

## Tyres with emergency running characteristics and tyre pressure warning systems

### All models

#### General information

#### Warning systems

BMW AG offers two different systems to warn the driver of a drop in tyre pressure.

System	Description	Measuring principle
RDC	Tyre pressure control	Tyre pressure/temperature
RDW	Tyre pressure warning	Comparison of wheel speeds

#### Emergency running systems

In addition to the warning systems, two emergency running systems are also employed to prevent a depressurised tyre from caving in:

Components of emergency running system with self-supporting tyres:

RDW (standard equipment)	Tyre pressure warning
RDC (available as option from 03/2000)	Tyre pressure control
SST	<b>Self Supporting Tyre</b>
EH2 disc wheel	Disc wheel with <b>Extended Hump 2</b>

Components of emergency running system with integrated support ring:

Support ring	<i>Note:</i> In the future, only for heavy safety vehicles (E38/3)
RDC (optional)	Tyre pressure control
H2 disc wheel	Standard disc wheel with <b>Hump 2</b>

#### Tyre pressure control (RDC)

##### RDC system description

RDC permanently monitors the tyre pressure and the temperature in the tyres, both while the vehicle is being driven and when it is stationary. Data is transmitted via data telegram by the wheel electronic units to the antennas installed in the wheel housing and on to the RDC control unit. There, the data received is compared with the stored limit values.

After correcting the air pressure with the engine off and the ignition on, press the Set button and hold (approx. 6 seconds) until the words "Set tyre pressure" appear in the instrument cluster (instrument cluster high) or the yellow LED lights up (basic instrument cluster).

If the limit values are exceeded, the driver will be warned via the instrument cluster in two stages, as follows:

##### Loss of tyre pressure

Drop in tyre pressure of 0.2 to 0.4 bar

##### Warning

Yellow LED on basic instrument cluster  
or  
Text: "Check tyre pressure" on instrument cluster high  
Gong: no

Drop in tyre pressure of more than 0.4 bar

Red LED on basic instrument cluster

or

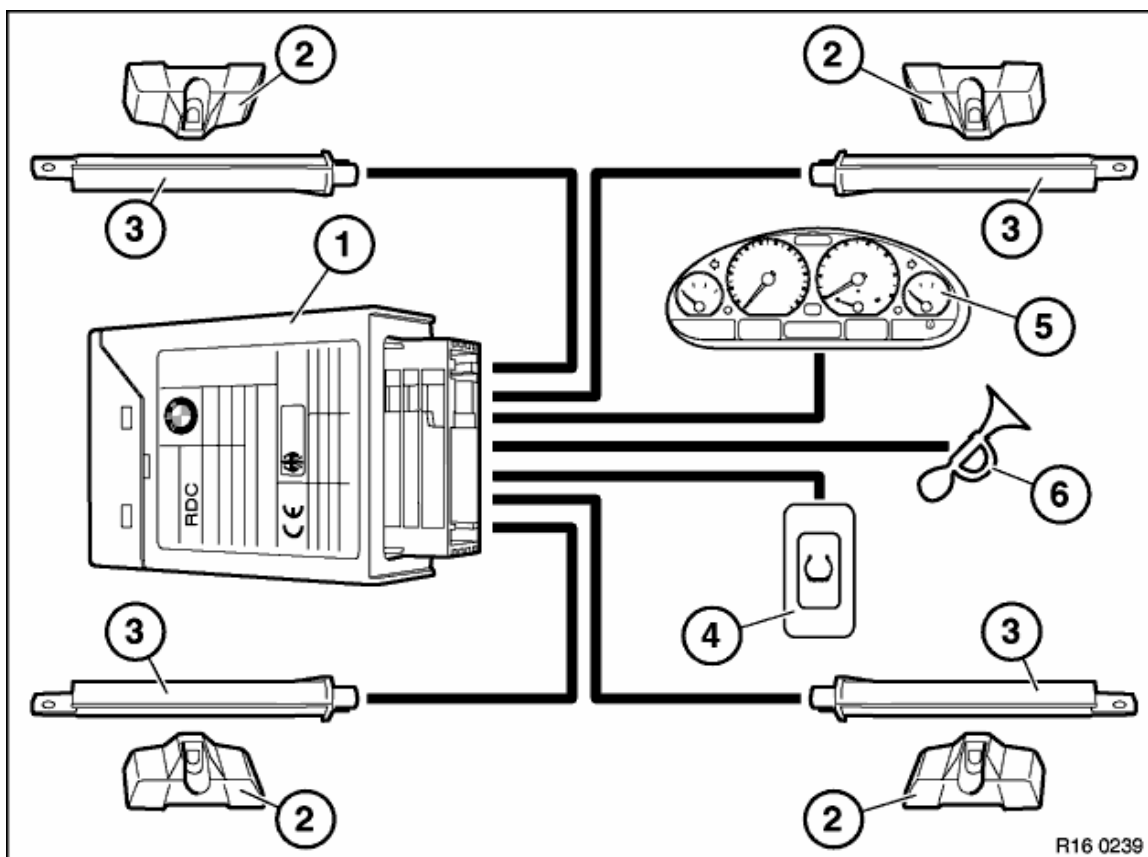
Text: "Tyre failure" on instrument cluster high

