61 11 ... Cutting to length and stripping insulation from cables



Special tools required:

- 0 494 159
- 0 496 849
- 0 496 833
- 2 407 379
- 61 4 320
- 61 4 340
- 61 4 328
- 61 0 210
- 61 0 220
- 61 0 230



New parts for vehicle electrical system (stops, housing):

- Sourcing reference: BMW Group Parts



For cutting cables to length and stripping insulation, refer to Service Information.

Stripped length:

Wire cross-section (mm^2)	Stripped length (mm)
0,35 ... 0,50	4,0
0,75 ... 1,00	4.5
1,00 ... 2,50	5,0



Crimping on NanoMQS stop parts

Crimping of NanoMQS contacts (MQS).

- Special tool handle 0 494 159 or 0 496 849
- Special tool (die-plate) 0 496 833
- Stripping tool2 407 379

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2. Crimping of stops up to 2.5 mm

Crimping Micro Quadlock System contacts (MQS).

- Special tool61 4 320

Crimping Micro Power Quadlock contacts (MPQ).

- Special tool61 4 320

Crimping miscellaneous stop parts up to 2.5 mm^2

- Special tool 61 4 340 (up to 03/2010 special tool 61 4 328)
- Refer to Service Information bulletin

Crimping of stops above 2.5 mm^2

Crimping load current contacts (LSK 8).

- Special tool61 0 210

Crimping load current contact 2.8.

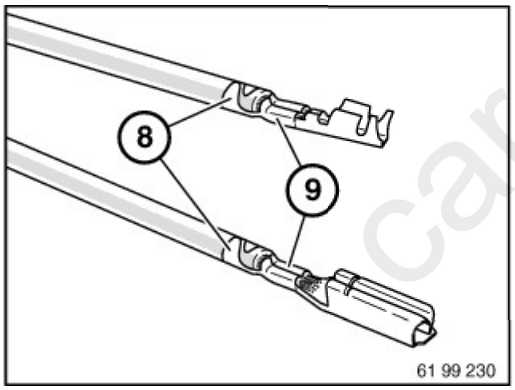
- Special tool61 0 220

Refer to Service Information SI 2 02 05 194

Crimping double spring contact (DFK 40)

Crimping MAK 8

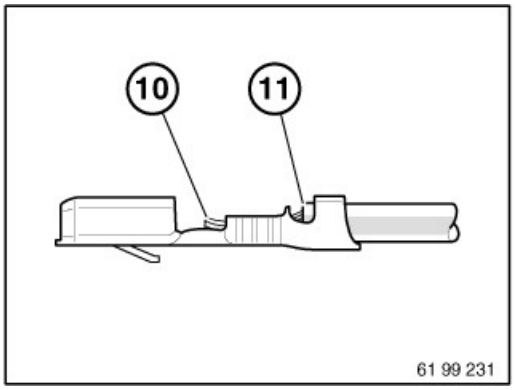
- Special tool61 0 230
- Refer to Service Information bulletin



Checking crimping

Check insulation crimping (8) and wire crimp (9) against following illustrations to ensure crimps are correctly located.

Note:
Illustration shows butt connectors and contact sleeves for comb connectors knocked on one side. The crimping procedure is identical here.

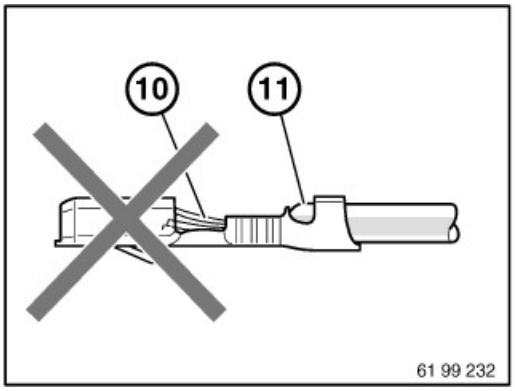


Correct crimping:

Visible conductor end (10).

Visible insulation end (11).

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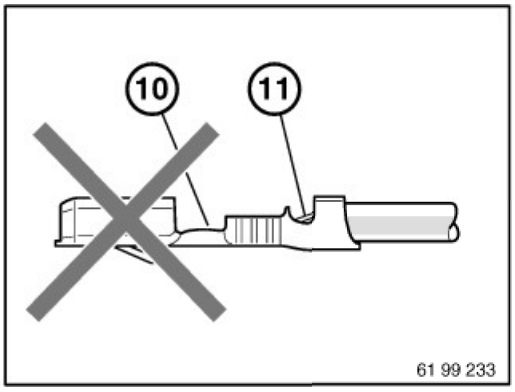


Incorrect crimping:

Conductor end (10) inserted too far.

Insulation end (11) in wire crimp.

If necessary, repeat crimping with a new contact.



Incorrect crimping:

Conductor end (10) not visible.

Insulation end (11) not visible.

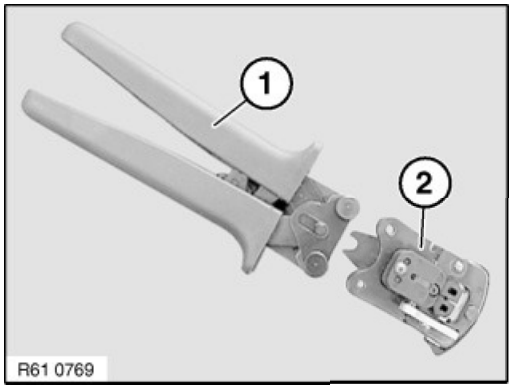
If necessary, repeat crimping with a new contact.

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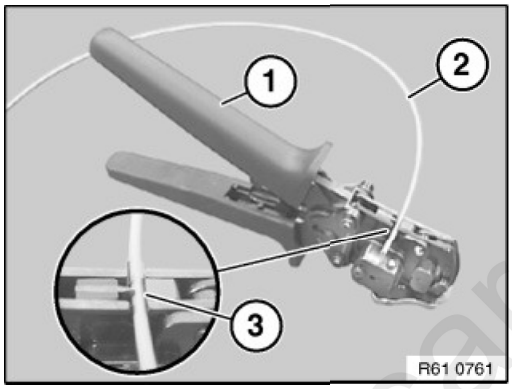
61 13 ... Cutting, strip insulation and crimping optical fibres

Special tools required:

- 61 4 321
- 61 4 329
- 61 4 320
- 61 4 323



The hand pliers 61 4 321 (1) in connection with the crimping head 61 4 329 (2) from crimp kit 61 4 320 are used for cutting, strip insulation and cutting optical fibres to size.*Note:*
Hand pliers (1) open automatically until limit position when handles are pressed together.

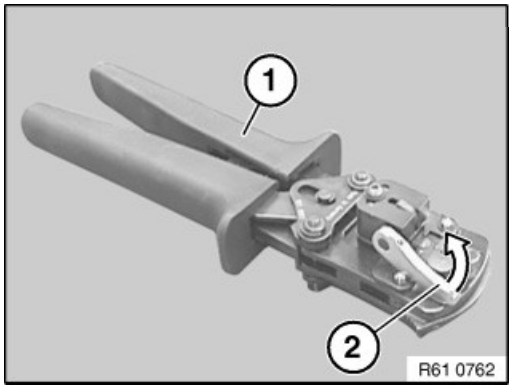


Cutting optical fibre

Open hand pliers (1).

Place optical fibre (2) in cutting device (3).

Close pliers (1) and remove optical fibre (2).

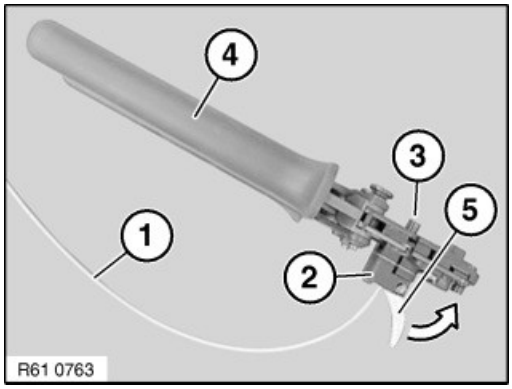


Stripping insulation from optical fibre

Open hand pliers (1).

Open lever (2) in direction of arrow.

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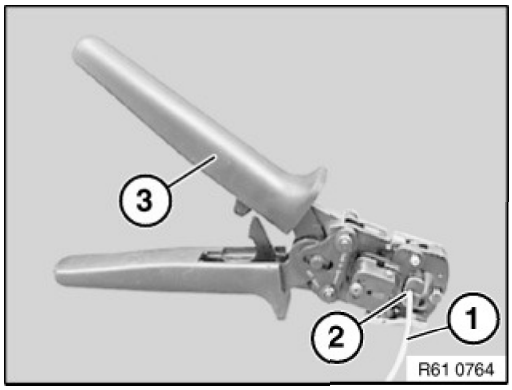
Push the optical fibre (1) into the strip insulation equipment (2) until it is flush in this area (3).

Close hand pliers (4) fully.

Close the operating lever (5) in the direction of the arrow.

Open hand pliers (4) by one tooth notch.

Re-open the operating lever (5) against the direction of the arrow and remove the optical fibre (1).



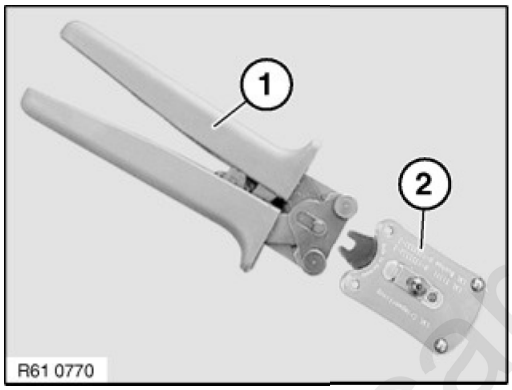
Cutting optical fibre to length

Open hand pliers (3).

Push the optical fibre (1) into the cutting equipment (2) until the insulation of the optical fibre (1) comes into contact with the clamping fixture.

Close hand pliers (3) fully and keep closed.

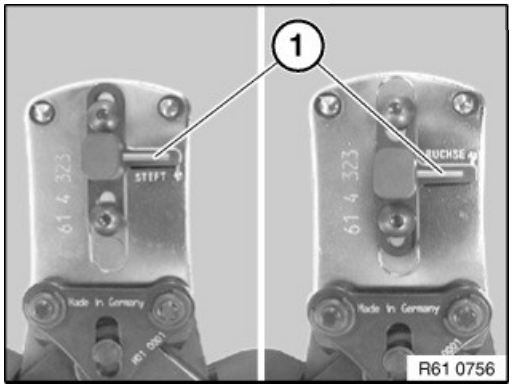
Remove optical fibre (1).



Crimp optical fibre

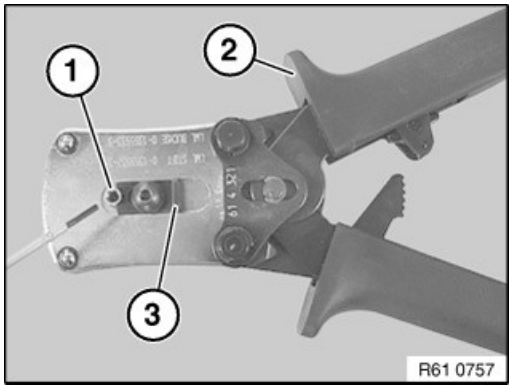
The hand pliers 61 4 321 (1) in connection with the crimping head 61 4 323 (2) from crimping kit 61 4 320 are used for crimping the optical fibres to size.

Note:
Hand pliers (1) open automatically until limit position when handles are pressed together.



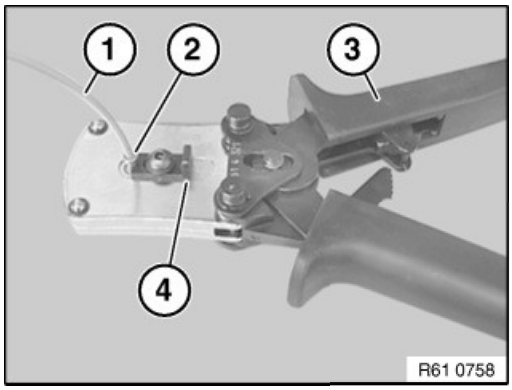
Move contact guide by means of stop lever (1) into corresponding position (pin contact or jack).

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Open hand pliers (2).

Place pin contact or jack (1) in crimping head and secure with locking lever (3).

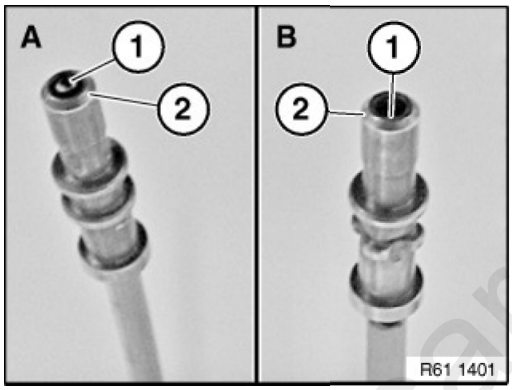


Insert stripped optical fibre(1) until limit position into pin contact or jack (2).

Close hand pliers (3) fully.

Open hand pliers (3) and locking lever (4).

Remove optical fibre (1).



Caution!

Make sure optical fibre is correctly seated in jack.

Right (A)

End of optical fibre (1) must be flush with tip of pin contact (2).

Wrong (B)

End of optical fibre (1) is not flush with tip of pin contact (2).

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61 00 ... Notes on handling wiring harnesses and cables



The following applies in general:

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- To ensure professional repairs, perform repair work only with BMW-approved or recommended special tools and spare parts
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies:

Shielded lines

Interference radiation and interference resistance can lead to neutral zones at contact points in the shielding. Consequently, distinctions have to be drawn between the following types:

Coaxial lines

- Shielded coaxial cables RTK031 may only be repaired with a special crimping tool.
- For aerial lines only the bushing contact may be repaired.
- RG174 Lines and the bushing contact may not be repaired.

CVBS lines

- CVBS cables may not be repaired.
- CVBS cables must be replaced in their entirety.

HSD lines

- HSD cables may not be repaired.
- HSD cables must be replaced in their entirety.

Optical fibre cable:

Note:
Fibre-optic cables are coloured differently as follows:

- Green = **MOST** (**M**edia **O**riented **S**ystems **T**ransport) optical fibres
- Yellow = **ISIS** (**I**ntelligent **S**afety and **I**ntegration **S**ystem) optical fibres
- Orange=repair fibre-optic cables

Attention!

- Optical fibres are permitted to show only one junction point (bridge). Replace optical fibres if necessary
- Smallest permissible bending radius is 25 mm
- Avoid effects of heat ≥ 85 °

Treating cables and fibre-optic cables

FlexRay (twisted cables):

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional butt connectors and heat-shrink tubing.

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Note:

- FlexRay lines may only reveal one separation point (bride); renew complete line if necessary.
- If possible, maintain twisted cable after repair.
- After repairs, twist cables as close as possible to the connector/separation point.
- Twisting must be as symmetrical as possible.

Airbag lines:

Repairing airbag cables

Ribbon cables:

Repairing ribbon cables

Replacing wiring harnesses

Repair wiring harnesses mainly cover the full equipment of the vehicle. If certain optional equipment is not installed in the vehicle, note the following:

- If necessary, secure the remaining connectors.
- If necessary, seal the remaining connectors outside the vehicle interior, for example, with butyl tape in such a way that moisture ingress can be eliminated permanently.
- If necessary, repin the connector of the repair wiring harness.

Note:
Repair wiring harnesses can be equipped with an **additional socket housing** (30-pin, for example), **which was not provided on the previous vehicle-side wiring harness**. This socket housing also cannot be found in the wiring diagram.

Procedure

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **in the vehicle interior** (in the footwell, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.
- Alternatively, a suitable pin housing can be fitted on the vehicle-side wiring harness and connected to the additional socket housing.

  However, this is permitted only if the following conditions are met:

  - Carpets must not protrude visibly or become deformed due to the installation of the additional plug connection.
  - It must be possible to install the adjacent components (for example, trims, trim panels, etc.) correctly after installing the additional plug connection.
  - All the attachment points of the adjacent components (for example, trims, trim panels, etc.) must engage correctly.
  - There must be no rattling noise due to the installation of the additional plug connection.
  - The additional plug connection must not damage the adjacent components/wiring harnesses, etc..

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **outside the vehicle interior** (in the

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wheel arch, for example):

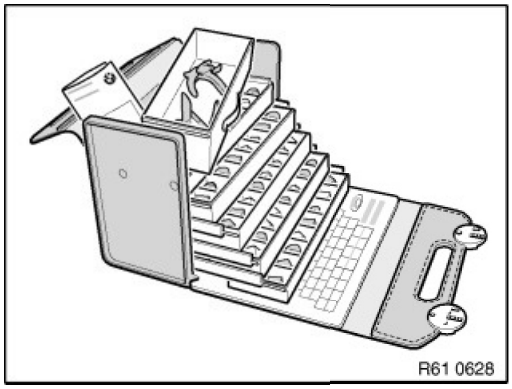
- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.
- **Using the additional socket housing is not permitted with a separation point outside the vehicle interior.**

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61 13 ... Special tools for wiring harness repairs

Special tools required:

- 61 0 300
- 61 0 400
- 61 1 100
- 61 4 320
- 61 0 200
- 61 0 210
- 61 0 220
- 61 0 230
- 61 0 240



Repair range, vehicle electrical system:

Single parts for wiring harness repairs*

* Sourcing reference: BMW Parts Department

Note:

- Refer to Service Information:
  SI 2 04 07 341



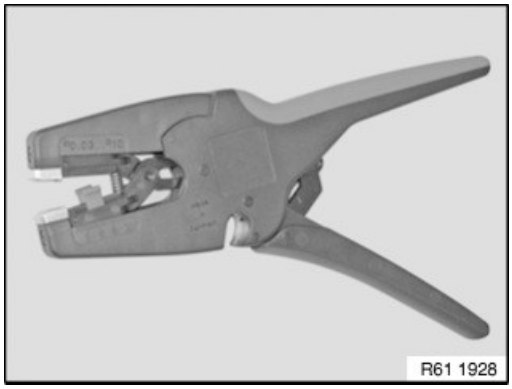
Release and press-out tool:

- Special tool61 0 300
- Special tool 61 0 400 (MINI N12/N14)
- Special tool 61 1 100 (engine)

Handling:

- Notes for opening contacts and locks of different connector contact systems

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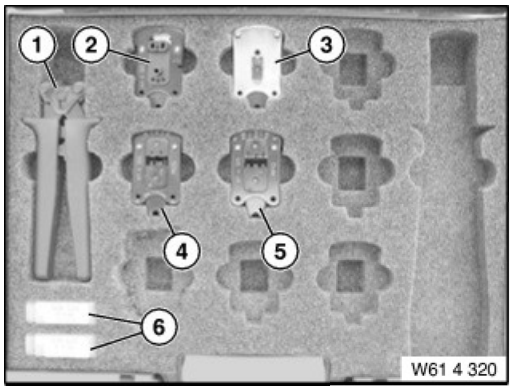
Cutting to length and stripping insulation from cables:

Wire stripper MultiStrip10*

*Sourcing reference BMW Workshop Equipment Catalogue

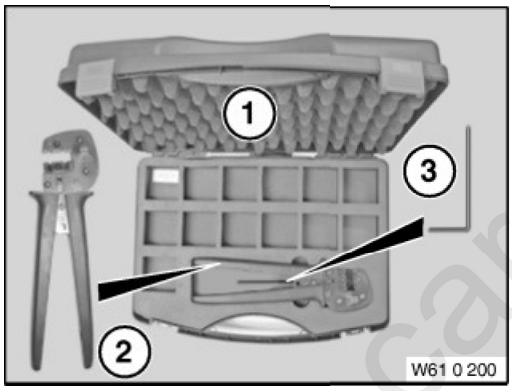
Handling:

- Cutting cables to length and strip insulation



Crimping stop parts (small contacts) and butt connectors:

- Special tool61 4 320
  1. Tool without crimping head
  2. Crimping head (stripping insulation and cutting fibre-optic cables to length)
  3. Crimping head (crimping fibre-optic cable contacts)
  4. Crimping head (crimping MQS contacts)
  5. Crimping head (crimping MPQ contacts)
  6. Replacement blade (face-cutting fibre-optic cables)
  7. Replacement blade with tool (insulation stripping unit)
  8. Universal crimping head (SI 2 04 06 293)



Crimping stop parts (large contacts) and butt connectors:

- Special tool 61 0 200 (crimping set)
- Special tool 61 0 210 (matrix set SLK 8)
- Special tool 61 0 220 (matrix set SLK 2.8)
- Special tool 61 0 230 (matrix set MAK 8 / DFK4)
- Special tool 61 0 240 (butt connector 4.0 - 6.0 mm²)

Handling:

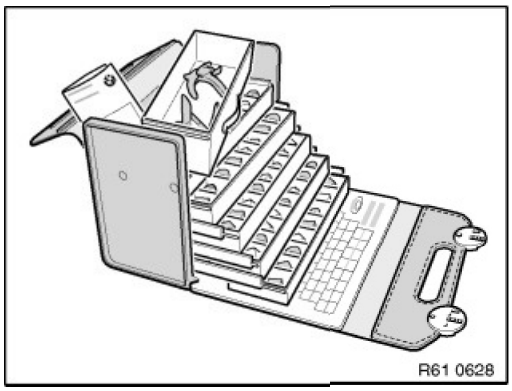
- Refer to Service Information:
  SI 2 02 05 194
  SI 2 07 05 233

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61 13 ... Wiring harness repair (special tools, butt connectors)

Special tools required:

- 61 0 300
- 61 0 400
- 61 1 100
- 61 4 320
- 61 0 200
- 61 0 210
- 61 0 220
- 61 0 230
- 61 0 240
- 61 4 340



Repair range for vehicle electrical system:

Single parts for wiring harness repairs*

* sourcing reference BMW Group Parts Department

Note:

- Refer to Service Information bulletin



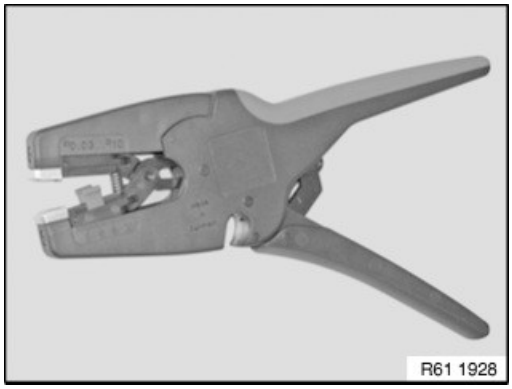
Release and press-out tool:

- Special tool61 0 300
- Special tool61 0 400
- Special tool 61 1 100 (engine)

Handling:

- Notes on opening contacts and locks of various connector systems

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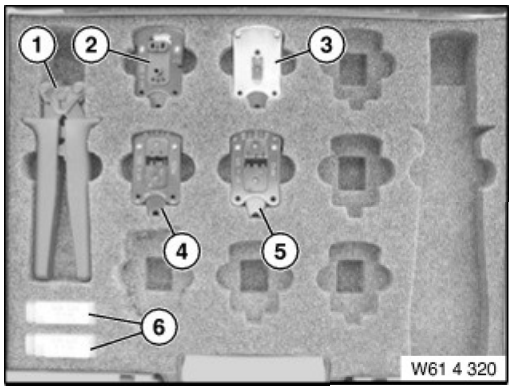
Cutting to length and stripping insulation from cables:

Wire stripper MultiStrip10*

*Sourcing reference BMW Workshop Equipment Catalogue

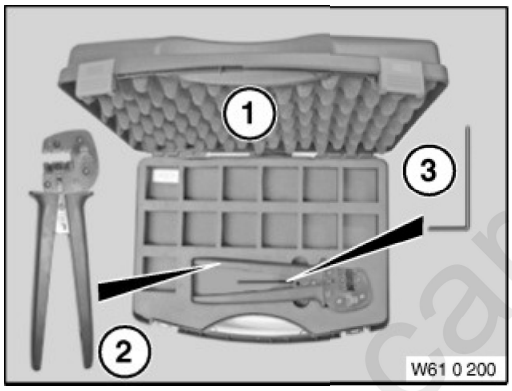
Handling:

- Cutting cables to length and strip insulation



Crimping stop parts (small contacts) and butt connectors:

- Special tool61 4 320
  1. Tool without crimping head
  2. Crimping head (stripping insulation and cutting fibre-optic cables to length)
  3. Crimping head (crimping fibre-optic cable contacts)
  4. Crimping head (crimping MQS contacts)
  5. Crimping head (crimping MPQ contacts)
  6. Replacement blade (face-cutting fibre-optic cables)
  7. Replacement blade with tool (insulation stripping unit)
  8. Universal crimping head (SI 2 04 06 293)



Crimping stop parts (large contacts) and butt connectors:

- Special tool 61 0 200 (crimping set)
- Special tool 61 0 210 (matrix set SLK 8)
- Special tool 61 0 220 (matrix set SLK 2.8)
- Special tool 61 0 230 (matrix set MAK 8 / DFK4)
- Special tool 61 0 240 (butt connector 4.0 - 6.0 mm²)

Handling:

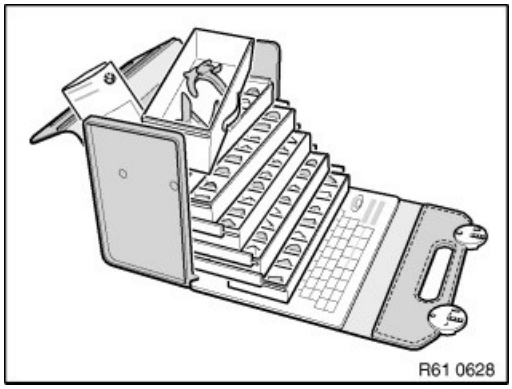
- Service Information bulletins
- Service Information bulletins



Important!

1. Identify cause of damage (e.g. sharp-edged body components, faulty electrical loads, jammed mechanisms, corrosion caused by ingress of water, etc.).
2. Reading out the fault memory
3. Eliminate cause of damage.
4. Disconnect battery negative terminal
5. Check the wiring diagram to make sure that no safety systems (e.g. antilock braking system, active rear axle kinematics, airbag, etc.) are influenced. Otherwise replace faulty wiring harness or use repair cable (sourcing reference: BMW Group Parts)
6. Carry out function check and read out fault memories again
7. Eliminate new faults if applicable and clear fault memories

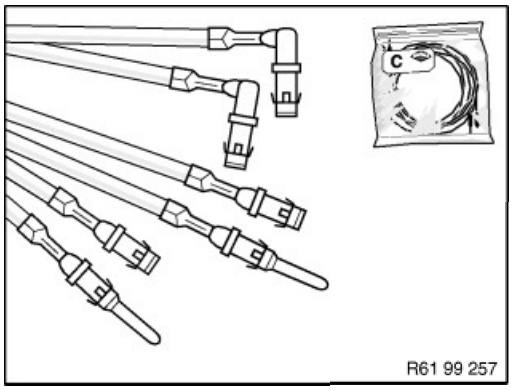
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Note:
The repair range IV for the vehicle electrical system contained the required special tools and separate components for retrofitting and repair work with the aid of comb connectors.

