Operating Instructions

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Indicator lights on Frontpanel and switches for safe operation

1. Adjustment control: LEDs of the receiver elements E1, E2, E3
2. Integrated muting lamp: lamp is on if the beam does focus at all (see page 19)
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 function is activated
5. Connection lid

**Connections and Markings**

1. PE / Erde
2. + Ub 24V DC
3. - Ub 0V
4. RS 232 GND
5. - Ub S
6. + Ub S
7. FUS
8. FUS
9. GG
10. SX_PSK
11. SP
12. SGa
13. NLW
14. OSSD 1
15. OSSD 2
16. KAST
17. RXOK 2
18. RXOK 1
19. EDMS
20. EDMO
21. EDMS
22. FUS
23. FUS
24. FUS
25. FUS
26. FUS

**View of the receiver elements**

**View after removing the connection lid on the receiver**

**Indicator lights for in- and outputs**

- RXOK2
- RXOK1
- NLW
- NA1
- NA3
- NA2
- FUS
- FUS
- FUS
- EDMO
- EDMS
- SP
- SGA
- SGO
- SGS
- RXOK 2
- RXOK 1
- NLW
- NA1
- NA3
- NA2
- FUS
- FUS
- FUS
- EDMO
- EDMS
- SP
- SGA
- SGO
- SGS

**Typ 4**

Laser actuated AOPD EN 12622
**LEDs and operating elements**

**AKAS® LC-II M**

**1.2**

**Connections/Allacciamento**

1. PE / Erde
2. + Ub 24 V DC
3. - Ub 0 V
4. RS 232 GND
5. - Ub 5
6. + Ub 5
7. FUS
8. FUO
9. SGS
10. SGO
11. SP
12. SGA
13. ---
14. HUSP
15. OSSD 1
16. OSSD 2
17. KAST
18. RS 232 OUT
19. ---
20. ---
21. ---
22. ---
23. ---
24. ---
25. ---
26. ---

**Adjustment control/Leds of the receiver elements E1, E2, E3**

- LEDs are on if the beam does focus at all (see page 19)
- Integrated muting lamp
- 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 36)
- 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
- LED is on if box bending function is activated
- Indicator lights for in- and outputs
- Connection lid

**Indicator lights for in- and outputs**

(see page 36)

- 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
This is the operating instruction for the AKAS® models AKAS®-LC IIM, AKAS®-LC IIF. Special instructions for each model are provided with its individual model marking.

Read the operating instructions

Attention is drawn to all safety instructions by this symbol. Particular attention must be paid to such 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

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

Safety warning

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 E1 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 (EN12622).

Protection circuits and Emergency can only stop the opening movement when the movement is interrupted with the RXOK outputs.

A-Test:

A-TEST when putting into operation

The setting must be done in a way that the following test will be passed:

- 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 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 in position “10” on the lower tool. Select the box bending function if you use a system of the AKAS®3... product family.

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. Select the normal bending function if you use a system of the AKAS®3... product family.

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.) Move the test piece (“14”) along the tip of the upper tool. The AKAS®-Il receiver has to remain in the interrupted (LS unterbrochen /interrupted = red LED) state.
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 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: 10mm bei AKAS®-LC II...
The press must have an automated overrun traverse control for the first stroke. If not, it can be realised by the AKAS®-...F and a cam controller or by the Fiessler AMS-system. Before the initial start-up, the overrun traverse must be checked either by using the test rod (see page 5) 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 10mm the fast speed must be reduced.

5. Due to the missing synchronization 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 an opening of ≤ 13 - 22 mm (according to overrun traverse of the press) the control system of the machine must send a Mutingsignal to the receiver. Then 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 a bending in the bottom of a box inside one 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

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. 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.

**Produkt conformance**

"Complies with 21CFR and 1040.10 and 1040.11".

"Caution! the use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure."

Attention! L’utilisation de commandes ou de réglages ou l’exécution de procédures autres que ceux et celles spécifiés dans le présent manuel risque d’entraîner une radioexposition dangereuse.

**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 48.
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, Type 4
- 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®-3M / -3F, AKAS®-IIM / -IIF: equipped with electromotor driven supports for transmitter and receiver for self-acting tool change if tools with different heights are used

AKAS®-LC II M / -LC II F: is recommended if there are no frequent tool changes or in case if extended operation with the same tool is required, therefore no re-adjusting to different tool sizes is necessary. (Fig.7/4)

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### Functions / Characteristics

<table>
<thead>
<tr>
<th>Function / Characteristic</th>
<th>AKAS®-LC II M</th>
<th>AKAS®-LC II F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Overrun Traverse of the press brake</td>
<td>10 mm</td>
<td>10 mm</td>
</tr>
<tr>
<td>Recommended turnover point</td>
<td></td>
<td></td>
</tr>
<tr>
<td>From fast speed into slow speed (according to overrun traverse of the press) Distance between metal sheet and bending punch</td>
<td>according to overrun traverse 13 - 22 mm</td>
<td>according to overrun traverse 13 - 22 mm</td>
</tr>
<tr>
<td>Detecting beams / Receiver elements</td>
<td>2 / 3</td>
<td>2 / 3</td>
</tr>
</tbody>
</table>

### Inputs

<table>
<thead>
<tr>
<th>Description</th>
<th>AKAS®-LC II M</th>
<th>AKAS®-LC II F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overrun traverse control</td>
<td>-</td>
<td>1 -selectable with / without</td>
</tr>
<tr>
<td>NLW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 inputs for control of doors / emergency-OFF-circuit</td>
<td>-</td>
<td>3 Pairs -selectable with / without</td>
</tr>
<tr>
<td>NA1, NA2, NA3 for paired use</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>1 pair lateral door circuit, equivalent or antivalent,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 pair rear door circuit, equivalent or antivalent,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 pair emergency-OFF-circuit s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stopp contactor control</td>
<td>-</td>
<td>2 -selectable with / without</td>
</tr>
<tr>
<td>EDMO, EDMS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data of traverse in slow speed</td>
<td>-</td>
<td>1 -selectable with / without</td>
</tr>
<tr>
<td>SGW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start / stop of closing stroke</td>
<td>2 equivalent</td>
<td>2 -selectable antivalent or equivalent switching</td>
</tr>
<tr>
<td>FUS, FUO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position control in slow speed</td>
<td>2</td>
<td>2 -selectable antivalent or equivalent switching</td>
</tr>
<tr>
<td>SGO, SGS</td>
<td></td>
<td>-selectable with / without foot pedal delay</td>
</tr>
<tr>
<td>Selection of box bending</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>KAST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety point</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>SP</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Outputs

<table>
<thead>
<tr>
<th>Description</th>
<th>AKAS®-LC II M</th>
<th>AKAS®-LC II F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety outputs for release of closing stroke</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>OSSD1, OSSD2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Release and Emergency OFF of the rear stoppers</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>RXOK1, RXOK2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Box bending function is displayed</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>HUSP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output for messages RS 232</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>TXD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demand for slow speed</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>SGA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. Release the closing movement by activating the foot pedal.

2. Press brake closes in fast speed (> 10 mm/s) change-over point above sheet metal from fast speed into slow speed: according to overrun traverse 13 - 22 mm

3. After reaching the change-over point from fast speed to slow speed (= 10 mm/s):

E1 and E3 are deactivated, E2 remains activated for 0.6s (6 mm) more (protection)

4. 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 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 within the next 70 ms + the selected enhanced tolerance. A tolerance enhancement is possible only with the AKAS® F systems.

By twice pressing the foot pedal can also use this function to perform a stroke, when the protective field of the AKAS® is interrupted in the OT.
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® confirms the selection of the box bending by activating the output HUSP (= +24V).
change-over point above sheet metal from fast speed into slow speed:
according to overrun traverse 13 - 22 mm
receiver elements:
E1 not activated
E2 and E3 activated (protection)

3. Release the closing movement by activating the foot pedal. The press closes in fast speed (> 10mm/s).
E3 is deactivated,
E2 remains activated for 0,6s (6mm) more (=protection)

4. After reaching the change-over point from fast speed to slow speed (= 10 mm/s):

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 function 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 within the next 70 ms + the selected enhanced tolerance. A tolerance enhancement is possible only with the AKAS® ......F systems.

