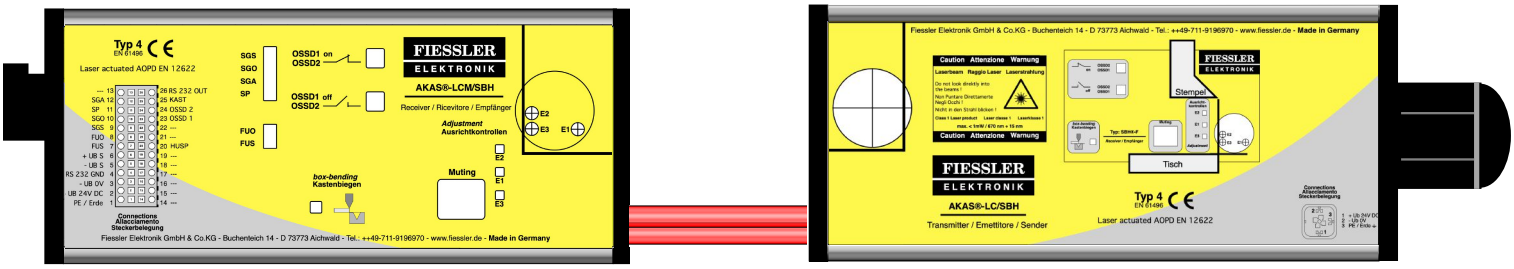
FIESSLER ELEKTRONIK

Folding Machine Protection System saftey category 4

AKAS®-LCM/SBH

Operating Instructions USA Version
translation



TÜV NORD CERT GmbH
Baumuster geprüft

EC type examination certified

MOODY INTERNATIONAL

DIN ISO 9001:2000

CONTENTS:

SI Safety Instruction See page SI/ 30
Read and understand this section prior to installing and operating the system AKAS®
Please observe always!!!

Doku Nr. 1939 Stand 04.04.2025 / TR/Aui

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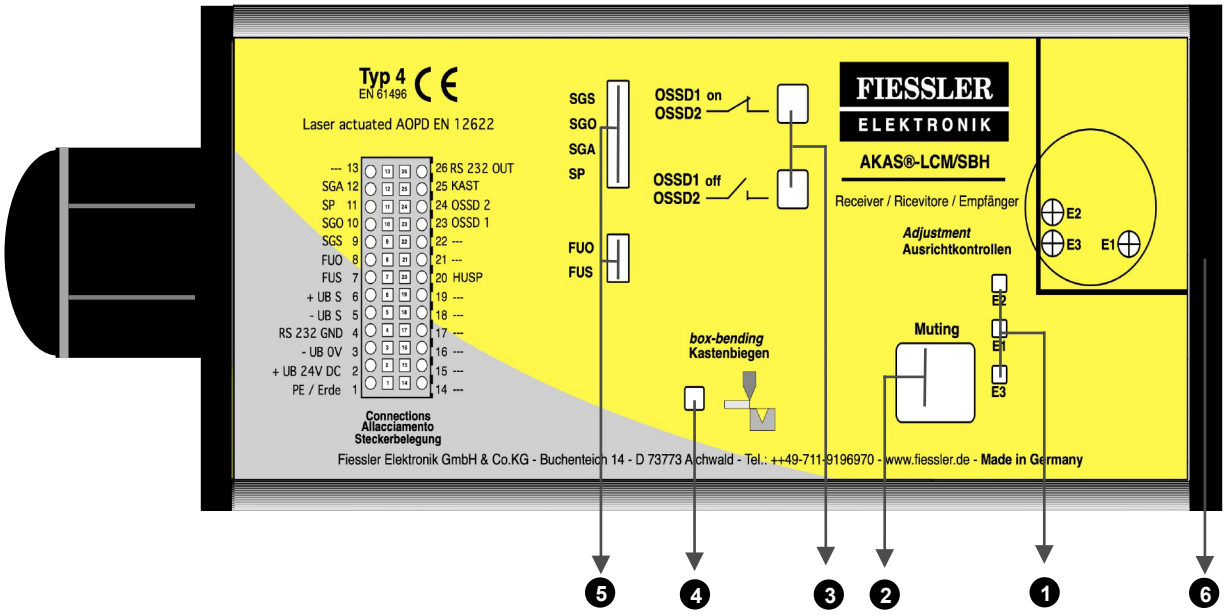
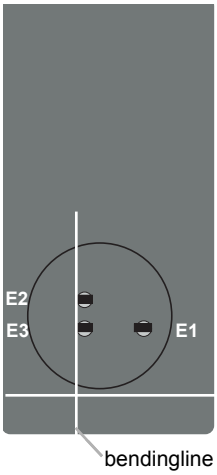
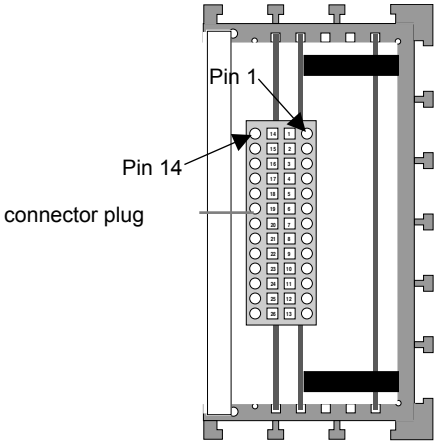


view of the receiver elements

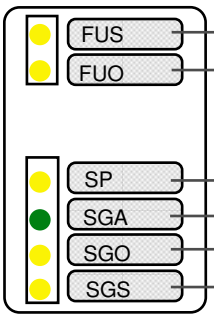


view after removing the connection lid on the receiver



1	ajustment controll-Leds of the receiver elements E1, E2, E3 LEDs are on if the beam does focus at all (see page 20)
2	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 20)
3	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
4	LED is on if box bending funktion is activated
5	Indicator lights for in- and outputs
6	connection lid

5 **LED's for Inputs ans Outputs**
(see page 20)



Inputs for press start / stop
(release of closing stroke)

Inputs for press start / stop (release of closing strok

Output for demand for slow speed

Input for position control in slow speed

Attention is drawn to all safety instructions by this symbol.

Read operating instructions

These operating instructions provide the user with important information on the correct use of the AKAS®. It is part of the delivery of every AKAS® and must be kept at the installation site of the AKAS®.

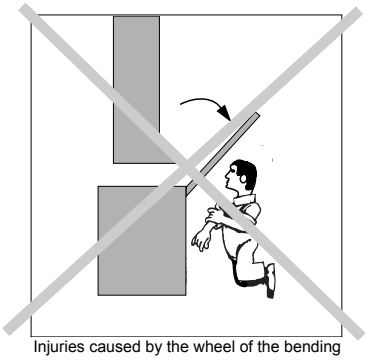
All information in these operating instructions must be observed before commissioning the AKAS®. Relevant regulations and the accident prevention regulations must also be observed.

Qualified personnel

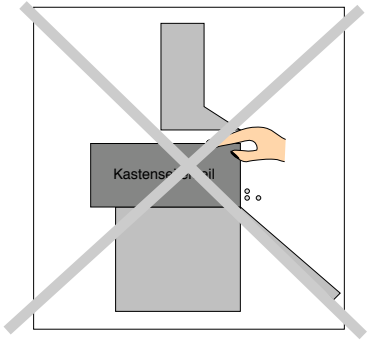
Installation, commissioning and maintenance may only be carried out by qualified personnel.

