassist.com.

Valeo TechAssist is not only a technical database, but also a learning platform and a forum for information exchange. It covers passenger cars and all Valeo product lines.

The information in Valeo TechAssist is structured in four comprehensive domains:

1.Product documentation

2.Technical assistance

3.Workshop tools

4.Technical training

You will benefit from Valeo TechAssist all through the workshop service process:

- Get product information: product data sheets provide details in addition to the catalogue information.
- Find common failures: step-by-step failure diagnosis guides about typical faults.
- Keep you updated about Valeo Service products: full access to all technical service bulletins.
- Find help when it is needed: answers to frequently asked questions and contact with the Valeo Service technical hotline
- Use Valeo workshop tools efficiently: retrieve user manuals, service manuals and software updates on Valeo Service tools
- Learn about new technologies: online training modules (e-learning) and self-study documents about most modern product technologies. In addition, you have access to some advanced features:
- Add comments to any document: give personal feedback to Valeo Service and contribute to a continuous service improvement.
- Fill in your evaluation: provide feedback on your satisfaction.
- Write a fitting testimony: share your experience with other users.

4 Why hydraulics?

The clutch is the interface between the engine and the gearbox. This interface can be disengaged via a release system connected to the clutch pedal to enable gear changes. In engaged position, the disc is squeezed between the two friction surfaces of the flywheel and the pressure plate of the clutch cover. To disengage a push or a pull type clutch, it is necessary to push or to pull the fingers of the diaphragm. The pressure plate then moves against the flywheel and releases the friction. The clutch is then disengaged. This release system can be either mechanical (by clutch cable) or hydraulic.

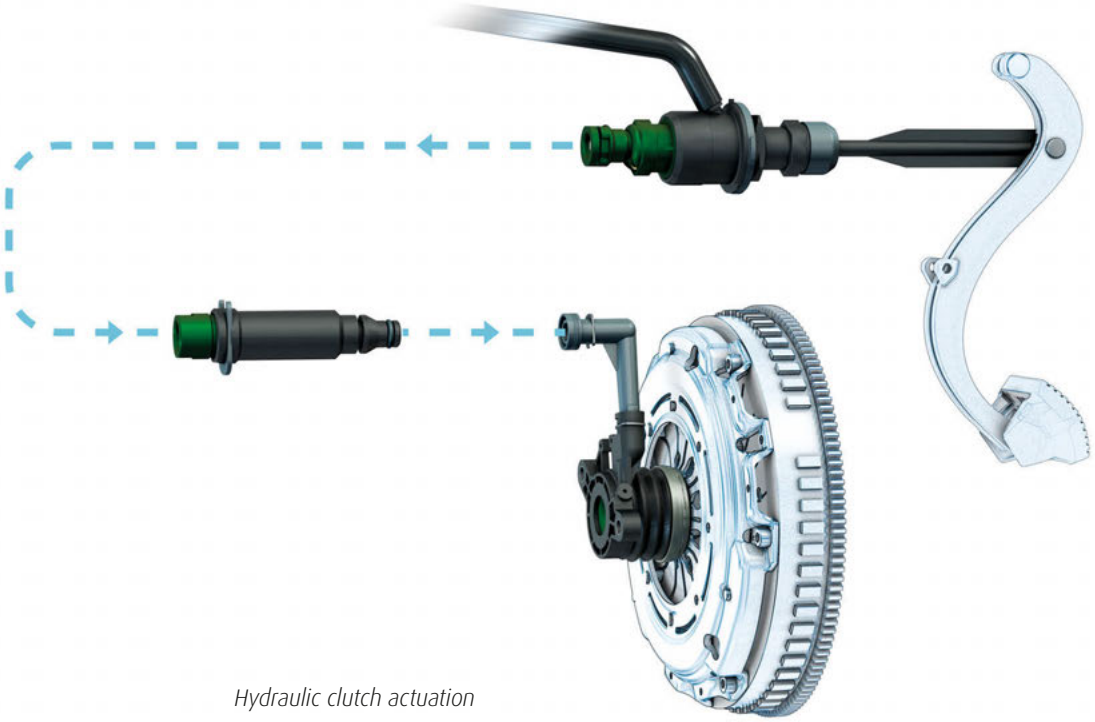
The mechanical clutch release system consists of a release bearing that is operated by a fork. The fork is attached to a clutch cable operated by the driver's foot via the clutch pedal. Cars have become lighter and more compact. Car manufacturers demand reduced pedal load linked to comfort reason. Hydraulic systems become mandatory in such cases as they also provide benefits compared to the manual system, increasing efficiency of the actuation with less space required.
For these reasons, one vehicle out of two is equipped with a hydraulic system today.

5 Hydraulics design and composition

The hydraulic clutch release systems are based on the same principle as hydraulic brakes. The hydraulic system consists of a transmitter (clutch master cylinder), a hose and a receiver.

The clutch master cylinder is connected to a plastic or a metal tank filled with hydraulic fluid. The tank is either common between the clutch and the brake master cylinders or separate.

The receiver, depending on the application, can be a ***clutch release cylinder (semi-hydraulic system) or a concentric slave cylinder (full hydraulic system).***