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 E1, 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 not detected!!
max. Standard-Range: 6m (optional higher range)

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).

Fastening:
Fastening with shifting tenon blocks at the three side of transmitter and receiver housings.

Dimensions:

<table>
<thead>
<tr>
<th>Housing Type</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting Bracket</td>
<td>400 x 200 mm</td>
</tr>
<tr>
<td>Receiver</td>
<td>194 mm</td>
</tr>
<tr>
<td>Transmitter</td>
<td>194 mm</td>
</tr>
<tr>
<td>Plug</td>
<td>32mm</td>
</tr>
</tbody>
</table>

Front View:

- M32 - 36 mm
- PG 13,5 - 27mm
- Plug - 32mm

Fig. 1/1

Fig. 1/2

Fig. 1/3
How to proceed: Step by step mounting the AKAS®

Fiessler-mechanical holders

<table>
<thead>
<tr>
<th>Step</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Overrun traverse measurement</td>
</tr>
<tr>
<td>2</td>
<td>Design of the mechanical holders - void if Fiessler holders are used</td>
</tr>
<tr>
<td>3</td>
<td>Mounting of the AKAS® at the ram</td>
</tr>
<tr>
<td>4</td>
<td>Mounting of the AKAS® at the ram</td>
</tr>
<tr>
<td>5</td>
<td>Connection of the AKAS® / Selection of the operating mode at the F-series</td>
</tr>
<tr>
<td>6</td>
<td>Adjustment of the AKAS® during first installation</td>
</tr>
<tr>
<td>7</td>
<td>Adjustment of the distance of the AKAS® from the bending punch</td>
</tr>
<tr>
<td>8</td>
<td>Function Verification of all electrical connections in view of the safety classes 4 requirements</td>
</tr>
<tr>
<td>9</td>
<td>Self-acting Overrun Traverse Test</td>
</tr>
</tbody>
</table>

Holder for mounting of the AKAS®-LC

Order code AKAS/AS/3/LC/ZM (optional)
1. Overrun Traverse Measurement

The press must have an automated overrun traverse control for the first stroke. If not, it can be realised by the AKAS®...F and a cam controller or by the Fiessler AMS-system. Before the initial start-up, the overrun traverse must be checked either by using the test rod (see page 5) 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 10 mm the fast speed must be reduced.

### Table: Overrun Traverse Measurement

<table>
<thead>
<tr>
<th><em>distance Z</em> after adjustment</th>
<th><em>max. allowable stop distance of the machine with interruption of a beam of the AKAS®-LCII in fast speed</em></th>
<th><em>recommended change over (U) from fast speed to work speed before the bending punch meets the sheet metal</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>9 mm</td>
<td>10 mm</td>
<td>18 mm</td>
</tr>
<tr>
<td>8 mm</td>
<td>9 mm</td>
<td>17 mm</td>
</tr>
<tr>
<td>7 mm</td>
<td>8 mm</td>
<td>16 mm</td>
</tr>
<tr>
<td>6 mm</td>
<td>7 mm</td>
<td>15 mm</td>
</tr>
<tr>
<td>5 mm</td>
<td>6 mm</td>
<td>14 mm</td>
</tr>
<tr>
<td>4 mm</td>
<td>5 mm</td>
<td>13 mm</td>
</tr>
</tbody>
</table>

* For tolerating undulating sheet metal of 2mm tolerance.
2. design of the holders - void if Fieessler holding Devices 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 5mm.
- 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 element E1 must face the operator and E3 must remain free when the highest tool is utilized. (Fig. 14/3 u. 4)

b) The gap between the front edge of the AKAS® systems and the press brake should be > 100mm in order to prevent injury while closing the press.

c) 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 getting caught between grids and safety equipment must be excluded.

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. 14/4.
4. Mounting of the AKAS®-LC ... to the holders
Fiessler-holders

The AKAS®-LC- holders came with a complete set of fastening material and a detailed mounting instruction.

Mounting on self-supplied holders

fastening bracket with tenon blocks at the rear

Boring 6 mm for fastening

M4 adjustment screws with locknuts for pivoting around the longitudinal axis

slot 6.7 mm slot for pivoting around the lateral axis and for fastening.

To guarantee a trouble-free operation, 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. Pay attention to avoid any deformation of the profile.

When pivoting around the longitudinal axis, the locknuts of each M 6 screw at the angle 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®

Connecting the AKAS®

Wiring diagrams are shown in chapter 6 Electrical connections.

Choose the operating mode at ...F series

The functions are described in chapters 6.3, 6.4, 6.5.

The position of the Hex switches is described in chapter 6.5.2.
6. Adjustment of the AKAS® at the first installation

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

The fastening brackets are designed for the fastening and adjustment of the AKAS®-LC II.

Together with the sliding tenein blocks, the brackets allow a universal fastening.

Transmitter and receiver must be mounted in a way that the receiver element E 4 remains free when the bending punch is fixed.

If a height-adjustable support is used, adjust the support with the help of a spirit level vertically, i.e. parallel to the guiding rails of the ram.

Drop a perpendicular from the bending line of the bending punch and adjust optically the receiver with the help of M4 adjustment screws so that the mark (centre of the receiver elements) is located vertically at the front of the receiver. When using a manually movable support for transmitter and receiver, make this test along the entire displacement area.

Check the distance between the mark and the perpendicular (bending line) to make sure that the receiver is carried up parallely to the bending line.

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.

If a support is used, adjust the support with the help of a spirit level vertically, i.e. parallel to the guiding rails of the ram.

The red transmitting beams should meet the receiver like it is shown in the opposite illustration.

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.
fine adjustment

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

![Diagram showing fine adjustment process](image)

Fig. 17/2

When using large tools, the AKAS®-LC transmitter is adjusted as follows:

1. Place the special AKAS®-LC magnetic lamina with its magnetic side at the spot marked “A”.
2. Adjust the transmitter in a way that the picture “LS” can be seen at the front side of the lamina.
3. Then place the special AKAS®-LC magnetic lamina with its magnetic side at the spot marked “B”.
4. Adjust the transmitter in a way that the picture “LS” can be seen at the magnetic side of the lamina.
5. Repeat the steps 1-4 until at both positions A and B the picture LS can be seen.
Mounting

Adjustment of the AKAS® at the first installation

correction of adjustment errors

possible maladjustment

<table>
<thead>
<tr>
<th>AKAS® LC II M / -F</th>
<th>remedy AKAS®-LC II M / -F</th>
</tr>
</thead>
<tbody>
<tr>
<td>The beam misses the target circle of the magnetic lamina at both of the tool tips and meets at the right hand side of the circle.</td>
<td>By unscrewing all M4 adjustment screws (Fig. 15/2) the support must be positioned further away behind the bending line, i.e. push the Fiessler holders in their slots further to the front.</td>
</tr>
<tr>
<td>The beam misses the target circle of the magnetic lamina at both of the tool tips and meets at the left hand side of the circle.</td>
<td>By tightening all M4 adjustment screws (Fig. 15/2) the support must be put closer to the bending line, i.e. push the Fiessler holders in their slots further to the front.</td>
</tr>
<tr>
<td>The beam hits the target circle at the left tool end, at the right tool end the beam edge is lower than the target circle = case B Fig. 18/1</td>
<td>The transmitter must be turned to the right in the slot, i.e. on the Fiessler holders, the inclination adjustment screw must be tightened.</td>
</tr>
<tr>
<td>The beam hits the target circle at the left tool end, at the right tool end the beam edge is further up than the target circle = case C Fig. 18/1</td>
<td>The transmitter must be turned to the left in the slot, i.e. on the Fiessler holders, the inclination adjustment screw must be loosened.</td>
</tr>
<tr>
<td>The beam hits the target circle at the left tool end, and at the right tool end the beam it hits a spot at the left outside of the target circle</td>
<td>After unscrewing the upper left M4 adjustment screws and after readjusting the right M4 adjustment screws the transmitter (Fig. 15/2) must be turned clockwise around its longitudinal axis, i.e. at the Fiessler holders, the swiveling is carried out counterclockwise by loosening of the front swiveling adjustment screw and by tightening of the rear swiveling adjustment screw.</td>
</tr>
<tr>
<td>The beam hits the target circle at the left tool tip, and at the right tool end the beam it hits a spot at the right, outside of the target circle</td>
<td>After unscrewing the upper left M4 adjustment screws and after readjusting the right M4 adjustment screws the transmitter (Fig. 15/2) must be turned counterclockwise, i.e. at the Fiessler holders, the swiveling is carried out counterclockwise by loosening of the rear swiveling adjustment screw and by tightening of the front swiveling adjustment screw.</td>
</tr>
</tbody>
</table>

