

Installation and Operational Instructions for ROBA®-takt clutch brake unit with 'energise to engage' brake Type 67_0_._. Sizes 3 to 7

(B.6.1.EN)

Please read these Operational Instructions carefully and follow them accordingly!

Ignoring these instructions may lead to malfunctions or to failure of the clutch brake unit, resulting in damage to other parts.

These Installation and Operational Instructions (I + O) are part of the delivery.

Please keep them handy and near to the clutch brake unit at all times.

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Safety and Guideline Signs

DANGER



Immediate and impending danger, which can lead to severe physical injuries or to death.

CAUTION



Danger of injury to personnel and damage to machines.



Please Observe!
Guidelines on important points.



Guidelines on the Declaration of Conformity

A conformity evaluation has been carried out for the product (electromagnetic clutch brake unit) in terms of the EU Low Voltage Directive 2014/35/EU. The Declaration of Conformity is laid out in writing in a separate document and can be requested if required.

Guidelines on the EMC Directive (2014/30/EU)

The product cannot be operated independently according to the EMC directive.

Due to their passive state, brakes and clutches are also non-critical equipment according to the EMC. Only after integration of the product into an overall system can this be evaluated in terms of the EMC.

For electronic equipment, the evaluation has been verified for the individual product in laboratory conditions, but not in the overall system.

Guidelines on the Machinery Directive (2006/42/EC)

The product is a component for installation into machines according to the Machinery Directive 2006/42/EC.

The product can fulfil the specifications for safety-related applications in coordination with other elements.

The type and scope of the required measures result from the machine risk analysis. The product then becomes a machine component and the machine manufacturer assesses the conformity of the safety device to the directive.

It is forbidden to start use of the product until you have ensured that the machine accords with the regulations stated in the directive.

Guidelines on the EU Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment

The product as well as the rectifiers / microswitches / proximity switches required for control / self-monitoring fulfil the requirements laid down in the EU Directive 2011/65/EU (RoHS) (restrictions on the use of certain hazardous substances, such as lead (0.1 %), mercury (0.1 %), cadmium (0.01 %), hexavalent chromium (0.1 %), polybrominated biphenyls (PBB) (0.1 %), polybrominated diphenylethers (PBDE) (0.1 %)). In addition, the substances listed in the delegated Directive 2015/863 EU – 22 July 2019, Di(2-ethylhexyl)phthalate (DEHP) (0.1 %), butylbenzylphthalate (BBP) (0.1 %), dibutylphthalate (DBP) (0.1 %) and diisobutylphthalate (DIBP) (0.1 %) are also not included.

Guidelines on the ATEX Directive

Without a conformity evaluation, this product is not suitable for use in areas where there is a high danger of explosion.

For application of this product in areas where there is a high danger of explosion, it must be classified and marked according to Directive 2014/34/EU.

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Safety Regulations

These Safety Regulations are user hints only and may not be complete!

General Guidelines

DANGER



Danger of death!
Do not touch voltage-carrying lines and components.

Clutches may generate further risks, among other things:



Hand injuries



Danger of seizure



Contact with hot surfaces



Magnetic fields

Severe injury to people and damage to objects may result if:

- ☐ the clutch brake unit is used incorrectly.
- ☐ the clutch brake unit is modified.
- ☐ the relevant standards for safety and / or installation conditions are ignored.

During the risk assessment required when designing the machine or system, the dangers involved must be evaluated and removed by taking appropriate protective measures.

To prevent injury or damage, only specialist personnel are allowed to work on the components.

They must be familiar with the dimensioning, transport, installation, inspection of the clutch equipment, initial operation, maintenance and disposal according to the relevant standards and regulations.



Before product installation and initial operation, please read the Installation and Operational Instructions carefully and observe the Safety Regulations. Incorrect operation can cause injury or damage. At the time these Installation and

Operational Instructions go to print, the clutch brake units accord with the known technical specifications and are operationally safe at the time of delivery.

- ☐ Technical data and specifications (Type tags and documentation) must be followed.
- ☐ The correct connection voltage must be connected according to the Type tag and wiring guidelines.
- ☐ Check electrical components for signs of damage before putting them into operation. Never bring them into contact with water or other fluids.
- ☐ Please observe the EN 60204-1 requirements for electrical connection when using in machines.



