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Hints and tips.

If you require to locate quickly a double sheet detector for your application you will find on page 5 the sensor selection table for single sided, sheet touching and on page 6 for double sided, no sheet touching sensors in which you can select the sensor that fits to your application (sheet thickness / sheet material). On page 7 you will find the amplifier selection table for selection of an amplifier that meets your requirements. Or if you prefer just give us phone call (+49 7232 8740) or sent us a fax (+49 7232 8407) or e-mail us at info@jungmichel.de

If you already know the sensor and / or amplifier type and you need more information

you will find on page 5 and 6 the sensor selection tables with bold letters printed against sensor types and on page 7 types with bold printed letters the amplifier types with correlated catalogue pages that will give you more information.

Informations about Double Sheet Detectors with 0- 10 VDC output start on page 21. Latest informations are also allways on our web- site: www.jungmichel.de

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Disclaimer: All information is given in good faith but without warranty.

Jungmichel Industrieelektronik GmbH

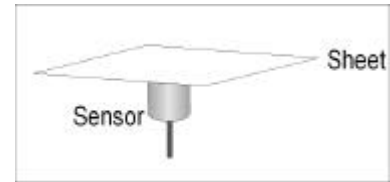
Solutions with sensors since 1977.....



Double sheet detectors monitor the automatic sheet destacking and sheet separation on sheet working machines with automatic sheet destackers, sheet loading robots, sheet feeders etc. If double or multiple sheets instead of only one sheet are destacked, expensive machine or die- destruction / damages may occurred. A double sheet detector consists either of one sensor that monitors the sheet by touching or consists of a pair of sensors that monitor the sheet touch-less from either side of the sheet. (see fig.1) and an amplifier. The sheets are monitored by the sensor(s). If more than one sheet is detected, a switching signal is generated in the amplifier. This switching signal (change over output contact) is then used to control the machine's stop control, the automatic sheet eject and / or other alarm circuits. Fig. 2 shows an example of an application on a multi stage press. The oval sheets are feded from die to die by mechanical gripper units. The single sided sensor (arrowed) monitors in front of the first die, the sheets. As soon as the sensor detects double sheets the machine is stopped to make sure that no double sheets can reach the first die. The one single sided sensor type is mostly used on machines where there is no space for mounting a pair of double sided sensors. Fig. 3 shows another example for a single sided sensor on a sheet destacker for scrolled sheets. The sensor (arrowed) flushes tight into the sheet positioning plate opposite the sheet stack. The first few sheets of the stack are already separated by side magnets. The vacuum suction unit near the sensor pulls the sheet against the sensor on each destacking cycle. Because the sensor contains a magnetic current, each sheet is pulled against the sensors active area and is monitored for double sheets. Fig.4 (next page) shows the application of double sided touch-less sensors. The robot takes the tailored blanks from the magazine and feeds them through the gap between both sensors. After this double sheet examination the robot places the sheet into the press. he sensor sizes depend on the max. monitored sheet thickness, from the kind of sheet material and from the distance "A" between the sensors. Higher sheet thickness and greater sensors distance means also larger sensor dimensions. There are different amplifier types available: With low protection degrees for mounting into enclosures and cabinets and with high protection degrees for outside mounting on walls and machines.

Fig.1

singlesided touching
Sensor



bothsided touchless
Sensors

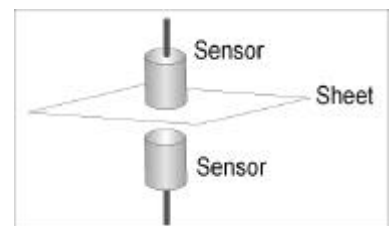


Fig.2

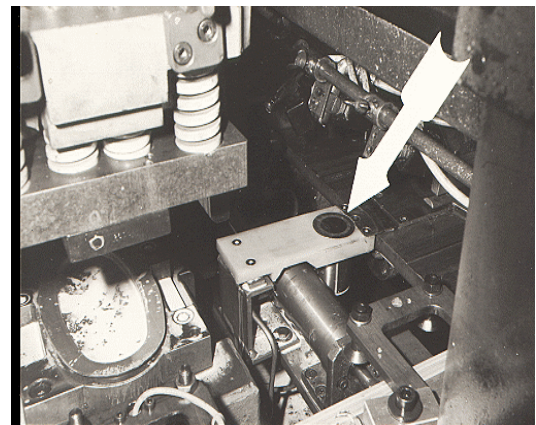
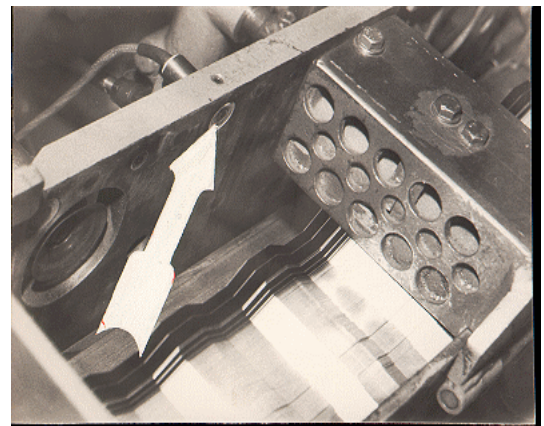


Fig.3

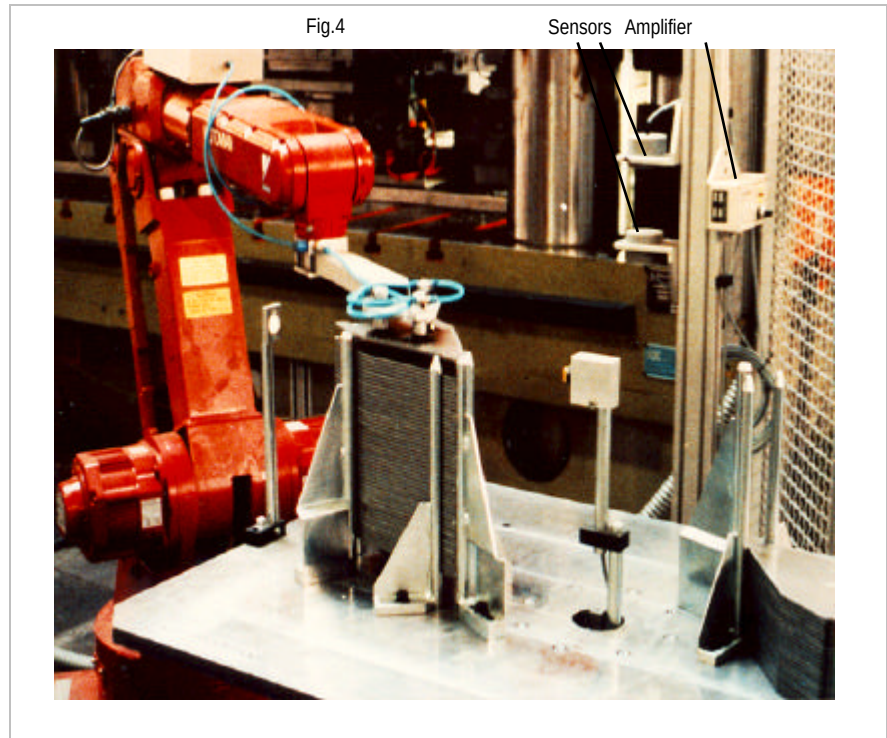


There is a calibration necessary that refers to the sheet thickness and - material on the first installation. Re-calibrations on later operating may be necessary if the sheet thickness and / or sheet material change. If the sheet thickness changes only by a small amount, re-calibration may not be necessary considering the sheet thickness tolerances. On applications on which the sheet thickness do not change or only change very seldom there are amplifiers with internal screwdriver operated adjusts. For more frequent changing sheet thickness and / or sheet materials amplifiers with external sheet thickness adjust with multi-turn precision dial, scale and fixing lever and LED indicators are available. There are also amplifiers available with up to 9 programmable sheet thickness values that are programmed at the first amplifier installation. The sheet thickness values can later be changed by local push button or by remote control from a PLACC or other form of controller. Please ask for special documentation for these amplifiers. The sensor sizes depend on the max. monitored sheet thickness, from the kind of sheet material and from the distance "A" between the sensors.

Higher sheet thickness and greater sensors

distance means also larger sensor dimensions. There are different amplifier types available: With low protection degrees for mounting into enclosures and cabinets and with high protection degrees for outside mounting on walls and machines. There is a calibration necessary that refers to the sheet thickness and - material on the first installation. Re-calibrations on later operating may be necessary if the sheet thickness and / or sheet material change. If the sheet thickness changes only by a small amount, re-calibration may not be necessary considering the sheet thickness tolerances. On applications on which the sheet thickness do not change or only change very seldom there are amplifiers with internal screwdriver operated adjusts. For more frequent changing sheet thickness and / or sheet materials amplifiers with external sheet thickness adjust with multi-turn precision dial, scale and fixing lever and LED indicators are available. There are also amplifiers available with up to 9 programmable sheet thickness values that are programmed at the first amplifier installation. The sheet thickness values can later be changed by local push button or by remote control from a PLC or other form of controller. Please ask for special documentation for these amplifiers.

Newer models of Double Sheet Detectors have a 0 - 10 VDC output instead of the output contact. This 0- 10 VDC output fits to most electronic controllers like PLCs, IPCs etc. Using these 0- 10 V output sensors gives the user the freedom to program his application solutions according to his requirements for a very low price. For example : Double Sheet Detection with , unlimited amount of



local or remote controlled sheet thickness limits, teach- in thickness limits for programming with sample sheets, sheet thickness comparators and so on. The data sheets of 0- 10 VDC sensors start on page 21. There are different amplifier models available: Amplifiers with tight enclosures for outside fixing on machines and walls and amplifiers for mounting in cabinets and enclosures.

Safety- information: The double sheet detector output contact is normally used for stopping sheet transfers or sheet working machines. After removing the double sheets from the sensor(s) the output contact switches back in the no sheet / 1 sheet position. The control circuit must work so that the transfers / machines do not restart automatically to avoid dangerous situations.



Double Sheet Detector type selection

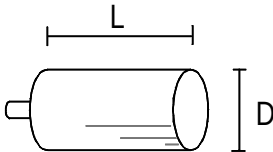
A double sheet detector for single sided, sheet touching, sheet monitoring consists of 1 sensor and for double sided no sheet touching, sheet monitoring consists of a Pair (2) sensors. The first requirement is the selection of a suitable sensor type. For this the sensor selection table is used. Reading the table from top to bottom will indicate the most suitable sensor type:

- 1) Select the the sensor selection table for single sided sensors here on page 5 or for double sided sensors on page 6
- 2) Select the sheet material(s)
- 3) Select the max. sheet thickness
- 4) Read the related sensor type: Example a sensor for single sided sheet monitoring for magnetic sheets up to 1.0 mm thickness would give us a sensor type S 1.0. More details are to be found on the mentioned catalogue page. After determining the sensor type a suitable amplifier can be selected by using the amplifier selection table on page 7. There are also the related catalogue pages on which more details can be found.