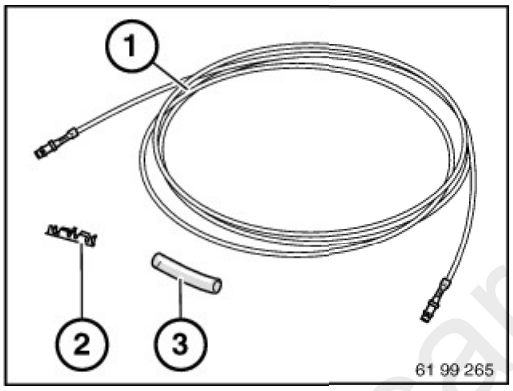
The case can no longer be ordered. Order separate components for wiring harness repair via BMW Group Parts.

- Refer to Service Information:



Choose repair kit.

Example: Repair kit, circular connector system D 2.5.

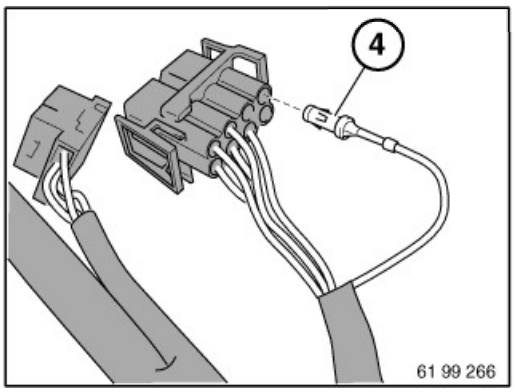


Remove following parts:

(1) Pre-packaged end of cable with requisite wire cross-section

(2) Crimp connector for selected wire cross-section

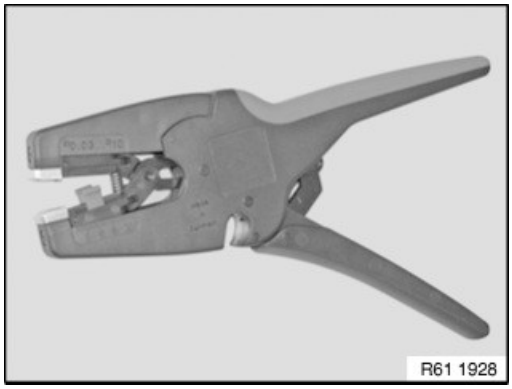
(3) Shrink-fit hose



Open secondary lock on housing.

Mark damaged contact (4) with socket number of housing and press it out of housing using appropriate special tool contained in special tool set61 0 300).

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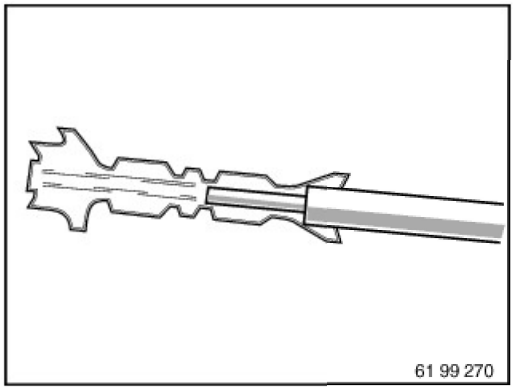
Important!

- Check maximum length of repair cable
- If more than one wire is to be repaired, the individual interfaces must be offset so that the wiring harness is not too thick at the repaired point.

Adhere to following procedure:

- Cut off wire with faulty contact at point which is easily accessible
- Strip insulation from end of wire at wiring harness end
- Cut preassembled wire end to length and strip insulation

Refer also to repair instruction:
Cutting to length and stripping insulation from cables

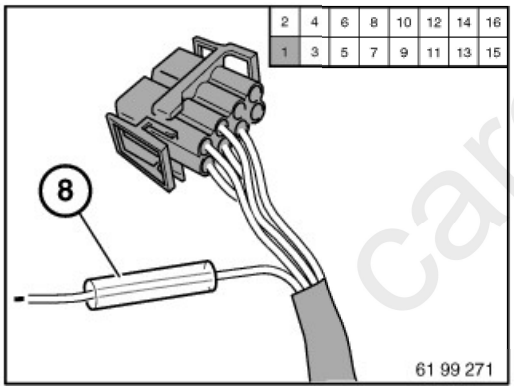


Crimp butt connector on preassembled wire end.

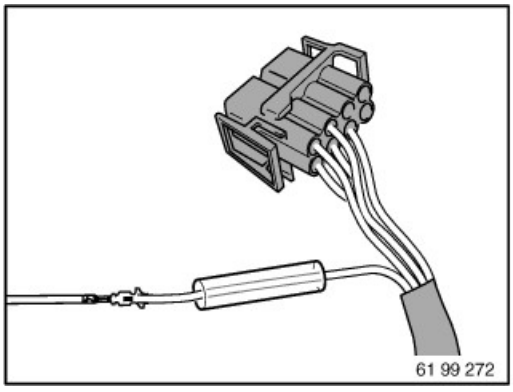
Special tools:

- 61 4 340 (0.35 - 2.5 sq mm)
- 61 0 240 (4.0 - 6.0 sq mm)

See repair instructions
Crimping on stop parts

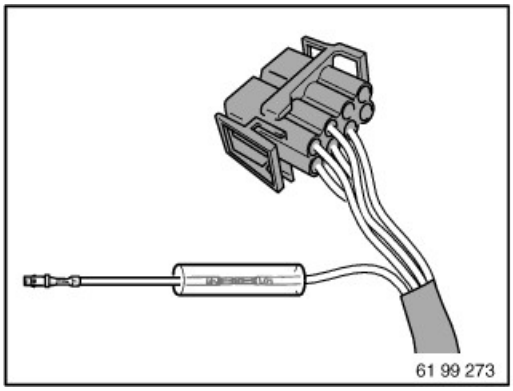


Push shrink-fit hose (8) onto free wire end.

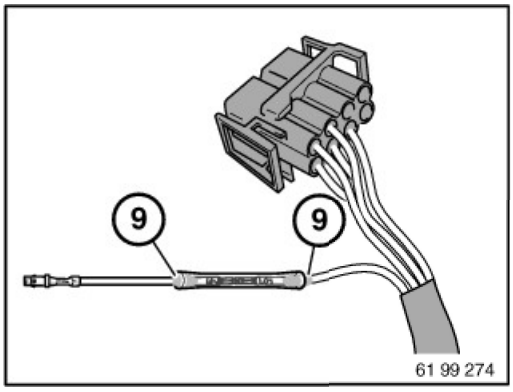


Crimp unused wire end using butt connector.

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Pull shrink-on sleeve over butt connector.



Important!

Do not burn shrink-on sleeve.

Using hot air blower, shrink heat-shrink tubing until adhesive is discharged uniformly at both ends (9) of heat-shrink tubing.

Insert contact *in* housing.

Close secondary lock on housing.

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61 11 ... Cutting to length and stripping insulation from cables



Special tools required:

- 0 494 159
- 0 496 849
- 0 496 833
- 2 407 379
- 61 4 320
- 61 4 340
- 61 4 328
- 61 0 210
- 61 0 220
- 61 0 230



New parts for vehicle electrical system (stops, housing):

- Sourcing reference: BMW Group Parts



For cutting cables to length and stripping insulation, refer to Service Information.

Stripped length:

Wire cross-section (mm^2)	Stripped length (mm)
0,35 ... 0,50	4,0
0,75 ... 1,00	4.5
1,00 ... 2,50	5,0



Crimping on NanoMQS stop parts

Crimping of NanoMQS contacts (MQS).

- Special tool handle 0 494 159 or 0 496 849
- Special tool (die-plate) 0 496 833
- Stripping tool2 407 379

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2. Crimping of stops up to 2.5 mm

Crimping Micro Quadlock System contacts (MQS).

- Special tool61 4 320

Crimping Micro Power Quadlock contacts (MPQ).

- Special tool61 4 320

Crimping miscellaneous stop parts up to 2.5 mm^2

- Special tool 61 4 340 (up to 03/2010 special tool 61 4 328)
- Refer to Service Information bulletin

Crimping of stops above 2.5 mm^2

Crimping load current contacts (LSK 8).

- Special tool61 0 210

Crimping load current contact 2.8.

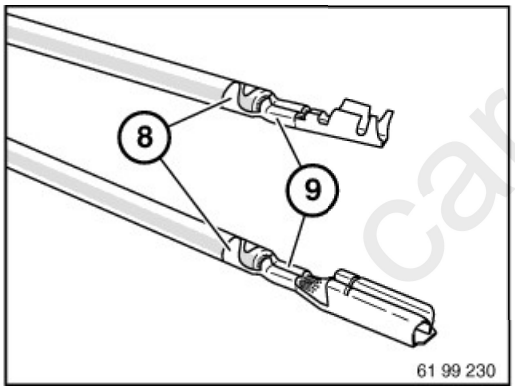
- Special tool61 0 220

Refer to Service Information SI 2 02 05 194

Crimping double spring contact (DFK 40)

Crimping MAK 8

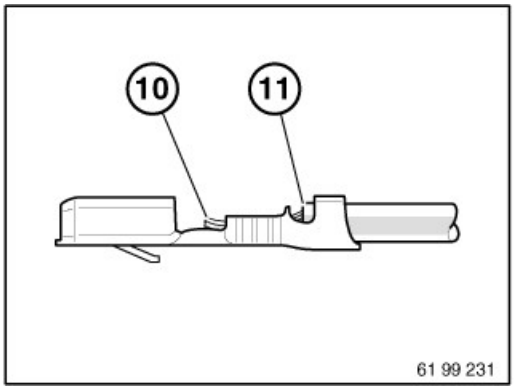
- Special tool61 0 230
- Refer to Service Information bulletin



Checking crimping

Check insulation crimping (8) and wire crimp (9) against following illustrations to ensure crimps are correctly located.

Note:
Illustration shows butt connectors and contact sleeves for comb connectors knocked on one side. The crimping procedure is identical here.

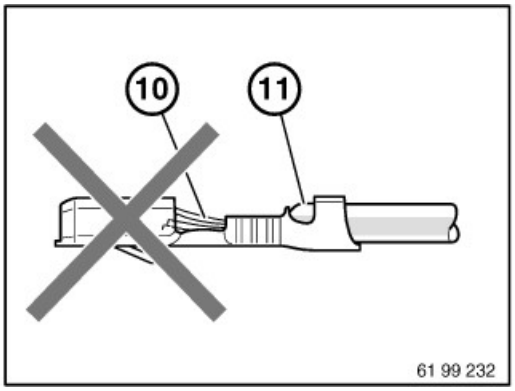


Correct crimping:

Visible conductor end (10).

Visible insulation end (11).

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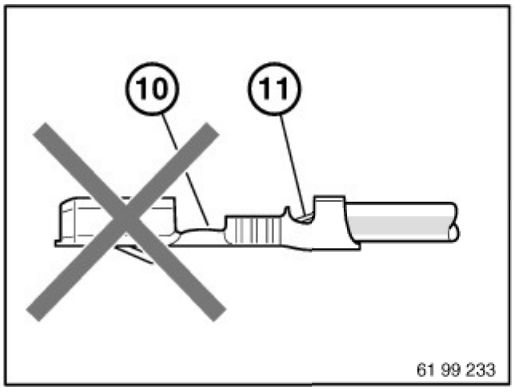


Incorrect crimping:

Conductor end (10) inserted too far.

Insulation end (11) in wire crimp.

If necessary, repeat crimping with a new contact.



Incorrect crimping:

Conductor end (10) not visible.

Insulation end (11) not visible.

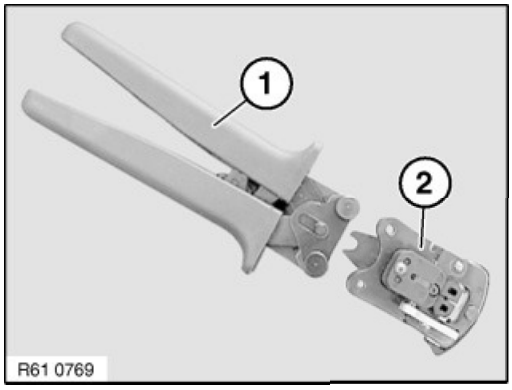
If necessary, repeat crimping with a new contact.

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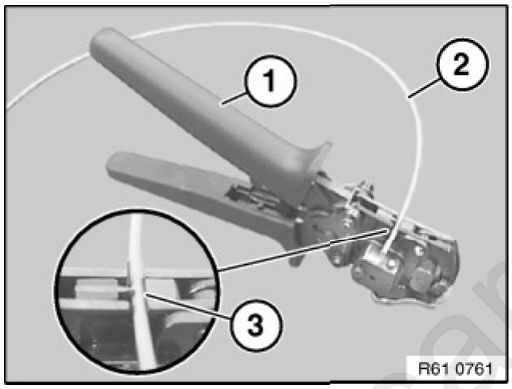
61 13 ... Cutting, strip insulation and crimping optical fibres

Special tools required:

- 61 4 321
- 61 4 329
- 61 4 320
- 61 4 323



The hand pliers 61 4 321 (1) in connection with the crimping head 61 4 329 (2) from crimp kit 61 4 320 are used for cutting, strip insulation and cutting optical fibres to size.*Note:*
Hand pliers (1) open automatically until limit position when handles are pressed together.

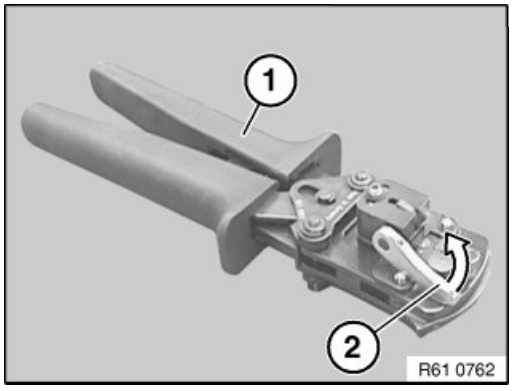


Cutting optical fibre

Open hand pliers (1).

Place optical fibre (2) in cutting device (3).

Close pliers (1) and remove optical fibre (2).

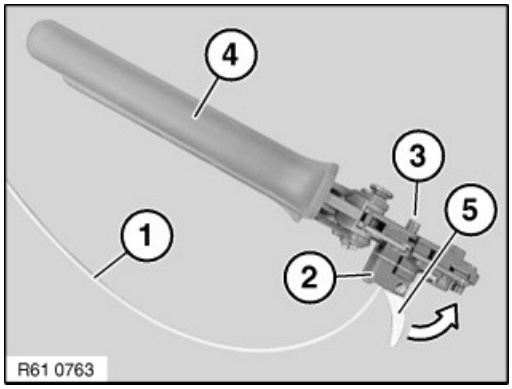


Stripping insulation from optical fibre

Open hand pliers (1).

Open lever (2) in direction of arrow.

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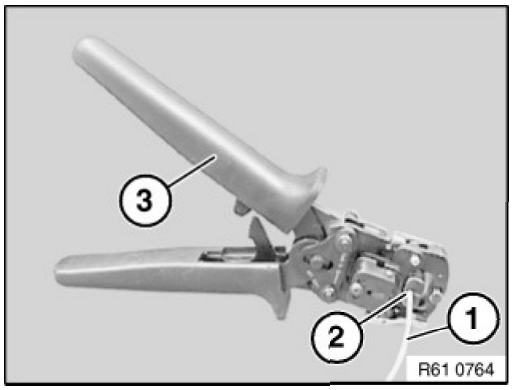
Push the optical fibre (1) into the strip insulation equipment (2) until it is flush in this area (3).

Close hand pliers (4) fully.

Close the operating lever (5) in the direction of the arrow.

Open hand pliers (4) by one tooth notch.

Re-open the operating lever (5) against the direction of the arrow and remove the optical fibre (1).



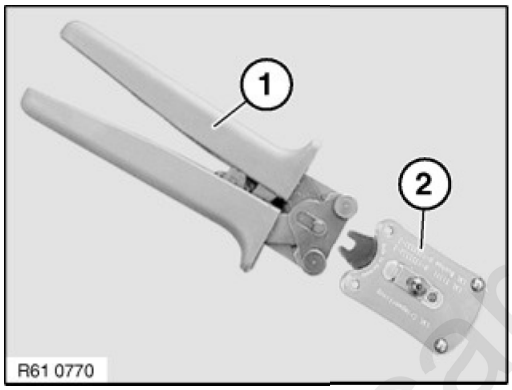
Cutting optical fibre to length

Open hand pliers (3).

Push the optical fibre (1) into the cutting equipment (2) until the insulation of the optical fibre (1) comes into contact with the clamping fixture.

Close hand pliers (3) fully and keep closed.

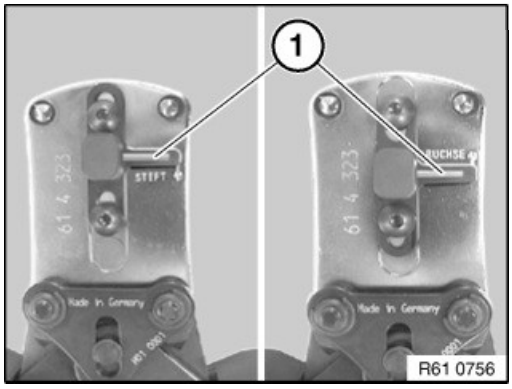
Remove optical fibre (1).



Crimp optical fibre

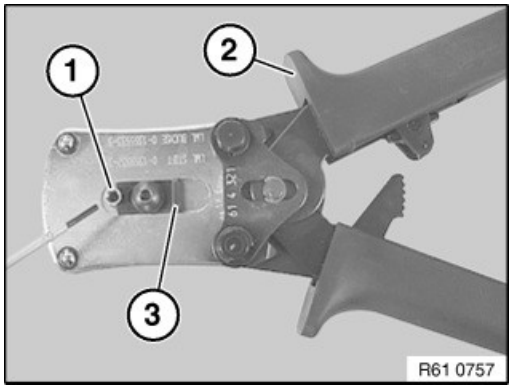
The hand pliers 61 4 321 (1) in connection with the crimping head 61 4 323 (2) from crimping kit 61 4 320 are used for crimping the optical fibres to size.

Note:
Hand pliers (1) open automatically until limit position when handles are pressed together.



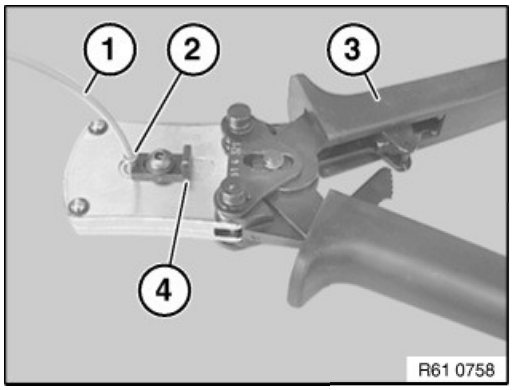
Move contact guide by means of stop lever (1) into corresponding position (pin contact or jack).

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Open hand pliers (2).

Place pin contact or jack (1) in crimping head and secure with locking lever (3).

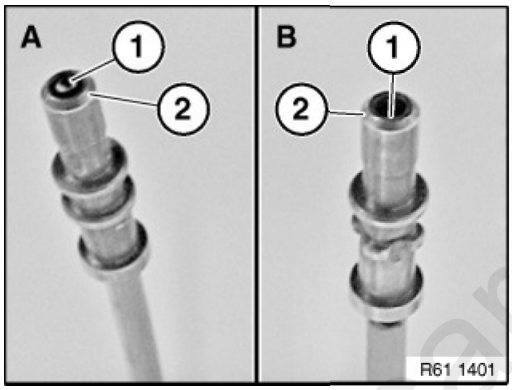


Insert stripped optical fibre(1) until limit position into pin contact or jack (2).

Close hand pliers (3) fully.

Open hand pliers (3) and locking lever (4).

Remove optical fibre (1).



Caution!

Make sure optical fibre is correctly seated in jack.

Right (A)

End of optical fibre (1) must be flush with tip of pin contact (2).

Wrong (B)

End of optical fibre (1) is not flush with tip of pin contact (2).

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61 12 ... Information on intelligent battery sensor (IBS)

Notice! Do not connect the charger to the 12 V charging socket

The 12 V charging socket is supplied with voltage by the rear power distribution box via relay. This relay drops out after terminal 15 OFF. This means that a trickle charger connected at the 12 V charging socket will be disconnected from the battery. Only charge the battery via the jump start terminal point. Only then can the voltage supply be registered by the vehicle.

Warning! Danger of destruction in event of mechanical strain

- Do not introduce any additional connections at the battery negative terminal.
- Do not modify the grounding cable. The ground cable also serves heat dissipation.
- Do not establish any connection between the IBS and the sensor screw.
- Do not use force when disconnecting the pole shoe from the battery terminal:
  - Do not pull on the ground cable.
  - Do not place any tools under the IBS to lever off the pole shoe.
- Do not use IBS connections as levers.
- Use a torque wrench and set tightening torque in accordance with repair instructions.
- Do not release or tighten down sensor screw (Torx screw).
- Avoid contact between IBS and ground.

Warning! Danger of destruction to IBS and wiring upon battery replacement

- The IBS and wiring can be destroyed by mechanical strain upon battery replacement. Therefore avoid mechanical strain.
- The size (capacity) of the battery required for the car is coded in the Car Access System (CAS).
- Use the battery size (capacity) installed as standard upon battery replacement.
- Recode the Car Access System (CAS) when installing a battery with a different capacity.
- Register battery replacement via Service functions in diagnosis system.
- Delete fault code entries in the Digital Engine Electronics (DME) associated with battery replacement.
- Always proceed in accordance with the repair instructions.

Note: Battery draining possible in spite of the intelligent battery sensor IBS being fault-free.

- A battery can be drained (e.g. with lights or radio switched on) even when the IBS functions perfectly in conjunction with power management.
- **For this reason, only exchange the IBS when there is a corresponding fault code entry!**

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61 12 002 Replacing positive battery cable (safety battery terminal) (from battery to rear B+ power distribution box)

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.

PRELIMINARY WORK

1 – Disconnecting all battery earth leads



- See additional information.

MAIN WORK

2 – Removing the safety battery terminal

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.

RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.

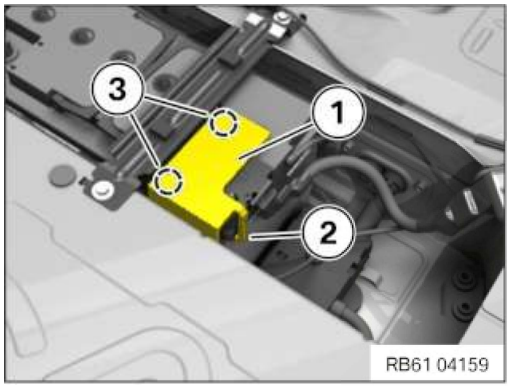
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RISK OF DAMAGE

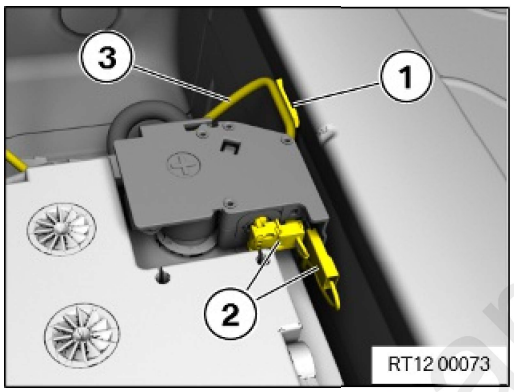
Electrostatic discharge.

Damage to or destruction of electrical components.

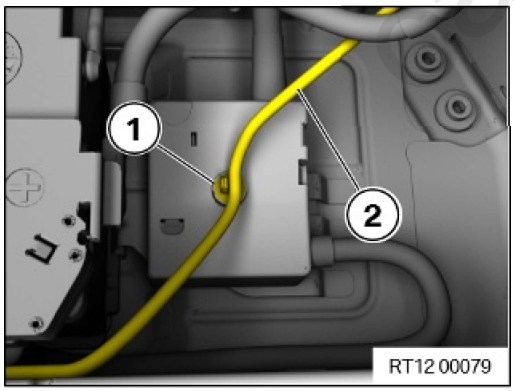
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 Information on electrostatic discharge (ESD) protection.



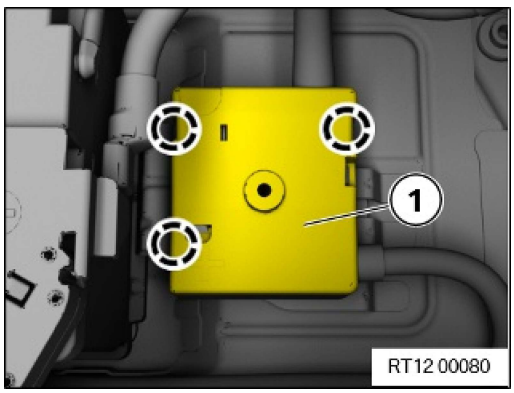
- Release latch mechanism (2) of the protective cap (1).
- Feed out protective cap (1) to the top and remove it from the guides (3).



- Loosen the holder (1).
- Unlock and disconnect plug connections (2).
- Put the cable (3) to one side.

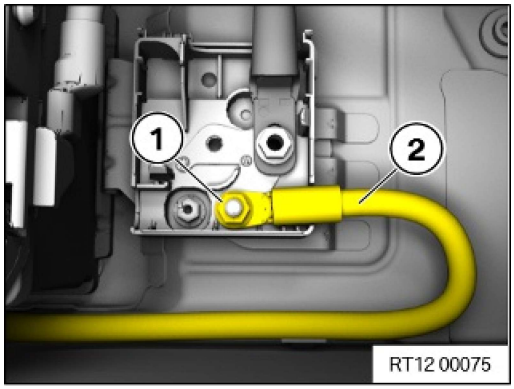


- Loosen the holder (1).
- Put the cable (2) to one side.

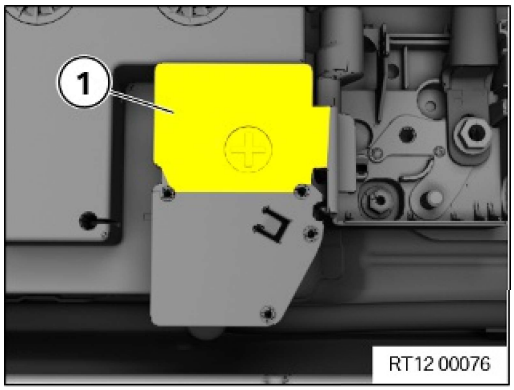


- Unclip the cover (1) in the marked areas.
- Release and remove the cover (1).