Only carry out installation, maintenance and repairs in a de-energised, disengaged state and secure the system against inadvertent switch-on.

Guidelines for Electromagnetic Compatibility (EMC)

In accordance with the EMC directives 2014/30/EU, the individual components produce no emissions. However, functional components e.g. mains-side energisation of the clutch brake units with rectifiers, phase demodulators, ROBA®-switch devices, ROBA®-takt control units, ROBA®-takt circuit modules or similar controls can produce disturbance which lies above the allowed limit values. For this reason it is important to read the Installation and Operational Instructions very carefully and to keep to the EMC directives.

Application Conditions



The catalogue values are guideline values which have been determined in test facilities. It may be necessary to carry out your own tests for the intended application. When dimensioning the clutch brake units, please remember that installation situations, braking torque fluctuations, permitted friction work, bedding-in condition / conditioning of the brake linings and wear as well as general ambient conditions can all affect the given values. These factors should therefore be carefully assessed, and alignments made accordingly.

- ☐ Mounting dimensions and connection dimensions must be adjusted according to the size of the clutch brake unit at the place of installation.
- ☐ The clutch brake units are designed for a relative duty cycle of 100%.
- ☐ The braking torque is dependent on the current bedding-in condition of the brake. Bedding in / conditioning of the friction linings is necessary.
- ☐ The clutch brake units are only designed for dry running. The torque is lost if the friction surfaces come into contact with oil, grease, water or similar substances or any other foreign bodies.

CAUTION



The friction surfaces may rust up and seize up in corrosive ambient conditions and / or after longer downtimes.
The user is responsible for taking appropriate countermeasures.

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Climate Conditions

The ROBA®-takt clutch brake unit is suitable for applications with an ambient temperature of between -20 °C and +40 °C.



Reduction in torque possible

Condensation can form on the friction surfaces and cause a loss in torque:

- ☐ due to fast changes in temperature
- ☐ at temperatures of around or under freezing point

The user is responsible for taking appropriate countermeasures (e.g. forced convection, heating, drain screw).



Malfunction of ROBA®-takt clutch brake unit possible

Condensation can form on the friction surfaces and cause malfunctions:

- ☐ at temperatures around or under freezing point, the clutch brake unit can freeze over and not disengage any more.

The user is responsible for taking appropriate countermeasures (e.g. forced convection, heating, drain screw).

Intended Use

mayr®-clutch brake units have been developed, manufactured and tested in compliance with the DIN VDE 0580 standard and in accordance with the EU Low Voltage Directive as electromagnetic components. During installation, operation and maintenance of the product, the requirements for the standard must be observed. mayr®-clutch brake units are for use in machines and systems and must only be used in the situations for which they are ordered and confirmed. Using them for any other purpose is not allowed.

Earthing Connection

The clutch brake unit is designed for Protection Class I. This protection covers not only the basic insulation, but also the connection of all conductive parts to the protective conductor (PE) on the fixed installation. If the basic insulation fails, no contact voltage will remain. Please carry out a standardised inspection of the protective conductor connections to all contactable metal parts!

Class of Insulation F (+155 °C)

The insulation components on the magnetic coils are manufactured at least to class of insulation F (+155 °C).

Protection IP55

Dust-proof and protected against contact as well as against jet water from a nozzle coming from any direction.

Storage of ROBA®-takt clutch brake units

- ☐ Store the clutch brake units in a horizontal position, in dry rooms, dust and vibration-free.
- ☐ Relative air humidity < 50 %.
- ☐ Temperature without major fluctuations within a range from -20 °C up to +40 °C.
- ☐ Do not store in direct sunlight or UV light.
- ☐ Do not store aggressive, corrosive substances (solvents / acids / lyes / salts / oils / etc.) near to the brakes.

For longer storage of more than 2 years, special measures are required (please contact the manufacturer).

Storage acc. DIN EN 60721-3-1 (including the limitations / additions described above): 1K3; 1Z1; 1B1; 1C2; 1S3; 1M1

Handling

Before installation, the clutch brake unit must be inspected and found to be in proper condition.