correct transmitter adjustment

in correct transmitter adjustment
**adjustment control - LEDs**

<table>
<thead>
<tr>
<th>Ausrichtkontrollen</th>
<th>E3</th>
<th>E1</th>
<th>E2</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>synchronisation transmitter - receiver</th>
<th>AKAS®-LC II M / - F</th>
</tr>
</thead>
<tbody>
<tr>
<td>transmitter-beam does focus at all</td>
<td>E3, E2, E1 on</td>
</tr>
<tr>
<td>beam does not focus precisely</td>
<td>E...partially off</td>
</tr>
<tr>
<td>beam does not focus at all</td>
<td>E...off</td>
</tr>
</tbody>
</table>

**Advises!**

E3, E1, E2

LEDs are flashing slowly about once per second: 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 adjustment controll-LEDs are flashing slowly until the press brake is not opened completely.
When using frequently upper tools with different heights, the system AKAS®-II or AKAS®-3 is recommended owing to the enhanced operating convenience during the tool change.

How to adjust the AKAS LC II according to the overrun traverse of the press brake.

1. Evaluate the overrun traverse of the press brake.

2. Transmitter adjustment

- Place the lower edge of the tool exactly on the line of the scale ("BT1670, Dok 1262/2") which corresponds to the evaluated overrun traverse.

- Adjust the laser beam in a way that it hits the center of the circles on the magnetic lamina (parallel laser beam positioning) at the transmitter and the receiver sides of the tool.

3. Receiver adjustment

- Place the lower edge of the tool exactly on the line of the scale which corresponds to the evaluated overrun traverse.

- Move the receiver upwards until LED E3 lights up. Then, move the receiver downwards until the LED E3 is to go out and "Free" is displayed at the receiver.

4. Enter the switch-over point (and the waviness of the sheet) at

5. The illustration on the receiver must look like this

After having completed the adjustment procedure, the tests (see page 5) must be carried out.
8. Verification of all electrical connections referring to safety class 4

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.

The products of the AKAS®...F product family can execute this overrun traverse test with the help of a cam switch and a normally closed contact. For this, the length of the cam must correspond to the allowable overrun traverse plus the hysteresis of the cam switch. The maximum allowable overrun traverse must not exceed the value of 10 mm with the AKAS®-LCF.

This overrun traverse cam must be mounted in a way that the press is in the maximum closing speed when the cam switch is opened by the cam, and the stroke is started out of the upper dead center of the machine.

The overrun traverse test is carried out after every voltage reset and must be repeated every 24 hours. After the successful overrun traverse test, the press must be at first opened for the execution of one bending stroke.

If the overrun traverse is too long, the cam does not open the overrun traverse cam switch when the closing movement is stopped, and the AKAS® will prevent the complete bending stroke in fast speed.

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 13849-1:2008) and EN 61496 or IEC 61496 and EN 12622
Performance Level: PL e (EN ISO 13849-1:2008), MTTF > 300
Safety Integrity Level: SIL3 (EN 62061:2005), PFH = 2.38 x 10^-10/h

Operation voltage: 24 V DC, +/- 20 %, SELV
Max. power consumption: (no charge): max. 0.5 A
Protection from incorrect connection: Protection against all possibilities of errors is not provided.
Protection class: III
Electrical connection: transmitter: angular plug, receiver: integrated plug-in connector with M 32 as strain relief

Connecting cables:
- Transmitter: 3-core max. 1 mm
- Receiver: 10-bis 28-core (according to operating mode) 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. 0.5 A, with short-cut and side-current monitoring.
- Output current for resistance u. Inductive loads in the on state = min. 0 mA, max. 0.5 A, max.
- Output current in the inactive = 50 uA max. Voltage in the inactivate = 0.9 V,
- Max. capacitive load = 200 nF, max. Cable resistance between OSSD and load = 10 Ohm
- RXOK1 and 2: PNP-outputs with short-cut and side-current monitoring during switching on, max. 0.5 A
- SGA, HUSP, SEU2K, KAST (KAST: only when using the external muting lamp): PNP-outputs max. 0.5 A

Inputs:
- FUO, FUS, SGO, SGS, SP, EDMO, EDM, NA1, NA2, NA 3, NLW: 0 V / 24 V DC +/- 20 %, 10 mA
- KAST: 0 V / 24 V 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 and the opening of a protective circuit and the disabling of the OSSDs
- 10 ms between the opening of a protective circuit and disabling of the release of the rear stoppers RXOK1 & 2
- 2.6 ms between the opening of the overrun traverse cam switch and the disabling of the OSSDs during the overrun traverse test

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 operating mode with contactor/valve control EDM).
- 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 detection of the closing movement state by the EDM, i.e. 100 ms after enabling of the OSSDs when the press is operating without the EDM.
  - Switch-over into fast speed when the press is outside the range of the safety point (at SP = 0): 100 ms after detection of the closing movement state by the EDM, i.e. 100 ms after enabling of the OSSDs when the press is operating without the EDM.
  - Switch-over into slow speed state when the start of the press has been transmitted to NC: 70 ms after detection of the closing movement state by the EDM, i.e. 70 ms after enabling of the OSSDs when the press is operating without the 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. FPSC) which provides the safe fast speed-/slow speed signals and closing request signals via cables with short-cut and side-current 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.

If the press does not possess any position-monitored contactors for the switch-over from fast speed into slow speed, a safe integration is possible using the Fiessler AMS-System.
Muting signal

(Muting signal available from the contactor position control of the working stroke valve, from the pressure switch or from the AMS)

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

The set up operation has to be carried out according to the description in chapter 6.5.1 function 7 on the AKAS®-F systems, 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.

Checkliste

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AKAS® is used on &quot;foot operated fast motion&quot; mode.</td>
</tr>
<tr>
<td>2</td>
<td>&quot;Foot operated fast motion&quot; should only be possible with activated AKAS®</td>
</tr>
<tr>
<td>3</td>
<td>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.)</td>
</tr>
<tr>
<td>4</td>
<td>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</td>
</tr>
<tr>
<td>5</td>
<td>In all operating modes except &quot;Foot operated fast motion&quot; the AKAS® must be disconnected from the power supply (=switched off).</td>
</tr>
<tr>
<td>6</td>
<td>The machine control system issues a muting signal with 13 - 22 mm above the slug. (according to overrun traverse of the press) (Muting signal coming from the contactor position control of the working stroke valve, from the pressure switch or from the AMS)</td>
</tr>
<tr>
<td>7</td>
<td>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.</td>
</tr>
<tr>
<td>8</td>
<td>When the muting signal is given, it must be guaranteed according to safety class 4 that the stroke of the machine is &lt; 10mm/s.</td>
</tr>
<tr>
<td>9</td>
<td>The box-bending function must be chosen and acknowledged by a button (change-over contact). Here a pedal is more advantageous, because by using it both hands stay free to hold the sheet.</td>
</tr>
<tr>
<td>10</td>
<td>After a voltage reset, an overrun traverse test is carried out.</td>
</tr>
<tr>
<td>11</td>
<td>The overrun traverse is smaller than 10 mm.</td>
</tr>
</tbody>
</table>
- 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 FPSC)).
- The safety PLC gives a safe signal to the AKAS® inputs FUS and FUO, if a closing movement is about 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 overrun traverse must not exceed the value of 10 mm at the AKAS®-LC II M.

