Automatic air conditioning
BMW 3 Series (E46) left and right-hand drive with M43 engine (from start of series)
Technical knowledge is required. Installation time approx. 10 - 11 hours, which can vary according to the condition and fittings of the vehicle.

**Important notes on installing the automatic air conditioning system**

Installation of the air conditioning system may be undertaken only by a specialist workshop which has the necessary special tools and appropriate equipment for evacuating and filling the air conditioning system.

All work is shown as taking place on a left-hand drive vehicle. Many of the operations are to be carried out in mirror image for right-hand drive vehicles.

By installing the air conditioning system, the payload of the vehicle is reduced by approx. 26 kg.

All seals and O-rings are to be moistened with refrigerator oil before installation.

It is advisable to remove plugs to all parts of the refrigerant circuit only just before installing the system as the system is damaged by moisture penetrating into it.

In vehicles which have automatic transmission it is not necessary to change radiator and suction fan as these vehicles are already fitted with the High radiator and the 390 W suction fan.

If any pins or terminals are already allocated, bridges, double crimping or parallel connections must be made.

**Important notes on operating the air conditioning system:**

1. The condensation water forming on the evaporator is drained off under the vehicle and can amount to 2 litres/h, depending on the air humidity.

2. The air conditioning system must be run at least once a month for a short time (also in cold seasons), to ensure continuous and faultless functioning of the system.

3. If any malfunction occurs in the air conditioning system, e.g. no issuing of cold air despite switched-on system, the system must be switched off and a BMW service centre consulted immediately.

4. Before commissioning the air conditioning system a control unit coding and a changing of the central coding key must be made by the BMW Customer Service (otherwise no control of the air conditioning compressor relay).

For addresses of BMW Customer Service for air conditioning systems: see directory “BMW Service” (which is in the vehicle).

**Required tools and auxiliary materials**

- MoDiC III or DIS
- Flat-tip screwdriver
- Phillips screwdriver
- TORX screwdriver T25
- 1/2 inch torque spanner
- 1/2 inch reversible ratchet
- 1/2 inch extension
- 1/2 inch socket-wrench insert SW 12 mm, 13 mm, 17 mm, 22 mm, 24 mm
- 1/4 inch reversible ratchet
- 1/4 inch extension
- 1/4 inch socket-wrench insert SW 6 mm, 8 mm, 10 mm, 13 mm
- Hexagon socket screw key SW 6 mm

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1. **Preparatory work**

On grounds of safety, steering wheels with integrated airbag may only be disassembled by a BMW specialist workshop.

- Print out error memory
- Disconnect battery
- Dismantle instrument panel and unclip fresh air louver
- Dismantle microfilter/housing/cover/underpart
- Dismantle lower engine cowling
- Dismantle right headlight
- Dismantle front bumper
- Drain off coolant
- Dismount battery and battery plate
- Dismantle AUC sensor
- Dismantle microfilter/housing/cover/underpart
- Dismantle instrument panel and unclip fresh air louver

To avoid coolant getting into the passenger compartment when dismantling the heater, the return nozzles should be carefully blown through with compressed air (max. 1 bar overpressure).

2. **Installation and wiring layout**

   **F 46 64 050 R**

   **Key**

   1. Control unit IHKA (automatic heating and air conditioning)
   2. Heater/air conditioner unit
   3. Air conditioning compressor
   4. Condenser
   5. Auxiliary fan
   6. AUC (automatic recirculating air control) sensor
   7. Drying container
   8. Cable set for air conditioning system
   9. Outside temperature sensor
   10. Instrument cluster
   11. Water valve
   12. Branch cable DME