The clutch brake unit function must be inspected both **once attachment has taken place** as well as **after longer system downtimes**, in order to prevent the drive starting up against possibly seized friction surfaces.

User-implemented Protective Measures:

- ☐ Please cover moving parts to protect **against injury through seizure**.
- ☐ Attach a cover to protect **against injury through high temperatures** on the housing
- ☐ **Protection circuit:** When using DC-side switching, the coils must be protected by a suitable protection circuit according to VDE 0580, which is integrated in mayr®-rectifiers. To protect the switching contact from consumption when using DC-side switching, additional protective measures are necessary (e.g. series connection of switching contacts). The switching contacts used should have a minimum contact opening of 3 mm and should be suitable for inductive load switching. Please make sure on selection that the rated voltage and the rated operating current are sufficient. Depending on the application, the switching contact can also be protected by other protection circuits (e.g. mayr®-spark quenching unit, half-wave and bridge rectifiers), although this may of course then alter the switching times.
- ☐ Install additional protective measures **against corrosion** if the clutch brake unit is subject to extreme ambient conditions or is installed in open air conditions, unprotected from the weather.
- ☐ Take precautions **against freeze-up of the friction surfaces** in high humidity and at low temperatures.

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Standards, Directives and Regulations Used and To Be Applied

DIN VDE 0580	Electromagnetic devices and components, general specifications
2014/35/EU	Low Voltage Directive
CSA C22.2 No. 14-2010	Industrial Control Equipment
UL 508 (Edition 17)	Industrial Control Equipment
EN ISO 12100	Safety of machinery – General principles for design - Risk assessment and risk reduction
DIN EN 61000-6-4	Interference emission
DIN EN 61000-6-2	Interference immunity

Liability


The information, guidelines and technical data in these documents were up to date at the time of printing. Demands on previously delivered brakes are not valid. Liability for damage and operational malfunctions will not be taken if:

- the Installation and Operational Instructions are ignored or neglected.
- the clutch brake units are used inappropriately.
- the clutch brake units are modified.
- the clutch brake units are worked on unprofessionally.
- the clutch brake units are handled or operated incorrectly.

Guarantee

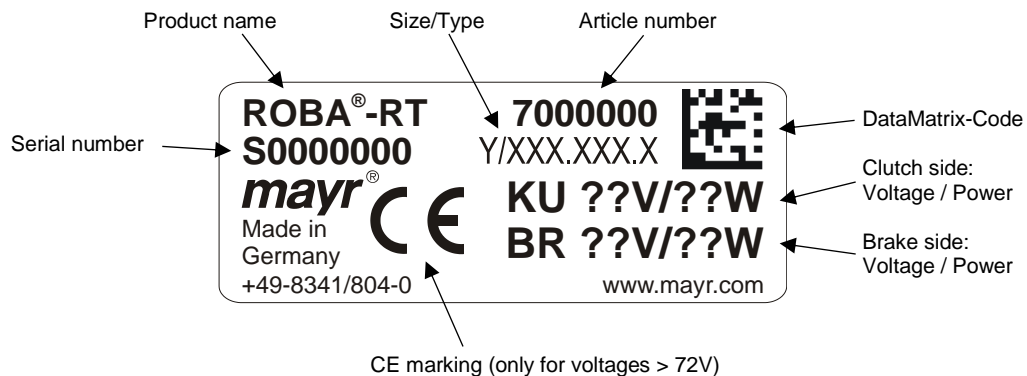
- ☐ The guarantee conditions correspond with the Chr. Mayr GmbH + Co. KG sales and delivery conditions.
- ☐ Mistakes or deficiencies are to be reported to *mayr*® at once!

