FIESSLER ELEKTRONIK

Press Brake Protection System safety category 4

AKAS®-5M

Operating Instructions

translation

CONTENTS:

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CE

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FIESSLER
ELEKTRONIK

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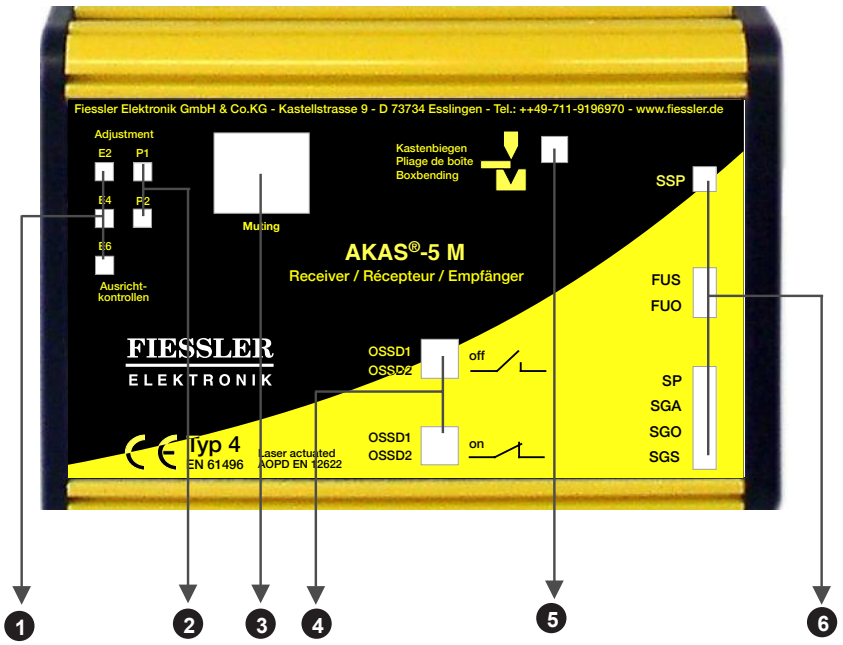
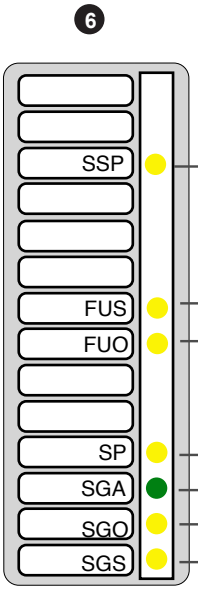
AKAS®-5M 1.2



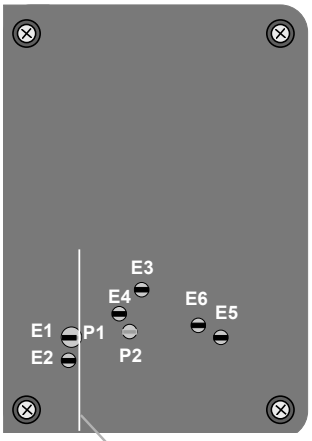


Indicator lights for inputs and outputs

(see page 31)

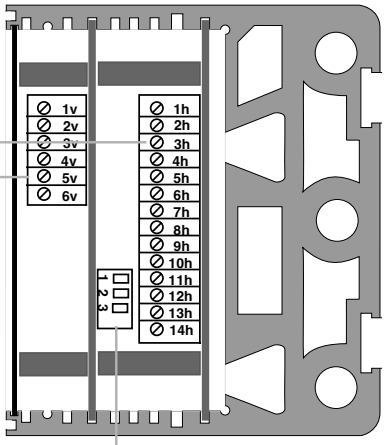
- Input Blanking test signal
- Inputs for press start / stop (release of closing stroke)
- Input for safety point
- Output for demand for slow speed
- Input for position control in slow speed

view of the receiver elements



bendingline

1. ajustment controll-Leds of the receiver elements E2, E4, E6 LEDs are on if the beam does focus at all (see page 21)
2. ajustment controll-Leds P1, P2 for self-acting ajustment after tool change LEDs are of if the beam does focus at all (see page 21)
3. integrated mutinglamp lamp is on if the protective field of the AKAS is not activated lamp is flashing if EDM- or SP-input-signals are wrong (see page 31)
4. LEDs for safety outputs (OSSDs, Fail-Safe PNP) red LEDs are on if the OSSDs are in OFF status green LEDs are on if the OSSDs are in ON status
5. LED is on if box bending funktion is activated



connector plug

view after removing the connection lid on the receiver support

dip-switches (see page 14)

This is the operating instruction for the AKAS® models: AKAS®-5M
Special instructions for each model are provided with its individual model marking.
All safety notices are marked with this symbol and must be strictly observed

Read the operating instructions

These operating instructions provide to the user important information concerning the correct use of the AKAS®. These instructions are a component of the light barrier concerned. It is essential that they are easily available at the location where the safety light barrier is installed. Before the initial operation of the AKAS®, all requirements detailed in these operating instructions must be observed. Other relevant regulations and the requirements of the employers' liability insurance associations have also to be complied with.

Qualified Personnel

Safety warning

Mounting, initial operation and maintenance may only be performed by qualified persons.

Light barriers do not protect anybody from machine-caused flying objects.
The AKAS® protects fingers and hands that hold the sheet during the operation. **Therefore it does not protect during any fast engagement between the bending punch and the matrix short time before those are closed. The protection function of the system is cancelled when the Muting lamp is on.**
The front beams E3-E6 (AKAS®-5M) **which are turned to the operator before the bending line do not protect, if the box-bending function has been activated earlier.**
With the integration of a AKAS ® safety system, the standard should be strictly complied with the European Standard (EN 12622).

A-Test: putting into operation

The setting must be done in a way that the following test will be passed:
!!! If either test A or B fails, the machine must not be used until the problem is resolved !!!

- **The B-Test must be done for safety reasons each 5 times on the left end and on the right end of the upper tool.**
- **The press brake must be equipped completely with the heaviest upper tool.**
- **Start of the closing movement from the maximum top dead centre (T.D.C)**

B-Test: daily check
(at least every 24 hours)

At the beginning of each shift and after each change of tools, the AKAS® press brakes protection must be checked in normal mode (flatbending) as follows (see also EN 12622):

Test must be carried out at both left and right ends of the bending punch.The punch must not touch the step-shaped test rod.

a.) Place the test piece centered in position "10" on the lower tool.
Now start the close down movement.

b.) The press brake stops.

c.) The test piece must be placed in position "15" under the upper tool. In this position ("15") the test piece may not touch the upper tool.

d.) Drive up the press brake. Place the the test piece in position "35" on the lower tool.
Now start the close down movement.

e.) The press brake must be stopped in a way that the test piece ("35") may not touch the upper tool.

f.) Turn on the sender (adjustment keyswitch to ON position)and move the test piece ("14") along the tip of the upper tool. The adjustment controll LED P1 on the AKAS® receiver has to remain ON during the test.

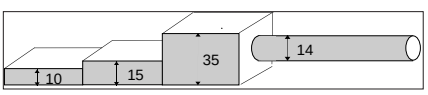


Fig.4/1

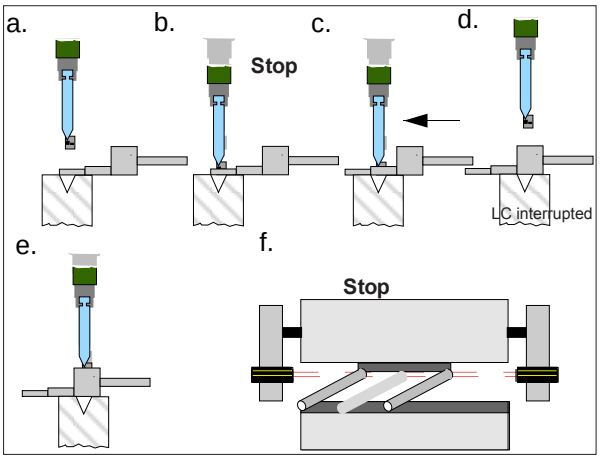


Fig.4/ 2

Prerequisites for using the press brake protection AKAS® 2.1

1. **Use only tools with the same height in the same fixing on the press. All utilized tools must have one common bending line.**

2. **According EN 12622 the press brake safety safety system AKAS® is designed specifically and only for the use of "V" type tools**

3. **Stoppers, which are mounted at the matrix, lead to a premature switching-off of the downward movement.**

4. **The maximum allowable overrun traverse of the machine: 13mm / AKAS®-5...**
The press must have an automated overrun traverse control for the first stroke. Before the initial start-up, the overrun traverse must be checked either by using the test rod (see page 4) or by using an Overrun Traverse measuring device. (upon customer's request, Fiessler Elektronik will perform the Overrun Traverse Measuring on the customer's machine.) **If one results of 10 consecutive measurements is larger than 13mm / AKAS®-5..., the fast speed must be reduced.**

5. **Due to the missing sychronization during fast speed, AKAS® cannot be used for two machines aligned in parallel (e.g. "tandem press brake") .**

6**. Muting signal If a light beam is interrupted by the sheet which is to be bent, the AKAS® would stop the working stroke immediately. Therefore the AKAS® must be muted before it gets interrupted by the sheet. Likewise, slightly uneven sheets should not lead either to an unintended switching-off of the cutting movement.**
From a certain opening above sheet plate, the machine controller must output a bypass signal to the receiver (see page 14). At the same time the control system of the machine must reliably guarantee according to safety category 4, that from this time the stroke speed is < 10 mm/s.

6.1 **Bending boxes with AKAS** If the "boxbending" mode of AKAS is activated the
blanking and the muting signal must be activated before the receiver element E2 (for Details see page 11) is interrupted.
Please refer page 14 columns "boxmode" how to setup the correct blanking / mute point values
for boxbending mode.

6.2 **Bending flat sheet plates with AKAS** When bending flat sheet plates, before any interruption of receiver E1,E3-E6, first SSP must be driven from 0 to 1, than SP must driven from 0 to 1.
The signal SP (blanking signal) can be output from the machine control. The signal SSP (blanking test signal) to be outputted from a safe distance measuring system (safety PLC). Then the closing movement can be further carried out at fast speed.
Receiver elements E3 and E4 remains active. The protection by E3 and E4 stays active for 27ms. At the latest after further 8 mm stroke, the machine control must switch to slow speed. Then also E3 is muted. The machine send a Mute signal zu SGO and SGS input of the AKAS receiver. **At the same time the control system of the machine must reliably guarantee according to safety category 4, that from this time the stroke speed is < 10 mm/s.**

7. **The protection of a pressbrake by the AKAS® does not permit bending in the bottom of a box inside the box in fast speed.**
8**. The AKAS® does not protect: -if the machine is only run in the work speed, or AKAS will be interrupted during fast speed and the stroke will be continued in work speed**
-if the overrun traverse of the press brake is too long
-from squeezing during the bending operation
-if the mutinglamp is constantly on

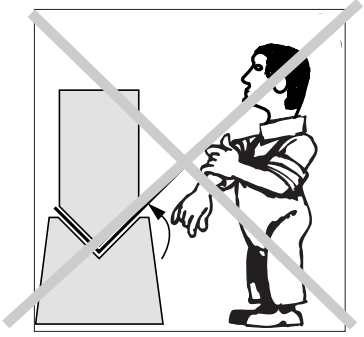


Fig.5/ 1

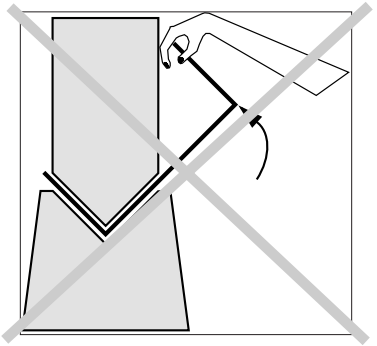


Fig.5/ 2

9. **The hazardous state of the machine must be terminated by the sensor function.**

10. **The safety level (class 4) of the accident preventing light barrier should at least correspond to the safety level of the control system of the machine.**

11. **The Blanking Test Signal shall be generated according safety class 4.**
This signal should be at least 1 mm and at most 6mm be output before the blanking signal SP.

12. **Laser beams may be deviated due to air currents, this may cause unwanted and unforeseen machine stops.**
Therefore the machine must be erected at a place free of air currents.

Acceptance Acceptance test: the installation acceptance test and inspections should be carried out by a competent person in possession of all the information supplied by the manufacturer of the machine and the ESPE. Upon customer's request, Fiessler Elektronik will perform the initial acceptance as well as the annual test. Additionally, customer training seminars on how to execute annual tests will be conducted at regular intervals.

Annual Inspection The machine owner must make sure that a competent person is assigned to check the light barrier annually. This person can be an employee either from the light-barrier manufacturer or from the operator's staff. The annual test shall be executed according to the inspection *sheet on page 43.*

The laser - accident preventing light barrier AKAS® is an electro sensitive protective and controlling device (ESPE) which has the function to protect operators from accidents.
This happens as follows : Before a part of the body is squeezed between two opposed moving machine parts, this part of the body interrupts at least one light beam. By this means the movement of the machine is stopped, before it comes to an injury.

AKAS®
- meets IEC 61496, Typ 4, prEN 12622
- is self- monitoring without additionally wiring.
- easy to adjust after tool changing.

Operative range for the laser-accident preventing light barrier of the AKAS® types are: **press brakes**

AKAS®-5: equipped with electromotor driven supports for transmitter and receiver for self-acting tool change if tools with different heights are used (see fig. 7/1).

with Support:
AKAS®-5...

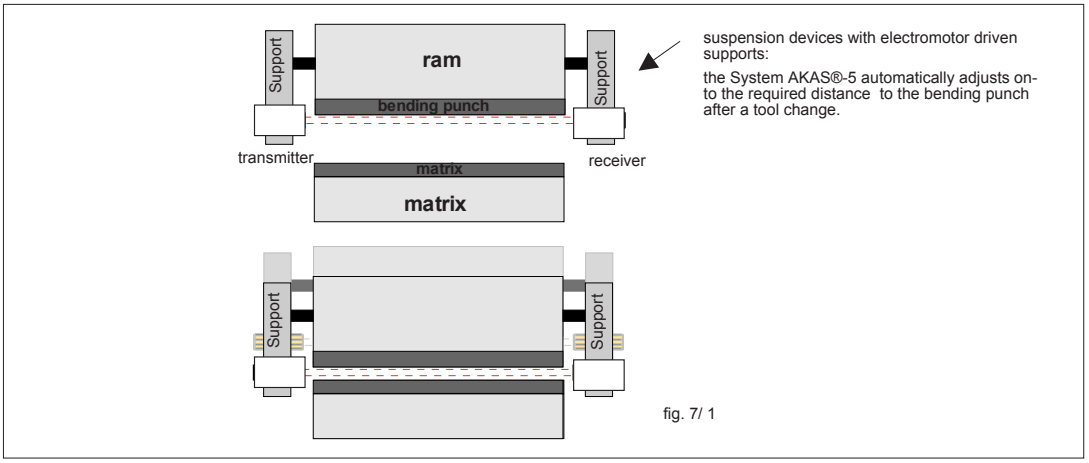


fig. 7/ 1

Serial Numbers
AKAS®-5...

