BM Industrial Metal separation systems

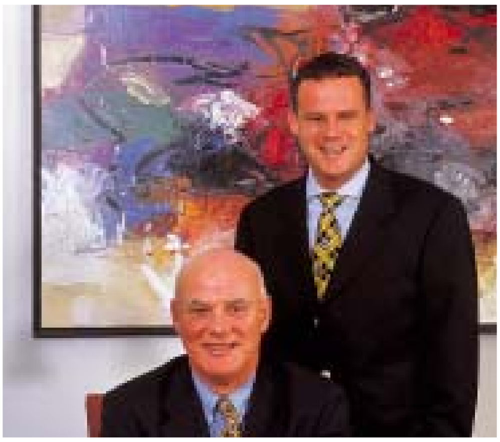
Separation systems for waste processing and recycling industries

[for ferrous and non-ferrous metals]

BM Bakker Magnetics

Contents list

BUSINESS PROFILE



GERARD H. BAKKER & GEERT-JAN BAKKER

BAKKER MAGNETICS,
SPECIALISTS IN MAGNETS AND
MAGNET SYSTEMS

Bakker Magnetics has been active as a supplier and manufacturer of magnetic materials and industrial systems for over 25 years. During that period the company has evolved into one of the leading manufacturers in this field in Europe. Quality, innovation, supply reliability, the product range and service have constituted the main pillars of strength over the years.

Gerard H. Bakker founded the company in 1971. Since its inception the company has enjoyed a continuous controlled growth. From the beginning we have focused on strengthening and expanding the Marketing and Sales organisation. At present, Bakker Magnetics is active in a large number of countries throughout the world. In order to be able to offer maximum service and support locally to customers in the application of our products, we have, over the years, established facilities in Belgium, Germany, France, Great Britain, Norway and Spain. In addition we have established a fine network of carefully chosen specialised local distributors in Europe, the United States and in the Far East.

Next to the Sales organisation, Bakker Magnetics has invested heavily in technical knowledge. A specialised and well-trained staff of engineers forms the backbone of the company. The development of new products and the optimisation of existing ones are the ongoing processes within the company. Where necessary or when required, we will work in conjunction with research centres, both at home and abroad, in order to expand the field of knowledge, and to maintain this level. Also our customers can benefit from the knowledge gathered by Bakker Magnetics. Experienced application engineers are able to support the manufacturers of products requiring magnets and magnet systems, in order to optimise these products.

In the eighties, Bakker Magnetics was one of the first companies in this field to introduce the computer for finite element calculations of complex magnet systems. Apart from a considerable reduction in the development time, the quality level was also distinctly enhanced. At the same time CAD-systems and systems for the statistical processing of measuring data were also introduced. The international lead that Bakker Magnetics has established in this area, is best reflected in the vast export share of the total turnover.

An integrated quality control process within the Bakker Magnetics organisation guarantees the quality level of all company disciplines from development, production and logistics through to sales and service.
Therefore, it is not surprising that Bakker Magnetics was the first company in this field to be awarded ISO 9001 certification for total integral quality procedures within the company.

The procedures needed for Bakker Magnetics obtaining QS 9000 certification are currently at an advanced stage of development.

BVQi ISO 9001 Accredited by the Dutch Council for Accreditation

METAL SEPARATION SYSTEMS
WASTE PROCESSING AND RECY

FOR
YCLING INDUSTRIES

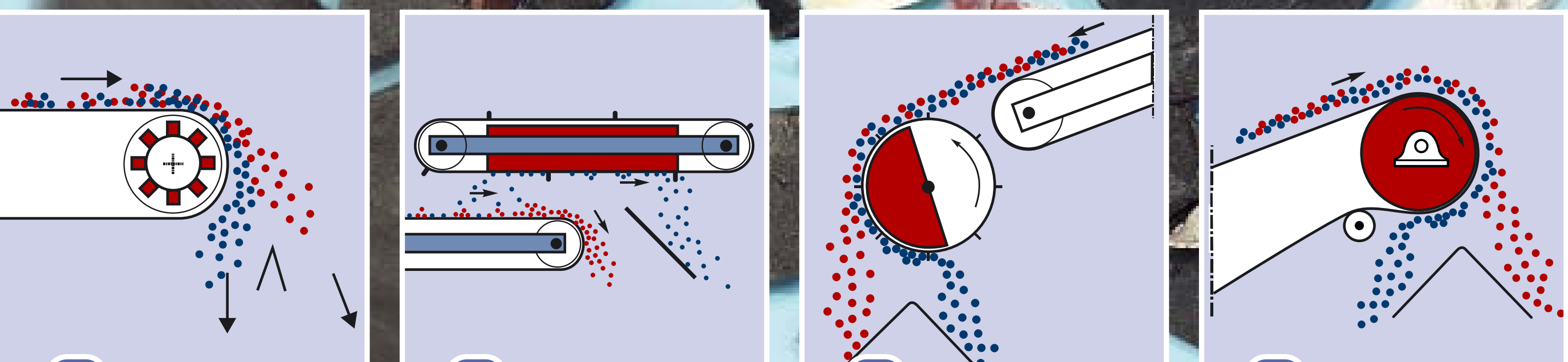
CYCLE: FROM WASTE PROBLEM TO AN ECONOMIC PROFITABLE INDUSTRY

Society produces an enormous amount of waste matter. Particularly the use of packaging materials has increased to a large extent in recent times. Initially this waste was taken to refuse dumps. However, different authorities needed to put a check to this procedure as it became obvious that the limits in this growth of waste had been reached. A reduction in the amount of waste could be achieved by incineration. It was concluded that the mountain of waste contained many useful materials suitable for recycling. Especially as non-ferrous metals are so valuable, separation proved to be very profitable. Various methods and techniques are being applied in order to separate useful materials from the waste flow.

People continue to recognise that it is the consumer who should separate waste products initially. Separation of paper, glass, chemical and kitchen and garden waste by the consumer has proved very positive. At this stage, further separation is not efficient. The residual waste, not counting the afore-mentioned waste matter, is suitable for further separation by the waste processing industry. Before incineration this residual waste often goes through a separation process. After arriving at the waste processing plant, useful components are removed from the waste flow. In this regard, ferrous metals such as iron, sheet metal, steel, etc. are of main consideration. For this purpose de-ironing systems, such as drum magnet and overbelt magnet systems are available. Subsequently an eddy current removing system makes it possible to remove non-ferrous metals from the waste flow.

Separation preceding incineration has the advantage of an increased yield, e.g. of aluminium, of which a significant part is lost during incineration.
In addition, separation following incineration requires a significantly larger net throughput.

Through modern insight, the control of waste flows has evolved from an environmental necessity into an industry, allowing profitable returns. Because of price-rises in raw materials and the development of new techniques in recent years, recovery of useful materials from waste flows has become an economic industry of increasing importance. Moreover, the energy required for recycling metals such as iron, aluminium and similar metals has proved to be a fraction of the energy needed for processing ores to "new" metals. Apart from aspects such as the environment and the recycling of raw materials, other considerations play a role in the removal of metals during industrial processes such as the protection of expensive machinery against damage, caused by metal particles in the material flows. This brochure gives an idea of the state of technical development in metal removal systems, suitable for entering the new millennium. In this regard an important role is reserved for the eddy current non-ferrous metal removing systems.


1
2
3
4

BM DELIVERY PROGRAMME

BM EDDY CURRENT SEPARATING SYSTEMS

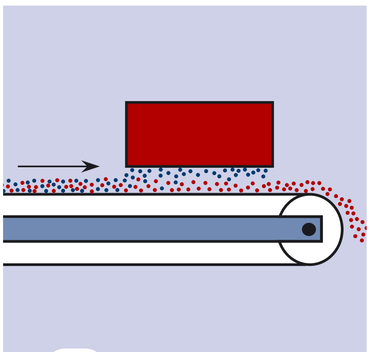
The principle of the action of the eddy current separating systems is based on the difference in electric conduction of metals and non-metals. With the eddy current separator a belt conveyor leads the waste flow towards a fast rotating induction pulley with a large number of magnets, arranged in opposite pairs of pole pitches. The induction rotor produces a rapidly alternating magnetic field, causing an eddy current of the metal particles in the waste flow. This eddy current works in the opposite direction to the nearest pole of a magnet in the induction roll.