Gong: yes

## Advantages of RDC

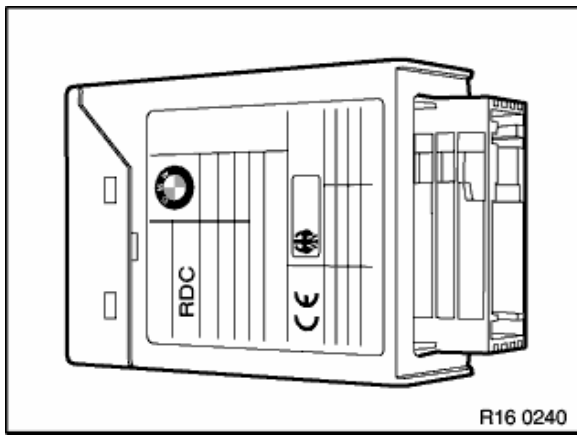
1. Safety
  - early warning in the event of rapid loss of pressure
  - warning of loss of tyre pressure through normal diffusion
2. Comfort
  - unchanging ride comfort
  - instruction to check tyre pressure as necessary
3. Service life, economy
  - minimisation of tyre wear
  - minimisation of fuel consumption
4. New developments
  - allow tyres with emergency running characteristics to be fitted
  - no spare wheel if tyres with emergency running characteristics are fitted (saves weight)

## RDC system layout



- |  |                               |
|--|-------------------------------|
| (1) RDC control unit                             | (4) Set button                |
| (2) Wheel electronic units (4 off)               | (5) Display element           |
| Wheel electronic unit for spare wheel (optional) | (6) Anti-theft warning system |
| (3) Receiving antennas (4 off)                   | - Wiring harness              |

## Component description



### RDC control unit

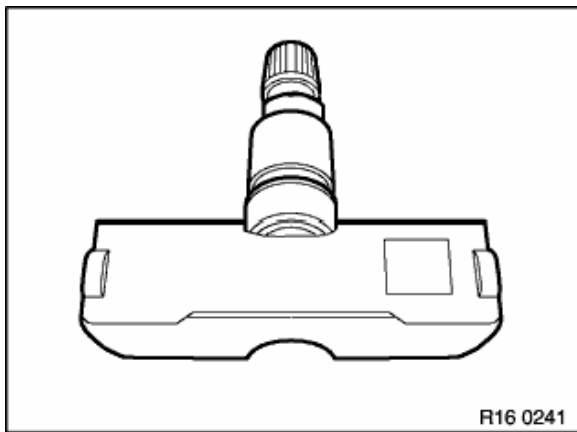
Fully diagnosis-compatible

#### Task:

evaluates the following telegrams from the wheel electronic units:

- tyre pressure
- tyre air temperature
- identification number (ID) of wheel electronic unit
- remaining service life of wheel electronic unit battery

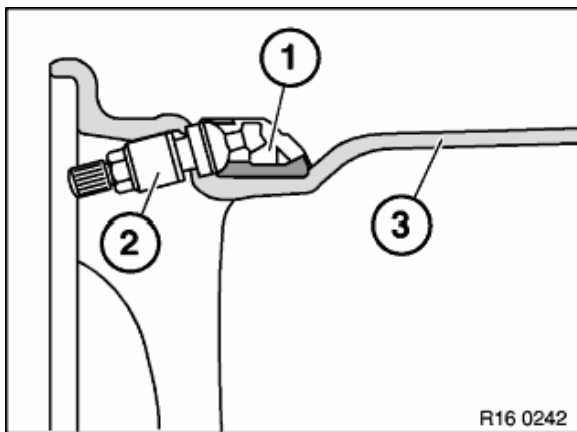
If required, information or a warning is transmitted.



### Wheel electronic unit with valve

Components:

- pressure sensor
- temperature sensor
- transmitter
  - frequencies according to country
- power supply
  - service life: approx. 7 years
  - not exchangeable



### Installation location of wheel electronic unit in disc wheel

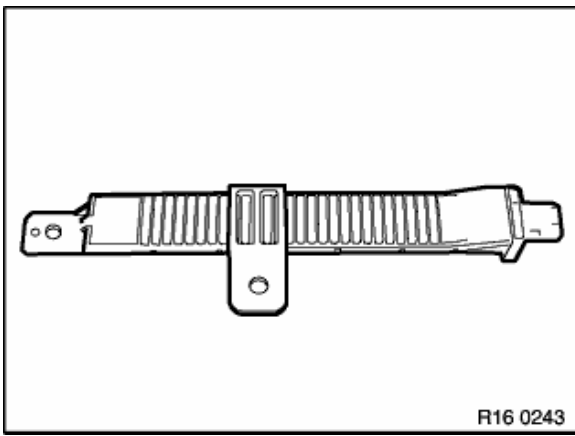
The wheel electronic unit (1) is screwed to the valve (2) on the disc wheel (3)

#### Identifying feature:

metal tyre valves

#### Note:

Different valves have to be used to allow for the different disc wheel sizes. The valves are colour-coded. The correct coding can be taken from the spare parts catalogue.



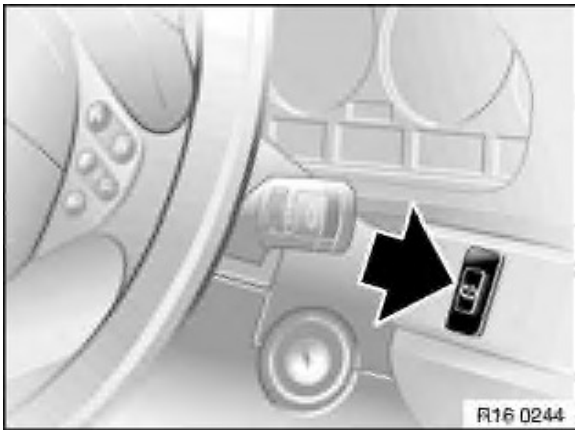
### Antenna

There is an antenna in each wheel housing.

#### Task:

receives telegrams and forwards these to the RDC control unit.

### Component description



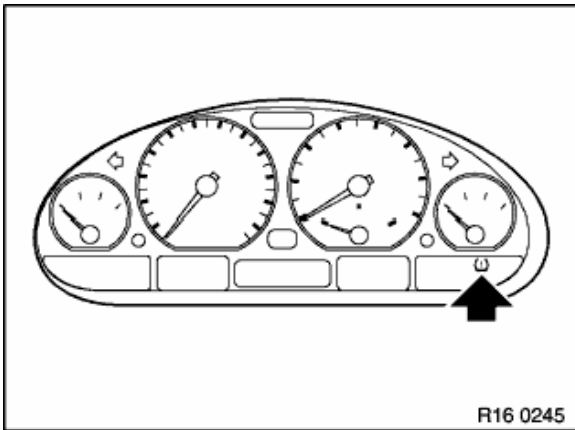
### Set button

Installed in the instrument panel to the right of the steering wheel. (E46: in the centre console)

Symbol: tyre cross-section

#### Task:

initialisation after resetting cold tyre pressure or after changing tyre or wheel location.