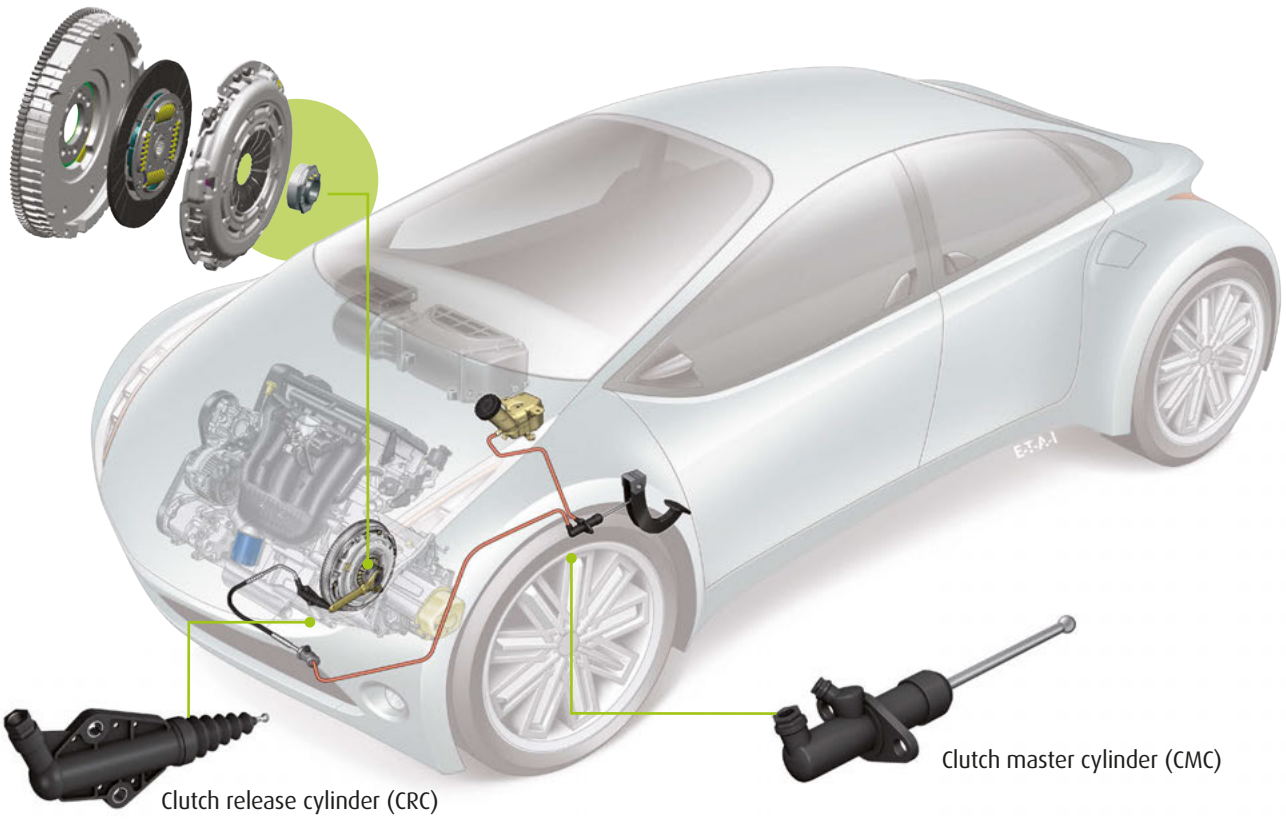


Hydraulic clutch actuation

5.1 In a semi-hydraulic system

The clutch pedal arm operates a piston in the clutch master cylinder (CMC). This forces hydraulic fluid through a hydraulic hose to the clutch release cylinder (CRC) where another piston operates the clutch disengagement mechanism. When the vehicle is equipped with a release cylinder, the interface within the hydraulic system and the clutch is operated by a clutch fork and a release bearing. This system can be used both with push or pull type clutches.

In a semi-hydraulic system, the release cylinder is located outside the transmission housing. Thus it is possible to replace the hydraulic components without removing the gearbox.



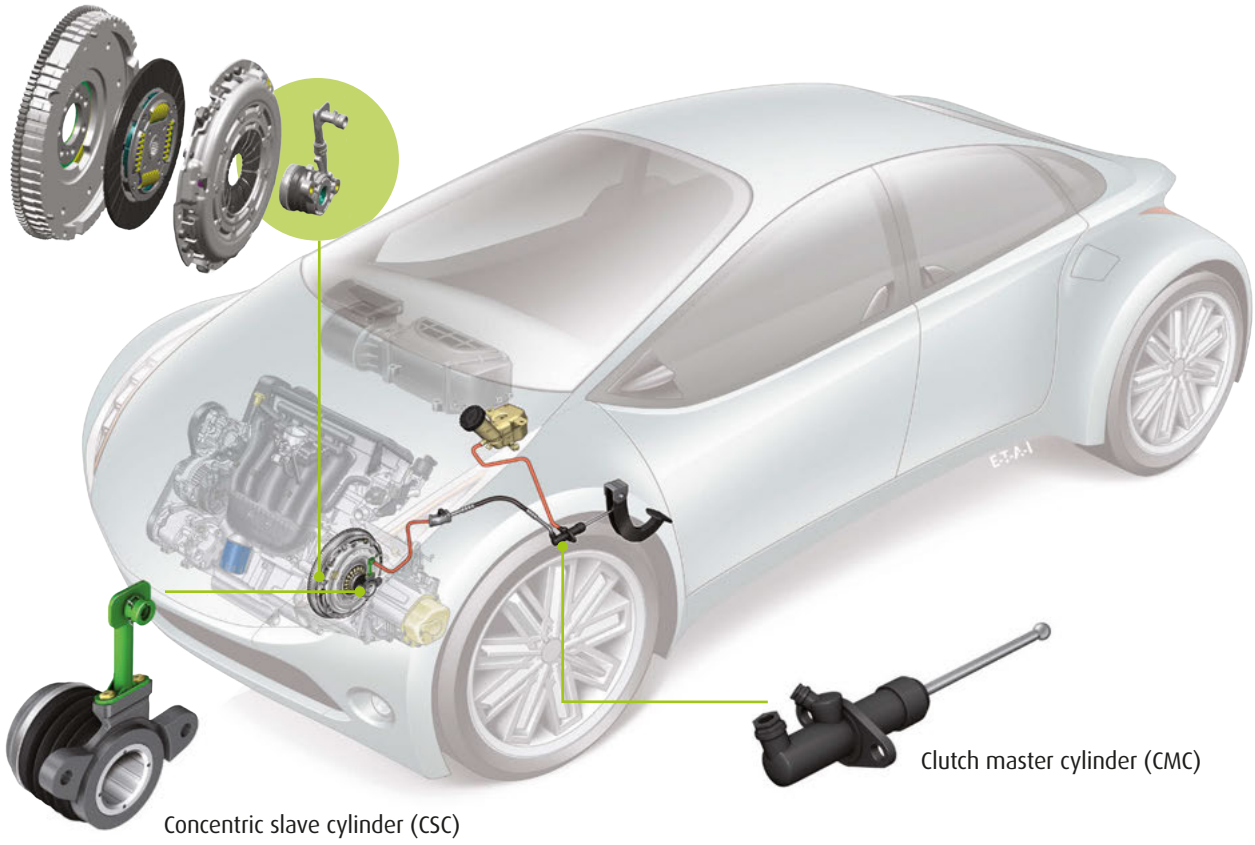
Semi-hydraulic clutch actuation (clutch master cylinder (CMC) & clutch release cylinder (CRC)).

5. Hydraulics design and composition

5.2 In a full-hydraulic system

The concentric slave cylinder (CSC) is connected to the master cylinder via a hose. It is a hydraulic cylinder with an integrated release bearing. The design eliminates the clutch fork, the release bearing and the guide tube. The CSC is in direct contact with the clutch cover diaphragm, increasing the efficiency of the hydraulic system.

This system can only be used with push type clutches. In a full-hydraulic system the CSC is located inside the transmission housing. It is highly recommended to replace the CSC during each new clutch installation.