As is well known, equal poles exert a repulsive force through which the metal particles are actually launched out of the waste flow. Materials with a comparatively weak conduction are hardly or not influenced by the generated magnetic field and therefore drop straight down. Depending on the density the metal parts are bent out of the waste flow. In practice an optimal removal can be achieved through adjustment of the separator. In addition, apart from the electrical properties, the density of the material to be removed must also be taken into account. [1]

Eddy current separating systems of the previous generation were only capable of separating larger non-ferrous particles, exceeding ca. 9 mm, from the waste. Bakker Magnetics' new generation separators however have a significant increased yield, since particles as small as 2 mm can now be removed successfully from the waste flow.
In addition a "wet eddy current removal system" is in the final stage of the development trajectory. This patented system makes it possible to separate even smaller particles.

BM OVERBELT MAGNET SYSTEMS

Overbelt magnet systems are mainly used to de-iron materials on conveyor belts. For this purpose they are placed above the conveyor belt. The magnet system removes the iron particles from the passing flow of waste. A bypass belt moves the iron particles out of the magnetic field, through which the particles drop so that they can be collected.



5

Bakker Magnetics' Overbelt magnet systems are standard, equipped with powerful permanent magnetic block magnets. Electromagnetic systems can be delivered on request. [2]

BM DRUM MAGNETS

The drum magnet, also called separation drum, contains two sectors: a magnetic and a non-magnetic sector. Around this system a drum rotates onto which the flow of materials is dropped. This material flow is fedd onto the magnetic sector of the drum. The magnetic field forces the iron particles to remain longer on the drum. The iron will drop after a delay, after leaving the magnetic sector, so that it can be collected separately. Bakker Magnetics' drum magnets are standard, equipped with a strong permanent magnet system. Also drum magnets in a housing can be supplied as standard. [3]

BM HEADROLLER MAGNETS

The magnetic headroller can serve instead of the drive roll at the dumping point of the conveyor belt. The image clearly shows that the magnetic headroller attracts the iron particles from the flow of materials, after which they are transported to the lower part of the conveyer belt. As the iron leaves the head-roll further down than the non-attracted matter, it can be collected separately. Bakker Magnetics' headroller magnets are standard, equipped with a strong permanent magnet system. [4]

BM BLOCK MAGNETS

BM block magnets can be applied to de-iron material flows on conveyor belts, at a free fall, on guide plates, vibrating feeders, etc. Bakker Magnetics' block magnets are standard, equipped with a strong permanent magnet system. Electromagnetic systems can be delivered on request. [5]

MODULAR SYSTEM CONCEPT

Bakker Magnetics' new, recently introduced generation eddy current non-ferrous separators, have been incorporated in a modular system concept. This means that the various system elements can be mounted in the same base frame. This concept allows you to modify the configuration of the removal system, quickly and efficiently. In addition to this the modular structure makes it possible to incorporate (elements of) the system easily into existing plants. This construction also significantly simplifies maintenance of the system, allowing easy replacement, e.g. of the conveyor and the reverse drum.

STRUCTURE OF THE NON-FERROUS SEPARATION SYSTEM

The base of the modular system consists of two steel support girders, which, together with the box girders, make up the frame of the system.
Both sides of the frame have mounting plates for assembling the modular separation units, a vibrating feeder and/or a magnet drum for removing the iron particles from the flow of material. This base ensures a solid and stable seat for the system. Great attention has been paid to an effective seal , to prevent pollution in the various parts caused by dust formation. For this the system is fitted with a two-sided dust seal. Also for the driving and reverse drum measures are provided to avoid pollution.

CONVEYOR BELT WITH INTEGRATED MAGNET ROTOR

The conveyor belt is controlled by means of a curved drive roll. The belt tension can be adjusted easily. Two switches, mounted at the bottom side of the conveyor, monitor the running of the belt. It is driven by a loose, 2.2 kW motor, which is installed onto a sledge on the inside of the conveyor. Driving takes place by an entirely shielded drive belt. The conveyor itself is a heatproof, wear-resistant PU belt, fitted with carriers and edges. The induction roll, also called magnet rotor, is built into a glass-fibre reinforced polyester reverse drum, which is covered with a ceramic coating.

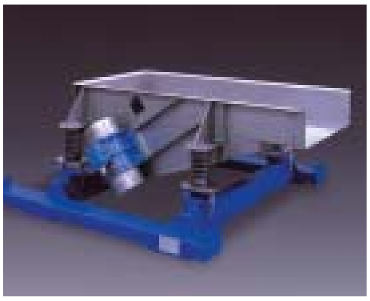
[see the pictures on page 10]

STRUCTURE OF THE NON-FERROUS SEPARATION SYSTEM

CONVEYOR BELT WITH INTEGRATED MAGNET ROTOR.

SEPARATION UNITS

SYSTEM CONTROL



VIBRATING FEEDER

DRUM MAGNET

Separation units

The separation unit is available in 3 different models, depending on the product and the capacity.
The separating plate can be adjusted quickly and easily to almost every position and angle of inclination, using the 'fast-click' positioning system. In this way construction parts do not obstruct the flow of materials.

The system control

The heart of the system control consists of a Siemens Programmable Logic Controller. This PLC contains the powerful CPU (the Central Processing Unit). Through the application of this modern PLC, the number of settings on the non-ferrous separator has extended enormously. It can be operated easily and the results of the settings are displayed on an LCD backlight screen. The settings can be read out in three languages: English, Dutch and German (other languages possible). As the status of the unit is monitored continuously, a safe, effective and reliable operation is guaranteed. Failures and maintenance intervals are reported on the LCD display as well. The software provides 3 password levels. Apart from the digital operation, the control panel has two continuously variable frequency controls: one 2.2 kW control for the driving of the conveyor belt and another 7.5 kW control with brake option for driving the induction roll.
Four different pre-select settings can be entered.
These parts are incorporated into a compact solid system housing.

Vibrating feeder

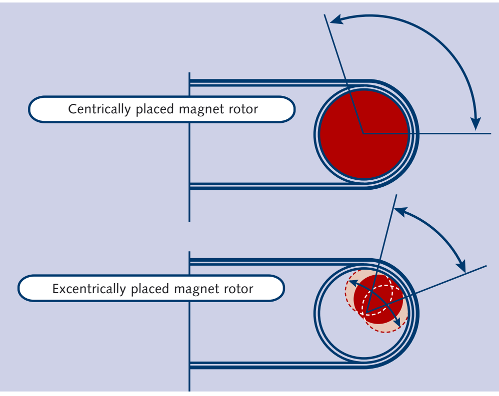
The design of the imbalance vibrating feeder is entirely geared to the ECSM units.
The trough is made of stainless steel AISI304. The vibrating feeders are available in 2 standard lengths: 1,500 resp. 2,500 mm.

Drum magnet

The drum magnet links up perfectly with the modular design of both the ECSM conveyor belt and the vibrating feeders.
The supplied support beams must be used if the drum magnet needs to be positioned directly before the conveyor belt. If the drum magnet has to be placed in front of the vibrating feeder, this must be mounted onto the support frame of the hopper.
The standard system is equipped with a drive motor and a division plate.

Bakker Magnetics has at its disposal simulation software for Windows, allowing you for example, to visualise discharge curves. This software also offers the facility for making grade/recovery calculations. After consultation it can be obtained on a CD-ROM.

MAGNET ROTOR



ADVANTAGES OF A CENTRICALLY PLACED MAGNET ROTOR COMPARED TO AN EXCENTRICALLY PLACED SYSTEM:

- NON-FERROUS PARTICLES ARE LIABLE TO REMAIN IN THE MAGNETIC FIELD FOR A LONGER TIME; THIS LARGER WORKING RANGE RESULTS IN A BETTER GRADE/RECOVERY RATIO.
- AS A RESULT OF THE NARROW AIR GAP, THE SEPARATION EFFICIENCY APPLIES ESPECIALLY TO THE SMALLER PARTICLES.
- THE ROTOR POSITION DOES NOT NEED TO BE ADJUSTED.