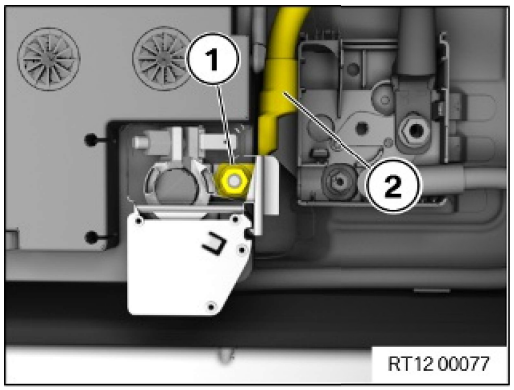
ardiagn.com



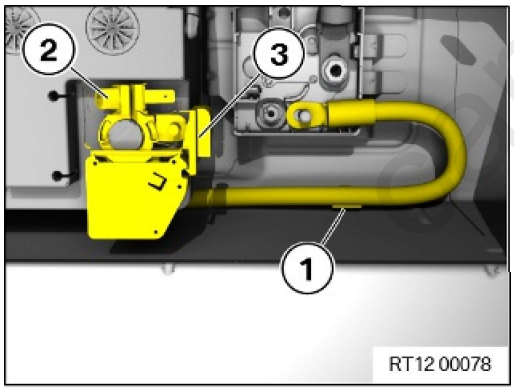
- Unfasten nut (1).
- Remove positive battery cable (2).



- Remove the cover for the positive battery terminal (1).

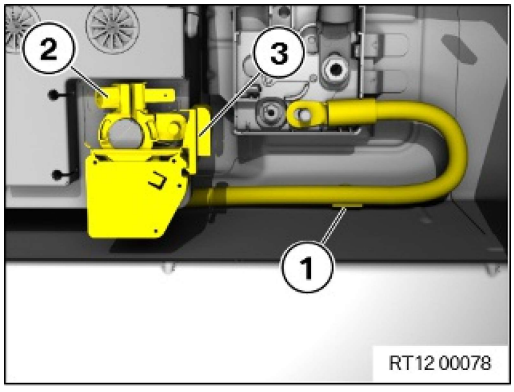


- Release the nut (1) and put the positive battery cable (2) aside.



- Open the holder (1).
- Release nut (2) and remove the safety battery terminal (3).

3 – Installing the safety battery terminal

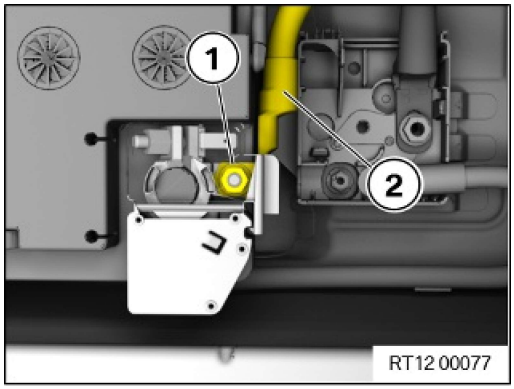


- Position the safety battery terminal (3) on the positive battery terminal.
- Close the holder (1).
- Tighten nut (2).

Positive battery terminal

Nut		Tightening torque	5 Nm

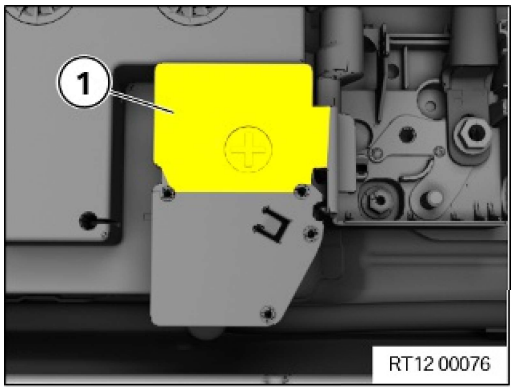
emdiagn.com



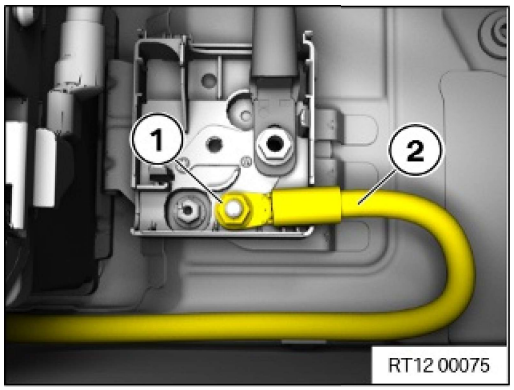
- Position the positive battery cable (2) on the safety battery terminal.
- Tighten nut (1).

Positive battery cable to safety battery terminal

Flange nutM8		Tightening torque	15 Nm



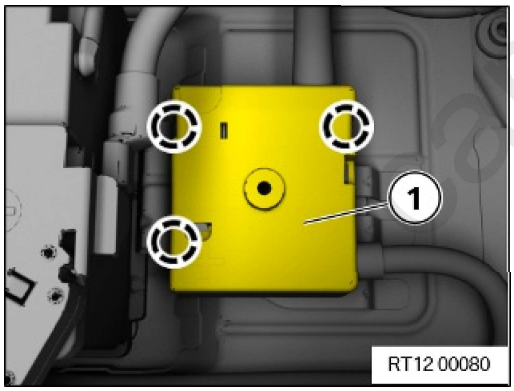
- Close the positive terminal cover (1).



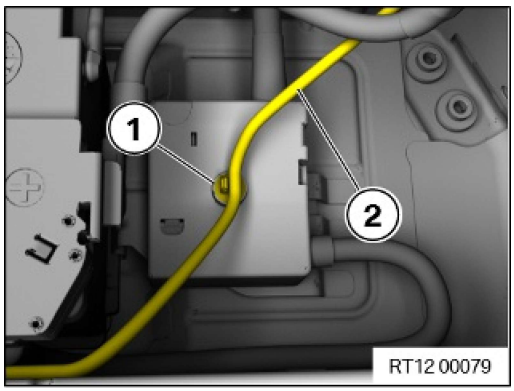
- Position the positive battery cable (2) on the power distribution box.
- Tighten nut (1).

Positive battery cable to power distribution box

Flange nutM8		Tightening torque	15 Nm

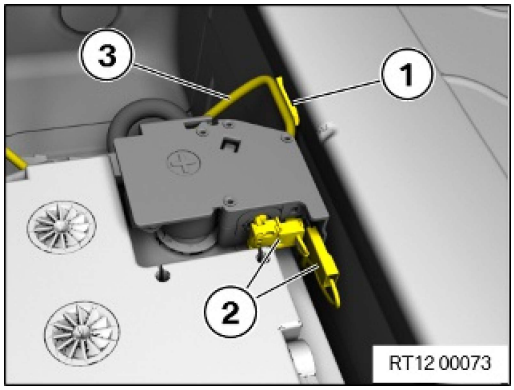


- Position the cover (1) and clip it in at the marked areas.

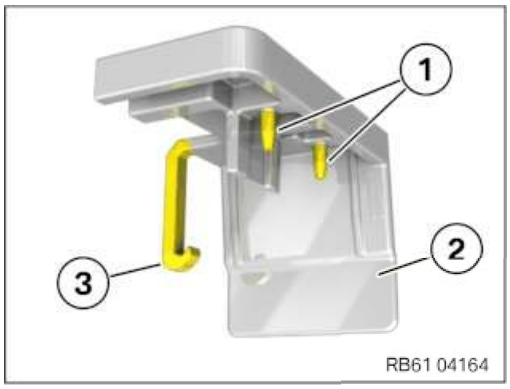


- Position cable (2).
- Clip in the holder (1).

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- Position the cable (3) and clip in the holder (1).
- Connect connectors (2) and lock.



Check

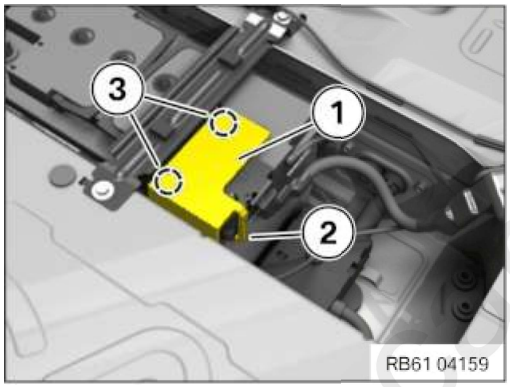
- Check guides (1) and latch mechanism (3) on protective cap (2) for damage.

Result

» The guides (1) or the latch mechanism (3) are damaged.

Measure

- Renew protective cap (2).



- Clip in the guides (3) of the protective cap (1) into the associated openings on the positive battery terminal in arrow direction.
- Clip in protective cap (1) with latch mechanism (2).

POSTPROCESSES

4 – Disconnecting all battery earth leads



- See additional information.

Additional Information

Overview of Tightening Torques

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Overview of Tightening Torques

Positive battery terminal			Used in step 3
Nut		Tightening torque	5 Nm

Positive battery cable to safety battery terminal			Used in step 3
Flange nutM8		Tightening torque	15 Nm

Positive battery cable to power distribution box			Used in step 3
Flange nutM8		Tightening torque	15 Nm

Links

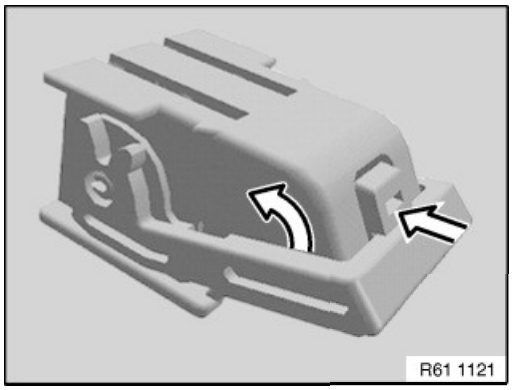
Repair instructions	**Used in step**
61 20 900 Disconnecting and connecting battery earth lead	14
61 20 900 Disconnecting and connecting battery earth lead	14
61 20 900 Disconnecting and connecting battery earth lead	14
61 20 900 Disconnecting and connecting battery earth lead	14
61 20 900 Disconnecting and connecting battery earth lead	14
61 20 900 Disconnecting and connecting battery earth lead	14
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	14
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	14
61 20 900 Disconnecting and connecting battery earth lead	14
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	14
61 20 900 Disconnect and connect battery earth lead (Plug-in Hybrid Electric Vehicle)	14
61 20 900 Disconnecting and connecting battery earth lead	14
61 20 900 Disconnecting and connecting battery earth lead	14
61 20 900 Disconnecting and connecting battery earth lead	14
61 20 900 Disconnecting and connecting battery earth lead	14
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61 20 900 Disconnecting and connecting battery earth lead	14
61 20 900 Disconnecting and connecting battery earth lead	14
61 20 900 Disconnecting and connecting battery earth lead	14
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	14
61 20 900 Disconnecting and connecting battery earth lead	14
61 20 900 Disconnecting and connecting battery earth lead	14
61 20 900 Disconnecting and connecting battery earth lead	14
61 20 900 Disconnecting and connecting battery earth lead	14
61 20 900 Disconnecting and connecting battery earth lead	14
61 20 900 Disconnecting and connecting battery earth lead	14
61 20 900 Disconnecting and connecting battery earth lead	14
61 35 ... Notes on ESD protection (Electro Static Discharge)	2

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61 13 ... Unlocking and disconnecting different plug connections

Note:
The document describes unlocking and disconnecting different types of plug connections.

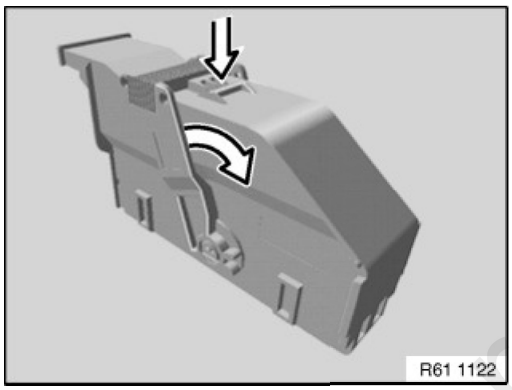
Differences in the details of the size and shape of the plug connections are possible.



1.

Press lock and open release clip in direction of arrow.

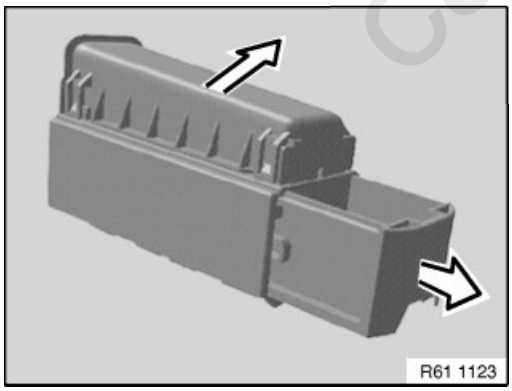
Disconnect plug connection.



2.

Press lock and open release clip in direction of arrow.

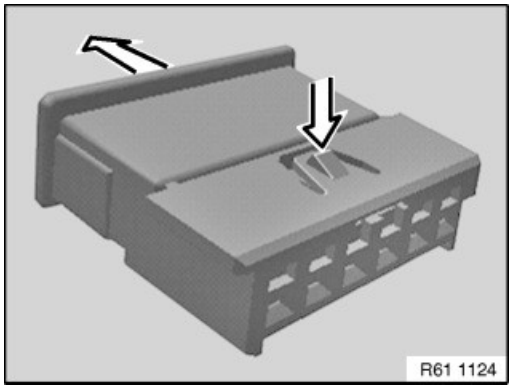
Disconnect plug connection.



3.

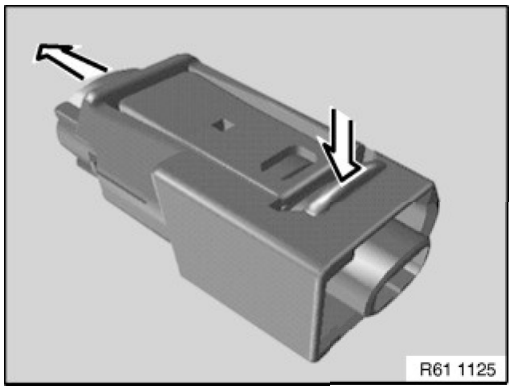
Open release clip in direction of arrow and disconnect plug connection in direction of arrow.

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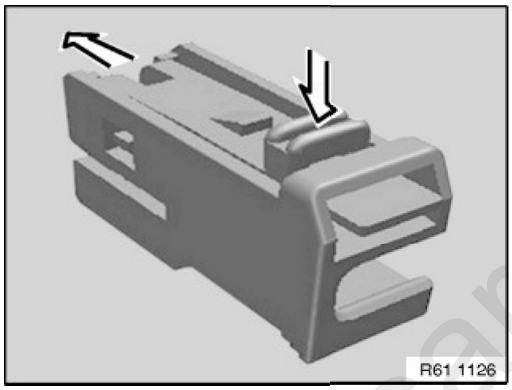
4.

Press lock and disconnect plug connection in direction of arrow.



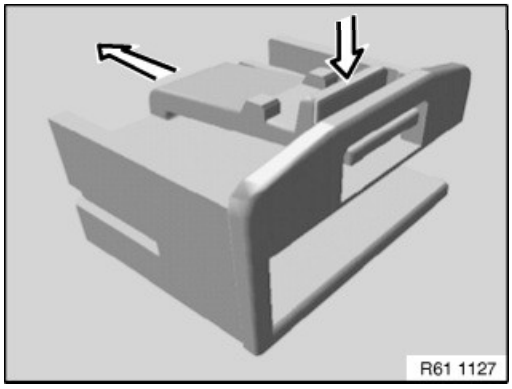
5.

Press lock and disconnect plug connection in direction of arrow.



6.

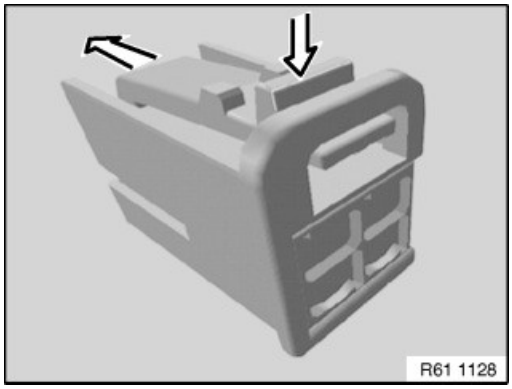
Press lock and disconnect plug connection in direction of arrow.



7.

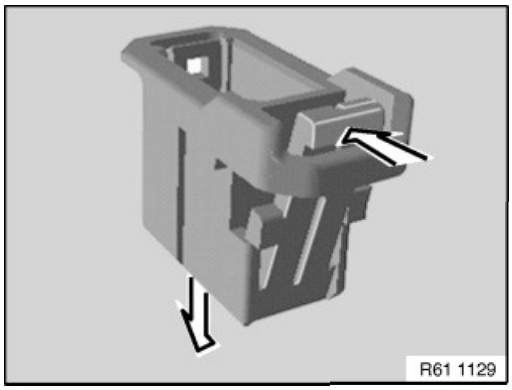
Press lock and disconnect plug connection in direction of arrow.

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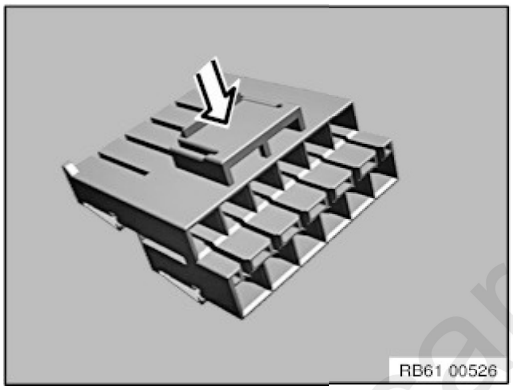
8.

Press lock and disconnect plug connection in direction of arrow.



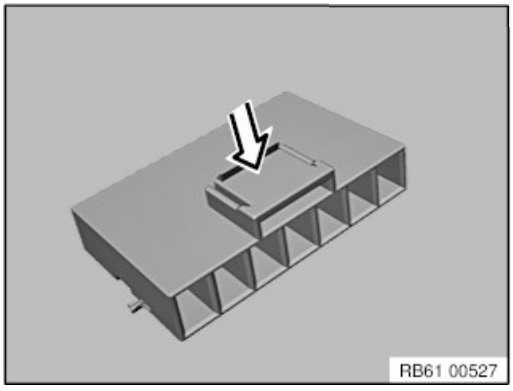
9.

Press lock and disconnect plug connection in direction of arrow.



10.

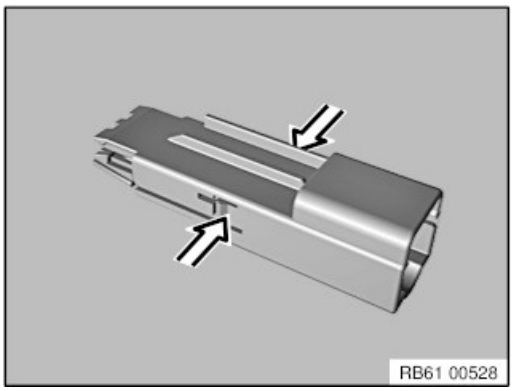
Press the lock and detach plug connection.



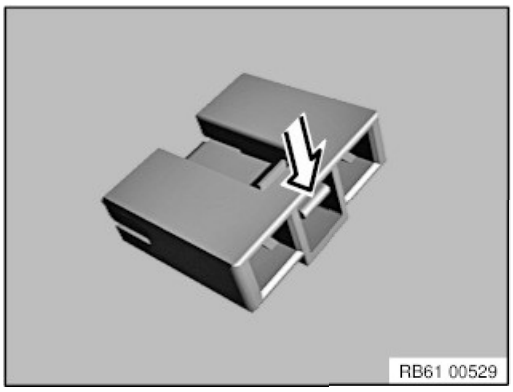
11.

Press the lock and detach plug connection.

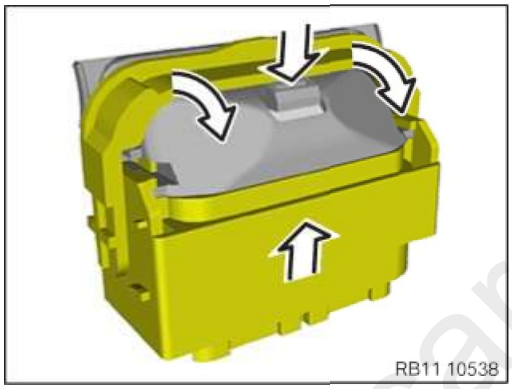
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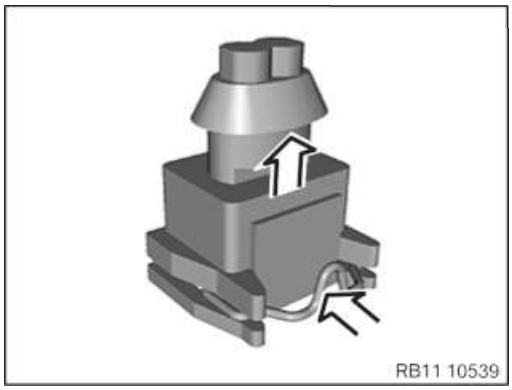
12.
Press the lock on both sides and detach plug connection.



13.
Press the lock and detach plug connection.

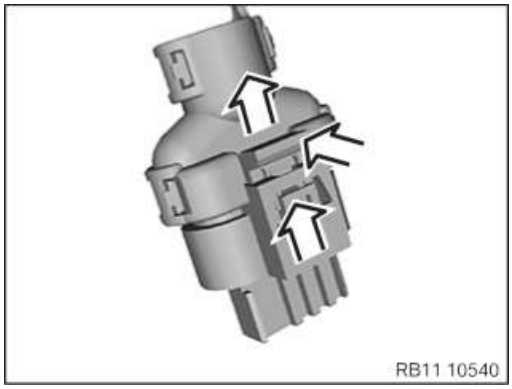


14.
Press lock and open release clip in direction of arrow.
Disconnect plug connection.

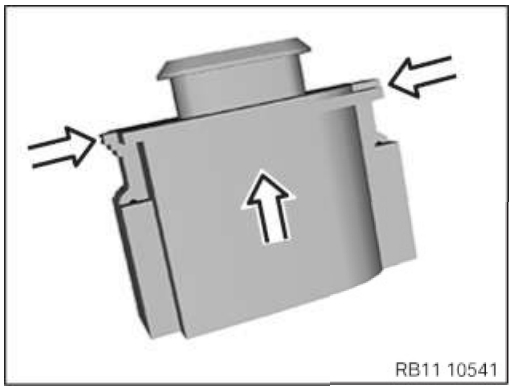


15.
Press the lock and detach plug connection.

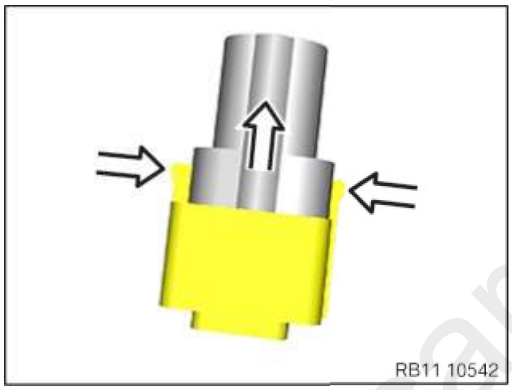
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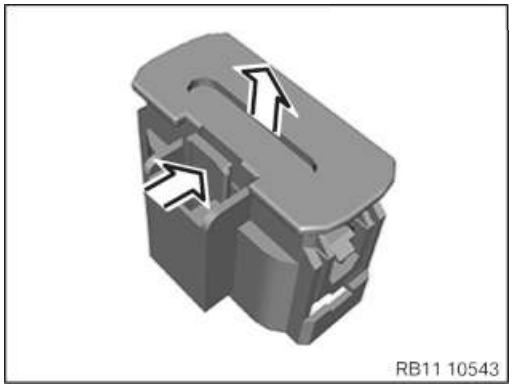
16.
Pull out lock and press.
Disconnect plug connection.



17.
Press the lock and detach plug connection.

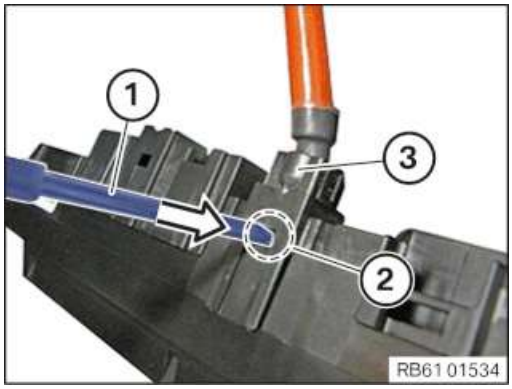


18.
Press the lock and detach plug connection.



19.
Press the lock and detach plug connection.

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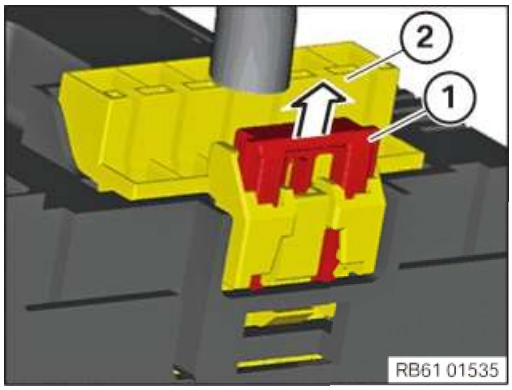


20.

Plug connection, e.g. on the power distribution box:

Press into the opening (2) using a suitable tool (1).

Pull off plug connection (3) upwards.



21.

Plug connection, e.g. on the power distribution box:

Lift lock (1) with a suitable tool.

Pull off plug connection (2) upwards.



22.

Vibration resistant high power engine contacts:

Caution!

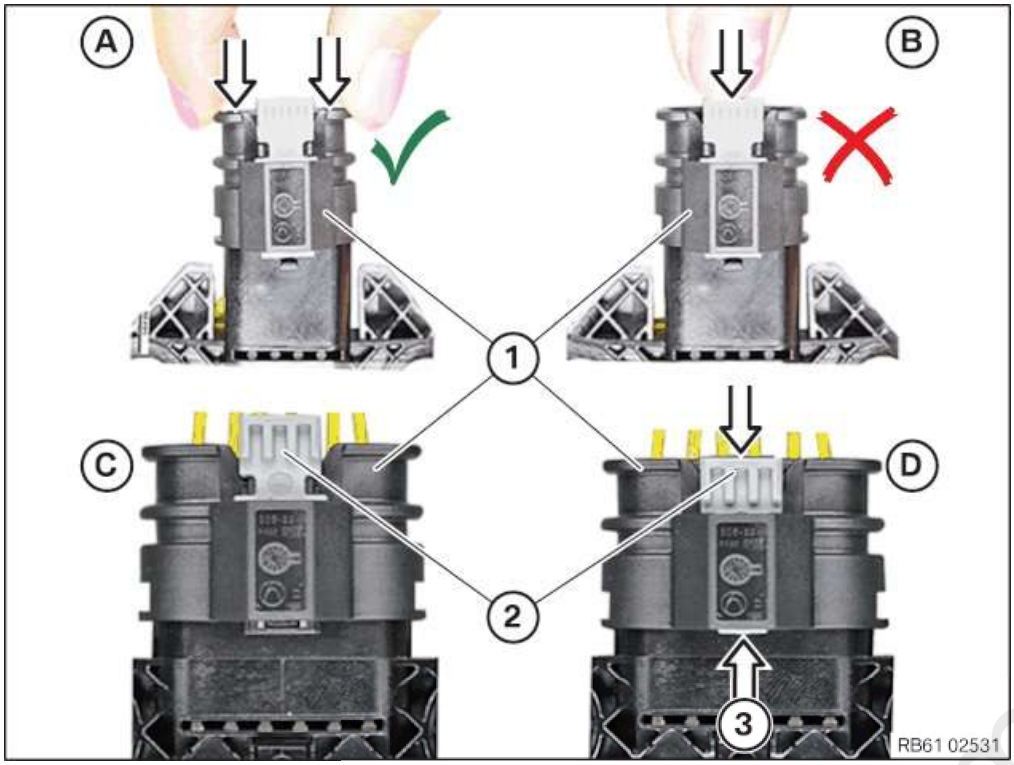
For this connector type, increased forces come into play when disconnecting and closing.