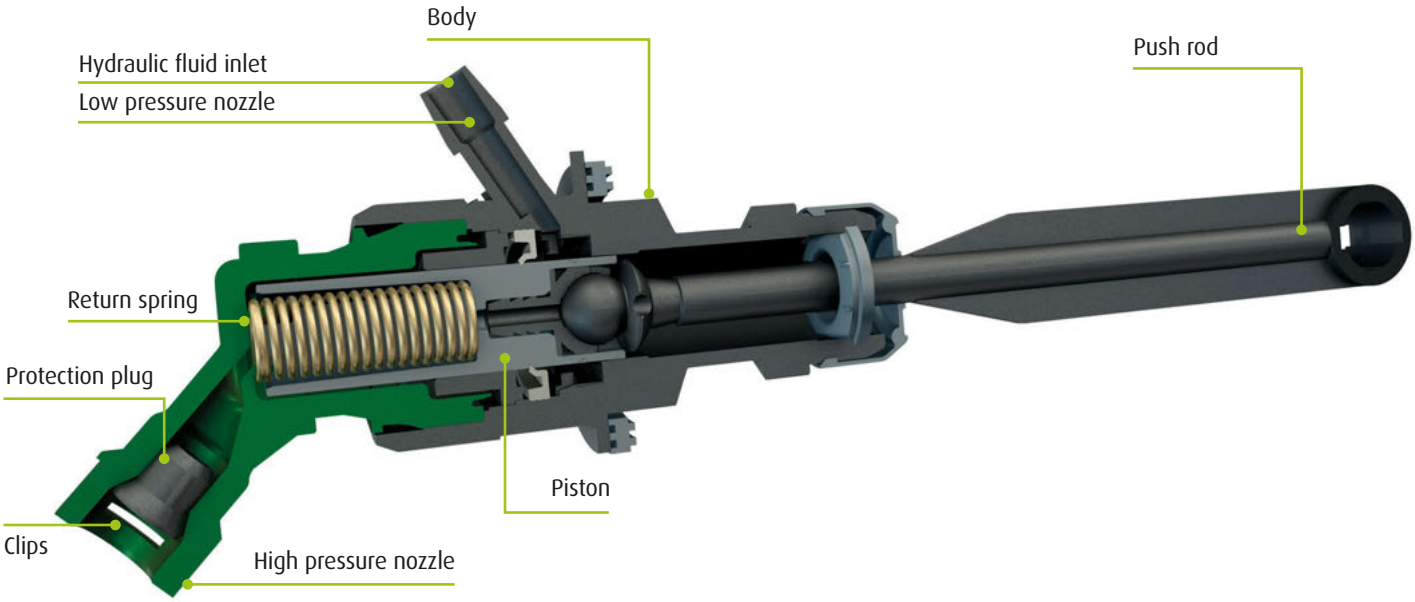


Full hydraulic clutch actuation (clutch master cylinder (CMC) & concentric slave cylinder (CSC)).

5.3 Clutch Master Cylinder (CMC)

The clutch master cylinder (CMC) is composed of:

- Aluminum or plastic body
- Anodized aluminum piston
- Primary seal that isolates the reservoir from the hydraulic chamber
- Secondary seal that isolates the low-pressure chamber of the reservoir from its environment
- Push rod that connects the CMC to the pedal
- Low pressure nozzle that connects the CMC to the reservoir
- High pressure nozzle that connects the CMC to the high pressure pipe and the receiver



Clutch master cylinder composition

5. Hydraulics design and composition

5.4 Clutch Release Cylinder (CRC)

When the clutch pedal is pressed, the CMC push rod moves inwards generating pressure on the circuit and the CRC push rod moves outwards to disengage the clutch

The clutch release cylinder is composed of:

- Cast iron, aluminum or plastic body
- Piston, generates high pressure inside the body
- Primary seal that isolates the reservoir from the hydraulic chamber
- Secondary seal that isolates the low-pressure chamber of the reservoir from its environment
- Push rod that connects the CRC to the clutch fork
- High pressure nozzle that connects CRC to the high pressure pipe and the CMC.

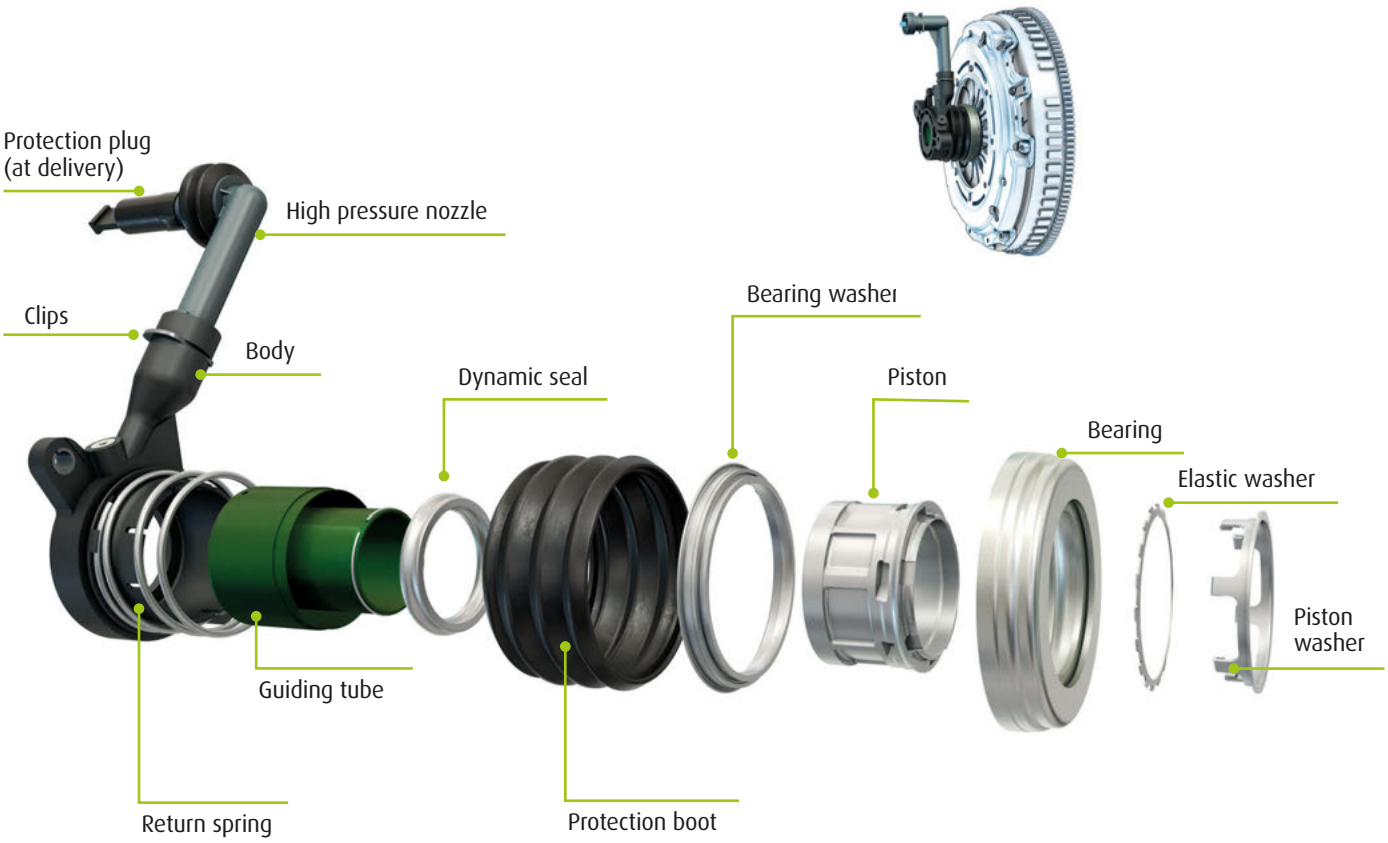
Clutch release cylinder composition

5.5 Concentric Slave Cylinder (CSC)

CSC is also a receiver and operates directly on the clutch cover diaphragm. The CSC replaces the CRC. and eliminates the release bearing, the guide tube and the clutch fork from the system.

The CSC is composed of:

- Steel, aluminum or plastic body
- Guide tube forming the hydraulic chamber
- Piston and seal assembly that ensures the stroke of the bearing
- High pressure nozzle that connects CSC to the high pressure pipe and the CMC.
- Self centering bearing



Concentric slave cylinder composition

5. Hydraulics design and composition

When designing a concentric slave cylinder, a self centering function is mandatory. The self centering corrects eccentricity between the axis of the pressure plate and the axis of the bearing which is generated by free play between the bearing and the sleeve. This allows the bearing to move relative to the sleeve, and to be self centered relative to the axis of the diaphragm of the cover assembly.

