Cassel Metal Detector DSP

For panel board production lines
(MDF, Particle, OSB, LVL, Laminate)

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DSP Metal Detector

- **The Cassel metal detector** alerts you to the presence of foreign metal objects in the chip mats and fiber mats on moulding lines in order to protect the press and other machines.
- **Cassel Messtechnik** has developed technology, enabling even the smallest metal parts to be detected, even when using very large metal detectors.
- **Cassel metal detection technology** is constantly undergoing further development and enhancement; it has achieved total reliability and reached development maturity.
- **Functional guarantee:** We are convinced of the efficiency and quality of our metal detectors. If in practice any Cassel metal detector fails to work in accordance with this guarantee, we will quite simply take the equipment back.
- **World-wide service facility** with experienced Cassel technicians.
- **Quality assurance:** Every single unit is test thoroughly during and after production. Before it is shipped from the factory it is subject to final testing over a period of several days. All test results are recorded in a log.

Features

The digital metal detector DSP has been developed and designed specifically for the requirements of industrial production of wooden board, and is therefore as robust as that environment demands.

- **High-performance, long-term dependable detection capability** for magnetic and non-magnetic metals across the detection width.
- **Dimensions of the detection coil** designed for installation in moulding lines.
- **Simple operation. Maintenance-free.**
- **AutoSens technology:** Fully-automatic definition of parameters when changing the board format.
- **Anti-static belts** can be used as long as the belt types are approved.
- **Application range** spans both thin and thick board production lines.
- **Reserves of sensitivity and functionality** enable optimum metal detection even under conditions that are less than ideal.

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References

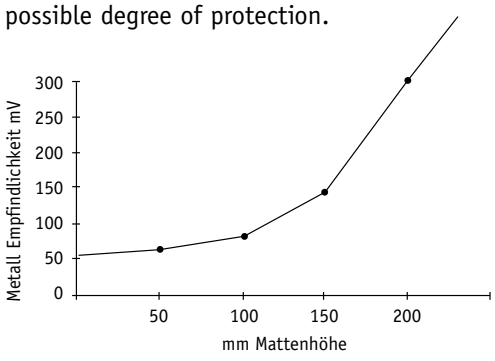
- More than 100 Cassel metal detectors installed world-wide in MDF, particleboard, OSB and other wood board production plants. A list of references is available on request.
- Prefered OEM supplier to leading MDF, particleboard and OSB equipment manufactures:

DIEFFENBACHER KVÆRNER Siempelkamp SUNDS DEFIBRATOR

Technical specification

- **Highly sensitive detection coil** with a transmitter coil and a precision-balanced pair of receiver coils.
- **PowerDrive measuring field:** An extremely powerful measuring field in the detection coil enables the detection of metal to be carried out largely unaffected by electromagnetic interference (interfering radiation, e.g. from frequency-controlled drives).
- **Anti-static belts** may be used as long as the belt type is one approved by Cassel. Some of the belts we have approved are produced by well-known belt manufacturers.
- **Measurement signals** are evaluated using a state-of-the-art digital signal processor.
- **Dynamic digital interference filter with frequency spectrum:**
  The frequency spectrum is the fingerprint of a measurement signal. Interference contains frequencies not found in metal signals, and thus also has a different "fingerprint". The spectrum analysis is ideal for distinguishing the smallest metal signals from interference.
- **Permanent twin-channel instrumentation:**
  Optimum sensitivity for all types of magnetic and non-magnetic metal.
- Equipment monitors its own functioning constantly with a separate alarm output contact.
- **Fully automatic compensation:** Temperature drifts, ageing of electronic circuits and ambient conditions are compensated automatically. This results in the self-monitoring electronic system always being perfectly calibrated.

- **Resistant to vibration:** Solid detection coil housing 3/8 inch (10-mm-thick) aluminium alloy, completely filled internally with a vibration-damping high-resistance foam which is cavity-free.
- **Conveyor speeds** from 1 to 400 Ft/Min (1 to 120m/min.)
  Full sensitivity across the entire range of speeds.
- **Anti-radio kit:** Results are in no way adversely affected by radiotelephones, whether they are using a VHF or UHF frequency.
- **AutoSens system:** Programmable characteristic curve "Metal sensitivity plotted against mat height" including "mat height" signal input. The thinner the finished board, the more sensitive the metal detector sets itself. Unnecessary breaks in production are avoided in this manner, while the press at the same time benefits from the greatest possible degree of protection.



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Hidden virtues

The closer you look at our technical features, the better we look:

High-performance or PowerDrive measuring field, with a significantly higher performance than known competitor systems.