Disconnect:

Pull out lock (1) downward in direction of arrow first.

Then press lock (1) down in direction of arrow and pull off connector.

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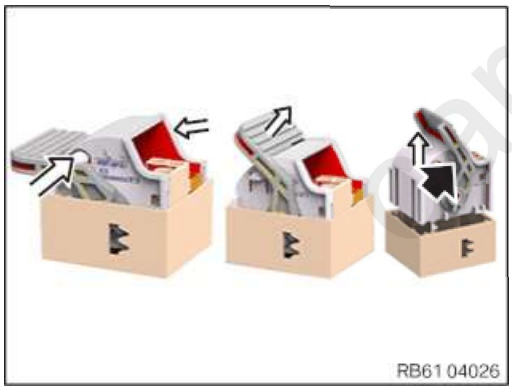


23.

Close:

A. Press the connector (1) down at the points indicated by the arrow **until it reaches the end position**
B. **Do** not press the connector (1) further than the lock
C. Connector (1) is in the end position, but lock (2) is not yet locked
D. Press lock (2) down in the direction of the arrow until the tip of lock (2) is visible at point (3)

Unlock / lock front light combination plug connection & replace housing after damage:

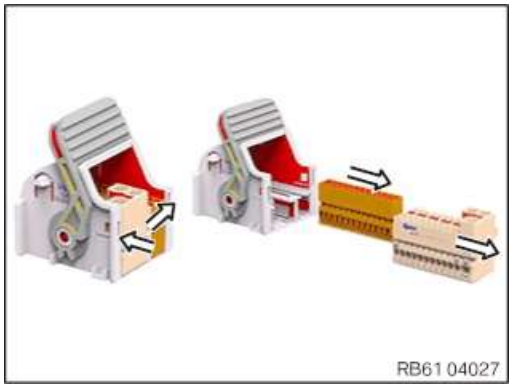


24.

Press in locking lever at both sides until the lever is unlocked and can be moved.

Move lever upwards until it latches into place in the end position.

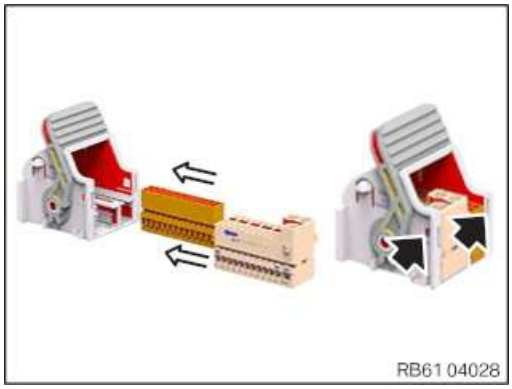
Once the lever is locked in the end position, remove plug connection upwards.



Unlock socket housing by lifting up each of the locking tabs.

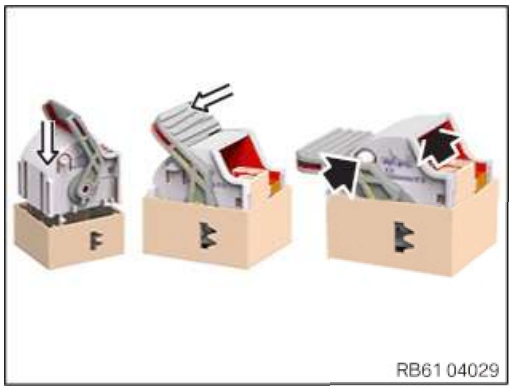
Slide out after unlocking the socket housing.

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Slide in socket housing up to limit position.

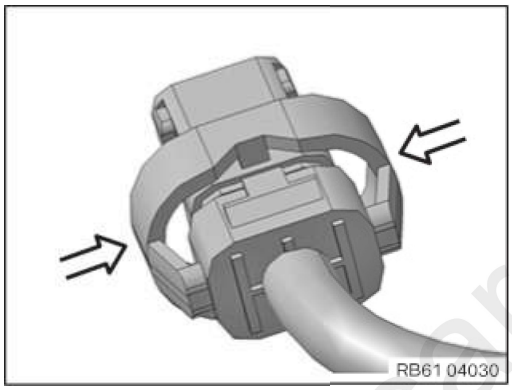
Lock socket housing into place in end position.



Sliding in up to limit position.

Activate plug-inn procedure by moving lever downwards.

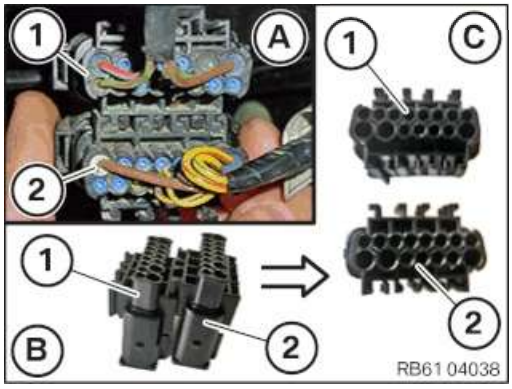
IMPORTANT: the latch mechanism on both sides only works for a completed plug-in procedure.



25.

Rosenberger D4S20G-400A5-Y

Press to unlock on both sides.

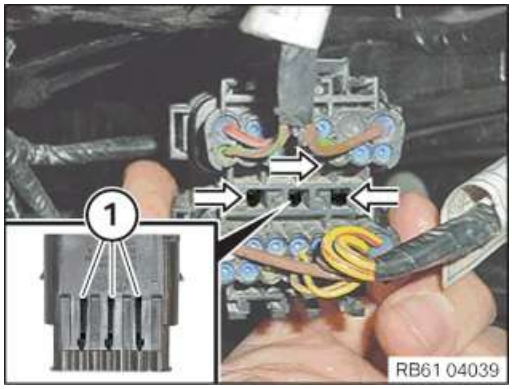


26.

Pin housing, 15-pinMLK1

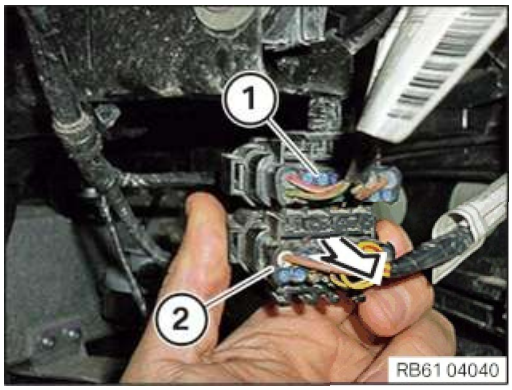
- A & B. To avoid any damage to individual connectors, the given connector assembly consisting of several individual connectors (1) & (2) must be released before disconnecting the plug connection.
- C: released connector assembly

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Disconnecting connector assembly:

Release retaining hooks (1) in direction of arrow (detail image shows retaining hooks of individual connector).



Release connector (2) in direction of arrow from connector (1).

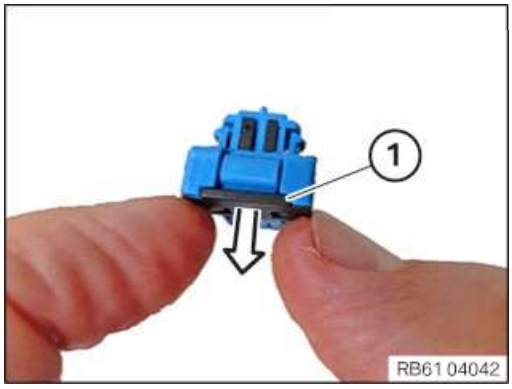


27.

Airbag ignition circuit connector

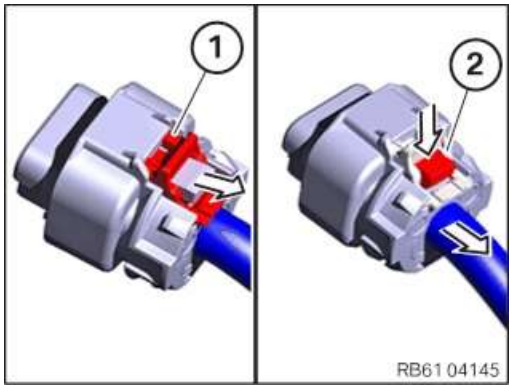
Warning!

Note the safety information for working on vehicles with airbag systems prior to disconnecting the plug connection.



Pull the cap (1) in the direction of the arrow to unlock

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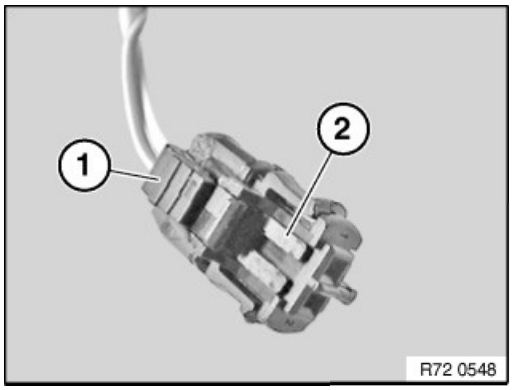


28.

Connector e.g. on front and rear lighting unit

Open safety catch (1) in direction of arrow using appropriate tool.

Push safety catch (2) in direction of arrow and disconnect plug connection.



29.

Plug, e.g. in airbag ignition circuits

Press the lock (1) and pull out the connector (2) up to initial engagement position.

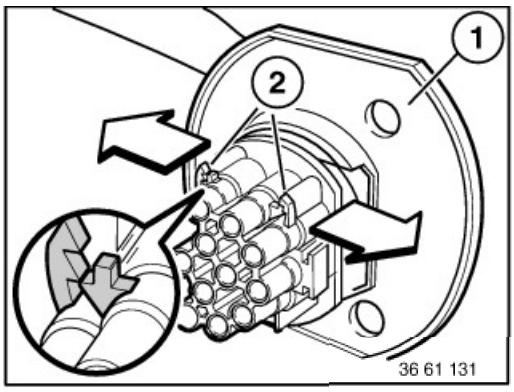
Pull off connector (2).

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61 13 ... Circular connector, 13-pin, system D2.5

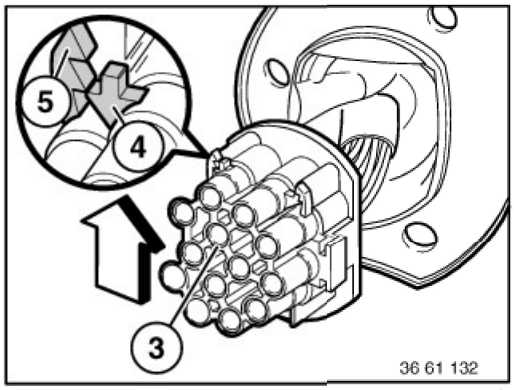
Special tools required:

- 61 0 303

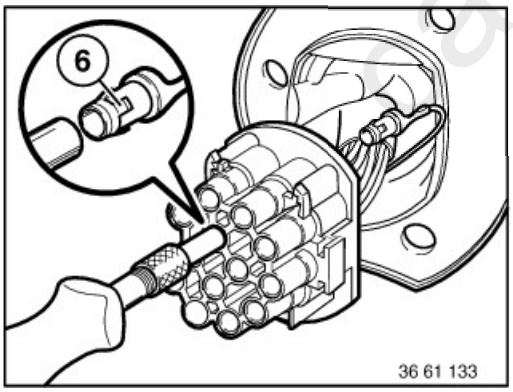


Pull off rubber grommet (1).

Carefully pull out lock (2) in direction of arrow.



Move lower section of connector (3) in direction of arrow until retaining lugs (4) snap into release groove (5).



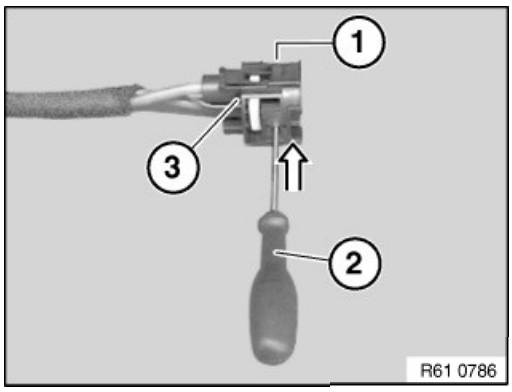
With special tool 61 0 303 , press down retaining lugs (6) of corresponding contact and pull out cable.

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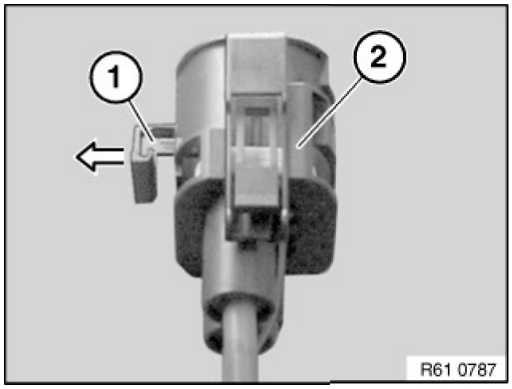
61 13 ... Connector housing, LCC contact (load current contact)

Special tools required:

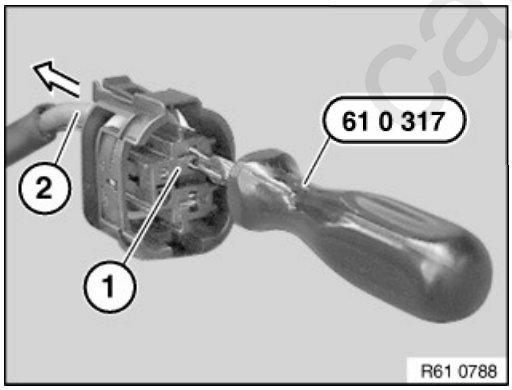
- 61 0 317



Socket housing:
Press lock (1) with suitable tool (2) in direction of arrow out of socket housing (3).

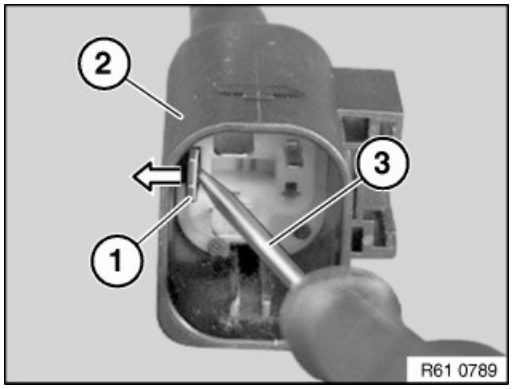


Pull lock (1) out of socket housing (2).

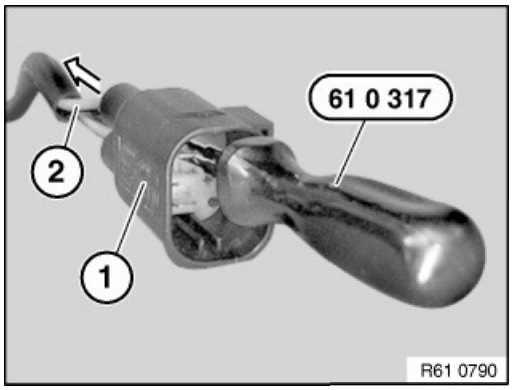


Insert special tool 61 0 317 into socket housing (1) and pull out wiring with LCC contact (2) in direction of arrow.

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Pin housing:
Unlock locking slide (1) of pin housing (2) with suitable tool (3) in direction of arrow.



Insert special tool 61 0 317 into pin housing (1) and pull out wiring with LCC contact (2) in direction of arrow.

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61 13 ... Crimping annular contacts



Special tools required:

- 61 4 320



Crimping annular contacts:

Special tool61 4 320

Handling:

Refer to Service Information:

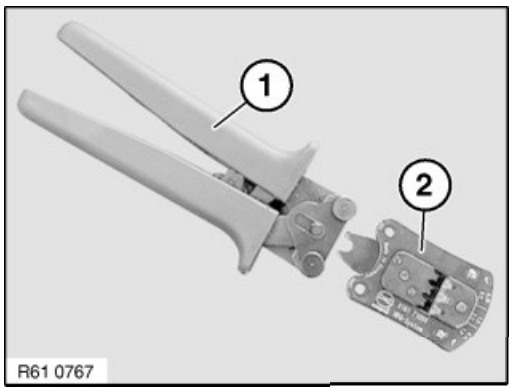
- SI 2 04 06 2939

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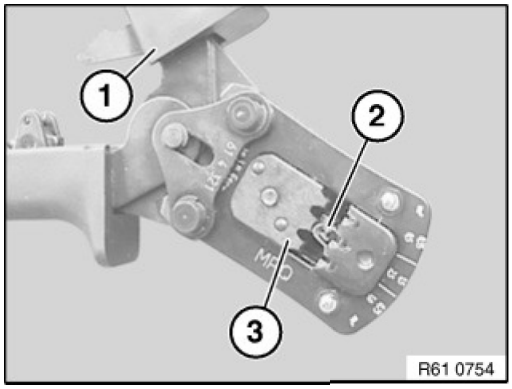
61 13 ... Crimping Micro Power Quadlock contacts (MPQ)

Special tools required:

- 61 4 320



To crimp MPQ contacts, use hand pliers 61 4 321 (1) in conjunction with crimping head 61 4 325 (2) from crimping set 61 4 320 .*Note:*
Hand pliers (1) open automatically until limit position when handles are pressed together.

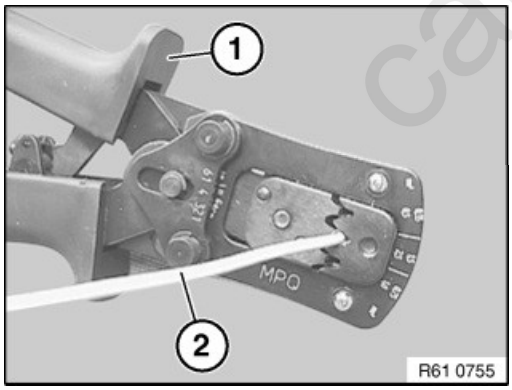


Open hand pliers (1).

Note:
Place contact (2) with utmost care in designated nest (observe line cross-section) in crimping head (3). Make sure it is exactly positioned.

Place MPQ contact (2) in crimping head (3).

Close hand pliers (1) one notch.



Note:
Follow procedure for cutting and stripping insulation from cables.

Insert stripped cable (2).

Close hand pliers (1) fully.

Open hand pliers (1) and remove cable (2).

Important!

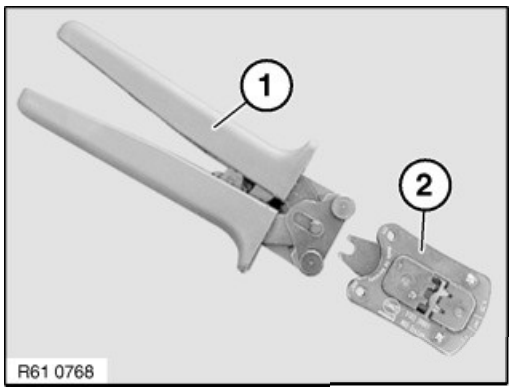
Check contact for correct crimping.

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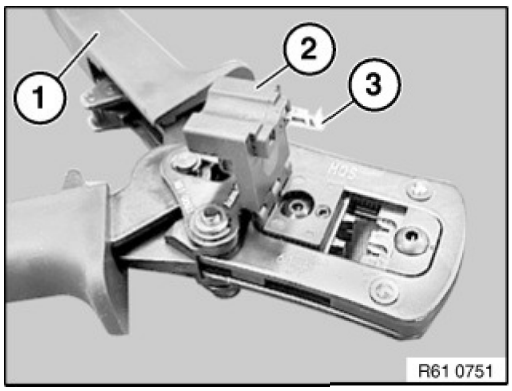
61 13 ... Crimping Micro Quadlock System contacts (MQS)

Special tools required:

- 61 4 320



To crimp MPQ contacts, use hand pliers 61 4 321 (1) in conjunction with crimping head 61 4 324 (2) from crimping set 61 4 320 .*Note:*
Hand pliers (1) open automatically until limit position when handles are pressed together.

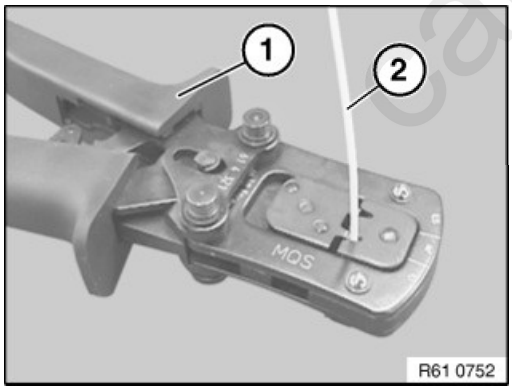


Open hand pliers (1).

Fold up contact carrier (2).

Insert MQS contact (3) in contact carrier (2).

Fold back contact carrier (2).



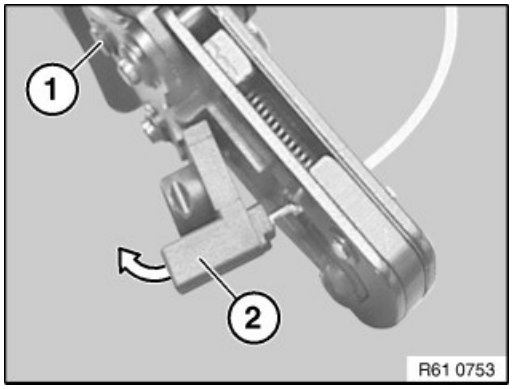
Note:
Follow procedure for cutting and stripping insulation from cables.

Close hand pliers (1) one notch.

Insert stripped cable (2).

Close hand pliers (1) fully.

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Open hand pliers (1).

Open contact carrier (2) gently and carefully remove MQS contact.

Important!

Check contact for correct crimping.

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61 13 ... Crimping stop parts

Special tools required:

- 12 1 080
- 12 1 081
- 12 1 083

Spare parts for in-car electronics (housing and contacts):

Refer to Service Information:

SI 2 04 07 341

1. Crimping butt connectors and contact sleeves for comb connectors up to 2.5 mm

Refer to Service Information:

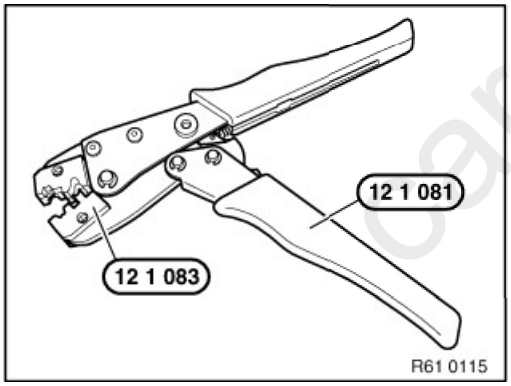
SI 2 04 06 293

2. Crimping butt connectors and contact sleeves for comb connectors larger than 2.5 mm ^{2}

Refer to Service Information:

SI 2 02 05 194

SI 2 07 05 233

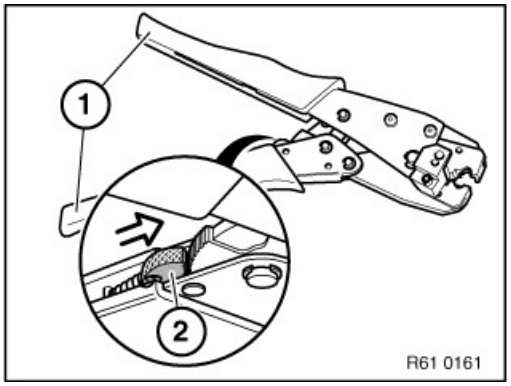


3. Crimping contact sleeves for 4 mm^2 comb connectors and ignition cable contacts

Use special tool kit 12 1 080 to attach ignition cable contacts and crimp 4 mm^2 contact sleeves for comb connectors.

- 12 1 081 (hand pliers)
- 12 1 083 (nest)

See repair instructions
Special tools for wiring harness repairs.



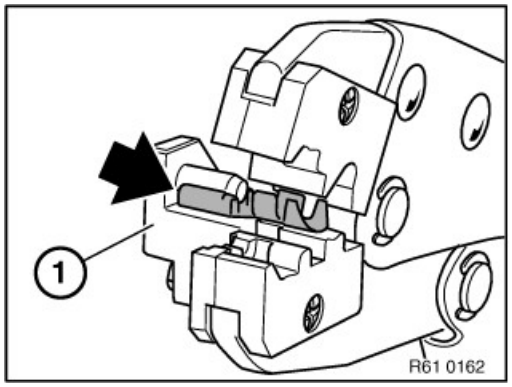
Release special tool 12 1 081 :

Squeeze grips (1) lightly and push release lever (2) in direction of arrow.

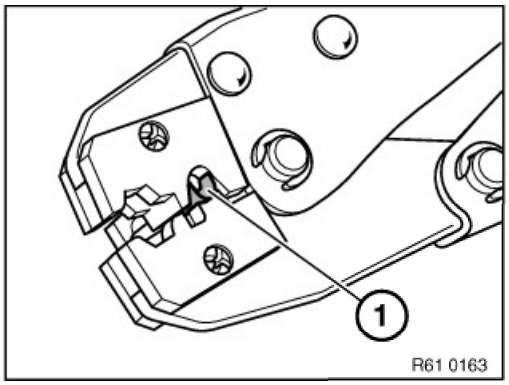
Or:

Compress handles until limit position, hand pliers unlock automatically.

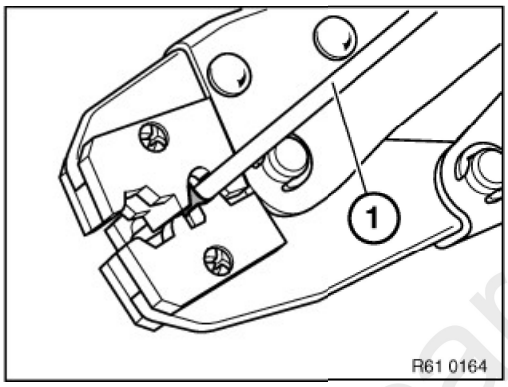
cardiagn.com



Place 4 mm² contact sleeve in nest with anti-twist safeguard (1) as far as possible.



Preload contact by squeezing matrix in crimping tool. Grip contact (1) firmly only, do not crimp.