A key element within the hydraulic component is the seal.

For manual transmission, the seal within the hydraulic component is an EPDM (ethylene propylene diene monomer) synthetic rubber. In this case, it can be in contact only with the DOT hydraulic fluid. If the seal comes into contact with mineral or synthetic fluid (such as engine oil, gearbox oil and grease used for lubrication), the system will leak.

For robotized gearboxes, the seal within the hydraulic component is made of HNBR (hydrogenated nitrile butadiene rubber). In this case, it can be in contact with mineral or synthetic fluid.

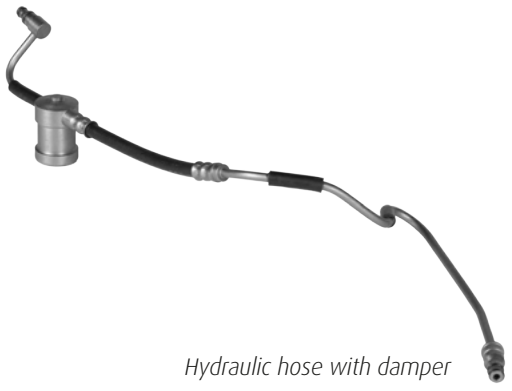
It is important to refer to the car manufacturer manual to identify the correct hydraulic fluid.

Concentric slave cylinder

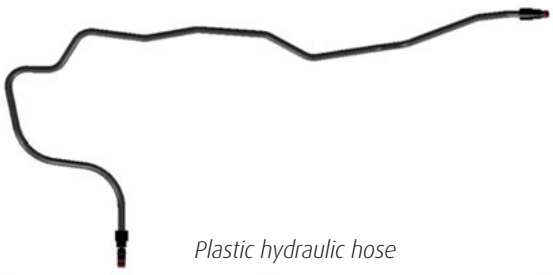
5.6 Hydraulic hose

The hose can be made of either steel and/or plastic. The steel pipe is coupled to a small rubber hose to allow a relative displacement.

All plastic hoses have been in production with laser welded connectors. The advantages of plastic hoses compared to steel are weight reduction, lower cost and ease of assembly on the vehicle line.



Hydraulic hose with damper



Plastic hydraulic hose

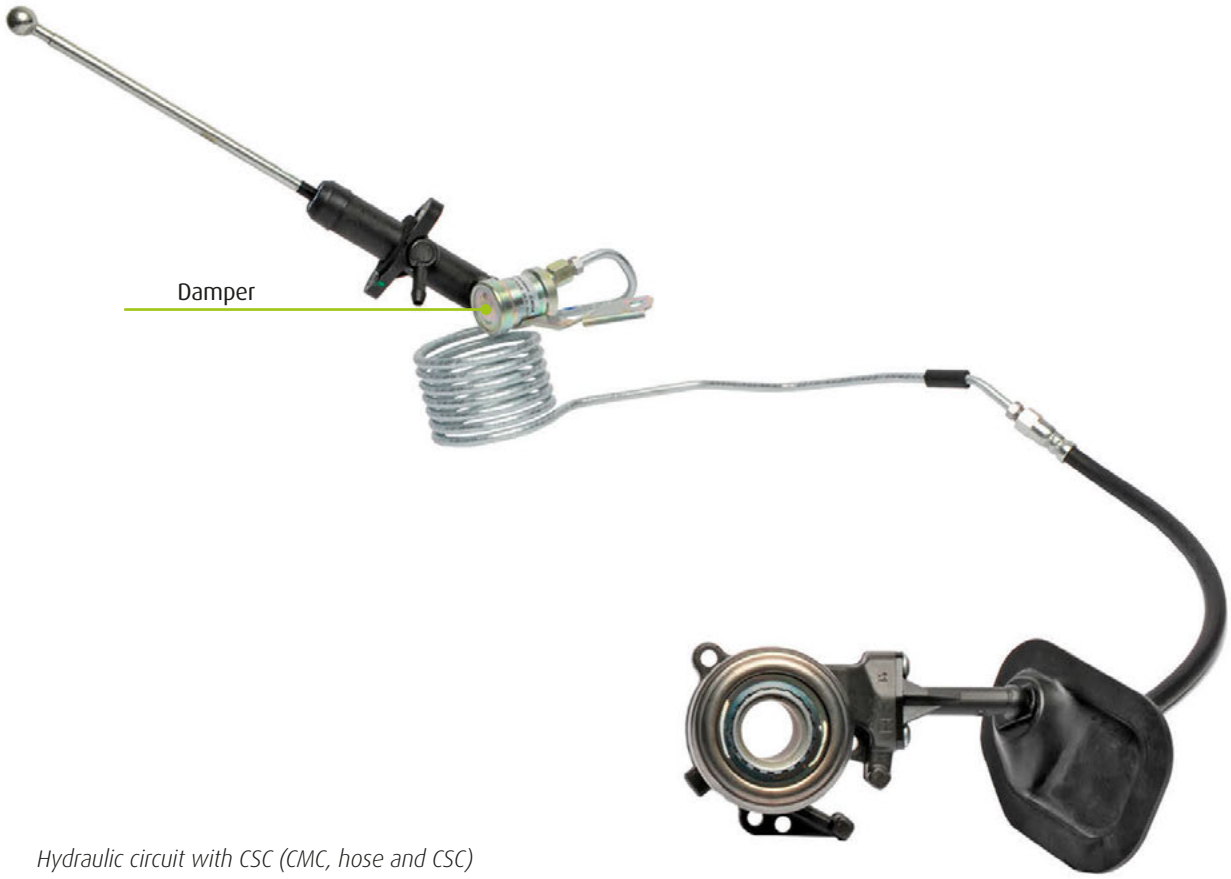
5.7 Hydraulic dampers

The deformations of the engine crankshaft during combustion within the engine create axial movement of the flywheel up to several tenths of a millimeter. These movements produce vibrations which propagate through the diaphragm fingers, the release bearing up to the clutch pedal.

Dampers can be used within the hose for vibration reduction. For applications fitted with a damper, these hoses cannot be replaced by a version without a damper.

5.8 Comparison of the full-hydraulic system versus the semi-hydraulic system

The concentric slave cylinder (CSC) replaces the clutch release cylinder (CRC) and eliminates the fork, the release bearing and the guide tube from the system. The efficiency is increased as the deformations under load are reduced and the pedal load is reduced. The CSC is concentric to the gearbox which is an advantage for the car manufacturer due to a reduced number of components and so a reduced risk of failure.



