

Repair Manual



F 650 CS

**BMW Motorrad
After Sales**

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 After Sales
 UX-VS-2

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Use

Each chapter starts with the list of contents.

The list of contents is followed by the technical data table.

Key to symbols

In this Repair Manual for the F 650 CS model, the following symbols are used; their meanings are explained in the table.

Special instructions aimed at improving the work procedures



Note:

Special information on operating and inspecting the motorcycle as well as maintenance and adjustment procedures.



Attention:

Instructions and precautions specifically intended to prevent damage to the motorcycle. Failure to comply with them could invalidate the warranty.



Warning:

This symbol stands for precautions and measures which are essential in order to protect the rider or other persons from possibly severe or fatal injury.

Contents

The titles of the tasks described in this chapter..... complete with page numbers

Activities

- Activities
- The bullet symbol indicates work steps that are described in greater detail under another headline
- Preceding activities
- A line indicates work steps that are described in greater detail under another headline or in another chapter

The term "remove" means that:

the fastener (e.g. screw) must be backed off completely and removed

or

a component (e.g. injection rail) has to be removed to the extent that components behind it (e.g. throttle valve rail) are rendered accessible

The term "loosen" or "slacken" means that:

the fastener (e.g. screw) must be backed off, but not removed



Tightening torque:

Values are stated if they differ from DIN EN 24 014 or DIN 912 ISO industrial standards.

BMW Motorrad Maintenance schedule F 650 CS



			BMW Inspection at 1,000 km/600 miles	BMW Maintenance Service every 10,000 km/6,000 miles	BMW Inspection every 20,000 km/ 12,000 miles	BMW Annual Service
Customer _____	Licence No. _____	Mileage _____				
Job Order No. _____	Date _____	Mechanic's signature _____				
Read the fault code memory with the BMW MoDiTeC			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Change the engine oil [engine only] while at regular operating temperature and replace the oil filter element			<input type="checkbox"/>			
Change the engine oil [engine and oil tank] while at regular operating temperature and replace the oil filter element if motorcycle is used only for short journeys or at outside temperatures below 0°C (32°F): every 3 months or at the latest after 3,000 km (1,800 miles)				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clean oil strainer in frame once only at 10,000 km/6,000 miles				<input type="checkbox"/>		
Check the coolant and restore to correct level if necessary			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Grease rubber grommets for cover insert			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Replace the coolant *) every 2 years						<input type="checkbox"/>
Check valve clearances, adjust if necessary *)				<input type="checkbox"/>	<input type="checkbox"/>	
Replace the spark plug					<input type="checkbox"/>	
Drain the outlet hose from the air filter box			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Replace intake air filter If motorcycle is operated in very dirty or dusty conditions, clean or replace the intake air filter every 10,000 km (6,000 miles); check every 3,000 km (1,800 miles)					<input type="checkbox"/>	
Replace fuel filter every 40,000 km (24,000 miles)					<input type="checkbox"/>	
Check clutch play, adjust if necessary			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Examine brake pads and discs for wear, replace if necessary *)				<input type="checkbox"/>	<input type="checkbox"/>	
Check front/rear circuit brake fluid				<input type="checkbox"/>	<input type="checkbox"/>	
Check for operation of brake system and freedom from leaks; repair/replace if necessary *)					<input type="checkbox"/>	
Renew brake fluid at least once a year						<input type="checkbox"/>
[ABS] Replace the primary front/rear brake master cylinder cup *) every 40,000 km (24,000 miles)					<input type="checkbox"/>	
Replace toothed belt					<input type="checkbox"/>	
Check toothed belt and sprocket, replace if necessary *)					<input type="checkbox"/>	
Check belt tension, adjust if necessary *)			<input type="checkbox"/>	<input type="checkbox"/>		
Check battery acid level, add distilled water if necessary				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clean and grease the battery terminals, if necessary						<input type="checkbox"/>
Check steering head bearings and adjust *) or replace if necessary *)				<input type="checkbox"/>	<input type="checkbox"/>	
Grease the side stand				<input type="checkbox"/>	<input type="checkbox"/>	
Using a torque wrench, check that the screws and nuts of the engine mounts, manifold fastener, the frame threaded fasteners, the rear-frame threaded fasteners, and the eccentric clamp are tightened to specified torque			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Final inspection with road safety and functional check: – Clutch, gearshift – Steering – Front and rear brakes – Side stand contact switch – Condition of tyres and wheels, tyre pressures – Lights and signalling equipment, indicator and warning lights, instruments – Optional equipment – Test ride, if necessary			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*) Write up on separate invoice; Not part of standard service procedure