CE Identification

 according to the Low Voltage Directive 2014/35/EU

Identification

mayr® components are clearly marked and described on the Type tag:



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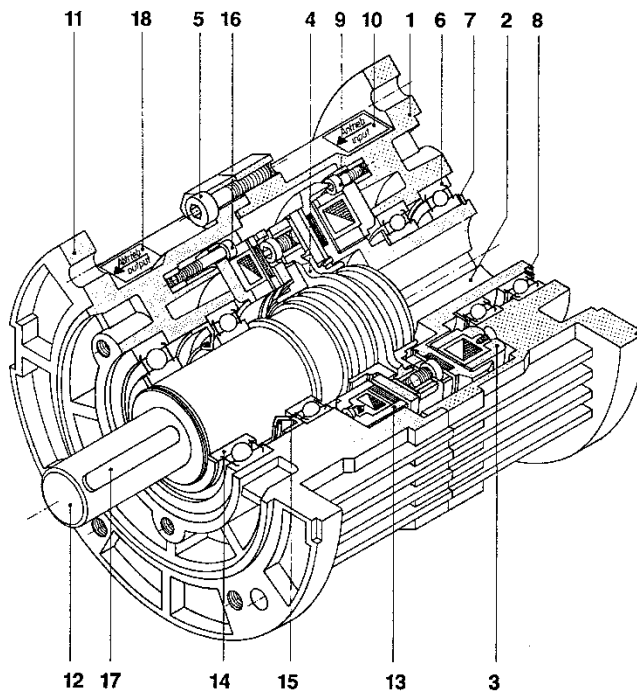


Fig. 1

Parts List (Only use mayr® original parts)

Item	Name
1	Housing, drive
2	Drive shaft
3	Coil carrier, clutch
4	Automatic re-adjustment
5	Cap screw
6	Deep groove ball bearing
7	Shim rings
8	Locking ring
9	Cap screw
10	Guideline sign, drive
11	Housing, output
12	Output shaft
13	Coil carrier, brake
14	Deep groove ball bearing
15	Radial shaft sealing ring (acc. design)
16	Cap screw
17	Key
18	Guideline sign, output

Design

The ROBA®-takt clutch brake unit consists of an 'energise to engage' clutch and an 'energise to engage' brake. The electrical connection is produced via a terminal box with a 4-pole terminal. The clutch brake unit is completely enclosed and complies with Protection IP55, the dimensions of the flanges and shafts correspond to the IEC dimensions.

Due to the patented principle of automatic re-adjustment, the ROBA®-takt clutch brake unit is maintenance-free for the entire service lifetime of the clutch and brake.

The clutch brake units are delivered manufacturer-assembled and set ready for installation.

Function

On continuously running drive machines, the output is coupled and braked alternately.

Coupling:

The magnetic coil in the clutch is energised, the magnetic coil in the brake must be voltage-free.

The rotating drive shaft (2) attracts the armature disk. The torque is transmitted via frictional locking from the drive shaft (2) via the armature disk onto the output shaft (12).

Braking:

The brake coil is energised, the clutch coil must be voltage-free. The armature disk is attracted by the fixed brake coil carrier (13). The output shaft (12), which is connected with the armature disk via disks, is braked.

The drive shaft (2) runs continuously.

Ambient Conditions

- ☐ ROBA®-takt clutch brake units are designed for dry running.
- ☐ Ambient temperature: -20 °C up to +40 °C

CAUTION



At temperatures of around or under freezing point (ambient temperatures of -20 °C up to +5 °C), both condensation and the special characteristics of the linings (lower friction values at lower temperatures) can strongly reduce the torque. During longer downtimes, the friction linings can stick to the friction surfaces. The user is responsible for taking appropriate countermeasures.

An ambient temperature of +40 °C should not be exceeded if the device is run with friction work values in the area of the max. permitted values.

CAUTION



Higher temperatures lead to unpermitted strong heat-up with friction work values in the limit area.

Torque

The torque (catalogue value) is not achieved until after the run-in procedure has been carried out.

Normally, this requires approx. 100 switching actions in dynamic operation. In new condition, approx. 50 % of the torque (M_2) stated in the catalogue is transmitted. Clutch brake units in static or virtually static operation (i.e. low friction work) do not transmit the full torque (M_2) stated in the catalogue.

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Electrical Connection

The electrical connection of the clutch and brake coil is produced in the standard series via a 4-pole terminal, which is installed in the terminal box.

When wiring the clutch brake unit, please make sure that the clutch and brake are not energised at the same time.

Both coils can be energised either directly via a present source of DC voltage while observing the required slope separation, or by using a ROBA®-takt control unit or ROBA®-takt circuit module.