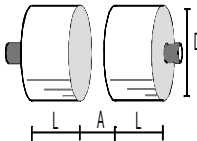
Safety- information: handling of sheets (during trials, removing double sheet from sensors etc.) please take care for your hands and fingers. Especially with Sensors S 2.0 and S 3.0 in conjunction with bigger sheets there is a risk of trapping. The magnetic force attracts the sheet against the sensor's surface.

Sensor selection tabel for singlesided sheet touching sensors

Outline:										
Sheet material:	Steel sheet, magnetic					Steel sheet, nonmagnetic, stainless steel			Aluminium sheets	
Max. sheet thickness, steel, magnetic (mm):	0,3	0,5	1,0	2,0	3,0					
Max. sheet thickness, steel , non magnetic (mm):						2,0	4,0	8,0		
Max. sheet thickness, aluminium (mm):										
Sensor type:	S 0.3	S 0.5	S 1.0	S 2.0	S 3.0	SIE 2.0	SIE 4.0	SIE 8.0	SA 1.0	SA 3.0
catalog page:	8					10			12	
Sensor diameter D (mm)	10	18	28	43	54	43	54	75	43	54
Sensor length L (mm):	45	45	55	70	75	70	75	50	70	75
Max. attraction force (N):	5	15	80	200	350	no force				
Response time (mesec.):	10									
Usable amplifier type:	FT 01S, FT 01I, FT 01E, FT 10					FE 01S, FE 01I, FE 01E, FE 10			FA 01S, FA 01I, FA 01E, FA 10	
Sensor system:	magnetic					induktiv				

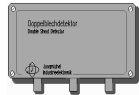


Sensor selection table for bothsided, touchless sensors

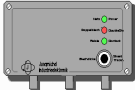
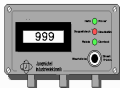
Outline:								
Sheet material:	Steel sheets, magnetic and / or aluminium sheets					Steel sheets, non magnetic, stainless steel		
Max. sheet thickness, steel, magnetic (mm) *):	0,3	0,5	1,0	2,0	3,0			
Max. sheet thickness, steel , non magnetic (mm)*):						1,0	3,0	6,0
Max.sheet thickness, aluminium (mm)*):	0,6	1,0	2,0	4,0	8,0			
Sensor type:	SIZ 16	SIZ 30	SI 43	SI 54	SI 75	SIE 43	SIE 54	SIE 75
Catalog page:	14		16			18		
Sensor diameter D (mm)	16	M30	43	54	75	43	54	75
Sensor length L (mm):	17	25	70	75	50	70	75	50
Max. attraction force (N):	no force							
Response time (msec.):	10				20	10		
Suitable sensor type:	IT 01IZ, IT 01EZ, IT 02DA, IT 04DA		IT 01S, IT 01I, IT 01E, IT 10					
Sensor system:	Eddy current							
*)Sheet thickness values are appr. values. Real max. sheet thickness values depent on the sensor´s mounting distance A. The max. sheet thickness can be determinated from the sensor characteristic diagrams found on the mentioned catalog pages.								



Amplifier selection table , internal screwdriver operated sheet thickness adjust

Outline:										
	Type:	FT 01S	FE 01S	FA 01S	IT 01S	FT 01I	FE 01I	FA 01I	IT 01I	IT 01IZ
	Catalog page:	8	10	12	16	8	10	12	16	14
	Output:	PNP Transistor + change over contact				Change over contact				
	Monting:	Internal, screw fixing or snap on 35 mm rails				Top mounting on walls or machines				
Thickness adjust:	Screwdriver									
Dimensions (mm):	55 x 75 x 110				160 x 80 x 55					
Protection degree:	IP 00 (IP 30)				IP 65					

Amplifier selection table, external sheet thickness adjust

Outline:									
Type:	FT 01E	FE 01E	FA 01E	IT 01E	IT 01EZ	IT 02DA, IT 04DA	IT 10	FA 10	FE 10
Catalog page:	8	10	12	16	14	14	Please ask for documentation!		
Output:	Change over contact						PNP Transistor + change over contact		
Monting:	Top mounting on walls or machines								
Thickness adjust:	10- Turns- Dial with scale and fixing lever						9 programmable sheet thicknesses		
Dimensions (mm):	160 x 80 x 55						203 x 196 x 126		
Protection degree:	IP 63								



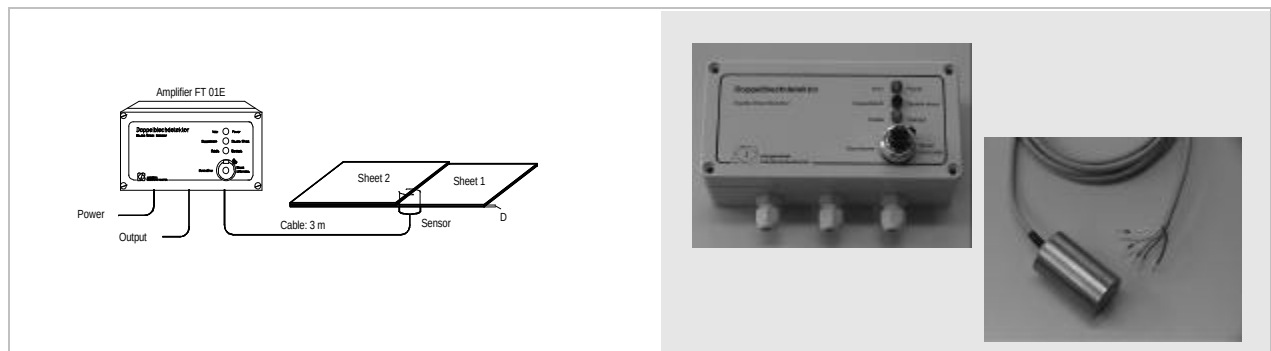
Safety advice

All amplifiers with higher power voltage (line voltage) than 24 V.

Risk of electrical tension. Remove connection to power line before opening the amplifiers enclosure. Only authorized personal should be allowed to open the amplifiers enclosure and make connections to power supply (line voltage) or to make internal sheet thickness adjusts. Always make sure power line / voltage is switched off before testing or replacement of the internal fuse.



Double sheet detector with singlesided sensor for magnetic steel sheets



Amplifier types FT 01S, FT 01I, FT 01E, and sensor types S 0.3, S 0.5, S 1.0, S 2.0, S 3.0

Application

Double Sheet Detectors are for detection of magnetic steel sheets. It consists of a sensor and the switching amplifier. The sensor is fitted so that the sheet can touch the sensor's active surface. Detection is possible both on moving or stationary sheets. There must be no distance between sheet and sensor. Usually the sensor is mounted flush into a machine part, eg. a slitter table. Together with a bracket or holder (not supplied), for example the sensor can be mounted near a sheet sucker unit that takes off the upper sheet from the stack. Every time the sucker has picked up a sheet, it is pressed against the sensors active surface, checking for double / multiple or single sheet. The sensors are magnetic, therefore the sheet is automatically attracted against the sensors active surface. Opposite the active sensors surface must be a free area of at least same size as the diameter of the sensor. No ferro (magnetic-) material must be in that area. All sensors can be mounted flush in any kind of material. The sensors dimensions depends on the max. detectable single sheet thickness. The sensors type name also identifies the max. detectable sheet thickness (i.e. Sensor S 2.0 is for single sheet thickness up to 2 mm). There are different amplifier types available: Type FT 01S is for mounting in cabinets or enclosures with screws or snap on 35 mm rails and for screw driver operated sheet thickness adjust. Types FT 01I and FT 01E are for top mounting on walls or machine parts with internal screwdriver adjust (FT 01I) or external knob adjust with scale and fixing lever and 3 external LED indicators for power, double sheet and relay indication (FT 01E). Each amplifier has an output contact (SPDT) that switches if double sheets are detected. Amplifier FT 01S has an additional PNP transistor output. This transistor is on if no sheet or only one sheet is detected, the transistor is off if a double sheet is detected. The sensor cable may be cut to suit. In this case it is very important also to connect again the shield / cord of the cable (red wire) to the sensor.

Mounting

Mount the sensor so that the sheet can touch the sensor flat, position the sensor into a machine part or make a sensor holder or bracket according to the machines requirements. The sensor can be mounted in any kind of material. Amplifier FT 01S can be fixed either with screws or snap on 35 mm rails. Amplifiers FT 01I and FT 01E: Remove the cover and fix the amplifier using the four blind holes



Adjustment

Make sure that you connect the amplifier to the same line / main voltage as it is indicated on the amplifiers type label. Wire the amplifier, sensor, contact and power / mains according to the connection diagram. Switch on power / mains and position a sheet with same thickness as the sheets that are to be monitored flat on the sensors active surface. The sheet must be at least 3 times as large as the sensors active surface (i.e. = 3 x sensor diameter). thickness adjust for amplifier FT 01S:

Turn screwdriver operated regulator (poti) full left (counter clockwise, 15 turns) and than slowly to right (clockwise) until the red LED "Double Sheet" goes out and the green LED "Contact" comes on. Thickness adjust for amplifier FT 01I:

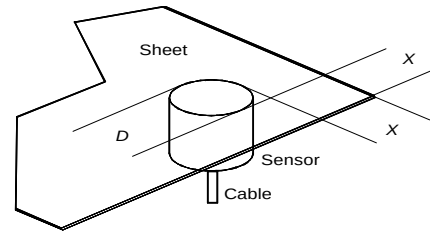
Turn screwdriver operated regulator (poti) full left (counter clockwise) and than slowly to right (clockwise) until the green LED inside goes on.

Thickness adjust for amplifier FT 01E:

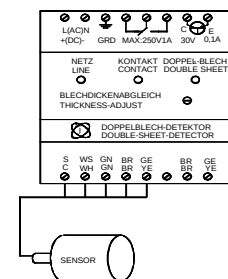
Slacken the fixing lever on the sheet thickness adjust knob and turn knob full left to "0.00" scale value. Then turn slowly right (clockwise) to increase scale values until the red LED "Double sheet" goes out and the green LED "Contact" comes on. Put fixing lever in the fixed position. Later re- adjusts are easy by setting the scale values. If sheet thickness changes only a small amount, one adjust may cover several sheet thickness values. Check all adjustments by using two sample sheets to simulate single and double sheets.