BMW Motorrad Pre-delivery check F 650 CS



_____ Customer _____ Job Order No.		_____ Licence No. _____ Mechanic's signature		BMW Pre-delivery check
Check the shipping pallet for damage				<input type="checkbox"/>
Unpack the motorcycle				<input type="checkbox"/>
Inspect motorcycle for damage				<input type="checkbox"/>
Check complete specification delivery: <ul style="list-style-type: none"> - tools - handbooks and documents - keys - optional extras 				<input type="checkbox"/>
Motorcycle complete				<input type="checkbox"/>
Battery: <ul style="list-style-type: none"> - remove - add battery acid - charge - grease the terminal posts - re-install (mark date) 				<input type="checkbox"/>
Check tyre pressure				<input type="checkbox"/>
Fuel the motorcycle				<input type="checkbox"/>
Safety/operating check as final inspection: <ul style="list-style-type: none"> - Oil inspection - Clutch, gearshift - Steering - Hand brakes and foot brakes - Check lights and signalling equipment, warning and indicator lights, instruments, ABS - Test ride, if necessary 				<input type="checkbox"/>
Confirm delivery inspection in "Maintenance Booklet"				<input type="checkbox"/>
Final cleaning				<input type="checkbox"/>
Vehicle delivered on:				

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Service data

F 650 CS



Item	Desired value	Units / Specifications
Oil capacities		
Engine (incl. filter)	0.5 (0.88/0.53)	Litres (Imp. pints/US quarts) Specification: see latest Service Information
Engine (incl. filter) and oil tank	2.5 (4.4/2.64)	Litres (Imp. pints/US quarts) Specification: see latest Service Information
Coolant		
	50% 50%	Water Anti-freeze protection to -25 °C
Cooling system	1.3 (2.29/1.37)	Litres (Imp. pints/US quarts)
Reservoir	0.1 (0.18/0.11)	Litres (Imp. pints/US quarts)
Brake Fluid		
DOT 4		
Valve clearance		
measured cold (max. 35 °C/95 °F)		
Inlet	0.03-0.11 (0.0012-0.004)	mm (in)
Exhaust	0.25-0.33 (0.010-0.013)	mm (in)
Spark plugs		
NGK DR8 EB		
Electrode gap	0.6...0.7 (0.02...0.03)	mm (in)
Engine idle speed		
1,400		
Clutch cable play		
Cable at grip	1.0 - 2.0 (0.004 - 0.008)	mm (in)
Tyre pressure		
tyres cold		
Solo front/rear	2.2/2.5 (31.91/36.26)	bar (psi)
fully loaded front/rear	2.2/2.5 (31.91/36.26)	bar (psi)
Tightening torques		
Engine oil drain plug	40	Nm
Oil filter cover	10	Nm
Drain plug, on-frame oil tank	21	Nm
Oil lines to frame	42	Nm
Oil strainer to frame	80	Nm
Water pump drain screw	10	Nm
Vent screw	12	Nm
Expansion tank to radiator	9	Nm
Cylinder head cover	10	Nm
Spark plugs	20	Nm
Camshaft bearing cap	10	Nm
Chain guide	10	Nm (Loctite 243)
Fuel filter to stowage-compartment frame	9	Nm
Intake air pipe to intake air silencer	9	Nm
Suspension strut to angled lever	41	Nm
Eccentric clamp	Initial tightening 10 21	Nm Nm
Brake caliper to swinging arm	21	Nm
Struts to swinging arm	41	Nm
Swinging-fork pivot axle	100	Nm
Adjusting screw steering head bearing	25 Back off through angle of rotation 60	Nm °
Clamp screw for fork bridge steering head	23	Nm
Engine to frame at rear	50	Nm
Cylinder head to frame	41	Nm
Cylinder head to frame, locknut	100	Nm
Engine shell to engine	55	Nm
Engine shell to engine, bottom, with bottom truss	55	Nm
Engine shell to bracing tube	24	Nm
Rear frame to main frame	24	Nm (Loctite 2701)
Exhaust manifold to cylinder head	20	Nm
Silencer to exhaust manifold	55	Nm