3. **Connection overview**

   **F 46 64 044 R**

<table>
<thead>
<tr>
<th>Item</th>
<th>Designation</th>
<th>Cable colour</th>
<th>Cable cross-section</th>
<th>Connection point in vehicle</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Branch cable DME (digital motor electronics)</td>
<td>black/blue</td>
<td>0.5 mm²</td>
<td>To engine control module A60004, connector X60004, pin no. 29</td>
</tr>
<tr>
<td>A2.1</td>
<td>Branch cable water valve</td>
<td>yellow/brown</td>
<td>0.50 mm²</td>
<td>To water valve Y4, connector X85, pin no. 1.</td>
</tr>
<tr>
<td>A2.2</td>
<td>Branch cable water valve</td>
<td>red/grey</td>
<td>0.75 mm²</td>
<td>To water valve Y4, connector X85, pin no. 2.</td>
</tr>
<tr>
<td>A3</td>
<td>Branch cable outside temp. sensor</td>
<td>–––––</td>
<td>–––––</td>
<td>To outside temp. sensor B21</td>
</tr>
<tr>
<td>A3.1</td>
<td>Branch cable outside temp. sensor</td>
<td>blue/brown</td>
<td>0.5 mm²</td>
<td>To outside temp. sensor B21, connector X770, pin no. 1</td>
</tr>
<tr>
<td>A3.2</td>
<td>Branch cable outside temp. sensor</td>
<td>blue/red</td>
<td>0.5 mm²</td>
<td>To outside temp. sensor B21, connector X770, pin no. 2</td>
</tr>
<tr>
<td>B1</td>
<td>Relay base X51 air cond. comp.</td>
<td>brown</td>
<td>0.75 mm²</td>
<td>Behind the glove box to relay carrier</td>
</tr>
<tr>
<td>B2</td>
<td>Joint connector terminal 31</td>
<td>brown</td>
<td>0.75 mm²</td>
<td>Behind the glove box to joint connector X219</td>
</tr>
<tr>
<td>B3</td>
<td>Joint connector TD signal</td>
<td>black</td>
<td>0.35 mm²</td>
<td>Behind the glove box to joint connector X243</td>
</tr>
<tr>
<td>B4</td>
<td>Joint connector K-Bus</td>
<td>white/red/yellow</td>
<td>0.35 mm²</td>
<td>Behind the glove box to joint connector X10116</td>
</tr>
<tr>
<td>B5</td>
<td>Branch cable fuse connection compressor</td>
<td>red/violet/yellow</td>
<td>0.75 mm²</td>
<td>Behind the glove box to current distributor A46, fuse plug-in place F63</td>
</tr>
<tr>
<td>B6</td>
<td>Branch cable fuse connection water valve</td>
<td>red/grey</td>
<td>0.75 mm²</td>
<td>Behind the glove box to current distributor A46, fuse plug-in place F62</td>
</tr>
<tr>
<td>B7</td>
<td>Branch cable terminal 15</td>
<td>green/yellow</td>
<td>0.50 mm²</td>
<td>Join with mini-connector to outgoing green/yellow line of fuse no. 28</td>
</tr>
<tr>
<td>C1</td>
<td>Connector X163</td>
<td>–––––</td>
<td>–––––</td>
<td>To air conditioning compressor Y2, connector X163</td>
</tr>
<tr>
<td>C1.1</td>
<td>Branch cable compressor</td>
<td>black/grey</td>
<td>0.75 mm²</td>
<td>To air cond. compressor Y2, connector X163, pin no. 1</td>
</tr>
<tr>
<td>C2</td>
<td>Connector X126</td>
<td>–––––</td>
<td>–––––</td>
<td>To pressure sensor B8 at the drying container</td>
</tr>
<tr>
<td>C2.1</td>
<td>Branch cable pressure sensor</td>
<td>black/yellow</td>
<td>0.35 mm²</td>
<td>To pressure sensor B8, connector X126, pin no. 1</td>
</tr>
<tr>
<td>C2.2</td>
<td>Branch cable pressure sensor</td>
<td>black/grey</td>
<td>0.35 mm²</td>
<td>To pressure sensor B8, connector X126, pin no. 2</td>
</tr>
<tr>
<td>C2.3</td>
<td>Branch cable pressure sensor</td>
<td>black/green</td>
<td>0.35 mm²</td>
<td>To pressure sensor B8, connector X126, pin no. 3</td>
</tr>
<tr>
<td>C3</td>
<td>Connector X3211</td>
<td>–––––</td>
<td>–––––</td>
<td>To AUC sensor (auto. recirc. air ctrl) B414 at radiator right</td>
</tr>
<tr>
<td>C3.1*</td>
<td>B. c. AUC (auto. recirc. air ctrl) sens.</td>
<td>brown</td>
<td>0.50 mm²</td>
<td>To AUC sensor B414, connector X3211, pin no. 1</td>
</tr>
<tr>
<td>C3.2</td>
<td>Branch cable AUC sensor</td>
<td>yellow</td>
<td>0.50 mm²</td>
<td>To AUC sensor B414, connector X3211, pin no. 2</td>
</tr>
<tr>
<td>C3.3*</td>
<td>Branch cable AUC sensor</td>
<td>brown</td>
<td>0.50 mm²</td>
<td>To AUC sensor B414, connector X3211, pin no. 3</td>
</tr>
<tr>
<td>C3.4</td>
<td>Branch cable AUC sensor</td>
<td>blue</td>
<td>0.50 mm²</td>
<td>To AUC sensor B414, connector X3211, pin no. 4</td>
</tr>
<tr>
<td>D</td>
<td>Connector X610</td>
<td>–––––</td>
<td>–––––</td>
<td>To heater/air conditioning control unit A11</td>
</tr>
<tr>
<td>D1</td>
<td>Branch cable water valve</td>
<td>yellow/brown</td>
<td>0.50 mm²</td>
<td>To heater/air conditioning control unit A11, connector X608 (natural colour) pin no. 4</td>
</tr>
<tr>
<td>E1</td>
<td>Connection to outside temp. display</td>
<td>blue/red</td>
<td>0.5 mm²</td>
<td>To instrument cluster A2, connector X11176 (natural colour) pin no. 1</td>
</tr>
<tr>
<td>E2</td>
<td>Connection to outside temp. display</td>
<td>blue/brown</td>
<td>0.5 mm²</td>
<td>To instrument cluster A2 connector X11176 (natural colour) pin no. 2</td>
</tr>
</tbody>
</table>