Sensor position related to the sheet 's edges:

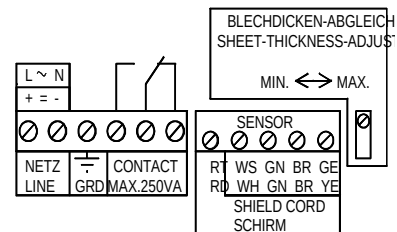
If distance X is smaller than the sensors's diameter D than must X remain fixed



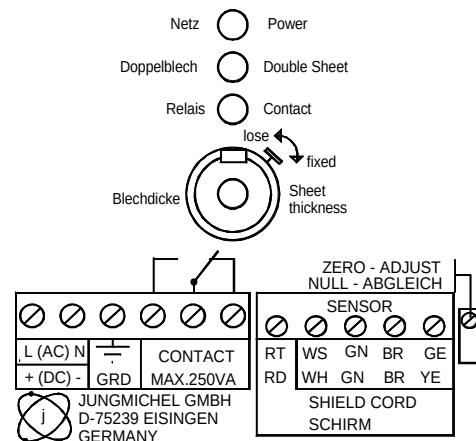
Connection and sheet thickness adjust FT 01S



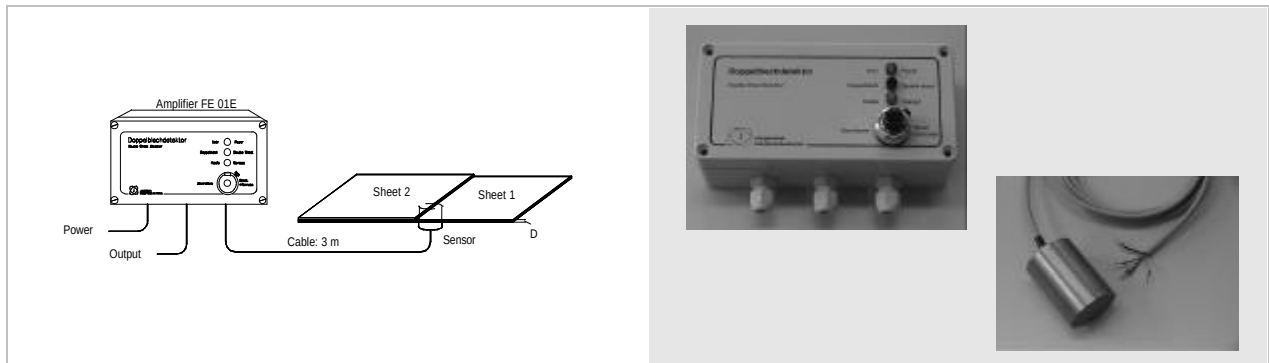
Connection and sheet thickness adjust FT 01I



Connection and sheet thickness adjust FT 01E



Double Sheet detector with singlesided sensor for non magnetic steel sheets (stainless steel)



Amplifier types FE 01S, FE 01I, FE 01E,

Sensor types SIE 2.0, SIE 4.0, SIE 8.0

Application

These Double Sheet Detectors are used for the detection of non- magnetic (stainless-) steel sheets. They consists of a sensor and the switching amplifier. The sensor is fitted so that the sheet can touch the sensors active surface. Detection is possible both on moving or stationary sheets. There must be no distance between sheet and sensor. Usually the sensor is mounted flush into a machine part like a slitter table. Together with a bracket or holder (not supplied), for example the sensor can mounted near a sheet sucker unit that takes off the upper sheet from the stack. Every time the sucker has picked up a sheet, it is pressed against the sensors active surface, checking for double / multiple or single sheet. The sensor uses an eddy current system to monitor the sheet. Therefore no force effect occurs between sheet and sensor. The sheet has to touch the sensors active surface without any distance (i.e. no air gap between sheet and sensor surface). Therefore on some application it may be necessary to press down the sheet against the sensor by using spring supported rolls or similar. The rolls or sliders must be made from non metallic material like PVC, POM etc. Opposite the active sensors surface must be a free area of at least same size as the diameter of the sensor. No metallic material must be in that area. All sensors can be mounted flush in any kind of material. The sensors dimensions depend on the max. detectable single sheet thickness. The sensors type name also shows the max. detectable sheet thickness (i.e. Sensor SIE 2.0 is for single sheet thickness up to 2 mm). There are different amplifier types available: Type FE 01S is for mounting in cabinets or enclosures with screws or snap on 35 mm rails and for screw driver operated sheet thickness adjust. Types FE 01I and FE 01E are for top mounting on walls or machine parts with internal screwdriver adjust (FE 01I) or external knob adjust with scale and fixing lever and 3 external LED indicators for power, double sheet and relay indication (FE 01E). Each amplifier has an output contact (SPDT) that switches if double sheets are detected. Amplifier FE 01S has an

additional PNP transistor output. This transistor is on if no sheet or only one sheet is detected, the transistor is off if a double sheet is detected. The sensor cable may be cut to suit. In this case it is very important also to connect again the shield / cord of the cable (red wire) to the sensor.

Mounting

Mount the sensor so that the sheet can touch the sensor flat, position the sensor into part of the machine body or make a bracket or holder according to the machines requirements. The sensor can be mounted in any kind of material. Amplifier FE 01S can be fixed either with screws or snap on 35 mm rails. Amplifiers FE 01I and FE 01E: Remove the cover and fix the amplifier using the four blind holes.



Adjustment

Make sure that you connect the amplifier to the same line / main voltage as it is indicated on the amplifiers type label. Wire the amplifier, sensor, contact and power / mains according to the connection diagram. Switch on power / mains and position a sheet with same thickness as the sheets that shall be monitored flat on the sensor's active surface. The sheet must be at least 3 times as large as the sensor's active surface (i.e. = 3 x sensor diameter).

Sheet thickness adjust for amplifier FE 01S:

Turn screwdriver operated regulator (poti) full left (counter clockwise, 15 turns) and then slowly to right (clockwise) till the red LED "Double Sheet" goes out and the green LED "Contact" comes on.

Sheet thickness adjust for amplifier FE 01I:

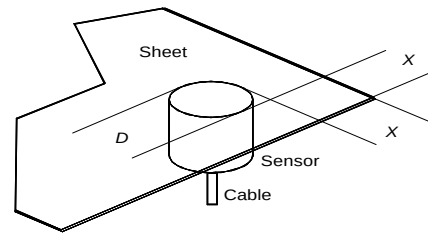
Turn screwdriver operated regulator (poti) full left (counter clockwise) and then slowly to right (clockwise) till the green LED inside goes on.

Sheet thickness adjust for amplifier FE 01E:

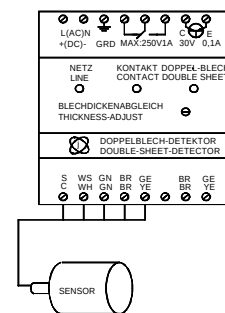
Slacken the fixing lever on the sheet thickness adjust knob and turn knob full left to "0.00" scale value. Then turn slowly right to increasing scale values till the red LED "Double sheet" goes out and the green LED "Contact" comes on. Put fixing lever in the fixed position. Later re- adjusts are easy by setting the scale values. Check all adjustments by using two sample sheets to simulating single and double sheets.

Sensor position related to the sheet 's edges:

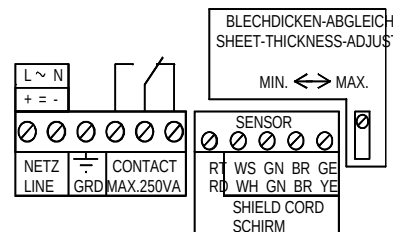
If distance X is smaller than the sensors's diameter D than must X remain fixed



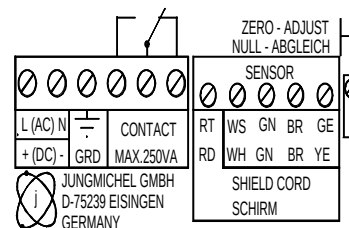
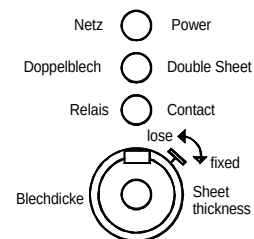
Connection and sheet thickness adjust FE 01S



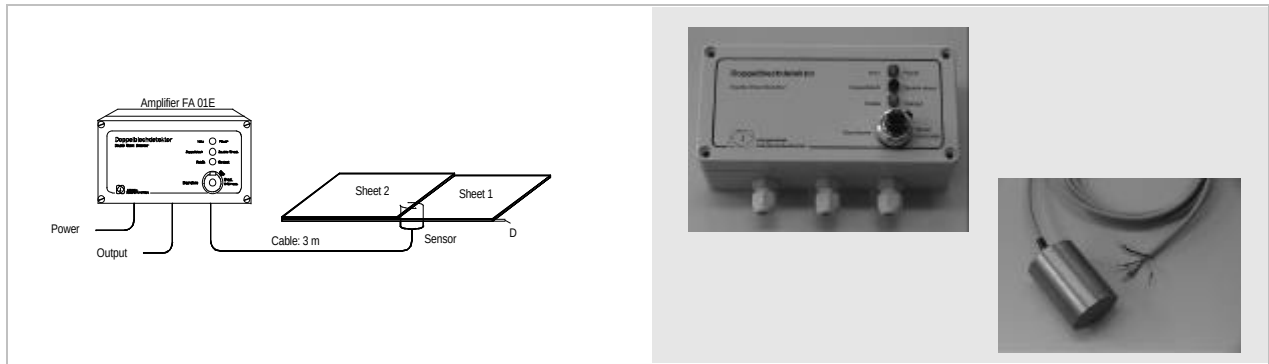
Connection and sheet thickness adjust FE 01I



Connection and sheet thickness adjust FE 01E



Double Sheet Detector with singlesided sensors for aluminium sheets



Amplifier typ FA 01S, FA 01I, FA 01E

Sensors typ SA 1.0, SA 3.0

Application

These Double Sheet Detectors are for detection aluminium sheets. They consists of a sensor and the switching amplifier. The sensor is fitted so that the sheet can touch the sensor's active surface. Detection is possible both on moving or stationary sheets. There must be no distance between sheet and sensor. Usually the sensor is mounted flush into a machine part like slitter table. Together with a machines special holder (not supplied), the sensor, for example, could mounted near a sheet sucker unit that takes off the upper sheet from the stack. Every time the sucker has picked up a sheet, it is pressed against the sensors active surface, checking for double / multiple or single sheet. The sensor uses an eddy current system to monitor the sheet. Therefore no force effect occurs between sheet and sensor. The sheet have to touch the sensors active surface without any distance (i.e. air gap between sheet and sensor surface). Therefore on some application it may be necessary to press down the sheet against the sensor by using spring supported rolls or simmilar. The rolls or sliders must be made from non metallic material like PVC, POM etc. Opposite the active sensors surface must be a free area of at least same as sensors diameter. No metallic material must be in that area. All sensors can be mounted flush in any kind of material. The sensors dimensions depend on the max. detectable single sheet thickness. The sensor's typ name also shows the max. detectable sheet thickness (i.e. Sensor SA 1.0 is for single sheet thickness up to 1 mm). There are different amplifier types available: Type FA 01S is for mounting in cabinets or enclosures with screws or snap on 35 mm rails and for screw driver operated sheet thickness adjust. Types FA 01I and FA 01E are for top mounting on walls or machine parts with internal screwdriver adjust (FA 01I) or external knob adjust with scale and fixing lever and 3 external LED indicators for power, double sheet and relay indication (FA 01E). Each amplifier has an output contact (SPDT)

that switches if double sheets are detected. Amplifier FA 01S has an additional PNP transistor output. This transistor is on if no sheet or only one sheet is detected, the transistor is off if double sheet is detected. The sensor cable may be cut to suit. In that case it is very important also to connect again the shield/ cord of the cable (red wire)

Mounting

Mount the sensor so that the sheet can touch the sensor flat into a machine part or make a sensor holder according to the machine's requirements. The sensor can be mounted in any kind of material. Amplifier FA 01S can be fixed either with screws or snap on 35 mm rails. Amplifiers FA 01I and FA 01E: Remove the cover and fix the amplifier in the four blind holes.