Hazard warnings

Light barriers do not protect against flying objects caused by the function of the machine. The AKAS® is designed to protect fingers and hands holding the blank during the work process. It therefore does not protect against rapid engagement between the upper and lower tools shortly before they are closed. The protective function is deactivated when the muting lamp lights up.AKAS LCM/SBH does not protect the area between the backsplash and the upper tool moving downwards.The front receiver facing the operator in front of the bending line E1 does not protect if the box bending function has been activated.The swivel movement of the folding beam is not monitored.



Injuries caused by the wheel of the bending beam (eg the risk of injury can be avoided by an additional light curtain)



Hand injury when this is departing clamping tool on the raised edge.

Please note

These operating instructions apply to the AKAS®-LCM/SBH models.
Special information for the individual models is provided with the respective model designation.
All safety instructions are marked with this symbol and must be observed in particular.

A-test: during initial commissioning

The setting must be made in such a way that the following test procedure is passed:

!!!! If one of the tests A or B is not passed, the machine must not be used until the fault has been rectified!!!

- The B test must be carried out 5 times each at the left and right ends of the upper tool for safety reasons

- The machine must be fully loaded with the heaviest upper tool

- The closing movement must be started from the maximum O.T.

B test: daily test (after 24 hours at the latest)

Before the start of each shift and after each tool change, the AKAS®-LCM/SBH folding machine must be tested as follows (see also EN 12622):

The test must be carried out at the left and right ends of the machine. A sheet with maximum thickness must be placed on the lower beam tool and the individual test stages must not be touched.

a.) The test rod must be placed in position "10".

Then initiate the closing movement of the folding machine.

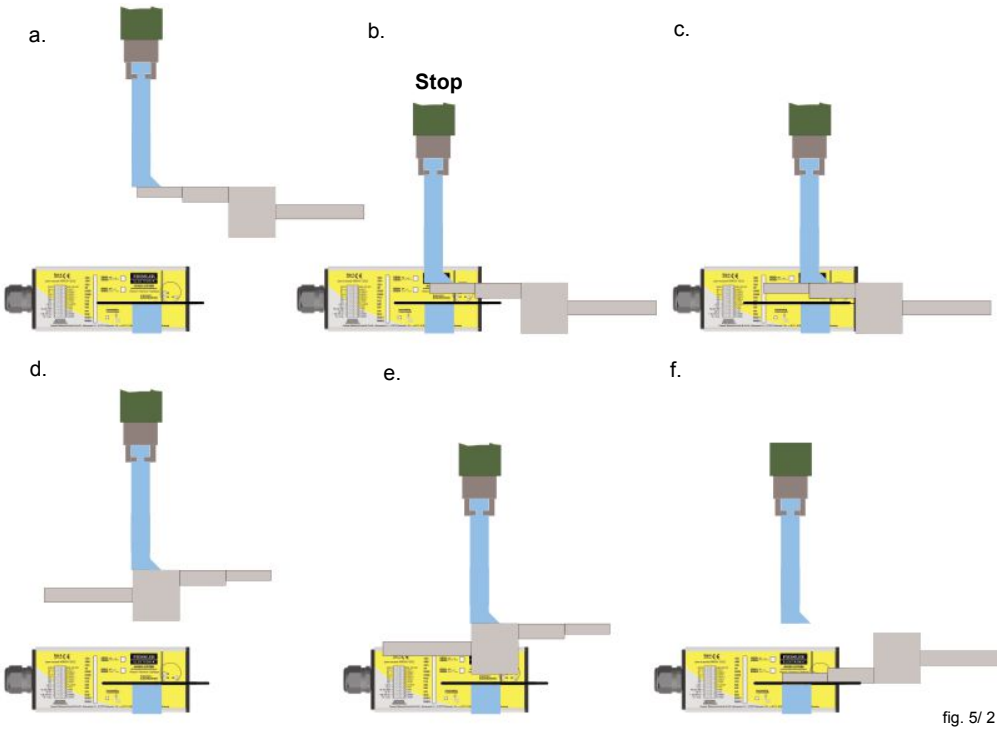
b.) The machine comes to a standstill

c.) Push the test rod further in at position "15".
The test stage "15" must not be touched by the lower beam tool.

d.) Open the folding machine and place the test rod in position "35" on the upper tool.
Then initiate the closing movement.

e.) The machine must stop so that the lower beam tool does not touch test step "35".

f.) The adjustment must be carried out so that the 10 mm test rod step is just recognized on the transmitter, receiver side and in the middle.



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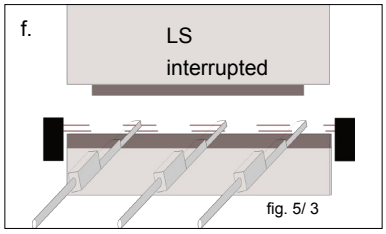


fig. 5/ 3

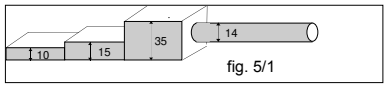


fig. 5/1

Note!

NLW sequence:

1. move along with the 10mm test rod step --> stop --> the 15mm step must fit between the clamping tool and the lower beam tool => with an opening of ≤ 25mm, an NLW of 9mm minus sheet thickness is permissible.

2. move along with the 35mm test rod step --> stop --> the 35mm step must not be clamped => with an opening of ≥ 50mm, an NLW of 14mm minus sheet thickness is permissible.

1. **Only tools of the same height may be used in one clamping.**
All tools clamped together may only have one common bending line.

2. **stops mounted on the lower tool do not allow any downward movement.**

3**. max. permissible overtravel of the machine: 9mm minus max. sheet thickness / AKAS®-LC-SBH**

The machine should have an automatic overtravel control for the 1st stroke. If this is not available, it can be used with AKAS®-...F and a cam switch or the AMS system from Fiessler Elektronik. Before initial commissioning, the overtravel must be checked using an overtravel measuring device. (On request, we can carry out overrun measurements on your machine.) **If the result of 10 consecutive measurements exceeds 9 mm minus max. sheet thickness / AKAS®-LC-SBH, the rapid traverse must be throttled.**

4. **Muting signal** The AKAS® would stop the clamping stroke immediately if a light beam is interrupted by the blank to be bent. (e.g. in box bending mode). Therefore, the AKAS® must be safely bridged before the interruption by the blank.

Theoretically, the clamping beam can be closed in rapid traverse with flat material until the sheet is clamped without an intermediate stop. It must be ensured that the clamping beam stops quickly enough if the AKAS® is interrupted (see point 3 Overtravel).