- Cassel metal detector is largely immune to interference from frequency inverters and other types of electromagnetic interference.

Solid, completely foam-filled detection coil housing made from 3/8 inch (10 mm) thick, high-quality aluminium alloy.

- Homogenous measuring field in the detection coil, since aluminium, as a non-magnetic metal, effectively directs the measuring field away from itself to the centre of the opening. This results in fewer disruptions to production, especially where thick fiber mats are used. Our competitors, on the other hand, use sheet steel for the detection coil housing. Sheet steel is magnetic and draws the magnetic field outwards towards the housing.
- Excellent high-frequency screening, e.g. against radios, mobile telephones, computers, monitors etc. provided by aluminium's high degree of electrical conductivity.
- The detector continues to function even if the belt sliding plate is resting on the detection coil (a not uncommon problem caused by incorrect assembly) since the detection coil housing is extremely solid.
- Not affected by vibrations from the foundations or the retaining structure.
- Matt-silver metallic high-tech appearance by virtue of the clean, polished aluminium surfaces and non-corrosive aluminium alloy.

The electronic components include only the bare minimum of potentiometers, trimmers and plug connections. This necessitates a greater degree of precision in the production of the detection coil and the electronic components, but the following advantages justify this overhead:

- Extremely durable electronic system with no loose contacts or corrosion on contact surfaces.

High-quality plug-in overvoltage protection modules from Phoenix-Kontakt main power and signal inputs.

- Electronic system benefits from optimum protection against thunderstorms, incorrect connection, short circuits and other similar dangers.
- Phoenix modules are standard, and are available world-wide.

Multiple-setting main power filter from Schaffner with excellent attenuation over a broad range of frequencies.

- Full metal detection capability even where the main power is not „clean".

Sensitivities

Non-ferrous metal: 1.2x Fe ball Ø
High-grade steel: 1.5x Fe ball Ø

Best possible sensitivity (typical lab results)

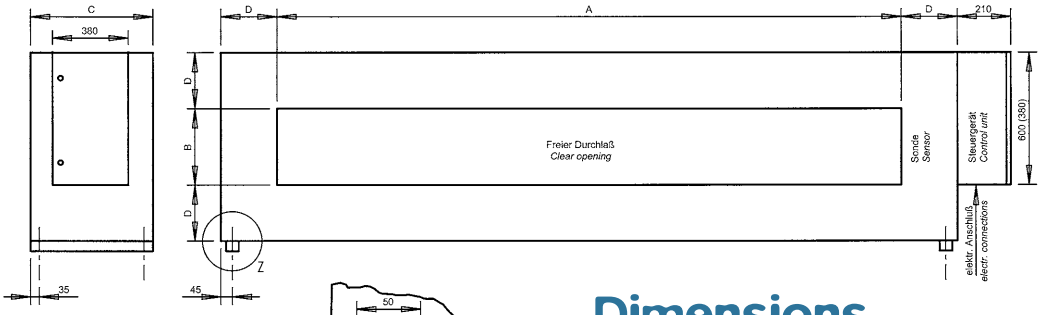
B Opening height		Fe-ball Ø resting on belt		Fe-ball Ø at centre of opening	
mm	inch	mm	inch	mm	inch
150	5.9	0.9	0.03	1.0	0.04
250	9.8	1.2	0.05	1.5	0.06
300	11.8	1.4	0.06	1.8	0.07
400	15.7	1.6	0.06	2.4	0.09
500	19.7	1.8	0.07	3.0	0.12

Typical sensitivity in practice

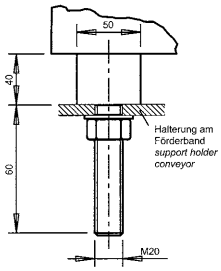
B Opening height		Fe-ball Ø resting on belt		Fe-ball Ø at centre of opening	
mm	inch	mm	inch	mm	inch
150	5.9	3.0	0.12	3.5	0.14
250	9.8	3.0	0.12	3.8	0.15
300	11.8	3.0	0.12	4.0	0.16
400	15.7	3.0	0.12	4.3	0.17
500	19.7	3.0	0.12	5.0	0.20

The sensitivity in practice is applicable under the following conditions:

- Installation is carried out in accordance with the installation instructions (or special instructions provided to the customer).
- Industrial electrical equipment in the vicinity conforms to EMC/CE standards in respect of emitted interference.
- Conveyor belt is sufficiently free of metallic impurities.