The serial numbers are located at the front side of the housings of both transmitter and receiver supports.

	systems <u>without</u> operating mode selection operation only with additional safety					
Functions / Characteristics	**AKAS®-5M**					
with / without Support self-adjusting onto different tool heights	with					
max. Overrun Traverse of the press brake	4 - 13 mm					
recommended turnover point from fast speed into slow speed (according to overrun traverse of the press) Distance between metal sheet and bending punch)	0 - 6 mm					
Detecting beams / Receiver elements	3 / 6					
Inputs						
start / stop of closing stroke FUS, FUO	2 equivalent					
position control in slow speed SGO, SGS	2 equivalent					
Blanking test signal / selection of box bending SSP	1					
safety point SP	1					
Outputs						
Safety outputs for release of closing stroke OSSD1, OSSD2	2					
demand of a higher change-over point from fast speed into slow speed above the slug during box-bending HUSP	1					
output for messages RS 232 TXD	1					
demand for slow speed SGA	1					

bending of flat sheet metal

The SSP signal (Blanking test signal) must be active before the SP signal is turned on. The SP signal must lie before any of the receiver elements E1 or E3 – E6 is interrupted by the sheet.
The machine can still move in high speed for a maximum of 800ms.

At start of stroke

-If the SSP and SP signal is not active all receiver elements E1 and E3–E6 must be free.
-If SP is controlled by + 24V, SSP must be driven with + 24V.
-If only SP is driven by +24V, the red OSSD Interrupted LEDs blink when the foot pedal is pressed.
-If the SSP signal is active and at least the receiver elements E1 and E3-E6 is free, AKAS will turn off the SGA output (highspeed enable). Only a slowspeed stroke is allowed now.
-If at least one of the receiver E1, E3-E6 is interrupted and SSP and SP are driven by +24 V and no slow speed signal is present on SGS, SGO, the output SGA switches off and a slow speed stroke is allowed.
-If at least one of the receiver E1 or E3-E6 is interrupted . And SP is notdriven by +24 V (SSP state no matter). The SGA can be switched off by double-pressing of the foot pedal.
A slow speed stroke is permitted (muting) (for example: for bending inside a box).
-If slow speed signal is present (SGS and SGS are driven by + 24V), a slow speed stroke (muting) is allowed regardless of the state of the receiver.

fast speed

-If the SSP and SP signal is not activated the receiver elements E1 and E3-E6 must be free.
-If SSP is activated and the SP signal is just activated, the receiver elements E3 and E4 must stay free for at least 27ms. (Important: SSP must be activated before SP = 1)
-If SP is driven by +24V. Then the slow speed signal must be present after at latest 800ms (Muting is carried out only in slow speed). The receiver E3 has to be free till the slow speed signal is activated.

Principle of function bending of flat sheet metal

1.Release the closing movement by activating the foot pedal. Receiver E1 and E3-E6 are activated.

2. Press brake closes in **fast speed (> 10mm/s)**
Receiver element E2 are deactivated, **E1,E3 bis E6 activated (protection)**

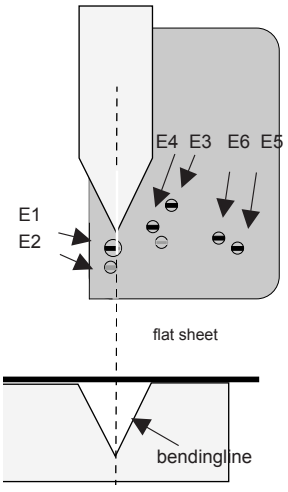


Fig.9/ 1

3. About 1 mm before the Blanking point (changing SP = 0 to SP = 1), SSP is driven by the safe position measuring system (for example, safety PLC).

4. Position for AKAS blanking reached (SP signal is changing from SP = 0 to SP = 1):
The receiver elements E1, E5 and E6 will be muted. E4 will stay active for about 27ms (max allowed travel distance 4mm). E3 will stay active.

5. After reaching the change-over point from fast speed to **slow speed (= 10 mm/s)**:
(Distance between punch and sheet 0-6mm depending on the stopping distance of the machine)
Receiver element E3 will be muted, so the complete AKAS receiver is muted now.

6. All receiver elements are muted and the muting lamp is on. The bending procedure is finished.
(The fast speed mode and the slow speed mode are limited of about 2 min.)

Advice The beams of the AKAS® must be located at a certain distance to the bending punch.
(See **chapter 5.2 Overrun Traverse Measurement and**
chapter 5.8 Adjustment of the distance between the AKAS® and the bending punch.
Caution! Use only tools with equal overall height within one fixing.

Bending of wavy sheet metal

Closing movement with interrupted protective field

The AKAS® system offers the possibility to execute a closing movement under monitored slow speed even when the protective field is interrupted by a wavy sheet metal.
After the interruption of the protecfive field and the release and reactivation of the foot pedal, the AKAS will deactivate the SGA output when the protective field is interrupted. By this, only slow speed will be enabled by the machine control (NC).
AKAS® provides a reaction time of about 200ms for the machine control and then activated the safety switching outputs for the closing movement (OSSDs). The OSSDs remain activated as long as the AKAS® receives a slow speed message to SGS and SGO:
by AKAS®5**M** within the next **170 ms**.

By twice pressing the foot pedal can also use this function to perform a stroke, when the protective field of the AKAS®-5 is interrupted in the OT.

Function principle box bending

see diagram page 41

1. "Box Bending" is activated by the box bending button. The signal at the box bending input SSP must be high (+24V) for at least 100 ms and after that low (0V) for at least 100 ms.
(The box bending function can be canceled by twice activating the box bending button again)

2. AKAS® confirms the selection of the box bending by activating the output HUSP and the LED *box-bending*

- HUSP output active: The speed change point (fast -> slow) must be a bigger value (refer table 14/1)
The receiver elements E3 – E6 are muted, **E1 and E2 are active. The status of the input SSP does not matter, when box-bending function is selected.**

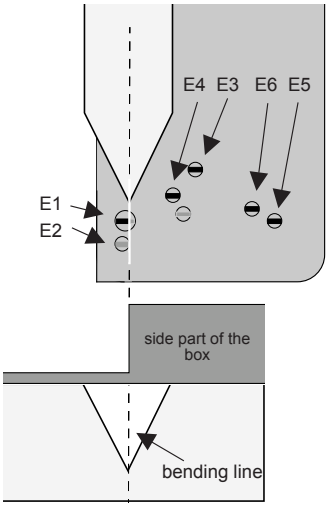


Fig.11/ 1

3. Release the closing movement by activating the foot pedal. The press closes in **fast speed (> 10mm/s).**

4. Upon reaching the change over point from fast speed to slow speed (= 10 mm / s) and with switching from SP = 0 to SP = 1, E2 is muted. **E1 remains 0.5s (5mm) active (protection)**

5. All Receiver elements are muted and the muting lamp is on. The bending procedure is finished.
(The fast speed mode and the slow speed mode are limited of about 2 min.)

6. After the bending procedure the box bending functiuon is cancelled.

Bending of the box bottom

Closing movement with interrupted protective field
The AKAS® system offers the possibility to execute a closing movement under monitored slow speed even when the protective field is interrupted.
After the interruption of the protective field and the release and reactivation of the foot pedal, the AKAS will deactivate the SGA output when the protective field is interrupted. By this, only slow speed will be enabled by the machine control (NC).
AKAS® provides a reaction time of about 200ms for the machine control and then activated the safety switching outputs for the closing movement (OSSDs). The OSSDs remain activated as long as the AKAS® receives a slow speed message to SGS and SGO:
by AKAS®5-**M** within the next **170 ms**.

Bending of very small pieces

In the case of bending of very small pieces, which must be guided by the fingers, the box-bending function must be selected. Otherwise, the fingers would interrupt E3, E4, E5, E6 (AKAS®-5) which would lead to the switching off of the bending process!
With activated box-bending function, a finger which is placed next to the slog on a large matrix, is <u>not</u> detected!!

housing type The aluminium housing of both transmitter and receiver are powder coated in RAL 1020 yellow. The optical head is made of acid-resistant spherically reinforced plastic (polyamide). The support housings are of eloxal coated aluminium.

fastening With Fiessler tenon blocks

dimensions

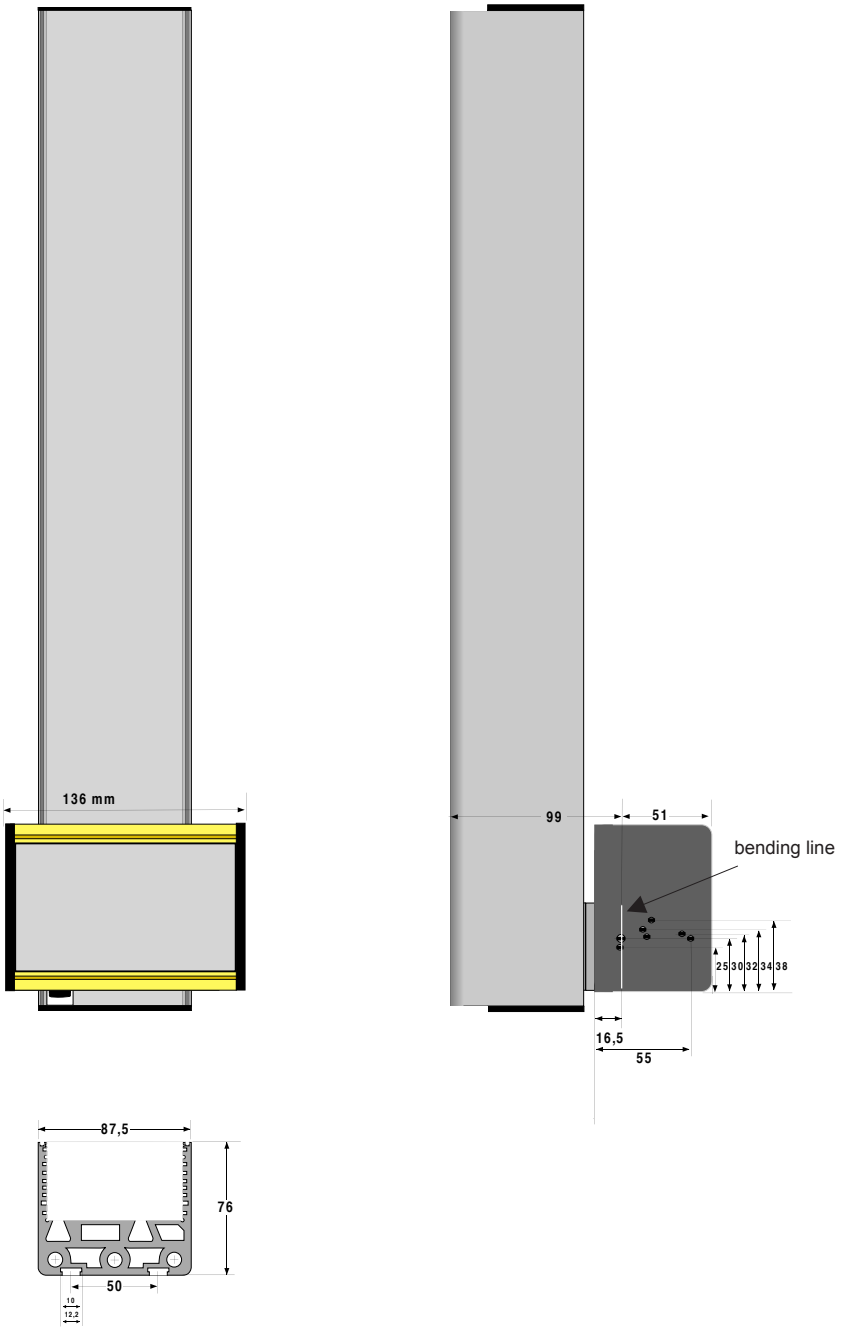


Fig. 12/1

max. Standard-Range between transmitter/receiver unit 8 m

(For longer range please get in contact with Fiessler Elektronik or your local dealer).

max. positioning range of the supports

AKAS®-5...

Standard 150 mm
(190 mm as option)
(On demand, supports with larger position ranges are available)

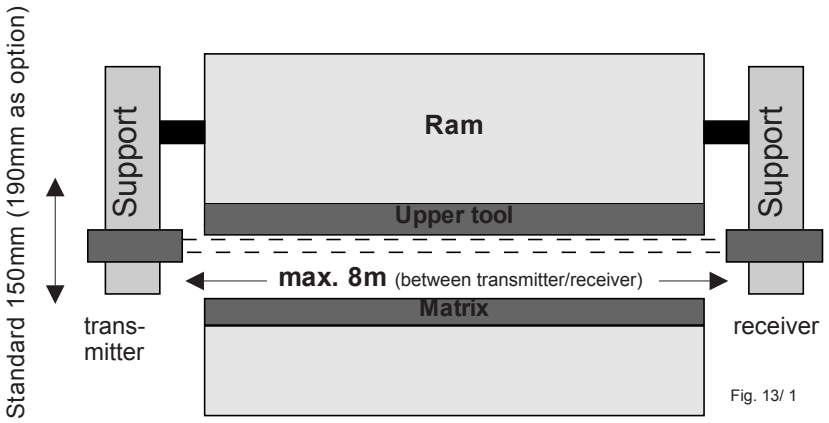


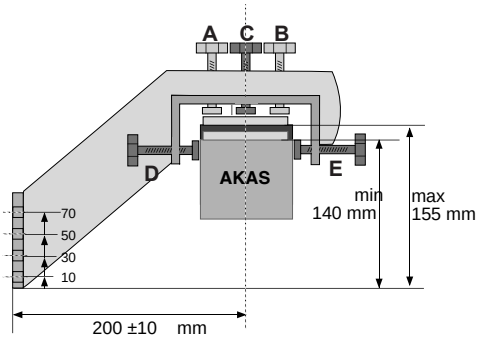
Fig. 13/ 1

Fiessler Holders

front view fig. 13/2

Holder for AKAS®-5...

order code AKAS/AS/U (optional)

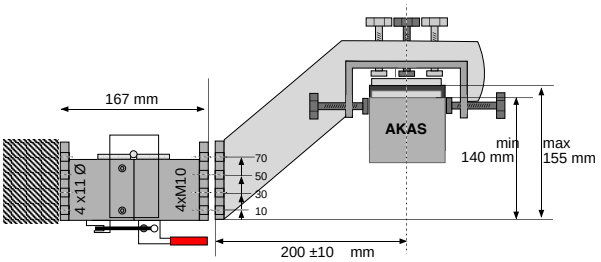


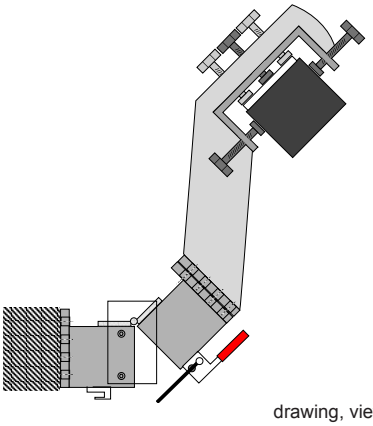
drawing, view from the top fig. 13/3

rear view fig. 13/4

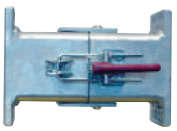
swiveling adaptor for Holder AKAS/AS/U

order code AKAS/AS/U/S (optional)

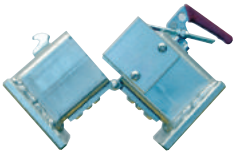




drawing, view from the top fig. 13/5



closed fig. 13/6



open fig. 13/7

How to proceed: Step by step mounting the AKAS®

1	**a. Overrun traverse measurement / b. Dip switch adjustment at the support**
2	**Design of the mechanical holders** - not to apply if Fiessler holders are used
3	**Mounting of the holders at the ram**
4	**Mounting of the AKAS® on the holders**
5	**Connection of the AKAS®**
6	**Adjustment of the AKAS® during first installation**
7	**Adjustment of the distance of the AKAS® from the bending punch** (self-acting if supports are used)
8	**Function Verification of all electrical connections in view of the safety classs 4 requirements**
9	**Self-acting Overrun Traverse Test**

1a. Overrun Traverse Measurement

The press must have an automated overrun traverse control for the first stroke. Before the initial start-up, the overrun traverse must be checked either by using the test rod (see page 4) or by using an Overrun Traverse measuring device. (upon customer's request, Fiessler Elektronik will perform the Overrun Traverse Measuring on the customer's machine.)