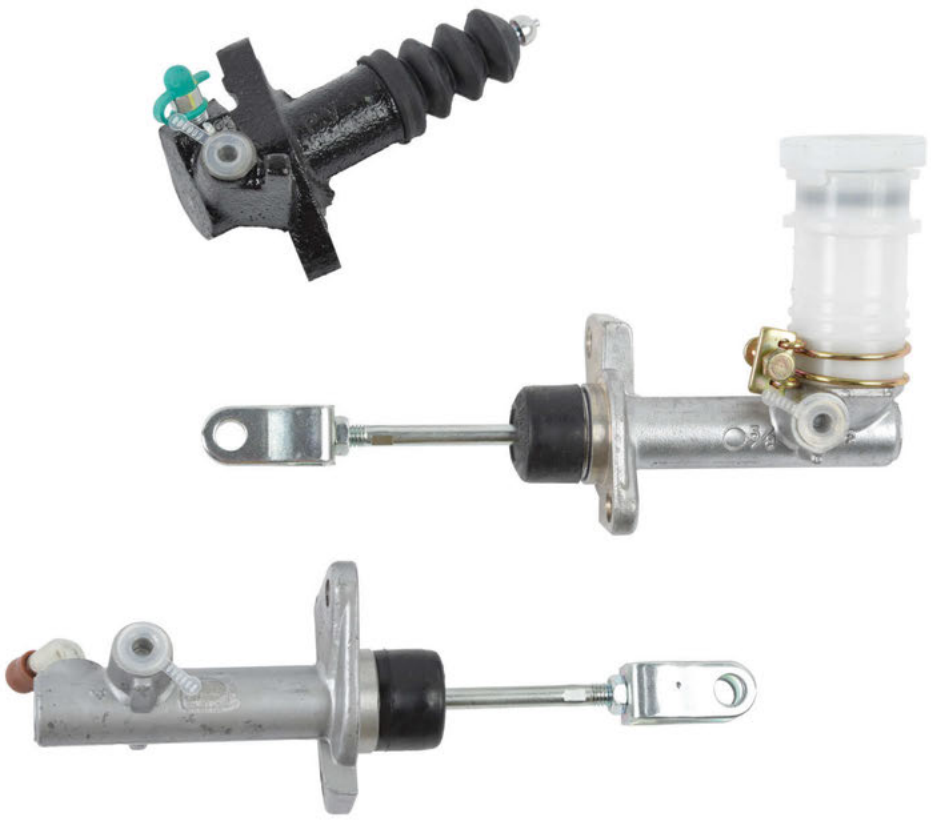
Hydraulic circuit with CSC (CMC, hose and CSC)

5. Hydraulics design and composition

5.9 Comparison of the all-plastic hydraulics versus aluminum and cast iron components

Until 1995, the clutch hydraulic release system was composed of a master cylinder in aluminum and a cast iron release cylinder connected to a hydraulic hose made of steel and rubber. The weight of the subassembly was about 1 kg (2.2 lbs.). The full function (with bearing, fork, guiding tube) weighs about 1.7 kg (3.75 lbs.).

From 1995, hydraulic clutch release systems were revolutionized and with the widespread use of plastic materials and of CSC, the weight of the function and cost are considerably reduced with less risks of corrosion. The total weight of the CMC, the hydraulic hose and the CSC is about 0.4 kg.(0.88 lbs.).



Hydraulic components with aluminum or cast iron body

6 Innovations on the actuation system

6.1 Concentric slave cylinder with sensor for electronic clutch & robotized gearbox

CSC with sensor

The system is a robotized manual gearbox with electronically controlled clutch. The actuation is made via an electronic unit associated with a hydraulic power unit, eliminating the clutch pedal, master cylinder and the hose from the vehicle.

A sensor is attached to the CSC to detect the stroke of the bearing sending this information to the electronic control unit to either engage or disengage. Unlike the hydraulic circuit, it is filled with mineral oil (instead of DOT used for manual transmission), impacting the material of the CSC as well.

6.2 Clutch master cylinder with stroke sensor

CMC with stroke sensor

A new generation of clutch master cylinders with a sensor attached is commonly used for applications equipped with electronic hand brakes, cruise control or stop & start function.

A sensor with a reduced dimension is attached to the body of the CMC and the piston contains a magnet. The magnetic field enables the sensor to detect the position of the piston, thus the pedal position is identified. Peugeot 308 and Citroen C4 Picasso are the examples of vehicles fitted with this new CMC technology by Valeo.

7 Technical support

7.1 Replacement of the hydraulic components

The actuation system is composed of a mechanical part, which is the pedal, the firewall and the over-center spring. The hydraulic system consists of a transmitter (clutch master cylinder), a hose with or without a damper and a receiver (clutch release cylinder or concentric slave cylinder).

It is important to realize that the performance of the hydraulic system is also linked to the mechanical part. During each clutch replacement or once an actuation problem is detected, it is important to check all of the components in the transmission line, from the pedal to the gearbox. This will avoid unnecessary replacement of expensive components and unexpected labor costs.

However, many clutch failures are also linked to poor functioning of the hydraulic actuation system.

The clutch master cylinder (CMC) may need to be replaced if:

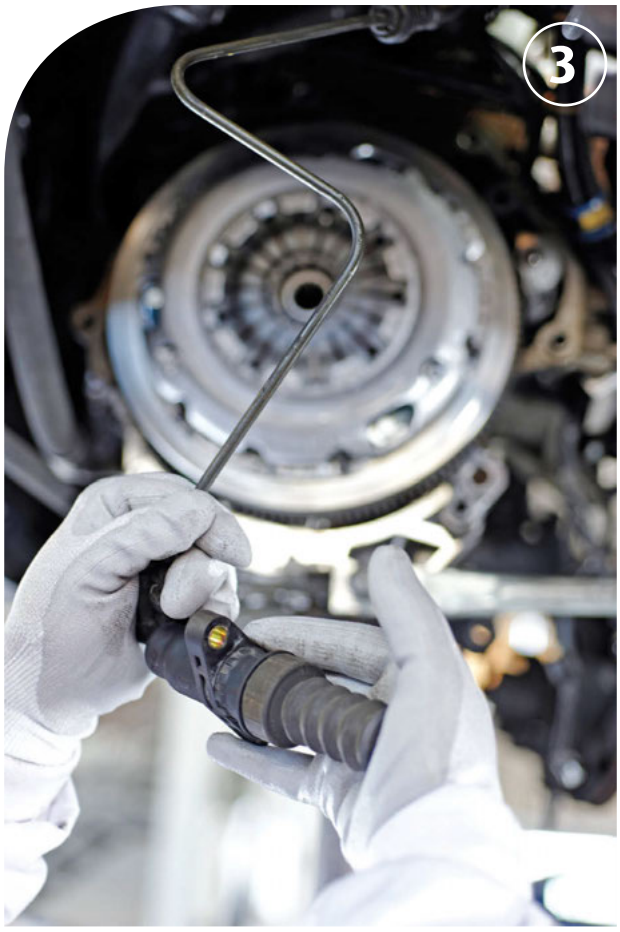
- The clutch pedal slowly sinks to the floor and does not return

Trace of hydraulic fluid on CMC

2

- There is a leak from the surface of the push rod coming out of the piston or from the connectors top image. In such a case, the clutch master cylinder may also leak fluid inside the car. Check also any trace of hydraulic fluid behind the pedal area.

If you change the clutch master cylinder, it is recommended to change the slave cylinder at the same time, as both units typically fail around the same time.



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The clutch release cylinder (CRC) may need to be replaced if:

- The push rod does not return correctly when compressed right image

It is difficult and not recommended to measure effective stroke of the receiver rod as the stroke of the piston is different for each application.

- There is leakage from the surface of the rod coming from the piston or from the connectors

7. Technical support

Concentric slave cylinder (CSC) is positioned within the gearbox housing. Thus it is mandatory to dismount the gearbox. Replacement of the CSC itself is time-consuming (like with a clutch replacement) and labor costs are high. It is recommended to change the CSC during each clutch replacement. For many applications, the replacement of the CSC is even obligatory.