5. **The protection of a folding machine by the AKAS® does not allow any bending in the box bottom within a box in rapid traverse, as the upright box walls interrupt the AKAS®.** During box bending, the clamping beam must stop at the pre-stop position and may then only close at creep speed. **The machine control system must ensure that the closing speed is < 10 mm/s in accordance with safety category 4.**

6. **The AKAS® offers no protection**

- **if the machine is only operated in creep speed, or if the stroke is continued with the AKAS interrupted and bridged after an interruption in rapid traverse.**
- **if the overtravel of the machine is too long**
- **against crushing during the clamping process when bending crates**
- **if the muting lamp lights up**

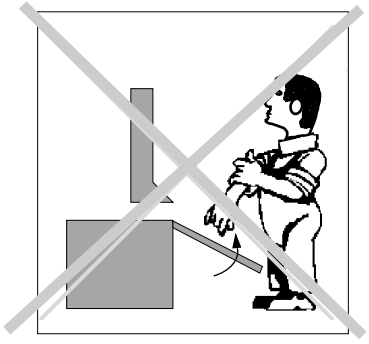


fig. 6/ 1

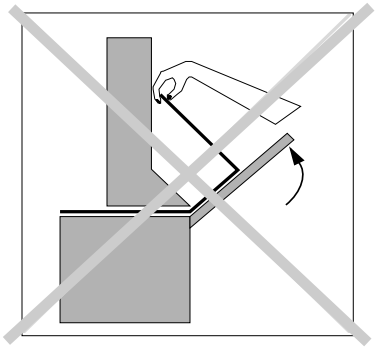


fig. 6/ 2

7. The dangerous state of the machine must be able to be terminated by the sensor function.

8. the safety category (type 4) of the swivel bending machine guarding should at least correspond to the safety category of the machine control system.

9. the laser beams can be deflected by air currents, this can lead to an unintentional shutdown of the machine, air currents should be avoided at the installation site of the machine.

Acceptance

The acceptance of the attachment and the tests should be carried out by a person who is competent and has all the information provided by the suppliers of the machine and the ESPE.
Fiessler Elektronik carries out the initial acceptance and the annual inspection at the customer's request.
In addition, customer training seminars for carrying out the annual inspection are held at regular intervals.

Annual Inspection

The operator should ensure that a competent person is appointed to inspect the light barrier annually. This person can be an employee of the sensor manufacturer or the operator.

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.

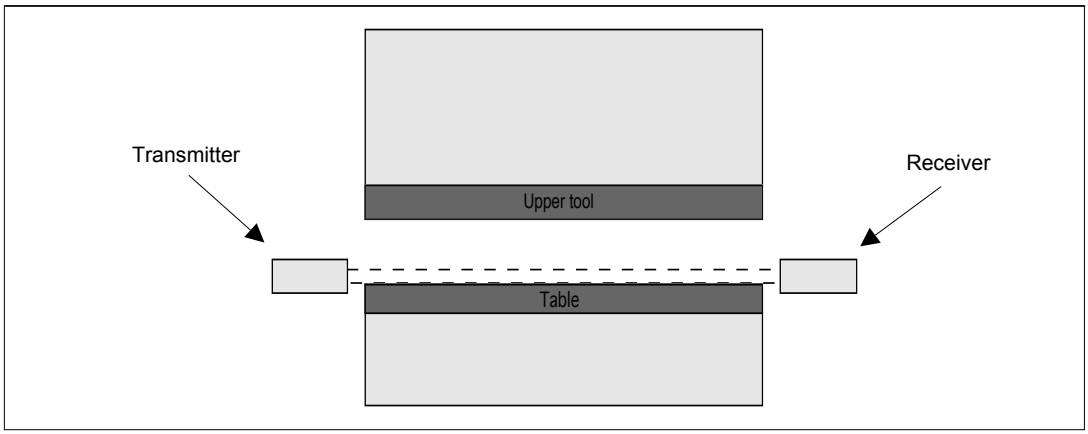
AKAS®

- meets EN61496-1 and CLC/TS 61496-2 Typ4; ENISO13849 PL e, Kat4, MTTF>300y; EN62061 SIL3, PFH2, 38 E-10 1/h
- is self- monitoring without additionally wiring.
- easy to adjust after tool changing.

Operative range for the laser-accident preventing light barrier of the AKAS®-LCM/SBH types are:
folding machines.

Max. range: **12m**

Mounting example: AKAS®-LC/SBH



Serial Numbers AKAS®-LC… The serial numbers are located at the down side of the housings of both AKAS®-LCM/SBH transmitter and AKAS®-LCM/SBH receiver.

	systems <u>without</u> operating mode selection operation only with additional safety PLC (e.g. **FMSC**)		
Funktionen / Eigenschaften		**AKAS®-LCM/SBH**	
with / without Support automatic. Adjustment to different tool sizes		without	
max. Overrun Traverse of the press brake		9mm minus max. sheet thickness	
Detecting beams / Receiver elements		1 / 3	
Inputs			
Overruntraverse control NLW		-	
3 inputs for control of doors / emergency-OFF-circuit NA1, NA2, NA 3 for paired use 1 pair lateral door circuit, equivalent or antivalent, 1 pair rear door circuit , equivalent or antivalent, 1 pair emergency-OFF-circuit s		-	
Stopp contactor control EDMO, EDMS		-	
data of traverse in slow speed SGW		-	
start / stop of closing stroke FUS, FUO		2 equivalent	
position control in slow speed SGO, SGS		2	
selection of box bending KAST		1	
safety point SP		1	
Outputs			
Safety outputs for release of closing stroke OSSD1, OSSD2		2	
release and Emergency OFF of the rear stoppers RXOK1, RXOK2		-	
box bending function is displayed HUSP		1	
output for messages RS 232 TXD		1	
demand for slow speed SGA		1	

Principle of function bending of flat sheet metal

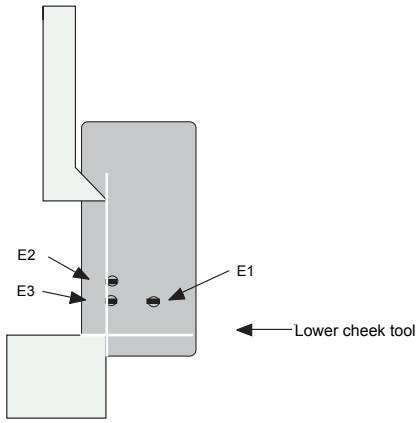
1. Release the closing movement by activating the foot pedal.

2. Machine closes in **fast speed (> 10mm/s)**

AKAS®-LCM/SBH

Receiving elements:
E1, E2 and E3 active (protection)

All beams remain active until the terminal point. No muting, no switching point.



3. To prevent the clamping beam from switching off in the clamped state, the AKAS® must be safely muted from this point onwards.

4. All receiving elements are bridged and the muting lamp lights up.
The bending process is initiated. (The bending process is limited to approx. 2 min. in rapid and creep speed)

Note Caution! Only tools of the same height may be used in a clamping device.

Bending of corrugated sheet metal

Closing movement despite interrupted AKAS

If the AKAS is interrupted by corrugated sheet metal, it is possible to continue the closing movement at a controlled creep speed when the protective field is interrupted. After interrupting the protective field, releasing and reactivating the foot pedal, AKAS switches off the SGA output when the protective field is interrupted, so that the machine control (NC) only permits creep speed. AKAS allows the machine control system a reaction time of approx. 200 ms and then switches on the safety switching outputs for the closing movement (OSSDs).