The ROBA®-takt control unit and the ROBA®-takt circuit module are supply and control devices for quick switching of the clutch and brake coil:

- ❑ The ROBA®-takt control unit is mains connection-side (230 VAC) and offers adjustable slope separation between the clutch and the brake as well the possibility to switch the 24V coils quickly via overexcitation.
- ❑ The ROBA®-takt circuit module does not have an overexcitation function and requires a coil voltage of 24 VDC supply-side.

Both Wiring Diagrams and Installation and Operational Instructions are part of the device delivery.

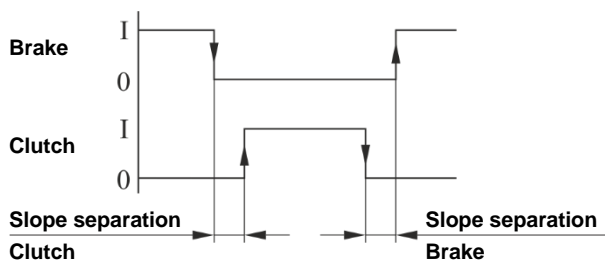


Diagram 1



The slope separation avoids simultaneous occurrence of clutch and braking torques.

Table 1

ROBA®-takt	Size	3	4	5	6	7
Slope separation with overexcitation [ms]		29	33	43	65	106
Slope separation without overexcitation [ms]		22	28	37	52	95

When electromagnetic devices are switched off, cut-off peaks may occur. These can lead to destruction of the device and must therefore be damped. The damping can have a negative effect on the switching times stated in the catalogue. Ensure that the voltage supply is fused acc. the current values.

Installation

Clutch brake unit with flange:

The shafts, centerings, screw-on pitch circles and flange diameters are produced acc. IEC standard.

The drive and output sides can be screwed together with the respective flanges of the motor, the gearbox or other clutch brake units without any problems, see Fig. 2.

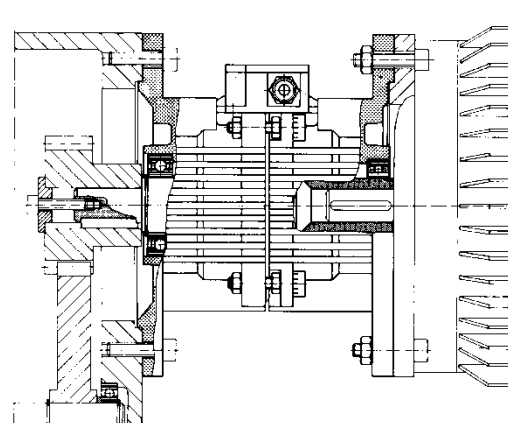


Fig. 2

Installation of the drive elements:

The drive elements are mounted onto the respective shafts and secured axially via a press cover and a screw screwed into the threaded centre hole of the shaft, see Fig. 3.

For the combination motor shaft - ROBA®-takt hollow shaft, the motor shaft must be greased slightly to prevent fretting corrosion (copper paste is recommended).

Pressing the drive elements or mounting via hammer blows are not permitted, as the shaft bearings might be damaged.

Radial loads acting on the shaft via the drive elements must not exceed the permitted values (see chapter "Permitted Shaft Load").

Should both radial and axial loads be present on the shaft, the permissible loads must be determined (please contact the manufacturers).

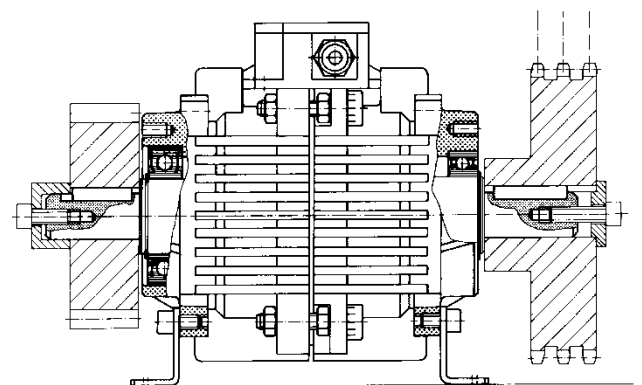


Fig. 3

Installation and Operational Instructions for ROBA®-takt clutch brake unit with 'energise to engage' brake Type 67_0_._. Sizes 3 to 7

