# KPM KB2
# Sheet Break Detector
Quick Guide

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## Quick Guide

**Edition 1.18 · 2019-01-31**

**Original instructions**



**SAFETY INFORMATION**

All personell must have the necessary knowledge and training for the work, to minimize risk of injury and damage. All adjustments, settings, calibration routines and service work must be done only by specially trained personnel. It is the responsibility of the supervisor to ensure that this is the case.

All covers must be in place during normal operation. Most of the instruments have moving parts that are operated pneumatically and/or electrically, and some incorporate sharp edges that are capable of causing serious injury. A large part of the service work needs to be done with the compressed air supply connected.

Always read the instructions carefully before operating the equipment. The following notations are used to emphasize important and critical instructions:

**NOTE**
This label is used for instructions that are important but not related to hazards.

**WARNING**
This label is used to indicate potential risk of severe injury or damage if warning is ignored.

# 1 Quick start-up guide

This quick guide leads the way to install start-up and configure parameters in the normal cases.

**1. Preparing installation**

- ☐ Install fiber optic cable inside conduit. This is easier done when temperature is cool and conduit is straight on the floor. In new devices this cable is installed.

> **NOTE**
> DO NOT PULL FIBER OPTIC CABLE STRONGLY. It may break or cut or connector may get loose.

- ☐ Connect conduit to sensor head tube.
- ☐ Install sensor head mounting rack or mounting clamps.

**2. Sensor unit installation**

- ☐ Check that dry clean purge air is connected (pressure between 0.5 - 3.0 bar / 7-40 psi).
- ☐ Check that the eyelet holes are aimed at the web.
- ☐ Check that the sensor distance from the web is 10 – 30 cm (4 - 12").
- ☐ Check that the measurement point distance to paper edge is about 30 cm (12").
- ☐ Fix position preliminary. Tuning may change this slightly.

**3. Display unit installation**

- ☐ Check that fiber optic conduit bushing is tight.
- ☐ Check that fiber optic cable is connected to the optics block:
  - Other optic cable to RX.
  - Another cable to RGB or IR.
- ☐ Check the wiring of the power supply.
- ☐ Check the wiring of alarm signal.

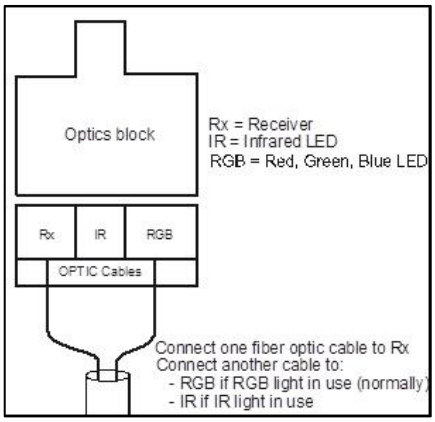



*Fig. 1.1. Fiber optic cable connection.*

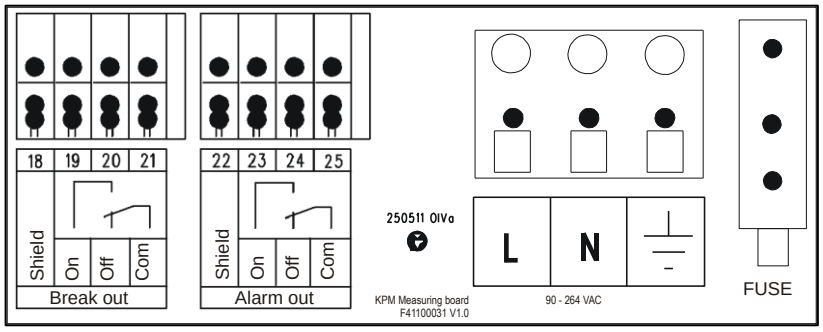



*Fig. 1.2. Wiring diagram for 110 – 230 VAC.*

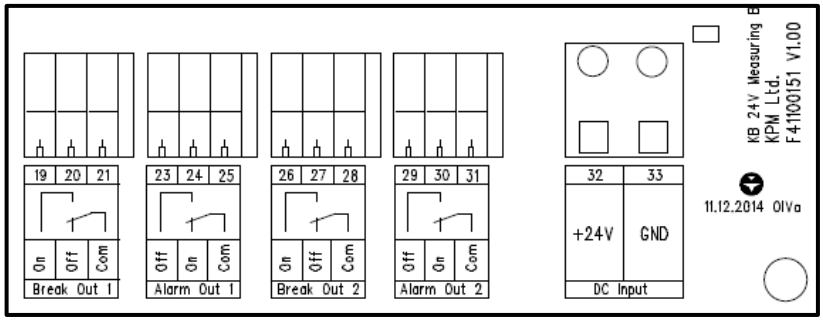



*Fig. 1.3. Wiring diagram for +24 VDC.*

**4. Start-up and tuning**

Preliminary tuning can be done during installation at the actual place by simulating paper on situation with dry paper on front of sensor head. Final tuning should be always done with real paper running situation.

- ☐ Set unit to "Mode: Maintenance" in the "Configuration" menu.
- ☐ Turn on the power.
- ☐ Select from the "Maintenance" menu "On-line signals".
- ☐ Turn the sensor head light beam so that signal levels are on their maximum values (normally 100 - 700) when simulating paper in front of sensor. Paper sheet should be close its correct position. Signal level can be adjusted with "TX Power" and "RX gain" in the "Measurement config" menu. Ambient light should be < 60 %.
- ☐ Simulate break: Press "SAMPLE". Store signals as "Break level".
- ☐ Simulate paper: When the paper is front of the sensor close to its normal position, press "SAMPLE". Store signals as "Paper level".
- ☐ Perform "Calculate Auto-limit" to find the best break detection signal.
- ☐ Select the signal suggested by KPM KB2 pressing right arrow and "ENTER".
- ☐ Select "Auto-alarm" to set the alarm signal Low/High limits. Drift alarm action, alarm limit and direction should be set as well.
- ☐ Activate the break relay by selecting operating mode ("Configuration" -› "Mode"): "Detect en- abled".
- ☐ Check that the position memory ring is locked.

**5. Final tuning**

Final tuning should be always done with real paper running situation and real break situation.

This time paper distance to the detector is stable and temperature as normal running temperature.

- ☐ Select "Configuration" -› "Mode" -› "Maintenance" (break relay deactivated).
- ☐ While the machine is running without paper press "SAMPLE" and store signals as "Break level".

  This can be done when the paper machine is warm and before paper sheet is on.
- ☐ When the web (paper) is on press "SAMPLE" and store signals as "Paper level".
- ☐ Perform "Calculate Auto-Limit" to find the best break detection signal.
- ☐ Select the signal suggested by KPM KB2 by pressing right arrow and "ENTER".
- ☐ Activate the break alarm relay by selecting operating mode ("Configuration" -› "Mode"): "Detect enabled".

# KPM KB2
# Sheet Break Detector
Instruction manual V1.8

# Table of contents

This manual is applicable for software version V2.16 and later

# 1 Description

## 1.1 System components

KPM KB2 fiber optic sheet break detection system contains:

- Sensor head installed above or under the web.
- Fiber optic cable protected with a flexible conduit.
- Display unit housing the light source, detector, and the measurement computer.

KPM KB2 is a solution to high temperature sheet break applications. The light source, detector, and electronics are isolated from the high temperature environment by a 6 m (20'), 9 m (30') or 12 m (40') fiber optic cable. While the sensor head is exposed to high temperatures, the electronics is mounted in a less hostile environment.

Sensor head "eye" holes are kept clean by purging instrument air through the sensor housing. Flowing air keeps the eyelet holes clean and prevents dirt or steam from contaminating the active optic surfaces. Purging air helps also to keep the sensor head temperature lower in high temperature applications.

KPM KB2 requires clean instrument air at 0.5 – 3.0 bar (7 - 40 psi), the rotameter or pressure regulator can be used for the easy detection of airflow.