Function principle box bending

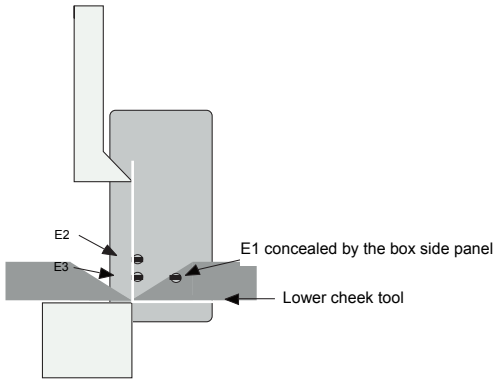
1. "Box Bending" is activated by the box bending button. The signal at the box bending input KAST must be high (+24V) for at least 100 ms and after that low (0V) for at least 100 ms.
(The box bending function can be canceled by twice activating the box bending button again)

2. AKAS® acknowledges the selection by switching on the HUSP output and the box bending LED, closing the clamping cheek, slow closing with 10mm/s muting.

AKAS®-LCM/SBH

Switchover point from rapid to creep speed:

Receiving elements:
E1 not active
E2 and E3 active (protection)



3. to prevent the clamping beam from switching off in the clamped state, the AKAS® must be safely muted from this point onwards.

4. all receiving elements are bridged and the muting lamp lights up. The bending process is initiated. (The bending process is limited to approx. 2 min. in rapid and creep speed)

5. After the bending process, the box bending function is canceled again.

Bending of corrugated sheet metal

Closing movement despite interrupted AKAS
If the AKAS is interrupted by corrugated sheet metal, it is possible to continue the closing movement at a controlled creep speed when the protective field is interrupted. After interrupting the protective field, releasing and reactivating the foot pedal, AKAS switches off the SGA output when the protective field is interrupted, so that the machine control (NC) only permits creep speed. AKAS allows the machine control system a reaction time of approx. 200 ms and then switches on the safety switching outputs for the closing movement (OSSDs).

Bending of very small pieces

The box bending function must be selected for very small parts that have to be guided with the fingers for clamping, as otherwise the fingers would interrupt E1 and cause the clamping process to switch off! When the box bending function is activated, a finger that is next to the blank is not recognized!

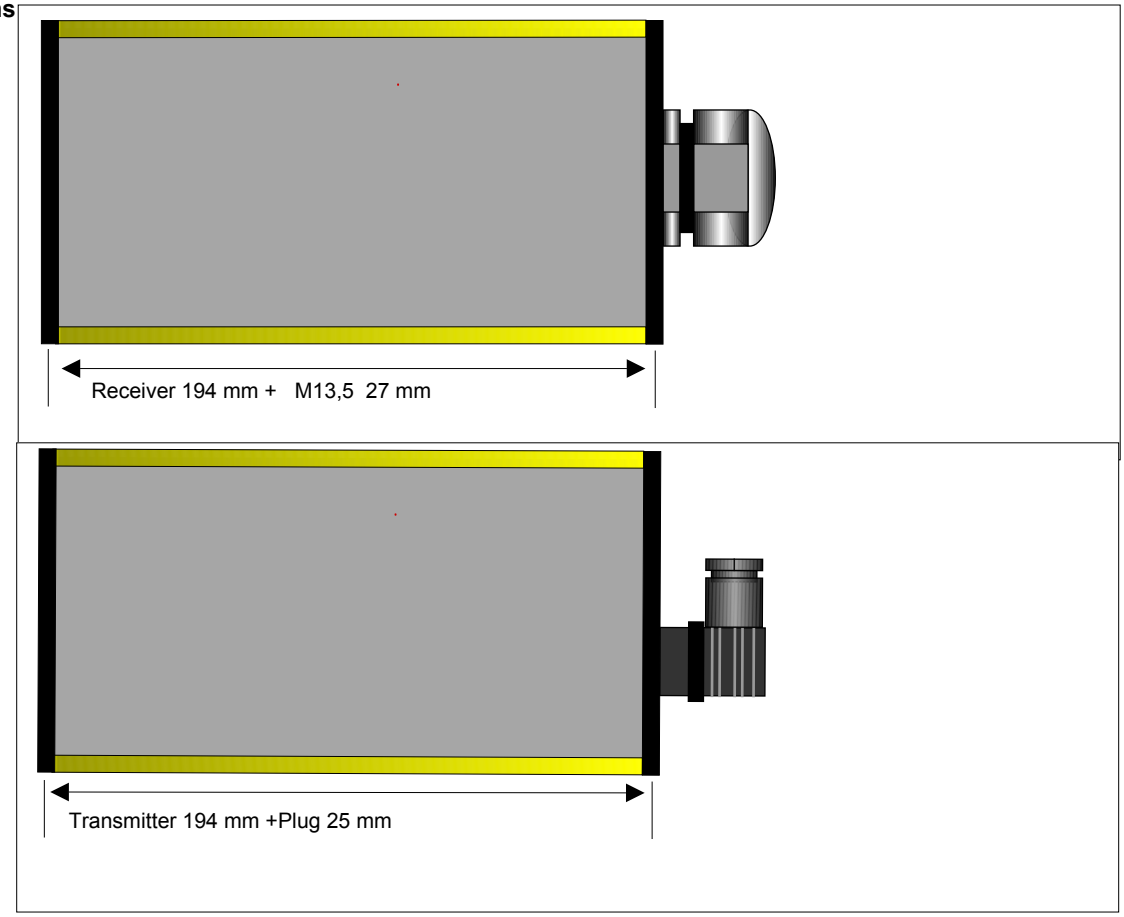
housing type The aluminium housing of both transmitter and receiver are powder coated in silver.
The optical head is made of acid-resistant spherically reinforced plastic (polyamide).

fastening fastening with shifting tenon blocks at the three side of transmitter and receiver housings

weight: transmitter: 0,7 KG, receiver 0,54 KG

Max. range: 12m

dimensions



mounting bracket

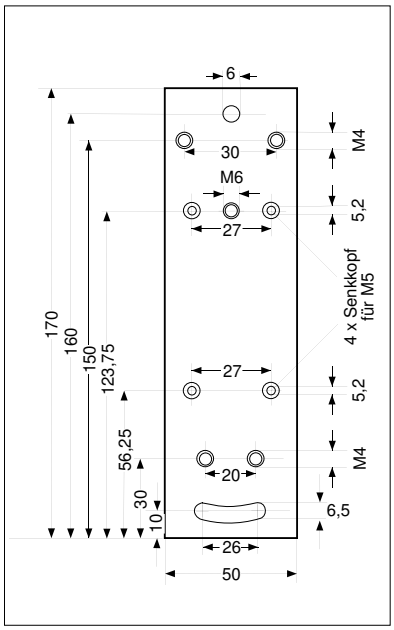


fig. 11/ 1

How to proceed: Step by step mounting the AKAS®

1	Overrun traverse measurement
2	Design of the mechanical holders
3	Mounting of the holders at the Lower cheek tool
4	Mounting of the AKAS® on the holders
5	Connection of the AKAS® / Selection of the operating mode
6	Adjustment of the AKAS® during first installation
7	Function Verification of all electrical connections in view of the safety classs 4 requirements
8	Self-acting Overrun Traverse Test

1. Overrun Traverse Measurement

The machine should have an automatic overrun control for the 1st stroke. If this is not available, the AKAS®-...F types can use the selectable automatic overrun control in conjunction with a cam switch or the AMS system from Fiessler Elektronik.
Before initial commissioning, the overrun distance must be checked using an overrun measuring device. (We can carry out overrun measurements on your machine on request) **If the result of 10 consecutive measurements exceeds 9 mm minus the maximum sheet thickness for AKAS®-LCM/SBH, the rapid traverse must be reduced.**

Note!