The Concentric slave cylinder (CSC) may need to be replaced if:

- The clutch pedal does not return:

Bleed the system of air. After bleeding check by applying pressure on the pedal first slowly and then rapidly to see if the fault will continue. If it does, check for hydraulic fluid leakage under the chassis around the gearbox. In case of leakage, proceed by removing the gearbox from the engine and check if there is leakage from the CSC If contaminated, replace the CSC.

- Noise in cold engine and neutral position; noise disappears once the pedal is pressed:

This may be a sign of a relative rotation between the CSC bearing and the clutch diaphragm.

- Extra stroke; piston goes over its stopper:

Press and release the bearing. If it does not move, the CSC must be replaced.

- Oil contamination:

Replace the CSC and check for the source of contamination top image.

Repair is not possible! If replacement is necessary, only new parts should be used to avoid any failure linked to the hydraulic system.

In almost all cases, the clutch fluid is the same as the brake fluid. However, if the reservoir is different, see your car owner's manual to find out what grade of fluid your car requires right image.

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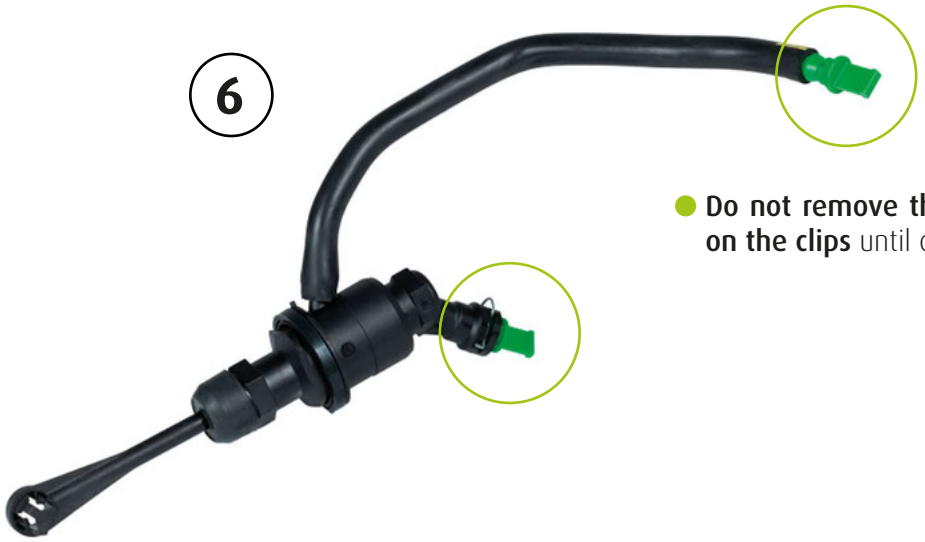
7.2 Before or when replacing a hydraulic component

- For a newly purchased part, always check that the metallic clips and the protection plugs over the connectors are present left image.

If any of them are missing, do not attempt to assemble the part on the vehicle.

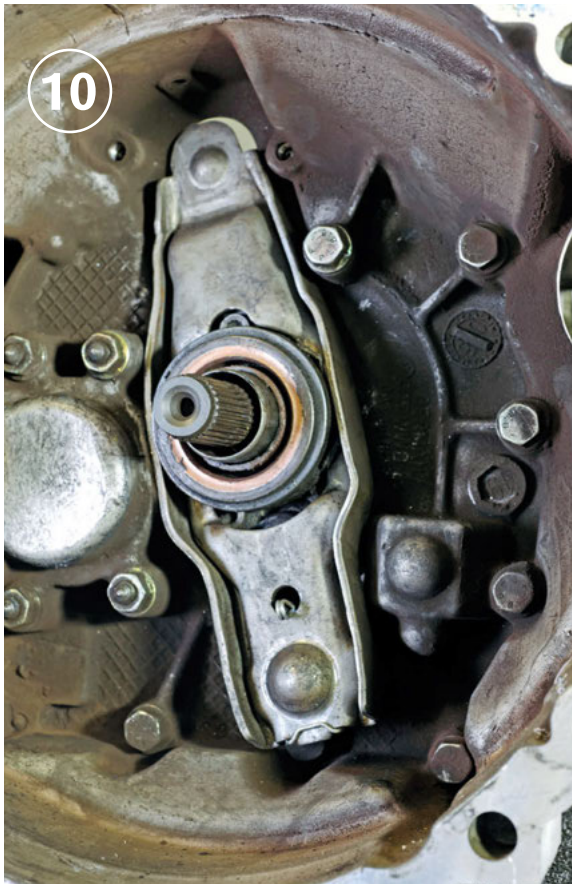


- **Do not remove the protection plugs or apply on the clips** until connection

7. Technical support

- **Do not pull or try to squeeze the CSC** when the protection plugs are connected. There is no liquid in the hydraulic chamber and the pressure generated may cause damage / further leakage from the CSC (7)
- The connectors do not require any lubrication, so **never use grease or oil to lubricate the connectors before installation**
- It is recommended to keep the dismounted plugs for further usage. If, for any reason, it is required to dismount the hose from the CMC or CRC/CSC, **the connector caps should be reinstalled to protect the connectors from oil contamination**
- Always connect the hydraulic components to the connectors **without excessive force** (8)

9



10

- Install the CSC inside the gearbox housing and over the gearbox input shaft **in linear position and without shock** to avoid damage
- **Do not mix or replace engine oil with DOT** as the seals will deform rapidly and the system will leak. Always refer to the car manufacturer manual to choose the appropriate lubricant
- Always **check the condition of the engine and the gearbox seals**. Many hydraulic problems are generated by the interface of the mineral oil with the hydraulic seals. It is recommended to change the two seals during each replacement.
- If CRC is replaced, it is mandatory to **grease the area between the push rod and the clutch lever since**, if no lubrication is applied, noise may be generated [9]
- Always **check the bushing of the lever and change if worn** out or if there is excessive free play which will impact the correct functioning of the CRC. [10]