### Display element in instrument cluster

Indicator lamp lights up yellow:

- drop in tyre pressure of 0.2 to 0.4 bar

Indicator lamp lights up red:

- drop in tyre pressure greater than 0.4 bar

## Tyre pressure warning RDW

### RDW system description

RDW measures the wheel speeds on all four wheels, using the wheel speed sensors of the ABS/ASC or ABS/DSC system. It compares the wheel speeds of the diagonally opposite wheels and of the average speed.

In the event of a drop in tyre pressure, the dynamic diameter of a wheel will change, leading to a changed wheel speed.

A drop in tyre pressure of  $30 \pm 10\%$  can be detected on all wheels from about 15 km/h (10 mph) up to the vehicle's top speed.

If this value is exceeded, the driver will be warned via the instrument cluster as follows:

### Loss of tyre pressure

### Warning

Loss of tyre pressure of  $30 \pm 10$  %

Red LED  
Text: "Tyre failure"  
Gong: yes

**The vehicle is not to be driven faster than 80 km/h (50 mph).**

*Note:*

A cautious driving style with moderate forward and transverse acceleration will help to prolong the service life of the defective tyre.

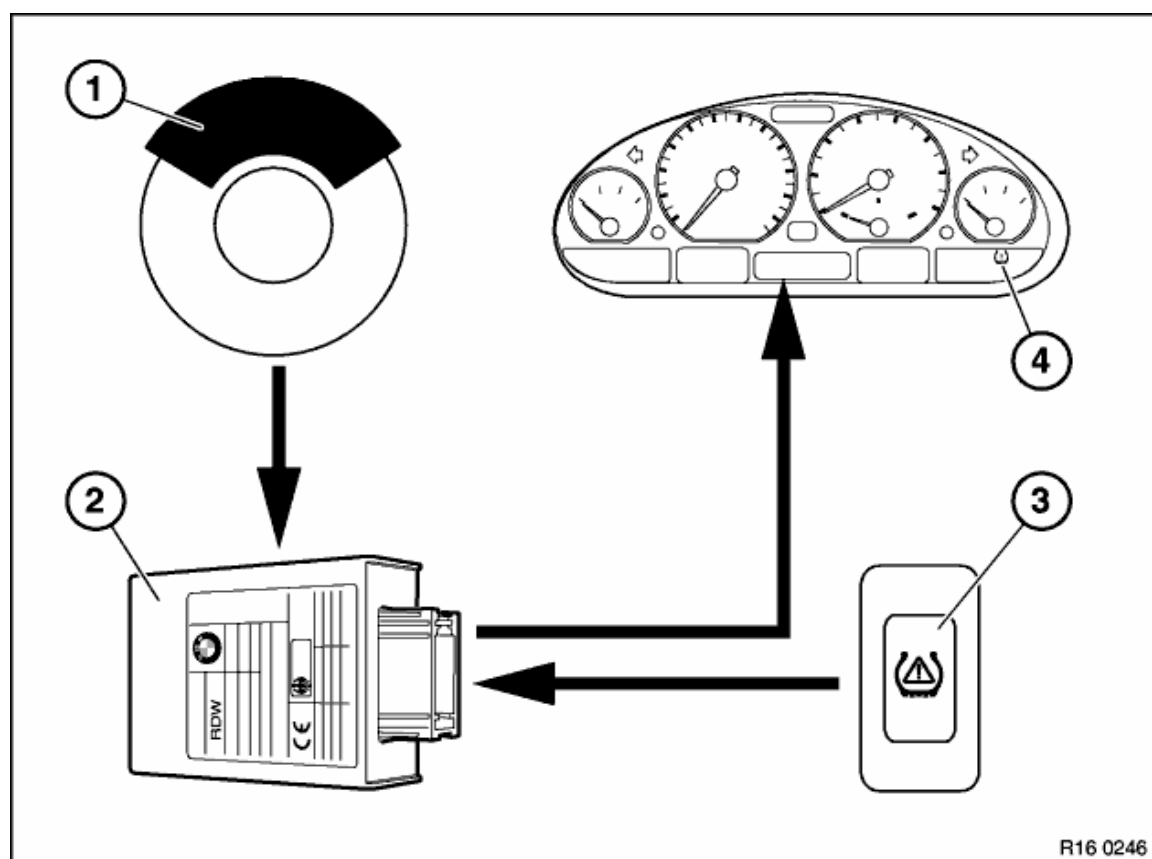
### Advantages of RDW

With two exceptions, the advantages of RDC also apply to RDW.

Exceptions:

- no warning of loss of tyre pressure through normal diffusion
- tyre pressure still have to be checked regularly, every 14 days