NLW sequence:
1. move along with the 10mm test rod step --> stop --> the 15mm step must fit between the clamping tool and the lower beam tool => with an opening of ≤ 25mm, an NLW of 9mm minus sheet thickness is permissible.

2. move along with the 35mm test rod step --> stop --> the 35mm step must not be clamped => with an opening of ≥ 50mm, an NLW of 14mm minus sheet thickness is permissible.

2. design of the holders

- The dimensions of the self-supplied holders must be individually laid out according to the dimensions of the machine.

3. Mounting of the holders at the matrix

a) The holders must be mounted at the matrix in a way that the marks on transmitter and receiver correspond exaclty to the bending line. The receiver element E1 must face to the operator.
b) The lowest edge of both housings must be at the same level.

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.

4. Mounting the AKAS® on self-supplied holders

fastening bracket with tenon blocks at the rear

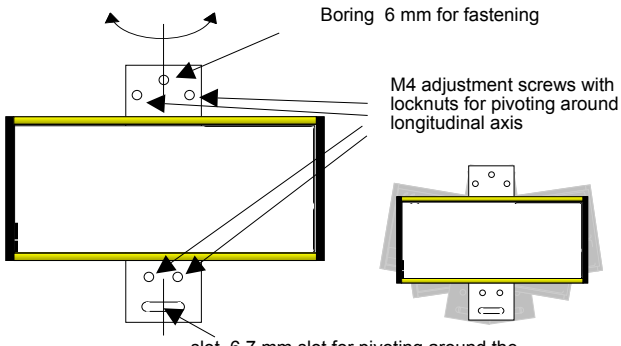


Fig. 12.1

The transmitter and receiver must be attached to stable, torsion-free, plane-parallel brackets on the machine.

Mount the mounting brackets so that the adjustment screws are easily accessible. Ensure that the profile is not twisted.

When swiveling around the longitudinal axis, the lock nuts of the individual M 6 screws on the mounting bracket should be loosened.

There are additional fastening possibilities with shifting tenon blocks at the three side of transmitter and receiver housings.

5. Connecting the AKAS®

Wiring diagrams are shown in chapter 6 **Electrical connections.**

6. Adjustment of the AKAS® at the first installation

AKAS®-LCM/SBH

The transmitter and receiver must be attached to the lower beam tool in a very stable and plane-parallel manner.

The mounting brackets are used to attach and adjust the AKAS®-LCM/SBH.
Together with the sliding sliding blocks, the brackets allow universal fastening.

The transmitter and receiver must be mounted in accordance with the markings for the lower beam tool and bending line on the front of the receiver.

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

adjustment of the receiver

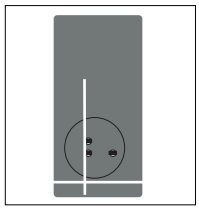
Cut a plumb line from the bending line of the upper tool and align the receiver with the M4 adjustment screws so that the marking on the front of the receiver is on the plumb line.

The upper edge of the thickest possible sheet (max. 6 mm) lying on the lower beam tool must be at the same height as the marking on the front of the receiver.

adjustment of the transmitter

The transmitter must be mounted so that its marking is also on the perpendicular of the bending line and at the height of the marking on the lower beam tool, as with the receiver.

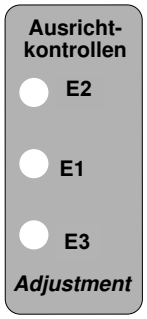
The red transmission beam should hit the receiver as shown in the picture below.



AKAS®-LCM/SBH

adjustment control - LEDs

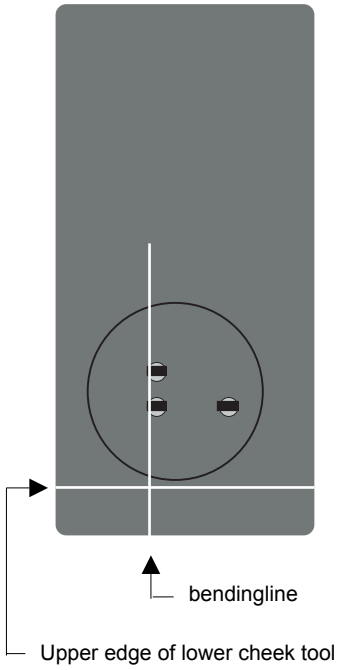
synchronization transmitter - receiver	AKAS®-LC…
transmitter-beam does focus at all	E...on
transmitter-beam does not focus precisely	E...partially off
transmitter-beam does not focus at all	E...off



7. adjustment The AKAS®-LCM/SBH transmitter and receiver must be firmly attached to the lower beam tool. (see chapter 5.2)

The tip of the upper tool must be on the bending line and the upper edge of the lower cheek tool must be at the height of the marking.

Then align the laser transmitter so that the laser beam runs parallel to the upper cheek and hits the receiver.



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

see chapter **6 Electrical connections**

9. Automatic overrun traverse test

The overrun distance of the machine should be checked automatically on the first stroke after switching on the supply voltage of the machine or the AKAS and repeated after 30 h at the latest if the machine remains switched on for longer.

Electrical data	
safety class	EN61496-1 and CLC/TS 61496-2 Typ4; ENISO13849 PL e, Kat4, MTTF>300y; EN62061 SIL3, PFH2, 38 E-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®-LC...SBH:** angular plug receiver: integrated plug-in connector with M 32 as strain relief
connecting cables	transmitter: **AKAS®-LC...SBH:** core max. 1 mm receiver: **AKAS®-LC...SBH:** max. 1 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 resistive and inductive loads in single state = min. 0mA, max. 0.5 A, max. output current in off state = 50 µA, max. voltage in off state = 0.9 V, max. capacitive load = 200 nF, max. line resistance between OSSD and load = 10 Ohm **SGA , HUSP, KAST** (KAST: only when using the external muting lamp): PNP-outputs max. 0,5A **RS232out**: RS 232 serial interface
inputs	FUO, FUS, SGO, SGS, SP: 0 V / 24V DC +/- 20 %, 10 mA KAST: : 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 from stopped state into closing state after enabling of the OSSDs : 300 ms (only with operatiing mode with contactor/valve control EDM).
environmental data	
ambient operation temp.	0° to 50° C
storage temperature	-25° to 70° C

Caution!! The use of both AKAS® ...**without F** series and the AKAS®...**with F** series adjusted to "operation with connection to an additional safety PLC" receiver is only permitted in combination with an additional safety PLC (e.g. **FMSC**) which provides the safe fast speed-/slow speed signals and closing request signals via cables with short-cut and side-currant monitoring and which provides a safe processing of the OSSD-Signals of the AKAS®.

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:
(Muting signal e.g. from valve position monitoring of the operating valve, pressure switch or from the AMS)

The output of the muting signal from the machine control must be selected so that no muting signal may be output in the event of a malfunction of the responsible switching elements (e.g. sticking of a contactor or no changeover from rapid to creep speed)!