<table>
<thead>
<tr>
<th>Nr</th>
<th>designation</th>
<th>meaning</th>
<th>signal level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Erde</td>
<td>functional ground</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>+Ub 24VDC</td>
<td>power supply voltage</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>-Ub 0V</td>
<td>Meldeausgang (Status-/Fehlermeldung)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>RS 232 GND</td>
<td>connection for -Ub AKAS-transmitter</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>+Ub Sender</td>
<td>key-operated switchfor adjustment</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>+24V</td>
<td>inputs equivalent</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>FUS</td>
<td>input</td>
<td>0V: Press brake stop</td>
</tr>
<tr>
<td>8</td>
<td>FUO</td>
<td>input</td>
<td>0V: Press brake stop</td>
</tr>
<tr>
<td>9</td>
<td>SGS</td>
<td>input</td>
<td>0V: at fast speed</td>
</tr>
<tr>
<td>10</td>
<td>SGO</td>
<td>input</td>
<td>0V: at fast speed</td>
</tr>
<tr>
<td>11</td>
<td>SP</td>
<td>input</td>
<td>0V: within fast speed range</td>
</tr>
<tr>
<td>12</td>
<td>SGA</td>
<td>input</td>
<td>0V: within slow speed range</td>
</tr>
<tr>
<td>20</td>
<td>HUSP</td>
<td>message</td>
<td>+24V: within fast speed range</td>
</tr>
<tr>
<td>23</td>
<td>OSSD1</td>
<td>safety output</td>
<td>+24V: message of box bending function</td>
</tr>
<tr>
<td>24</td>
<td>OSSD2</td>
<td>safety output</td>
<td>+24V: if released</td>
</tr>
<tr>
<td>25</td>
<td>KAST</td>
<td>box bending</td>
<td>+24V: pulse min. 100 ms</td>
</tr>
<tr>
<td>26</td>
<td>RS 232 out</td>
<td>output message (State-)</td>
<td></td>
</tr>
</tbody>
</table>

Transmitters:

<table>
<thead>
<tr>
<th>Nr</th>
<th>designation</th>
<th>meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+S</td>
<td>+Ub transmitter</td>
</tr>
<tr>
<td>2</td>
<td>-S</td>
<td>-Ub transmitter</td>
</tr>
<tr>
<td>3</td>
<td>Erde</td>
<td>functional ground</td>
</tr>
</tbody>
</table>
Mr. B. R. Steuer

AKAS-LC II M

--with HEX switch position 00 00

AKAS-LC II F

--operation only with additional safety PLC (e.g. FPSC)

---

**Electrical connections - Description / Wiring diagrams**

---

**AKAS-LC... transmitter**

- Functional ground: End 6
- Ub transmitter: +5 1, -5 2

**AKAS-LC... receiver**

- Ub transmitter: +24 VDC +-20%
- Ub sender: +24 VDC
- Ub receiver: -Ub 0 VDC

---

**Bridge SP - SGO / SGS:** only if the machine control does not indicate any safety point or slow speed range. Short strikes within the slow speed range by activating the footpedal twice are only possible, if the valves are not yet in the slow speed position at the start of the stroke, but if the AKAS® light beams have been interrupted before.
functions  AKAS®-LC II F provide - apart from the standard functions - more safety functions which enable the monitoring and control of a press brake without additional safety PLC.

These safety functions are selectable via 4 HEX switches.

- Protection of the operator from being squeezed between the ram and the matrix
- Overrun traverse test (after every voltage reset, and to be repeated at least within the next 30 h)
- Stop contactor control (EDM)
- Monitoring of the slow speed position (position monitoring of the contactors)
- Release of the closing stroke (via safety outputs)
- monitoring of the mechanical protective grids (at the rear and at the sides of the press)
- emergency-OFF-Monitoring (Emergency OFF at the rear and at the front)
- Emergency OFF of the rear stoppers
  (Emergency OFF at the rear and at the front, metal protective grids)
### Terminals of the Receiver AKAS®-LCF

<table>
<thead>
<tr>
<th>Nr</th>
<th>designation</th>
<th>meaning</th>
<th>position of HEX-switches B8 B8 oder F8 F8</th>
<th>position of HEX-switches 00 00</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Erde</td>
<td>functional ground</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>+Ub 24VDC</td>
<td>power supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>-Ub 0V</td>
<td>connection for -Ub AKAS transmitter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>RS 232 GND</td>
<td>message output (State-/error)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>FUS</td>
<td>Start / Stop closing stroke</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>SGS</td>
<td>monitoring of slow speed position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>SGO</td>
<td>monitoring of slow speed position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>SP</td>
<td>output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>SGA</td>
<td>slow speed request</td>
<td>0V only slow speed permitted</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>NLW</td>
<td>overrun traverse control input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>EDMS</td>
<td>monitoring of the Stopvalves</td>
<td>0V: at closing stroke</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>EDM0</td>
<td>monitoring of the Stopvalves</td>
<td>0V: at Stop</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>NA1</td>
<td>Emergency OFF / rear metal grid</td>
<td>0V only slow speed permitted</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>NA2</td>
<td>Emergency OFF / lateral metal grid</td>
<td>0V only slow speed permitted</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>S_EU2K</td>
<td>guard with antivalent switching light grid</td>
<td>0V: at fast speed</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>RXOK1</td>
<td>drive rear stopper emergency-OFF</td>
<td>0V: at fast speed</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>RXOK2</td>
<td>drive rear stopper emergency-OFF</td>
<td>0V: at fast speed</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>OSSD1</td>
<td>release of the closing stroke</td>
<td>0V: at fast speed</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>OSSD2</td>
<td>release of the closing stroke</td>
<td>0V: at fast speed</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>HUSP</td>
<td>request for higher switch</td>
<td>0V: at fast speed</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>OSSD3</td>
<td>box bending</td>
<td>0V: at fast speed</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>KAST</td>
<td>message output (State-/error)</td>
<td>0V pulse min. 100 ms</td>
<td></td>
</tr>
</tbody>
</table>

### Terminals of the Transmitter

<table>
<thead>
<tr>
<th>Nr</th>
<th>designation</th>
<th>meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S</td>
<td>+Ub transmitter</td>
</tr>
<tr>
<td>2</td>
<td>-S</td>
<td>-Ub transmitter</td>
</tr>
<tr>
<td>3</td>
<td>Erde</td>
<td>functional ground</td>
</tr>
</tbody>
</table>
Wiring example with a suitable hydraulics. AKAS is responsible for all safety related monitoring tasks

Machine-Safety monitoring by AKAS®-...F

AKAS®-LC II F

Electrical connections - Description / Wiring diagrams

-with selectable safety functions
The safety PLC is responsible for the fast speed / slow speed position control and provides this state to the AKAS® inputs SGO, SGS and SP via a signal line. (see wiring diagram 1/S. 29)

In fast speed: at SGO, SGS and SP = 0 V
In slow speed: at SGO, SGS and SP = + 24 V

During this, the safety PLC must monitor the signal line to the AKAS® for eventual short-circuits against potential conducting lines.

In the operating modes "without additional Safety PLC" the monitoring of the foot pedal is permanently present. AKAS® activates the safety outputs OSSDs only if the foot pedal is permanently pressed. AKAS® monitors both positions of the foot pedal and requires:

- if the foot pedal is released: at FUO = +24 V and at FUS = 0 V (see wiring diagram 4a/S. 29)
- if the foot pedal is pressed: at FUO = 0 V and at FUS = + 24 V

The monitoring function is able to monitor even 2 connected foot pedals, if two operators work at the press brake and if the foot pedals are correctly wired as shown in wiring diagram 4b/S. 36.