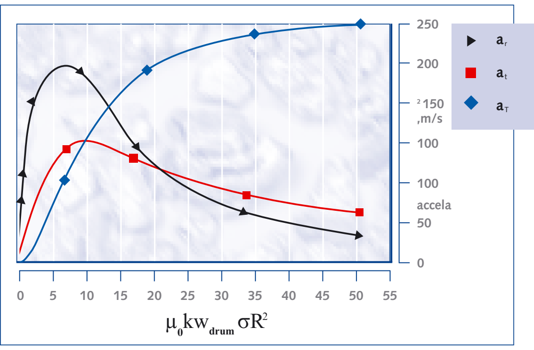
INDUCTION ROTOR

The high-speed induction roll provided with an R-glass or a stainless steel outer jacket, is integrated in the reverse drum. The speed of rotation of the induction rotor can be adjusted continuously and is variable from 500 up to 3000 rpm. The speed is limited electronically to 3000 rpm. The final checks take place at 3500 rpm. The induction rotor has a 7.5 kW Euronorm drive gear and completely shielded side plating. This motor is mounted on the inside of the conveyor belt.

The magnet system of the induction rotor is composed of the strongest magnets currently available: Neodymium quality BM 42. In order to realise the narrowest possible air gap, each individual magnet has a radius. The pole pairs have been optimised using special software for computer simulation, resulting in a very strong alternating magnet field. These properties have led to a very important increase in the effectiveness of Bakker Magnetics' non-ferrous separators. Higher machine speeds are possible if the magnet system inside the induction rotor is centred, allowing a significantly larger effective range of a centric magnet system compared to an excentric positioning. This has a positive effect on the system's capacity. Also the settings of the system do not need to be modified, even if the composition of the flow of materials changes. Great attention has been paid to the durability and reliable functioning of the induction roll and the reverse drum. The reverse drum is made of glass-fibre reinforced polyester, which is covered with a ceramic coating. The drum to a great extent is heat-resistant.

TECHNICAL

Data + Practical examples



ACCELERATION OF ALUMINIUM PARTICLES, CAUSED BY EDDY CURRENT FORCES, CALCULATED FOR THE BAKKER MAGNETICS 18-POLE MAGNET ROTOR.

PRINCIPLE OF THE EDDY CURRENT SEPARATING TECHNOLOGY

In contrast to the rather simple magnet separation, the principle of eddy current separating technology is complex. In order to get a clear insight into the separation technology which push away the metal particles instead of attracting them as is the case with iron particles, one needs to know that Faraday's law of induction applies to magnetic fields. This basic electromagnetic law states that a time-independent magnetic field can induce eddy currents in an electrically conductive particle due to the presence of induced electric field.

According to the Biot-Savart's law, the eddy currents will in return result in magnetic fields that oppose the inducing fields, thereby giving rise to eddy current forces. For a large conductor, say more than 10 mm in diameter, this is the major driving force pushing away the conductor from non-conductive particles.

The eddy current force on a conducting particle is in effect the Lorentz force. For a sufficiently small volume of a conductor carrying a current density *j* in a magnetic field *Ba*, *Ba* can be calculated as folows:

$f = j \times Ba\ dV$

If the current density distribution within a particle is known, this force on the particle could be calculated easily by integrating its volume *V*:

$$F = \int_V \mathbf{f} = \int_V j \times B^a\ dV$$

The torque *T*, exerted by the magnetic field on the conductive particle, can be determined using the following formula:

$$T = \int_V r \times \mathbf{f} = \int_V r \times (j \times B^a)\ dV$$

In this formula *r* represents the distance to the mass centre of the particle.

The acceleration, caused by eddy current forces on spherical aluminium particles of different sizes, has been calculated for the Bakker Magnetics 18-pole magnet rotor. The results are shown in the above graph.

In this graph *ar* represents the radial acceleration due to the radial component of the eddy current force, at is the tangential acceleration due to the tangential component of the eddy current force and *aT* is the acceleration component, caused by the exerted eddy current torque.

The results show that for smaller particles (< 5 mm) the radial force is the dominant force in particle acceleration, whilst the eddy current torque makes the particles rotate. The reason why the size of the particles is the most significant variable, is due to the fact that eddy current forces depend more on the

DEPENDENCY OF THE PARTICLE-SIZE FOR THE VARIOUS FORCES

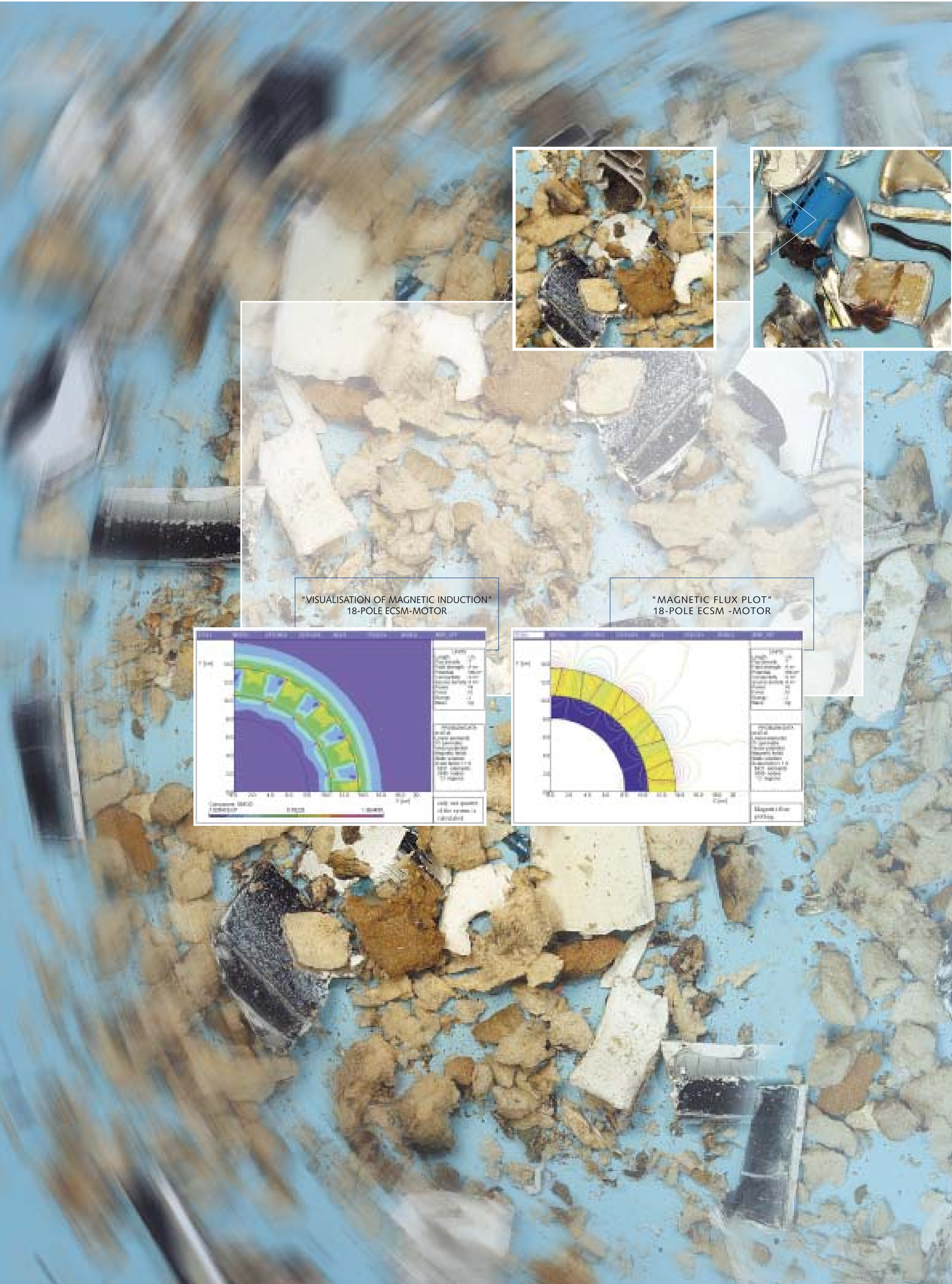
Name	Symbol	Relation
Radial eddy current force	F_r	$F_r \sim d_p^7$
Tangential eddy current force	F_t	$F_t \sim d_p^5$
Force from eddy current torque	F_T	$F_T \sim d_p^4$
Force of gravity	F_g	$F_g \sim d_p^3$
Resistant force	F_{drag}	$F_{drag} \sim d_p^2$

particle-size than the other exerted forces. The table above shows the dependency of the different forces as a function of the particle-size (dp).