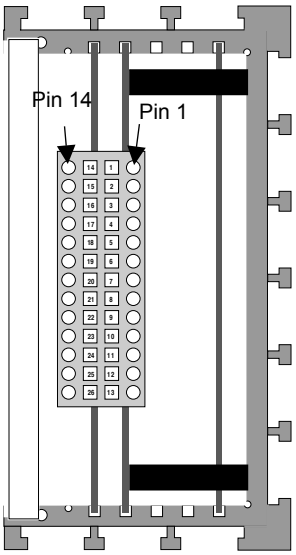
Checklist

		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	Use the safety outputs OSSD1 and OSSD2 to control the actuators relevant for the downward movement as directly as possible in order to keep the overtravel distance as short as possible	
5	In all operating modes except "Foot operated fast motion" the AKAS® must be disconnected from the power supply (=switched off).	
6	The machine control system issues a muting signal for AKAS®-SBH...: after sheet clamping has been completed or after the pre-stop for box bending. (muting signal e.g. from safe control, safe limit switches etc.)	
7	The machine control unit prevents rapid traverse during the closing movement if no static signal is present (SGA). This function of the machine does not have to be safety-related.	
8	Wenn das Mutingsignal gegeben wird muss nach Sicherheitskategorie 4 gewährleistet sein, dass der Hub der Maschine < 10mm/s ist.	
9	The box bending function must be selected using a button (normally open contact). A foot switch is more advantageous here, as this leaves both hands free to hold the blank.	
10	An overtravel distance test is performed after voltage reset	
11	The overtravel is less than 9 mm minus the maximum sheet thickness specified for AKAS®-LC-SBH	

function

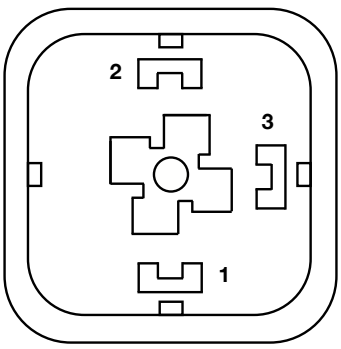
- protection of the operator from being squeezed between the ram and the matrix (all other safety monitoring functions are carried out by a safety control (e.g. safety PLC **FMSC**).
- The **safety PLC** gives a safe signal to the **AKAS®** inputs **FUS** and **FUO** , if a closing movement is ab out to be performed, and another **safe signal** is given to **SGO**, **SGS** and **SP** , if the press closes safely at slow speed. For this, **the signal lines must be monitored for eventual short-circuits by the safety PLC.**
- The safety PLC evaluates the safety 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 overtravel of AKAS®-LCM/SBH must not exceed 9 mm minus the maximum sheet thickness.

terminal
receiver



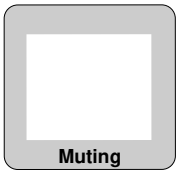
		Terminals of the receiver		
Nr	**designation**	**meaning**	**signal level**	
1	Ground	functional ground		
2	+Ub 24VDC	power supply voltage		
3	-Ub 0V	power supply voltage		
4	RS 232 GND	Meldeausgang (Status-/Fehlermeldung)		
5	-Ub Sender	connection for -Ub AKAS-transmitter		
6	+Ub Sender	connection for +Ub AKAS-transmitte / key-operated switchfor adjustment	+24V if FUS is triggered or key-operated switch is on	
7	FUS	input **Start / Stop closing stroke**	0V folding machine stop +24V folding machine close	inputs equi-valent
8	FUO	input **Start / Stop closing stroke**	0V folding machine stop +24V folding machine close	
9	SGS	input **slow speed position**	0V: at fast speed +24V: at slow speed	
10	SGO	input **slow speed position**	0V: at fast spoed +24V: at slow speed	
11	SP	input **safety point**	0V: within fast speed range +24V: within slow speed range	
12	SGA	output **slow speed request by AKAS**	0V only slow speed permitted +24V fast-/slow speed possible	
20	HUSP	output **message of box bending function**	+24V if box-bending is selected	
23	OSSD1	safety output **release of closing stroke**	+24V if released	
24	OSSD2	safety output **release of closing stroke**	+24V if released	
25	KAST	input **box bending**	+24V pulse min. 100 ms	
26	RS 232 out	output message (State-/error)		

transmitter



Terminals of the transmitter		
Nr	**designation**	**meaning**
1	+S	+Ub transmitter
2	-S	-Ub transmitter
3	Erde	functional ground

Displaying of conditions by the Muting lamp



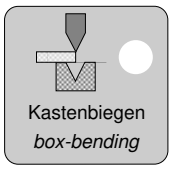
lamp is out (flashing is hardly recognizable) : during the closing movement the proitective field is at least partially avctivated

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

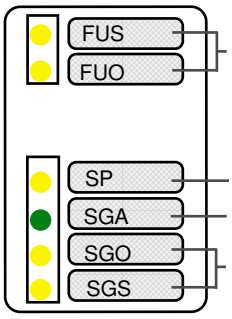
The lamp is flashing slowly : about once per second: EDM is not in Stop condition, or the rear reset button must be released, or the press brake must be opened completely in order to quit the slow speed range to enbable the triggering of SP = 0.

The lamp is flashing rapidly: about five times per second: AKAS® is in interlock state. Carry out a voltage reset.

Indicator LEDs



LED is on if box bending funktion is activated



LED indicators for inputs and outputs	AKAS®-...M
Inputs for start/stop of the closing movement	Inputs switching simultaneously: FUS / FUO light up when foot pedal is pressed
Safety point input	SP lights up when safety point is reached
Creep speed request output	SGA lights up when rapid traverse is permitted
Creep speed position monitoring inputs	Inputs switching simultaneously: SGS / SGO light up at creep speed

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		front reset button does not enable	verify reset button and cable leading to the normally closed contact of the foot pedal if interrupted
3	*antivalent foot pedal inputs without protective circuit monitoring*	*normally closed contact of the foot pedal does not enable*	*verify the cable leading to the normally closed contact of the foot pedal if interrupted*
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
15		Stop at the overrun traverse cam	during overrun traverse test
15	*without overrun traverse control*	-	-
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
39		release foot pedal	
43		overrun traverse OK	during overrun traverse test
43	*without overrun traverse control*	-	-
51		rear reset buuton is defective or the EDM is not in Stop status	check rear reset button for short-circuits
51	*without EDM*	*rear RESET button is defective*	*check rear reset button for short circuit*
51	*without protective circuit monitoring*	*EDM is not in Stop Status*	*Check EDM Signals*
51	*without EDM and without protective circuit monitoring*	*wrong poetntial at EDMO or EDMS*	*check the connectors for short circuits*
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 at the version that has no connection option of an external muting lamp. With the version with external connection option of an external Muting lamp, the connection KAST must be checked for short-circuits on -.
83		overrun traverse too long	during overrun traverse test
83	*without overrun traverse control*	-	-
95		overrun traverse mearuement has not been carried out	possible reasoin: the protective field is interrupted, or the protective circuit is interrupted, or the foor pedal is released, or no fast speed during the overrun traverse measurement, evtl. because the stroke for the oberrun traverse measurement has not been started by the UDC of the machine. Open the press completely and carry out a new stroke for the overrun traverse measurement.
95	*without overrun traverse control*	-	-