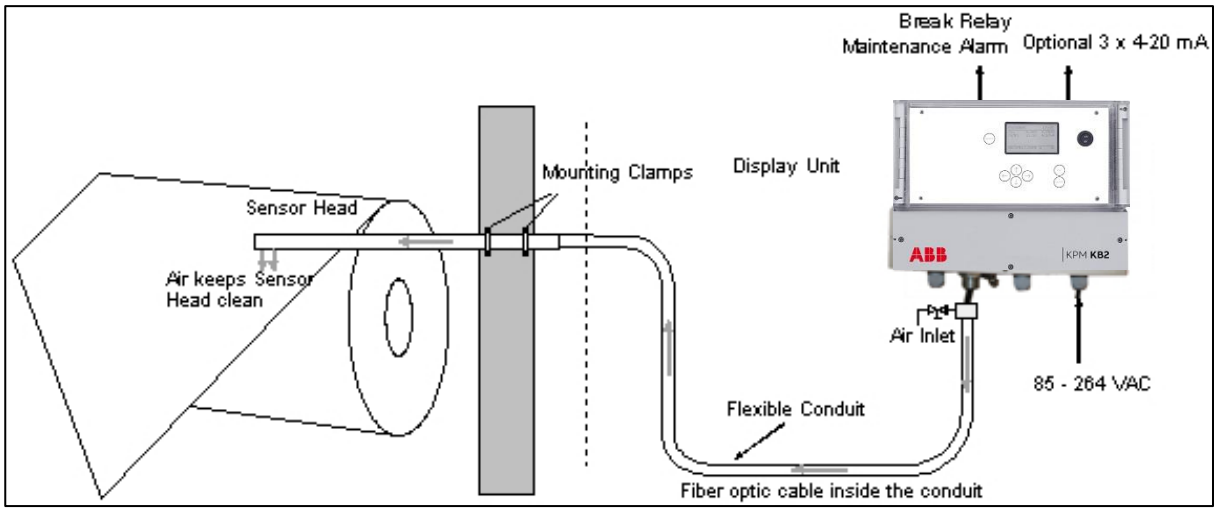



*Fig. 1.1. KPM KB2 system components. Fiber optic cable can be 6, 9 or 12 m long.*

## 1.2 Operating principle

The KPM KB2 operates on a proven, non-contact reflection principle. The light source can be either RGB LED (red, green, blue) or IR LED (infrared). The optical sensor is placed above or under the web. Applications include paper or board webs, wires or felts. Thanks to the unique RGB detection method the color of the product or the felt has no effect on the measurement reliability. The sensor is neither affected by dirt, steam nor temperatures up to 180 °C (356 °F) when installed according to ABB Oy, KPM specifications. There are no electronic components located in the sensor head.

The optical sensor is connected through a fiber optic cable to the RGB/IR light source located in the display unit. The RGB/IR LEDs emit pulsed red, green, blue, or IR light onto the web surface. The reflected light is received and transmitted through the fiber optic cable to the detector. All light components are analyzed fast for a reliable break detection.

A break activates a relay, which can be connected to the logic control of a paper machine. The reflected light intensities are also available as optional 4 - 20 mA analog outputs.

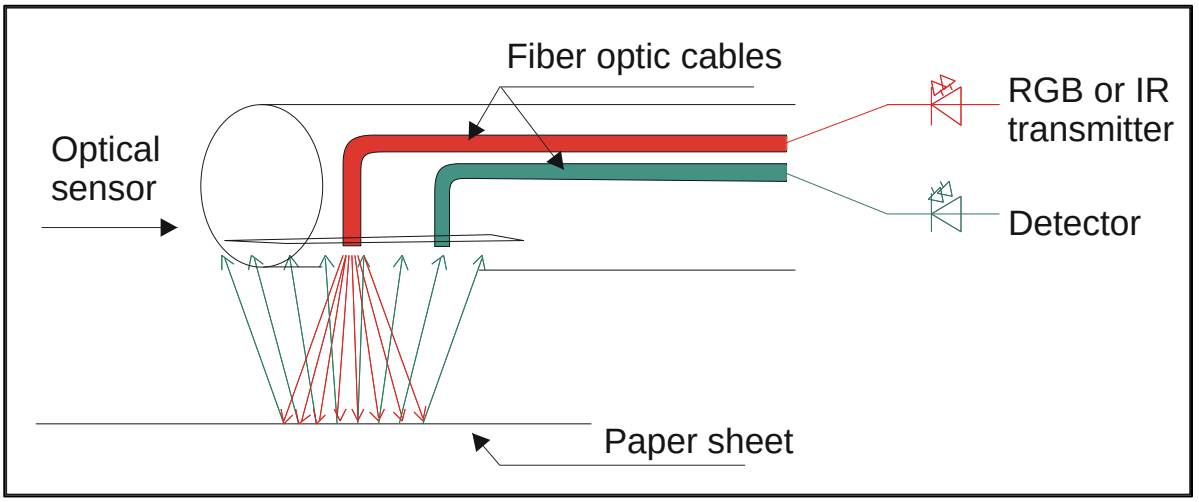



*Fig. 1.2. Operating principle.*

The self-cleaning sensor head is a 33.7 x 1500 mm (1" x 59") stainless steel tube with two holes serving as eyelets for the fiber optics and outlets for purge air. Continuous airflow through the stainless steel enclosure keeps positive pressure around the sensor head's eyes and keeps the eyelets free of steam, dust or debris. The openings should be located towards the surface being monitored.

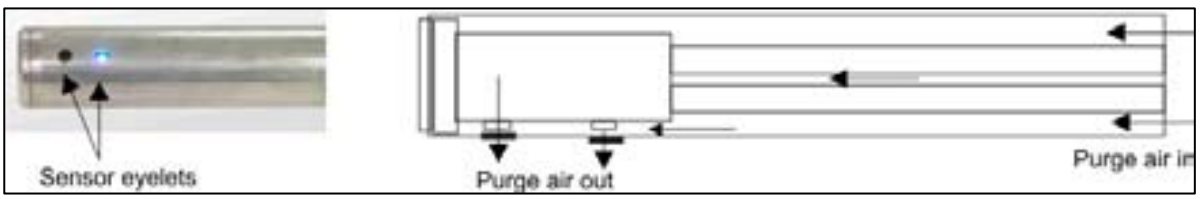



*Fig. 1.3. Sensor eyelets and purge air operation.*

# 2 Installation

**NOTE**

Do not mount several fiber optic sensor heads side by side; a mutual interference may occur. Infrared dryer might also interference the measurement. Please contact ABB Oy, KPM for more information.

## 2.1 Delivery limits

Manufacturer supplied components:

- KPM KB2 sensor head tube (2 pipes) with position memory, 1 ea.
- Mounting clamps, 2 ea.
- Fiber optic cable (6 m/20", 9 m/30" or 12 m/40"), 1 ea.
- Display unit, 1 ea.
- Flexible conduit for a fiber optic cable protection (SS tubing, 25,4 mm / 1" OD), 1 ea.

Options:

- Mounting rack.
- Analog output board.

## 2.2 Display unit installation

Install the display unit to the wall outside the machine for easy access.

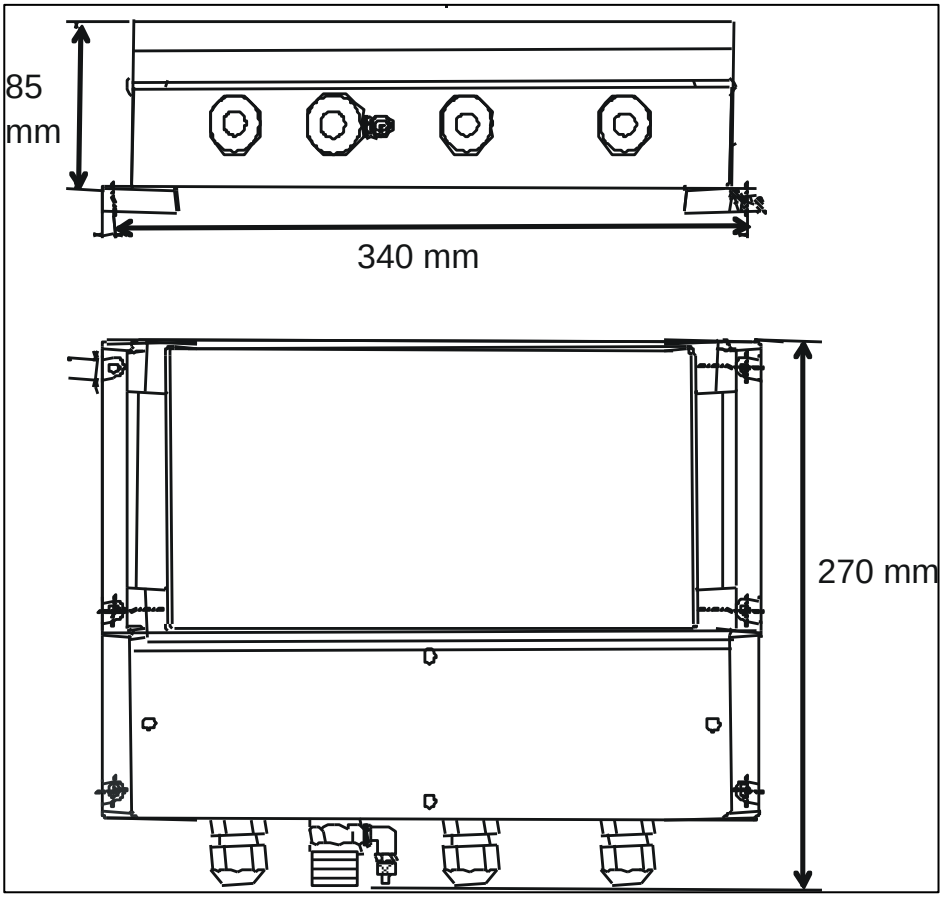



*Fig. 2.1. Display unit dimensions (mm).*

## 2.3 Sensor head installation

The display, conduit, sensor head and mounting clamps are delivered separately and are mounted together at customer site (see Fig. 2.2).