From this we can deduce that a selective separation of various metals and non-metals in a rotating eddy current separator is determined by the competition between the eddy current force on the one hand and the remaining forces on the other. In a metal/non-metal removing system, making use of a rotating eddy current magnet rotor,the following relations apply in order to realise a selective separation.

$$F_e^C >> \sum_{i=1}^{n} F_{ic}^C \qquad F_e^{NC} << \sum_{i=1}^{n} F_{ic}^{NC}$$

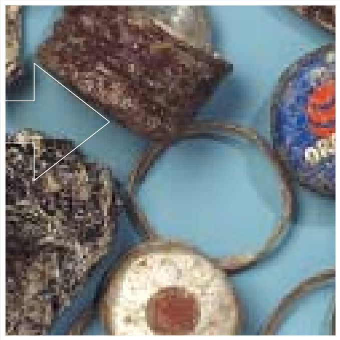
Here F_e^C is the eddy current force exerted on a conductor, F_e^{NC} is the eddy current force exerted on a poor conductor or a non-conductor, F_{ic}^C constitutes the remaining forces on a conductor, whilst F_{ic}^{NC} represents the remaining forces on a poor conductor or a non-conductor. This means that the remaining forces primarily determine the discharge curve of poor and/or non-conductors, whereas eddy current forces mainly define the discharge curve of conductors. The above analysis shows that in practice it can be important to pre-sieve the flow of materials in advance, in order to get the best results. Bakker Magnetics' ECSM units are extremely suitable for removing various metals from non-metals.



"VISUALISATION OF MAGNETIC INDUCTION"
18-POLE ECSM-MOTOR

"MAGNETIC FLUX PLOT"
18-POLE ECSM -MOTOR

Technical data + Practical examples

MAIN FIELDS OF APPLICATION FOR EDDY CURRENT SEPARATORS

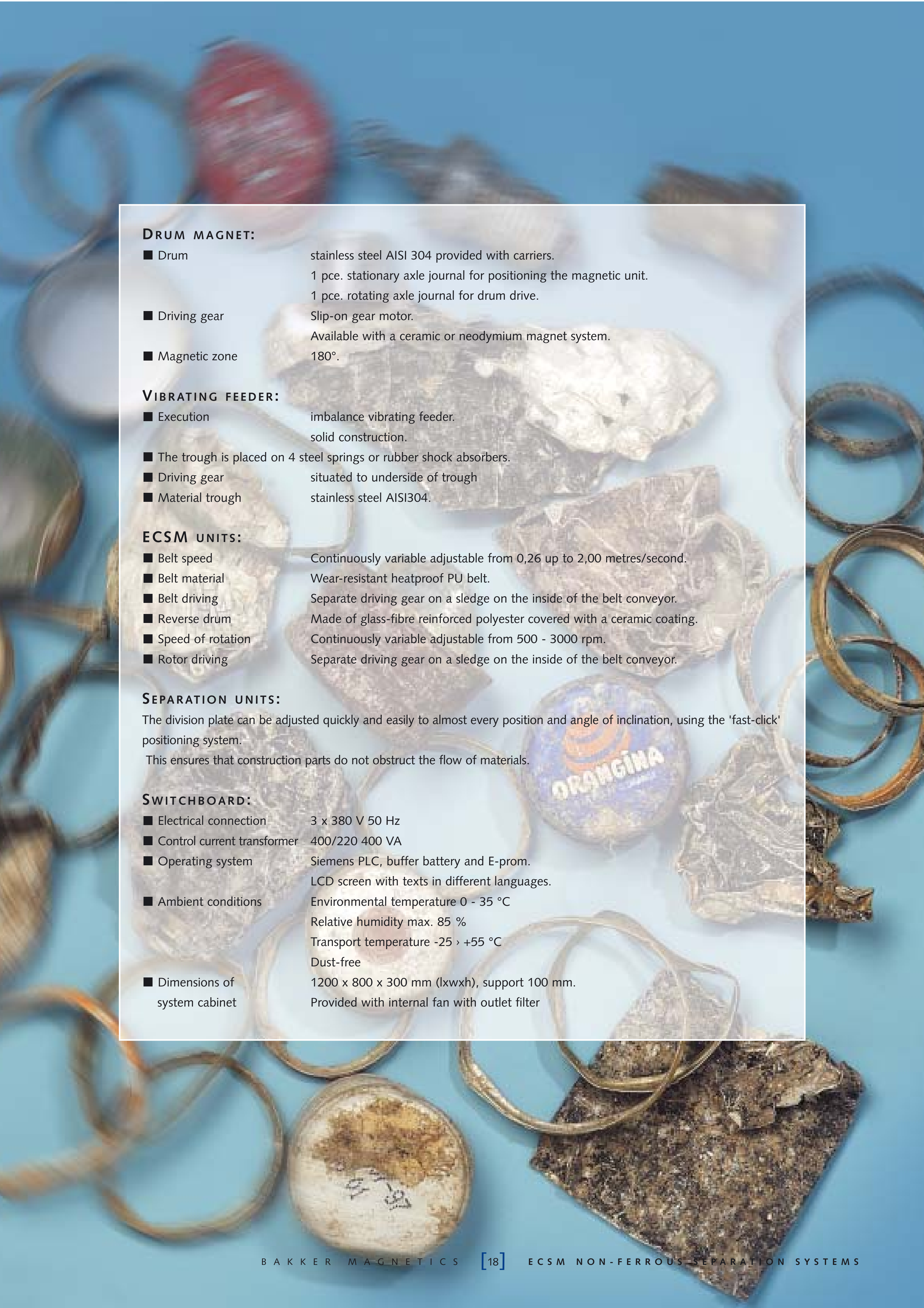
Flow of materials	Magnet rotor type	Particle-size	Capacity
Domestic waste	12	+ ~ 30 mm.	150 m^3/u
Scrap from electronic equipment	18	- ~ 30 mm.	50 m^3/u
Recycling of kitchen appliances	12	+ ~ 30 mm.	150 m^3/u
Shredded wood	12	+ ~ 30 mm.	200 m^3/u
	18	- ~ 30 mm.	100 m^3/u
Shredded plastics	12	+ ~ 30 mm.	160 m^3/u
Car scrap	12	+ ~ 30 mm.	80 m^3/u
	18	+ ~ 10 → 30 mm.	60 m^3/u
	18	- ~ 10 mm.	40 m^3/u
Incineration slags	18	variabel	40-80 m^3/u
Recycling glass	18	+ ~ 20 mm.	50 m^3/u
Cable scrap	18	- ~ 30 mm.	50 m^3/u
Bottom ashes	12	+ ~ 30 mm.	80 m^3/u
	18	+ ~ 10 → 30 mm.	60 m^3/u

The above-mentioned (guidelines for) capacities apply to an ECSM unit, type 1500.

CHARACTERISTICS OF NON-FERROUS EDDY CURRENT SEPARATION

Type of metal	Electr. conductivity	Density	Ratio
Aluminium	0,35	2,7	13,0
Copper	0,59	8,9	6,7
Silver	0,63	10,5	6,0
Zinc	0,17	7,1	2,4
Brass	0,14	8,5	1,7
Tin	0,09	7,3	1,2
Lead	0,05	11,3	0,4

Best results are obtained with electrical high-conducting non-ferrous metals with a low specific weight.



Drum magnet:

■ Drum	stainless steel AISI 304 provided with carriers. 1 pce. stationary axle journal for positioning the magnetic unit. 1 pce. rotating axle journal for drum drive.
■ Driving gear	Slip-on gear motor. Available with a ceramic or neodymium magnet system.
■ Magnetic zone	180°.

Vibrating feeder:

■ Execution	imbalance vibrating feeder. solid construction.

■ The trough is placed on 4 steel springs or rubber shock absorbers.

■ Driving gear	situated to underside of trough
■ Material trough	stainless steel AISI304.