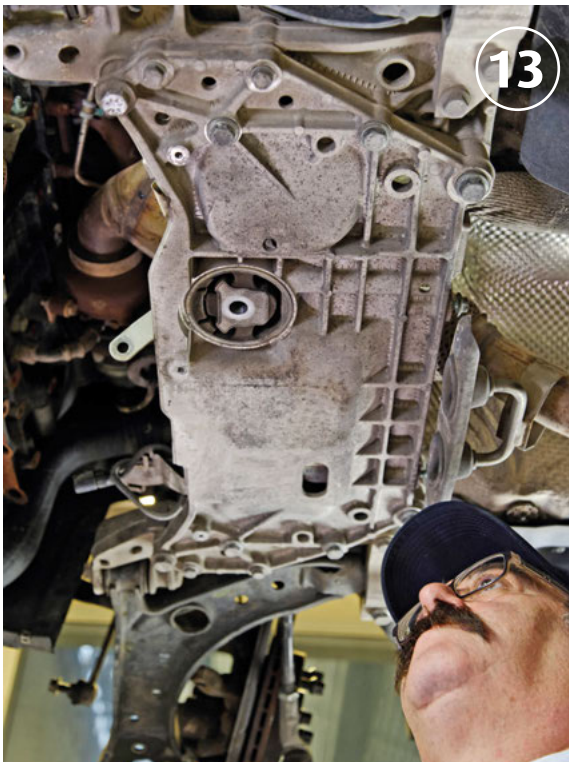
7. Technical support

7.3 CSC fitting instructions

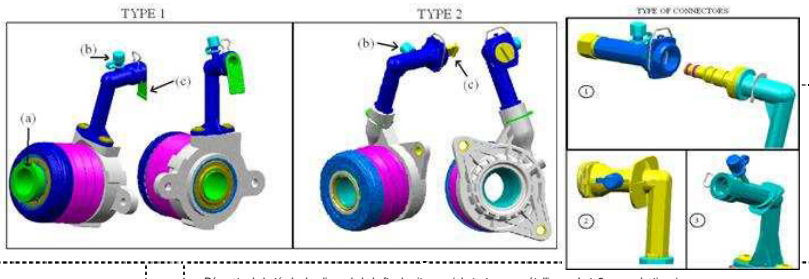
- Remove the existing CSC from the gearbox.
- Before assembly check the presence of the protection plug and the clips on the new CSC. (11)
- Compare the connectors with the CSC removed from the vehicle. Remove the protection plug and check its correct connection with the hydraulic hose. Put back the protection plug.
- Install the new CSC without removing the protection plug (silicone application on the CSC body depend on application and must be done according to car makers specifications).
- Remove if there is a protection tube on the CSC
- Assemble the gearbox over the engine.
- Remove the protection plug only after assembly and just before connecting the hydraulic line.
- Connect the hydraulic circuit with the concentric slave cylinder (12)

(this step should be performed carefully as there is a risk of damaging the seal)

- Fill the circuit with the hydraulic fluid (according to car makers' specifications) and start the bleeding procedure to eliminate any presence of air in the circuit.
- Check the if there are any leaks from the CSC or the gearbox (13)



Generic Fitting Instructions for CSC



EN

- Disassemble existing CSC from gearbox (type 1 has metallic body, type 2 has plastic body).
- On the replacing CSC, check presence of gearbox seal protection tube(a) - if existing, plastic plug (b) and clip (c).
- Assemble CSC on gearbox without removing the plug (b) neither the seal protection (a). (fixing bolts torque and eventual silicone application on CSC body depend on application and must be done according to car maker specification only).
- Remove seal protection (a), after assembly only. just for type 1
- Fit the gearbox on engine and car body.
- Remove protection plug (b), after assembly only, and just before step 7.
- Assemble clutch pipe on male (n°1) / female (n°2 or n°3) connector.
- Fill circuit with requested fluid (according to car maker specification), then proceed to draining procedure to eliminate any presence of air into the circuit.
- Check presence of any leak from CSC or gearbox.

FR

- Démonter la butée hydraulique de la boîte de vitesses (photo 1 corps métallique; photo2 corps plastique)
- Sur la butée hydraulique à monter, vérifier la présence, du tube de protection (a), de l'obturateur sur l'entrée hydraulique de la butée (b)ainsi que le clip de verrouillage de la tuyauterie (c)
- Monter la butée hydraulique sans retirer l'obturateur (b) ni le tube de protection (a) (fixer la butée hydraulique au fond du carter embrayage avec les vis de fixations, appliquer du silicone sur le corps de la butée hydraulique si le constructeur le précise
- Enlever le tube de protection (a) seulement après le montage, uniquement sur la butée corps métallique (photo1)
- Accoster la boîte de vitesses sur le moteur
- Retirer l'obturateur (b), seulement après accostage de la boîte de vitesse et juste avant l'étape 7
- Assembler la tuyauterie hydraulique sur le connecteur mâle (n°1) ou femelle (n°2 ou n°3) de la butée
- Remplir le circuit avec du liquide hydraulique suivant les préconisations du constructeur et procéder à une purge du circuit pour éliminer d'éventuelles bulles d'air
- Vérifier une éventuelle fuite de la butée hydraulique ou de la boîte de vitesse

IT

- Smontaggio del CSC dalla scatola del cambio (tipo 1 con corpo metallico, tipo 2 con corpo di plastica).
- durante la sostituzione del CSC, controllare la presenza della guarnizione del tubo(a) di chiusura della scatola del cambio- se esistente del tappo di plastica(b) e della pinza (C).
- Montare il CSC sulla scatola cambio senza rimuovere il tappo (b) né la protezione della chiusura (a) (fissare i bulloni ed eventualmente il silicone sul corpo del CSC a seconda delle applicazioni e delle specifiche delle case produttrici).
- Rimuovere la guarnizione della chiusura (a), solo dopo l'assemblaggio, solamente sui corpi metallici (tipo 1)
- Montare la scatola cambio sul motore.
- Rimuovere il tappo di protezione (b), solo dopo l'assemblaggio e subito prima lo step 7.
- Montare il tubo rella frizione nel connettore maschio (n°1) o femmina (n°2 o n°3).

ES

- Desmontar el CSC existente en el vehículo (el tipo 1 tiene cuerpo metálico; el tipo 2 tiene cuerpo de plástico).
- En el CSC de reemplazo, comprobar la presencia del sello de protección (a) - del
- Montar el CSC en la caja de cambios sin quitar el tapón (b) ni el sello de protección (a). (El par de apriete de los tornillos de fijación y la aplicación eventual de silicona en el cuerpo de CSC dependen de la aplicación y debe realizarse de acuerdo con las especificaciones del fabricante del vehículo).
- Quitar el sello de protección (a), sólo tras el montaje ---> para el tipo 1
- Monte la caja de cambios
- Quitar el tapón de protección (b), después del montaje, sólo y justo antes del paso 7.
- Montar el tubo de embrague con conector macho (n ° 1) o conector hembra (n °2 - n °3).
- Rellenar el circuito con el líquido adecuado (de acuerdo con las especificaciones del fabricante del vehículo) y, a continuación, realice el procedimiento de purgado del circuito para eliminar el aire del mismo.
- Comprobar la presencia de cualquier fuga en el CSC o en la caja de cambios.

PT

- Desmontar o CSC existente no veículo (o tipo 1 tem corpo metálico; o tipo 2 tem corpo de plástico).
- No CSC de substituição, comprovar a presença do selo de proteção (a) - do protector plástico do purgador (b) e do clip (c).
- Montar o CSC na caixa de velocidades sem retirar o tampão (b) nem o selo de proteção (a). (O par de aperto das roscas de fixação e a aplicação eventual de silicone no corpo de CSC dependem da aplicação e deve realizar-se de acordo com as especificações do fabricante do veículo).
- Retirar o selo de proteção (a), apenas tem a montagem ---> para o tipo 1
- Monte a caixa de velocidades
- Retirar o tampão de proteção (b), depois da montagem, apenas e só antes do passo 7.
- Montar o tubo de embraiagem com conector macho (n °1) ou conector fenêa (n °2 - n °3).
- Encher o circuito com o liquido adequado (de acordo com as especificações do fabricante do veículo) e, em seguida, realize o procedimento de purgar o circuito para eliminar o ar do mesmo.
- Comprovar a presença de qualquer fuga no CSC ou na caixa de velocidades.