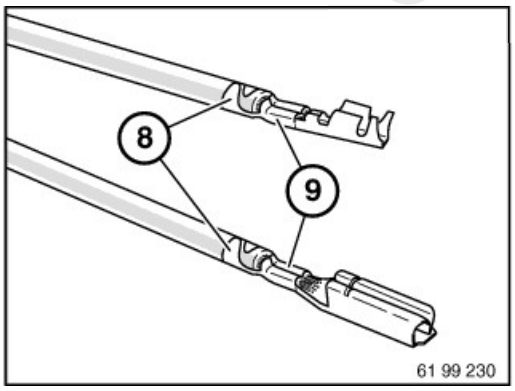
Note:
Follow procedure for cutting and stripping insulation from cables.

Insert stripped end of wire (7) in the contact. Ensure insulation and stripped wire end are correctly laid in contact.

Compress crimping tool to limit position.

Crimping tool unlocks automatically.

Take contact out of crimping tool.

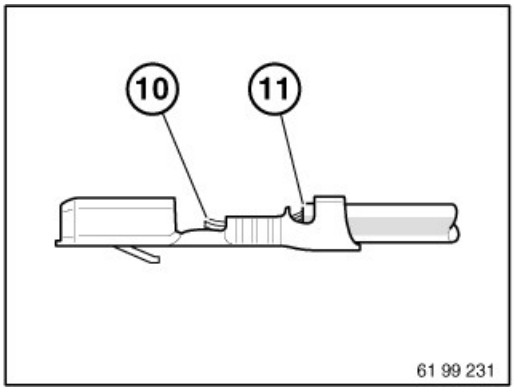


4. Checking crimping

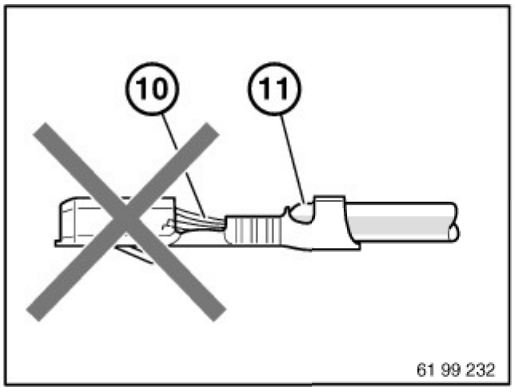
Check insulation crimping (8) and wire crimp (9) against following illustrations to ensure crimps are correctly located.

Note:
Illustration shows butt connectors and contact sleeves for comb connectors knocked on one side. The crimping procedure is identical here.

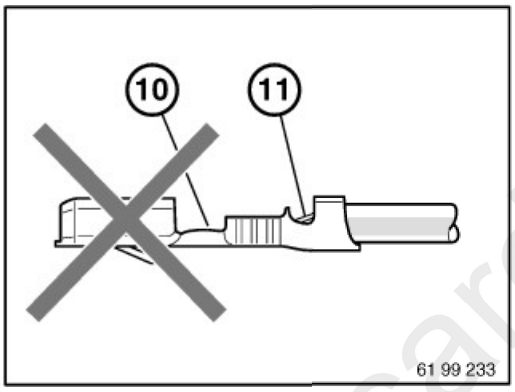
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Correct crimping:
Visible conductor end (10).
Visible insulation end (11).



Incorrect crimping:
Conductor end (10) inserted too far.
Insulation end (11) in wire crimp.
If necessary, repeat crimping with a new contact.



Incorrect crimping:
Conductor end (10) not visible.
Insulation end (11) not visible.
If necessary, repeat crimping with a new contact.

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61 11 ... Cutting to length and stripping insulation from cables



Special tools required:

- 0 494 159
- 0 496 849
- 0 496 833
- 2 407 379
- 61 4 320
- 61 4 340
- 61 4 328
- 61 0 210
- 61 0 220
- 61 0 230



New parts for vehicle electrical system (stops, housing):

- Sourcing reference: BMW Group Parts



For cutting cables to length and stripping insulation, refer to Service Information.

Stripped length:

Wire cross-section (mm^2)	Stripped length (mm)
0,35 ... 0,50	4,0
0,75 ... 1,00	4.5
1,00 ... 2,50	5,0



Crimping on NanoMQS stop parts

Crimping of NanoMQS contacts (MQS).

- Special tool handle 0 494 159 or 0 496 849
- Special tool (die-plate) 0 496 833
- Stripping tool2 407 379

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2. Crimping of stops up to 2.5 mm

Crimping Micro Quadlock System contacts (MQS).

- Special tool61 4 320

Crimping Micro Power Quadlock contacts (MPQ).

- Special tool61 4 320

Crimping miscellaneous stop parts up to 2.5 mm^2

- Special tool 61 4 340 (up to 03/2010 special tool 61 4 328)
- Refer to Service Information bulletin

Crimping of stops above 2.5 mm^2

Crimping load current contacts (LSK 8).

- Special tool61 0 210

Crimping load current contact 2.8.

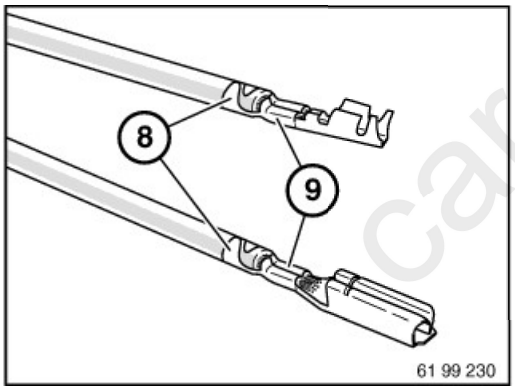
- Special tool61 0 220

Refer to Service Information SI 2 02 05 194

Crimping double spring contact (DFK 40)

Crimping MAK 8

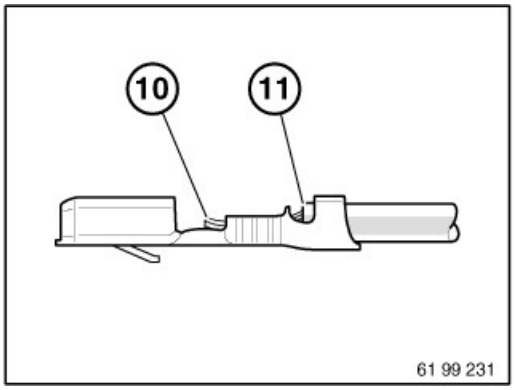
- Special tool61 0 230
- Refer to Service Information bulletin



Checking crimping

Check insulation crimping (8) and wire crimp (9) against following illustrations to ensure crimps are correctly located.

Note:
Illustration shows butt connectors and contact sleeves for comb connectors knocked on one side. The crimping procedure is identical here.

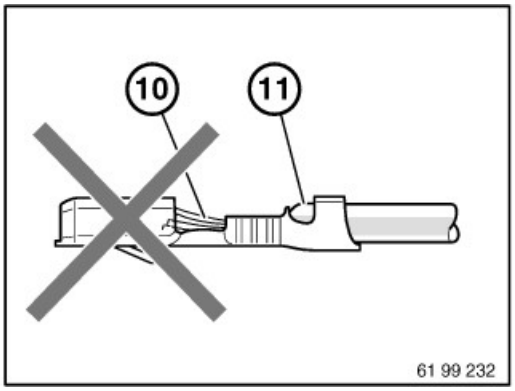


Correct crimping:

Visible conductor end (10).

Visible insulation end (11).

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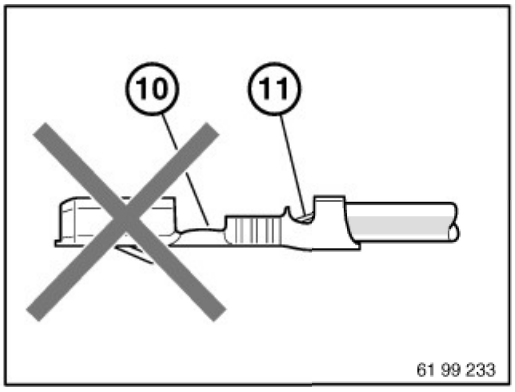


Incorrect crimping:

Conductor end (10) inserted too far.

Insulation end (11) in wire crimp.

If necessary, repeat crimping with a new contact.



Incorrect crimping:

Conductor end (10) not visible.

Insulation end (11) not visible.

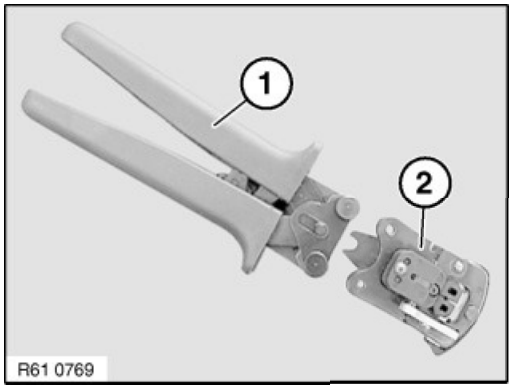
If necessary, repeat crimping with a new contact.

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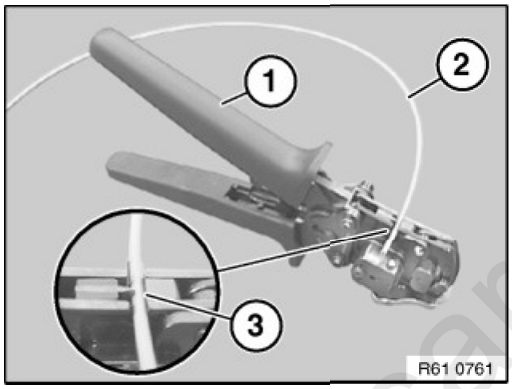
61 13 ... Cutting, strip insulation and crimping optical fibres

Special tools required:

- 61 4 321
- 61 4 329
- 61 4 320
- 61 4 323



The hand pliers 61 4 321 (1) in connection with the crimping head 61 4 329 (2) from crimp kit 61 4 320 are used for cutting, strip insulation and cutting optical fibres to size.*Note:*
Hand pliers (1) open automatically until limit position when handles are pressed together.

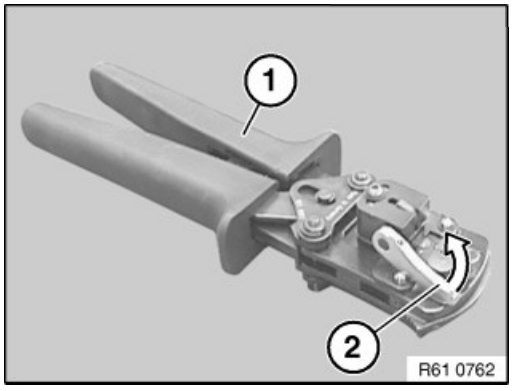


Cutting optical fibre

Open hand pliers (1).

Place optical fibre (2) in cutting device (3).

Close pliers (1) and remove optical fibre (2).

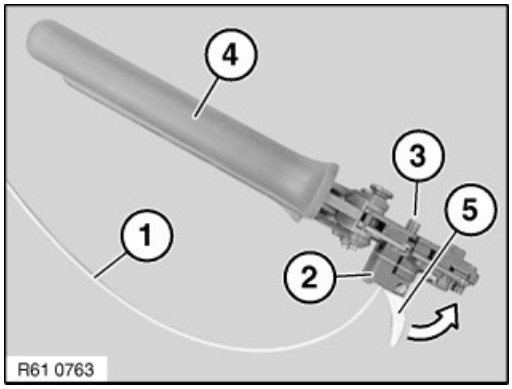


Stripping insulation from optical fibre

Open hand pliers (1).

Open lever (2) in direction of arrow.

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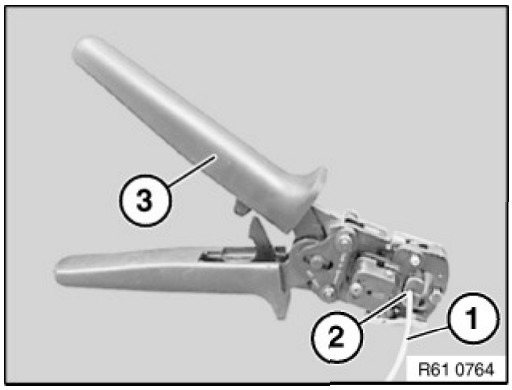
Push the optical fibre (1) into the strip insulation equipment (2) until it is flush in this area (3).

Close hand pliers (4) fully.

Close the operating lever (5) in the direction of the arrow.

Open hand pliers (4) by one tooth notch.

Re-open the operating lever (5) against the direction of the arrow and remove the optical fibre (1).



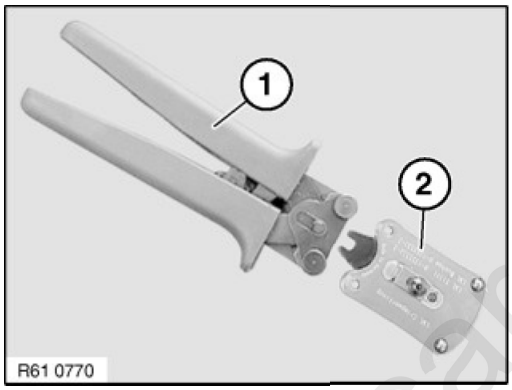
Cutting optical fibre to length

Open hand pliers (3).

Push the optical fibre (1) into the cutting equipment (2) until the insulation of the optical fibre (1) comes into contact with the clamping fixture.

Close hand pliers (3) fully and keep closed.

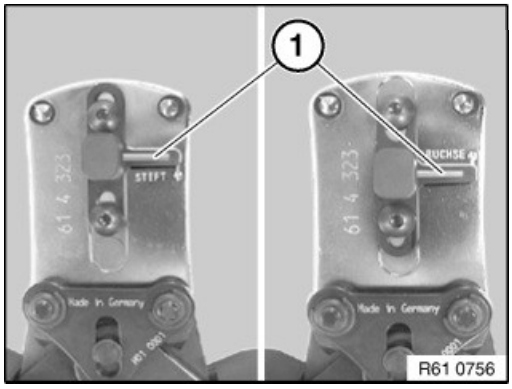
Remove optical fibre (1).



Crimp optical fibre

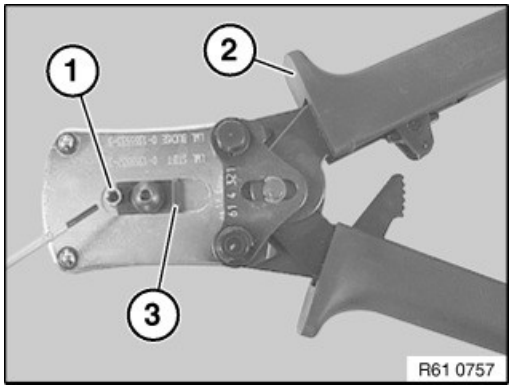
The hand pliers 61 4 321 (1) in connection with the crimping head 61 4 323 (2) from crimping kit 61 4 320 are used for crimping the optical fibres to size.

Note:
Hand pliers (1) open automatically until limit position when handles are pressed together.



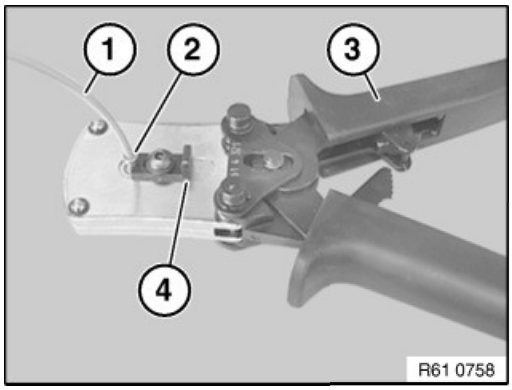
Move contact guide by means of stop lever (1) into corresponding position (pin contact or jack).

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Open hand pliers (2).

Place pin contact or jack (1) in crimping head and secure with locking lever (3).

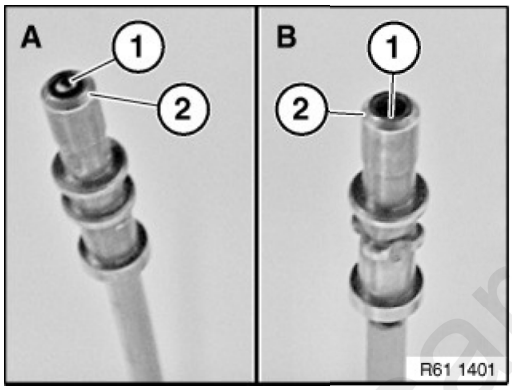


Insert stripped optical fibre(1) until limit position into pin contact or jack (2).

Close hand pliers (3) fully.

Open hand pliers (3) and locking lever (4).

Remove optical fibre (1).



Caution!

Make sure optical fibre is correctly seated in jack.

Right (A)

End of optical fibre (1) must be flush with tip of pin contact (2).

Wrong (B)

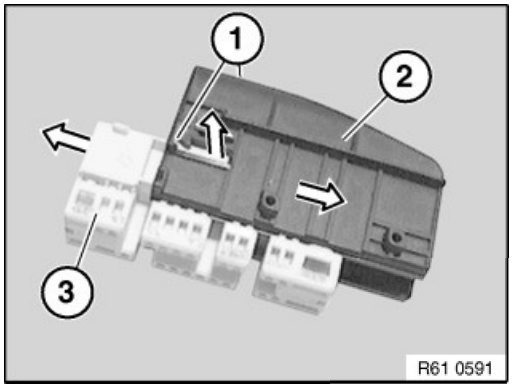
End of optical fibre (1) is not flush with tip of pin contact (2).

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61 13 ... In-line connectors, 24-/44-pin, Hybrid System MQS/MPQ

Manufactured by AMP: The following contact types without strand sealing can be fitted in the connector housings:

- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)

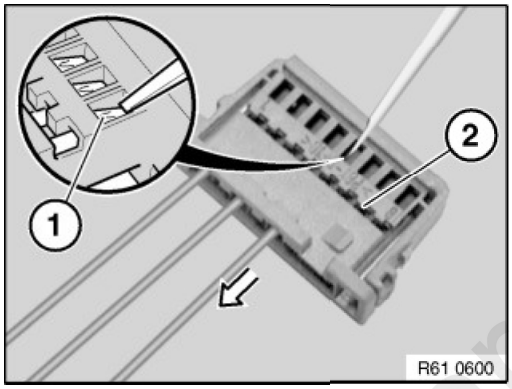


Socket housing:

Press locks (1) on protective cap (2) upwards on both sides.

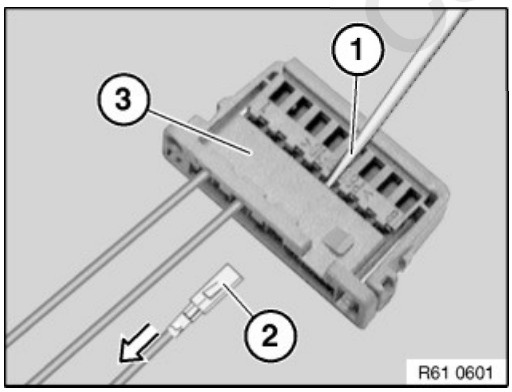
Detach protective cap from contact carrier (3).

Note:
Detaching the protective cap releases the secondary locks of the socket contacts.



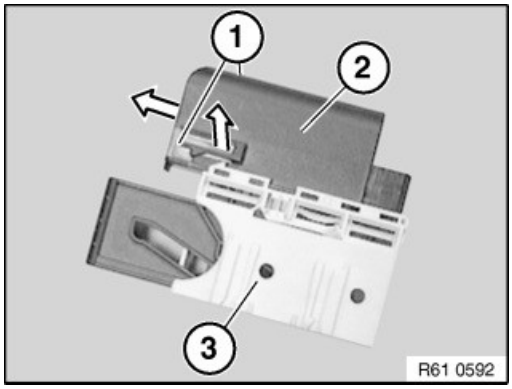
Hold down retaining hook (1) of socket contact in opening of contact carrier with a small screwdriver.

Pull wire with socket contact in direction of arrow as far as secondary lock (2).



Hold down retaining hook in secondary lock (1) again and pull cable with socket contact (2) completely out of contact carrier (3).

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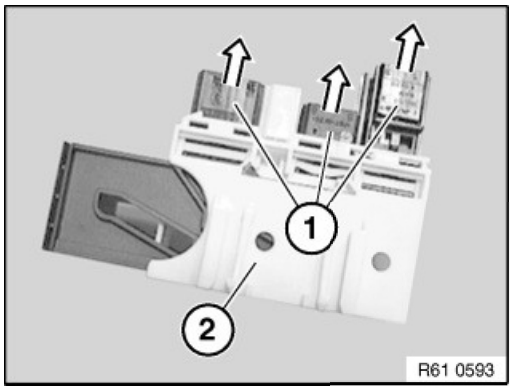


Pin housing:

Press locks (1) on protective cap (2) upwards on both sides.

Detach protective cap from housing carrier (3).

Note:
Detaching the protective cap releases the secondary locks of the pin contacts in the contact carriers.



Pull contact carrier (1) out of housing carrier (2).

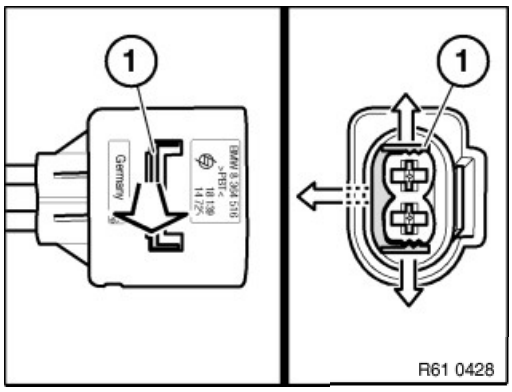
The pin contacts are pulled out of a contact carrier as described under ”Socket housing”.

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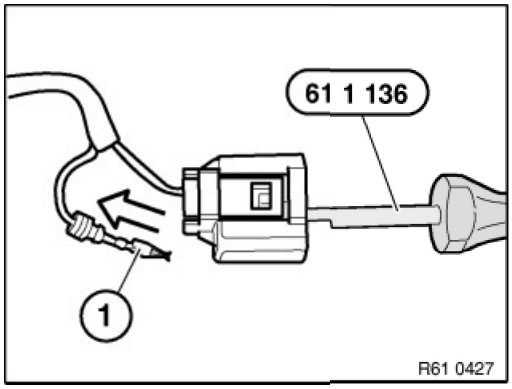
61 13 ... In-line plugs, 2-pin, System MDK 3 plus 2.8

Special tools required:

- 61 0 316



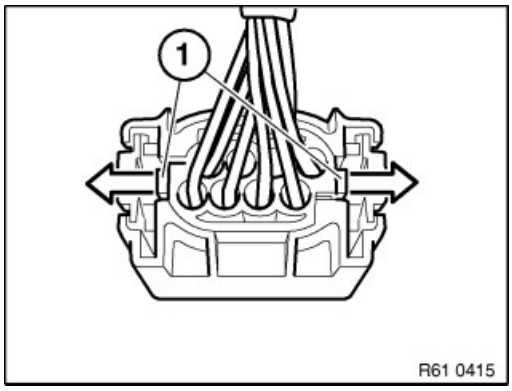
Unlock lock (1) on outside at retaining hook and slide out lock (1) to side.



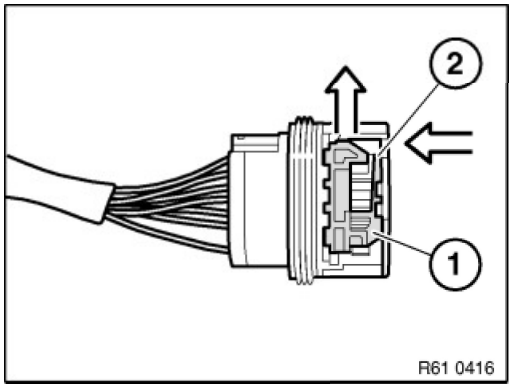
With special tool 61 0 316 (61 1 136), unlock contact and pull out cable with contact (1) towards rear.

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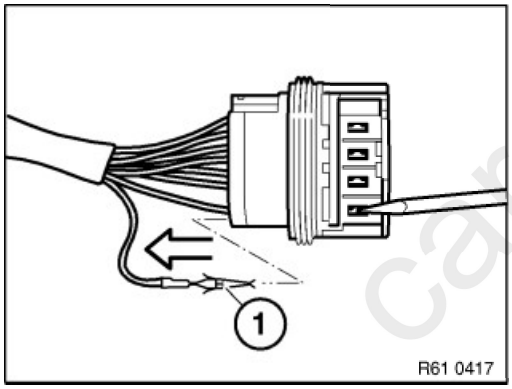
61 13 ... Inline connectors, 6-, 8-pin, System MQS



Press lock (1) in direction of arrow and slide connector forward.



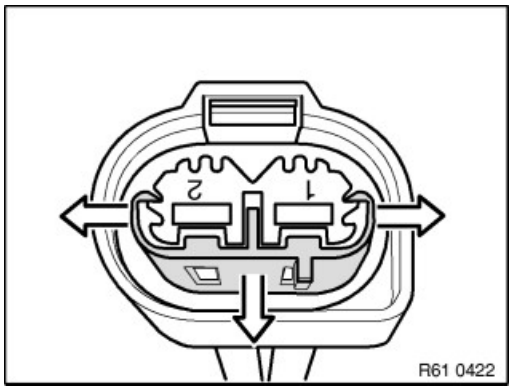
Press locking hook (2) downward and slide lock (1) out.



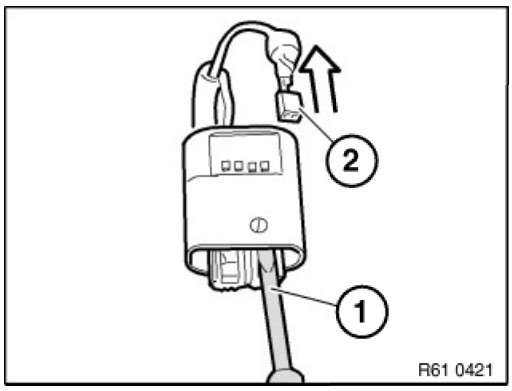
Press down retaining hook (1) with screwdriver and pull out cable with contact towards rear.

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61 13 ... Inline plugs, 2-pin, System MPQ 2.8



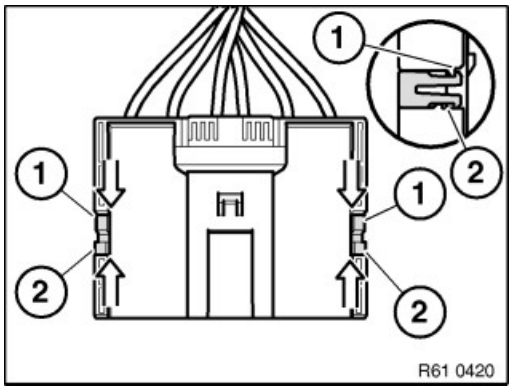
Press catch on outside in direction of arrow and remove towards top.



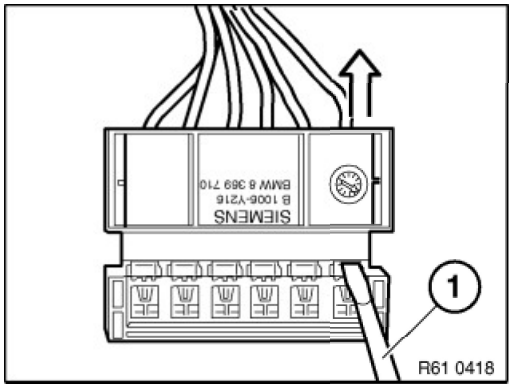
Press down retaining hook (1) with screwdriver and pull out cable and contact (2) towards rear.