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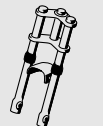
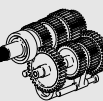
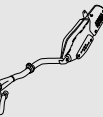
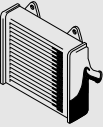
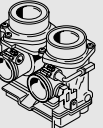
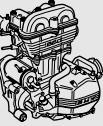
21 Clutch

23 Gearbox

27 Chain/belt drive

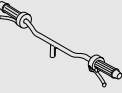
31 Front forks

>> Continuation

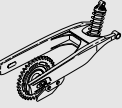


Group / Chapter

32 Steering



33 Rear wheel drive



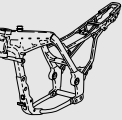
34 Brakes



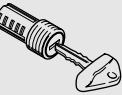
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Tightening torques

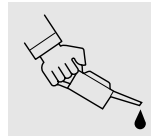
Model		F 650 CS
Connection		
11 Engine		
Freewheel housing and freewheel	Nm	35 (clean thread + Loctite 648)
Engine block	Nm	10
Double drive gear on crankshaft	Nm	180 (clean thread + Loctite 243)
Driver to countershaft	Nm	140 (clean thread + Loctite 243)
Pressure plate	Nm	10
Magnetic hub to crankshaft	Nm	180 (clean thread + Loctite 243)
Chainwheel to main shaft	Nm	140 (clean thread + Loctite 243)
Signal transmitter	Nm	8
Ignition cover	Nm	10
Cylinder base	Nm	10
Fastener for chain tensioner	Nm	40
Oil circuit		
Oil filter cover	Nm	10
Oil pressure switch	Nm	12 (clean thread + Loctite 243)
Strainer cover to housing half	Nm	8
Drain plug, on-frame oil tank	Nm	21
Engine oil drain plug	Nm	40
Oil supply/oil return lines to engine	Nm	42
Oil pump cover	Nm	6 (clean thread + Loctite 243)
Oil pressure valve	Nm	24
Oil retaining valve	Nm	24
Cylinder head		
Collar nuts for cylinder head	Nm	60
Collar screws for cylinder head	Nm	33
Machine screws (chaincase)	Nm	10
Camshaft bearing cap	Nm	10
Chain sprockets to camshafts	Nm	60 threads oiled
Chain guide to camshaft bearing cap	Nm	10 (clean thread + Loctite 243)





Model	F 650 CS	
Connection		
11 Engine		
Cylinder head cover	Nm	10
Machine screw (hole for locating screw)	Nm	25
Model	F 650 CS	
Connection		
12 Engine electrics		
Spark plug	Nm	20
Magnetic hub to crankshaft	Nm	180 (clean thread + Loctite 243)
Signal transmitter	Nm	8
Engine block cover, left/right	Nm	10
Starter to clutch cover	Nm	10
Positive lead to starter motor	Nm	9
Positive contact to starter motor	Nm	4
Necked-down bolt, starter housing	Nm	6
Cable cover to engine block	Nm	9
Cable holder to ignition cover	Nm	8
Stator to ignition cover	Nm	10 (clean thread + Loctite 243)
Ignition coil bracket to cylinder head cover	Nm	9