Adjustment

Make sure that you connect the amplifier to the same line / main voltage as it is indicated on the amplifiers type label. Wire the amplifier, sensor, contact and power / mains according to the connection diagram. Switch on power / mains and position a sheet with same thickness as the sheets that will be monitored flat on the sensors active surface. The sheet must be at least 3 times as large as the sensors active surface (i.e. $\approx 3 \times$ sensor diameter).

Sheet thickness adjust for amplifier FA 01S:

Turn screwdriver operated regulator (poti) full left (counter clockwise, 15 turns) and then slowly to right (clockwise) till the red LED "Double Sheet" goes out and the green LED "Contact" comes on.

Sheet thickness adjust for amplifier FA 01I:

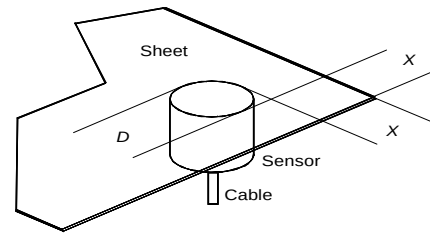
Turn screwdriver operated regulator (poti) full left (counter clockwise) and then slowly to right (clockwise) till the green LED inside goes on.

Sheet thickness adjust for amplifier FA 01E:

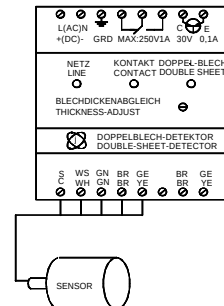
Slacken the fixing lever on the sheet thickness adjust knob and turn knob full left to "0.00" scale value. Then turn slowly clockwise to increase scale values till the red LED "Double sheet" goes out and the green LED "Contact" comes on. Lock the fixing lever in the fixed position. Later re- adjusts are easy by setting the scale values. If sheet thickness changes only a small amount, one adjust may cover several sheet thickness values. Check all adjustments by using two sample sheets by simulating single and double sheets.

Sensor position related to the sheet 's edges:

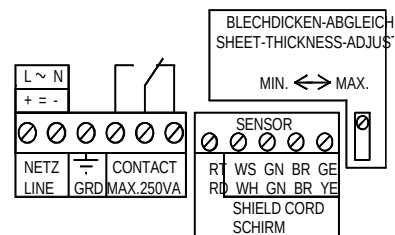
If distance X is smaller than the sensors's diameter D than must X remain fixed



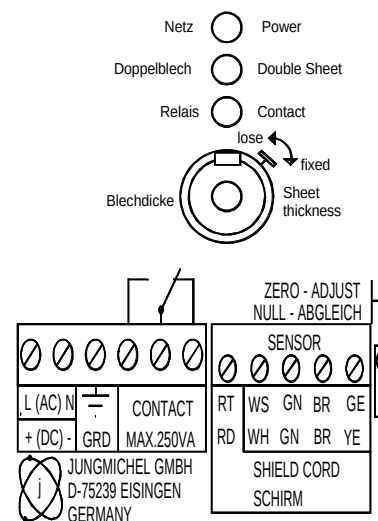
Connection and sheet thickness adjust FA 01S

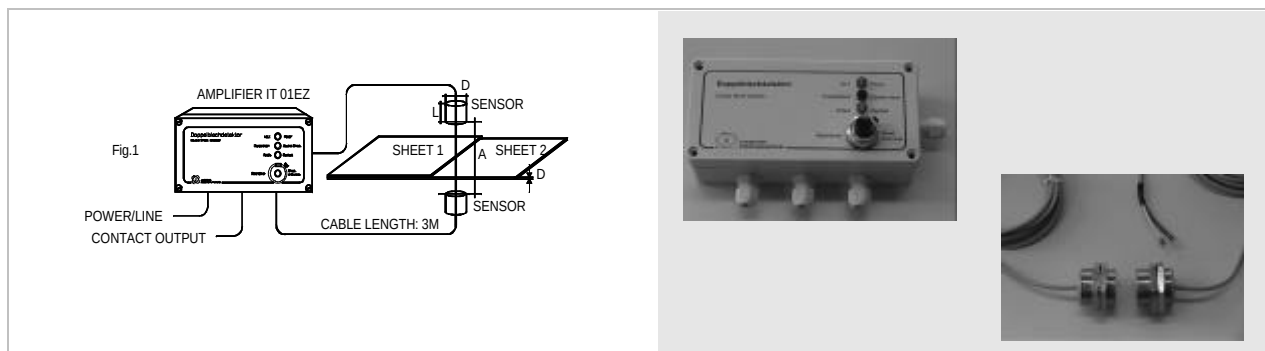


Connection and sheet thickness adjust FA 01I



Connection and sheet thickness adjust FA 01E





Amplifier typ IT 01IZ, IT 01EZ, IT 02DA, IT 04DA

Sensoren typ SIZ 16(Pair), SIZ 30(Pair)

Application

These Double Sheet Detectors are designed for detection layers of thin gauge steel and aluminium sheet at high transportation speeds. They consist of the sensors (pair) and the switching amplifier. The two sensors are fitted to oppose each other in perfect alignment; the sheet to be checked is passed through the gap A between the sensors. The maximum distance A between the Sensors depends on the sheet thickness D and the sheet material (See sensor characteristics on next page). The different amplifier types have the same outline dimensions and fixing holes arrangements. Amplifier type IT 01IZ has an internal screw driver operated sheet thickness adjust and LED indicators. Amplifier IT 01EZ has an external knob operated sheet thickness adjust with scale and fixing lever and 3 external LED indicators for power, double sheet and relay indication. IT 02DA and IT 04DA are the same as type IT 02EZ but have a 3- stage LCD- display that shows the same values as the sheet thickness adjust knob scale but in 13 mm high numbers for easy and quick re- adjusts after sheet thickness and / or material changings. All amplifiers with exception of IT 04DA have an adjustable (internal, screwdriver operated) pulse prolongation which ensures that the output relay will switch even at high speed and that enough time is available for triggering machine stops, sheet ejectors etc. Operation safety: The double sheet detector is so designed as to ensure that the output relay switches in the double sheet position if the current supply should fail or if the cables leading to one or both sensors are short circuited or open or one or both sensors are damaged. The two sensors are identical and may randomly connected to the same or other amplifier. The sensor cable may be cut to suit.

Mounting

Mount the sensors in alignment to each other so that the sheet can pass between both sensors without touching them. The sensors can be mounted in any kind of material. Sensor SIZ 30(Pair) has 4 pcs. of M 30 nuts for quick and

easy mounting in a simple hole. For sensors SIZ 16(Pair) make a sensor holder according to the machine's requirements. The amplifier can be fixed after removing the cover in the four blind holes.



Adjustment

Make sure that you connect the amplifier to the same line / main voltage as it is indicated on the amplifier's type label. Connect the amplifier according to the connection diagram. Switch on power/mains and position a sheet with same thickness as the sheets that shall be monitored between both sensors in the same position as the sheets will later pass the sensors. (No sheet may touch the sensors). The sheet must be at least 3 times as large as the sensor's active surface (i.e. = 3 x sensor diameter).

Sheet thickness adjust for amplifier IT 01IZ:

Turn screwdriver operated regulator (poti) full left (counter clockwise, 15 turns) and then slowly to right (clockwise) till the red LED L2 goes out and the green LED L1 comes on.

Sheet thickness adjust for amplifier IT 01EZ and IT 02DA:

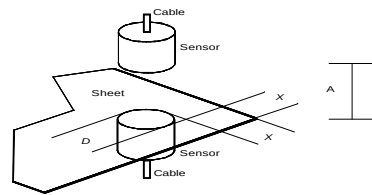
Slacken the fixing lever on the sheet thickness adjust knob and turn knob full left (anti-clockwise) to "0.00" scale/display value. Then turn slowly right (clockwise) to increasing scale/display values until the red LED "Double sheet" goes out and the green LED "Relay" comes on. Put fixing lever in the fixed position. Later re-adjusts are easy by setting the scale/display values. If sheet thickness changes only a small amount, one adjust may cover several sheet thickness values.

Check all adjustments by using two sample sheets by simulating single and double sheets.

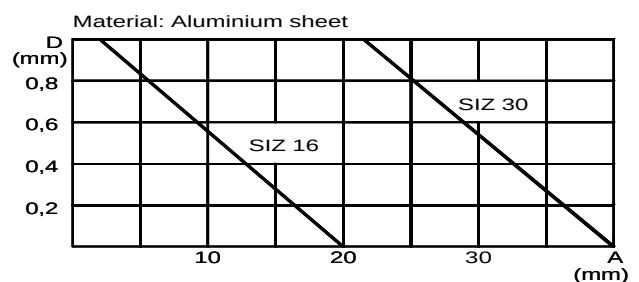
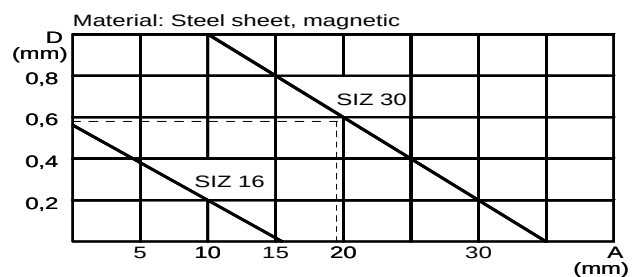
The pulse prolongation adjust regulator P1 (delay) is on all amplifiers (not in IT 04DA) inside near the sensor's screw terminals and screwdriver operated. The pulse prolongation i.e. the time during the output relay drop when double sheet is detected can be adjusted via this regulator. Right turning (clockwise) = long time. This adjust is useful on high speed detections detection, to make sure that the double sheet pulse can be caught from the machine stop, sheet eject or similar units.