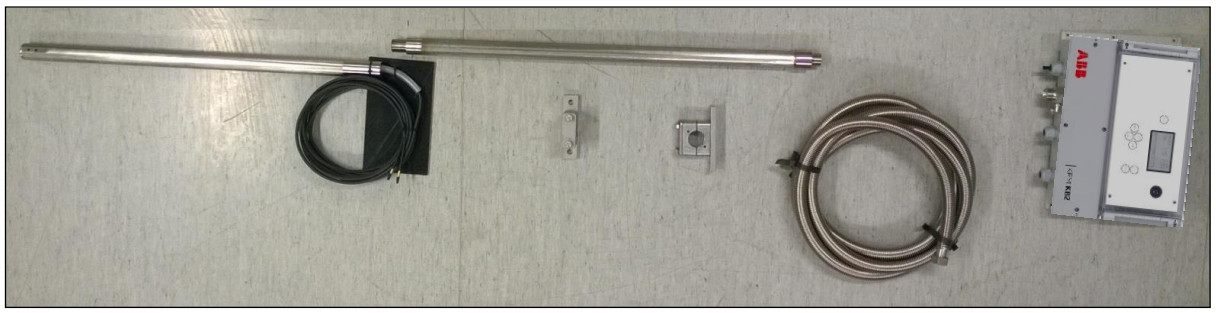


*Fig. 2.2. KPM KB2 delivery.*

The sensor head tube is delivered in 2 pieces which are mounted together at customer site (see Fig. 2.3).

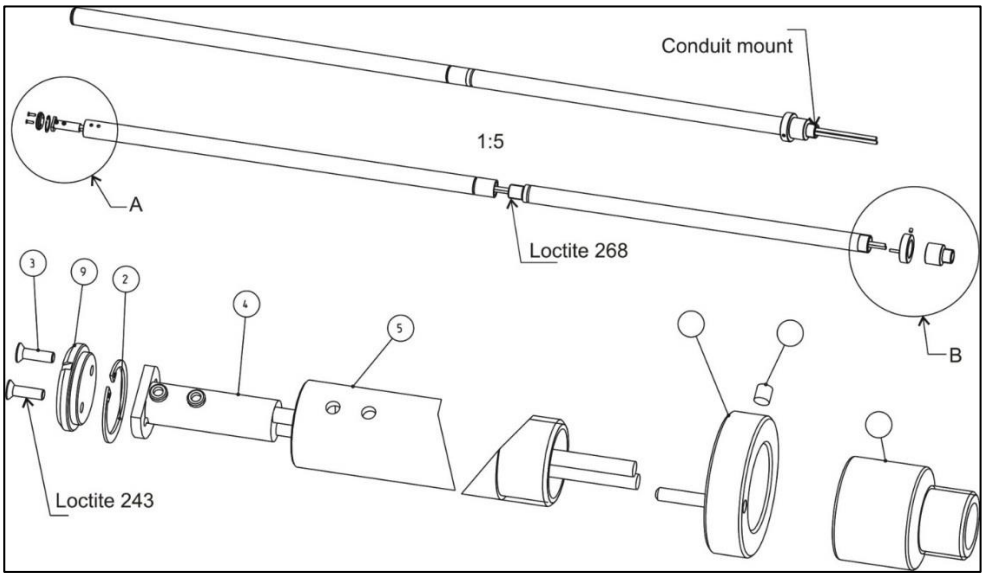



*Fig. 2.3. Sensor head assembly, typical installation (parts listed in appendix 2).*

The fiber optic cable is mounted to the first part of sensor head tube.

Make the installation as follows:

1) Remove plastic support and plastic tube. They are preventing fiber optic cable from bending during transportation (Fig. 2.4).

*Fig. 2.4. Sensor head with plastic support and plastic tube.*

2) Insert the free fiber optic cable through the second part of sensor head (Fig. 2.5).

*Fig. 2.5. Optic cable through the second part of sensor head.*

3) Attach the sensor head parts together with threads. Loctite 268 is already added in threads by manufacturer to seal the threads (Fig. 2.6).


*Fig. 2.6. Threads with Loctite 268.*

4) Insert the free fiber optic cable through the flexible conduit (Fig. 2.7). This is easiest, if the conduit is lying straight on the floor and the fiber optic cable is at room temperature. If you must pull, pull the fiber optic cable carefully from the outer jacket, not from the connectors. The maximum force for pulling from 2 cables is 50 Newton (11 lbf). The minimum bending radius is 50 mm (2").

*Fig. 2.7. Fiber optic cable through flexible conduit.*

5) Connect the conduit to the sensor head tube. After that you can install the sensor head tube to its measuring position. The sensor should be installed about 25 cm (10") inside from the edge of the web and 15 cm (6") below or above it. Standard range is 10 - 30 cm (4 - 12"). Continue the installation as follows:

6) Install the mounting clamps (Fig. 2.8) or the rack (optional, Fig. 2.9) or PosiEye adapter (optional, Fig. 2.10) on paper machine's frame or other solid mounting structure. Leave 20 - 30 cm (8 - 12") between the clamps. It is recommended to leave option to adjust clamp height so that sensor head can be positioned optimally during the start-up.

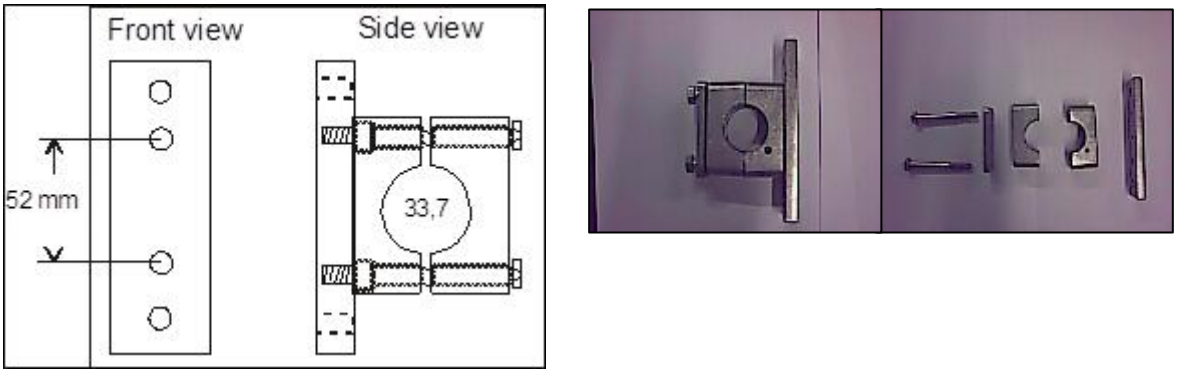



Fig. 2.8. Mounting clamps.

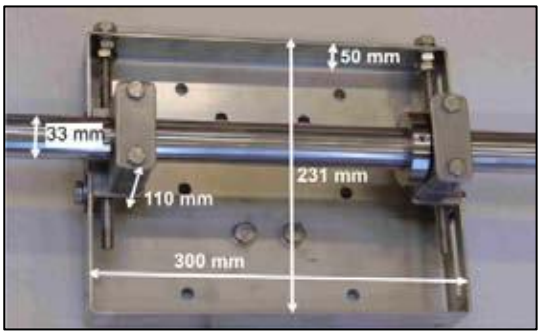



*Fig. 2.9. Mounting rack (option).*

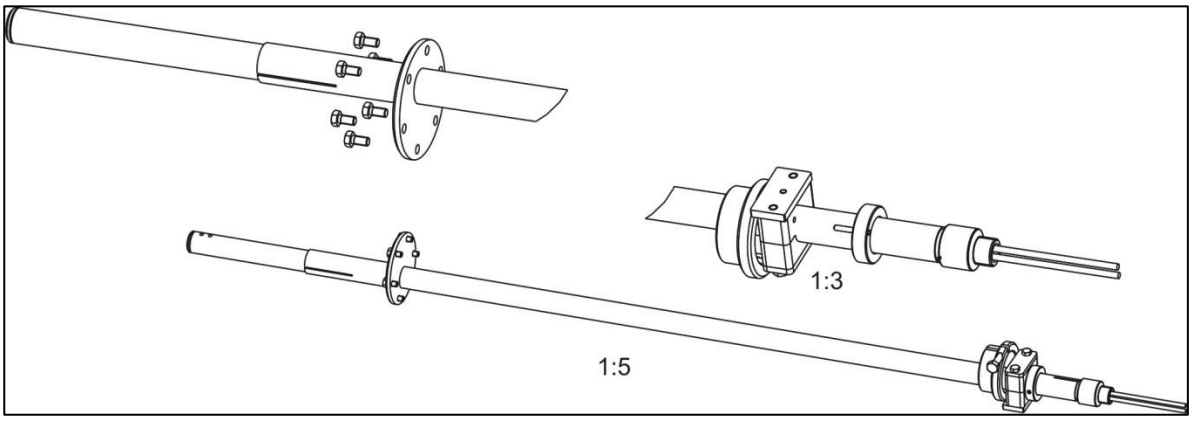



*Fig. 2.10. PosiEye adapter.*

**NOTE**
There is several lengths of the PosiEye Tube, with the longest tubes, the sensor head adapter needs to be flipped around so that it goes inside the PosiEye tube.