*Connectors C3.1 and C3.3 have the same colour. The resistance must therefore be tested to ensure that the correct branch cable is connected to connector X3211 in each case. See circuit diagram for pin allocation.*
4. Install compressor

F 46 64 045 R

The screw lengths specified are to be complied with unreservedly!

1. Air conditioning compressor
2. Torx screw M8 x 55 with washer (3 pces)
3. Ribbed V-belt
4. Hexagon-head screw M8 x 35 with washer (2 pces)
5. Hexagon-head screw M8 x 100 with washer (1 pce)*
6. Hexagon-head screw M8 x 55 with washer (4 pces)
7. Mounting bracket
8. Pulley
9. Hexagon-head screw M8 x 14 with washer (3 pces)
10. Tensioning device
11. Hexagon-head screw with washer M8 x 55 (1 pce)
12. Locking pin

Sequence of work steps:
1. Install mounting bracket (7)
2. Install pulley (8)
3. Install tensioning device (10)
4. Install compressor (1) (but first loosen the locking screws of the refrigerant line)
5. Put on ribbed V-belt (3)
6. Remove locking pin from tensioning device (10).

Tightening torque of the hexagon-head screws 22 Nm.

* This screw replaces the original screw fitted in the vehicle

5. Install drier

F 46 64 005 R

Place drier (1) together with support in the rebate in the body and secure with hexagon head screw (2) 6.3 x 16.

Tightening torque of the hexagon head screw 10 Nm.