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Permitted Shaft Load

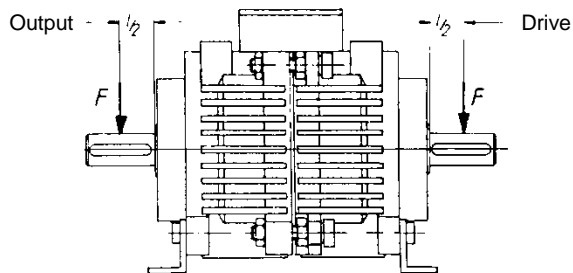


Fig. 4

The drive elements located on the shafts exert a radial load during operation which has to be absorbed by the bearings of the clutch brake unit.

The force value is limited by the required bearing service lifetime and by the shaft strength (Table 2).

For determining the permitted radial force, the force application is assumed to apply in the centre of the shaft. If additional axial forces occur, extensive calculation is necessary (please contact the manufacturers).

The permitted radial forces stated in Table 3 refer to a speed of $n = 1500$ rpm and a bearing service lifetime $L_h = 10000$ hours.

For different speed or bearing service lifetime values, the permitted force F can be calculated using the factor k . The factor k can be determined using Diagram 2.

$F = k \times F_N \leq F_{\max} \text{ [N]}$		
F [N]	= Permitted radial force	
k [-]	= Correction factor	Diagram 2
F_N [N]	= Permitted radial force with speed $n = 1500$ rpm and bearing service lifetime $L_h = 10000$ hours	Table 3
F_{\max} [N]	= Max. permitted radial force, limited due to shaft strength	Table 2

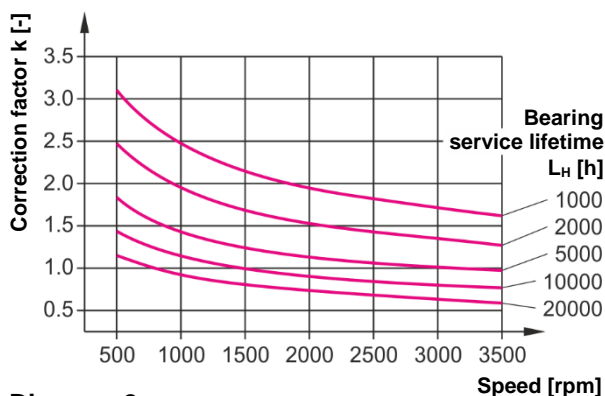


Diagram 2

Table 2: Max. permitted radial force F_{\max} limited due to the strength of the shaft, force application in the shaft centre

ROBA®-takt		Size	3	4	5	6	7
Radial force F_N [N]	Drive shaft without IEC-flange		436	547	681	819	1149
	Output shaft without IEC-flange		788	1052	1484	1685	2861
	Output shaft small IEC-flange		840	1134	1586	1785	3115
	Output shaft large IEC-flange		788	1052	1484	1685	2861

Table 3: Permitted radial force F_N with
speed $n = 1500$ rpm,
bearing service lifetime $L_h = 10000$ hours
and force application in the shaft centre

ROBA®-takt		Size	3	4	5	6	7
Max. permitted radial force F_N [N]	Drive shaft without IEC-flange		333	995	2150	2705	5355
	Output shaft without IEC-flange		333	1105	2331	2950	6211
	Output shaft small IEC-flange		-	-	-	-	-
	Output shaft large IEC-flange		333	1105	2331	2950	6211

Disposal

Our clutch brake unit components must be disposed of separately as they consist of different materials. Please also observe the relevant authority regulations. Code numbers may vary according to the disassembling process (metal, plastic and cables).

Electronic Components (Rectifier/ ROBA®-switch):

Products which have not been disassembled can be disposed of under Code No. 160214 (mixed materials) or components under Code No. 160216, or can be disposed of by a certified disposal firm.

Coil carriers (steel pads with coil/cable) and all other steel components:

Steel scrap (Code No. 160117)

All aluminium components:

Non-ferrous metals (Code No. 160118)

Brake and clutch rotors (steel or aluminium pads with friction linings):

Brake linings (Code No. 160112)

Seals, O-rings, V-seals, elastomers:

Plastic (Code No. 160119)