If the results of 10 consecutive measurements are larger than 11mm (AKAS®-5...,) the fast speed must be reduced.

1b. adjustment of the dip switches
only AKAS®-5...

According to the induvidual overrun traverses of each machine, 7 different distances Z (=gap between uppermost receiver element and bending punch, see Fig. 14/1 u. Fig. 14/2) can be programmed via 3 dis switches at the support. The adjustment to the respective selected distance is carried out automatically. (s. chapter 5.7 (Adjustment of the distance of the AKAS® from the bending punch). Fiessler delivers the system pre-adjusted "B".

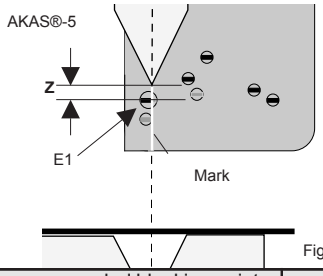


Fig14/1

adjust-ment	**distance Z** after completed automatical adjustment in accordance to the max. allowable overrun traverse of the press brake after the interruption of the beams. **AKAS®-5...**	Dip switch Position	recommended blanking point SP->1 above the slug surface **AKAS®-5...**		recommended change-over point (V->10mm/s) from fast speed into slow speed* above the slug surface * **AKAS®-5...**		To be checked changeover point limit
	The distance must not be less than the stopping distance of the machine		Flat (HUSP=0) (HUSP=1)	Kasten	Flat (HUSP=0) (HUSP=1)	Kasten	Flat (HUSP = 0)
A	13 mm	off on	16 mm	21 mm	8 mm	21 mm	7 mm
B	11 mm	off on	14 mm	19 mm	6 mm	19 mm	5 mm
C	9 mm	off on	12 mm	17 mm	4 mm	17 mm	3 mm
D	8 mm	off on	11mm	16mm	3 mm	16mm	2 mm
E	7 mm	off on	10mm	15mm	0 mm	15mm	-1 mm
F	6 mm	off on	9mm	14mm	0 mm	14mm	-1 mm
G	5 mm	off on	8mm	13mm	0 mm	13mm	-1 mm
H	4 mm	off on	7mm	12mm	0 mm	12mm	-1 mm

table 14/1

The distance to the upper tool must be set so

*** by this, a tolerance in sheet metal waviness of about 2mm is given.**

Blanking test signal

1mm before SP change from 0 to 1, the signal SSP must be present as precisely as possible.
If the SSP signal will be output from a safety PLC, the signal SSP from 0 to 1 has to change if the safety PLC reads an opening h.

h < SPposition + 1mm + 2x tz x v (tz in seconds)

tz = program cycle time of safety PLC.
v = current closing speed of the press brake.
h = Opening of the press brake above clamping point
SPposition = Suggested Blankingpoint SP (see page 14 Table 14/1)

Exacample: SPposition = 9mm, v= 100mm/s, tz= 10ms = 0,01s
h < 9mm + 1mm + 2 x 0,01 s x 100mm **==>**
The signal SSP has to change from 0 to 1 when the safety PLC reads an opening above clamping point of h < 12mm.

For plausibility check of the NC, the safety PLC must verify that in flat bend mode the changeover to slow speed is not later than at the values shown in table 14/1 in column 8

If this is not the case, the stroke has to be stopped and no subsequent strokes are allowed.

2. design of the holders
void if Fiessler holding device are used

- The dimensions of the self-supplied holders must be individually laid out according to the dimensions of the press brake.
- The self-supplied holders must be made of torsion-free rigid material, e.g. steel tubes 80 x 50 x 5 mm.
- They must be sufficiently long so that the largest and the shortest tool are still within the detection range of the AKAS® .
- If frequent tool change requires the presence of a swivable holder, this should be installed at the receiver arm, in order to leave the precise adjustment of the transmitter arm unchanged.

3. Mounting of the holders at the ram

a) The holders must be mounted at the ram in a way that the marks on transmitter and receiver correspond exactly to the bending line. The receiver elements E5 (AKAS®-5 fig. 16/3) must face the operator and E1 (AKAS®-5 fig. 16/3) must remain free when the highest tool is utilized. (Fig. 16/ 1 u. /3)
d) The lowest edge of both supports must be at the same level.
c) The gap between the front edge of the AKAS®systems and the press brake should be > 100mm in order to prevent injuriers while closing the press.
d) The existing mechanical guards of the machine must be modified in a way that any by-passing of the safety equipment by the operator is not possible. Likewise, any danger of geeting caught between grids and safety equipment must be excluded.

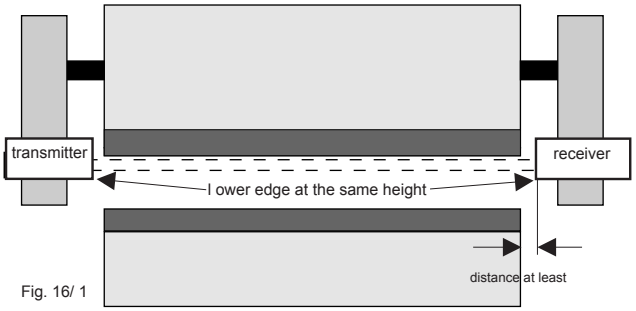
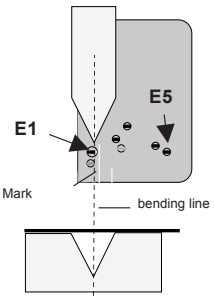


Fig. 16/ 1

Fiessler holder fig. 16/4



AKAS®-5 Fig.16/ 3

please observe!

Transmitter and receiver of the AKAS® must not be subject to mechanical stress (e.g. bottles must not be placed on it). To prevent this and to protect the AKAS® from any damages, a solid protection cap should be always mounted.
Make sure that no material or solid parts are placed in the clearance beneath the AKAS® and the holders, in order to exclude any collision caused by the closing movement of the press brake. Fig. 16/ 5

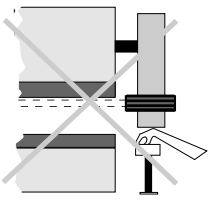


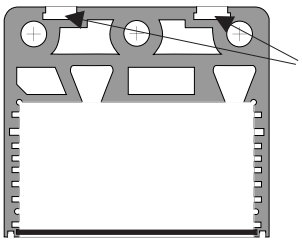
Fig.16/ 5

4. Mounting of the AKAS® on the holders

a) AKAS®-5...

mounting with Fiessler holder **(optional)**

a) Support with tenon blocks at the rear



2 M5 sliding tenon blocks are located in each groove for fastening

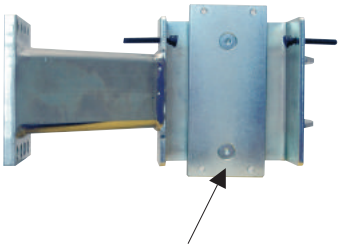
The adjustment is made with the help of the holders.

Fig. 17/ 1

Remove the fastening plate from the Fiessler holder and tighly fasten it by using the tenon blocks at the AKAS®.

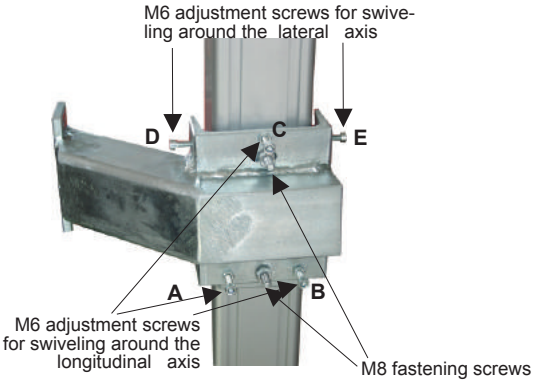
Choose a mounting position according to the directions given in chapter 5.7 **Adjustment of the AKAS® during first installation.**

Pay attention to avoid any deformation of the profile.



fastening plate

Fiessler holder front view fig. 17/2



Fiessler holder rear view fig. 17/3

Mounting on self-supplied holders

b) **Support with fastening angles at the upper and lower side** (as option)

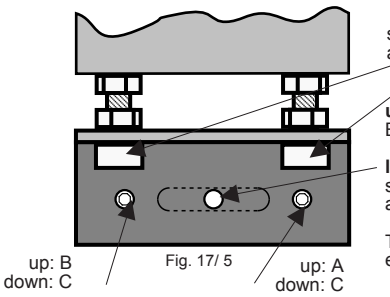


Fig. 17/ 5

Fig. 17/ 4

To guarantee a trouble-free operation, the supports of both the receiver and the transmitter must be fixed at solid, deformation-free plane-parallel constructions at the ram.

The adjustment screws must be easily accessible. When pivoting around the longitudinal axis, the locknuts of the lower M 10 screw at the angle bracket should be unscrewed, the other M10 locknuts must be tightened.

Pay attention to avoid any deformation of the profile. By unsrewing the M10 screws, fine height adjustment is enabled.

6. Adjustment of the AKAS® at the first installation

-AKAS®-5...

both supports must be mounted in a way that:

1. the highest (biggest) bending punch and the smallest bending puch is within the range of the supports.

2. using the smallest bending punch, the receiver element E1+Z (**AKAS®-5** see fig. 18/1) are covered by the punch at the highest range position of the support.

3. using the highest bending punch, the receiver element E1+Z (**AKAS®-5** see fig. 18/1) can still be positioned correctly at the lowest position

Transmitter and receiver must be mounted at the same height if both are installed in the lowest position of the supports.

Fig.18/1

The receiver and the transmitter must be swiveled around the longitudinal axis in a way that their housings are plane parallel to the ram. With pivoting around the longitudinal axis, the adjustment screw or the locknut that counteracts the screwing movements, must be loosened.

adjustment of the receiver

Adjust the support with the help of a spirit level vertically, i.e. parallel to the guiding rails of the ram.

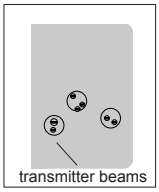
Set up the receiver with the M6 adjustment screws until the white line on the receiver cover is in line with the bending line of the machine.

Verify that the white line on the receiver is in line with the bending line all over the entire movement range of the receiver support.

Check this over during the whole travel of the support of the receiver by turning the key-operated switch to ""ON" and carrying the receiver upwards with pressing the button "RECEIVER UP". For doing this, the adjustment mode must be in manual mode s. chap. 5.8.). During the upward movement of the receiver, repeatedly turn the key-operated switch to "OUT" and check the distance between the mark and the perpendicular (bending line) to make sure that the receiver is carried up parallelly to the bending line. The displacement by the motor is not intended for nonstop carrying up and down. In this case the thermal protection switches off the motors. After letting go the button and a short brake you may continue the carrying procedure.

adjustment of the transmitter

The transmitter must be mounted in a way that its marks are located perpendicularly to the bending line, the same way as the receiver is positioned. Adjustment must dbe made just the way like the receiver.



AKAS®-5 Fig.18/3

The red transmitting beams should meet the receiver like it is shown in the opposite illustration. When doing so, please observe that the receiver stays in the lower stop of the support. To check this, cover the transmitter entire- ly. Then the receiver should not move further downwards. The adjustment mode must be in manual mode (s. chap.5.8.)

fine adjustment

-AKAS®-5...

The support of the transmitter must be turned around both the longitudinal and vertical axis until the laser beams are aligned parallel to the ram.

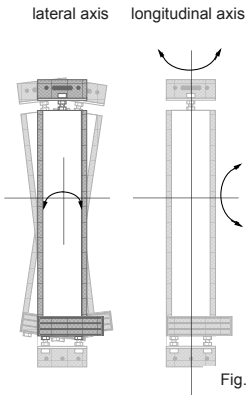


Fig. 19/1

Angular fastening (optional): When turning around the longitudinal axis the lock nut of the single M10 screw which is located at the angle must be loosened. (Otherwise there is a danger of deformation of the support housing!)
For checking whether the laser beams are parallel to the ram, a tool may be clamped alternately in front of the transmitter and the receiver (Fig. 19/3).

The transmitter is moved upwards to the ram until the tip of the ram covers a small segment of the highest transmitting beam (Fig. 19/2). This will be in the 1 o'clock positiion. When moving the **AKAS®** for the first mounting, the manual mode has to be selected

If the tool is mounted completely on the left or on the right hand side, there must be always the same projection (Fig. 19/3) on a sheet of paper held behind the tool (Fig. 19/2).

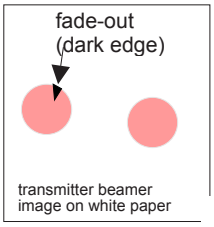


Fig. 19/2

This check must be done with the highest (biggest) and lowest (smallest) tool.

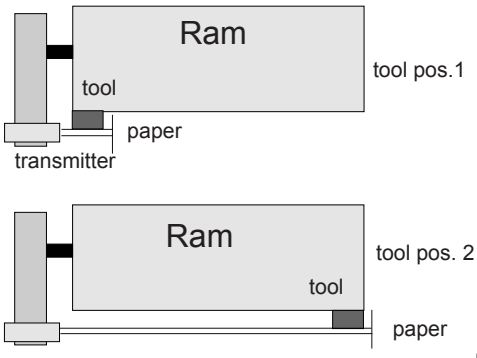


Fig. 19/3

Then, the transmitter is carried upwards by pressing the button "transmitter up/down". This action makes the receiver follow.