F 46 64 006 R

Fasten support of the drier to the lower longitudinal carrier with hexagon head self-tapping screw (1) 6.3 x 16.

Tightening torque of the hexagon head screw 10 Nm.

6. Install condenser

F 46 64 007 R

Attach condenser (1) on left and right into the guide (2) of the radiator support.

F 46 64 008 R

Secure condenser (1) at above right to the radiator support using self-cutting Torx screw (2) taken from the installation kit.

F 46 64 009 R

Fix condenser (1) at above left to the radiator support using expanding rivet (2).

Only vehicles with automatic transmission:
Install radiator again in reverse order of disassembly.

7. Change radiator (only vehicles with manual gearbox)

F 46 64 037 R

Remove Torx screws (1). Remove mounting plate (2) and fit it to the new radiator.

F 46 64 038 R

Unclip seal (1) and attach to new radiator.

F 46 64 039 R

Change the support (1) for the coolant drain plug. Install radiator and new suction fan again in reverse order of disassembly (if necessary, rearrange the hose support of the secondary air injection).

In vehicles with automatic transmission the suction fan must not be changed. (See also note on page 2).

F 46 64 042 R

Remove the covers (1) from the air guide.

8. Install water valve

F 46 64 036 R

Dismantle water hose (1) and replace it with the hose supplied in the installation kit.

F 46 64 047 R

Insert water valve (1) in the bracket (2) provided for it at the left Macpherson strut tower. Connect water hose (3) coming from the engine to the lower connection point of the water valve (1). Connect water hose (4) going towards the heating/air conditioning unit to the upper connection point of the water valve (1).

The flow direction shown in the illustration must be complied with unreservedly.
9. Install automatic air-conditioning cable set and connect it

F 46 64 043 R

Install air conditioning cable set along the standard wiring harness in the vehicle.
Install branch cables A1, A2 and A3 on the left side into the E-box.
Lay B1-B7 and C1-C3 to the power distribution box.

Insert E1, connection of outside temperature display to instrument cluster, cable colour blue/red, into connector X11176 (natural colour) in pin no. 1.
Insert E2, connection of outside temperature display to instrument cluster, cable colour blue/brown, into connector X11176 (natural colour) in pin no. 2.

F 46 64 014 R

Insert A1 branch cable, DME (digital motor electronics), cable colour black/blue, in connector (2) X60004 of the engine control module (2), A60004 pin no. 29
Install A2 branch cable, water valve Y4, through the rubber grommet (3) of the E-box to the water valve.
Install A3 branch cable, outside temperature sensor, through the rubber grommet (3) of the E-box along the standard wiring harness to the installation location of the outside temperature sensor

F 46 64 048 R

Insert A2.1 branch cable (1), water valve, cable colour yellow/brown, into connector X85 (3), pin no. 1
Insert A2.2 branch cable (2), water valve, cable colour red/grey, into connector X85 (3), pin no. 2
Put connector X85 (3) on to water valve (4).

F 46 64 015 R

Install branch cables C1, C2 and C3 (1) through the rubber grommet (2) on the right-hand side into the engine compartment.

F 46 64 016 R

Install branch cable C1.1 (1) up to the air conditioning compressor Y2.

Insert C1.1 branch cable (1), compressor Y2, cable colour black/grey, into connector (2) X163, pin no. 1.
Connect connector (2) to the compressor Y2 (3).
Fasten branch cable (1) with cable clip (4) to the longitudinal carrier of the body.

Care should be taken to see that the white safety contact is properly interlocked.

F 46 64 017 R

Install branch cables C2.1-2.3 (1) up to drying container.

Insert C2.1 branch cable, cable colour black/yellow, into connector (3) X126, pin no. 1.
Insert C2.2 branch cable, cable colour black/grey, into connector (3) X126, pin no. 2.
Insert C2.3 branch cable, cable colour black/green, into connector (3) X126, pin no. 3.