In the operating modes "with additional Safety PLC" the monitoring of the foot pedal can be cancelled, by selecting: "equivalent switching inputs for enabling the closing stroke".

In this case, both AKAS® inputs FUS and FUO are triggered + 24 V, if a closing movement of the press brake is wanted.

During the operating modes without additional safety PLC, a foot pedal response delay of the AKAS® safety outputs (OSSDs) of about 30 ms after the release of the foot pedal during the fast speed closing stroke can be selected.

When the foot pedal is checked also by the machine control, the control will execute an easier, smoother breaking via the proportional valves of the closing movement during this time, just before the OSSDs of the AKAS® disable the other closing stroke valves.

The overrun traverse control is realized by a cam switch with a normally closed contact. For this, the length of the cam must correspond to the allowable overrun traverse plus the hysteresis of the cam switch. The maximum allowable overrun traverse must not exceed the value of 10 mm. This overrun traverse cam must be mounted in a way that the press is in the maximum closing speed when the cam switch is opened by the cam, and the stroke is started out of the upper dead center of the machine.

The overrun traverse test is carried out after every voltage reset and must be repeated every 24 hours. After the successful overrun traverse test, the press must be at first opened for the execution of one bending stroke. The adjustment controll-LEDs are flashing slowly until the press brake is not opened.

If the overrun traverse is too long, the cam does not open the overrun traverse cam switch when the closing movement is stopped, and the AKAS® will prevent the complete bending strokes in fast speed.

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.
5. Control of the stop contactors (EDM)

AKAS® monitors in a safe way both positions of the stop- and the fast speed closing state of the contactor position monitors and switching contactors and requires:

- in fast speed state at EDMS = +24 V and at EDMO = 0 V
- in stop state at EDMS = 0 V and at EDMO = +24 V (see wiring diagram 2/S.39)

During the closing movement in slow speed, EDMO has to be = 0 V, EDMS is not monitored. After the release of the safety switching outputs (OSSDs) the AKAS® requires a switch-over of the EDM signals no later than 300 ms + the programmed tolerance enhancement.

In the operating modes with additional safety PLC, the safety PLC (e.g. FPSC) must carry out the monitoring of the stop contactors.


The protective doors and the emergency OFF-buttons are evaluated by double-channel inputs. As soon as at least one input is disabled, i.e. is in OFF state, the closing movement will be stopped immediately by switching OFF of the OSSDs, and the movement of the rear stoppers is prevented by disabling of the double channelled release RXOK1 and RXOK2.

A continuation of the press operation in only possible if all relevant protective switching circuits are disabled and then closed again. If afterwards the respective rest button is activated.

If the protective side doors are opened, AKAS® permits the movement of the rear stoppers after having activated the respective reset button. The closing movement of the press is permitted only during slow speed state. For this, AKAS® requires the prevention of the fast speed by the NC, by disabling the output SGA. AKAS® monitors the slow speed state during the closing movement. During this, the protective field of the AKAS® is not active.

During operation with foot pedal monitoring (antivalent foot pedal contacts), the reset is carried out after the disabling and re-enabling of the Emergency-OFF-Circuits and of the lateral protective metal grids. This is carried out by activation of an normally closed contact button, which is connected in series to the normally closed foot pedal contact at FUO (see wiring diagram 2/S.39 u. 5b/S.30).

The Reset after the disabling and re-enabling of the rear protective grid is carried out during the operation with EDM by activation of a normally closed contact button which is connected in series to the normally closed contactor controls at EDMO (see wiring diagram 5a/S.30).

A continuation of the press operation in only possible if all relevant protective switching circuits are disabled and then closed again, and if afterwards the respective rest button is activated.

During operation with foot pedal monitoring (antivalent foot pedal contacts), the reset is carried out after the disabling and re-enabling of the Emergency-OFF-Circuits and of the lateral protective metal grids.

During the operation without foot pedal monitoring (equivalent triggering of FUO and FUS) the reset of all protective circuits is carried out by a normally open contact which is connected between +24 V and EDMO. (see wiring diagram 5a/S.30)

The emergency-OFF-circuits are equivalent switching, i.e. the emergency-OFF-buttons must have 2 normally closed contacts. When laying out the circuits of the protective doors, you may choose from either the equivalent switching protective door contacts, i.e. 2 normally open contacts per door switch, or antivalent switching contacts, i.e. only one normally open and normally closed contact per door switch.

The second possibility however, is only available with the operation modes without additional safety PLC. The connection of the emergency OFF-circuits and the equivalent protective door contacts to the reset buttons when EDM is selected, is shown on wiring diagram 2/S.39.
6a. Rear safeguarding
with lightgrid
with equivalent switching outputs

Instead of using a rear protective metal grid, a safety light grid with equivalent switching outputs, e.g. type FieSSLer ULVT / TLVT or ULCT / TLCT as shown in wiring diagram 6/S.31 is possible.

Protective doors and emergency OFFs and light grid ULVT / TLVT or ULCT / TLCT for rear safeguarding at operating mode equivalent protective door control pairs / with EDM / with monitoring of the foot pedal / with Start interlock for the lightgrid

6b. Rear safeguarding
with lightgrid
with antivalent switching outputs

As alternative, the connection of a light grid with antivalent switching outputs is also possible, like p.e. the FieSSLer light grid EU2K 500/2. **Wiring Diagram 7/S.31** shows the connection of the Fiessler light grid EU2K 500/2 as a rear safeguard. In this case, the switches of the lateral protective grids must have antivalent switching contacts (1 normally closed and 1 normally open contact each) and the operating mode with antivalent switching protective door circuits must be selected. In this case, the connector 1 at the transmitter of the **EU2K 500/2** must be wired to the output S_EU2K of the AKAS®.

The lateral protective grids are not monitored. Every switching-over of the selector, the reset button must be activated for the Emergency-OFF circuits and the circuits of the lateral protective doors.

Protective doors and emergency OFFs and light grid EU2K 500/2 for rear safeguarding at operating mode antivalent protective door control pairs / with EDM / with monitoring of the foot pedal

!! Only to use the operation modes D...D... or F...F...! These modes activates Start interlock for the rear safety lightgrid! (see chapter 6.5.2)

If the connected lightguard does not detect all possible cross circuit and short circuit on the outputs OSSD 1 and OSSD2 you have to wire them in a way that no cross and short circuit is possible.
7. Installation operating mode, i.e. protection by monitors slow speed without activated protective field during operation with door monitoring

A selector switch provides the possibility to choose between operating mode with activated protective field of the AKAS® and fast closing speed, or operating mode with protection only by monitored slow speed closing, see Wiring diagrams 8/S.32 und 9/S.32. If the selector switch is activated, the protective field of the AKAS® is muted (bridged). This state is displayed by the shining muting lamp. By disabling of its output SGA, AKAS® requires the NC to carry out only cycles in slow speed, which is monitored by the AKAS®. Given the fact that in this operating mode, only cycles in slow speed are possible, the lateral protective grids are not monitored. Every switching-over of the selector, the reset button must be activated for the Emergency-OFF circuits and the circuits of the lateral protective doors.

Wiring diagram 8/S.32

Wiring diagram 9/S.32
During the operation with slow speed traverse information, the upper receiver elements are only muted if a +24 V signal is given to KAST. This signal is provided by a traverse measuring system (e.g. Fießler AMS, or NC) which indicates that the traverse has been actually covered. By this, the upper receiver elements remain activated as long as possible even in the case of a very low slow speed, and intermediate stops during slow speed. By this, even in slow speed range, protection by the AKAS® is provided until the introduction of the operator’s fingers between bending punch and sheet metal is made impossible. Connection: see wiring diagram 10/S.33.

AKAS® dynamically monitors the valve position signals, i.e. the individual states of the valve position signals must change within a certain time. The basic tolerances for the switching-over of the valve position monitors from stop state into closing movement and from fast speed movement into slow speed movement or vice-versa can be enhanced by additional 300 ms.