7) Connect fiber optic cable to the display unit, see paragraph 2.4.
8) Slide the sensor tube through the mounting clamps. Rotate the eyes into a position towards the web and semi-tighten the clamps. Final adjustment is done with the help of the signal level display after the unit is powered up. The light beam is directed to the measured web.
9) Insert the pin of the position memory ring (Fig. 2.11) into the hole in the clamp and tighten the stop screw. If the sensor is removed for maintenance the memory ring ensures that the sensor head is positioned exactly in the same position as before the removal. Adapters for PosiEye installations are available.

*Fig. 2.11 Position memory.*

## 2.4 Fiber optic cable installation

**NOTE**
Handle fiber optic cables with care. Do not pull strongly. Remove protective caps before connecting to the optic block.

Route the flexible conduit with the fiber optic cable inside it to the display unit.

1. Remove the conduit bushing from the display unit.

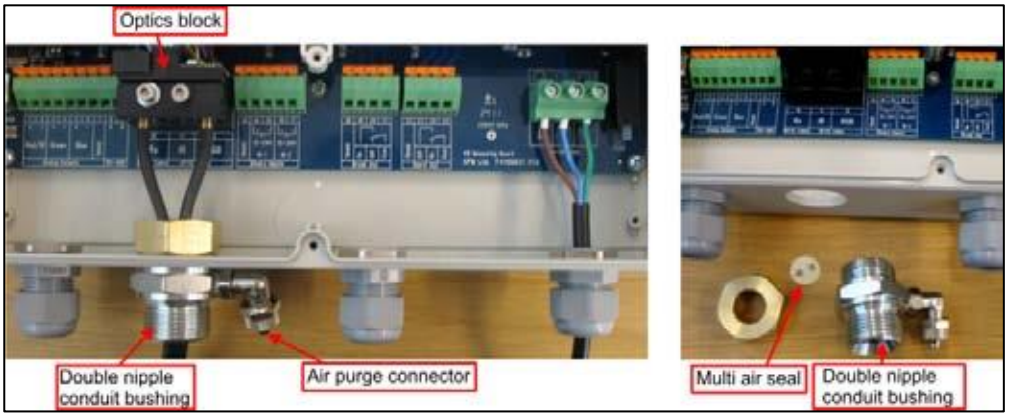



*Fig. 2.12. Removing the conduit bushing from the display unit.*

2. Guide the end of the fiber optic cable through the conduit bushing and fasten the bushing to the flexible conduit.
3. Place the multi air seal on top of the fiber optic cables, Fig. 2.13, points A & B.
4. Insert the multi air seal inside the conduit bushing, step C.

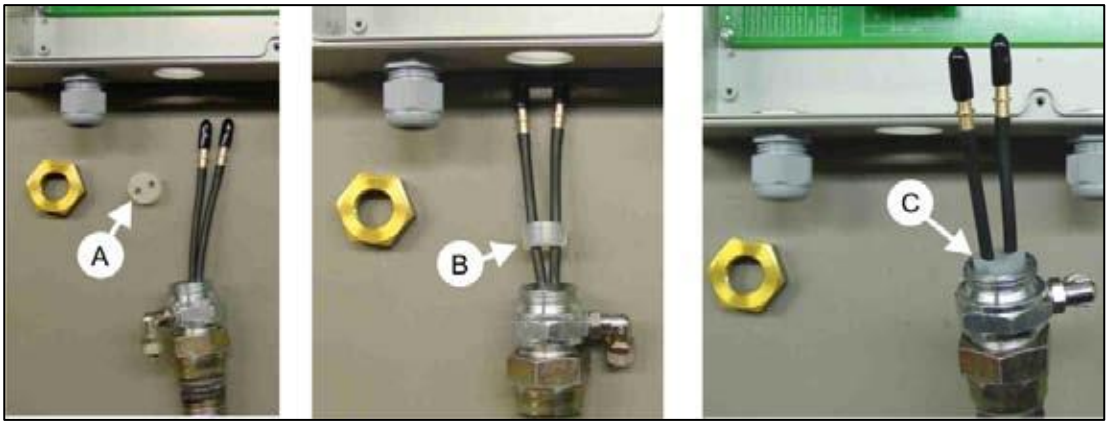



*Fig. 2.13. Multi air seal inserting.*

5. Open the optics block cover, slide the cables through the bushing hole, cap nut and tighten the bushing loosely, Fig. 2.14.
6. Insert one of the cables to the Rx slot and the other one to the RGB slot (or to IR slot if IR light is used). It does not matter which one of the cables is connected to the Rx slot.

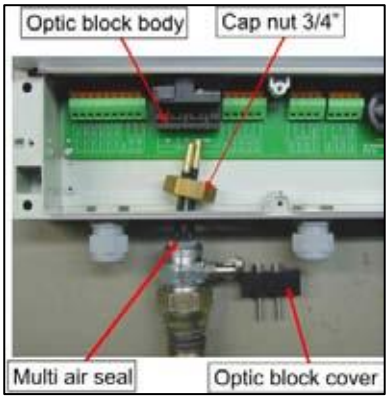



*Fig. 2.14. Connecting cables to optical unit.*

7. Lock the cables in place with the optic block cover, Fig. 2.15, points A & B.
8. Fasten the optic block cover and tighten the cap nut of the cable bushing, points B & C.
9. Connect the instrument air 0.5 - 3.0 bar (7 - 40 psi) to the air inlet connector (point C) at the end of the flexible conduit outside the display unit housing.

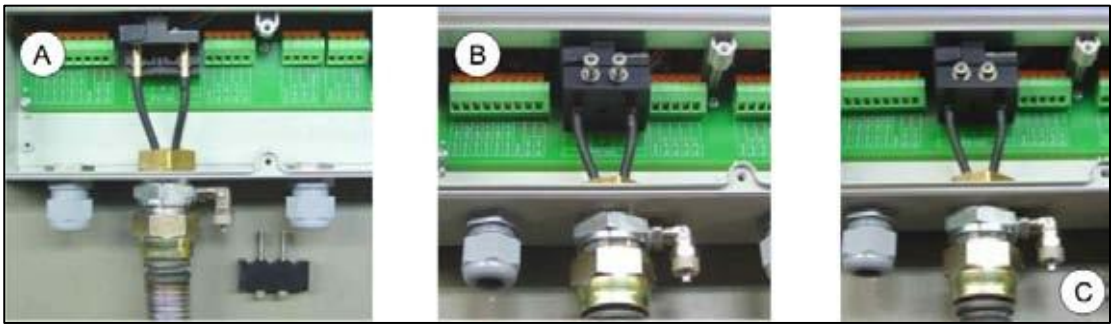



*Fig. 2.15. Connecting cables to optical unit.*

# 3 Wiring

## 3.1 Wiring and fiber optic cable connection

The terminals for the electrical and fiber optic cables are located under the bottom cover of the display unit.

### 3.1.1 KPM KB2 with 110 – 230 VAC + power supply

The layout of the KPM KB2 110 – 230 VAC measuring board is shown in Fig. 3.1.

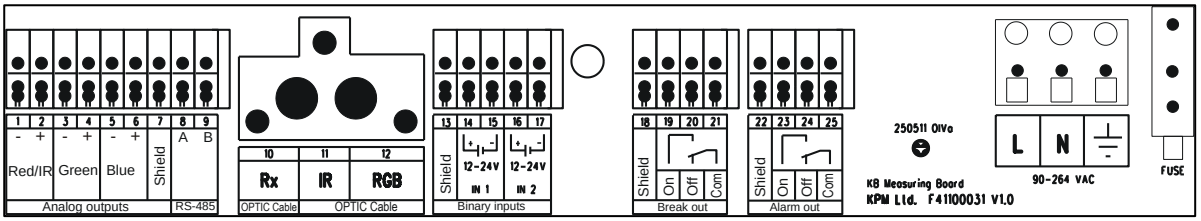



*Fig. 3.1. KPM KB2 110 – 230 VAC measuring board layout.*

Relays are of dry contact types. In normal operation the "Break Out On" relay is open and it closes during a break. In case the power is lost or turned off the "Break Out On" relay remains open (disabled). "Break Out Off" works in the opposite way.