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
99		no overrun traverse test was carried out because of slow speed during overrun traverse test	set the switch-over point onto the normally required position, open the press until the machines reaches its UDC and carry out a new stoke for overrun taverse measurement
111		interrupted protective circuit	Release all protective grids and Emergency off buttons
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		error within the protective circuits, re-disable and enable them	open again all protective grids and Emergency off buttons and close them again so that a possible bad contact is activated again
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		error within the protective grids, re-open and close them	re-open and close the protective grids so that a possible bad contact is activated again
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*
131		lateral protective grids are open, *CLOSE!*	close all lateral protective grids
135		lateral protective grids are open, i.e. protection by AKAS® is cancelled, activate RESET	Press can close only in slow speed
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*
139		error within lateral grids or Emergency-OFF-button, open and close them once more	open and close again all lateral protective grids and all Emergency-OFF-buttons so that a possible bad contact is activated again
147		error within rear grids or Emergency-OFF-button, open and close them once more	open and close again all rear protective grids and all Emergency-OFF-buttons so that a possible bad contact is activated again
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		Emergency OFF actvated	re-enable emergency OFF button
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		rear protective grid is open	close rear protective grid
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		lateral and rear protective grids are open	close all protective grids
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		activate reset button for the rear protective grid	reset must be actvated after the operning and closing of the protective grids
183	*no monitoring of the protective circuit*	-	-
187		open the press after overrun traverse test	Press has successfully stopped at the cam during the overrun traverse test, only when the cam is free again, the OSSDs can be enabled again The ajustment controll-LEDs are flashing slowly until the press brake is not opened completely.
187	*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
235		activate emergency-OFF-reset of the grids	after the opening and closing of a protective grid, a reset must be carried out
235	*no monitoring of the protective circuit*	-	-
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)

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

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.

Warning transferred decim. byte	**error** transferred decim.byte	**operating mode**	**description** possible text in the display system	**reason for the error**
6	5		EDM does not respond even though the OSSDs are released	If this happens during fast sped: valve position monitors do not switch in fast speed position or at an interruption in the EDMS circuit. If this happens during Muting: EDMS and EDMO are both at + 24 V
6	*5*	*no monitoring of the protective circuit*	-	-
10	9		slow speed signal error	When switching over from fast speed into slow speed, at SGO remains+ 24 V
10	*9*	*with additional safety PLC (e.g. **FPSC**)*	*slow speed signal error*	*When swithcing over vom fast speed into slow speed, the triggereing of the SGS and the SGO is antivalent instead of equivalent*
18	17		machine stops at the overrun traverse cam/ cam switch does not conduct	in the case of "warning": open press completey, in the case of "error": check cable and cam switch
18	*17*	*overrun traverse control*	-	-
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 switch-over of the slow speed position monitors into slow speed. Check the SGA line for interruptions and check also the slow speed position monitors and their lines.
86	85		Problem release of the rear stoppers	line short circuiting of one RXOX circuit with another line
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	during operation without safety PLC, both EDMS and EDMO are at + 24 V at the same time in stopped status.
106	*105*	*with additional safety PLC (e.g. **FPSC**)*	*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
126	125		short circuit of the the muting lamp line	only possible at the version with external Muting lamp, otherwise: internal problem
130	129		problem at request for higher switchover point:	line short circuiting of the HUSP circuit with other lines
142	141		Muting lamp should not light up, release box bending button	short circuit in box bending button or line short circuiting of the KAST circuit with other lines
150	149		problem at pressing of foot pedal	line short circuiting of the foot pedal circuits FUO and FUS with other lines
166	165		Hex switches deadjusted	Readjust the Hex switches onto the selected operating mode, then carry out a voltage reset. If the error repeats itself, a repair by Fiessler Elektronik is necessary.
170	169		invalid Hex switch position	Turn HEX switch into a permitted position
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	*with additional safety PLC (e.g. **FPSC**)*	*unequal slow speed connections*	*This error happens only during the operating mode "for connection to safety PLC" if the signals at the SGO and the SGS are not exactly the same.*
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

Tel. 0711 / 91 96 97 - 0
Fax 0711 / 91 96 97 - 50
eMail 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® accessories (electronic equipment)

part designation	order code	
Safety double foot pedal FE-FS2-U2/SU2ASDU1-U-RD	**FE-FS2-U2/SU2ASDU1-U-RD**	
AKAS® Foot pedal for box-bending function	**FE-FS1-U1-U-YE**	

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
The AKAS® fulfils the safety class 4, in compliance with EN 954.
Devices of safety category 4 are self-monitoring electrosensitive protective devices (ESPE) and represent the highest safety class among the ESPE

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 12 m (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.

Box-bending
By-pass of the receiver unit **E1**, during a box-bending process.

WARNING! Read and understand this section prior to installing and operating the system AKAS®
Please observe always

WARNING: The Check Daily Procedure must be also performed after any maintenance, adjustment, modification to the folding machine safety system AKAS® or after each change of tools (upper tool or matrix). Checking ensures that the AKAS®-system and the machine's control system work properly to stop the machine. Failure to the check properly could result in serious injury to personnel. The Check Daily Procedure is shown below in this safety instructions and on the front cover of the AKAS®-receiver

At the beginning of each shift and after each change of tools and material, the AKAS® Folding machine Protection must be checked like described in page 5.:

If the machine has not stopped, before the test piece is touched don't continue to work with this folding machine. DO NOT ATTEMPT TO OPERATE THE MACHINE IN THIS CONDITION!

The folding machine has to be shut down!

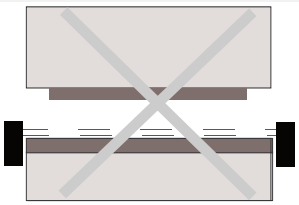
WARNING: in this situation the folding machine safety system AKAS® don't provide the full safety for the operator.

If you install and / or operate the AKAS® on machines not capable of this performance you are in violation of national safety standards. Doing so could result in serious injury to personnel.
You assume all responsibility for the safety of the machine in question if it is not capable of this performance.

WARNING! Read and understand this section prior to installing and operating the system AKAS® Please observe always

WARNING:

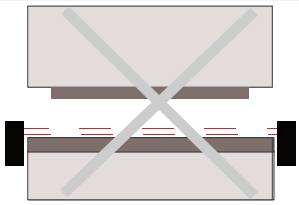
No protection by AKAS®



PictureS3/1

WARNING: The shelters that protect the worker getting inside the folding danger-zone have to be modified in a way that there are no possibilities to get inside in the danger-zone and to get squeezed between the machine, the safety equipment and parts or material.

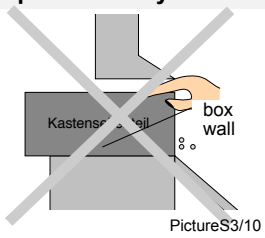
No protection by AKAS®



PictureS3/2

WARNING: The distance between the front edge of the AKAS® systems and the folding should be >100mm to avoid injuries while while closing the press.