The basic tolerances have the following values:

Switching-over from stopped condition into closing movement after the enabling of the OSSDs: 300 ms, (only with operating mode “Monitored EDM”)

Switching-over into the slow speed condition when the start is within the range of the safety point (when SP = 1): 100 ms after from the detection of the closing movement condition by the EDM, i.e. 100 ms after the enabling of the OSSDs during operating mode “without EDM”.

Switching-over into the fast speed condition when the start is outside the safety point (when SP = 0): 100 ms after the detection of the closing movement condition by the EDM, i.e. 100 ms after enabling of the OSSDs during operating mode “without EDM”.

Switching-over into the slow speed condition, start with request for slow speed (200 ms after SGA = 0 has been sent to NC): 70 ms after the detection of the closing movement condition by the EDM, i.e. 70 ms after the enabling of the OSSDs during operating mode “without EDM.”
By the use of 4 Hex switches different operating modes can be selected. The Hex-switches must always be programmed in pairs (1 and 3, 2 and 4). Within each pair, equal values must be programmed.

1. Operating modes without additional safety control
with / without monitoring of protective doors / monitoring of the emergency off circuits (inputs equivalent)

<table>
<thead>
<tr>
<th>Hex-switches 1 and 3 Hex-switch-positions</th>
<th>start / stop of closing stroke</th>
<th>Monitoring of the foot pedal antivalent</th>
<th>Monitoring of protective doors / Emergency OFF equivalent switching</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>with</td>
<td>with</td>
<td>without</td>
</tr>
<tr>
<td>9</td>
<td>with</td>
<td>without</td>
<td>without</td>
</tr>
<tr>
<td>A</td>
<td>with</td>
<td>with</td>
<td>without</td>
</tr>
<tr>
<td>B</td>
<td>with</td>
<td>without</td>
<td>without</td>
</tr>
<tr>
<td>C</td>
<td>with</td>
<td>without</td>
<td>without</td>
</tr>
<tr>
<td>D</td>
<td>with</td>
<td>without</td>
<td>with</td>
</tr>
<tr>
<td>E</td>
<td>with</td>
<td>without</td>
<td>with</td>
</tr>
<tr>
<td>F</td>
<td>with</td>
<td>without</td>
<td>with</td>
</tr>
</tbody>
</table>

1. Operating modes with additional safety control
with monitoring of protective doors (inputs antivalent) / monitoring of the emergency off circuits (inputs equivalent)

| Hex-switches 1 and 3 Hex-switch-positions | start / stop of closing stroke | Monitoring of the foot pedal antivalent | Monitoring of the protective doors antivalent switching | Monitoring of the Emergency OFF equivalent switching |
|------------------------------------------|--------------------------------|----------------------------------------|---------------------------------------------------------------|
| 0 | with | with | without | without | 0 |
| 1 | with | with | without | without | 1 |
| 2 | with | with | with | without | 2 |
| 3 | with | with | with | with | 3 |
| 4 | with | without | without | without | 4 |
| 5 | with | without | without | with | 5 |
| 6 | with | without | without | with | 6 |
| 7 | with | without | with | with | 7 |

* Attention! Select always the shortest possible switching over tolerance enhancement of the valve position monitors!
The Hex-switches must always be programmed in pairs (1 and 3, 2 and 4). Within each pair, equal values must be programmed.

### Operating modes with additional Safety control (e.g., Safety PLC FPSC)

| Hex-switch 1 and 3 Hex-switchpositions | start / stop of closing stroke Monitoring of the foot pedal antivalent | inputs for release of closing stroke FUS / FUO overrun traverse control Monitoring of protective doors / Emergency OFF equivalent switching | Hex-switch 2 and 4 Hex-switchpositions | EDM Stop valve monitoring | slow speed traverse information * switching over tolerance enhancement of the valve position monitors |
|--------------------------------------|-------------------------------------------------|-------------------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------------------|-------------------------------------------------|
| 0                                    | without equivalent without without              | 0 without without + 0 ms                         |
| 1                                    | without equivalent without with                 | 1 without without +100 ms                        |
| 2                                    | without equivalent with without                 | 2 without without + 200 ms                        |
| 3                                    | without equivalent with with                    | 3 without without + 300 ms                        |
| 4                                    | with antivalent without without                 | 4 without with + 0 ms                             |
| 5                                    | with antivalent without with                    | 5 without with +100 ms                             |
| 6                                    | with antivalent with without                    | 6 without with + 200 ms                             |
| 7                                    | with antivalent with with                       | 7 without with + 300 ms                             |

⚠️ Attention!  
Select always the shortest possible switching over tolerance enhancement of the valve position monitors!

**example:**

```
Hex switch 1 2 3 4  
Hex switch position 3 1 3 1
```

### Hex-switch 1 and 3 Hex-switchpositions

| Hex-switch 1 and 3 Hex-switchpositions | start / stop of closing stroke Monitoring of the foot pedal antivalent | inputs for release of closing stroke FUS / FUO overrun traverse control Monitoring of protective doors / Emergency OFF equivalent switching | Hex-switch 2 and 4 Hex-switchpositions | EDM Stop valve monitoring | slow speed traverse information * switching over tolerance enhancement of the valve position monitors |
|--------------------------------------|-------------------------------------------------|-------------------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------------------|-------------------------------------------------|
| 3                                    | without equivalent with with                    | 1 without without +100 ms                        |
**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 activated.
- **Lamp is constantly on:** The protective field of the AKAS® is 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 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.

**Displaying of conditions by the Adjustment control-LEDs**

- **LEDs are flashing slowly** about once per second: 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 adjustment control-LEDs are flashing slowly until the press brake is not opened completely.**

*see also page 19*

---

**Indicator LEDs**

- **LED is on if box bending function is activated**

---

**Indicator LEDs for in- and outputs**

<table>
<thead>
<tr>
<th>Outputs for release of rear stoppers</th>
<th>AKAS®- ...F</th>
<th>AKAS®- ...M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inputs for Overrun traverse control</td>
<td>LED is lit if the cam is not activated</td>
<td>-</td>
</tr>
<tr>
<td>Inputs for control of protective grids or doors and emergency-off circuits</td>
<td>LED is lit if all protective door contacts are closed. Antivalent protective door contacts: NA1 and NA3 are lit, NA2 is dark if all protective door circuits/Emergency OFF circuits are closed</td>
<td>-</td>
</tr>
<tr>
<td>Inputs for press start / stop (release of closing stroke)</td>
<td>EDM: stop = 0 / fast speed = 1 / slow speed = X</td>
<td>-</td>
</tr>
<tr>
<td>Input for stop contactor control</td>
<td>EDM is lit during STOP state</td>
<td>-</td>
</tr>
<tr>
<td>Input for safety point</td>
<td>SP is lit if safety point is reached</td>
<td>-</td>
</tr>
<tr>
<td>Output for demand for slow speed</td>
<td>SGA is lit if fast speed is permitted</td>
<td>-</td>
</tr>
<tr>
<td>Input for position control in slow speed</td>
<td>Antivalent inputs SGO/SGS: stop=not 1/1; fast speed=1/0; slow speed=0/1</td>
<td>Equivalent inputs SGO/SGS: stop=1/1 or 0/0; fast speed=0/0; slow speed=1/1</td>
</tr>
</tbody>
</table>

*If the lateral protective doors are open:* All other protective doors / protective circuits must be closed. NA1 must be lit, NA2, NA3 must be dark if the protective door contacts are equivalent. If the protective door contacts are antivalent, NA1 and NA3 must be lit, and NA2 must be dark. (If necessary check the contacts). If the RXOK-LEDs are not lit, activate the RESET-Button(s). If the LEDs still remain dark, open and close all other protective doors / protective circuits, then activate the RESET-Button(s).

*If the lateral protective doors are closed:* All other protective doors / protective circuits must be equally closed. NA1, NA2, NA3 must be lit if the protective door contacts are equivalent. If the protective door contacts are antivalent, NA1 and NA3 must be lit, and NA2 must be dark. (If necessary check the contacts). If the RXOK-LEDs are not lit, activate the RESET-Button(s). If the LEDs still remain dark, open and close all protective doors / protective circuits, then activate the RESET-Button(s).
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 accepted that fulfill 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.