”Alarm Out Off" is normally closed. It opens in case the built-in self-diagnostics detects a failure. If power is lost or turned off the "Alarm Out Off" is OPEN. "Alarm Out On" works in the opposite way.

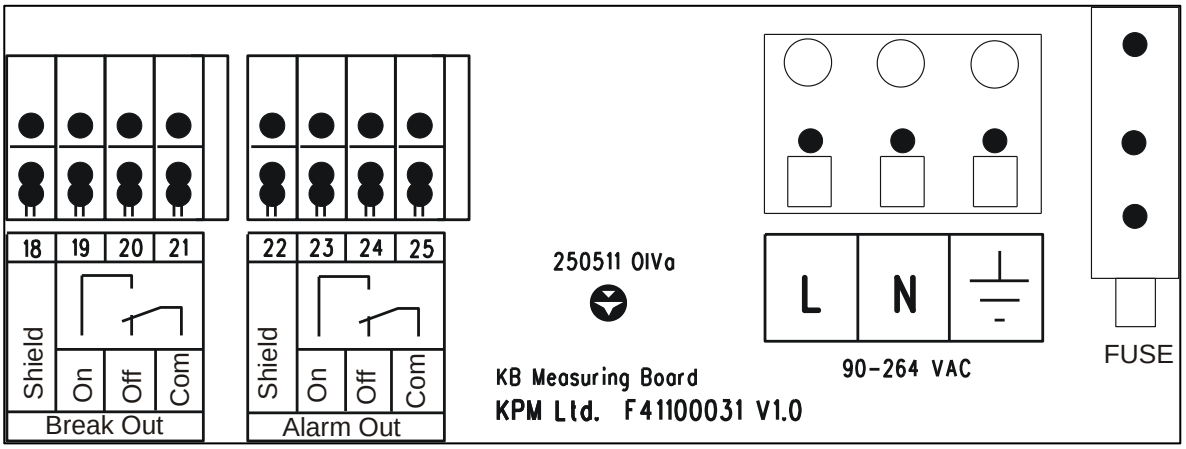



*Fig. 3.2. KPM KB2 110 – 230 VAC. Wiring of Power Supply, Break relay and Maintenance alarm.*

### 3.1.2 KPM KB2 with +24 VDC + power supply

Relays are of dry contact types. In normal operation the "Break Out On" relay is open and it closes during a break. In case the power is lost or turned off the "Break Out On" relay remains open (disabled). "Break Out Off" works in the opposite way. There is 2 parallel Break Relays, Break Out 1 and Break out 2 which are working simultaneously.

”Alarm Out Off" is normally closed. It opens in case the built-in self-diagnostics detects a failure. If power is lost or turned off the "Alarm Out Off" is OPEN. "Alarm Out On" works in the opposite way. There is 2 parallel Alarm Relays, Alarm Out 1 and Alarm out 2 which are working simultaneously.

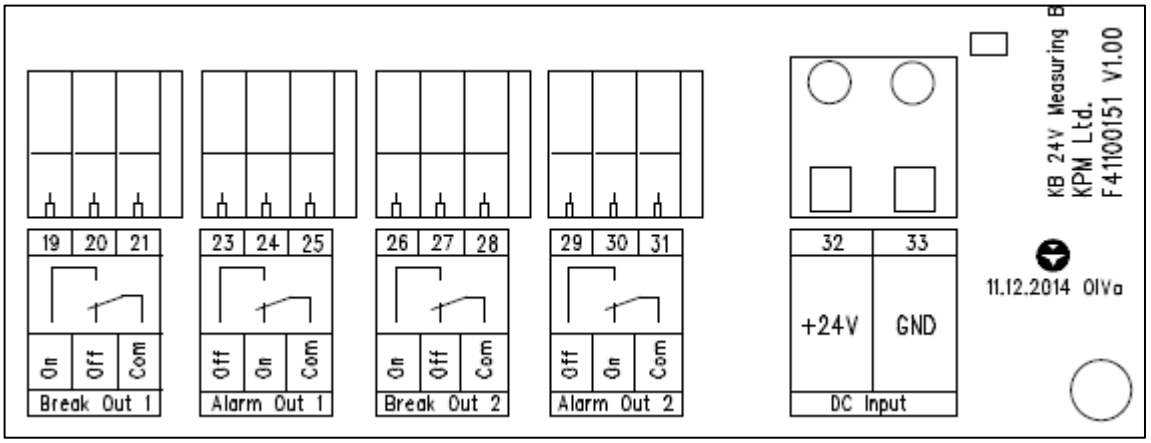



*Fig. 3.3. KPM KB2 +24 VDC. Wiring of Power Supply, Break relay and Maintenance alarm.*

Fiber optic cable is connected to the optics block. It does not matter which one of the two cables is connected to the receiver inlet (Rx). In a normal application another cable is connected to the RGB light source. IR light source is used in special cases such as heavy steam environment or in an application where exceptionally strong light is needed.

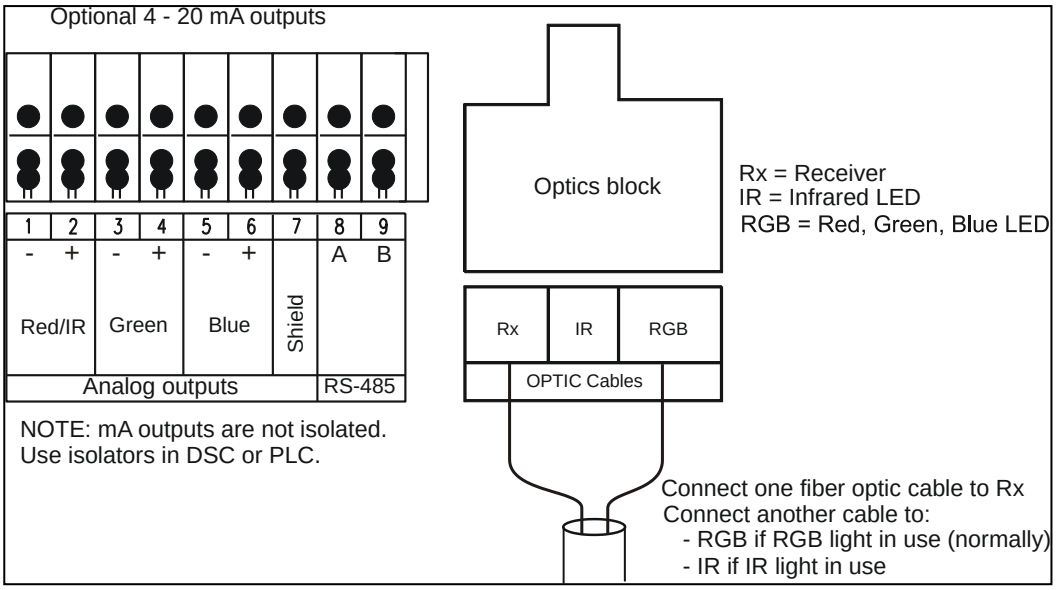



*Fig. 3.4. Fiber optic cable and optional 4-20 mA connections.*

- Analog outputs are active and KPM KB2 feeds 15 V to the current loop.
- Analog outputs are isolated, but not from each other, and they all use the same filtering time.

# 4 Operation and configuration

## 4.1 Display and operating keyboard

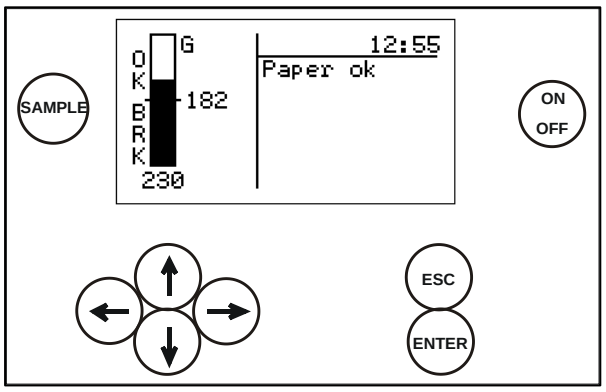



*Fig. 4.1. Display and keyboard.*

The display contains 7 lines, with 21 characters in a line. The main display (Fig. 4.1) shows:
- Selected measurement signal for break detection.
- Signal level of the selected signal.
- Time.
- Break status.
- Alarms, if activated.