ECSM units:

■ Belt speed	Continuously variable adjustable from 0,26 up to 2,00 metres/second.
■ Belt material	Wear-resistant heatproof PU belt.
■ Belt driving	Separate driving gear on a sledge on the inside of the belt conveyor.
■ Reverse drum	Made of glass-fibre reinforced polyester covered with a ceramic coating.
■ Speed of rotation	Continuously variable adjustable from 500 - 3000 rpm.
■ Rotor driving	Separate driving gear on a sledge on the inside of the belt conveyor.

Separation units:

The division plate can be adjusted quickly and easily to almost every position and angle of inclination, using the 'fast-click' positioning system.

This ensures that construction parts do not obstruct the flow of materials.

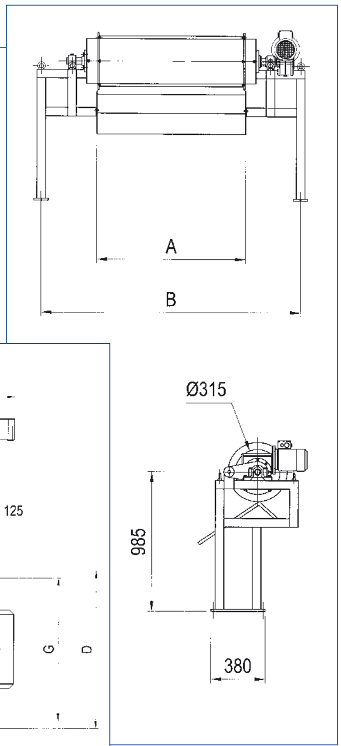
Switchboard:

■ Electrical connection	3 x 380 V 50 Hz
■ Control current transformer	400/220 400 VA
■ Operating system	Siemens PLC, buffer battery and E-prom. LCD screen with texts in different languages.
■ Ambient conditions	Environmental temperature 0 - 35 °C Relative humidity max. 85 % Transport temperature -25 › +55 °C Dust-free
■ Dimensions of system cabinet	1200 x 800 x 300 mm (lxwxh), support 100 mm. Provided with internal fan with outlet filter

ECSM NON-FERROUS SEPARATION SYSTEMS

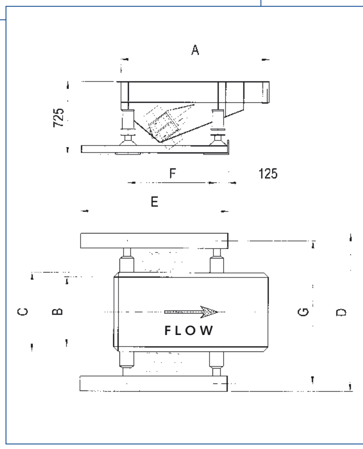
DRUM MAGNET SYSTEMS

Art. N° :	F	M	Weight	Capacity
BM 29.711/30	350	1.130	135 kg.	0,55 kW
BM 29.713/30	650	1.430	185 kg.	0,55 kW
BM 29.714/30	850	1.630	210 kg.	0,55 kW
BM 29.715/30	1.050	1.830	245 kg.	0,55 kW
BM 29.716/30	1.350	2.130	280 kg.	0,55 kW



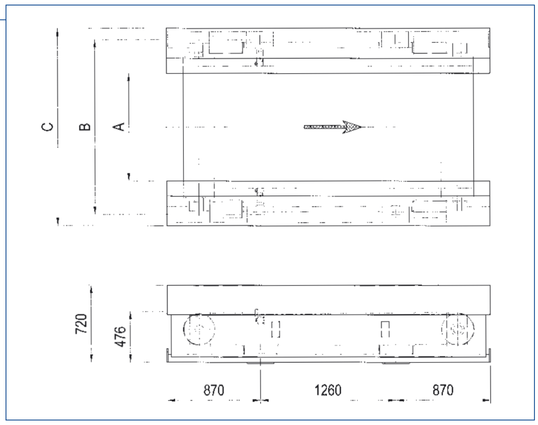
VIBRATING FEEDERS

Art. N° :	A	B	C	D	E	F	G	Weight	Capacity
BM 29.711/20/1500	1.500	400	500	1.280	1.480	885	1130	330 kg.	2x0,7 kW
BM 29.711/20/2500	2.500	400	500	1.280	2.480	1.885	1130	400 kg.	2x0,7 kW
BM 29.713/20/1500	1.500	700	800	1.580	1.480	885	1430	390 kg.	2x0,7 kW
BM 29.713/20/2500	2.500	700	800	1.580	2.480	1.885	1430	560 kg.	2x1,2 kW
BM 29.714/20/1500	1.500	900	1.000	1.780	1.480	885	1630	700 kg.	2x1,2 kW
BM 29.714/20/2500	2.500	900	1.000	1.780	2.480	1.885	1630	810 kg.	2x1,2 kW
BM 29.715/20/1500	1.500	1.100	1.200	1.980	1.480	885	1830	980 kg.	2x1,2 kW
BM 29.715/20/2500	2.500	1.100	1.200	1.980	2.480	1.885	1830	1.380 kg.	2x1,7 kW
BM 29.716/20/1500	1.500	1.400	1.500	2.280	1.480	885	2130	1.540 kg.	2x1,7 kW
BM 29.716/20/2500	2.500	1.400	1.500	2.280	2.480	1.885	2130	1.900 kg.	2x1,7 kW



ECSM-UNITS

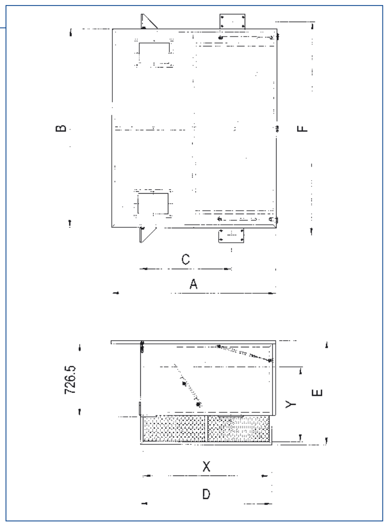
Art. N°:	A	B	C	Weight
BM 29.711	500	1.130	1.340	1.145 kg.
BM 29.713	800	1.430	1.640	1.290 kg.
BM 29.714	1.000	1.630	1.840	1.385 kg.
BM 29.715	1.200	1.830	2.040	1.470 kg.
BM 29.716	1.500	2.130	2.340	1.630 kg.



SEPARATION UNITS

Art. N°:	Type	A	B	C	D	E	F	Weight
BM 29.711/85/1	S-500	1.145	980	510	785	745	1.130	140 kg.
BM 29.711/85/2	N-500	1.645	980	910	1.315	1.035	1.130	200 kg.
BM 29.711/85/3	L-500	2.245	980	1.510	1.915	1.298	1.130	275 kg.
BM 29.713/85/1	S-800	1.145	1.280	510	785	745	1.430	155 kg.
BM 29.713/85/2	N-800	1.645	1.280	910	1.315	1.035	1.430	220 kg.
BM 29.713/85/3	L-800	2.245	1.280	1.510	1.915	1.298	1.430	300 kg.
BM 29.714/85/1	S-1000	1.145	1.480	510	785	745	1.630	170 kg.
BM 29.714/85/2	N-1000	1.645	1.480	910	1.315	1.035	1.630	235 kg.
BM 29.714/85/3	L-1000	2.245	1.480	1.510	1.915	1.298	1.630	310 kg.
BM 29.715/85/1	S-1200	1.145	1.680	510	785	745	1.830	180 kg.
BM 29.715/85/2	N-1200	1.645	1.680	910	1.315	1035	1.830	250 kg.
BM 29.715/85/3	L-1200	2.245	1.680	1.510	1.915	1.298	1.830	330 kg.
BM 29.716/85/1	S-1500	1.145	1.980	510	785	745	2.130	200 kg.
BM 29.716/85/2	N-1500	1.645	1.980	910	1.315	1.035	2.130	270 kg.
BM 29.716/85/3	L-1500	2.245	1.980	1.510	1.915	1.298	2.130	350 kg.

Adjustment reach (X x Y) of the division plate:
Type S : 770 x 430 mm. • Type N : 1.300 x 800 mm. • Type L : 1.900 x 1.000 mm.