<table>
<thead>
<tr>
<th>Status messages, handling directions for the operator (binary xxxxxxx11)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>message transferred byte</strong></td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>15</td>
</tr>
<tr>
<td>23</td>
</tr>
<tr>
<td>39</td>
</tr>
<tr>
<td>43</td>
</tr>
<tr>
<td>51</td>
</tr>
<tr>
<td>51</td>
</tr>
<tr>
<td>63</td>
</tr>
<tr>
<td>83</td>
</tr>
<tr>
<td>95</td>
</tr>
</tbody>
</table>
### Status messages, handling directions for the operator (binary xxxxxxx11)

<table>
<thead>
<tr>
<th>Message transferred byte</th>
<th>Operating mode</th>
<th>Description</th>
<th>Handling directions</th>
</tr>
</thead>
<tbody>
<tr>
<td>99</td>
<td></td>
<td>- no overrun traverse test was carried out because of slow speed during overrun traverse test.</td>
<td>Set the switch-over point onto the normally required position, open the press until the machines reaches its UDC and carry out a new stroke for overrun traverse measurement.</td>
</tr>
<tr>
<td>111</td>
<td></td>
<td>- interrupted protective circuit</td>
<td>Release all protective grids and Emergency off buttons.</td>
</tr>
<tr>
<td>117</td>
<td>no monitoring of the protective circuit</td>
<td>Internal error</td>
<td>If this is displayed again after the voltage reset, a verification by Fiessler Elektronik is necessary.</td>
</tr>
<tr>
<td>119</td>
<td></td>
<td>error within the protective circuits, re-disable and enable them</td>
<td>If this is displayed again after the voltage reset, a verification by Fiessler Elektronik is necessary.</td>
</tr>
<tr>
<td>119</td>
<td>no monitoring of the protective circuit</td>
<td>Internal error</td>
<td>If this is displayed again after the voltage reset, a possible bad contact is activated again.</td>
</tr>
<tr>
<td>123</td>
<td></td>
<td>error within the protective grids, re-open and close them</td>
<td>Re-open and close the protective grids so that a possible bad contact is activated again.</td>
</tr>
<tr>
<td>123</td>
<td>no monitoring of the protective circuit</td>
<td>Internal error</td>
<td>If this is displayed again after the voltage reset, a verification by Fiessler Elektronik is necessary.</td>
</tr>
<tr>
<td>131</td>
<td></td>
<td>lateral protective grids are open</td>
<td>Close all lateral protective grids.</td>
</tr>
<tr>
<td>135</td>
<td></td>
<td>lateral protective grids are open, i.e. protection by AKAS® is cancelled, activated</td>
<td>Press can close only in slow speed.</td>
</tr>
<tr>
<td>135</td>
<td>no monitoring of the protective circuit</td>
<td>Internal error</td>
<td>If this is displayed again after the voltage reset, a verification by Fiessler Elektronik is necessary.</td>
</tr>
<tr>
<td>139</td>
<td></td>
<td>error within lateral grids or Emergency-Off-button, open and close them once</td>
<td>Open and close again all lateral protective grids and all Emergency-Off-buttons so that a possible bad contact is activated again.</td>
</tr>
<tr>
<td>147</td>
<td></td>
<td>error within rear grids or Emergency-Off-button, open and close them once</td>
<td>Open and close again all rear protective grids and all Emergency-Off-buttons so that a possible bad contact is activated again.</td>
</tr>
<tr>
<td>147</td>
<td>no monitoring of the protective circuit</td>
<td>Internal error</td>
<td>If this is displayed again after the voltage reset, a verification by Fiessler Elektronik is necessary.</td>
</tr>
<tr>
<td>159</td>
<td></td>
<td>Emergency OFF activated</td>
<td>Re-enable emergency OFF button.</td>
</tr>
<tr>
<td>163</td>
<td>no monitoring of the protective circuit</td>
<td>Internal error</td>
<td>If this is displayed again after the voltage reset, a verification by Fiessler Elektronik is necessary.</td>
</tr>
<tr>
<td>163</td>
<td></td>
<td>rear protective grid is open</td>
<td>Close rear protective grid.</td>
</tr>
<tr>
<td>175</td>
<td>no monitoring of the protective circuit</td>
<td>Internal error</td>
<td>If this is displayed again after the voltage reset, a verification by Fiessler Elektronik is necessary.</td>
</tr>
<tr>
<td>175</td>
<td></td>
<td>lateral and rear protective grids are open</td>
<td>Close all protective grids.</td>
</tr>
<tr>
<td>183</td>
<td>no monitoring of the protective circuit</td>
<td>Internal error</td>
<td>If this is displayed again after the voltage reset, a verification by Fiessler Elektronik is necessary.</td>
</tr>
<tr>
<td>183</td>
<td></td>
<td>activate reset button for the rear protective grid</td>
<td>Reset must be activated after the opening and closing of the protective grids.</td>
</tr>
<tr>
<td>187</td>
<td></td>
<td>open the press after overrun traverse test</td>
<td>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 adjustment control-LEDs are flashing slowly until the press brake is not released.</td>
</tr>
<tr>
<td>187</td>
<td>no monitoring of the protective circuit</td>
<td>Internal error</td>
<td>If this is displayed again after the voltage reset, a verification by Fiessler Elektronik is necessary.</td>
</tr>
<tr>
<td>193</td>
<td></td>
<td>box bending function is selected</td>
<td>AKAS® provides only indirect protection by permitting the closing movement only in slow speed during the closing movement, the foot pedal was rear.</td>
</tr>
<tr>
<td>207</td>
<td></td>
<td>selected, bending of flat sheet material, muting</td>
<td>AKAS® provides only indirect protection by permitting the closing movement only in slow speed during the closing movement, the foot pedal was rear.</td>
</tr>
<tr>
<td>215</td>
<td></td>
<td>foot pedal is released</td>
<td>During the closing movement, the protective field was interrupted.</td>
</tr>
<tr>
<td>231</td>
<td></td>
<td>interruption of the protective field</td>
<td>After the opening and closing of a protective grid, a reset must be carried out.</td>
</tr>
<tr>
<td>235</td>
<td></td>
<td>activate emergency-Off reset of the grids</td>
<td>Disable key switch. If the same message remains displayed, there is a risk of short-circuiting of the normally open foot pedal contact.</td>
</tr>
<tr>
<td>243</td>
<td>no monitoring of the protective circuit</td>
<td>key switch is activated</td>
<td>If this is displayed again after the voltage reset, a verification by Fiessler Elektronik is necessary.</td>
</tr>
</tbody>
</table>
### Displaying outputs