### RDW system layout



(1) Wheel speed sensors of ABS/ASC or ABS/DSC system

(3) Set button

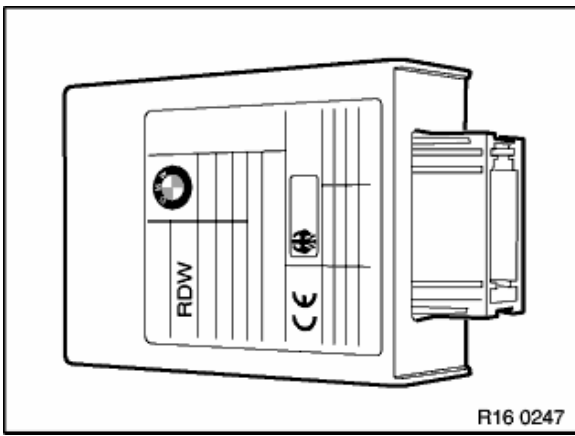
ASC = Automatic Stability Control  
DSC = Dynamic Stability Control

(4) Display element

(2) RDW control unit

- Wiring harness

### Component description



### RDW control unit

Fully diagnosis-compatible

Task:

- evaluates wheel speeds.
- a warning is transmitted as required.

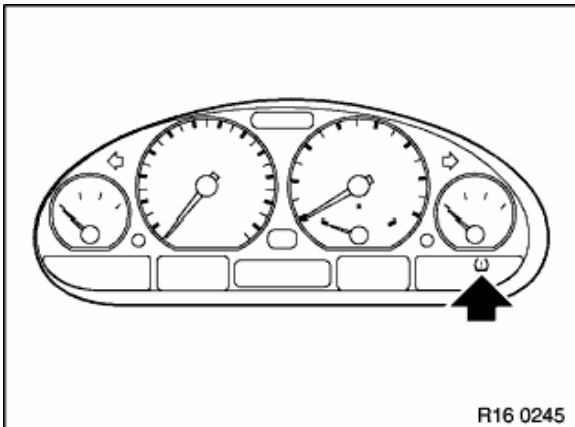


### Set button

Installed in the dashboard to the right of the steering wheel. Symbol: tyre cross-section with warning triangle

Task:

initialisation after resetting cold tyre pressure or after changing tyre or wheel location.



### Display element in instrument cluster

Indicator lamp lights up red:

- drop in tyre pressure  $30 \pm 10 \%$

## **Emergency running systems**

### **Introduction**

Tyres with emergency running characteristics can still be used for a certain distance even if they suffer a complete loss of pressure. There are two different systems which meet these requirements:

- emergency running system with self-supporting tyres
- emergency running system with integrated support ring

### **Emergency running systems setup**

#### **Emergency running system with self-supporting tyres**

The side walls of the self-supporting tyre are reinforced. In conjunction with a special disc wheel, the tyre can still be used for a certain distance even if it suffers a complete loss of pressure.