25,4 mm ≙ 1 inch



Einzelheit Z: Befestigung Sonde am Förderband
Detail Z: Fixing sensor to conveyor

Dimensions

A[mm] = Conveyor belt width + 100 mm

Table of dimensions

B Opening height		C		D	
mm	inch	mm	inch	mm	inch
100	3.937	380	14.961	160	6.299
150	5.906	380	14.961	180	7.087
200	7.878	380	14.961	200	7.878
250	9.843	430	16.929	200	7.878
300	11.811	480	18.897	220	8.661
350	13.780	530	20.666	220	8.661
400	15.748	580	22.835	240	9.449
450	17.717	630	24.803	260	10.236
500	19.685	680	26.772	280	11.024

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Summary

Metal impurities in the conveyor belt

The metal detector is usually adjusted in such a way that even small particles of metal are detected. It is virtually impossible to keep the belt on the conveyor line completely free of foreign metal objects. However, by exercising a certain amount of care it is possible to restrict the impurities to less than the signal level of a 0.12 inch (3 mm) Fe ball.

It is essential that every possible care is taken to keep the conveyor belt clean during its assembly and operation. Always remove shoes before walking on the belt in case fragments of metal are lodged in the soles. Never carry out any welding or grinding operation near the belt without first covering the belt. Hot weld splatters or swarf can burn into the surface of the belt.

The influence of frequency inverters

Interference is mainly emitted from the supply leads of controlled-frequency drives, and can cause random signals in metal detectors and also interfere with other electronic devices.

Screened cables between frequency inverter and drive are an extremely effective means of preventing such interference. The screening of cables is the only way of conforming to EMC standards on interference emission.

The measuring field of the metal detector must be as strong as possible in order to operate accurately despite interference emissions.

The Cassel PowerDrive has a very powerful measuring field which is more than sufficient for the vast majority of applications. For applications in which the interference emissions are known to be high (e.g. older plants in which cables are not screened) or for upgrading we recommend the Cassel SuperPowerDrive option, which has a field strength that is yet higher by a significant factor.

Anti-static conveyor belts, sprinkler systems, fiber mat

Our competitors' systems can respond to the following effects:

- Weld point on anti-static belts
- Film from a sprinkler system
- Change of fiber mat height or start of mat

Our competitors' systems can often "learn" and then blank out such effects. However, the processes of learning and blanking out are carried out at the expense of sensitivity for specific types of metal.

With Cassel detectors such effects simply do not exist. The special design of the detection coil means that the Cassel measuring field does not respond to thread-oriented anti-static belts (this can be confirmed on request by known belt producers), films of spray or fiber mats, yet it does respond to all types of metal.

Detection coil housing

Other manufacturers often use inexpensive housings made from magnetic sheet steel. For economic reasons many of our competitors only fill the housings partially with foam from within, leaving the equipment susceptible to vibrations and twisting from the retaining structure. (Test by knocking on the outside of another manufacturer's detector, which may produce a hollow sound, or look to see whether the detector is attached to the retaining structure by means of a rubber buffer).

The Cassel metal detector has a screened housing made from solid aluminium plates. The Cassel detector coil is completely filled from within with vibration-damping sealing material (test by knocking on the Cassel detector, which will produce a solid, hard sound). This renders the detector free from vibration, allowing it to be mounted without the need for any rubber buffer.

Accessories

SuperPowerDrive

- For the ultimate performance in metal detection – even in industrial environments that fail to comply with EMC standards and thus emit more disruptive electro-magnetic interference.
- All standard Cassel metal detectors DSP already feature an unusually powerful measuring field. The SuperPowerDrive option makes our strong measuring field even stronger by a factor of 4.
- SuperPowerDrive is recommended for plants which are producing thin boards but whose motor drives are not equipped with screened cables.

Printer

- Automatically logs the metal monitoring process, thus making metal detection simple to track and even safer.
- The printed logs should be archived by the quality assurance department. They can then be used to document the fact that the metal detector is being deployed reliably and continuously.
- Printer forms an integral part of the DSP control unit, being built in, ready connected and fully operational.

Metal test balls

The functioning of the metal detector is tested while it is in operation with the aid of metal test balls of defined size. A wide range of different-sized test balls can be obtained from Cassel. We supply a selection of test balls along with every new metal detector shipped.

Questionnaire

Questionnaire to accompany your enquiry, which is without any obligation

Product to be monitored: .....

Width of conveyor belt, moulding strap width: .....

Max. product height, max. mat height: .....

Min. and max. thickness of finished board: .....

Anticipated setup location for metal detector
(e.g. between prepress and main press): .....

Main voltage: .....

Min./max. conveyor speed: .....

Installation and set up by Cassel required? ❑ Yes ❑ No

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