When the highest highest position is reached, please check whether the receiver is also free and whether the transmitting beams meet the receiver as shown in Fig. 19/2. By this it is guaranteed that both transmitter and receiver move parallel to each other and to the bending line.

It is important to note that the marker line is only a rough guide. After the coarse adjustment is finished please activate the box bending mode and do the following tests:

a) an object which protrudes 3mm beyond the bending line into the machine must be detected
b) an object which protrudes 2mm beyond the bending line into the machine must not be detected

If a) is not met, the transmitter and receiver must be adjusted further forward towards the operator.

If b) is not met, the transmitter and receiver must be adjusted further backward, away from the operator.

Dejustage possibility **AKAS®-5...**	remedy **AKAS®-5...**
Position of dark (=covered) section is not in 1 o'clock position but 12 o'clock or earlier.	By unscrewing all M6 adjustment screws that are responsible for the longitudinal adjustment, (A,B,C) the support must be positioned further away behind the bending line.
Position of dark section is not in 1 o'clock position but 2 o'clock or later.	By tightening all M6 adjustment screws that are responsible for the longitudinal adjustment, (A,B,C) the support must be put closer to the bending line.
If the position of dark section is not located in 1 o'clock position but earlier when using the lowest tool, and if it is in the 1 o'clock position when using the highest tool, the support stands too close to the bending line.	By unscrewing the upper M6 adjustment screws that are responsible for the longitudinal adjustment, (A,B,C) the support must be positioned further away behind the bending line.
If the position of dark section is not located in 1 o'clock position but later when using the lowest tool, and if it is in the 1 o'clock position when using the highest tool, the support is too far away from the bending line.	By tightening the lower M6 adjustment screws that are responsible for the longitudinal adjustment the support must be put closer to the bending line.
In the left tool position the dark section is bigger than in the right tool position = case **B Fig. 20/1**	The support of the transmitter must be swiveled to the right in the slot.
In the left tool position the dark section is smaller than in the right position = case **C Fig. 20/1.**	The support of the transmitter must be swiveled to the left in the slot.
In the left tool position the dark section is located in the 1 o'clock position, in the right tool position in an earlier position.	After unscrewing the M6 adjustment screws B and after readjusting the upper right M6 adjustment screws A , the support must be swiveled clockwise around its longitudinal axis.
In the left tool position the dark section lies in the 1 o'clock position, in the right tool position in an earlier position.	After unscrewing the upper left M6 adjustment screw A and after readjusting the M6 adjustment screws B the support must be swiveled counterclockwise.

correct transmitter adjustment **in correct transmitter adjustment**

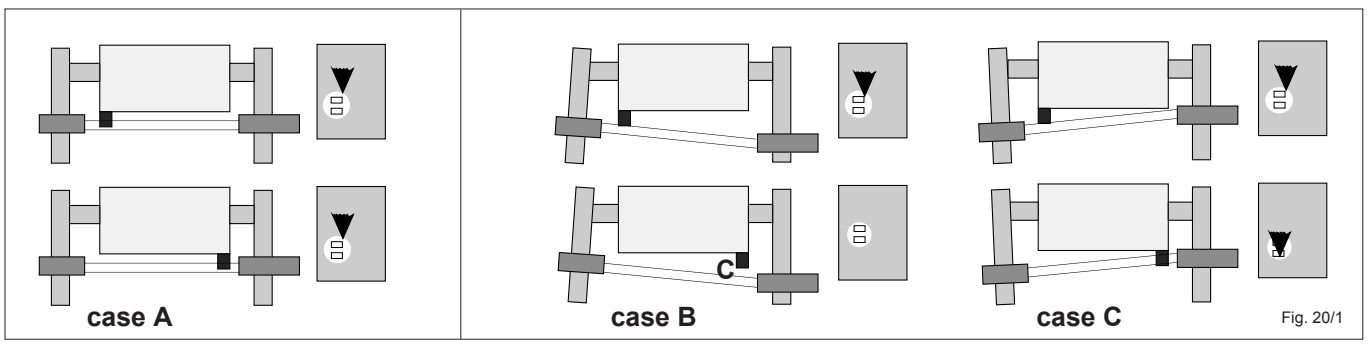
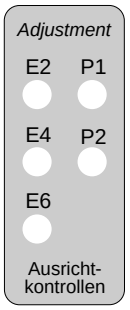


Fig. 20/1

adjustment control - LEDs

synchronization transmitter - receiver	**AKAS®-5...**
transmitter-beam does focus at all	E...on P...off
transmitter-beam does not focus precisely	E...partially off P...partially on
transmitter-beam does not focus at all	E...off P...on



AKAS®-5

adjustment directions

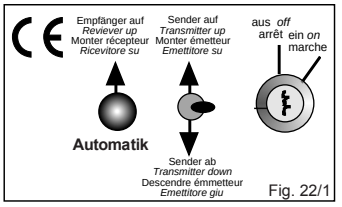


Fig. 22/1

1. For the **first adjustment** or after a **tool change** the **key-operated switch** at the support of the receiver must be turned to "**EIN**"(="ON"), if the foot pedal is not activated.

2. Attach the magnetic lamina vertical at the bending punch so that its edge is even with the bending punch. A correct adjustment is only possible if the magnetic lamina is even with the bending punch.

You will find these adjustment directions also on the from plate pof the receiver support!

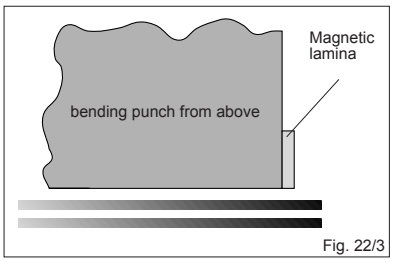


Fig. 22/3

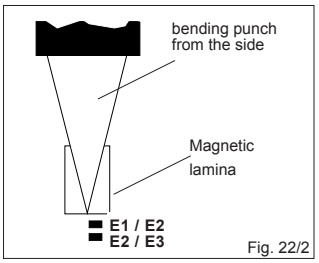


Fig. 22/2

3. Now, the operator may choose from 2 different adjustment modes:

A. Automatic adjustment (Automatic Mode):

By pushing **ONCE** the button "***Automatik"*** this adjustment mode is started. The procedure is automatically stopped as soon as the AKAS® system has reached the correct distance beneath the bending punch. The automated adjustment procedure can be interrupted, if - during the downward movement of both the AKAS®-transmitter and the AKAS®-receiver - the ***switch "Sender auf" (=transmitter up)*** is activated. (This action will be of help primarily in the case of a large tool being exchanged by a considerably smaller tool.) By doing this, the downward movement of the transmitter and receiver towards the lowest point is prevented or stopped. If the transmitting light beam hits the receiver elements, i.e. the optics of both components are "locked into one another" (focussing), the AKAS®-II system will adjust itself automatically onto the exchanged tool newly fixed at the ram. If the light beam from the transmitter does not hit the receiver (i.e. the transmitter beams are interrupted by the newly mounted tool), both transmitter and receiver will move downward to the lowest point of the displacing range. When moving upwards again, they are searching the lower edge of the bending punch. The system will automatically adjust itself to the newly installed bending punch.

After having carried out this, the key at the **key-operated switch** is turned to "**Aus"** (=OFF) and the key is removed from its lock.

After having completed the adjustment procedure, the tests (see page 4) must be carried out. If the key of the key-operated switch is removed from its lock, the outputs of the system are free only if the " Automated Mode" has been competely terminated.

B. Adjusting by hand (Manual Mode):

By activating the button "***Sender ab"*** (=transmitter down) the manual adjustment mode is started. Now the operator must check if either the transmitter beam hits the receiver : - adjustment indicators P do not light up (see **B1**) - or if the transmitter beam does not hit the receiver - adjustment indicators P light up (see **B2)**

Schematic layout of the AKAS®-II after a tool change-over and of the consecutive follow-up of the transmitter and the receiver.

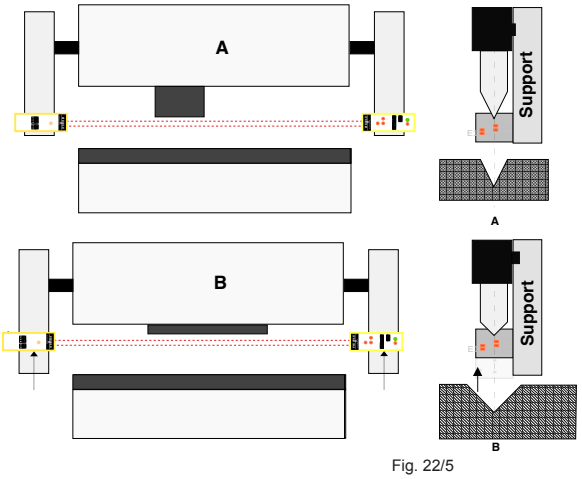


Fig. 22/5

B1: (This function is required during the first adjusting of the system)

AKAS® transmitter and AKAS® receiver can be carried upwards or downwards by activating the switch "Sender auf / Sender ab" (transmitter up / down). This is to verify whether both transmitter and receiver are correctly mounted parallel to the bending line of the machine. By activating the "***Automatik***"-button, the operator may start the automated adjusting procedure.

B2:(This function is carried out if the transmitter beam does NOT hit the receiver, p.e. if high matrixes are used)

By activating the "**Automatik**"-button or the "**receiver up**"-button, the receiver is carried upwards. At the same time, the transmitter can be carried upwards by activating the switch "Sender auf/ab" (= transmitter up/down). As soon as the transmitter beam hits the receiver again - adjustment indicators P are out at the receiver- , the adjusting procedure can be terminated as described in the automated adjustment "Automatic Mode" A.).

If the key of the key-operated switch is removed from its lock, the outputs of the system are free only if the " Automated Mode" has been competely terminated. The key switch must not be turned, if the foot pedal is activated. The key must be kept under the control of a responsible person (set-up man) !

8. Verification of all electrical connections referring to safety class 4

see chapter 6 **Electrical connections**

9. Automatic overrun traverse test

According to prEN 12622, the overrun traverse of the machine must be verified automatically at the first stroke after its connection to power of the press brake or of the AKAS® and it must be repeated at least after 30 h, if the machine remains connected to power for a longer period of time.

If the overrun traverse control is not carried out by the AKAS®, the machine control must carry out an overrun traverse test at least after a voltage reset. This overrun traverse test must be repeated within the next 30 hours.

Electrical data

Safety Category	4 (EN ISO 13849-1) and EN 61496 or IEC 61496 and EN 12622
Performance Level	PL e (EN ISO 13849-1), $MTTF_D$ > 300
Safety Integrity Level	SIL3 (EN 62061), PFH = 2,38 x 10^{-10}1/h
operation voltage	24 V DC, +/- 20 %, SELV
max. power cunsumption	(no charge)**:** max. 2,0 A, AKAS....LC: 0,5 A
protection from incorrect con	Protection against all possibilities of errors is not provided.
protection class	III
electrical connection	transmitter: **AKAS®-5...:** plug-in connector with PG 9 as strain relief receiver: integrated plug-in connector with M 32 as strain relief
connecting cables	transmitter: **AKAS®-5...:** 5-core, max. 1,5 mm, receiver: **AKAS®-5...:** 10- to 28-core (according to operating mode) max. 1,5 mm
cable arrangement	Cables to be laid separately from high-voltage cables. The cable laying must be arranged in a way that no mechanical damage of the cable is possible. For that reason the cable must be installed in a reinforced hose if not protected by the machine.
outputs	**OSSD 1 and 2:** Fail-Safe PNP outputs , max. 0,5A, with short-cut and side-current monitoring. Output current for resistance u. Inductive loads in the on state = min. 0mA, max. 0.5 A, max. Output current in the inactive = 50 uA max. Voltage in the inactive = 0.9V, max. capacitive load = 200 nF, max. Cable resistance between OSSD and load = 10 Ohm **SGA , HUSP, SEU2K, KAST** (KAST: only when using the external muting lamp): PNP-outputs max. 0,5A **TXD:** RS 232 serial interface
inputs	FUO, FUS, SGO, SGS, SSP, SP: 0 V / 24V DC +/- 20 %, 10 mA SSP: : 0 V / 24V DC +/- 20 %, 25 mA
response times	1,5 ms between the interruption of a light beam and the disabling of the OSSDs 10 ms between the release of the foot pedal orthe opening of a protective circuit and the disabling of the OSSDs
time windows for the input signals (basic tolerances)	Switch-over into slow speed state when the start is carried out within the range of the safety point (at SP = 1): 100 ms after enabling of the OSSDs Switch-over into slow speed state when the start of the press with slow speed request (200 ms after SGA = 0 has been transmitted to NC), or 170 ms after enabling of the OSSDs
Tolerance enhancement	---

environmental data

ambient operation temp.	0° to 50° C
storage temperature	-25° to 70° C

Caution!! The use of AKAS®-5 is only permitted in combination with an additional safety PLC which provides the safe fast speed-/slow speed signals and closing request signals via cables with short-cut and side-currant monitoring and and provides a safe blanking test signal.

Caution!!! Only if the accident preventing light barrier AKAS® has been installed according to the operating instructions and connected according to the wiring diagrams, and if all relevant national and international accident prevention/safety regulations are observed, a safe operation is ensured !

Any modification of the specified circuits can cause hazardous states and is therefore forbidden.

Muting signal

Muting signal from the machine control system:
(Mutingsignal available from the contactor position control of the working stroke valve, from the pressure switch or from a safe measuring signal for the slow speed signal)

The muting signal out of the machine control must be laid out in a way that no muting signal is given to AKAS® if there is any malfunction of the involved switching elements (i.e. no release of a contactor or no switching over from fast motion into working motion).

The top of the lateral die cover must be on the same height as top of the die.

set up operation

The set up operation has to be carried out in slow speed with driven input signal SGS,SGO = 1, or the AKAS® must be switched off, the safety outputs of the AKAS® (OSSDs) must be muted, and the fast speed closing speed must be reliably excluded.
After the set up operation it must be made sure that this special muting of the OSSDs is cancelled.

In the time slot 6ms before and after FUO and FUS are driven in the actuated state of the foot pedal a change of the state of the other inputs is not permitted.