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61 13 ... Inline plugs, 3-, 6-pin, System Elo-Power 2.8



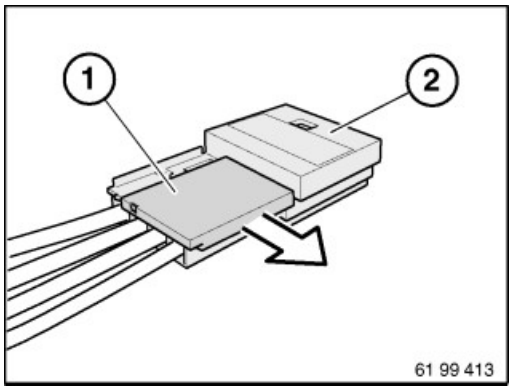
Press locking hook (1) in direction of arrow and disengage. Then unlock locking hook (2) and remove lock.



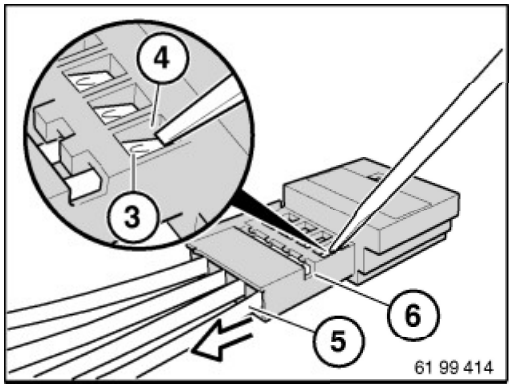
Press down retaining hook with screwdriver (1) and pull out cable with contact towards rear.

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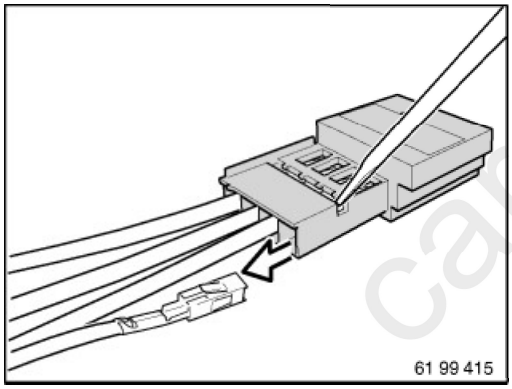
61 13 ... Inline plugs, 4-, 10-pin, System Elo



Detach fastener (1) from contact carrier (2).



Hold down retaining hook (3) of defective contact and pull cable and contact up to secondary lock (6).



Hold down retaining hook once again in secondary lock and pull cable and contact completely out of contact carrier.

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61 00 ... Notes on handling optical fibres



Important!

To avoid damage when handling optical fibres, comply with the following points:

- The minimum permitted bending radius is 25 mm
- Do not subject optical fibres to compressive and tensile load
- Protect optical fibres against the effects of heat ≥85 °C (e.g. during welding work, drying work with infrared beams or hot air blower)
- Fibre-optic cables are permitted to show only one junction point (bridge), replace fibre-optic cables if necessary



Note:
The optical fibres are coloured differently as follows:

- Green = **MOST** (**M**edia **O**riented **S**ystems **T**ransport) optical fibre
- Yellow = **ISIS** (**I**ntelligent **S**afety and **I**ntegration **S**ystem) optical fibre
- Orange=repair fibre-optic cables

Follow notes for processing cables and optical fibres.

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61 00 ... Notes on handling wiring harnesses and cables



The following applies in general:

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- To ensure professional repairs, perform repair work only with BMW-approved or recommended special tools and spare parts
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies:

Shielded lines

Interference radiation and interference resistance can lead to neutral zones at contact points in the shielding. Consequently, distinctions have to be drawn between the following types:

Coaxial lines

- Shielded coaxial cables RTK031 may only be repaired with a special crimping tool.
- For aerial lines only the bushing contact may be repaired.
- RG174 Lines and the bushing contact may not be repaired.

CVBS lines

- CVBS cables may not be repaired.
- CVBS cables must be replaced in their entirety.

HSD lines

- HSD cables may not be repaired.
- HSD cables must be replaced in their entirety.

Optical fibre cable:

Note:
Fibre-optic cables are coloured differently as follows:

- Green = **MOST** (**M**edia **O**riented **S**ystems **T**ransport) optical fibres
- Yellow = **ISIS** (**I**ntelligent **S**afety and **I**ntegration **S**ystem) optical fibres
- Orange=repair fibre-optic cables

Attention!

- Optical fibres are permitted to show only one junction point (bridge). Replace optical fibres if necessary
- Smallest permissible bending radius is 25 mm
- Avoid effects of heat ≥ 85 °

Treating cables and fibre-optic cables

FlexRay (twisted cables):

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional butt connectors and heat-shrink tubing.

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Note:

- FlexRay lines may only reveal one separation point (bride); renew complete line if necessary.
- If possible, maintain twisted cable after repair.
- After repairs, twist cables as close as possible to the connector/separation point.
- Twisting must be as symmetrical as possible.

Airbag lines:

Repairing airbag cables

Ribbon cables:

Repairing ribbon cables

Replacing wiring harnesses

Repair wiring harnesses mainly cover the full equipment of the vehicle. If certain optional equipment is not installed in the vehicle, note the following:

- If necessary, secure the remaining connectors.
- If necessary, seal the remaining connectors outside the vehicle interior, for example, with butyl tape in such a way that moisture ingress can be eliminated permanently.
- If necessary, repin the connector of the repair wiring harness.

Note:
Repair wiring harnesses can be equipped with an **additional socket housing** (30-pin, for example), **which was not provided on the previous vehicle-side wiring harness**. This socket housing also cannot be found in the wiring diagram.

Procedure

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **in the vehicle interior** (in the footwell, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.
- Alternatively, a suitable pin housing can be fitted on the vehicle-side wiring harness and connected to the additional socket housing.

  However, this is permitted only if the following conditions are met:

  - Carpets must not protrude visibly or become deformed due to the installation of the additional plug connection.
  - It must be possible to install the adjacent components (for example, trims, trim panels, etc.) correctly after installing the additional plug connection.
  - All the attachment points of the adjacent components (for example, trims, trim panels, etc.) must engage correctly.
  - There must be no rattling noise due to the installation of the additional plug connection.
  - The additional plug connection must not damage the adjacent components/wiring harnesses, etc..

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **outside the vehicle interior** (in the

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wheel arch, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.
- **Using the additional socket housing is not permitted with a separation point outside the vehicle interior.**

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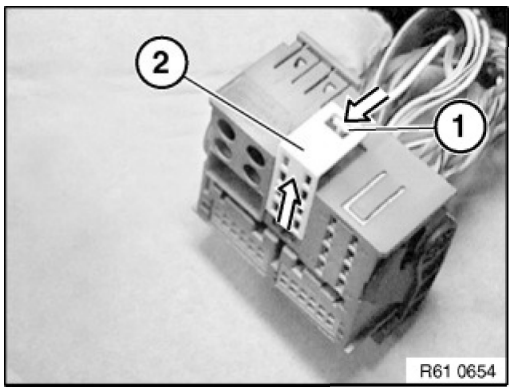
61 13 ... Socket housing (radio connector), Hybrid System MQS/MPQ

Special tools required:

- 61 0 314

Manufactured by AMP: The following contact types without strand sealing can be fitted in the connector housings:

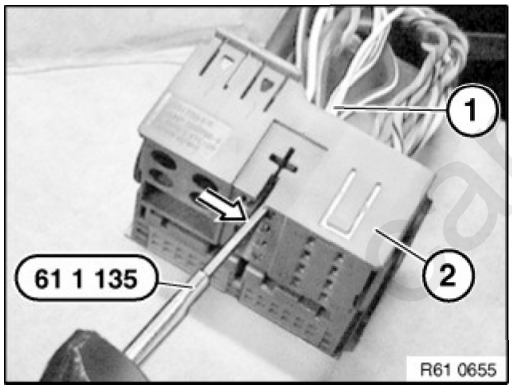
- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)



Removing MPQ contacts from radio connector:

Press lock (1) in direction of arrow.

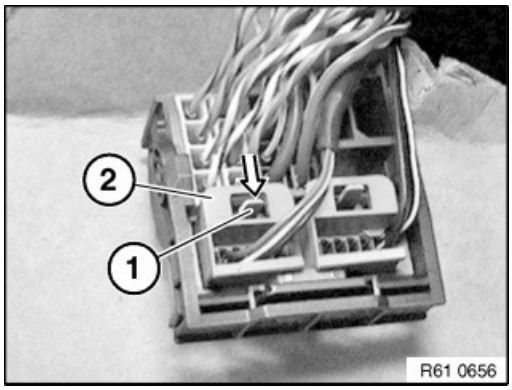
Detach secondary lock (2) from radio plug.



Feed special tool 61 0 314 (61 1 135) past side of contact.

Press special tool 61 0 314 (61 1 135) in direction of arrow.

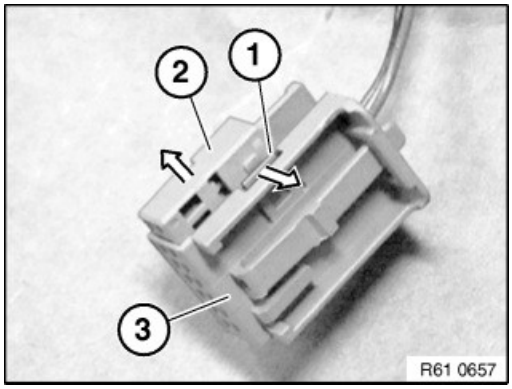
Pull wire (1) with socket contact out of radio connector (2).



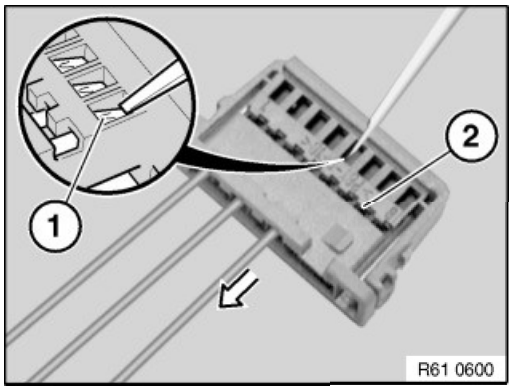
Removing MQS contacts from contact carrier:

Press lock (1) in direction of arrow and pull housing (2) out of radio connector.

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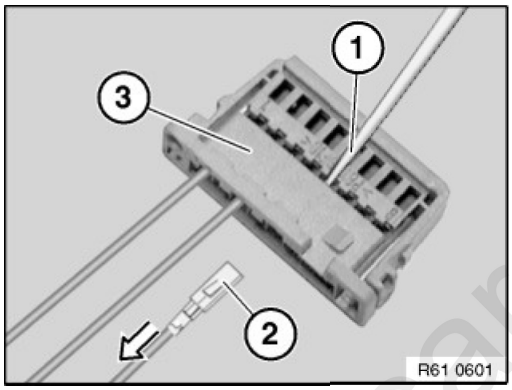
Press lock (1) in direction of arrow. Pull contact carrier (2) out of housing (3).*Note:*
When the contact carrier is pulled out, the secondary locks of the socket contacts are raised.



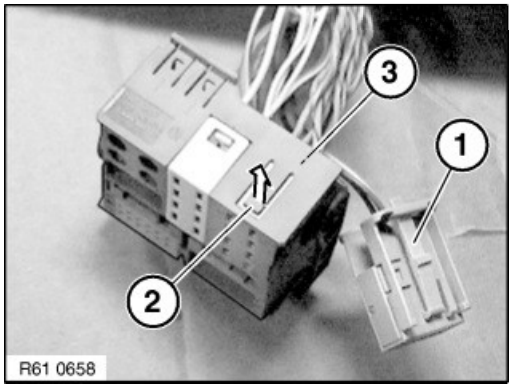
Note:
Schematic diagram shows the 8-pin socket housing by way of example.

Hold down retaining hook (1) of socket contact in opening of contact carrier with a small screwdriver.

Pull wire with socket contact in direction of arrow as far as secondary lock (2).



Hold down retaining hook in secondary lock (1) again. Pull wire with socket contact (2) out of contact carrier (3).



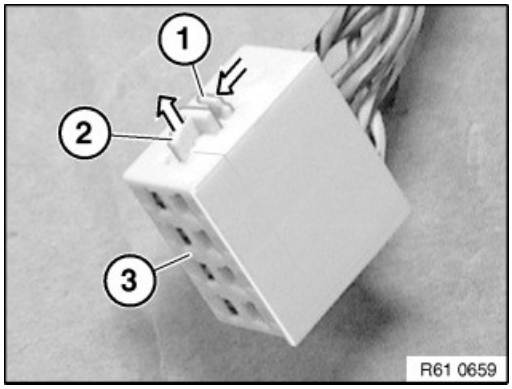
Removing MPQ contacts from contact carrier:

Remove contact carrier (1) with MQS contacts from radio connector.

Raise lock (2) on radio connector.

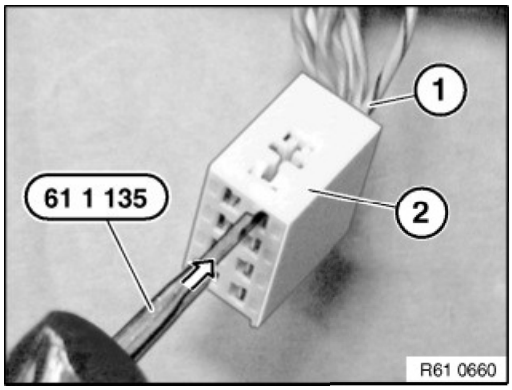
Pull contact carrier (3) out of radio connector.

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Press lock (1) in direction of arrow.

Pull secondary lock (2) in direction of arrow completely out of contact carrier (3).



Press special tool 61 0 314 (61 1 135) on inside of contact into contact carrier (2).

Pull wire with socket contact (1) out of contact carrier (2).

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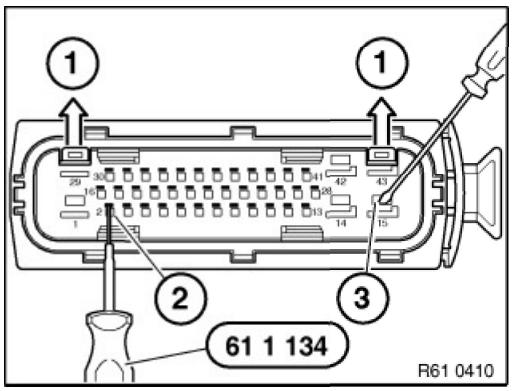
61 13 ... Socket housing 42-, 43-, 46-pin, Hybrid System MQS / MPQ

Special tools required:

- 61 0 312

Manufactured by AMP: The following contact types without strand sealing can be fitted in the socket housings:

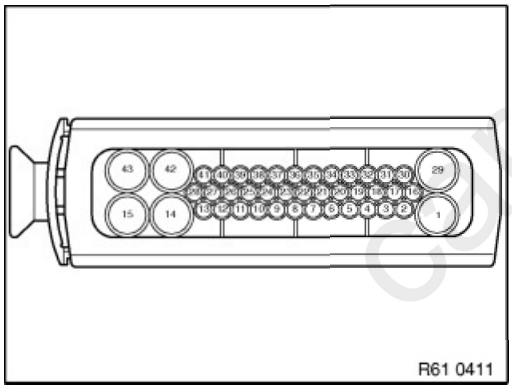
- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)



Open secondary locks (1) on socket housing.

Press back retaining hook of MQS contacts (2) with special tool 61 0 312 61 1 134 and pull out cable with contact.

Press back retaining hook of MPQ contacts (3) with screwdriver and pull out cable with contact.



Installation note:
Bend open retaining hook of contacts gently before inserting into connector housing.

For installation of contacts, observe chamber numbers on reverse side of socket housing.

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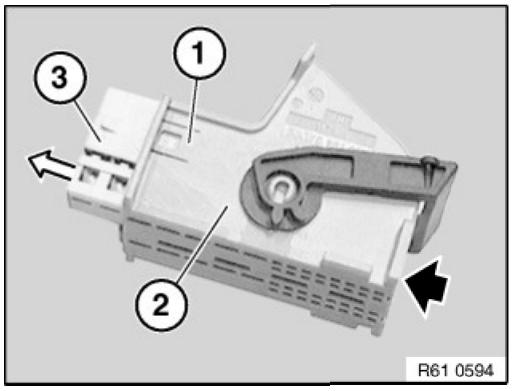
61 13 ... Socket housings, 2x21-, 2x27-pin, Hybrid Systems MQS/MPQ, Elo/Elo Power

Manufactured by AMP: The following contact types without strand sealing can be fitted in the socket housings:

- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)

Manufactured by Siemens: The following contact types without strand sealing can be fitted in the socket housings:

- Elo (electrical contact)
- Elo Power 2.8 mm width (electrical contact for heavy loads)
- Elo Power 5.2 mm width (electrical contact for heavy loads)

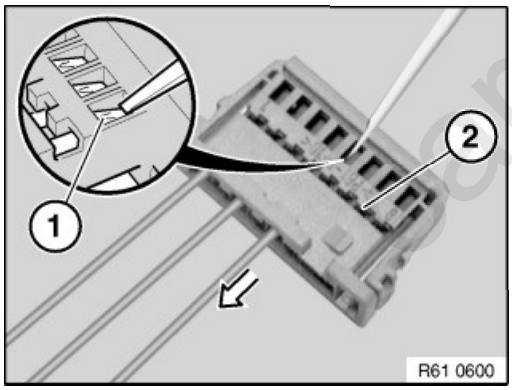


Raise lock (1) on housing (2).

Push contact carrier (3) from rear out of housing.

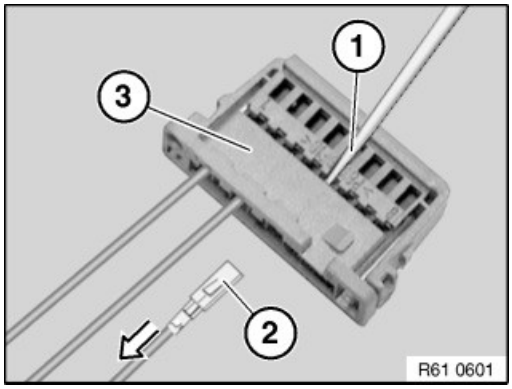
Note:
The second contact carrier is pushed out in the same way.

Pushing out the contact carrier releases the secondary locks of the socket contacts.



Hold down retaining hook (1) of socket contact in opening of contact carrier with a small screwdriver.

Pull wire with socket contact in direction of arrow as far as secondary lock (2).



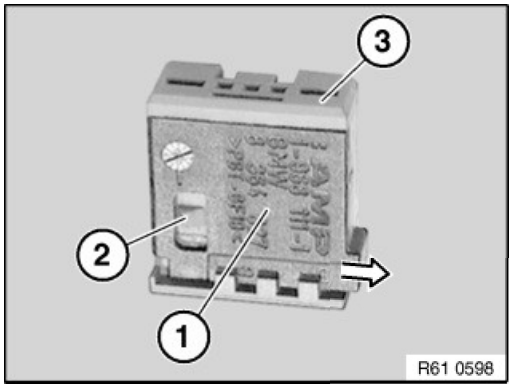
Hold down retaining hook in secondary lock (1) again and pull cable with socket contact (2) completely out of contact carrier (3).

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61 13 ... Socket housings, 5-pin, 8-pin, System MQS/MPQ

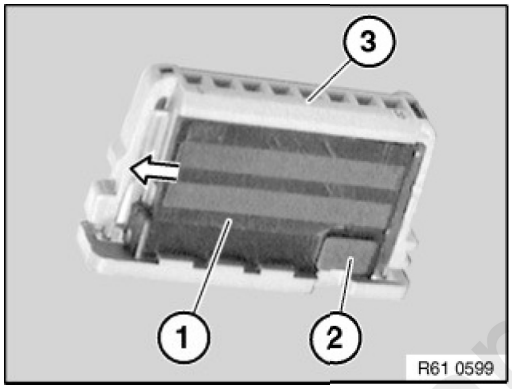
Manufactured by AMP: The following contact types without strand sealing can be fitted in the connector housings:

- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)



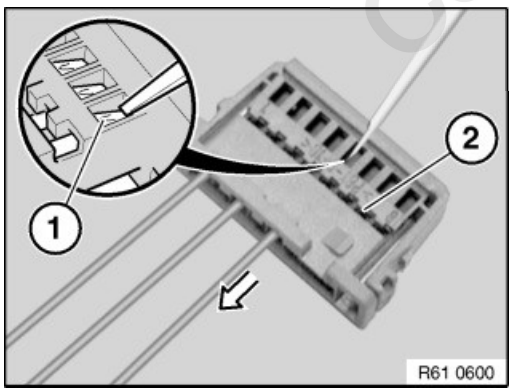
Socket housing, 5-pin (Hybrid System MQS/MPQ)

Raise fastener (1) over retaining lug (2) and pull off from contact carrier (3).



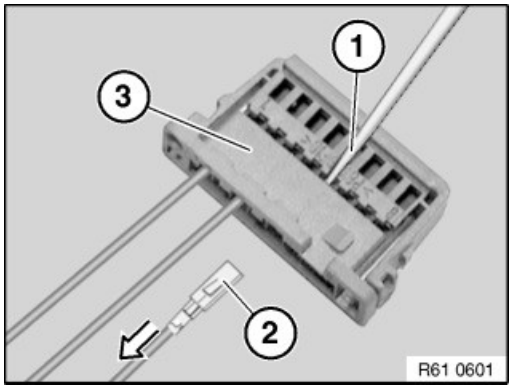
Socket housing, 8-pin (MQS):

Raise fastener (1) over retaining lug (2) and pull off from contact carrier (3).



Hold down retaining hook (1) of contact and pull cable with contact as far as secondary lock (2).

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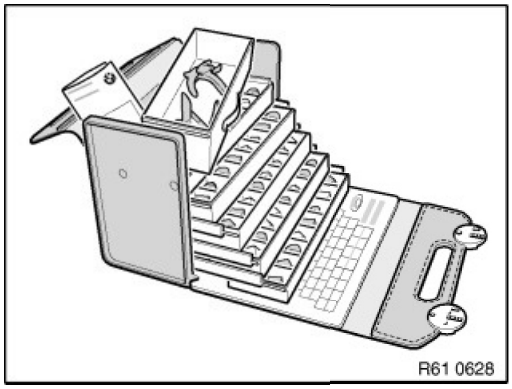
Hold down retaining hook in secondary lock (1) again and pull cable with contact (2) completely out of contact carrier (3).

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61 13 ... Special tools for wiring harness repairs

Special tools required:

- 61 0 300
- 61 0 400
- 61 1 100
- 61 4 320
- 61 0 200
- 61 0 210
- 61 0 220
- 61 0 230
- 61 0 240



Repair range, vehicle electrical system:

Single parts for wiring harness repairs*

* Sourcing reference: BMW Parts Department

Note:

- Refer to Service Information:
  SI 2 04 07 341



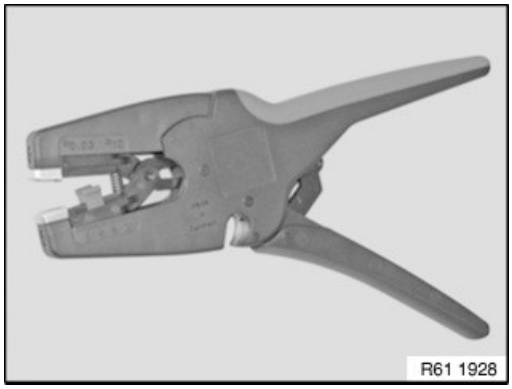
Release and press-out tool:

- Special tool61 0 300
- Special tool 61 0 400 (MINI N12/N14)
- Special tool 61 1 100 (engine)

Handling:

- Notes for opening contacts and locks of different connector contact systems

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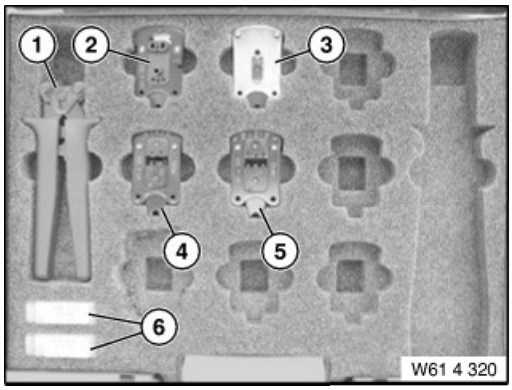
Cutting to length and stripping insulation from cables:

Wire stripper MultiStrip10*

*Sourcing reference BMW Workshop Equipment Catalogue

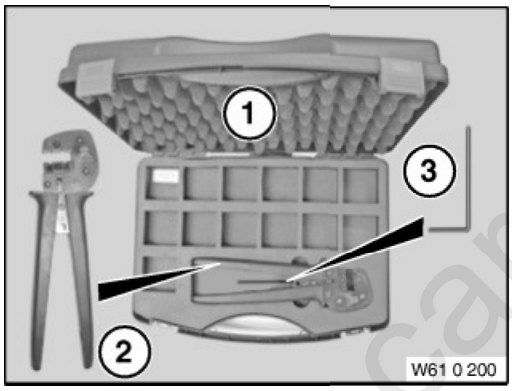
Handling:

- Cutting cables to length and strip insulation



Crimping stop parts (small contacts) and butt connectors:

- Special tool61 4 320
  1. Tool without crimping head
  2. Crimping head (stripping insulation and cutting fibre-optic cables to length)
  3. Crimping head (crimping fibre-optic cable contacts)
  4. Crimping head (crimping MQS contacts)
  5. Crimping head (crimping MPQ contacts)
  6. Replacement blade (face-cutting fibre-optic cables)
  7. Replacement blade with tool (insulation stripping unit)
  8. Universal crimping head (SI 2 04 06 293)



Crimping stop parts (large contacts) and butt connectors:

- Special tool 61 0 200 (crimping set)
- Special tool 61 0 210 (matrix set SLK 8)
- Special tool 61 0 220 (matrix set SLK 2.8)
- Special tool 61 0 230 (matrix set MAK 8 / DFK4)
- Special tool 61 0 240 (butt connector 4.0 - 6.0 mm²)

Handling:

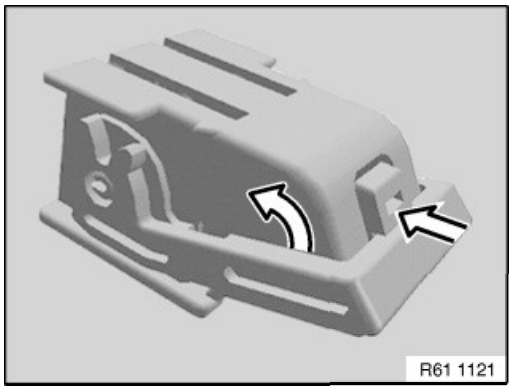
- Refer to Service Information:
  SI 2 02 05 194
  SI 2 07 05 233

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61 13 ... Unlocking and disconnecting different plug connections

Note:
The document describes unlocking and disconnecting different types of plug connections.