Sensor position related to the sheet's edges:

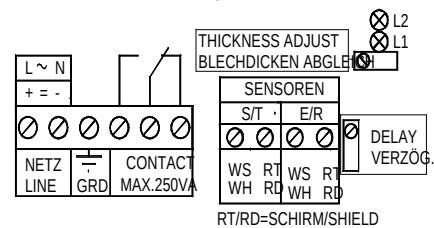
If distance X is smaller than the sensors's diameter D than must X remain fixed



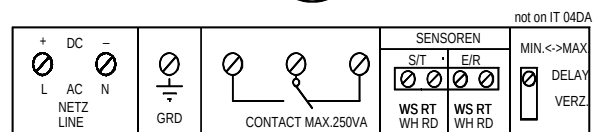
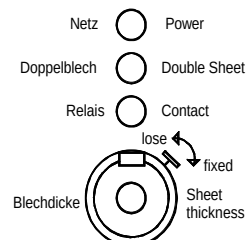
Sensor characteristics for determining the max. sensor distance A. Example (dotted lines): For sensors typ SIZ 30 and magnetic steel sheets with D = 0,6 mm thickness max. sensor distance A may not exceed 20 mm



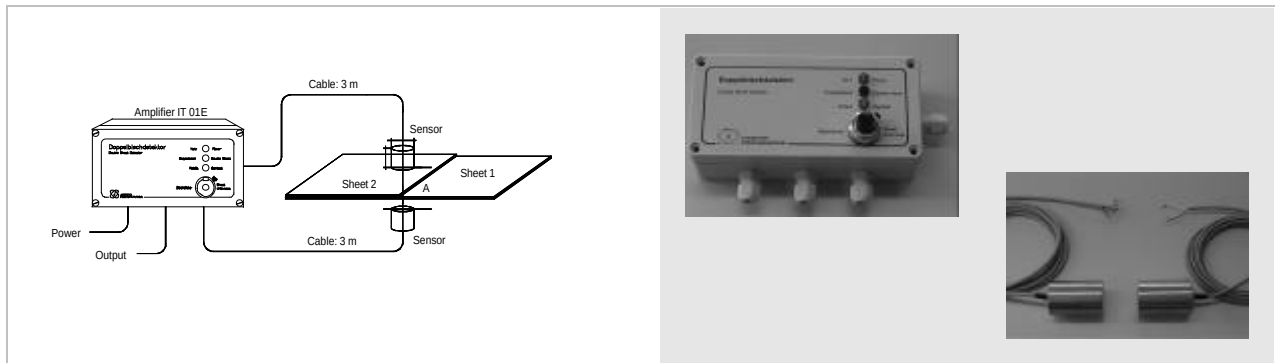
Connection and sheet thickness adjust IT 01IZ



Connection and sheet thickness adjust IT 01EZ, IT 02DA, IT 04DA



Double Sheet Detectors with bothsided for magn. steel and aluminium sheets



Amplifier typ IT 01S, IT 01I, IT 01E

Sensor typ SI 43(Pair), SI 54(Pair), SI 75(Pair)

Application

These Double Sheet Detectors are designed for detection magnetic steel or aluminum sheet. They consist of the sensors (pair) and the switching amplifier. The two sensors are fitted to oppose each other in perfect alignment; the sheet to be checked is passed through the gap A between the sensors. The maximum distance A between the sensors depends on the sheet thickness T and the sheet material. There are different amplifier types available: Type IT 01S is for mounting in cabinets or enclosures with screws or for to snap on 35 mm rails and for screw driver operated sheet thickness adjust. Types IT 01I and IT 01E are for top mounting on walls or machine parts with internal screwdriver adjust (IT 01I) or external knob adjust with scale and fixing lever and 3 external LED indicators for power, double sheet and relay indication (IT 01E). Each amplifier has an output contact (SPDT) that switches if double sheets are detected. Amplifier IT 01S has an additional PNP transistor output. This transistor is on, if no sheet or only one sheet is detected. The transistor is off, if double sheet is detected. The two sensors are different: One Sensor is the transmitter sensor (typ appendix "S") with 2 wires connections and the receiver sensor (typ appendix "E") with 5 wires connection. The sensors are usually delivered as pair but are also available in single units for replacement or spare parts. The sensor cable may be cut to suit. In that case it is very important also to connect again the shield/ cord of the sensor receiver's cable (red wire).

Mounting

Mount the sensors in alignment to each other so that the sheets can pass between sensors without touching them. The sensors are in a cylindrical stainless steel enclosures and can be fixed in any kind of material. Make a sensor holder or bracket according to the machine requirements. Amplifier IT 01S can be fixed either with screws or snap on 35 mm rails. Amplifiers IT 01I and IT 01E: Remove the cover and fix the amplifier in the four blind holes.

Adjustment

Make sure that you connect the amplifier to the same line / main voltage as it is indicated on the amplifier's type label. Wire the amplifier, sensors, contact and power/ mains according to the connection diagram. Switch on power/mains and position a sheet with same thickness as the sheets that shall be monitored between both sensors in the same position as the sheets will later pass the sensors. (No sheet may touch the sensors). The sheet must be at least 3 times as large as the sensor's active surface (i.e. = 3x sensor diameter).

Sheet thickness adjust for amplifier IT 01S:

Turn screwdriver operated regulator (poti) full left (counter clockwise, 15 turns) and then slowly to right (clockwise) till the red LED "Doublesheet" goes out and the green LED "Contact" comes on.

Sheet thickness adjust for amplifier IT 01I:

Turn screwdriver operated regulator (poti) full left (counter clockwise, 15 turns) and then slowly to right (clockwise) till the green LED inside comes on.



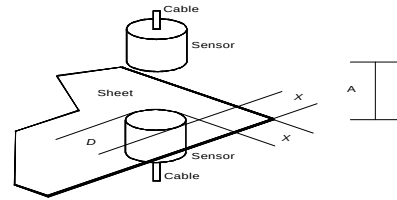
Sheet thickness adjust for amplifier IT 01E:

Slacken the fixing lever on the sheet thickness adjust knob and turn knob full left to "0.00" scale value. Then turn slowly right to increasing scale values till the red LED "Double sheet" goes out and the green LED "Relay" comes on. Put fixing lever in the fixed position. Later re-adjusts are easy by setting the scale values. If sheet thickness changes only a small amount, one adjust may cover several sheet thickness values.

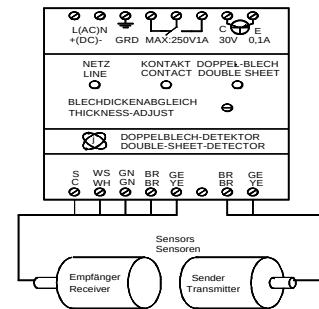
Check all adjustments by using two sample sheets simulating single and double sheets.

Sensor position related to the sheet's edges:

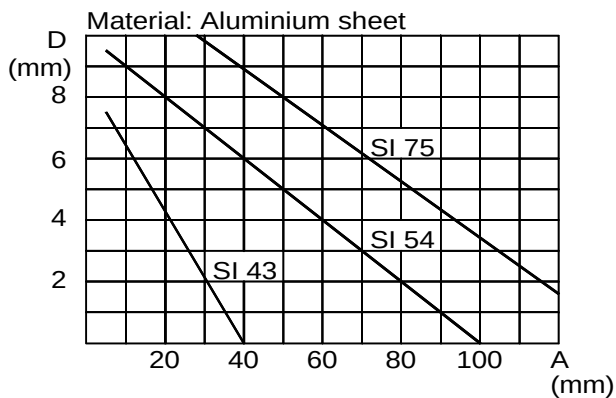
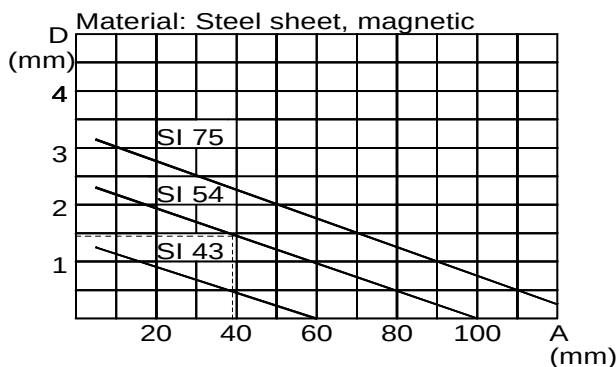
If distance X is smaller than the sensors' diameter D than must X remain fixed



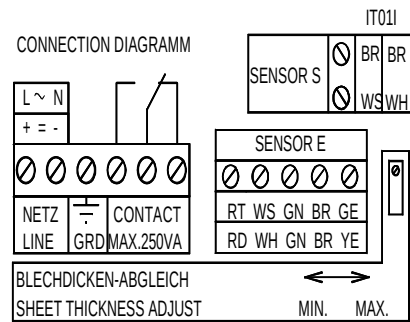
Connection and sheet thickness adjust IT 01S



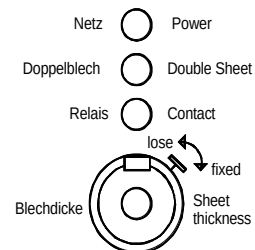
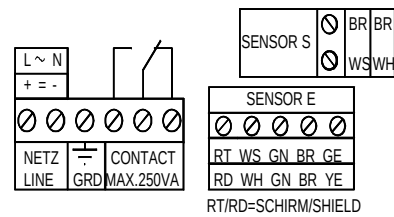
Sensor characteristics for determining the max. sensor distance A. Example (dotted lines): For sensors typ SI 54 and magnetic steel sheets with D = 1,5 mm thickness max. sensor distance A may not exceed 40 mm. Or vice versa: If the sensor typ SI 54 is used and distance A is 40 mm than sheets up to D = 1,mm thickness can be monitored.