Checklist

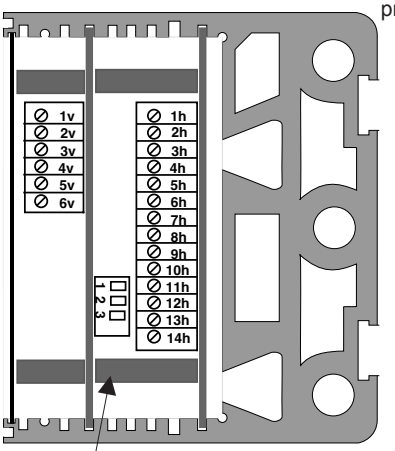
		OK
1	AKAS® is used on "foot operated fast motion" mode.	
2	"Foot operated fast motion" should only be possible with activated AKAS®	
3	During foot operated motion with AKAS®, the downward movement should only happen by pressing the foot pedal . **(The above-mentioned foot switch, must be a 3 position safety foot switch.)**	
4	The valves relevant for the downward movement must be triggered as directly as possible by the Fail-Safe PNP outputs OSSD1 and OSSD2 to keep the overrun traverse as short as possible	
5	For all operation modes without AKAS® protection, the safety system AKAS® has to be powered off (no active LED's on the AKAS receiver)	
6	The machine control system issues a muting signal with AKAS®-5...: value according the table 14/1 above the slug. (Mutingsignal coming from the contactor position control of the working stroke valve, from the pressure switch or from the AMS)	
7	In flat bend mode 1 mm before the machine controller outputs the blanking signal SP, a safe distance measuring system outputs a blanking test signal (SSP = 1).	
8	In flat bend mode, the machine controller output a blanking signal ASP. (Point see table 14/1)	
9	When using AKAS®-5... system, the machine control system is in a position to carry out 2 different switch-over points from fast speed into slow speed for the bending of plane metal sheets or for the bending of box-shaped products. The selection of the respective switch-over points is realized by a static signal issued by the AKAS®. (HUSP)	
10	The machine control system prevents the fast speed during the closing movement if no static signal is given (SGA). This function of the press must not be necessarily safety-orientated.	
11	When the muting signal is given, it must be guaranteed according to safety class 4 that the stroke of the machine is < 10mm/s.	
12	The safe distance measuring system monitors that the changeover to slow speed (≦ 10mm / s) is no later than at the openings shown in Table 14/1	
13	The box-bending function must be chosen and acknowledged by a button (changeover contact). Here a pedal is more advantageous, because by using it both hands stay free to hold the sheet.	
14	After a voltage reset, an overrun traverse test is carried out.	
15	The overrun traverse is smaller than the value indicated in table 14/1 for AKAS®-5....	

function

- protection of the operator from being squeezed between the ram and the matrix (all other safety monitoring functions are carried out by a safety control.
- The **safety PLC** gives a safe signal to the **AKAS®** inputs **FUS**/**FUO**, if a closing movement is about to be performed, a certain calculated position signal SSP 1mm before the blanking signal SP is expected by the machine controller and a safe signal to SGO and SGS if the press certainly is in closing speed
- For this, the signal wire to the SGS/SGO inputs **must be monitored** for eventual short-circuits by the **safety PLC.**
- The machine controller output a signal to the AKAS® receiver input SP, short bevor the receiver will be interrupted by the workpiece.
- The safety PLC evaluates the safeyt outputs OSSD1 and OSSD2 of the AKAS® and stops the closing movement, if there is no signal from the OSSDs.
- The machine control system must carry out an overrun traverse test of the press at least after every voltage reset, and this test must be repeated at least within the next 30 h. By doing this, the overrun traverse must not exceed the value of the maximum allowable overrun traverse that has been programmed by the dip-switches in the receiver-support (**AKAS®-5) .**

terminals

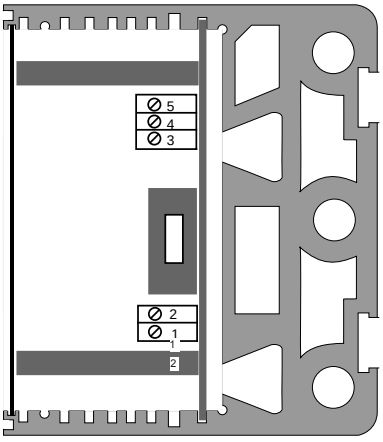
receiver



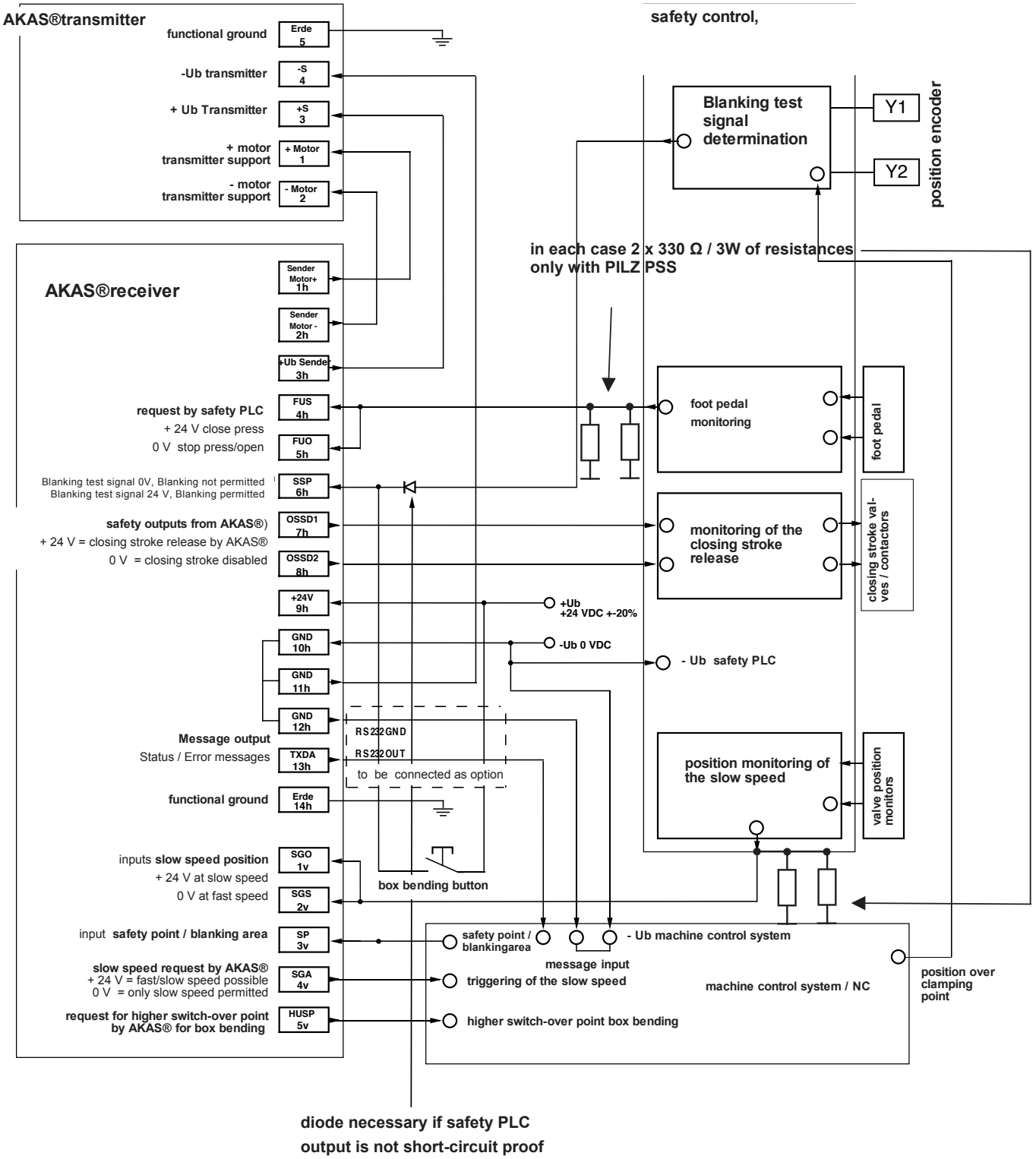
Dip-switches for the adjustment of the AKAS® in relation to the distance to the ram of the press
(adjustment independent from the overrun traverse of the press according to the table 14/1)

Terminals at the Receiver			
No	**designation**	**meaning**	**signal level**
1v	SGO	input **slow speed position**	0V at fast speed +24V at slow speed inputs switching equivalent
2v	SGS	input **slow speed position**	0V at fast speed +24V at slow speed inputs switching equivalent
3v	SP	input **safety point**	0V in fast speed range +24V in fast speed range +24 V puls min. 100ms if FUS/FUO =0V
4v	SGA	output **slow speed request**	0V only slow speed permitted +24V fast-/slow speed possible
5v	HUSP	output **higher mutepoint request (AKAS®-5), message box bending**	+24V if box-bending is selected
6v	-	nc	
1h	+Motor	connection for + motor transmitter support	
2h	-Motor	connection for - motor transmitter support	
3h	+Ub transmitter	connection for +Ub AKAS-connector	+24V if FUS is triggered
4h	FUS	input **Start / Stop closing stroke**	0V Press brake stop +24V Press brake close
5h	FUO	input **Start / Stop closing stroke**	0V Press brake stop +24V Press brake close
6h	SSP	input **box bending**	0V Blanking not permitted +24V Blanking permitted +24 V puls min. 100ms if FUS/FUO = 0V
7h	OSSD1	safety output **release of closing stroke**	+24V if released
8h	OSSD2	safety output **release of closing stroke**	+24V if released
9h	+Ub 24VDC	power supply voltage	
10h	-Ub 0V	power supply voltage	
11h	-Ub transmitter	connection for -Ub AKAS transmitter	
12h	RS 232 GND	output message (State-/error)	
13h	RS 232 out	output message (State-/error)	
14h	ground	functional ground	

transmitter



Terminals at the Transmitter		
No	**designation**	**meaning**
5	ground	functional ground
4	-S	-Ub transmitter
3	+S	+Ub transmitter
1	+Motor	+ Motor transmitter support
2	-Motor	- Motor transmitter support



wiring diagram 1/S.27

1. operation with additional Safety PLC

The safety PLC is responsible for the fast speed / slow speed position control and provides this state to the AKAS® inputs SGO and SGS is a signal line. (see **wiring diagram 1/S. 27**)
in **fast speed:** at **SGO and SGS = 0 V**
in **blanking range:** by **bending flat sheets at SGO, SGS = 0V** and **SSP = + 24 V**
in **slow speed**: at **SGO, SGS** and **SSP = + 24 V**
During this, the safety PLC must monitor the signal line to the AKAS® **for eventual short-circuits** against potential conductiong lines.

Generating a Blanking test signal

To mute the receiver E1, E5 and E6 the safety PLC must actuate the AKAS® input SSP about 1 mm before the machine controller/NC actuate the AKAS® input SP.

The mute occurs only if the signal SSP is received before the signal SP.

For safety reasons, the safety controller must output the signal SSP as closely as possible 1mm before the signal SP (issued by NC) are output.

Use the formular described in Chap. 5.2a. to determine the output position of the signal SSP.

Issue of SSP = 1 as soon as the press opening is equal

h < SPposition + 1mm + 2 x tz x v

SPposition = Suggested Blankingpoint SP (see page 14 Table 14/1)

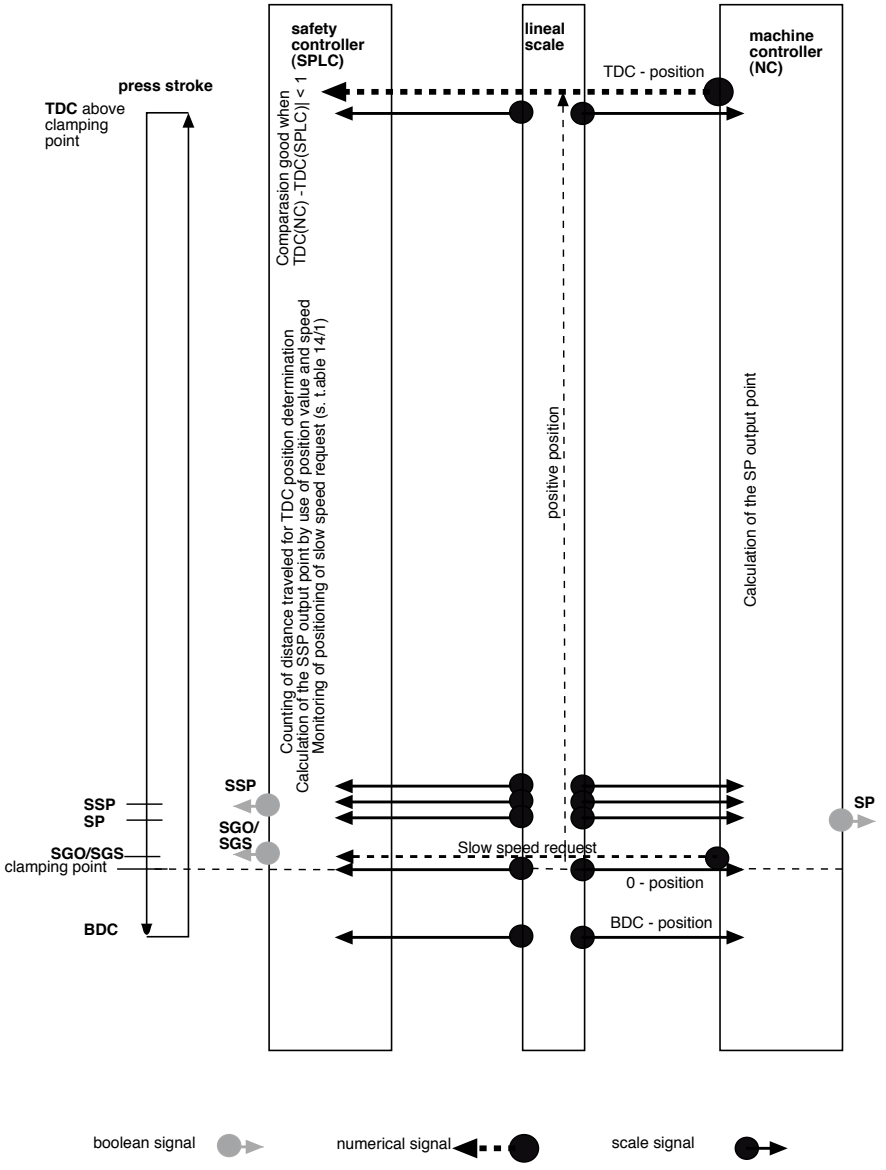
tz = program cycle time of safety PLC.

v = current closing speed of the press brake.

h = Opening of the press brake above clamping point

To calculate the output position of the signal SSP, the safety controller needs information about the position of the clamping point.

By following procedure, the safety controller can generate a safe and positionally accurate SSP .



Generating a Blanking test signal

After switching on the machine, before 1 stroke, the machine controller sends the position of the upper-beam above clamping-point to the safety controller.

Thus the safety controller can determine itself the position of the upper-beam above clamping-point by counting the edges of the scale signal.

At each stop in the TDC, the machine controller sends the position to the safety-controller. This position was measured by the machine-controller.

The safety controller can compare this value with its value. Its value was determined by counting.

If the values differ by more than 1 mm from each other, there is a fault and it must be prevented further strokes.

If the deviation is ≤ 1mm, the safety control system should accept the value of the exact but uncertain counting machine control.

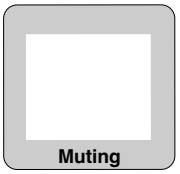
The position value will be changed by a tool or sheet thickness parameter change, that is by a tool change or change of plate thickness.