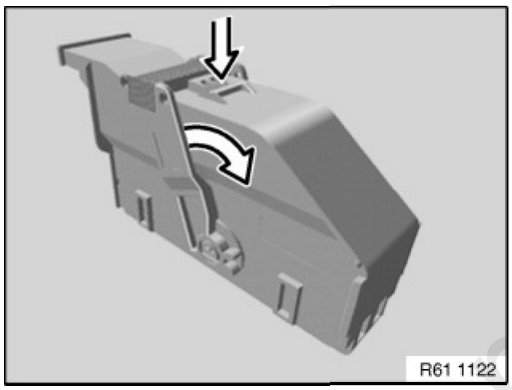
Differences in the details of the size and shape of the plug connections are possible.



1.

Press lock and open release clip in direction of arrow.

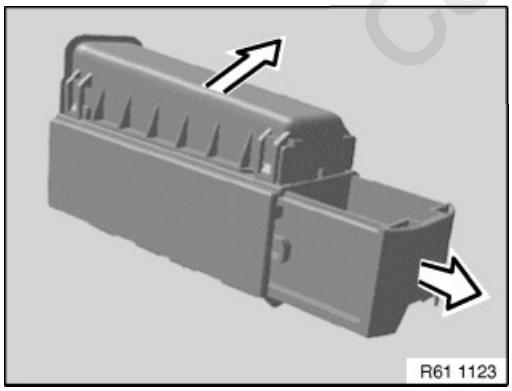
Disconnect plug connection.



2.

Press lock and open release clip in direction of arrow.

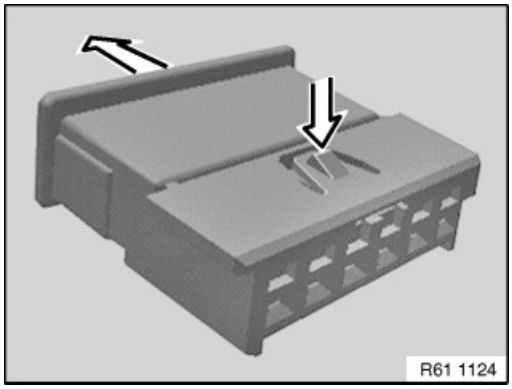
Disconnect plug connection.



3.

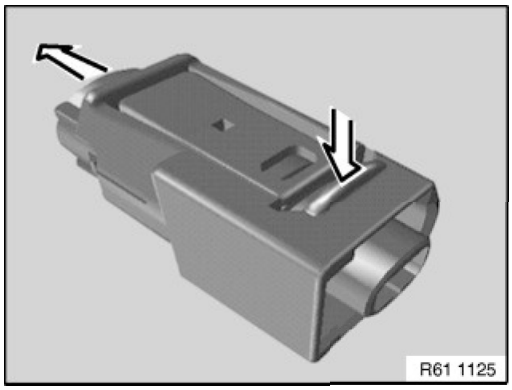
Open release clip in direction of arrow and disconnect plug connection in direction of arrow.

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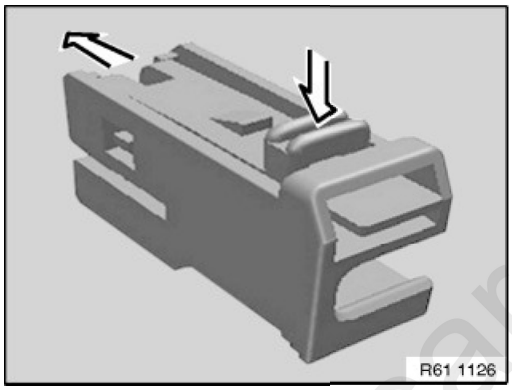
4.

Press lock and disconnect plug connection in direction of arrow.



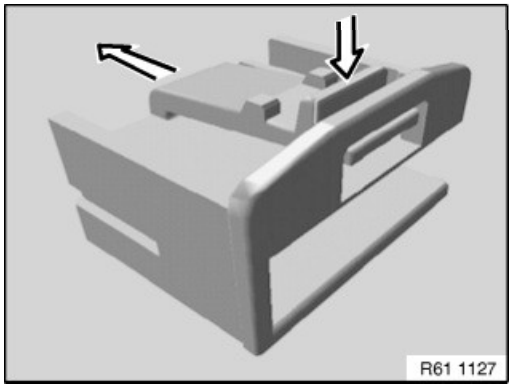
5.

Press lock and disconnect plug connection in direction of arrow.



6.

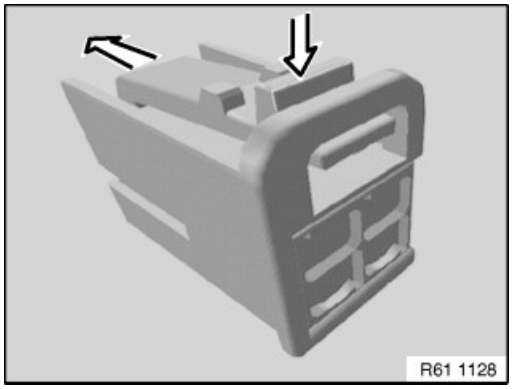
Press lock and disconnect plug connection in direction of arrow.



7.

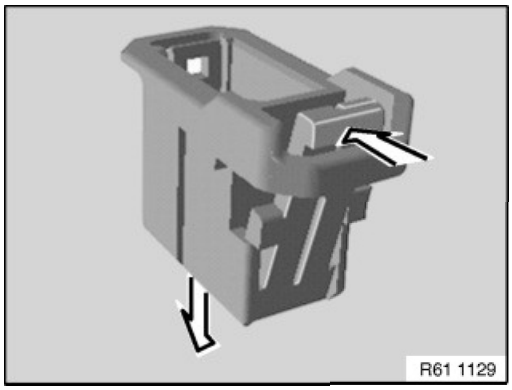
Press lock and disconnect plug connection in direction of arrow.

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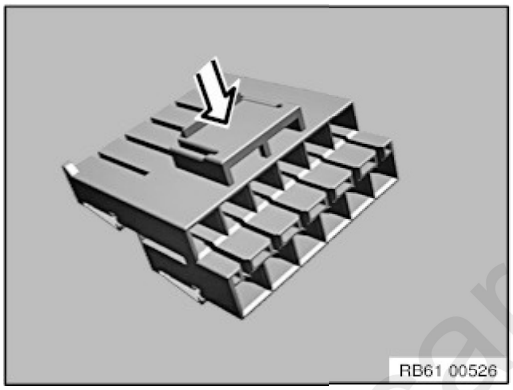
8.

Press lock and disconnect plug connection in direction of arrow.



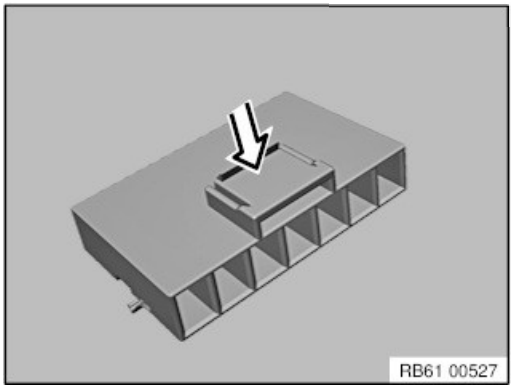
9.

Press lock and disconnect plug connection in direction of arrow.



10.

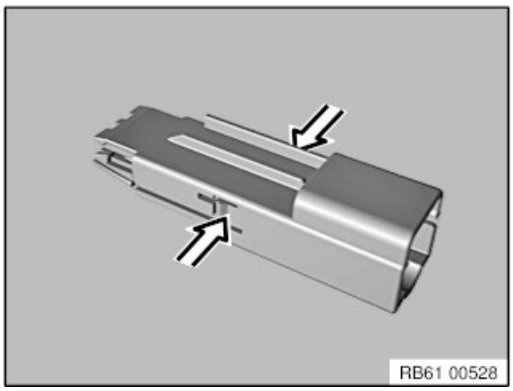
Press the lock and detach plug connection.



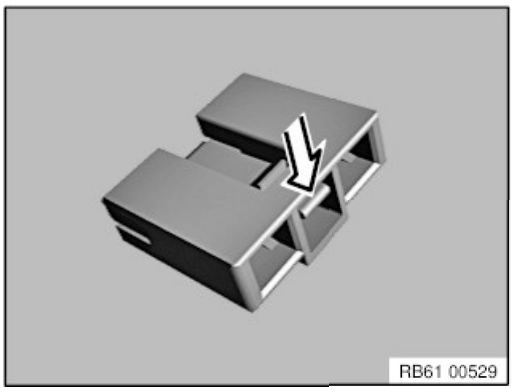
11.

Press the lock and detach plug connection.

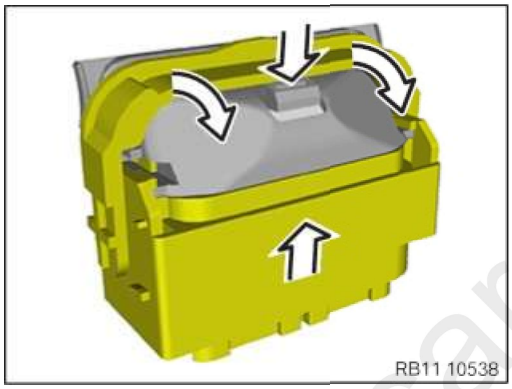
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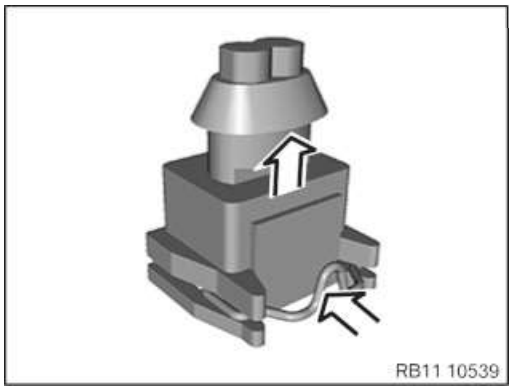
12.
Press the lock on both sides and detach plug connection.



13.
Press the lock and detach plug connection.

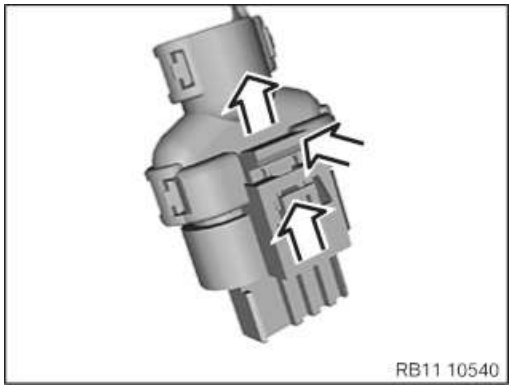


14.
Press lock and open release clip in direction of arrow.
Disconnect plug connection.

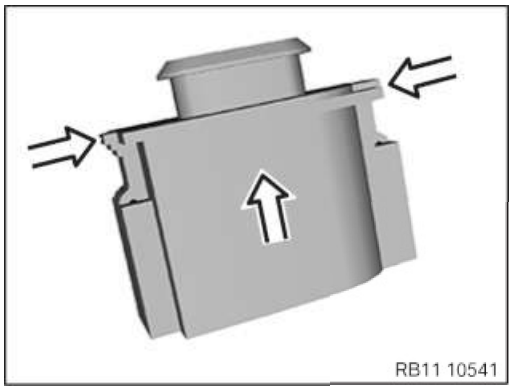


15.
Press the lock and detach plug connection.

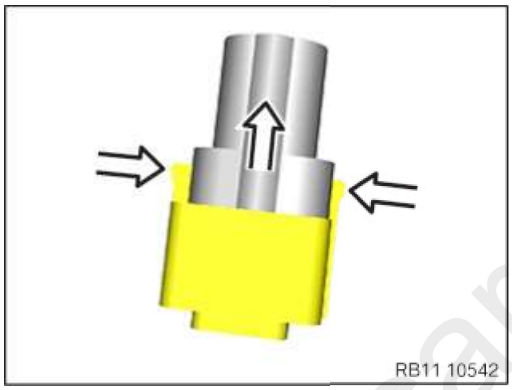
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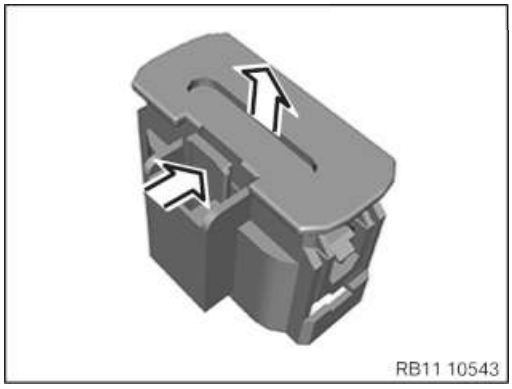
16.
Pull out lock and press.
Disconnect plug connection.



17.
Press the lock and detach plug connection.

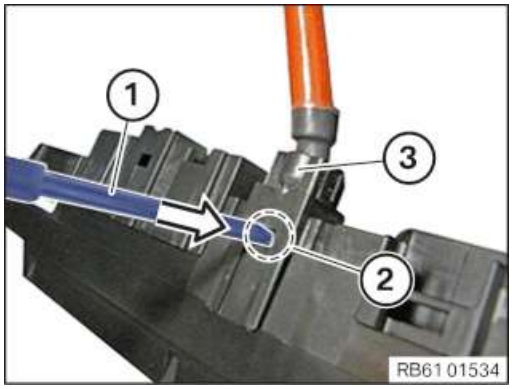


18.
Press the lock and detach plug connection.



19.
Press the lock and detach plug connection.

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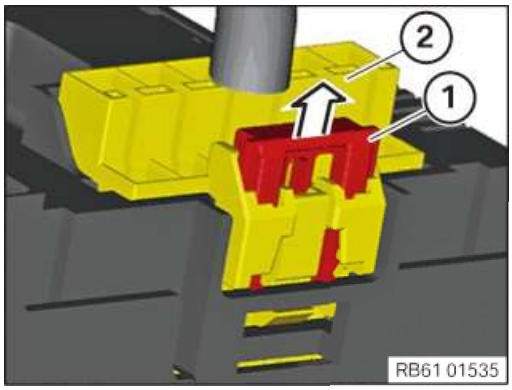


20.

Plug connection, e.g. on the power distribution box:

Press into the opening (2) using a suitable tool (1).

Pull off plug connection (3) upwards.



21.

Plug connection, e.g. on the power distribution box:

Lift lock (1) with a suitable tool.

Pull off plug connection (2) upwards.



22.

Vibration resistant high power engine contacts:

Caution!

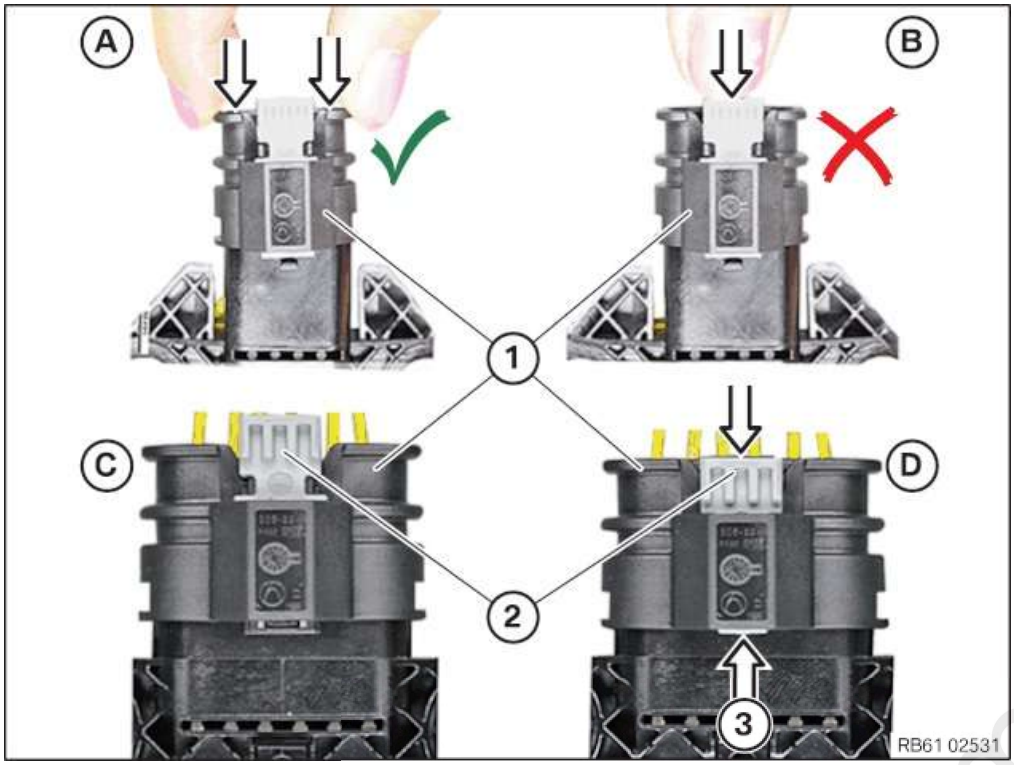
For this connector type, increased forces come into play when disconnecting and closing.

Disconnect:

Pull out lock (1) downward in direction of arrow first.

Then press lock (1) down in direction of arrow and pull off connector.

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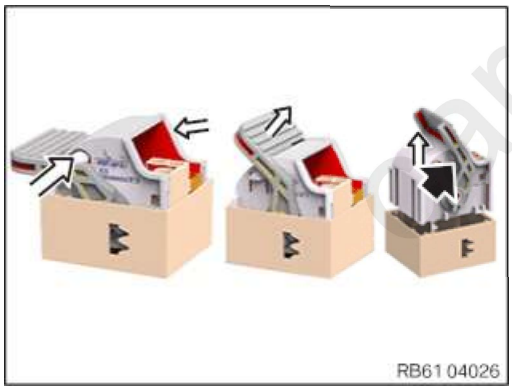


23.

Close:

A. Press the connector (1) down at the points indicated by the arrow **until it reaches the end position**
B. **Do** not press the connector (1) further than the lock
C. Connector (1) is in the end position, but lock (2) is not yet locked
D. Press lock (2) down in the direction of the arrow until the tip of lock (2) is visible at point (3)

Unlock / lock front light combination plug connection & replace housing after damage:

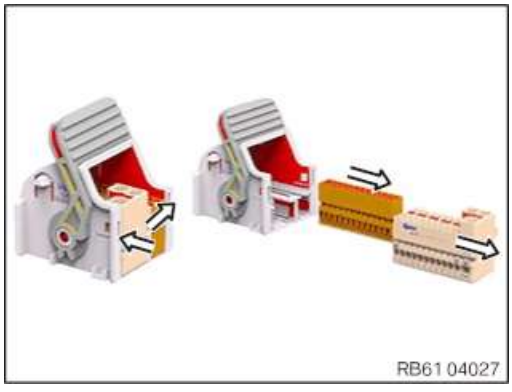


24.

Press in locking lever at both sides until the lever is unlocked and can be moved.

Move lever upwards until it latches into place in the end position.

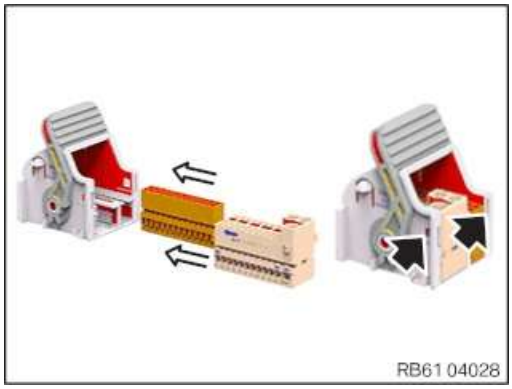
Once the lever is locked in the end position, remove plug connection upwards.



Unlock socket housing by lifting up each of the locking tabs.

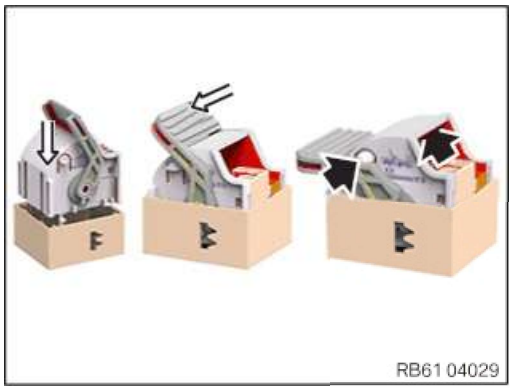
Slide out after unlocking the socket housing.

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Slide in socket housing up to limit position.

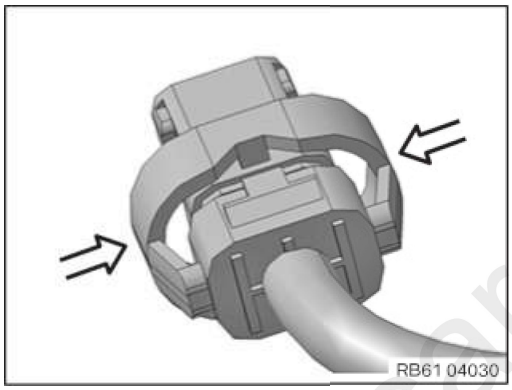
Lock socket housing into place in end position.



Sliding in up to limit position.

Activate plug-inn procedure by moving lever downwards.

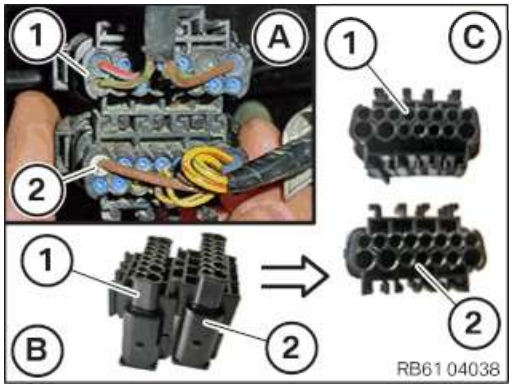
IMPORTANT: the latch mechanism on both sides only works for a completed plug-in procedure.



25.

Rosenberger D4S20G-400A5-Y

Press to unlock on both sides.

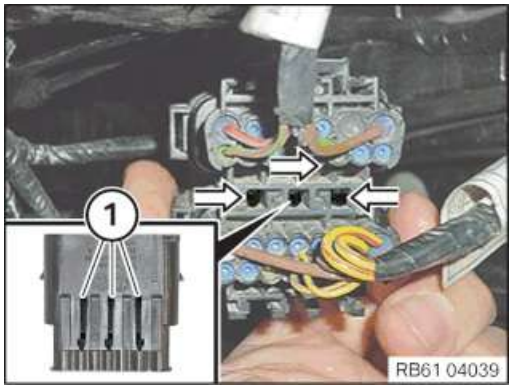


26.

Pin housing, 15-pinMLK1

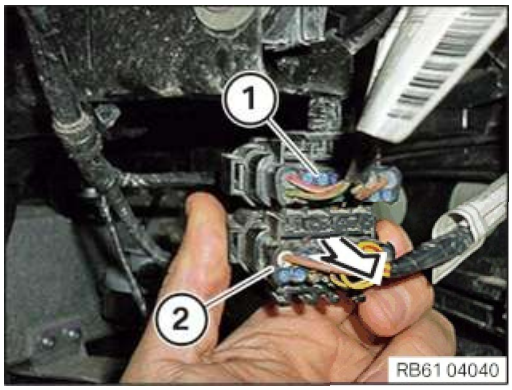
- A & B. To avoid any damage to individual connectors, the given connector assembly consisting of several individual connectors (1) & (2) must be released before disconnecting the plug connection.
- C: released connector assembly

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Disconnecting connector assembly:

Release retaining hooks (1) in direction of arrow (detail image shows retaining hooks of individual connector).



Release connector (2) in direction of arrow from connector (1).

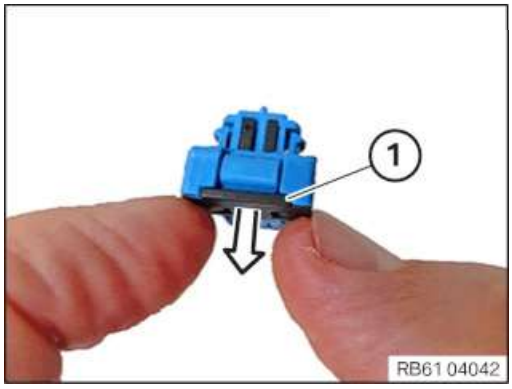


27.

Airbag ignition circuit connector

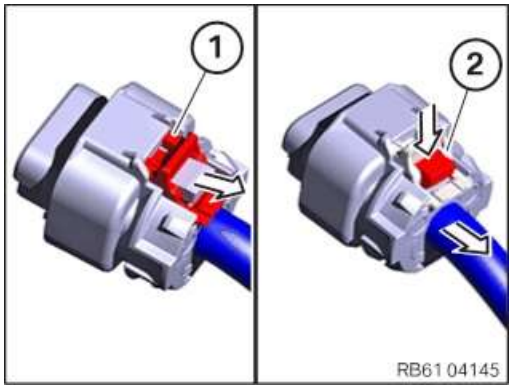
Warning!

Note the safety information for working on vehicles with airbag systems prior to disconnecting the plug connection.



Pull the cap (1) in the direction of the arrow to unlock

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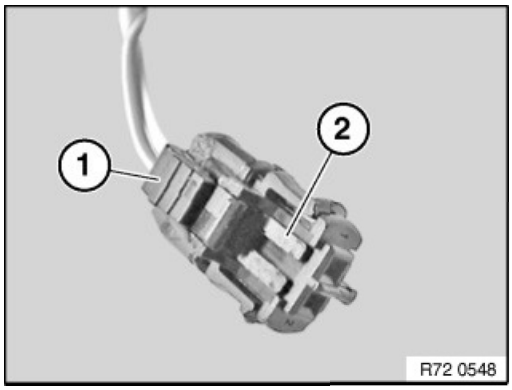


28.

Connector e.g. on front and rear lighting unit

Open safety catch (1) in direction of arrow using appropriate tool.

Push safety catch (2) in direction of arrow and disconnect plug connection.



29.

Plug, e.g. in airbag ignition circuits

Press the lock (1) and pull out the connector (2) up to initial engagement position.

Pull off connector (2).

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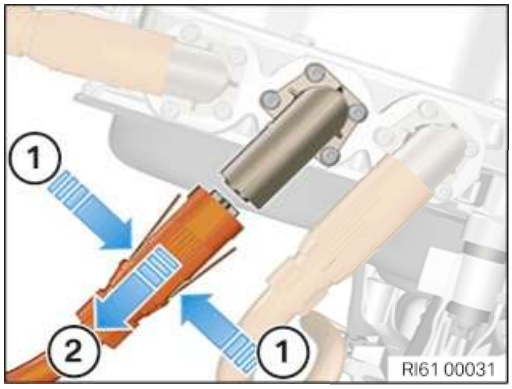
61 13 ... Unlocking and disconnecting various plug connections in electrical and hybrid vehicles



Attention!

Observe the following instructions for handling high-voltage plug connections:

- Damaged high-voltage plug connections must be replaced completely. Repair is not permitted.
- Dirt contamination must be removed before opening the plug connection.