F 46 64 046 R

Install branch cables C3.1-C4.1 (1) up to engine fan shroud of the radiator.

Insert C3.1 branch cable, cable colour brown (twisted with blue lead), into connector (2) X3211, pin no. 1.
Insert C3.2 branch cable, cable colour yellow, into connector (2) X3211, pin no. 2.
Insert C3.3 branch cable, cable colour brown (twisted with yellow lead), into connector (2) X3211, pin no. 3.
Insert C3.4 branch cable, cable colour blue, into connector (2) X3211, pin no. 4.

Connections C3.1 and C3.3 are the same colour. Therefore before installation the resistance must be tested to ensure that the correct branch cable is connected to connector X3211 in each case (see circuit diagram or connection overview).

The branch cable C3.1 must be joined with the plug-in connection X610, pin 11.
The branch cable C3.3 must be joined with the plug-in connection X610, pin 15.

Clip AUC (automatic recirculating air control) sensor (3) into the engine fan shroud (4) and connect connector (2) X3211.

Connect together connection of the auxiliary fan (5) and attach it to the engine fan shroud (4).

Only vehicles with auxiliary relay carrier.

F 46 64 019 R

Put B1 relay K19 on to relay base X51 (1) and attach it to relay carrier (2) as shown.

Only vehicles without auxiliary relay carrier.

F 46 64 020 R

Put B1 relay K19 on to relay base X51 (1) and attach it as illustrated.
All vehicles

**F 46 64 021 R**

Insert **B2** branch cable (1) terminal 31, cable colour brown, into joint connector (2) X219, cable colour brown/black.

Insert **B3** branch cable (3) TD signal, cable colour black, into joint connector (2) X243, cable colour black.

Insert **B4** branch cable (4) K-bus, cable colour white/red/yellow, into joint connector (2) X10116, cable colour white/red/yellow.

**F 46 64 022 R**

Connect **B5** branch cable compressor, cable colour red/violet/yellow, to current distributor (1) plug-in place F63.

Connect **B6** branch cable water valve, cable colour red/grey, to current distributor (1) plug-in place F62.

Connect **B7** branch cable terminal 15, cable colour green/yellow, together with mini-connector to the outgoing green/yellow line of fuse no. 28.

Insert fuse 7.5 A into plug-in place no. F63 (2) and F62 (3).

**10. Install condensation water drain**

**F 46 64 002 R**

Remove pre-stamped carpet cut-out and rubber bung at the gearbox tunnel (1).

**F 46 64 003 R**

Insert condensation water drain (1) in the opening.

Take note of the installation arrow on the condensation water drain. The arrow must point in the driving direction. ◄

**11. Install heater/air conditioner unit**

⚠️ The heater/air conditioner unit must be inspected for possible transportation damage before it is installed. ◄

**F 46 64 023**

Place heater/air conditioner unit (1) in carefully, straighten it and attach it with the hexagon nuts (2) which have been removed previously. Tightening torque of the hexagon nuts 10 Nm.

Make sure that branch cable **D** to the cable set (connection to air conditioner control unit) does not get jammed. ◄

**F 46 64 024 R**

Attach Bowden cable (1) to the switch lever (2) of the heater/air conditioner unit. Attach coolant hoses again and re-install instrument panel in the reverse order of disassembly.

**F 46 64 025 R**

Attach Bowden cable (1) to the switch lever of the fresh air louver (2). Push fresh air louver into the instrument panel and make it click home.

**F 46 64 055 R**

Insert **D** connector (1) X610, into the connection on the heater/air conditioner control unit (2).

Insert **D1** branch cable water valve, cable colour yellow/brown to the connector X608 (natural colour) (4) into pin no. 4.

Insert the connectors (3) which were removed when the instrument panel was disassembled into the connections on the heater/air conditioner control unit (2).

Press the heater/air conditioner control unit (2) into the instrument panel and make it click home.