Common properties in other menus:
- Selected line highlighted
- Upper right corner shows:
  - Number of lines/pages in that menu.
  - Arrow shows, if hidden lines.
- Help menus in bottom.

Keyboard
- **ON/OFF button:** Switch the mains on/off.
- **Arrows:** Scroll the menus and rows or adjust values.
- **Esc:** Delete changes and/or return back to the previous menu.
- **Enter:** Accept data and input changes.
- **Sample:** Averages the measured values. After sampling the program asks if the values will be stored for Break or Paper Reference values or deleted.

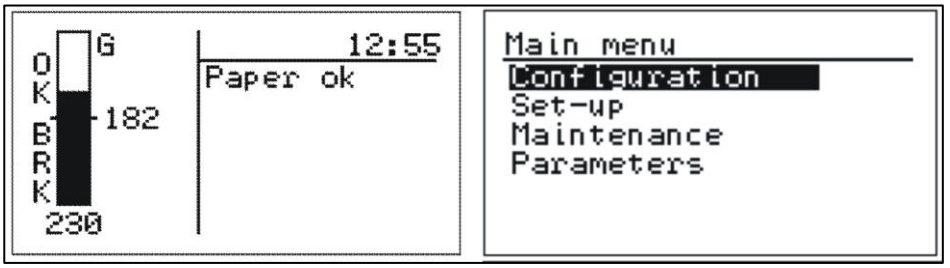
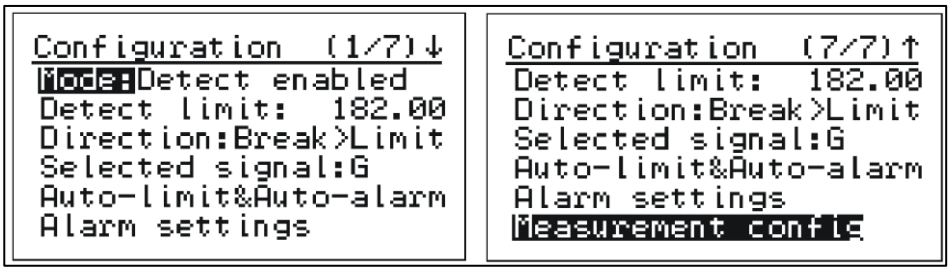


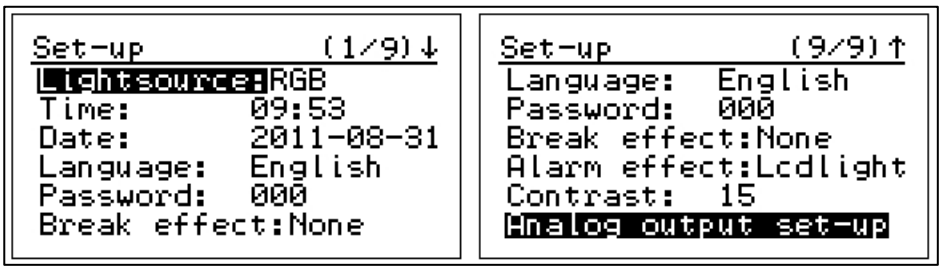

*Fig. 4.2. Main display and main menu.*

## 4.2 **Menu structure**

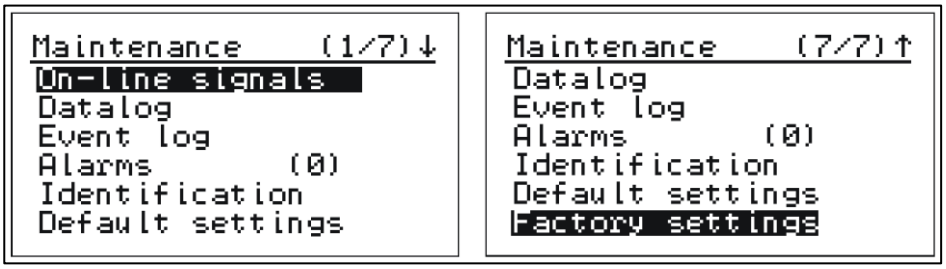

**Configuration**



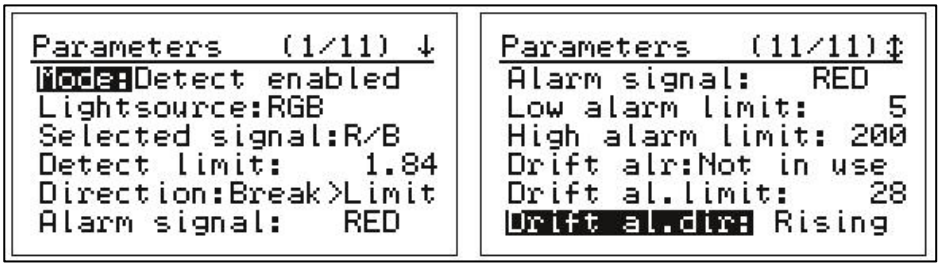

**Set-up**




**Maintenance**




**Parameters**



## 4.3 **Configuration**

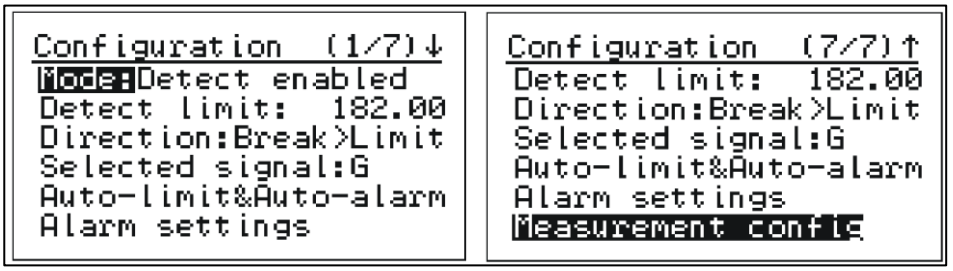



*Fig. 4.3. Configuration menu.*

**(Operating) Mode:** Select "Detect enabled" for normal operation. For maintenance select "Maintenance" - it disables the break relay to prevent false break during the maintenance work.

**Detect(ion) limit:** Set the signal level trigger point for the break.

**(Detect) Direction:** Select, when the break is activated, if the signal level goes under ("Break < Limit") or above ("Break > Limit") the detection limit.

**Selected signal:** One of the RGB-signals or combinations thereof can be selected for break detection. The one, which gives the highest difference between the web-on (PAPER) and the web-off (BREAK) situation is selected. In case IR light source is selected, then only IR is possible.

**Auto-limit and Auto-alarm:**

Auto-limit sets the signal type for break detection, detection level and direction, when performed. Auto-alarm sets the alarm signal and alarm limits, when performed.

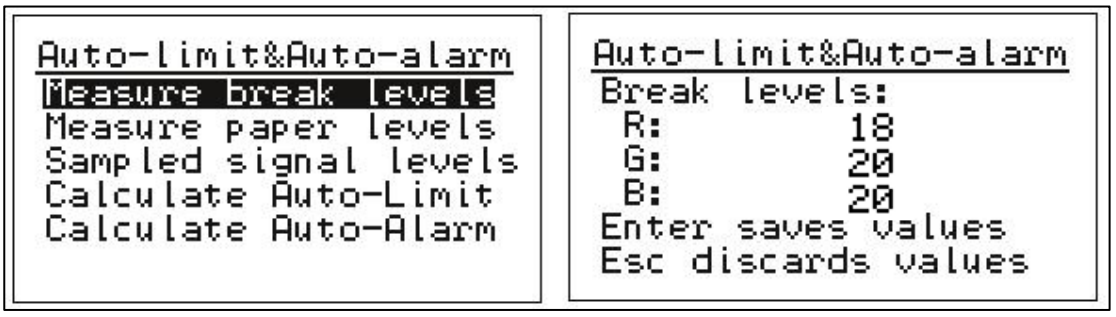



*Fig. 4.4. Setting reference values for break levels.*

KPM KB2 records all the signal levels in BREAK/PAPER situations and stores them as reference values.

- **Measure break (signal) levels:** Press right arrow. To store Break signal levels in KPM KB2 memory press "ENTER". "ESC" will escape without storing. Press "Sample" in front panel to average also signal levels and enter this display, where break and paper values can be stored.
- **Measure paper (ON signal) levels:** Press right arrow. To store Paper ON signal levels in KPM KB2 memory by press "ENTER". "ESC" will escape without storing. Press "Sample" in front panel to average also signal levels and enter this display, where break and paper values can be stored.
- **Sampled signal levels:** Displays both stored signal levels (PAPER and BREAK).