To ensure that this change does not lead to error-detection in the safety controller, the machine control must notify the safety controller about this parameters-change.

When the safety controller receives the message about the parameter-change. And the position-value before the paramter-change is equal with its self determined position-values. Then the safety controller accepts a new position value .

The safety PLC monitors the position of the slow speed request.
If the slow speed request is not done by the NC to the specified limit as shown in Table 14/1, the stroke must be stopped and further strokes must be prevented because it has to be assumed that there is system failure in the NC.

Displaying of conditions by the Muting lamp



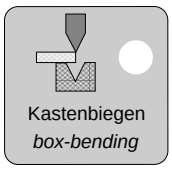
lamp is out (flashing is hardly recognizable) : during the closing movement the protective field is at least partially avctivated

lamp is constantly on: The protective field of the AKAS® ist not activated. AKAS® only permits closing strokes in slow speed.

The lamp is flashing slowly : about once per second: The press brake must be opened completely in order to quit the slow speed range to enable the triggering of SP = 0.

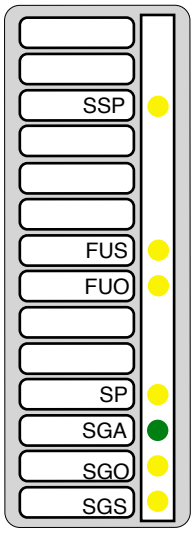
The lamp is flashing rapidly: about five times per second: AKAS® is in interlock state. Carry out a voltage reset. (red OSSD1 and OSSD2 are flashing the same time)

Indicator LEDs



LED is on if box bending funktion is activated

The SP-signal is generated before the SSP-signal, then the red OOSD1 / OSSD2 LEDs flash (approximately once per second) when FUO / FUS inputs controlled.



LED-displays for incomings and exits	AKAS®5-M
Input blanking test signal	SSP are lit press brake closure is reached and SP signal is accepted signal for blanking.
Inputs for press start / stop (release of closing stroke)	FUS is lit when the foot pedal is pressed.
Inputs for press start / stop (release of closing stroke)	FUO lit when the foot pedal is pressed.
Input for safety point	SP is lit if safety point is reached
Output for demand for slow speed	SGA is lit if fast speed is permitted
Inputs for position control in slow speed	equivalent inputs SGO/SGS: **fast speed**=0/0; **slow speed**=1/1

Status messages, warnings and Error reports via the RS 232 serial interface

The AKAS® displays messages by serial transfer via its RS 232 interface; transfer format: 9600 baud, 1 start bit, 8 data bits, 1 stop bit. The messages have even parity and will be repeated at least three times. The time gap between 2 messages is at least 100 ms. At the receiver, defective messages are gated, because only those messages are accpted that fulfil the following conditions: an even parity, successful reception of the message is provided if it is received at least 3 consecutive times and if its complete compatibility to one of the message possibilities indicated below is given.

There are different kinds of messages:

- Information concerning the status of the AKAS® or **handling directions** for the operator,
here are Bit 0 and Bit 1 = 1,

- **Warnings** concerning errors that, if received three times one immediately after the other, may lead to the interlocking of the AKAS®, here is Bit 0 = 0 and Bit 1 = 1,

- **Error reports** of the interlocked AKAS® , here is Bit 0 = 1 and Bit 1 = 0.

Status messages, handling directions for the operator (binary xxxxxx11)

background grey: other message or no message, if monitoring functions are partially cancelled

message transferred byte decimal	**operating mode**	**description** possible text in the display system	**handling directions**
3	*equivalent foot pedal inputs*	error at the request for release of the closing stroke	*check the equivalent switching lines going FUO and FUS . They are evaluated as "different"*
7		Mutinglamp does not light up	see message 63
23		open the press completely in order to quit the safety point range	if this message is displayed after every pressing and releasing of the foot pedal, check the SP connecting circuit for short circuits
27		*E3 interrupted*	*Check whether slowspeedsignal comes after Interrupting the E3*
39		release foot pedal	
63		Mutinglamp does not light up	open the press completely. If this message is repeated at the following new stroke and the internal muting lamp does not light up,there is an internal error
71		*max. fastspeed exceeded*	*Check whether slowspeedsignal comes later than 800ms after controlling SP*

Status messages, handling directions for the operator (binary xxxxxx11)

background grey: other message or no message, if monitoring functions are partially cancelled

message transferred byte decimal	**operating mode**	**description** possible text in the display system	**handling directions**
111	*no monitoring of the protective circuit*	*Internal error*	*if this is displayed again after the voltage reset, a verification by Fiessler Elektronik is necessary*
119	*no monitoring of the protective circuit*	*Internal error*	*if this is displayed again after the voltage reset, a verification by Fiessler Elektronik is necessary*
123	*no monitoring of the protective circuit*	*Internal error*	*if this is displayed again after the voltage reset, a verification by Fiessler Elektronik is necessary*
135	*no monitoring of the protective circuit*	*Internal error*	*if this is displayed again after the voltage reset, a verification by Fiessler Elektronik is necessary*
147	*no monitoring of the protective circuit*	*Internal error*	*if this is displayed again after the voltage reset, a verification by Fiessler Elektronik is necessary*
159	*no monitoring of the protective circuit*	*Internal error*	*if this is displayed again after the voltage reset, a verification by Fiessler Elektronik is necessary*
163	*no monitoring of the protective circuit*	*Internal error*	*if this is displayed again after the voltage reset, a verification by Fiessler Elektronik is necessary*
175	*no monitoring of the protective circuit*	*Internal error*	*if this is displayed again after the voltage reset, a verification by Fiessler Elektronik is necessary*
183	*no monitoring of the protective circuit*	-	-
195		box bending function is selected	-
207		bending of flat sheet metal	-
215		muting	AKAS@ provides only indirect protection by permitting the closing movement only in slow speed
219		foot pedal is released	during the closing movement, the foot pedal was released
231		interruption of the protective field	during the closing movement, the protective field was interrupted
243		key switch is activated	Disable key switch. If the same message remains displayed, there is a risk of short-circuiting of the normally open foot pedal contact.

Warnings (binary xxxxxx10)
error reports (binary xxxxxx01)

Warnings issued when several consecutive malfunctions occur that lead to an interlocking of the AKAS with displayed error reports. The interlocking status can be cancelled only by a voltage reset.

background grey: other message or no message, if monitoring functions are partially cancelled

Warning transferred decim. byte	**error** transferred decim.byte	**operating mode**	**description** possible text in the display system	**reason for the error**
10	9		slow speed signal error	When switching over from fast speed into slow speed, at SGO remains+ 24 V
30	29		no complete slow speed position in the Muting status	This message is displayed when the stroke is started in slow speed range or with a slow speed request SGA = 0 and if there is no complete switchover of the slow speed position monitors into slow speed. Check the SGA line for Short circuit to +24 V and check also the slow speed position monitors and their lines.
86	*85*	*no monitoring of the protective circuit*	*internal error*	*if this is displayed again after the voltage reset, a verification by Fiessler Elektronik is necessary*
90 / 102	89 / 101		Problem fast speed -- slow speed request	line short circuiting of the SGA circuit with another line
106	*105*		*fast speed/slow speed signals are faulty in stop status*	*The triggering of the SGS and the SGO is antivalent instead of equivalent*
114	113		OSSD- error	line short circuiting of the OSSD circuits with other lines
130	129		problem at request for higher switchover point:	line short circuiting of the HUSP circuit with other lines
142	141		Mutingla,p is not lightning	if this is displayed again after the voltage reset, a verification by Fiessler Elektronik is necessary
146	145		Safety point sequence error signal. SP con- trolled before SSP	Check if safety controller switches on SSP 1mm befor SP.
150	149		problem at pressing of foot pedal	line short circuiting of the foot pedal circuits FUO and FUS with other lines
154	153		SP_SGS short-circuit error	At least two of the signals SSP,SP and SGS comes at the same time while bending flat sheet
198	197		external transmitter signals are received	The transmitter is triggered although the foot pedal is released, or a transmitter from another AKAS® focuses the receiver. This must be prevented by adequate constructional measures.
interlocking without prior warning	201		*unequal slow speed connections*	*The signal for SGO and SGS input is not equal*
interlocking without prior warning	237		*disable key switch - voltage reset*	*The key switch ot the front reset switch have been activated when the foot pedal was pressed, or there is an error within the foot pedal, or the front reset button does not close.*
246	245		internal error	If this message is displayed immediately after a voltage reset, there is an EMC problem or an internal failure of the appliance.

Service

If you have questions that cannot be answered by reading this operation instruction manual, please contact us directly.

When calling, please have the following dara ready:

-Exact unit type and model
-Serial number(s)
-Symptom of the malfunction and/or fault description

Fiessler Elektronik GmbH & Co. KG
Buchenteich 14
D-73773 Aichwald

Phone: 0711 / 91 96 97 - 0
Fax: 0711 / 91 96 97 - 50
E-mail info@fiessler.de

Maintenance

The transmitter- and receiver lenses should be cleaned with a soft cotton swab at least once a month.
The spindle of the support should be lubricated with machine oil after 6 months.
The press brake protection systems AKAS® are maintenance-free with the exception of the supports.
On request by the customer, Fiessler Elektronik GmbH & Co. KG carries out the acceptance test and annual inspections.
In addition, seminars providing customers with training in annual inspections are held at regular intervals.

Warranty

The company Fiessler Elektronik GmbH & Co. KG refuses to accept any warranty claims if the device has been opened or if it has been modified.

Returning a unit

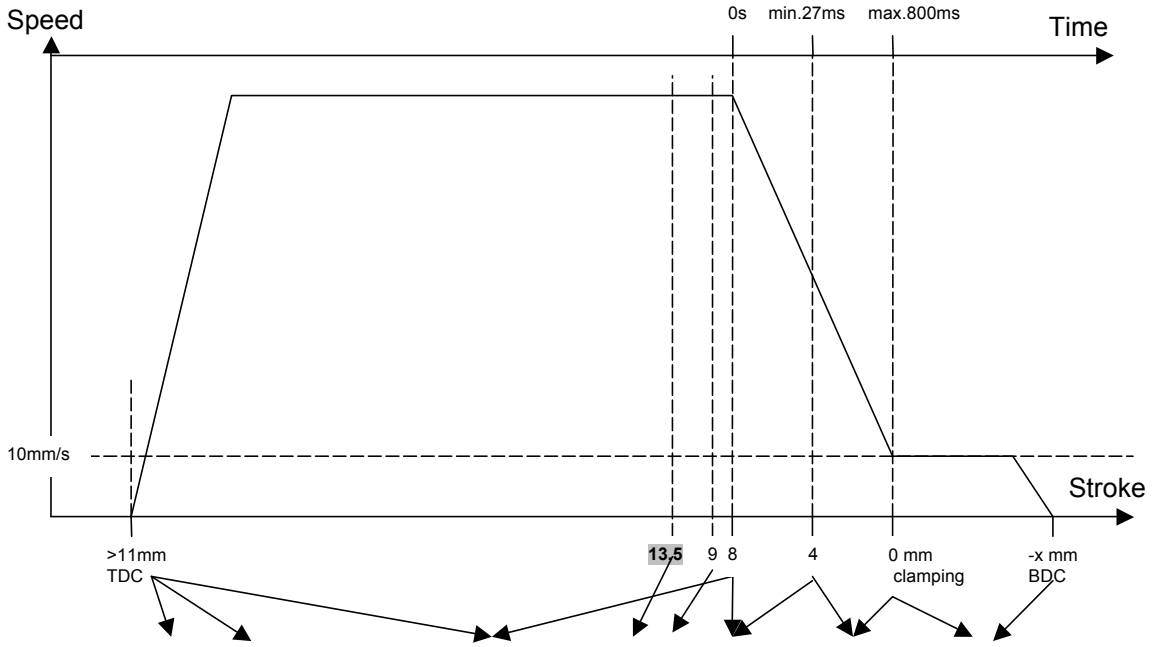
If, in the case of default, the necessity of returning the unit to Fiessler Elektronik arises, it will be very advantageous for a fast default diagnosis if the following topics are observed and observed:

-exact description of malfunction:
-did you frequently notice malfunctions at the machine where the light curtains are installed?
-any defaults or malfunctions in the past?
-etc..
-which operating mode has been used with this unit?

The more exactly the malfunction is described, the more accurate and faster we can determine it and repair it.

AKAS_5

Normal stroke with TDC > 9mm above clamping point with machine overrun of 5mm max., 15 ms safety PLC`s cycle time, 150 mm/s closing speed at 14 mm opening

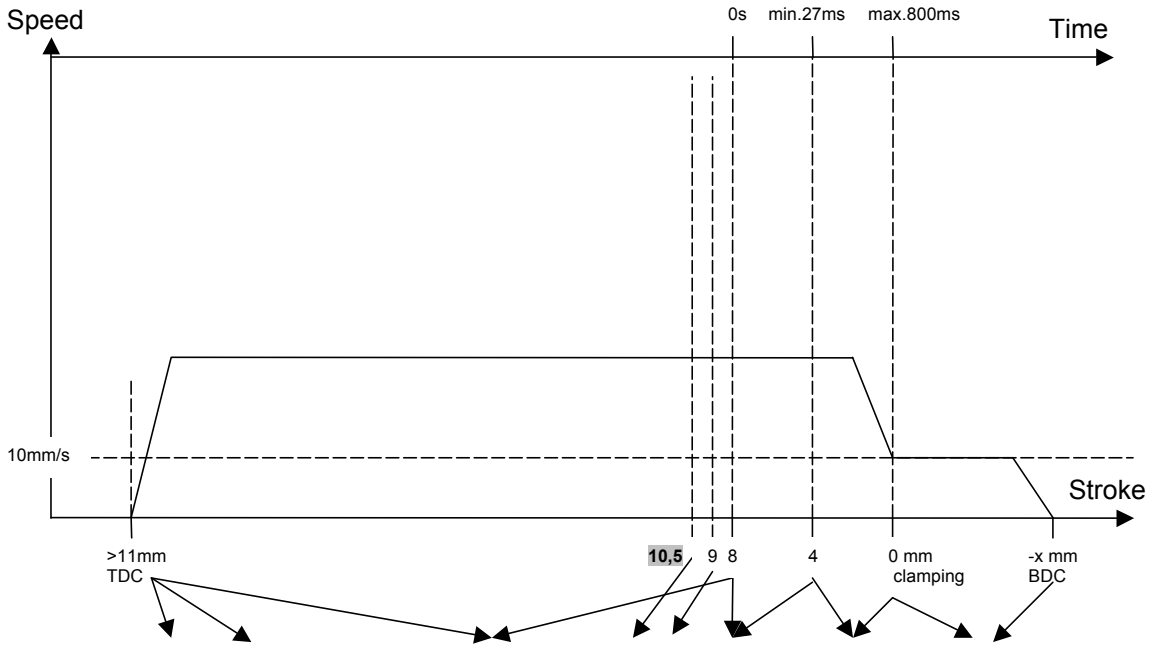


Status	Stop	FP pressed	Fast closing			1.half of breaking	2.half of breaking	Bending speed
Safety PLC OUT								
FUS	0	1	1	1	1	1	1	1
FUO	0	1	1	1	1	1	1	1
SSP	0	0	0	R	1	1	1	X
SGO	0	0	0	0	0	0	0	1
SGS	0	0	0	0	0	0	0	1
NC OUT								
SP	0	0	0	0	0	1	1	X
Manual signal OUT								
AKAS OUT								
OSSD1	0	0	1	1	1	1	1	1
OSSD2	0	0	1	1	1	1	1	1
SGA	1	1	1	1	1	1	1	1
HUSP	0	0	0			0	0	0
Receivers								
E5	inactive	active 1	active 1			blanked	blanked	blanked
E6	inactive	active 1	active 1			blanked	blanked	blanked
E3	inactive	active 1	active 1			active 1	active 1	blanked
E4	inactive	active 1	active 1			active 1 (for 27ms)	blanked	blanked
E1	inactive	active 1	active 1			blanked	blanked	blanked
E2	blanked	blanked	blanked			blanked	blanked	blanked

aktive 1 means receiver is active and has to be free
1 means +24 V
0 means 0 V
X means status is not relevant
R = If the read out position is smaller than this value, then at the end of the processing-cycle set this output.