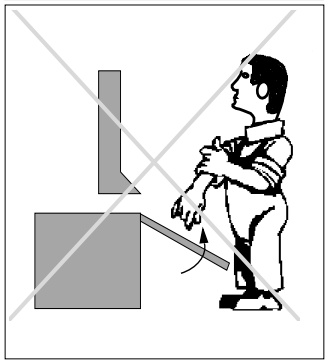
No protection by AKAS®



PictureS3/10

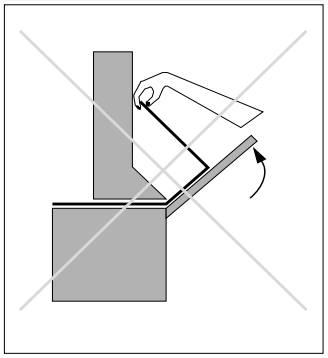
WARNING: The folding machine safety system AKAS® provides not a full protection when slipping with finger or hand on the upper edge of a box wall during the downwards of the upper die. When the receiver element is already below the upper edge.

No protection by AKAS®



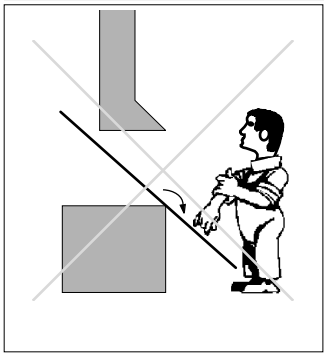
PictureS3/3

No protection by AKAS®



PictureS3/4

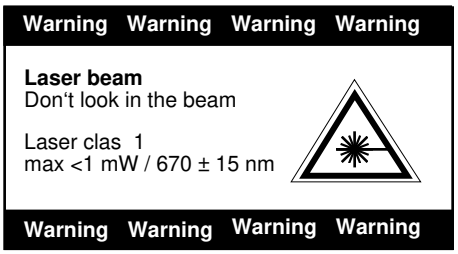
No protection by AKAS®



PictureS3/5

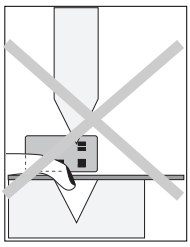
WARNING! Read and understand this section prior to installing and operating the system AKAS® Please observe always

The transmitter generates two or three modulated visible laser light beams.



PictureS4/ 1

WARNING:
The AKAS® does not protect,
- if the machine runs only in work speed, i.e. no more than 10mm/s (20mm/s USA Version)
- if the machine runs in workspeed (no more than 10mm/s), (20mm/s USA Version)
- if the overrun traverse of the machine comes to more than 10mm
- if the folding machine works only in a single speed.



PictureS4/ 2

WARNING: The front beams which is turned to the operator does not protect, if the box-bending function has been activated earlier.
WARNING:
With activated function of box-bending the finger is not detected as shown in picture S4/2 !

The protection of a folding machine by the AKAS® does not permit a bending in the bottom of a box inside one case in fast motion.
On folding machine equipped with AKAS® protection only tools of equal height may be used in one fixing.
All tools fixed together may have only one common bending line.
Stoppers, which are mounted at the matrix, lead to a premature switching-off of the downward movement.

The folding machine safety system AKAS® can only be used when the following requirements are fullfilled:
The machine or system can be electronically controlled and it must be possible to stop the hazardous motion at any time.
The folding machine safety system AKAS® is a special safety systems only for hydraulik folding machines.
See also chapter 2.1 "**Prerequisites for using the folding machine protection AKAS® "**
Muting contact: free of potential, may be closed only at a lifting speed / working speed ≤ 10 mm/s.
It must comply with safety category 4 according EN 954.
The overrun traverse including the safety equipment must be less than 15 mm.
The folding machine is equiped with an automatique overruncontrol for the first stroke after bringing the machine under tension.
The part of control system of the machine which is responsible for the stopp of the machine must full fil the requirements of category 4 according EN 954.

Both muting signals must be connected by separate cables in order to exclude any short circuit, or the layout of cables must be effected in a way that no mechanical damage of the cable may occur, thus excluding any short circuit of the lead of the cable.

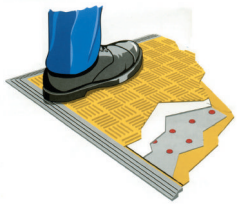
To use the folding machine safety system AKAS® the following requirements must be met:
— The guarded folding machine must be able to stop anywhere in its cycle.
— The guarded machine must not present a hazard from flying parts.
— The guarded machine must have a consistent stopping time and adequate control mechanisms.
— Severe smoke, particulate matter and corrosives may degrade the efficiency of the folding safety system AKAS®. Do not use the the folding machine safety system AKAS® in this type of environment.

WARNING! Read and understand this section prior to installing and operating the system AKAS®
Please observe always

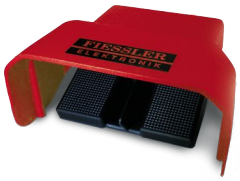
— All applicable governmental and local rules, codes, and regulations must be satisfied. This is the employer's responsibility.
— All safety-related machine control elements must be designed so that an alarm in the control logic or failure of the control circuit does not lead to a failure to danger.
— Additional guarding may be required for access to dangerous areas not covered by the folding machine safety system AKAS®
— Perform the Check Daily Procedure (page 5) test procedure at installation and after maintenance, adjustment, repair or modification to the machine controls, tooling, dies or machine, or the folding machine safety system AKAS®.
— Perform only the Check Daily Procedure outlined in this manual.
— Follow all procedures in this manual for proper operation of the folding machine safety system AKAS®.
The enforcement of these requirements is beyond the control of Fiessler Elektronik. The employer has the sole responsibility to follow the preceding requirements and any other procedures, conditions and requirements specific to his machinery.

Keep the receiver and transmitter optic free of liquid like oil and water!
Keep receiver and transmitter of the AKAS® system clean!

Weitere Sicherheitsprodukte

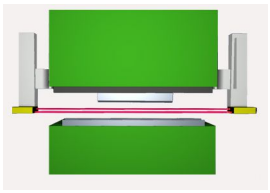


Saftety Mats



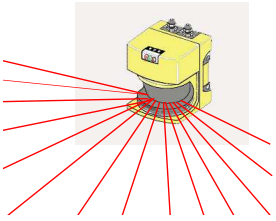
Safety-Footpedal

Parametricable Saftetycontrol **FMSC**



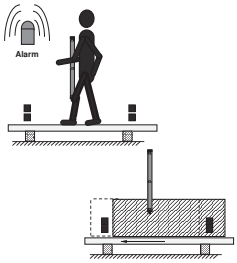
Press Brake Protection System AKAS

Safety-Light-Curtain

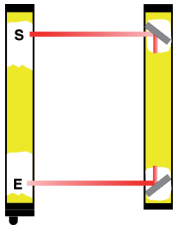


Proximity Laser Scanner

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

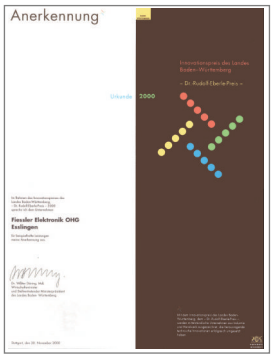
In order to ensure and maintain the high quality level of the Fiessler safety products, a quality control security system has been established early. Fiessler Elektronik holds the DIN ISO EN 9001 Certificate and, thanks to the company-owned EMC laboratory, all products must pass a inspection without 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.

CE BG zugelassen TÜV ZERT UL LISTED Ex

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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