#### Electrical connections - Description / Wiring diagrams

#### Warning reports (binary `xxxxxx01`) error reports (binary `xxxxxx10`) partially cancelled

<table>
<thead>
<tr>
<th>Warning</th>
<th>Error</th>
<th>Operating mode</th>
<th>Description</th>
<th>Reason for the error</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>5</td>
<td>System</td>
<td>EDM does not respond, even though the OSSDs are released</td>
<td>If this happens during fast speed: valve position monitors do not switch in fast speed position or at an interruption in the EDM circuit. If this happens during Muting: EDM and EDMO are both at + 24 V.</td>
</tr>
<tr>
<td>8</td>
<td>5</td>
<td>System</td>
<td>No monitoring of the protective circuit</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>9</td>
<td>Slow speed</td>
<td>Slow speed signal error</td>
<td>When switching over from fast speed into slow speed, at SGO remains + 24 V</td>
</tr>
<tr>
<td>10</td>
<td>9</td>
<td>Slow speed</td>
<td>Slow speed signal error</td>
<td>When switching over from fast speed into slow speed, the triggering of the SGS and SGO is antivalent instead of equivalent</td>
</tr>
<tr>
<td>18</td>
<td>17</td>
<td>Overrun</td>
<td>Muting lamp should not light up, release box bending button</td>
<td>If this is displayed again after the voltage reset, there is an EMC problem or an internal error.</td>
</tr>
<tr>
<td>30</td>
<td>29</td>
<td>Control</td>
<td>No complete switch-over position in the Muting status</td>
<td></td>
</tr>
<tr>
<td>86</td>
<td>85</td>
<td>Problem release</td>
<td>Problem release of the rear stoppers</td>
<td></td>
</tr>
<tr>
<td>86</td>
<td>85</td>
<td>Internal error</td>
<td>Internal error</td>
<td></td>
</tr>
<tr>
<td>90/102</td>
<td>89/101</td>
<td>Line short</td>
<td>Line short circuiting of the SGA circuit with another line</td>
<td></td>
</tr>
<tr>
<td>106</td>
<td>105</td>
<td>Slow speed</td>
<td>Fast speed/slow speed signals are faulty in stop status</td>
<td></td>
</tr>
<tr>
<td>106</td>
<td>105</td>
<td>Slow speed</td>
<td>Fast speed/slow speed signals are faulty in stop status</td>
<td>The triggering of the SGS and the SGO is antivalent instead of equivalent</td>
</tr>
<tr>
<td>114</td>
<td>113</td>
<td>OSSD error</td>
<td>OSSD error</td>
<td></td>
</tr>
<tr>
<td>126</td>
<td>125</td>
<td>Short circuit</td>
<td>Short circuit of the HUSP circuit with other lines</td>
<td></td>
</tr>
<tr>
<td>130</td>
<td>129</td>
<td>Problem at request for higher switchover position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>142</td>
<td>141</td>
<td>Problem at pressing of foot pedal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>150</td>
<td>149</td>
<td>Problem at pressing of foot pedal</td>
<td>Short circuit of the foot pedal circuits with other lines</td>
<td></td>
</tr>
<tr>
<td>166</td>
<td>165</td>
<td>Hex switches</td>
<td>Hex switches dead adjusted</td>
<td>If the error repeats itself, a repair by Fiessler Elektronik is necessary.</td>
</tr>
<tr>
<td>170</td>
<td>169</td>
<td>Invalid switch position</td>
<td>Turn HEX switch into a permitted position</td>
<td></td>
</tr>
<tr>
<td>198</td>
<td>197</td>
<td>External transmitter signals are received</td>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

#### Warning reports (binary `xxxxxx10`) error reports (binary `xxxxxx01`) partially cancelled

<table>
<thead>
<tr>
<th>Warning</th>
<th>Error</th>
<th>Operating mode</th>
<th>Description</th>
<th>Reason for the error</th>
</tr>
</thead>
<tbody>
<tr>
<td>201</td>
<td>237</td>
<td>Fast speed</td>
<td>Unequal slow speed connections</td>
<td></td>
</tr>
<tr>
<td>246</td>
<td>245</td>
<td>Internal error</td>
<td>Internal error</td>
<td>If this message is displayed immediately after a voltage reset, there is an EMC problem or an internal failure of the appliance.</td>
</tr>
</tbody>
</table>
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 data ready:
- Exact unit type and model
- Serial number(s)
- Symptom of the malfunction and/or fault description

Fiessler Elektronik GmbH & Co. KG
Kastellstraße 9
D-73734 Esslingen
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 press brake protection systems AKAS® are maintenance-free.
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)

<table>
<thead>
<tr>
<th>part designation</th>
<th>order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>AKAS® Muting System w. integrated overrun traverse control AMS/N, complete (incl. 2 magnetic sensors with 10m &amp; 5m cables, 1 magnetic tape)</td>
<td>AMS/N/K</td>
</tr>
<tr>
<td>Muting lamp white, 230V / 7W</td>
<td>UMLW</td>
</tr>
<tr>
<td>Safety double foot pedal FL2-528ZSD4-U</td>
<td>FS2-528ZSD4-U</td>
</tr>
<tr>
<td>AKAS® Foot pedal for box-bending function</td>
<td>AKAS/Ped</td>
</tr>
</tbody>
</table>

### AKAS® accessories (mechanical equipment)

<table>
<thead>
<tr>
<th>part designation</th>
<th>order code</th>
<th>page</th>
</tr>
</thead>
<tbody>
<tr>
<td>AKAS®-LC Mounting Kit (not swivable) with Holder 2 for mounting at the back for the AKAS® transmitter and receiver (one pair)</td>
<td>AKAS/AS/3/LC/ZM</td>
<td>12 / 15</td>
</tr>
</tbody>
</table>
**Inspection Sheet**

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

<table>
<thead>
<tr>
<th>No.:</th>
<th>Date:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Customer's order number:</th>
<th>Hex switch positions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company:</td>
<td>Machine builder:</td>
</tr>
<tr>
<td>Address:</td>
<td>Serial no.:</td>
</tr>
<tr>
<td>Department:</td>
<td>Machine type:</td>
</tr>
<tr>
<td>Post Code/City:</td>
<td>Machine control by:</td>
</tr>
<tr>
<td>Phone:</td>
<td>Machine located at:</td>
</tr>
<tr>
<td>Fax:</td>
<td>Inventory no.:</td>
</tr>
<tr>
<td>Attending staff:</td>
<td>Cost centre:</td>
</tr>
<tr>
<td>Inspecting company:</td>
<td>Type of control:</td>
</tr>
<tr>
<td>Inspector:</td>
<td>Muting box no.:</td>
</tr>
</tbody>
</table>

**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

After viewing of the electrical diagrams, the electrical integration of the AKAS® can be accepted as safe according to safety class 4 EN 954T.1, 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 LSUW N1 Muting K switching unit, safety PLC or machine control
- 4.11 Muting signal monitored by machine control

Muting point in mm:

**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 repeated.
Konformitätserklärung (gemäß Anhang II 1 A 2006/42/EG)

Wir, Fiessler Elektronik GmbH & Co. KG, Kastelstr. 9, D-73734 Esslingen, erklären in alleiniger Verantwortung, daß das Produkt AKAS LC II M und AKAS LC II F, Berührungsloswirkende Schutzeinrichtung Typ 4 nach EN 61496-1 zur Absicherung des Gefahrenbereiches von Abkantpressen nach EN 12622, auf die sich diese Erklärung bezieht, mit den folgenden Normen oder normativen Dokumenten übereinstimmen:

EN 61496-1:2013
EN 61496-2:2013

Gemäß den Bestimmungen der Richtlinie 2006/42/EG

Die Schutzziele der Niederspannungsrichtlinie (2006/95/EG) wurden gemäß Anhang I, Nr. 1.5.1 der Maschinenrichtlinie eingehalten.

The protection goals of the Low Voltage Directive (2006/95/EC) have been complied with in accordance with Annex I No.1.5.1 of the Machinery Directive.

Les objectifs de protection de la directive "basse tension" (2006/95/CE) ont été respectées conformément à l’annexe I n° 1.5.1 de la directive Machines.

Folgende benannte Stelle hat eine positive Erklärung ausgestellt.

Kennnummer der benannten Stelle 0044
Prüfbescheinigung Nr. 44 205 12016404
Name: TÜV Nord CERT GmbH

Esslingen, den / the / le 11.12.2015

Götz Fiessler / Geschäftsführer / Dokumentationsbevollmächtigter / managing director / authorized for documentation / gérant / mandataire de la documentation
**Electrosensitive protective equipment**  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**  AKAS® meets Safety Category 4 according to EN 954, e PL (Performance Level) according to EN ISO 13849-1: 2008 and SIL 3 according to EN 62061:2005 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 6 m (Optional higher 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.
other Safety products

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 liability insurance associations. All homologations are obtained only after having passed strict tests by the German surveyor organisation TÜV.

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.

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.

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

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Fax: ++49(0)711-91 96 97-50
Email: info@fiessler.de
Internet: www.fiessler.de

Fiessler Elektronik has representations in all major industrial nations.