Mobility is retained for the following distances up to a speed of 80 km/h (50 mph) and with a cautious, suitably adapted driving style:

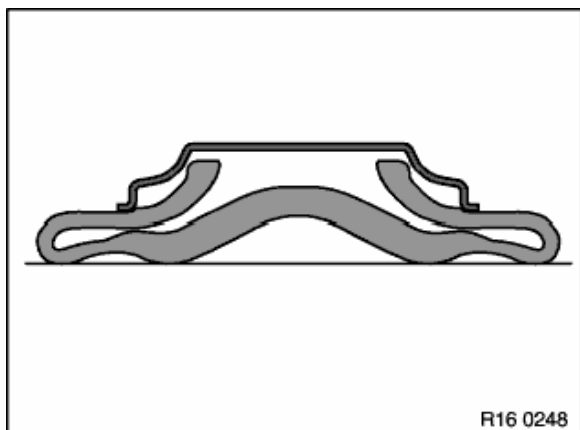
Unloaded vehicle	max. 500 km (300 miles)
Unloaded roadster	less than 250 km (150 miles)
Fully loaded vehicle	max. 50 km (30 miles)

Self-supporting tyres demand permanent monitoring of the tyre pressure to ensure that the driver is given adequate warning if pressure is lost during a journey. For this reason, these tyres are only available in conjunction with the warning system RDW and from 03/2000 also with RDC.

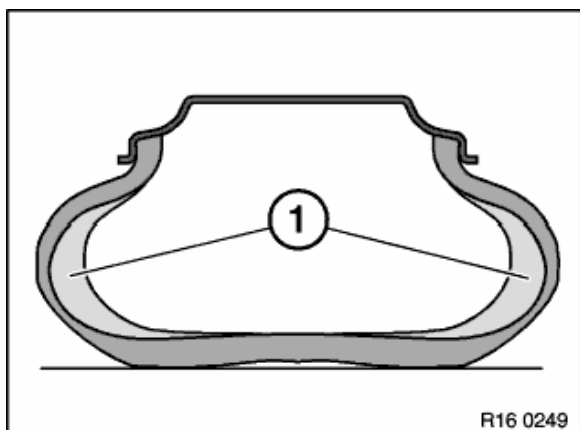
To prevent the self-supporting tyres from becoming detached from the disc wheel in the event of a complete loss of tyre pressure, they must be fitted to newly developed wheels with modified disc wheel humps, but with unchanged tyre seating (= standard disc wheel).

However, the new wheels can also be used for standard tyres of the same size.

### Comparison standard tyres / self-supporting tyres



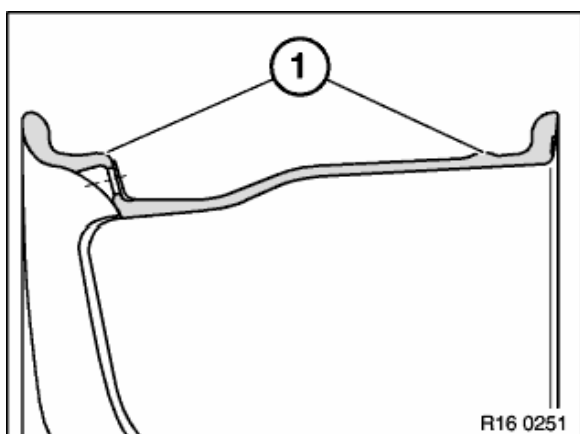
Standard tyres, unpressurised



Self-supporting tyres, unpressurised

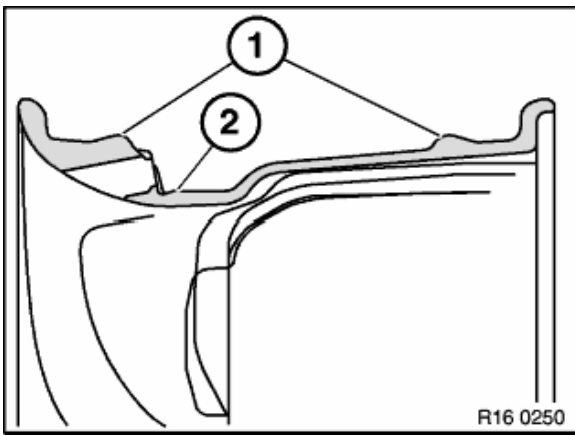
Envulcanised reinforcement (1) made of a temperature-resistant rubber compound.