AKAS_5

Normal stroke with TDC > 9mm above clamping point with machine overrun of 5mm max., 15 ms safety PLC`s cycle time, 50 mm/s closing speed at 11 mm opening

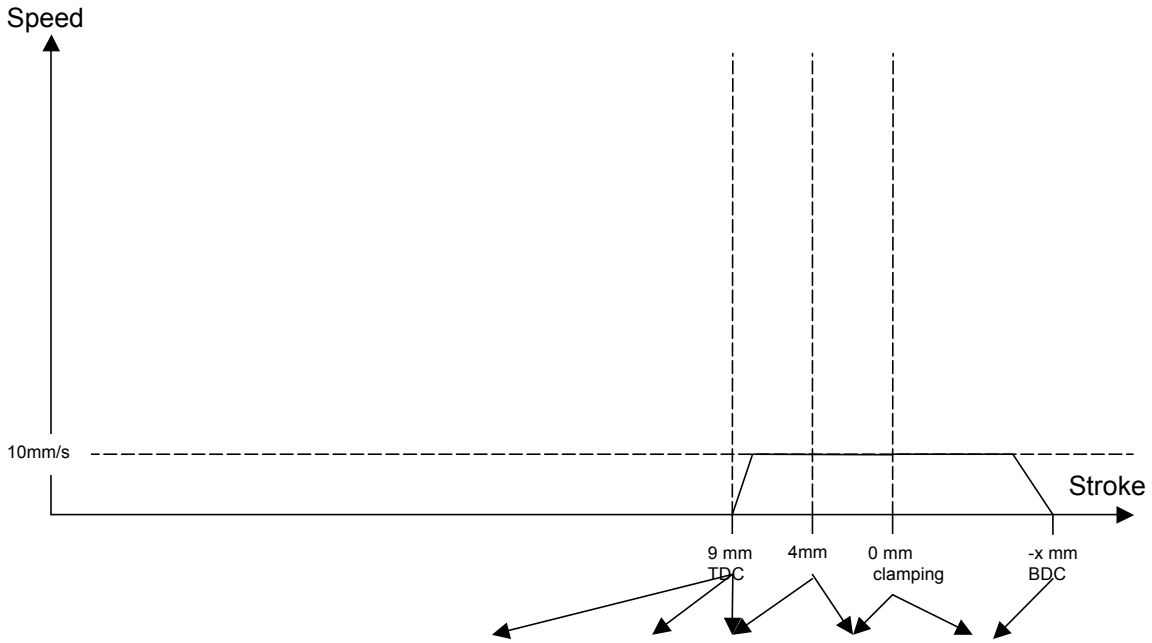


Status	Stop	FP pressed	Fast closing			1.half of breaking	2.half of breaking	Bending speed
Safety PLC OUT								
FUS	0	1	1	1	1	1	1	1
FUO	0	1	1	1	1	1	1	1
SSP	0	0	0	R	1	1	1	X
SGO	0	0	0	0	0	0	0	1
SGS	0	0	0	0	0	0	0	1
NC OUT								
SP	0	0	0	0	0	1	1	X
Manual signal OUT								
AKAS OUT								
OSSD1	0	0	1	1	1	1	1	1
OSSD2	0	0	1	1	1	1	1	1
SGA	1	1	1	1	1	1	1	1
HUSP	0	0	0			0	0	0
Receivers								
E5	inactive	active 1	active 1			blanked	blanked	blanked
E6	inactive	active 1	active 1			blanked	blanked	blanked
E3	inactive	active 1	active 1			active 1	active 1	blanked
E4	inactive	active 1	active 1			active 1 (for 27ms)	blanked	blanked
E1	inactive	active 1	active 1			blanked	blanked	blanked
E2	blanked	blanked	blanked			blanked	blanked	blanked

aktive 1 means receiver is active and has to be free
1 means +24 V
0 means 0 V
X means status is not relevant
R = If the read out position is smaller than this value, then at the end of the processing-cycle set this output.

AKAS_5

Normal stroke with TDC =< 9mm above clamping point with machine overrun of 5mm max.

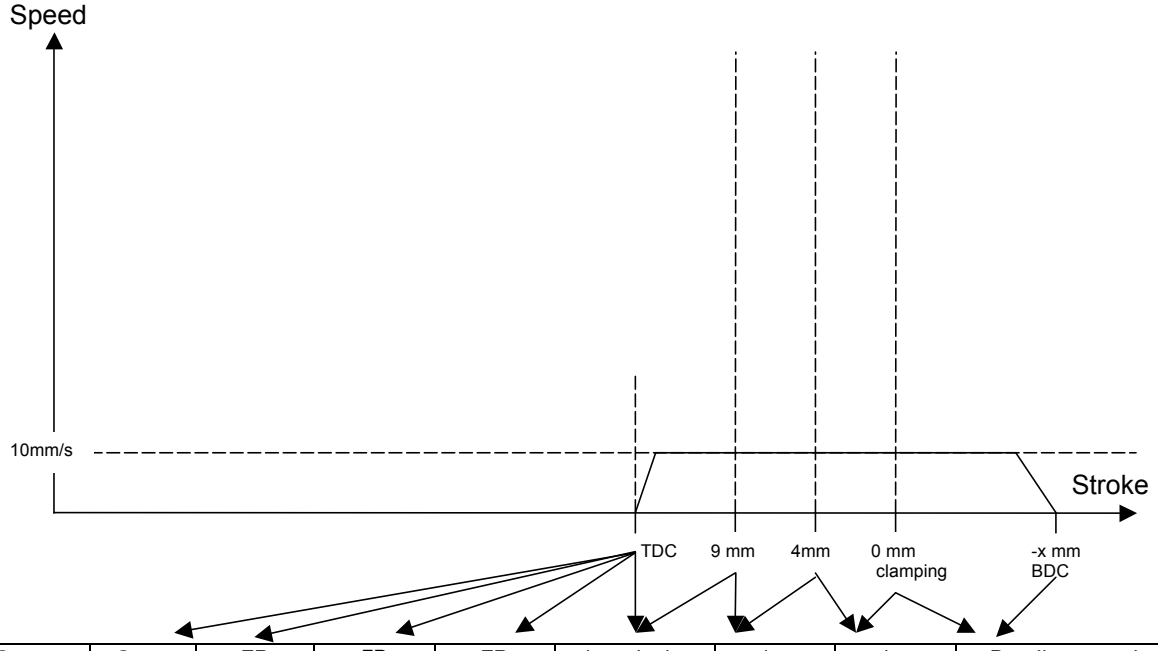


Status	Stop	FP pressed	slow closing	slow closing	Bending speed
Safety PLC OUT					
FUS	0	1	1	1	1
FUO	0	1	1	1	1
SSP	1	1	X	X	X
SGO	0	0	1	1	1
SGS	0	0	1	1	1
NC OUT					
SP	X	X	X	X	X
Manual signal OUT					
AKAS OUT					
OSSD1	0	0	1	1	1
OSSD2	0	0	1	1	1
SGA	1	0	0	0	0
HUSP	0	0	0	0	0
Receivers					
E5	inactive	active 1	blanked	blanked	blanked
E6	inactive	active 1	blanked	blanked	blanked
E3	inactive	active 1	blanked	blanked	blanked
E4	inactive	active 1	blanked	blanked	blanked
E1	inactive	active 1	blanked	blanked	blanked
E2	blanked	blanked	blanked	blanked	blanked

aktive 1 means receiver is active and has to be free
1 means +24 V
0 means 0 V
X means status is not relevant

AKAS_5

Normal stroke with initial interrupted protection field with TDC < 9mm above clamping point with machine overrun of 5mm max.

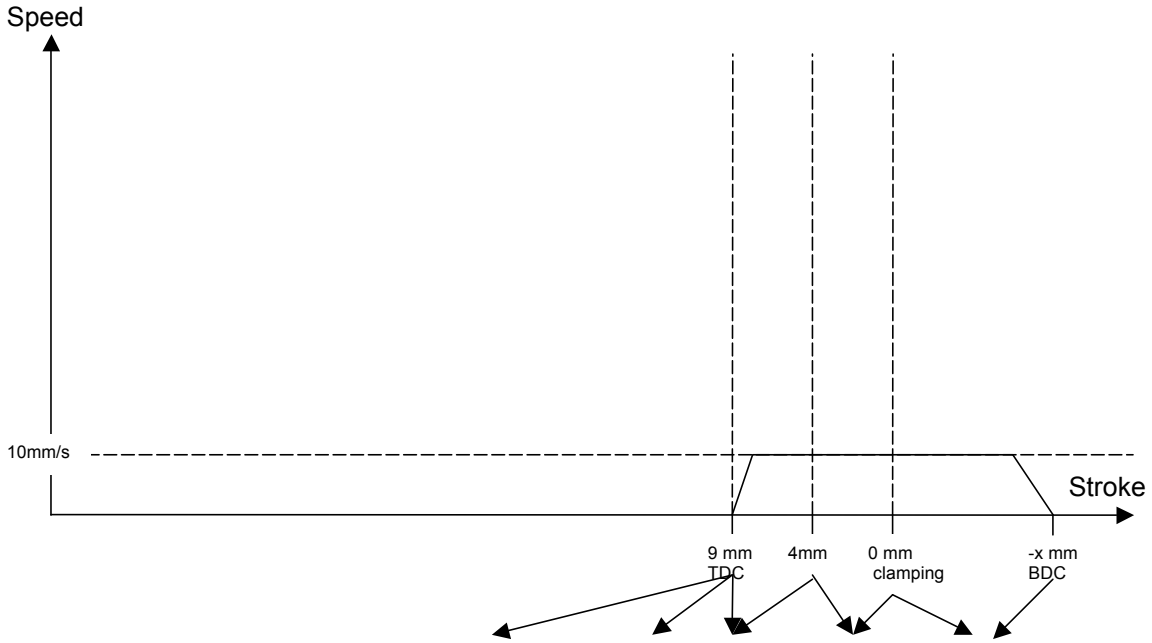


Status	Stop	FP pressed	FP depressed	FP pressed	slow closing	slow closing	slow closing	Bending speed
Safety PLC OUT								
FUS	0	1	0	1	1	1	1	1
FUO	0	1	0	1	1	1	1	1
SSP	X	X	X	X	X	X	X	X
SGO	0	0	0	0	1	1	1	1
SGS	0	0	0	0	1	1	1	1
NC OUT								
SP	0	0	0	0	X	X	X	X
Manual signal OUT								
AKAS OUT								
OSSD1	0	0	0	0	1	1	1	1
OSSD2	0	0	0	0	1	1	1	1
SGA	1	1	1	0	0	0	0	0
HUSP	0	0	0	0	0	0	0	0
Receivers								
E5	inactive	active 0?	inactive	active 0?	blanked	blanked	blanked	blanked
E6	inactive	active 0?	inactive	active 0?	blanked	blanked	blanked	blanked
E3	inactive	active 0?	inactive	active 0?	blanked	blanked	blanked	blanked
E4	inactive	active 0?	inactive	active 0?	blanked	blanked	blanked	blanked
E1	inactive	active 0?	inactive	active 0?	blanked	blanked	blanked	blanked
E2	blanked	blanked	blanked	blanked	blanked	blanked	blanked	blanked

aktive 0? means some of E1 – E5 are interrupted
1 means +24 V
0 means 0 V
X means status is not relevant
0? = minimum one of the receiver elements E1, E3-E6 are interrupted

AKAS_5

Stroke (normal or box bend) with initial interrupted or not interrupted protection field with TDC in slow speed area with machine overrun of 5mm max.

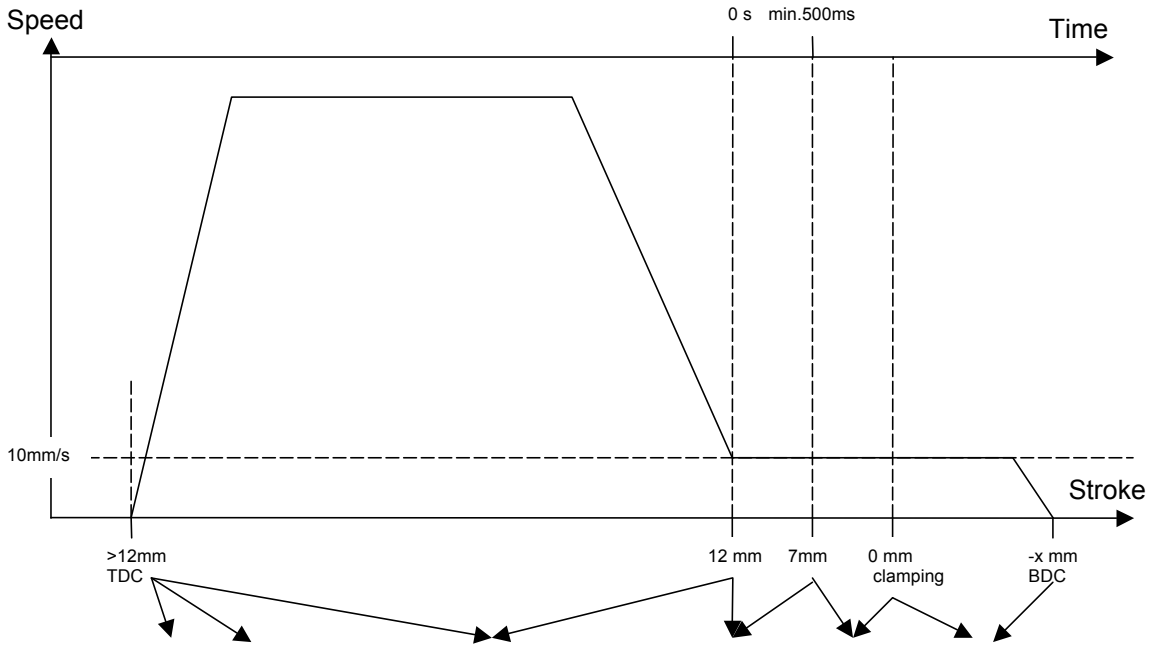


Status	Stop	FP pressed	slow closing	slow closing	Bending speed
Safety PLC OUT					
FUS	0	1	1	1	1
FUO	0	1	1	1	1
SSP	X	X	X	X	X
SGO	1	1	1	1	1
SGS	1	1	1	1	1
NC OUT					
SP	=<X	=<X	X	X	X
Manual signal OUT					
AKAS OUT					
OSSD1	0	0	1	1	1
OSSD2	0	0	1	1	1
SGA	1	1	1	1	1
HUSP	X	X	X	X	X
Receivers					
E5	blanked	blanked	blanked	blanked	blanked
E6	blanked	blanked	blanked	blanked	blanked
E3	blanked	blanked	blanked	blanked	blanked
E4	blanked	blanked	blanked	blanked	blanked
E1	blanked	blanked	blanked	blanked	blanked
E2	blanked	blanked	blanked	blanked	blanked

aktive 1 means receiver is active and has to be free
1 means +24 V
0 means 0 V
X means status is not relevant
=<X = Status is not relevant but must be 0 when input with status X is also 0. The status is permanently irrelevant when box bending is selected (HUSP = 1).