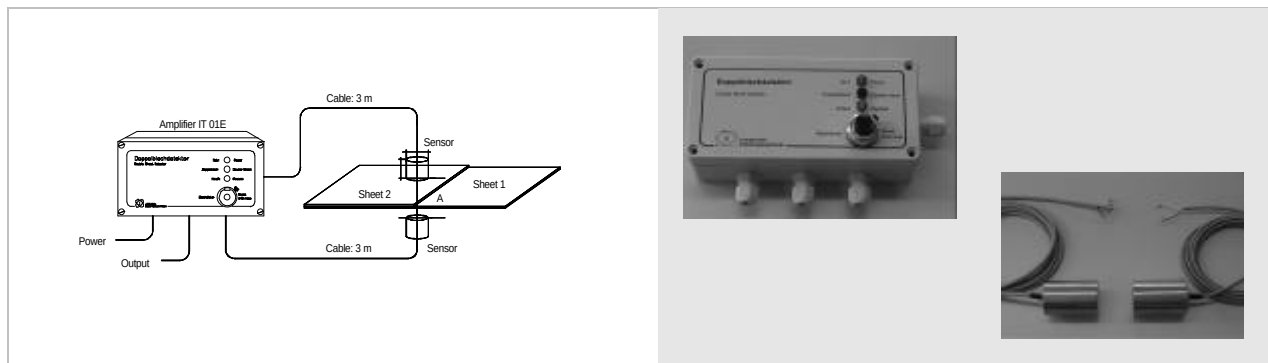
Connection and sheet thickness adjust IT 01I



Connection and sheet thickness adjust IT 01E



Double Sheet Detectors with bothsided sensors for non- magnetic (stainless) steel sheets



Amplifier typ IT 01S, IT 01I, IT 01E

Sensor typ SIE 43(Pair), SIE 54(Pair), SIE 75(Pair)

Application

These Double Sheet Detectors are designed for detection non- magnetic (stainless) steel. They consist of the sensors (pair) and the switching amplifier. The two sensors are fitted to oppose each other in perfect alignment; the sheet to be checked is passed through the gap A between the sensors. The maximum distance A between the Sensors depends on the sheet thickness D and the sheet material. There are different amplifier types available: Type IT 01S is for mounting in cabinets or enclosures with screws or for to snap on 35 mm rails and for screw driver operated sheet thickness adjust. Types IT 01I and IT 01E are for top mounting on walls or machine parts with internal screwdriver adjust (IT 01I) or external knob adjust with scale and fixing lever and 3 external LED indicators for power, double sheet and relay indication (IT 01E). Each amplifier has an output contact (SPDT) that switches if double sheets are detected. Amplifier IT 01S has an additional PNP transistor output. This transistor is on, if no sheet or only one sheet is detected. The transistor is off, if double sheet is detected. The two sensors are different: One Sensor is the transmitter sensor (typ appendix "S") with 2 wires connections and the receiver sensor (typ appendix "E") with 5 wires connection. The sensors are usually delivered as pair but are also available in single units for replacement or spare parts. The sensor cable may be cut to suit. In that case it is very important also to connect again the shield/ cord of the sensor receiver's cable (red wire).

Mounting

Mount the sensors in alignment to each other so that the sheets can pass between sensors without touching them. The sensors are in a cylindrical stainless steel enclosures and can be fixed in any kind of material. Make a sensor holder or bracket according to the machine's requirements. Amplifier IT 01S can be fixed either with screws or snap on 35 mm rails. Amplifiers IT 01I and IT 01E: Remove the cover and fix the amplifier in the four blind holes.

Adjustment

Make sure that you connect the amplifier to the same line / main voltage as it is indicated on the amplifier's type label. Wire the amplifier, sensors, contact and power/ mains according to the connection diagram. Switch on power/mains and position a sheet with same thickness as the sheets that shall be monitored between both sensors in the same position as the sheets will later pass the sensors. (No sheet may touch the sensors). The sheet must be at least 3 times as large as the sensor's active surface (i.e. = 3x sensor diameter).

Sheet thickness adjust for amplifier IT 01S:

Turn screwdriver operated regulator (poti) full left (counter clockwise, 15 turns) and then slowly to right (clockwise) till the red LED "Doublesheet" goes out and the green LED "Contact" comes on.



Check all adjustments by using two sample sheets simulating single and double sheets.

The diagram shows the terminal block of the sensor unit with the following connections and components:

- Terminal 1:** L(AC)N (DC) - Connected to the AC line.
- Terminal 2:** GRD - Connected to ground.
- Terminal 3:** MAX. 250V/1A - Connected to the AC line.
- Terminal 4:** 30V 0,1A - Connected to the AC line.
- Terminal 5:** E - Connected to ground.
- Terminal 6:** NETZ LINE - Connected to the AC line.
- Terminal 7:** KONTAKT CONTACT - Connected to the AC line.
- Terminal 8:** DOPPEL-BLECH DOUBLE SHEET - Connected to the AC line.
- Terminal 9:** BLECHDICKENABGLEICH THICKNESS-ADJUST - Connected to the AC line.
- Terminal 10:** DOPPELBLECH-DETEKTOR DOUBLE-SHEET-DETECTOR - Connected to the AC line.
- Terminal 11:** WS WH - Connected to the AC line.
- Terminal 12:** GN GN - Connected to ground.
- Terminal 13:** BR BR - Connected to the AC line.
- Terminal 14:** GE YE - Connected to the AC line.
- Terminal 15:** GE YE - Connected to the AC line.

The diagram also shows the internal components of the sensor unit, including the AC line, ground, and the various sensors and detectors.

Sensor characteristics for determining the max. sensor distance A. Example (dotted lines): For sensors type SIE 54 and non- magnetic steel sheets with D = 2,0 mm thickness max. sensor distance A may not exceed 50 mm. Or vice versa: If the sensor typ SIE 54 is used and distance A is 50 mm than sheets up to D = 2.0 mm thickness can be monitored.

CONNECTION DIAGRAM

IT011

SENSOR S

BR BR
WS WH

SENSOR E

RT WS GN BR GE
RD WH GN BR YE

NETZ
LINE

CONTACT
GRD MAX.250VA

BLECHDICKEN-ABGLEICH
SHEET THICKNESS ADJUST

MIN. MAX.

Diagram of a 3-phase 4-wire system with a neutral point and a ground connection. It includes a table for terminal markings (L, N, +, -) and a table for terminal types (Netz, LINE, GRD, CONTACT, MAX. 250VA). Below the tables are symbols for Netz, Doppelblech, Relais, and Blechdicke, each with a corresponding circle and a label.

L ~ N
+ -

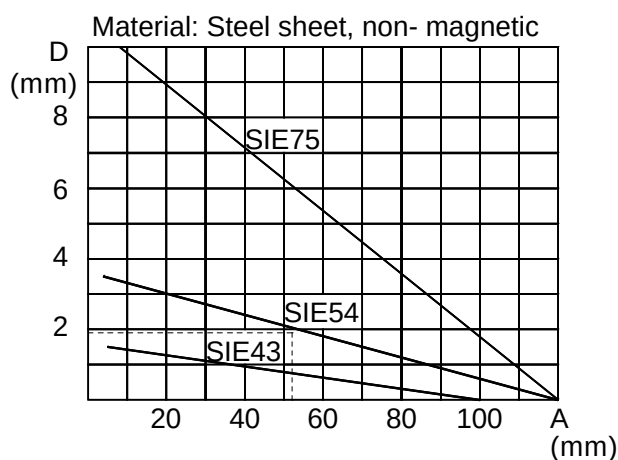
Netz	LINE	GRD	CONTACT	MAX. 250VA
------	------	-----	---------	------------

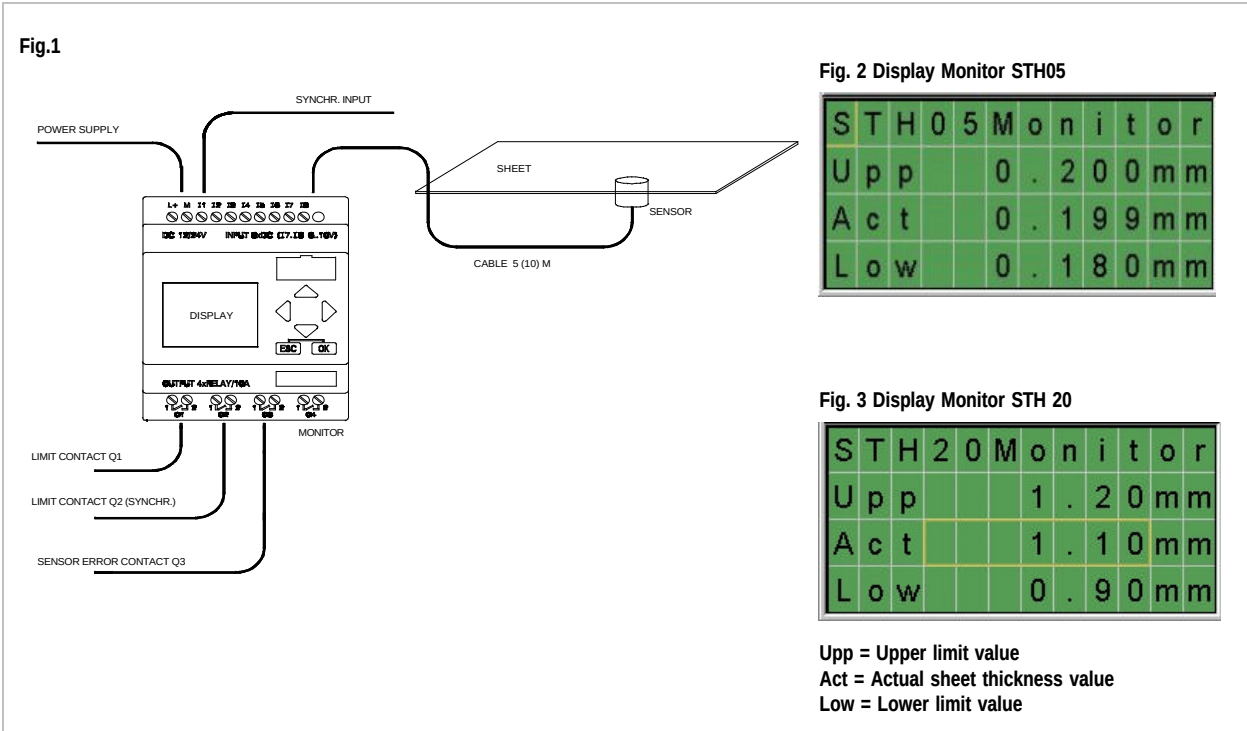
Netz

Doppelblech

Relais

Blechdicke





Monitore Typ STH 05, STH 20
Sensors Typ S 0.5 ES, S 2.0 ES

Application

To protect sheet working machines from sheets that are too thick (also double- or multiple sheets) or that are too thin the sheet thickness monitor is useful. (Thickness tolerance monitor). Today we deliver monitors and sensors for sheets up to 2 mm thickness of magnetic sheets. For this the monitored sheet passes a sensor before it is fed into the machine. The sensor incorporates a permanent magnet and a magnetfield transmitter that monitors the magnetic conductivity of the sheet that depends on the sheet thickness. The sensor touches the sheet singleside from one side only. The measured thickness value is digital displayed on the monitor as actual thickness value. This value is simultaneously compared with a programmable upper and lower limit. If the displayed value is between the upper and the lower limit value output contact Q1 is closed. This contact opens if the upper limit value is overstepped or the lower value is understepped by the actual thickness. Both limit values are programmable on the monitor and also displayed and stored during power/ supply off conditions. The monitor has a control input that allows the synchronisation of the measurement: A second contact Q2 is only closed if the measured thickness value is within the upper- and the lower limit and the input level on the synchronisation input is also high (H). This synchronisation is necessary to monitor single sheets that are fed in distance to each other or for measurements on a specified sheet area / -point. A third output contact Q3 watches the sensor- connection. This contact is only closed if power supply is on and the sensor is connected to the monitor (cable connection watch). There are different sensor- and monitor types available with different thickness ranges and resolutions. (see Fig. 4).