Model	F 650 CS	
Connection		
13 Fuel preparation and control		
Air intake pipe to cylinder head	Nm	21
Fuel filter to stowage-compartment frame	Nm	9
Injector holder to throttle valve	Nm	5
Fuel hose to injection nozzle holder	Nm	3
Fuel return hose to pump unit	Nm	3
Intake air pipe to intake air silencer	Nm	9
Throttle flap to intake stub	Nm	1
Throttle-valve potentiometer to throttle valve stub	Nm	3
Throttle valve actuator to throttle-valve stub	Nm	5 (clean thread + Loctite 243)
Model	F 650 CS	
Connection		
16 Fuel tank and lines		
Fuel tank to rear frame (M 8 stud)	Nm	21
Fuel filler cap to fuel tank	Nm	3
Roll-over valve to fuel tank	Nm	2
Clamps, activated charcoal filter bracket	Nm	9
Fuel pump to fuel tank	Nm	30
Model	F 650 CS	
Connection		
17 Radiator		
Expansion tank to radiator	Nm	9
Radiator to main frame at top	Nm	9
Fan to fan shroud	Nm	3
Water pump drain screw	Nm	10
Coolant hoses to radiator/engine/frame	Nm	3
Breather hose to expansion tank	Nm	2
Left engine block cover to engine block	Nm	10
Water pump cover	Nm	10
Temperature sensor in cylinder head	Nm	15
Vent screw	Nm	12





Model	F 650 CS	
Connection		
18 Exhaust system		
Oxygen sensor to exhaust elbow	Nm	45
Exhaust manifold to cylinder head	Nm	20
Silencer to exhaust manifold (Torca clamp)	Nm	55
Silencer to rear frame	Nm	41
Guards to silencer	Nm	5
Model	F 650 CS	
Connection		
21 Clutch		
Driver	Nm	140 (clean thread + Loctite 243)
Pressure plate	Nm	10
Engine block cover, left	Nm	10
Release lever to release shaft	Nm	10
Model	F 650 CS	
Connection		
23 Transmission		
Gear pedal to frame	Nm	21
Shaft lever to selector shaft	Nm	9

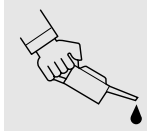
Model	F 650 CS	
Connection		
27 Chain/belt drive		
Drive sprocket cover to engine	Nm	2
Belt cover to swinging arm	Nm	9
Eccentric clamp	Nm	21
Initial tightening	Nm	10
Belt sprocket to gearbox output shaft	Nm	180 (clean thread + Loctite 638)
Model	F 650 CS	
Connection		
31 Front fork		
Clamp screws, upper fork bridge and steering head clamp	Nm	23
Clamp screws at lower fork bridge	Nm	23
Bracket to fork leg	Nm	5
Damper retaining screw	Nm	20
Adjusting screw		
Preload	Nm	25
Back off through angle of rotation	°	60
Model	F 650 CS	
Connection		
32 Steering		
Handlebars to fork bridge	Nm	23
Handlebar weight to handlebar	Nm	9
Handlebar fitting to handlebar	Nm	9
Cover of multi-function switch	Nm	1
Pivot pin of clutch lever	Nm	3
Locknut for pivot pin of clutch lever	Nm	5
Pivot pin of handbrake lever	Nm	7
Locknut of handbrake lever	Nm	7
Guide to fork bridge	Nm	5





Model		F 650 CS
Connection		
33 Rear wheel drive		
Suspension strut to frame	Nm	58
Wrench angle	°	45 ± 15
Suspension strut to angled lever	Nm	41
Swinging-fork pivot axle	Nm	100
Struts to swinging arm	Nm	41
Struts to angled lever	Nm	41
Angled lever to frame	Nm	58
Wrench angle	°	45 ± 15
Belt pulley to damper housing	Nm	28
Damper fastener	Nm	160
Eccentric clamp	Nm	21
Initial tightening	Nm	10
Model		F 650 CS
Connection		
34 Brakes		
Bleed screw to brake caliper front/rear	Nm	7
Brake caliper to fork slider tube	Nm	41
Brake light switch to handlebar fitting	Nm	3
Handlebar fitting to handlebar	Nm	9
Brake light switch to frame	Nm	5
Brake disc to front wheel	Nm	10 (clean thread + Loctite 2701)
Brake disc to rear wheel drive shaft	Nm	11 (clean thread + Loctite 2701)
Brake caliper to swinging arm	Nm	21
Brake master cylinder to main frame	Nm	10
Locknut for fork end to pushrod	Nm	9
Bracket, rear, to main frame	Nm	9 (clean thread + Loctite 2701)
Shroud to frame	Nm	6
Brake fluid reservoir for rear brake to rear frame	Nm	4
Brake pedal to frame	Nm	21
Brake line distributor to main frame	Nm	9