AKAS_5

Box bend stroke with TDC >12mm above clamping point with machine overrun of 5mm max.



Status	Stop	FP pressed	Fast closing	1.half of slow closing	2.half of slow closing	Bending speed
Safety PLC OUT						
FUS	0	1	1	1	1	1
FUO	0	1	1	1	1	1
SSP	0,1,0	X	X	X	X	X
SGO	0	0	0	1	1	1
SGS	0	0	0	1	1	1
NC OUT						
SP	0,1,0	0	0	1	X	X
Manual signal OUT						
AKAS OUT						
OSSD1	0	0	1	1	1	1
OSSD2	0	0	1	1	1	1
SGA	1	1	1	1	1	1
HUSP	1	1	1	1	1	1
Receivers						
E5	inactive	blanked	blanked	blanked	blanked	blanked
E6	inactive	blanked	blanked	blanked	blanked	blanked
E3	inactive	blanked	blanked	blanked	active 1	blanked
E4	inactive	blanked	blanked	blanked	blanked	blanked
E1	inactive	active 1	active 1	active 1 (for 500ms)	blanked	blanked
E2	inactive	active 1	active 1	blanked	blanked	blanked

aktive 1 means receiver is active and has to be free
1 means +24 V
0 means 0 V
X means status is not relevant

Accessories (electronic equipment)

part designation	order code
AKRB Safety connection interface cat. 4 EN954 for AKAS-_F and AMS-3 with 4 fast potential free normally open contacts incl. support terminal pluggable connector	**AKRB**
Safety foot-switch, double pedal, FE-FS2-U2/SU2ASDU1-U-RD, red cover, Safety function in the right pedal	**FE-FS2-U2/SU2ASDU1-U-RD**
AKAS® Foot pedal for box-bending function	**AKAS/Ped**

Accessories (mechanical equipment)

part designation	order code	see page
AKAS® mounting kit (not swivable) with U-shaped holder), for lateral mounting	**AKAS/AS/U**	13
swiveling adaptor for Holder AKAS/AS/U	**AKAS/AS/U/S**	13

Inspection Sheet

No.: _____
Date: _____

Inspection of a press brake safeguarded by a press brake protection system AKAS®

customer's order number: _____
company: _____
address: _____
department: _____
Post Code/City: _____ _____
phone: _____
Fax: _____
attending staff: _____
inspecting company: _____
inspector: _____

Hex switch position: _____
machine builder _____
machine type: _____ Serial no.. _____
machine control by: _____
machine located at: _____
inventory no.: _____
cost centre: _____
type of control: _____
Muting box no.: _____
AKAS® no: _____
AMS no: _____
Sensors 1/2, nos: _____ _____

1. Inspection:

☐ first inspection ☐ maintenance contract existing ☐ regular inspection requested
☐ regular inspection ☐ cost estimate of maintenance contract requested

2. Installation:

detection range: _____ m optional swivable holder at: ☐ transmitter ☐ receiver

3. Visual Inspection of the Installation

☐ 3.1 correct electric connection
☐ 3.2 cables damage free
☐ 3.3 strain relief at both sides of cable loop
☐ 3.4 cable protected against all mechanical damages by metal sheet
☐ 3.5 correct position of vertical light grid (not too far behind from bending line)
☐ 3.6 correct position of vertical light grid (distance sufficiently behind the bending line)
☐ 3.7 transmitter beams are parallel to the ram
☐ 3.8 work speed < 10 mm/s
☐ 3.9 test with test rod passed

3.10 max. work speed: _____ mm/s
3.11 max. fast speed: _____ mm/s
3.12 Overrun traverse of the AKAS® is: _____ mm when interrupted during fast speed motion

After viewing of the electrical diagrams, the electrical integration of the AKAS® can be accepted as safe according to safety class 4 under the condition that the machine control is wired exactly as shown in the said diagrams.

4. Cooperation between the AKAS® system and the machine

☐ 4.1 The stopping of the AKAS® during the dangerous movement complies with the safety level of safety category 4
☐ 4.2 control elements : OK
☐ 4.3 closing movement during foot operated motion with AKAS® only possible when foot pedal remains pressed down
☐ 4.4 interruption of the AKAS® during fast speed: OK
☐ 4.5 interruption of the AKAS® during work speed: OK
☐ 4.6 operation mode „foot-fast motion" is possible only when AKAS® is activated
☐ 4.7 AKAS® is switched off in all operation modes where AKAS® is not activated
☐ 4.8 Muting signal is given if the gap above metal sheet corresponds to distance between „lower edge E2 and tool tip+2mm"
☐ 4.9 Muting signal from valve position signal during work stroke or AMS
☐ 4.10 Muting signal monitored by AKAS® , Safety PLC
☐ 4.11 Muting signal monitored by machine control

Muting point in mm: _____

☐ 4.21 PLC input is controlled by ESPE output.
☐ 4.22 Muting signal unsafe
☐ 4.23 Safety level of the following machine control is lower than ESPE
☐ 4.24 Secondary control is single channel

☐ 4.30 The protective effect might be cancelled by a malfunction of the press.

If tops 3 and 4.1 - 4.10 are not completely ticked, or if one or more of the tops 4.21- 4.24 are ticked, the AKAS® installation is **not** in a faultless condition. In this case, the protective effect by the system is not completely provided.

5. Comments

Inspection Badge: ○ badge issued ○ badge not issued

The inspection refers only to the functionality check of the AKAS® according to the regulations. It does **not** replace the safety check of the machine itself. All modifications of the AKAS® or of the machine may impair the protective effect of the AKAS®. In this case, the inspection must be repated.

_____ , _____ .....

FIESSLER ELEKTRONIK

Fiessler Elektronik GmbH & Co. KG Kastellstr. 9 D -73734 Esslingen

GESCHÄFTSLEITUNG

EG-Konformitätserklärung

- Original -

(gemäß Anhang II 1 A 2006/42/EG)

Wir
Fiessler Elektronik
Kastellstr. 9
D-73734 Esslingen,

erklären in alleiniger Verantwortung, daß das Produkt
AKAS 5M,
Berührungsloswirkende Schutzeinrichtung Typ 4 nach EN 61496-1 zur Absicherung des Gefahrenbereiches von Abkantpressen nach EN 12622,

auf die sich diese Erklärung bezieht, allen einschlägigen Bedingungen der folgenden Richtlinien entsprechen:

2006/42/EG
2014/30/EU

Angewandte Normen:

EN 61496-1-1:2004+A1:2008, CLC TS 61496-2:2006 (IEC 61496 2:2013), EN 12622:2009 A1:2013, EN ISO 13849-1:2015, EN 62061:2005+A1:2013.

Die Schutzziele der Niederspannungsrichtlinie (2014/35/EU) werden gemäß Anhang I, Nr. 1.5.1 der Maschinenrichtlinie eingehalten.

Die Geräte entsprechen der Laserklasse 1

Translation of the original CE declaration of conformity

(according appendix II 1 A 2006/42/EU)

We
Fiessler Elektronik
Kastellstr. 9
D-73734 Esslingen,

declare under our sole responsibility that the product
AKAS 5M,
electro sensitive protective equipment type 4 according to EN 61496-1 to safeguard the danger zone of press brakes according to En 12622,

to which this declaration relates, satisfy all the relevant conditions of the following directives:

2006/42/EU
2014/30/EU

Applied standards:

EN 61496-1-1:2004+A1:2008, CLC TS 61496-2:2006 (IEC 61496 2:2013), EN 12622:2009 A1:2013, EN ISO 13849-1:2015, EN 62061:2005+A1:2013.

The safety objectives of the Low Vol tage Directive (2014/35/EU) are com plied with in accordance to Annex I No. 1.5.1 of the Machinery Directive.

The products are conform with the laser class 1

Traduction de la déclaration CE de conformité originale

(conforme appendice II 1 A 2006/42/CE)

Nous
Fiessler Elektronik
Kastellstr. 9
D-73734 Esslingen,

déclarons sous notre seule re sponsabilité que les produits
AKAS 5M,
équipement de protection sensitive de type 4 selon la norme EN61496-1pour protéger la zone dangereuse d´une presse plieuse selon la norme EN 12622,

satisfait toutes les dispositions pertinentes des directives suivantes :

2006/42/CE
2014/30/CE

Normes utilisées:

EN 61496-1-1:2004+A1:2008, CLC TS 61496-2:2006 (IEC 61496 2:2013), EN 12622:2009 A1:2013, EN ISO 13849-1:2015, EN 62061:2005+A1:2013.

Les objectifs de protection de la directive "basse tension" (2014/35/EU ont été respectées conformément à l'annexe I n ° 1.5.1 de la directive Machines.

Les Produits sont conformes à la classe laser 1.

EG-Baumusterprüfung / EC type-examination certificate / certificat d`examen CE de type Nr .: 44 205 12 016405
TÜV NORD CERT GmbH

Esslingen, den / the / le 20.06.2016

Götz Fiessler / Geschäftsführer / Dokumentationsbevollmächtigter / managing director / authorized for documentation / gérant / mandataire de la documentation

Electrosensitive protective equipement
The press brake protection AKAS® is an electrosensitive protective device (ESPE).
ESPE is characterised by the fact that a hazardous motion becomes interrupted or prevented if the **light beams** produced between the transmitter and receiver unit are interrupted.

Safety category 4 PL e, SIL3
AKAS ® meets Safety Category 4 according to EN ISO 13849-1, PL e (Performance Level) according to EN ISO 13849-1 and SIL 3 according to EN 62061.
Devices to safety category 4, PL e, SIL 3 are self-monitoring sensitive protective equipment and provide the highest Safety class among the sensitive protective equipment.

Self-monitoring
The electrosensitive protective device (ESPE) switches automatically into the "safe state" when it is faulty.

Standard Installation range
Maximum distance between transmitter and receiver is 8 m
(For longer range please get in contact with Fiessler Elektronik or your local dealer).

Max. Upper tool length
The maximum upper tool length is 6m.
(For longer range please get in contact with Fiessler Elektronik or your local dealer).

Overrun
The part of the hazardous motion still taking place after interrupting the light beam.

Overrun traverse
The distance covered during the overrun (e.g. by the ram of a press).

Overrun period
The duration of the overrun traverse.

Response time
The time that elapsed after light beam interruption until the switching action occurs.

Valve or contactor control
Before every release of the output contacts the contactor control is checking whether the switching elements connected (relays, contactors or valves) have been released. A renewed release of the
output contacts is only possible if the switching elements connected have been released. Thus a dangerous failure of switching-elements (relays, contactors or valves) caused by the hazardous motion is prevented.

Start interlock
After initial operation or after a power supply interruption a renewed "enabling" is blocked by the start interlock.The renewed release of the switching unit is only possible by closing and opening of the start entry.

Restart interlock
The restart interlock prevents any automatic releasing of the switching outputs after an interruption and re-enabling of the light beam (e.g. when penetrating the light beam).

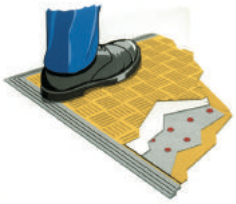
Muting
Short-time safe by-pass of the press brake protection AKAS® during material movement, i.e. during a plate bending process.

Blanking
Selected receiver elements will be muted, all other receiver elements stay active.

Box-bending
By-pass of the receiver unit E3-E6 (AKAS®-5), during a box-bending process.

Muting of the receiver elements E3 – E6 (AKAS®-5) during a boxbending stroke.
This is required because the side panels of the box will interrupt E3 – E6

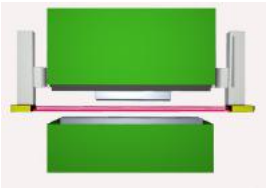
other Safety products



Saftety Mats

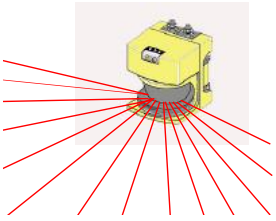
Safety-Footpedal

Parametricable Saftetycontrol FPSC



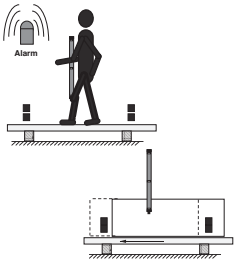
Press Brake Protection System AKAS

Safety-Light-Curtain

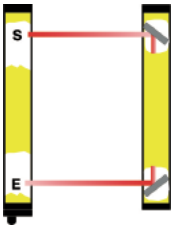


Proximity Laser Scanner

Single-Safety-Beam



Safety-Light-Grid with muting function



Safety-Light-Grid

Service

As a special feature for training our customers, Fiessler Elektronik offers one-day safety workshops. Our service team provides you with expert advice and information for the reliable integration of our safety equipment into your machine.

HOMOLOGATIONS

In order to ensure and maintain the high quality level of the Fiessler safety products, a quality control security system has been established early. Fiessler Elektronik holds the DIN ISO EN 9001 Certificate and, thanks to the company-owned EMC laboratory, all products must pass a inspection without exception before they leave the company. All safety equipment comply with the applicable national and international standards. Development and Design is made in close cooperation with the German employer`s liablility insurance associations. All homologations are obtained only after having passed strict tests by the German surveyor organisation TÜV.

AWARD OF

APPRECIATION

for exemplary performance in the development of the press brake protection system AKAS.
The award was bestowed upon Fiessler Elektronik by the ministry of trade and commerce of the federal state of Baden-Württemberg.

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Fiessler Elektronik has respresentations in all major industrial