Mounting

The sensors are PU capsuled in rugged cylindrical stainless steel tubes and may

be fixed in holes or clamps according to the machine requirements. Mount the sensor so that the sheet can touch the sensor's active surface flat and close during the measuring cycle. The sensor may fit flat in any kind of material. The sensor cable has a 3 pin M 12 connector on the sensor-side and open wires on the monitor side for connecting to the monitor's screw terminals. Sensor standard cable length is 5 m, also available are cables with 10 m length. The cable may be shortened to any required length. The monitors are for fixing in cabinets/ enclosure either to snap on 35 mm rails or with screws.

For more details please ask for the monitor manual.

Fig. 4

Typ:	STH 05 + S 0.5 ES	STH 20 + S 2.0 ES
Range (mm)	0- 0,500	0,10 - 2,00
Resolution (mm)	0,001	0,01
Sensor dia. (mm)	28	54
Sensor length (mm)	55	75



Double sheet detector with 0 - 10V analog voltage output with singlesided Sensors for steel sheets



Amplifier typ ABS 0
Sensors typ S 0.5, S 1.0, S 2.0, S 3.0

Application

The analog sheet thickness sensor ABS 02 consist of the amplifier and a sensor that monitors single side and touching the sheet. The sensor incorporates a permanent magnet and magnet filed sensor for measuring the sheets magnetic conductivity. The magnetic conductivity depends on the sheet thickness and is transformed into an analog DC output voltage. The output voltage can be connected on 2 screw terminals. Fig. 3.1 shows the output voltage as function of the sheet thickness for the sensors typ S 0.5 and S 1.0 and Fig. 3.2. for the sensors typ S 2.0 and S 3.0. The diagram show that the characteristics are linear at lower sheet thickness values and change over to saturation on higher sheet thickness values. As the sensor system is based on the magnetic conductivity it can be used only for ferromagnetic steel sheets. The output voltage is insulated from the power / line voltage and has no connection to ground.

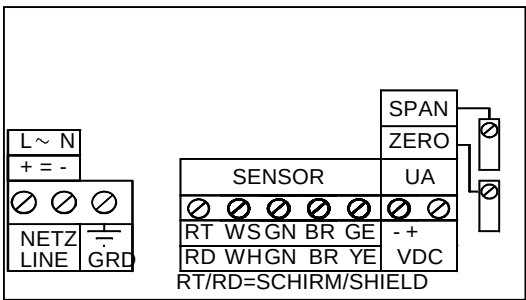
Mounting

Mount the sensor so that the sheet can touch the sensor into a machine part or make a sensor holder according to the machines requirements. The sensor can be mounted in any kind of material. The sensor cable can be shortened to any length. After shortening the cable the shield / cord (red terminal) must also be connected again. For mounting the amplifier remove the front cover and fix the amplifier in the four blind holes.

Adjustment

Mount sensor and amplifier and wire power / line and the sensor. Connect a voltmeter to the output voltage screw terminal UA and turn the "Zero" adjust so that the voltmeter shows 0 volt. Put a sheet as twice as thick as the sensors typ (example:
on Sensor typ S 1.0 a steek sheet with 2.0 mm sheet thickness) flat on the sensors active area. Turn the "Span" adjust so that the output voltage UA is 10 Volts. Remove the sheet from sensor and check whether the voltmeter shows again 0 volt. Repeat the adjusts if it does not show 0 volts.

Fig.2 Connection diagram



Techn. data

Sensors				
Type	S 0.5	S 1.0	S 2.0	S 3.0
max. sheet thickness (mm)	0,5	1,0	2,0	3,0
Diameter (mm)	18	28	43	54
Length (mm)	45	55	70	75
length of cable (m)	3			
Protection	IP 65			
Amplifier				
Line / Power voltage	220, 110, 48VAC, 24 VAC/DC			
Power requirements	ca. 3 VA			
Temperature	0 - 50 grd. C			
Output voltage UA	0 - 10 VDC			
Impedanz	> 200 Ohm			
Rise time for UA	< 0,5 msec.			
Dimensions:	160 x 80 x 55 mm			

Abb.3.1 $U_a = f(BD)$ for S 0.5 and S 1.0. BD = Sheet thickness

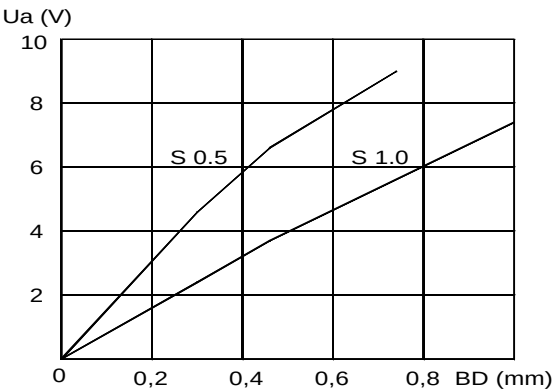
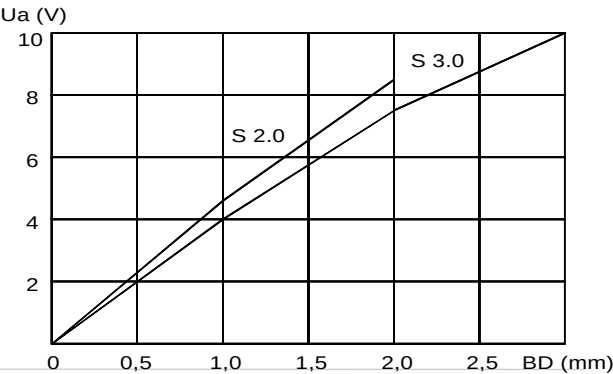
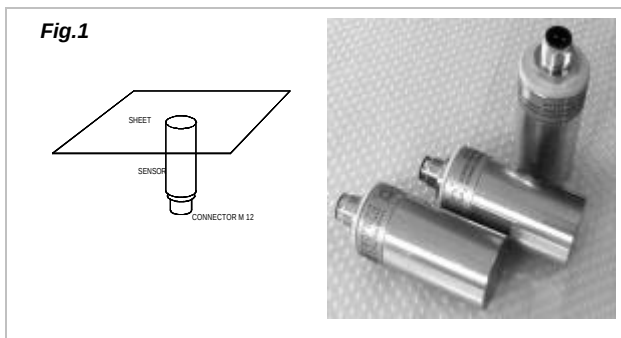


Abb.3.2 $U_a = f(BD)$ for S 2.0 and S 3.0 BD = Sheet thickness



Doublesheet/ Sheetthickness- Sensor with 0 - 10V DC Analog output with integr. Amplifier

Fig.1



Type S 1.0AS for magn./ferr. steel sheets up to 1.0 mm thickness
 Type SIE 2.0AS for non-magn./aust. steel sheets up to 2,0 mm
 Type SA 0.5AS for aluminium sheets up to 0,5 mm thickness

Application

These double sheet/ sheet thickness sensors supply a sheet thickness co- related output voltage from 0(1) to 10 VDC. The measuring amplifier is integrated into the sensor therefore no external amplifier or switching box is necessary. The 24 V DC power supply and the output voltage are connected to a 3 pin M12 x 1 connector and may used for many double/ sheet thickness monitoring applications. The analog voltage output of 0 (1) - 10 VDC from the sensors in connection with a PLC / IPC or other controllers that have 0 - 10 VDC inputs, allow a lot of high flexible, sophisticated and low price sheet thickness/ double sheet monitoring applications by programming these controllers. For example double sheet monitoring with one or more local or remoted thickness limits, sheet thickness comparators, sheet thickness limit calibration by teach- in and more. The sensors are built into rugged stainless- steel tubes. The monitored sheet has to touch the active front side of the sensor flat without any air gap. Sensor S 1.0AS has an integrated perm. magnet that attracts the monitored sheet automatically to the sensors front side. Sensor SA 0.5AS for aluminium sheets and sensor SIE 2.0AS for non-magnetic stainless are based on the eddy current system i.e. no forces pull the sheet to the sensors active front side. On some application special spring supported (non- metallic) sliders or rolls may be necessary to make sure that the sheet is pressed/ feeded allways against the sensors active front side. Fig. 2. shows the typical sensors output voltage diagram in relation to the sheet thickness. The outputvolatge is app. 1 V without a sheet on the active side of the sensor. These 1V output may be used to monitor the sensor connection cable against cable interrupts or cable short circuits. (fail save monitoring).

Mounting

The sensors are polyurethane capsulated in a flat, cylindrical staines steel tube and may fixed by clamps or in mounting holes with blocking screws. It is important that the sensors are fixed so in the sheet feed way that every sheet passes the sensor touching the active side of the sensor flat, closed and so that the active area is full covered. The sensor can be fixed in any kind of material also in steel. The sensor must be connected over the 3 - pin M12 x1 connector. On request we also delivery sensor- cables with singlesided connector and open wires on the other cable side. Type SKS305 = 5m long, Type SKS310 = 10m long. The sensor- cabel should be not longer than 20 m (also depended on the PLC / IPC input specifications).