**12. Install refrigerant lines**

**F 46 64 027 R**

Remove pre-stamped area of the insulation mat (1) in the engine compartment front right and screw (2).

Break out the pre-stamping (3) for the suction line.

**F 46 64 028 R**

Remove plastic cover (1).

Secure rubber buffer (2) with hexagon nut M6.

Tightening torque of hexagon nut 10 Nm

**F 46 64 029 R**

Insert double tube (1) and secure with locking tooth nut (2) M6.

Tightening torque of the locking tooth nut 10 Nm. Make sure the rubber grommet (3) is seated properly!

**F 46 64 030 R**

Install and screw pressure line (1) from drier to evaporator to double tube using hexagon socket head screw M8 x 30 (2).

Tightening torque of hexagon socket head screw 25 Nm

**F 46 64 031 R**

Screw pressure line (1) from drier to evaporator to drier (3) using hexagon socket head screw (2) M8 x 30.

Tightening torque of hexagon socket head screw 25 Nm

Put connector X126 (4) on to the pressure sensor **B8** (5).
**Screw suction line (1) from evaporator to compressor to double tube (3) using hexagon socket head screw (2) M8 x 30 and to rubber buffer (5) with hexagon nut (4), and clip to the side wall.**

Tightening torque of the hexagon socket head screw 25 Nm, hexagon nut 10 Nm.

**Screw suction line (1) from evaporator to compressor (3) using hexagon socket head screw (2) M8 x 30.**

**Screw pressure line (4) from compressor to condenser to condenser (5) and to compressor (3) using hexagon socket head screws (2) M8 x 30.**

Tightening torque of the hexagon socket head screws 25 Nm.

**Screw pressure line (1), from condenser to drier, to condenser (3) and to drier (4) using hexagon socket head screws (2) M8 x 30.**

Tightening torque of the hexagon socket head screws 25 Nm.

**Install temperature sensor**

**Insert temperature sensor (1) in recess provided for it on the left bottom covering (2)**

**Insert A3.1 branch cable (1), cable colour blue/brown, into connector (2) X770, pin no.1**

**Insert A3.2 branch cable (1), cable colour blue/red, into connector (2) X770, pin no.2**

Put connector X770 (2) on to outside temperature sensor (3)

**Finalising operations**

- Build back the vehicle in the reverse order of disassembly.
- Evacuate and fill cooling system according to specifications and check for leakages.
- Check headlight adjustment and correct if necessary.
- Stick on filling-capacity sticker (1)
- Evacuate air conditioning system and fill it. (filling quantity 740 g must be observed)
- Evacuate and fill air conditioning
  Check air conditioning for leakage.

**Coding**

Coding is required in every case and is to be carried out using coding software which is currently valid.

**Procedure:**
- connect DIS or MoDIC III to the vehicle
- ignition "ON"
- select "Coding ZCS"
- select "7 Series E46"
- select "2 Retrofit"
- select "3 IHKA"
- automatic recirculation control Yes/No
- start automatic coding (confirm with "Y")
- after coding, disconnect vehicle battery for at least 10 seconds, connect it again and carry out function test.
- when the coding operation has finished, print out coding label and stick it in the lid of the E-box.

**Circuit diagram/ key IHKA M43**

**Key**

A2 Instrument cluster
A11 Control unit IHKA (automatic heating and air conditioning)
A46 Fuse holder I
A47 Fuse holder II
A60004 Engine control module DME
B8 Pressure sensor low-high pressure
B11 Heat exchanger sensor L1
B14 Temperature sensor evaporator
B21 Outside temperature sensor
B414 Sensor AUC (automatic recirculating air control)
K19 Relay air conditioner
M30 Blower
M31 Footwell left
M35 Defrosting
M36 Actuator fresh air
M38 Ventilation left
N2 Output stage
The components framed in this way are already mounted on the heating/air conditioning unit.