### Disc wheels



H2 disc wheel (standard disc wheel) for emergency running system with integrated support ring

(1) Hump 2 of standard disc wheel



### EH2 disc wheel for emergency running system with self-supporting tyre

(1) Extended Hump 2 of disc wheel

(2) Drop centre relocated a few millimetres to the centre (precentring on outside)

#### *Note:*

The new EH2 disc wheels (extended Hump 2 inner and outer) will be used more frequently on BMW vehicles in the future as they can also help to delay standard tyres from being lost in the event of a drop in tyre pressure.

Example: from current 1.1 bar to 0.6 bar (X5 or Landrover disc wheel)

### **Emergency running system with integrated support ring**

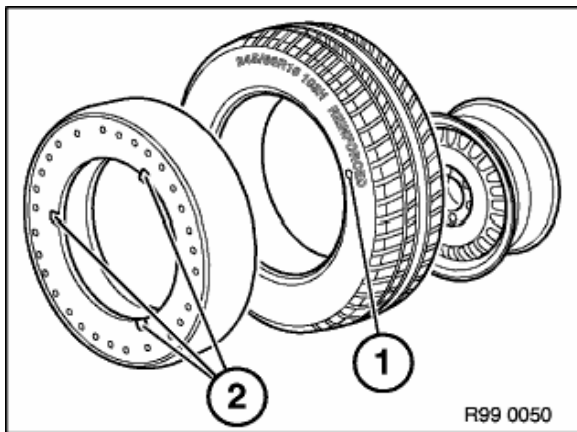
(In the future, primarily on heavy safety vehicles)

The support ring is made of a high-strength resilient plastic and is fitted on the disc wheel inside the tyre. The support ring can only be removed using special tools which have been specially approved by BMW. It can only be removed after destroying the tyre.

Emergency running systems with integrated support ring are used in particular on heavy safety vehicles. They allow the vehicle to be driven away from a potential danger without dropping speed even if the tyres have suffered a complete loss of pressure (flight situation).

It is possible as an option to have the tyre pressure monitored by an RDC system. The RDC is installed by pressing the components into the support ring before it is fitted.

### **Wheel structure with integrated support ring**

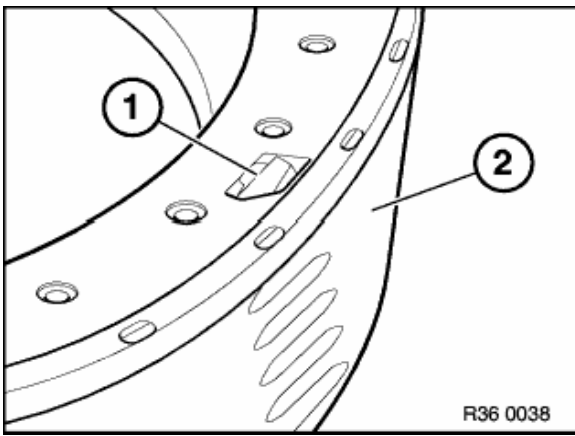


### Emergency running system with integrated support ring

(1) Tyre

(2) Support ring





Installation location of RDC wheel electronic unit

(1) Wheel electronic unit

(2) Support ring

**For further information on the subject of "Tyre pressure warning systems and tyres with emergency running characteristics", please refer to the vehicle Owner's Handbook.**

**A Parts Information bulletin will be published with information on how to order parts.**

**Functional and system descriptions are not subject to change. Parts availability and immediate ordering availability cannot be derived from this information. The specialised departments will inform the markets with further details at the appropriate time.**