OVERBELT MAGNET SYSTEMS

Overbelt magnet systems are mainly used to separate materials on conveyor belts. For this purpose they are suspended above the conveyor belt. The magnet system removes the ferrous particles from the passing flow of materials. After leaving the magnetic sector, these iron particles are dropped into a receptacle. At the active side the magnet is shielded by a stainless steel wearing plate. This type of separating system is often used in industry, to avoid machinery, such as shredders, being damaged by the iron particles. Bakker Magnetics' overbelt magnet systems are supplied in permanent magnetic and electromagnetic versions.

PERMANENT OVERBELT MAGNET SYSTEMS

This Bakker Magnetics type of de-ironing system is provided with a powerful permanent magnet

Standard overbelt magnet systems (up to the 320 series), are driven by a drum motor.
Models from the 400 and 500 series are standard equipped with drive through a slip-on gear motor. On request the overbelts from the 220 series can be supplied with a motor reductor (add "/21" to the Art. N°). The systems are provided with a tensioning device. As the drums are curved, the running of the belt is self-guided. The belt is made of synthetic rubber with vulcanised idlers. The electrical connection meets the IP 54 standards, or IP 65 if required, standard equipped for 3 x 380 V 50 Hz. Systems with deviating power connection can be supplied as well. Models with an extended construction are available. Here the extension of the main magnet pole is provided with a transport pole, producing a field fluctuation. This field fluctuation rotate the iron particles on the belt through which eventual material particles, clamped by the iron pollution, get the opportunity to return into the flow of materials. In this way a pure iron fraction is left. Models with an extended construction can be installed solely in the longitudinal direction of the conveyor belt. At the 400 and 500 series the rubber conveyor belt between the idlers is provided with an extra wear-resistant layer (Correx blue 45° shore).

OVERBELT MAGNET SYSTEMS

135 series

Art. N°	A	B	C	D	E	F	G	H	Motor power (kW)	Weight (kg)
BM 28.001	450	955	530	640	520	420	310	130	0,55	153
BM 28.002	650	1155	530	640	720	420	310	130	0,55	197
BM 28.003	850	1355	530	640	920	420	310	130	0,55	242

OVERBELT MAGNET SYSTEMS

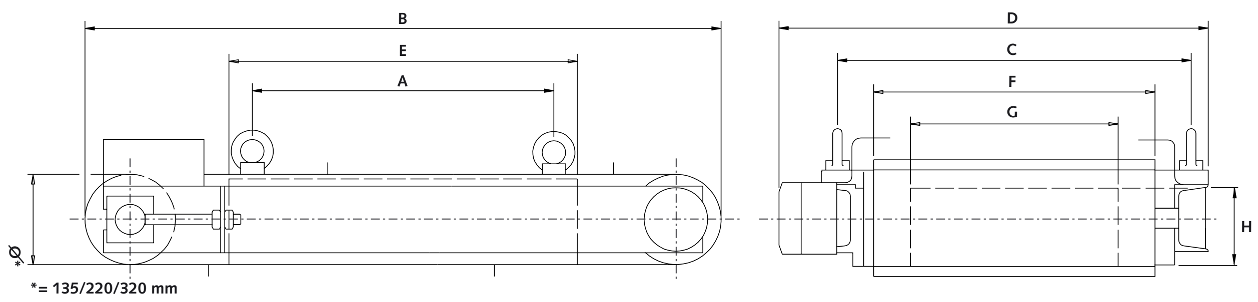
220 series

Art. N°	A	B	C	D	E	F	G	H	Motor power (kW)	Weight (kg)
BM 28.101	240	1050	850	1015	430	650	505	180	1,1	335
BM 28.102	300	1150	850	1015	530	650	505	180	1,1	375
BM 28.103	360	1250	850	1015	635	650	505	180	1,1	420
BM 28.104	420	1355	850	1015	735	650	505	180	1,1	470
BM 28.105	475	1455	850	1015	835	650	505	180	1,1	515
BM 28.106	535	1555	850	1015	935	650	505	180	1,1	560
BM 28.107	595	1655	850	1015	1040	650	505	180	1,1	600
BM 28.108	655	1755	850	1015	1140	650	505	180	1,1	650
BM 28.109	715	1860	850	1015	1250	650	505	180	1,1	695
BM 28.110	775	1960	850	1015	1350	650	505	180	1,1	740
BM 28.111	830	2060	850	1015	1450	650	505	180	1,1	785
BM 28.130	240	1050	1050	1225	430	900	810	180	1,5	470
BM 28.131	300	1150	1050	1225	530	900	810	180	1,5	545
BM 28.132	360	1250	1050	1225	635	900	810	180	1,5	620
BM 28.133	420	1355	1050	1225	735	900	810	180	1,5	695
BM 28.134	475	1455	1050	1225	835	900	810	180	1,5	765
BM 28.135	535	1555	1050	1225	935	900	810	180	1,5	840
BM 28.136	595	1655	1050	1225	1040	900	810	180	1,5	915
BM 28.137	655	1755	1050	1225	1140	900	810	180	1,5	990
BM 28.138	715	1860	1050	1225	1250	900	810	180	1,5	1060
BM 28.139	775	1960	1050	1225	1350	900	810	180	1,5	1140
BM 28.140	830	2060	1050	1225	1450	900	810	180	1,5	1210

OVERBELT MAGNET SYSTEMS

320 series

Art. N°	A	B	C	D	E	F	G	H	Motor power (kW)	Weight (kg)
BM 28.010	600	1705	975	1125	835	700	610	247	2,2	734
BM 28.011	800	1910	975	1125	1040	700	610	247	2,2	891
BM 28.012	1000	2120	975	1125	1250	700	610	247	2,2	1048
BM 28.013	1200	2320	975	1125	1450	700	610	247	2,2	1250
BM 28.014	1400	2520	975	1125	1650	700	610	247	2,2	1363
BM 28.020	600	1705	1175	1325	835	900	810	247	2,2	930
BM 28.021	800	1910	1175	1325	1040	900	810	247	2,2	1136
BM 28.022	1000	2120	1175	1325	1250	900	810	247	2,2	1342
BM 28.023	1200	2320	1175	1325	1450	900	810	247	2,2	1548
BM 28.024	1400	2520	1175	1325	1650	900	810	247	2,2	1754



BM 28.001 t/m 28.024

OVERBELT MAGNET SYSTEMS

Art. N°	CATCH FIELD DEPTHS bar ø 5x25	bar ø 5x75	nut M16
28.001 t/m 28.003	165	225	130
28.101 t/m 28.111	255	370	180
28.130 t/m 28.140	260	380	195
28.010 t/m 28.014	295	430	225
28.020 t/m 28.024	315	460	240
28.030 t/m 28.035	335	480	250
28.040 t/m 28.047	360	500	275

OVERBELT MAGNET SYSTEMS

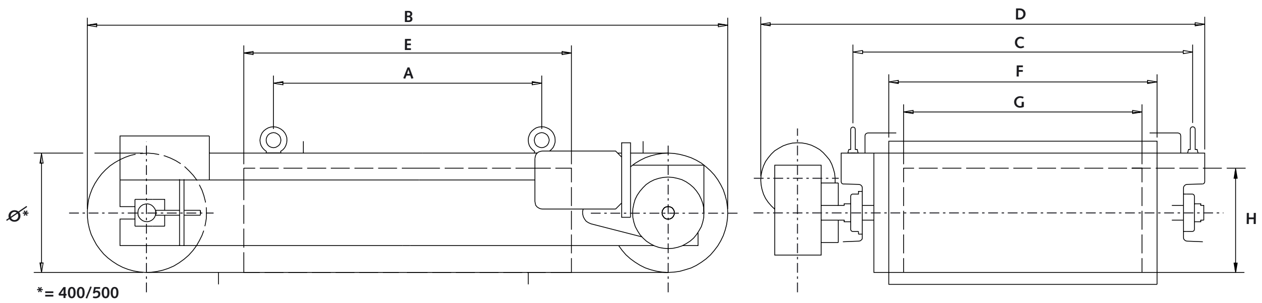
400 series

Art. N°	A	B	C	D	E	F	G	H	Motor power (kW)	Weight (kg)
BM 28.030	600	1885	1220	1490	835	900	810	350	2,2	1336
BM 28.031	800	2090	1220	1490	1040	900	810	350	2,2	1622
BM 28.032	1000	2300	1220	1490	1250	900	810	350	2,2	1789
BM 28.033	1200	2500	1220	1490	1450	900	810	350	2,2	2194
BM 28.034	1400	2700	1220	1490	1650	900	810	350	2,2	2481
BM 28.035	1600	2900	1220	1490	1850	900	810	350	2,2	2767