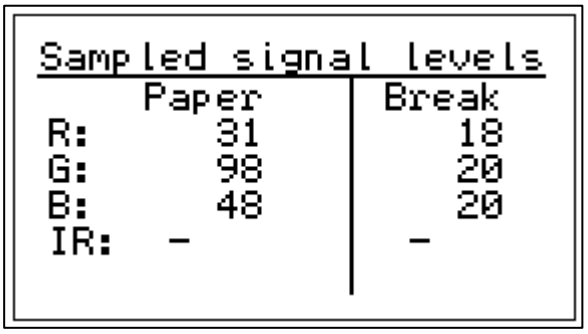



*Fig. 4.5. Sampled signal levels.*

– **Calculate Auto-limit:** KPM KB2 calculates the web-on to web-off ratio (Paper-to-Break Ratio) when both cases has been stored as references in memory.
KPM KB2 also suggests the best signal for break detection and puts them in a ranking list. Normally the best signal is chosen for break detection by having it in display and pressing right arrow and then "ENTER".
Then KPM KB2 sets the break trigger point ("Detection Limit") to 50 % of the difference between the web-on and the break-on levels for the selected signal. The unit sets also automatically the detection direction.

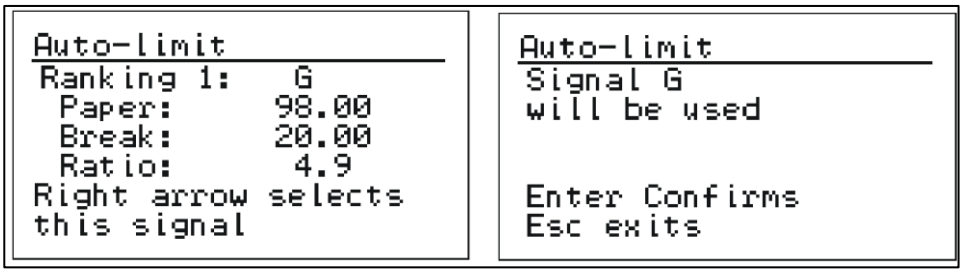



*Fig. 4.6 Calculating auto-limits.*

**Alarm settings:**

KPM KB2 can alarm in situations, where the signal level is very low (signal below Low alarm limit), very high (signal above High alarm limit) or when signal drifts a lot.
Drift alarm limit and Drift alarm direction (falling/rising) can be determined. Ambient light is normally always: In use.

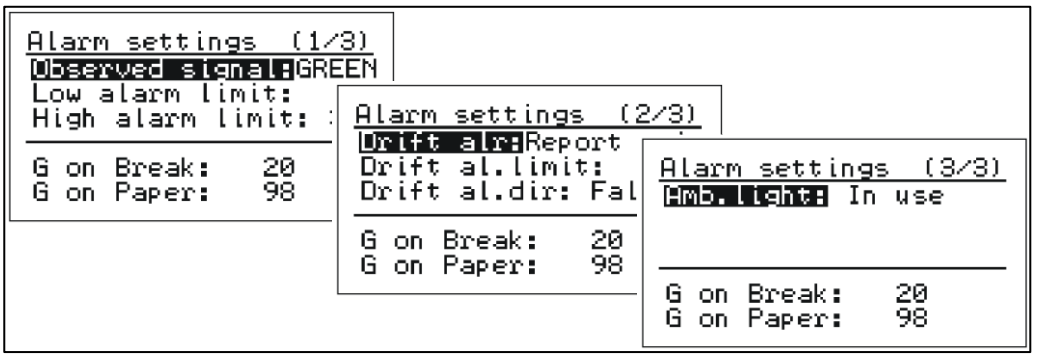



*Fig. 4.7. Alarm settings.*

- **Observed signal:** Select the R, G or B signal (IR in case of IR light source) which is used to monitor this alarm. Normally the same signal is chosen into alarm as in break detection. Only one main color can be chosen for alarming, no combination possible.

- **Low/High alarm limit:** If a piece of paper gets stuck on the sensor head, signal level can go very low or very high. The low and high alarm limits are set for this case.
  Alarm will go on, if the signal goes below low limit (default value 3) or over high limit (default value 1000). Normally default values are OK.

- **Drift Alr:** Drift alarm is used to give alarm in case measurement signal drifts. For example because of dust or dirt on top of fiber optic lens or in the opening (makes it smaller).
- There are three possibilities to use "Drift Alarm":
  - **Report only:** In case drift is detected; Alarm Relay is activated, break detection and Break Relay continue to operate normally.
  - **Not in use:** Drift detection is not used.
  - **Prev. break:** In case of drift is detected; Alarm Relay is activated, break detection and Break

  Relay is not used (purpose is that KPM KB2 will never give false Break output).
- R (G, B) Break on and R (G, B) Paper, in the bottom of display. These are stored signal values during Break and Paper. Auto limit calculation is using these values to perform detection limit and other values.
  These are only for indication in this menu to help select correct alarm limits.

**Special Alarm settings:**

Please consult ABB OY, KPM before using this.

KPM KB2 can detect break also in situations where ambient light level is very high.

This special application may be used for example in case, where KPM KB2 is installed very close to an IR-dryer, which causes too high ambient light (over 80 %). It is possible to eliminate too high ambient light giving alarm.

Instead of alarm, high ambient light can be selected to mean Paper or Break.

– First choose in Alarm settings Ambient light: Not in use, and then High ambient light: Paper or Break.

There is available an optional blue filter and shadow tube to prevent high ambient light alarm in IR-dryer installation.

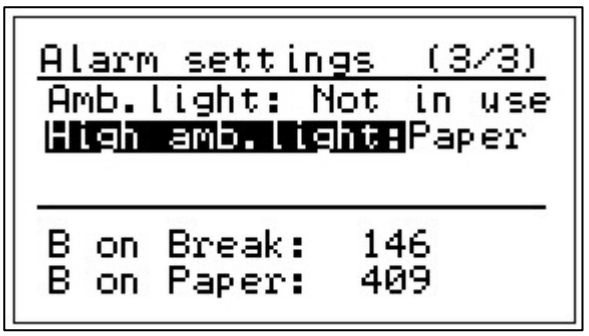



*Fig. 4.8. Special alarm menu.*

**Measurement config(uration):** This section determines detection speed (Detect filter), measurement intervall (cycle), light emission intensity and detector sensitivity.

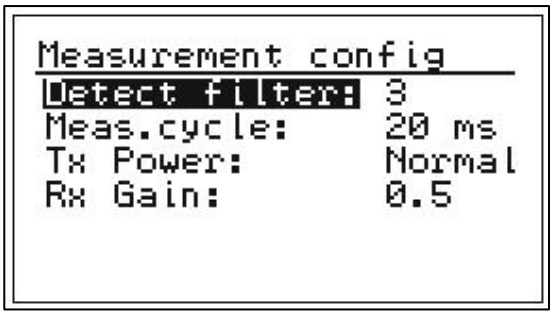



*Fig. 4.9. Measurement settings.*

– **Detect filter:** Set number of measurement cycles for break determination, default 3. Number 3 means that 3 consecutive measurements are all below detection limits before break relay is activated.
– **Meas. cycle:** Set the measurement cycle time, default 20 ms. Can be between 10 and 60 ms.
– **Tx Power:** Select light source intensity, High/Normal. High can be chosen when the measurement distance is high, for example over 20 cm.
– **Rx Gain:** Detector gain – normally 1 (selectable 4.0, 3.5, 3.0, 2.5, 2.0, 1.5, 1.0, 0.5). Effects directly on signal level. Can be adjusted lower if ambient light is too high (over 60 %).

## 4.4 **Set-up**

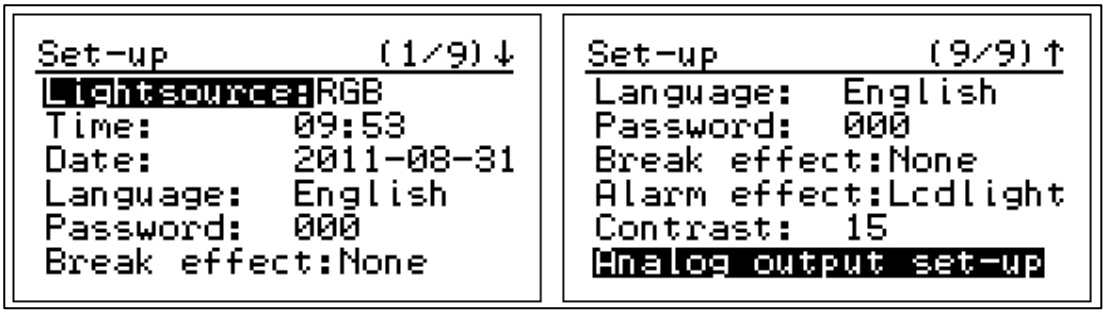



*Fig. 4.10. Setup displays.*

- **Light source:** RGB (visible Red, Green, Blue) light is recommended in a normal application. IR (Infrared) light is used in special cases, such as heavily steamy environment and/or long measurement distance from the web.
- **Time & date:** Set time and date for data logging.
- **Language:** Select English/Finnish.
- **Password:** Set password. 000 = no password.
- **Break effect:** Select None, Beep, Lcd+Beep, Lcdlight (= blinking display).
- **Alarm effect:**Select None, Beep, Lcd+Beep, Lcdlight (= blinking display).
- **Contrast:** Set the display contrast (1 - 10), default = 10.
- **Analog output setup:** Output and mA-values are shown only, if the analog output board is installed.