Model	F 650 CS	
Connection		
34 Brakes		
Brake lines/hoses		
Brake hose to brake caliper	Nm	18
Brake hose to rear brake caliper	Nm	18
Brake hose to brake lever fitting	Nm	18
Brake hoses to distributor	Nm	18
Brake hose to bracket, rear	Nm	18
Brake line to master brake cylinder, rear wheel	Nm	18
Banjo bolts, brake line	Nm	18
ABS		
ABS sensor front/rear	Nm	9
ABS control unit to holder	Nm	21
Brake lines to ABS control unit	Nm	18
Brake disc and sensor ring to front wheel	Nm	10 (clean thread + Loctite 2701)
Locknut for adjustable stop, brake-light switch	Nm	4
Model	F 650 CS	
Connection		
36 Wheels and tyres		
Clamp nut, front quick-release axle	Nm	23
Front quick-release axle to fork leg	Nm	30
Wheel nut to drive shaft (wheel side)	Nm	160 Lightly coat the thread with Optimoly TA





Model		F 650 CS
Connection		
46 Frame		
Covers, right and left, to main frame	Nm	2
Covers, right and left, to air guide	Nm	3
Cover, front, to covers, right and left	Nm	1
Cover, front to main frame	Nm	2
Cover, rear, to covers left and right and to stowage-compartment frame	Nm	2
Stowage-compartment rail to stowage-compartment frame	Nm	9
Stowage-compartment frame to main frame	Nm	9
Turn indicators, left and right, to fairing bracket	Nm	3
Instrument cover to fairing holder	Nm	2
Windscreen to windscreen bracket	Nm	2
Windscreen bracket to fairing bracket	Nm	9
Rear trim panels, left and right, to rear frame	Nm	2
Rear trim panels, left and right, to seat lock	Nm	2
Bracket for seat lock to rear frame	Nm	3
Turn indicator, rear, to rear finisher	Nm	3
Rear finisher to rear frame	Nm	9
Number-plate carrier to rear finisher	Nm	9
Spray guard to number-plate carrier	Nm	3
Number-plate carrier to rear mudguard	Nm	3
Cover of number-plate light to number-plate carrier	Nm	1
Grip to rear frame	Nm	9
Luggage carrier to grab handle	Nm	3
Mudguards/wheel guards		
Front mudguard, front section, to front mudguard, rear section	Nm	3
Front mudguard, front section, to slider tube	Nm	3
Front mudguard, rear section, to slider tube	Nm	3
Rear mudguard, front section, to rear frame, front and side	Nm	3
Rear mudguard, front section, to rear frame, rear and centre	Nm	3
Belt cover to swinging arm	Nm	9

Model		F 650 CS
Connection		
46 Frame		
Frame		
Drain plug, on-frame oil tank	Nm	21
Oil strainer to frame	Nm	80
Oil feed and return lines to main frame	Nm	42
Oil tank cover to frame	Nm	5
Footrest rubber to rear footrest	Nm	5
Fairing bracket to main frame	Nm	21
Rear frame to main frame	Nm	24 (clean thread + Loctite 2701)
Engine shell to bracing tube	Nm	25
Side stand to bottom truss	Nm	41
Engine mounts		
Engine shell to engine	Nm	55
Engine shell to engine, bottom, with bottom truss	Nm	55
Engine to frame at rear	Nm	50
Cylinder head to frame	Nm	41
Cylinder head to frame, adjusting sleeve	Nm	zero play, max. 5
Cylinder head to frame, locknut	Nm	100
Model		F 650 CS
Connection		
51 Equipment		
Ignition/steering lock to fork bridge, top	Nm	20
Mirror to clamp element	Nm	18
Clamp element to handlebar fitting	Nm	21
Seat hook to rear frame	Nm	9