OVERBELT MAGNET SYSTEMS

500 series

Art. N°	A	B	C	D	E	F	G	H	Motor power (kW)	Weight (kg)
BM 28.040	600	2085	1350	1640	835	1050	900	410	2,2	1758
BM 28.041	800	2290	1350	1640	1040	1050	900	410	2,2	2135
BM 28.042	1000	2500	1350	1640	1250	1050	900	410	2,2	2512
BM 28.043	1200	2700	1350	1640	1450	1050	900	410	2,2	2819
BM 28.044	1400	2900	1350	1640	1650	1050	900	410	3,0	3266
BM 28.045	1600	3100	1350	1640	1850	1050	900	410	3,0	3642
BM 28.046	1800	3300	1350	1640	2050	1050	900	410	3,0	4019
BM 28.047	2000	3500	1350	1640	2250	1050	900	410	3,0	4369



BM 28.030 t/m 28.047

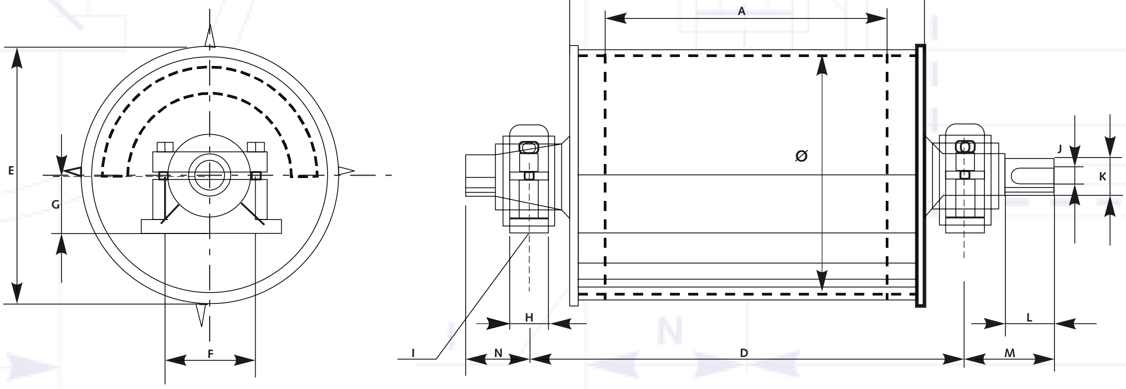
DRUM MAGNET SYSTEMS

The drum magnet, also called separation drum, contains two sectors: a magnetic and a non-magnetic sector. Around this system a drum rotates onto which the materials are dropped or passed on. For an effective removal, this drum is provided with idlers. The waste is fedd onto the magnetic sector of the drum. The magnetic field forces the iron particles to remain longer on the drum. As they leave the drum further down, they can be collected separately.

The drum is made of stainless steel and has both a rotating and a stationary axle journal. The rotating axle journal is driven. The magnet field is positioned in conjunction with the stationary axle journal . The magnetic field here is 180°. Bearing blocks are supplied.
Drum magnets are provided with a permanent ceramic magnet system. Models with a 215 and 315 mm drum bore can be supplied with a very powerful neodymium magnet system (add "/01" to the article N°). All models are almost maintenance free.

DRUM MAGNETS IN HOUSING.

This magnet system, comprising a drum magnet in a solid housing can be incorporated easily into (existing) installations. The parts, which are exposed to the flow of materials, are made of extremely wear-resistant materials. This makes the system very suitable to de-iron extremely abrasive materials. A slip-on gear motor drives the separation drum. Next to the standard model, which is provided with a ceramic magnet system, these models can be supplied with a very powerful neodymium magnet system (add "/01" to the article N°).



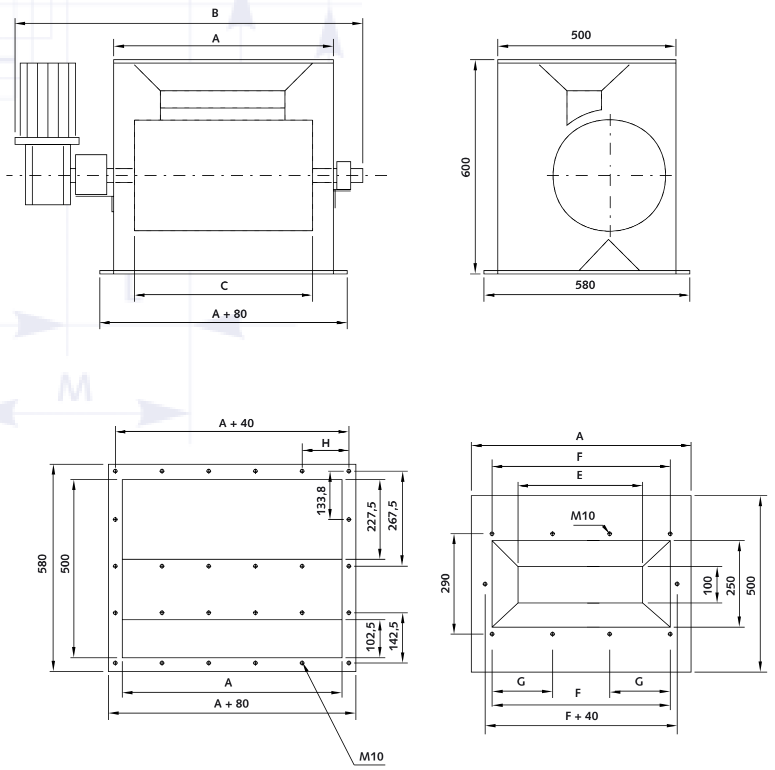
DRUM MAGNETS

Art. N°	ø	max. capacity (m3/h)	recomm. RPM	min. motor power (kW)	A	B	D	E	F	G	H	I	J	K	L	M	N	weight (kg)
BM 29.045	215	5	40	0,25	400	500	650	215	150	50	50	12	8	28	60	135	50	85
BM 29.046	215	6	40	0,25	500	600	750	215	150	50	50	12	8	28	60	135	50	95
BM 29.047	215	8	40	0,25	650	750	900	215	150	50	50	12	8	28	60	135	50	120
BM 29.048	215	10	40	0,25	800	900	1050	215	170	60	50	14	10	32	80	135	50	135
BM 29.049	215	12	40	0,25	1000	1100	1250	215	170	60	50	14	10	32	80	135	50	165
BM 29.050	315	12	40	0,25	400	500	680	320	170	60	50	14	10	35	80	160	50	100
BM 29.051	315	15	40	0,25	500	600	780	320	170	60	50	14	10	35	80	160	50	115
BM 29.052	315	20	40	0,25	650	750	930	320	170	60	50	14	10	35	80	160	50	140
BM 29.053	315	25	40	0,25	800	900	1080	320	170	60	50	14	12	40	110	160	50	160
BM 29.054	315	30	40	0,37	1000	1100	1280	320	170	60	50	14	12	40	110	160	50	190
BM 29.055	400	20	35	0,25	400	500	700	405	210	70	60	18	14	45	110	165	70	160
BM 29.056	400	25	35	0,25	500	600	800	405	210	70	60	18	14	45	110	165	70	180
BM 29.057	400	30	35	0,25	650	750	950	405	210	70	60	18	14	45	110	165	70	210
BM 29.058	400	40	35	0,37	800	900	1100	405	230	80	60	18	16	55	110	165	70	240
BM 29.059	400	50	35	0,37	1000	1100	1300	405	230	80	60	18	16	55	110	165	70	280

The above mentioned capacities are guidelines. For specific applications please contact Bakker Magnetics b.v.