Fig.2 Sensordiagram

Ua= Outputvoltage BD = Sheet thickness
 Ua (V)

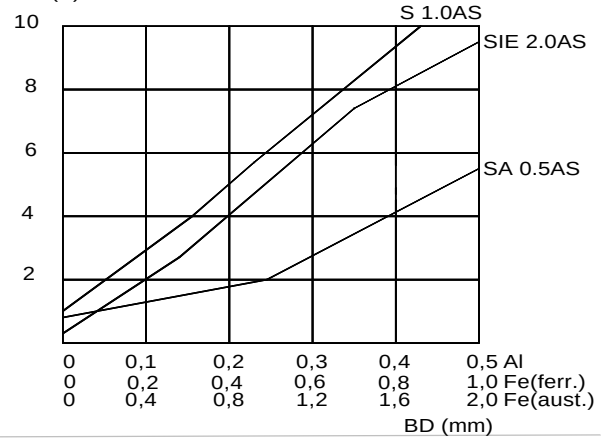


Fig.3 Sensor dimensions

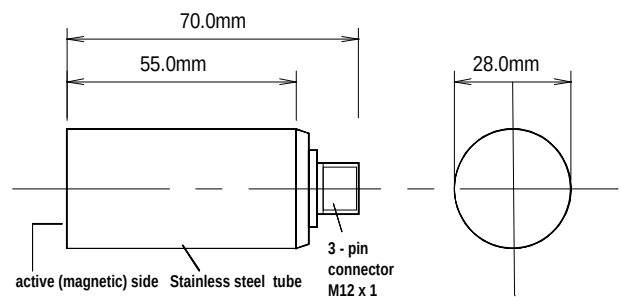


Fig.4 Connection

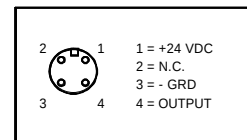
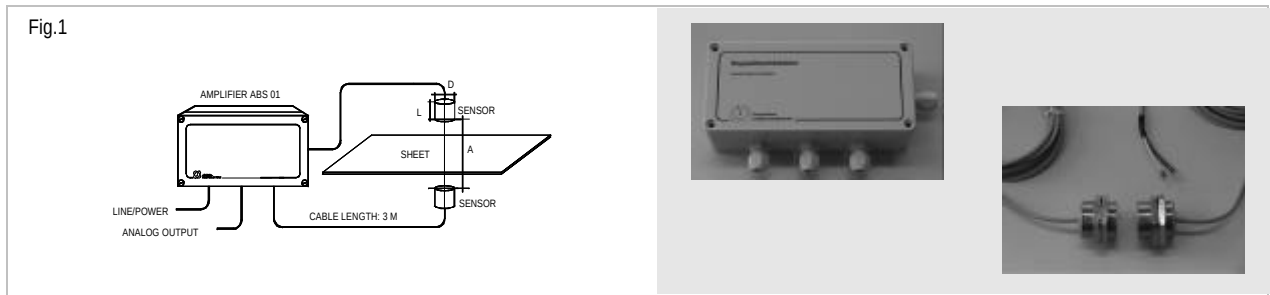


Fig.5 Specifications

Spezifications:	Sensor Type S 1.0AS	Sensor Type SIE 2.0AS	Sensor Type SA 0.5AS
Sheet Material	Steel (magn.)	Steel (non-magnetic) stainless	Aluminium
max.thickness (mm)	1	2	0.5
Supply current (mA)	20	20	60
Sensor- Diameter	28		
Sensor- Length (mm)	55		
Supply Voltage	24 VDC +/- 10%		
Output Voltage UA	0(1) - 10V (short circuit protected)		
Output Impedanz (Ri, Ohm)	200		
Rise Time	< 0,5 msec		
Temperatur	0 -50 grd. C		
Protection	IP 63		



Double Sheet Detectors with 0 - 10V analog output with bothsided sensors for thin Fe + Al sheets



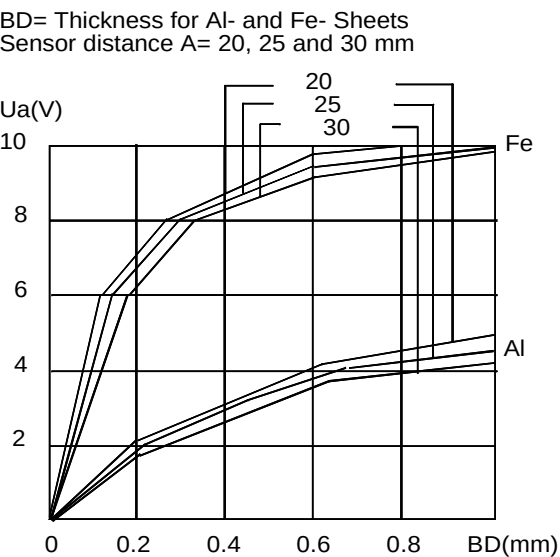
Amplifier Type ABS 01
Sensors Type SIZ 30(Pair)

Application.
The analog sheet thickness sensor ABS 01 consists of the amplifier and the sensors pair type SIZ 30(Pair), which are connected to the amplifier via 3 m shielded single wire cable. The sensors form an eddy current barrier in which one sensor transmits an AC field that is received from the opposite sensor. The sheet between both sensors reduce the received field strength. The amount of decreased field depends on the sheet thickness and the sheet material. The received signal then is transformed into an DC voltage between 0 and 10 volts. The screw terminals UA deliver an amount of output voltage that depends on sheet thickness, sheet material and distance A between both sensors. Diagram Fig. 3 shows the output voltage UA in relation to the sheet thickness BD (mm), for Steel (Fe) and Aluminum (Al) sheets for sensor distances of 20, 25 and 30 mm. The output voltage UA is insulated from the line / power voltage supply of the amplifier and is not grounded.

Mounting
The sensors are fitted into M 30 threat tubes so they can easy mounted into a through hole by using the enclosed M 30 nuts. The sensors must be mounted opposite each other in perfect alignment so that the sheet can pass between both sensors without touching them. The sensors can be mounted flush in any kind of material. Both sensors are identical and can be used either as transmitter - or as receiver - sensor. The sensor cable can be shortened to any length. For fixing the amplifier remove the cover and fix it by using the 4 blind holes.

Adjust
Fix sensors and amplifier in their final position. Wire sensors and amplifier's power supply. Connect a voltmeter to screw terminals UA and turn the Zero Adjust with a screwdriver till the voltmeter show 0 volt. After this adjust do not change sensor's distance anymore.

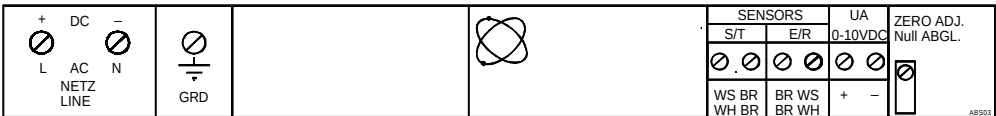
Fig.3 Outputvoltage $U_a = f(BD)$



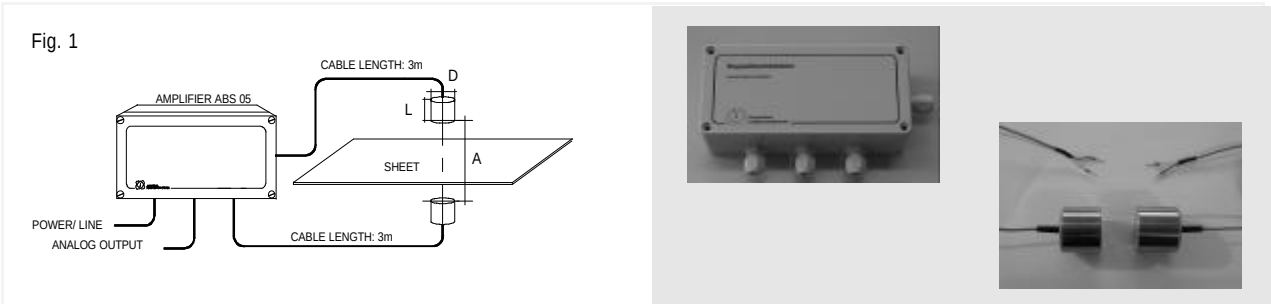
4. Specifications

Power / Line	220,110, VAC, 24 VAC/ VDC
Power requirements	app. 3 VA
Temperature	0 - 50 grd. C
Output voltage UA	0 - 10 VDC
Source resistant	> 200Ohm
Rise time for UA	< 10 msec.
Dimensions amplifier	160 x 80 x 55 mm
Dimensions sensors SIZ 30 (Pair)	M 30 x 25 mm
Cable length	3 m

Fig. 2 Connection Diagram



Double Sheet Detectors with 0 - 10V analog output with bothsided sensors for thick Fe + Al sheets



Amplifier ABS 05
Sensors SIZ 54 (Pair) , Sensors SIZ 75

Application

The analog sheet thickness sensor ABS 05 consists of the amplifier and the sensors pair type SIZ 54(Pair) or SIZ 75 (Pair), which are connected to the amplifier via 3 m shielded single wire cable. The sensors form an eddy current barrier in which one sensor transmits an AC field that is received from the other, opposite situated sensor. The sheet between both sensors reduce the received field strength. The amount of decreased field depends on the sheet thickness and the sheet material. The received signal then is transformed into an DC voltage between 0 and 10 volts. The screw terminals UA deliver an amount of output voltage that depends on sheet thickness, sheet material and distance A between both sensors. Diagram Fig. 3 shows the output voltage $U_a(V)$ in relation to the sheet thickness BD (mm), for Steel (Fe) and Aluminum (Al) sheets for a sensor distance of 50 +/- 10 mm. For steel sheets scale "fe" and for aluminium sheets scale "al" is valid. The senosrs are also usfull for some other materials like copper, bras, metal-compound materials etc. For more details , please inquire.The output voltage U_a is insulated from the line / power voltage supply of the amplifier and is not grounded.

Mounting

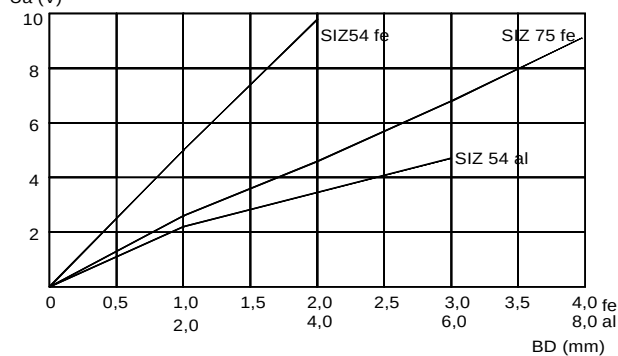
The sensors are fitted into cylindrical enclosures so they can easy mounted into a through hole or with clamps (not delivered). The sensors must be mounted opposite each other in perfect alignment so that the sheet can pass between both sensors without touching them. The sensors can be mounted flush in any kind of material. Both sensors are identical and can be used either as transmitter - or as receiver - sensor. The sensor cable can be shortened to any length. For fixing the amplifier remove the cover and fix it by using the 4 blind holes.

Adjust

Fix both sensors and the amplifier in their final position. The distance between both sensors should be 50 +/- 10 mm. Other distances are also possible however that results other sensor characteristics. Wire sensors and the amplifier's power supply. Connect a voltmeter to screw terminals U_a and turn the Zero Adjust with a screwdriver till the voltmeter shows 0 volt. After this adjust do

Fig.3 Analog output voltage $U_a = F(BD)$ BD= Sheet thickness

not change the sensor's distance anymore.



Specifications

Sensors		
Type	SIZ 54 (Pair)	SIZ 75 (Pair)
Length (mm)	36	50
Diameter (mm)	54	75
Encloser mat. (Tube/ Covers)	Stainless steel / PVC	PVC/PVC
Cable length	3 m	
Protection	IP 65	
Amplifier Type ABS 05		
Power/ Line	220,110,VAC, 24 VAC/ VDC	
Power requirements	ca. 3 VA	
Temperature	0 - 50 grd. C	
Output voltage UA	0 - 10 VDC	
Source resistant	> 200Ohm	
Rise time for UA	< 0,1 V/msec	
Dimensions (mm)	160 x 80 x 55	

Fig. 2 Connection Diagram