Disconnect the Hirschmann high-voltage connector:

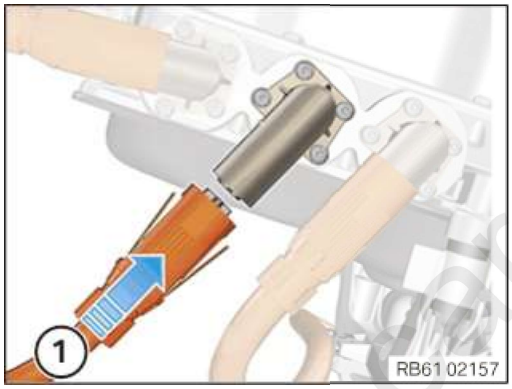
Press the lock (1) on the left and right on the connector in the direction of the arrow.

Pull off connector (2) in direction of arrow.

Attention!

Connector (2) is difficult to pull off.

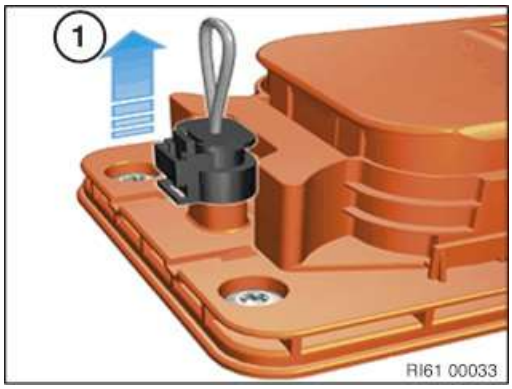
In the event of damage to high-voltage connector (2), the complete high-voltage cable must be replaced!



Connect the Hirschmann high-voltage connectors:

Slide the connector (1) on in the direction of the arrow.

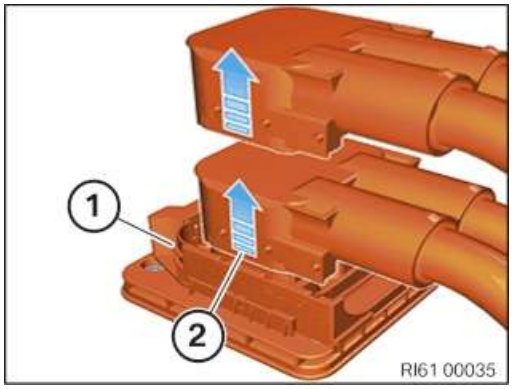
Note:
Connector (2) must lock audibly.



Disconnect the Kostal high-voltage connector:

Unlock and disconnect high-voltage interlock loop (1).

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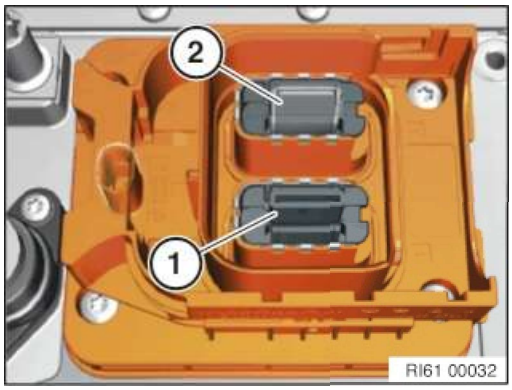
Push the lock (1) fully to the front.

Lift the connector (2) and remove it entirely.

Attention!

Plug connection (3) is difficult to pull off.

The connector (2) must be completely pulled off the opposite housing in one step. Damage may be caused to contact protection if connector is only partly pulled off and then closed again!



Check the Kostal high-voltage connector and connection for damage:

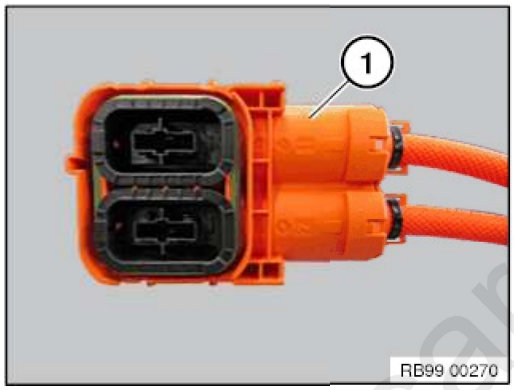
Check the touch protection for damage and correct positioning (1).

Warning!

Do not touch unprotected connector (2)!

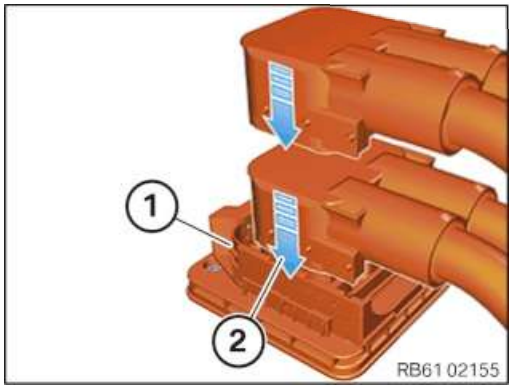
If the contact protection (1) has been pushed to the bottom (2), the high-voltage connector must be refitted.

If contact protection (1) remains in bottom position (2) after reinstallation, the contact protection is faulty and the component must be replaced!



Check the high-voltage connector (1) for damage.**Warning!**

In the event of damage to the high-voltage connector (1), the complete high-voltage cable must be replaced!



Connect the Kostal high-voltage connector:

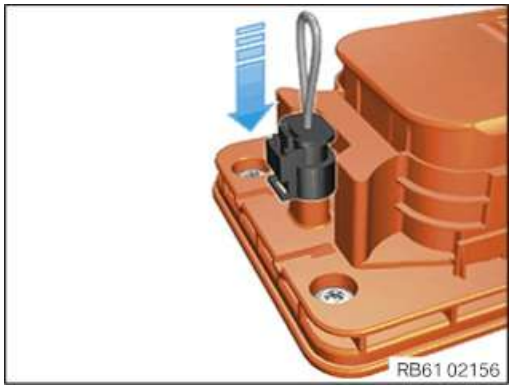
Connect the connector (2) in one single movement to the counter-housing.

Push the lock (1) fully to the rear.

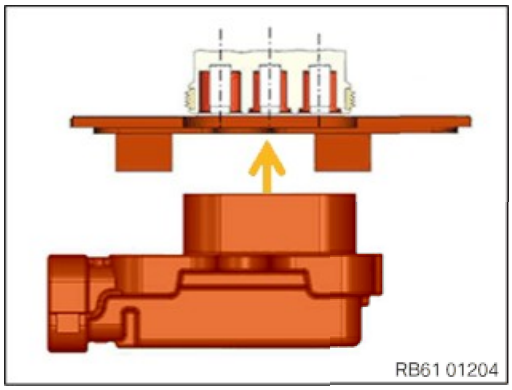
Attention!

Plug connection (3) must be correctly locked by lock (2), otherwise there is a risk of damage.

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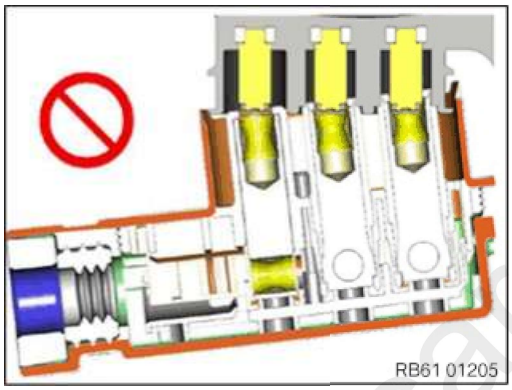


Connect the connector for the high-voltage interlock.



Three-phase high-voltage connector:

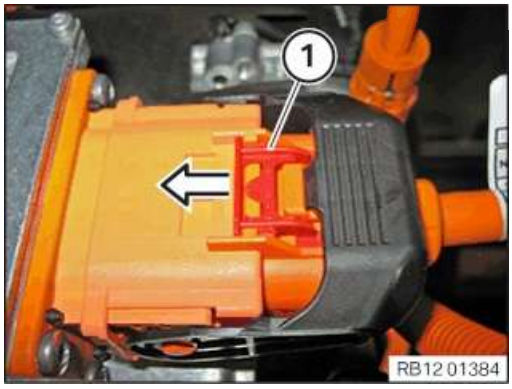
Connect and disconnect the connector straight.



Attention!

The system is designed to only offer limited protection against damage caused by connectors that are inserted at an angle.

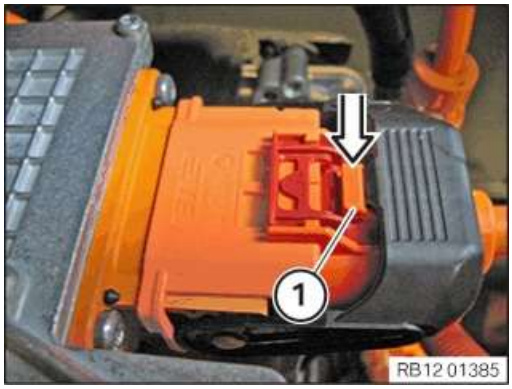
Increased tilted connections will increase the connecting force and the risk of danger.



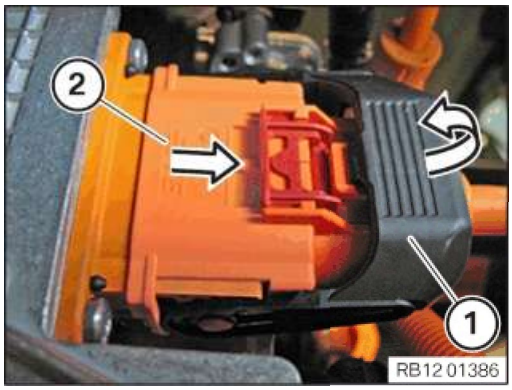
Disconnect the high-voltage connector from the high-voltage connection of the KLE:

Slide lock (1) in direction of arrow up to stop.

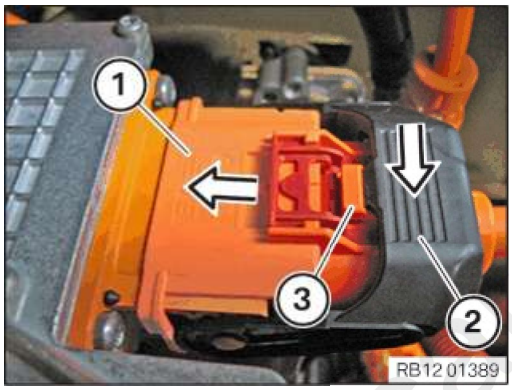
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Press lock (1).



Open the lock (1) completely and disconnect the connector (2).



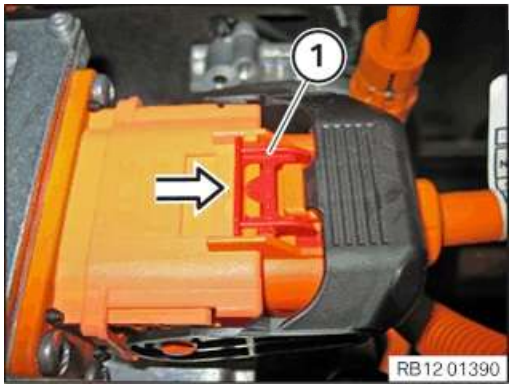
Connect the high-voltage connector to the high-voltage connection of the KLE:

Connect the connector (1) to the limit position and close the lock (2).

Attention!

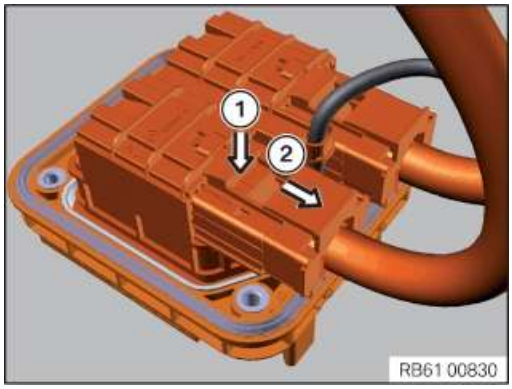
Lock (2) must snap audibly into place.

The retaining lug of the lock (2) must be positioned completely under the lock (2).



Slide the lock (1) on to the stop in the direction of the arrow.

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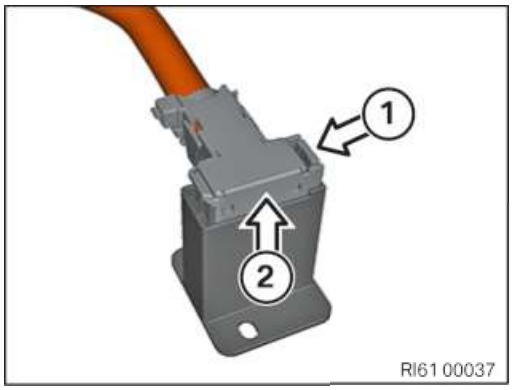
High-voltage connector on the high-voltage connection of the high-voltage battery unit:

Press down unlocking (1) in direction of arrow and pull off connector in direction of arrow (2).

Attention!

Contact protection is no longer provided in the event of a damaged connector housing.

In this case, contact technical support.



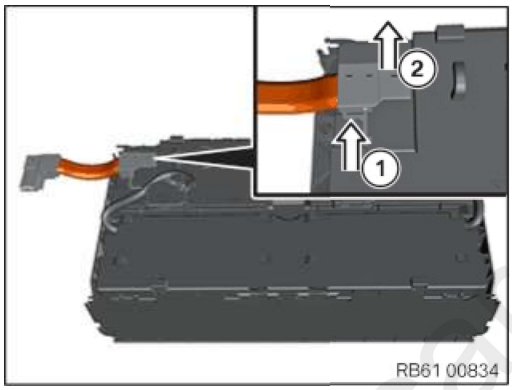
High-voltage connector on the cell module I01:

Press unlocking device (1) together and pull off connector upwards (2).

Attention!

Contact protection is no longer provided in the event of a damaged connector housing.

In this case, contact technical support.



High-voltage connector on the cell module (cell module connecting line):

Press unlocking (1) in direction of arrow and pull off connector in direction of arrow (2).

Attention!

Contact protection is no longer provided in the event of a damaged connector housing.

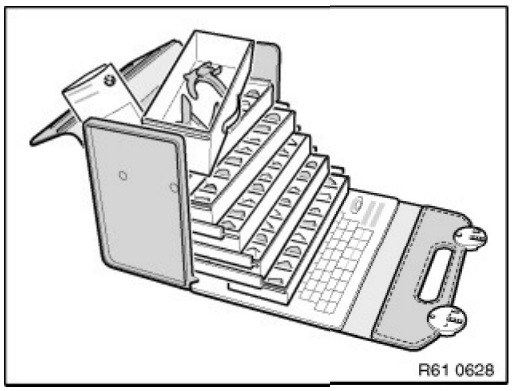
In this case, contact technical support.

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61 13 ... Wiring harness repair (special tools, butt connectors)

Special tools required:

- 61 0 300
- 61 0 400
- 61 1 100
- 61 4 320
- 61 0 200
- 61 0 210
- 61 0 220
- 61 0 230
- 61 0 240
- 61 4 340



Repair range for vehicle electrical system:

Single parts for wiring harness repairs*

* sourcing reference BMW Group Parts Department

Note:

- Refer to Service Information bulletin



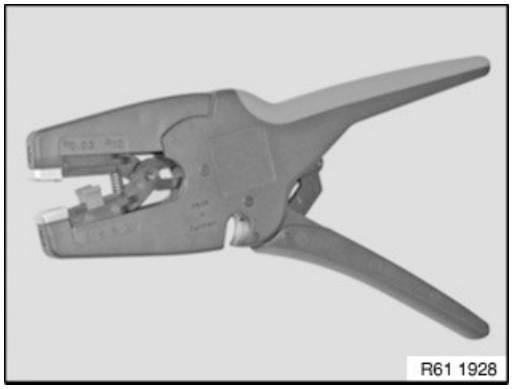
Release and press-out tool:

- Special tool61 0 300
- Special tool61 0 400
- Special tool 61 1 100 (engine)

Handling:

- Notes on opening contacts and locks of various connector systems

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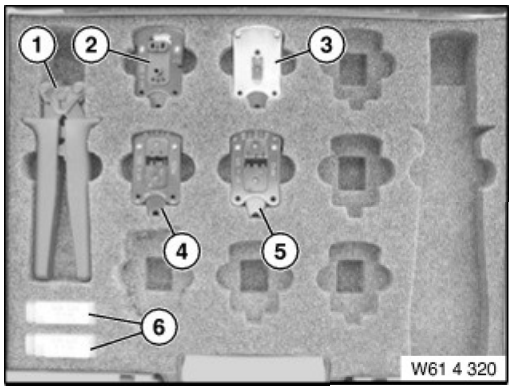
Cutting to length and stripping insulation from cables:

Wire stripper MultiStrip10*

*Sourcing reference BMW Workshop Equipment Catalogue

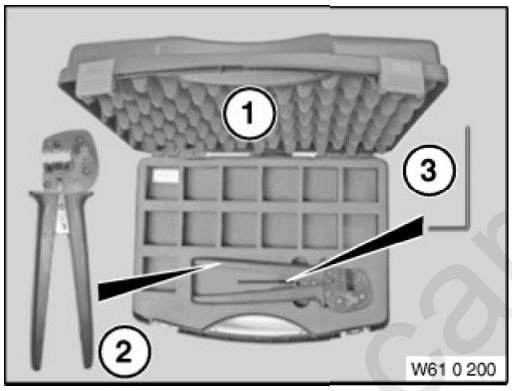
Handling:

- Cutting cables to length and strip insulation



Crimping stop parts (small contacts) and butt connectors:

- Special tool61 4 320
  1. Tool without crimping head
  2. Crimping head (stripping insulation and cutting fibre-optic cables to length)
  3. Crimping head (crimping fibre-optic cable contacts)
  4. Crimping head (crimping MQS contacts)
  5. Crimping head (crimping MPQ contacts)
  6. Replacement blade (face-cutting fibre-optic cables)
  7. Replacement blade with tool (insulation stripping unit)
  8. Universal crimping head (SI 2 04 06 293)



Crimping stop parts (large contacts) and butt connectors:

- Special tool 61 0 200 (crimping set)
- Special tool 61 0 210 (matrix set SLK 8)
- Special tool 61 0 220 (matrix set SLK 2.8)
- Special tool 61 0 230 (matrix set MAK 8 / DFK4)
- Special tool 61 0 240 (butt connector 4.0 - 6.0 mm²)

Handling:

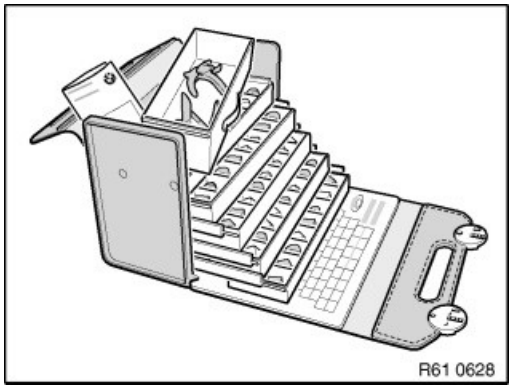
- Service Information bulletins
- Service Information bulletins



Important!

1. Identify cause of damage (e.g. sharp-edged body components, faulty electrical loads, jammed mechanisms, corrosion caused by ingress of water, etc.).
2. Reading out the fault memory
3. Eliminate cause of damage.
4. Disconnect battery negative terminal
5. Check the wiring diagram to make sure that no safety systems (e.g. antilock braking system, active rear axle kinematics, airbag, etc.) are influenced. Otherwise replace faulty wiring harness or use repair cable (sourcing reference: BMW Group Parts)
6. Carry out function check and read out fault memories again
7. Eliminate new faults if applicable and clear fault memories

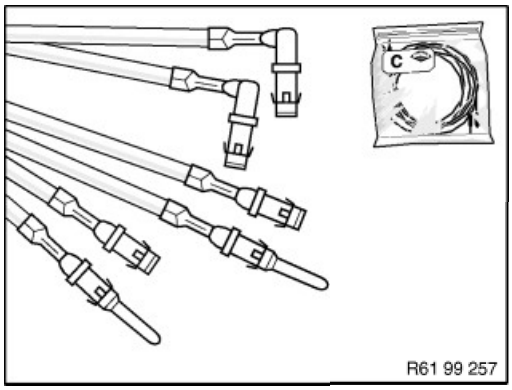
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Note:
The repair range IV for the vehicle electrical system contained the required special tools and separate components for retrofitting and repair work with the aid of comb connectors.

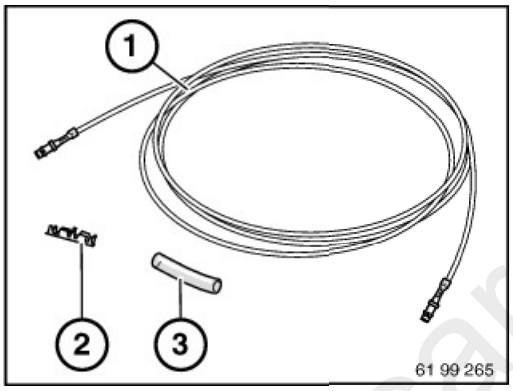
The case can no longer be ordered. Order separate components for wiring harness repair via BMW Group Parts.

- Refer to Service Information:



Choose repair kit.

Example: Repair kit, circular connector system D 2.5.

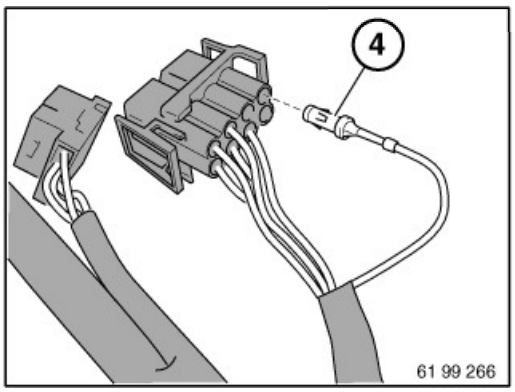


Remove following parts:

(1) Pre-packaged end of cable with requisite wire cross-section

(2) Crimp connector for selected wire cross-section

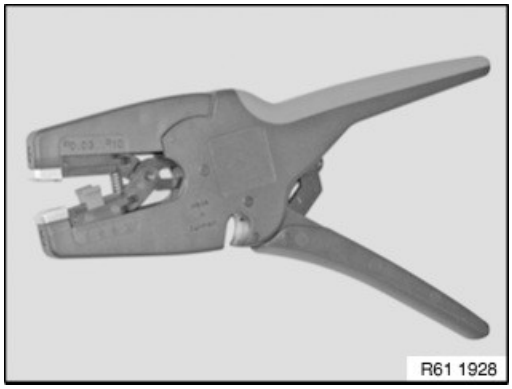
(3) Shrink-fit hose



Open secondary lock on housing.

Mark damaged contact (4) with socket number of housing and press it out of housing using appropriate special tool contained in special tool set61 0 300).

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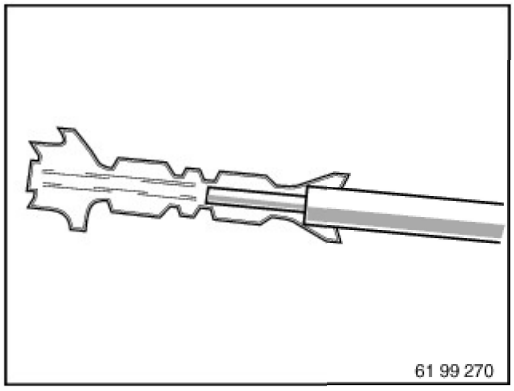
Important!

- Check maximum length of repair cable
- If more than one wire is to be repaired, the individual interfaces must be offset so that the wiring harness is not too thick at the repaired point.

Adhere to following procedure:

- Cut off wire with faulty contact at point which is easily accessible
- Strip insulation from end of wire at wiring harness end
- Cut preassembled wire end to length and strip insulation

Refer also to repair instruction:
Cutting to length and stripping insulation from cables

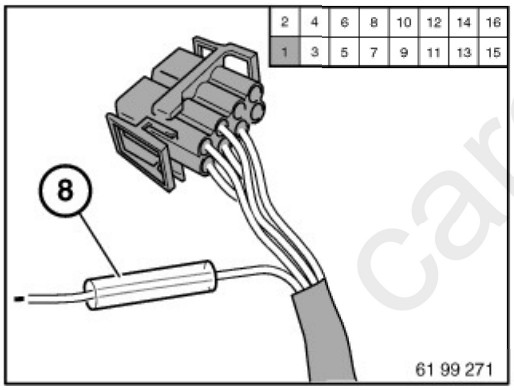


Crimp butt connector on preassembled wire end.

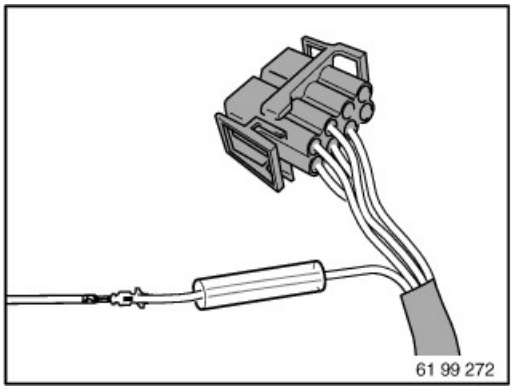
Special tools:

- 61 4 340 (0.35 - 2.5 sq mm)
- 61 0 240 (4.0 - 6.0 sq mm)

See repair instructions
Crimping on stop parts

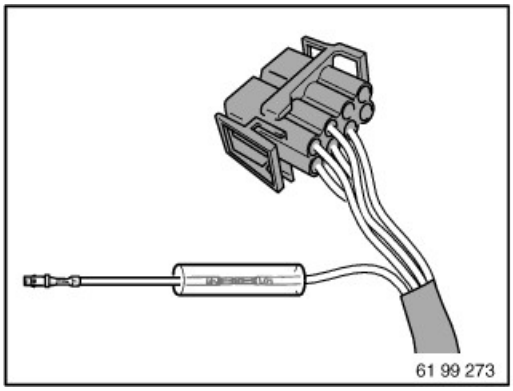


Push shrink-fit hose (8) onto free wire end.

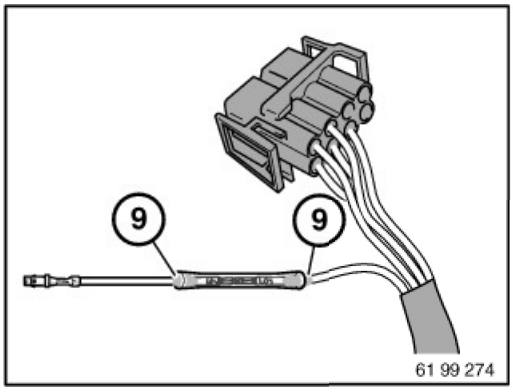


Crimp unused wire end using butt connector.

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Pull shrink-on sleeve over butt connector.



Important!

Do not burn shrink-on sleeve.

Using hot air blower, shrink heat-shrink tubing until adhesive is discharged uniformly at both ends (9) of heat-shrink tubing.

Insert contact *in* housing.

Close secondary lock on housing.

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