DRUM MAGNETS IN HOUSING

Art. N°	width	A	B	C	E	F	G	H	weight. (kg)
BM 29.149	250	340	700	250	100	250	2X125	2X190	130
BM 29.150	500	615	980	500	350	500	3X166	5X131	200
BM 29.151	600	715	1080	600	450	600	3X200	5X151	225
BM 29.152	750	865	1230	750	600	750	5X150	5X181	260
BM 29.153	900	1015	1375	900	750	900	6X150	5X211	300

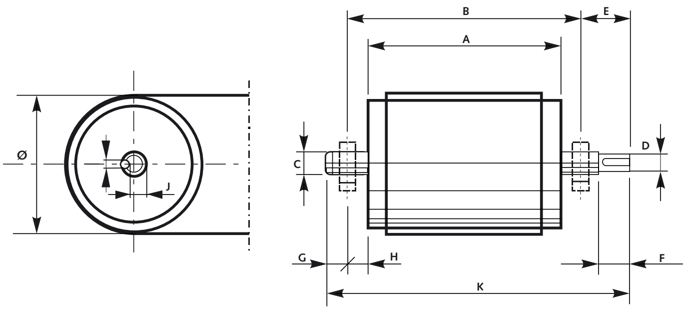


HEADROLLER MAGNET SYSTEMS

FOR CONVEYOR BELTS

The magnetic headroller replaces the drive roll at the end of the conveyor belt.

Considering the diversity of conveyor belts in use, Bakker Magnetics headroller magnets can be entirely made to measure.



The magnetic headroller attracts iron particles from the flow of materials, after which they are transported to the lower part of the conveyer belt where they can be collected.
In the standard configuration the headrollers have a longitudinal pole field pattern. This is suitable for thick-layered materials and larger iron particles in the flow of raw materials. On request headrollers can be supplied with a transversal pole field pattern, for use in slight iron pollution and thin material layers. A combination with a headroller magnet and an overbelt magnet system results in a perfect separation.

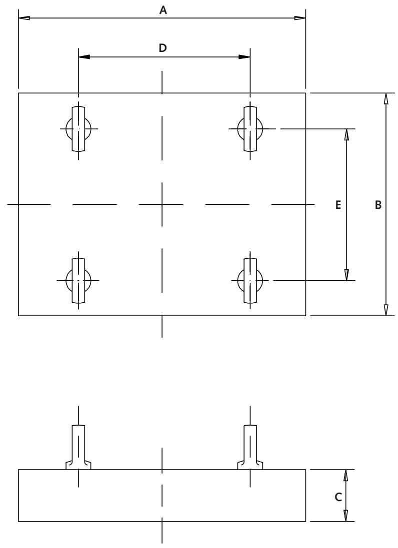
HEADROLLER MAGNET

Art. N°	Belt	ø	Capacity (m^3/h)	Max. belt speed (m/s)	A	C	D	F	I	J	K	Weight (kg)
BM 27.044*	400	215	14	0,8	500	40	32	119	10	27,0	909	75
BM 27.045*	500	215	17	0,8	600	40	32	119	10	27,0	1009	90
BM 27.046*	600	215	21	0,8	700	40	32	119	10	27,0	1109	100
BM 27.047*	650	215	23	0,8	750	40	32	119	10	27,0	1159	110
BM 27.048*	800	215	28	0,8	950	40	32	119	10	27,0	1359	130
BM 27.049*	1000	215	35	0,8	1150	40	32	119	10	27,0	1559	160
BM 27.050*	400	315	20	1,2	500	40	32	119	10	27,0	909	130
BM 27.051*	500	315	27	1,2	600	40	32	119	10	27,0	1009	140
BM 27.052*	600	315	30	1,2	700	50	48	153	14	42,5	1173	190
BM 27.053*	650	315	35	1,2	750	50	48	153	14	42,5	1223	195
BM 27.054*	800	315	45	1,2	950	50	48	153	14	42,5	1423	230
BM 27.055*	1000	315	55	1,2	1150	65	55	207	16	49,0	1717	280
BM 27.056	400	400	35	1,5	500	50	48	153	14	42,5	973	200
BM 27.057	500	400	45	1,5	600	50	48	153	14	42,5	1073	220
BM 27.058	600	400	55	1,5	700	50	48	153	14	42,5	1173	270
BM 27.059	650	400	55	1,5	750	50	48	153	14	42,5	1223	280
BM 27.060	800	400	70	1,5	950	65	55	207	16	49,0	1517	330
BM 27.061	1000	400	90	1,5	1150	65	55	207	16	49,0	1717	420

** These models can also be supplied with a very powerful neodymium magnet system*
The above mentioned capacities are guidelines. For specific applications please contact Bakker Magnetics b.v.

BLOCK MAGNETS

Block magnets can be applied to de-iron material flows on conveyor belts, at a free fall, at vertical or inclined conveyor chutes, above guide plates, etc.



BLOCK MAGNETS

Art. N°	A	B	C	D	E	*	Weight (kg)
BM 28.190	520	310	130	310	185	M16	95
BM 28.191	720	310	130	410	185	M16	135
BM 28.192	920	310	130	550	185	M16	175
BM 28.200	430	505	180	260	305	M16	160
BM 28.201	530	505	180	320	305	M16	200
BM 28.202	635	505	180	380	305	M16	240
BM 28.203	735	505	180	440	305	M16	275
BM 28.204	835	505	180	500	305	M16	315
BM 28.205	935	505	180	560	305	M16	355
BM 28.206	1040	505	180	625	305	M16	395
BM 28.207	1140	505	180	685	305	M16	430
BM 28.208	1250	505	180	750	305	M16	470
BM 28.209	1350	505	180	810	305	M16	510
BM 28.210	1450	505	180	870	305	M16	550
BM 28.230	430	810	180	260	485	M16	265
BM 28.231	530	810	180	320	485	M16	330
BM 28.232	635	810	180	380	485	M16	400
BM 28.233	735	810	180	440	485	M16	460
BM 28.234	835	810	180	500	485	M16	525
BM 28.235	935	810	180	560	485	M16	590
BM 28.236	1040	810	180	625	485	M16	655
BM 28.237	1140	810	180	685	485	M16	720
BM 28.238	1250	810	180	750	485	M16	770
BM 28.239	1350	810	180	810	485	M16	850
BM 28.240	1450	810	180	870	485	M16	915
BM 28.310	835	610	247	500	365	M16	580
BM 28.312	1040	610	247	625	365	M16	740
BM 28.314	1250	610	247	750	365	M16	900
BM 28.316	1450	610	247	870	365	M20	1025
BM 28.318	1650	610	247	990	365	M20	1180
BM 28.320	835	810	247	500	485	M16	755
BM 28.322	1040	810	247	625	485	M16	990
BM 28.324	1250	810	247	750	485	M20	1145
BM 28.326	1450	810	247	870	485	M20	1375
BM 28.328	1650	810	247	990	485	M20	1575

BLOCK MAGNETS

Art. N°	CATCH FIELD DEPTHS bar ø 5x25	bar ø 5x75	nut M16
28.190 t/m 28.192	165	225	130
28.200 t/m 28.210	255	370	180
28.230 t/m 28.240	260	380	195
28.310 t/m 28.318	295	430	225
28.320 t/m 28.328	315	460	240
28.330 t/m 28.340	335	480	250
28.353 t/m 28.367	360	500	275

BLOCK MAGNETS

Art. N°	A	B	C	D	E	*	Weight (kg)
BM 28.330	835	810	350	500	485	M16	990
BM 28.332	1040	810	350	625	485	M20	1245
BM 28.334	1250	810	350	750	485	M20	1505
BM 28.336	1450	810	350	870	485	M24	1735
BM 28.338	1650	810	350	990	485	M24	1990
BM 28.340	1850	810	350	1110	485	M24	2240
BM 28.353	835	900	410	500	540	M20	1335
BM 28.355	1040	900	410	625	540	M24	1665
BM 28.357	1250	900	410	750	540	M24	1995
BM 28.359	1450	900	410	870	540	M24	2325
BM 28.361	1650	900	410	990	540	M30	2655
BM 28.363	1850	900	410	1110	540	M30	2975
BM 28.365	2050	900	410	1230	540	M30	3305
BM 28.367	2250	900	410	1350	540	M30	3630

** = 4 x eye bolt C15 Din 580*

Bakker Magnetics

Bakker Magnetics b.v.
Sciencepark Eindhoven 5502
5692 EL Son - The Netherlands
Phone +31 40 2 678 678
Fax. +31 40 2 678 899

E-mail: Info@bakkermagnetics.com
Internet: www.bakkermagnetics.com

BM 601.200/E 2003-06