DE

- Demontage des alten hydraulischen Zentrallausrücklagers, CSC, vom Getriebe (Typ 1: Metallischer Körper, Typ 2: Kunststoff-Körper).
- Prüfen ob beim neuen CSC der Transportschutz (a) vorhanden ist. Falls ja, prüfen ob Ventilstaubkappe (b) und Schutzstecker (c) vorhanden sind.
- Montage CSC: Ventilstaubkappe (b) und Transportschutz (a)bei der Montage nicht entfernen. Anzugsdrehmoment und eventuelle Silikon-Verwendung auf CSC Körper müssen gemäß der Spezifikationen des Automobilherstellers durchgeführt und beachtet werden).
- Transportschutz (a) nur nach der Montage entfernen (Nur bei Typ 1).
- Montage vom Getriebe an Motor und Fahrzeugkarosserie.
- Ventilstaubkappe (b) nur nach der Montage entfernen wenn Kupplungsleitung montiert wird (Schritt 7)
- Kupplungsleitung mit passenden Verbindungsstück (1,2 oder 3) verbinden.
- System mit Flüssigkeit (Nach Herstellerangaben) füllen. Entlüftungsverfahren beginnen um Luft aus dem Kreislauf zu entfernen.
- Abschließend prüfen ob bei dem CSC oder dem Getriebe Flüssigkeit austritt.

NL

- Demonteer het oude CSC uit de versnellingsbak (type 1; metalen behuizing, type 2; kunstof behuizing)
- Controleer of aan het nieuwe CSC de beschermingsplug (a), kunstof dop (b) en clip (c) aanwezig zijn.
- Monteer het CSC aan de versnellingsbak zonder dop (b) en beschermingsplug (a) te verwijderen. (Het aanhaalmoment van de bevestigingsbouten en eventuele applicatie van siliconen op de CSC-behuizing naleven volgens gegevens van voertuigfabrikant)
- Verwijder de beschermingsplug (a) na montage (enkel bij type 1)
- Monteer de versnellingsbak aan de motor en de voertuigcarrosserie
- Verwijder dop (b) na montage versnellingsbak en vlak voor stap 7.
- Hydraulische leiding monteren met passend verbindingstuk (nr 1, 2 of 3)
- Vul het circuit met de voorgeschreven vloeistof (volgens voorschrift voertuigfabrikant), voer vervolgens de ontluchtingsprocedure uit om ingesloten lucht te verwijderen
- Controleer het hele hydraulische systeem op dichtheid

RO

- Demontați rulmentul hidraulic din cutia de viteze (tipul 1 are structură metalică, tipul 2 are structură de plastic)
- Pentru înlocuirea rulmentului hidraulic, verificați prezența garniturii de protecție (a) - dacă e cazul, a dopului de plastic (b) și a clemei (c)
- Montați rulmentul hidraulic în cutia de viteze fără să îndepărtați dopul (b) sau garnitura de protecție (a). (șuruburile de fixare și o eventuală aplicare a siliconului pe structura rulmentului depind de aplicație și trebuie efectuate doar conform cu specificațiile producătorului vehiculului).
- Îndepărtați garnitura de protecție (a) doar după montare. Doar pentru tipul 1
- Fixați cutia de viteze pe motor
- După montare îndepărtați dopul de protecție (b), chiar înainte de pasul 7.
- Montați furtunul ambreiajului pe conectorul tată (nr.1) / mamă (nr.2).
- Umpleți circuitul cu lichidul necesar (conform specificațiilor date de producătorul vehiculului), iar apoi urmați procedura de aerisire pentru a elimina orice prezență a aerului în circuit.
- Verificați să nu existe scurgeri din rulmentul hidraulic sau cutia de viteze.

The generic CSC fitting instruction is present in all CSC boxes

7.4 Bleeding procedure of CRC or CSC

1. Remove the bleeder cap and connect a transparent hose to drain air and exhausted fluid from the hydraulic system into a waste collector

2. Set up the connector on the bleeding position

- Pull the clip out (14) (on certain applications the clip cannot be pulled due to its design. In this case, push the clip (15) to separate it from the pipe)
- Pull the pipe back 5mm

3. Drain the air from the system

- Activate the clutch pedal by pressing it down very slightly until the fluid flows through the bleeding pipe)
- When the pedal is all the way down, ask someone to connect the pipe to the connector
- Pull up the pedal by hand
- Repeat the operation several times
- Check if the pedal stroke and load is normal. Repeat if not normal until all the air comes out of the hydraulic circuit.

For further explanations please visit **valeo-techassist.com**

CSC with pull type clip

CRC with push type clip

8 F.A.Q.

"Can I repair hydraulic components?"

No; repairing is not possible. Always use new parts if replacement is necessary.

"Can I grease the CMC and CRC connectors to avoid noise?"

This is a common mistake made by repairers; the hydraulic connectors must not be greased to avoid noise. The grease is a mineral-based oil and the seals will be deformed leading leakage if they come into contact with the grease.

If there is noise, check whether it is generated by the hydraulic system or the mechanical system as many noise problems are generated in the pedal area.

"What kind of lubricant is used, can I use another fluid other than the fluid proposed by the car manufacturer?"

DOT3, DOT4 and DOT4+ are used for applications with a manual gearbox. Mineral oil may be used linked to a specific function on the actuation system. Always refer to the car manufacturer manual to identify the proper lubricant. Any false usage may lead to deformation of the seals.

"How should I bleed the air out of the hydraulic circuit?"

Please refer to the technical support part of this brochure for the detailed bleeding procedure in the previous chapter.

"Should I remove the protection plug before fitting?"

Do not remove the protection plugs before installation and, if for any reason you need to separate the hydraulic components from the hose, use the protection caps.

"Can I test the CSC before fitting?"

CSC can be tested via specific equipments which do not exist in a standard garage. Testing the seals of a new CSC from Valeo is not necessary as Valeo controls 100% of the production.

"Can we say that hydraulic actuation improves clutch lifetime by smoothing the engagement time?"

Hydraulic actuation increases efficiency and dampening as opposed to the mechanical system which improves clutch lifetime especially linked to bad driving habits.

9 Conclusion

Valeo expertise is dedicated to both O.E. and I.A.M. products with O.E. matching performances. Since 1995, Valeo has continued to strengthen its presence among different car manufacturers, making Valeo a key solution provider for designing and producing suitable hydraulic components for the improving driveline technologies.

Hydraulic clutch actuators have advantages compared to the mechanical system such as improving driving comfort and release system efficiency.

Valeo support the installation thanks to TecDoc® and Valeo TechAssist website.

Looking at our website www.valeoservice.com, you will find all information you might need to find the part number you are looking for and fit it on the vehicle.

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Valeo Transmission Systems' mission is to be the supplier of choice for all powertrain architectures with innovative technologies developed for efficient and comfortable power transfer from the engine to the transmission, whilst reducing fuel consumption.

More and more car manufacturers demand new clutch technologies to increase comfort for the driver. This is one of the reasons why clutch hydraulics became popular in production, reducing pedal load and increasing efficiency of the release system.

Since 1995 Valeo has been producing clutch hydraulics to the car manufacturers worldwide. This handbook is the opportunity to explain you the design, composition and the related advantages of the clutch hydraulics. You will find as well a diagnosis, the instructions to install the hydraulic components and to bleed air from the hydraulic circuit.

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