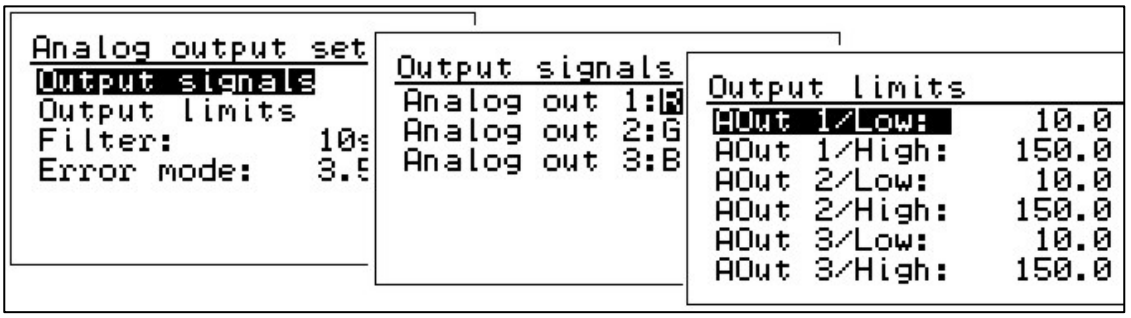



*Fig. 4.11. Analog output set-up.*

- **Analog output signals:** On optional analog board there are three 4 - 20 mA analog outputs. You can select any of the RGB signals and their combinations to each output. Menu is displayed only, if board is installed.
- **Analog output limits:** Set the signal levels corresponding 4 mA (LOW) and 20 mA (HIGH) for each analog output.
- **Analog output filter:** Select the dampening of the analog signals. The selected filtering time is applied to all the 3 outputs.
- **mA output error mode:** When the self-diagnostics finds a failure the unit sets the outputs to the selected mode. You can set the outputs to go to 22.5 or 3.5 mA, or to freeze to the last good number, or to continue to show the measured values although they may be wrong (mode No eff(ect)).

## 4.5 **Maintenance**

In "Maintenance" section you can find device identification, measured signal values, errors, data logging and event logging.

**On-line signals:**

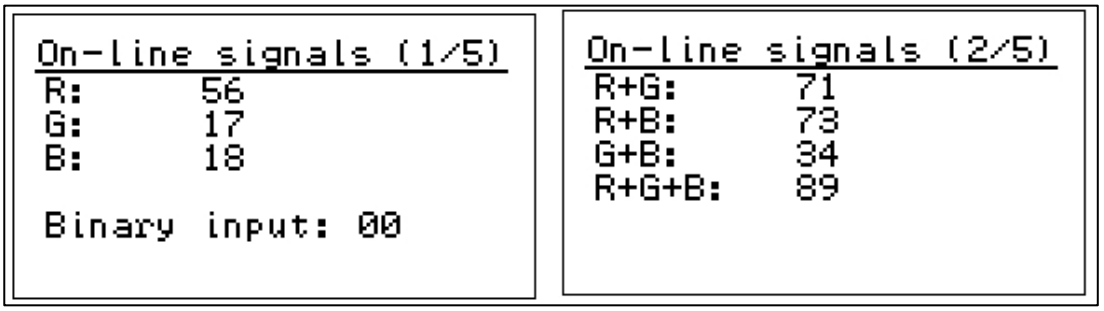



*Fig. 4.12. On-line signals, pages 1 and 2.*

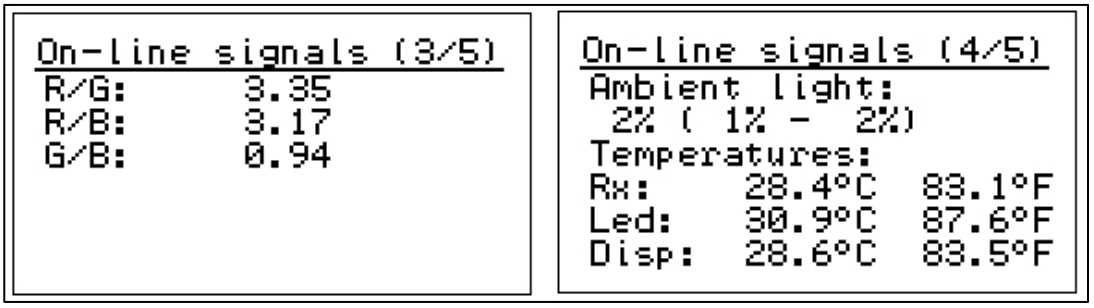



*Fig. 4.13. On-line signals, pages 3 and 4.*

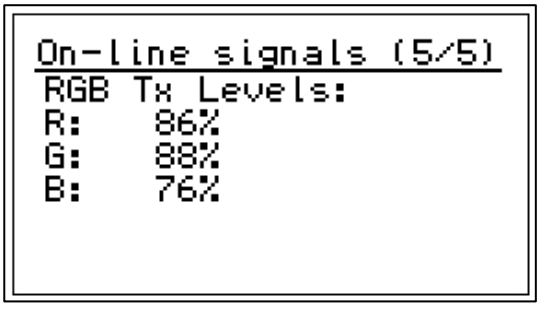



*Fig. 4.14. On-line signals, page 5.*

You can monitor measured and calculated signals for troubleshooting.

**NOTE**
"Ambient light" should be less than 60 %.

When "Ambient light" value is higher than 60 %, there is too much external light, which may disturb measurement. "Signal levels" and "Ambient light" values can be adjusted by parameters "TX Power" and "RX Gain", which are located in "Measurement Configuration" menu. Smaller "RX Gain" value will help in receiving less ambient light. Values in brackets ("Min% - Max%") indicate the occurred extremes in ambient light during one measurement cycle.

**Analog signals:** Contains measured values and mA output for each channel.

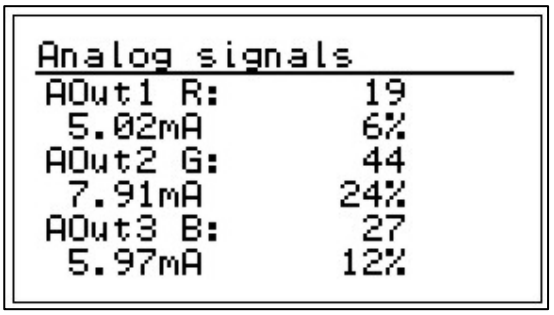



*Fig. 4.15. Analog signals.*

**Datalog:** Contains measured minimum and maximum signals and monitored internal temperature data since the last reset. **Please; reset during start-up**.

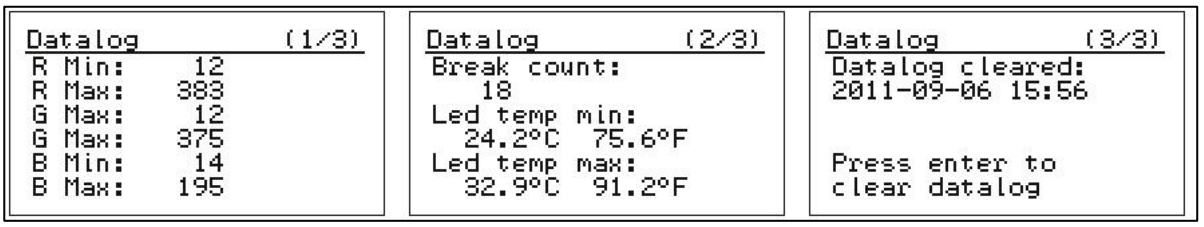



*Fig. 4.16. Datalog menus.*

**Event log:** Event log stores changes made after start setup. Also stores all boot-ups. Holds last 250 events.

Event log keeps track on breaks. When the break takes place, date and time information appears in the main page. There is 5 minutes delay until a new break can be recoded.

Press "ENTER" for more information of the break. "+" indicates time when the break took place, and "-" when paper is back again. The quantity of breaks recoded during the total length of break (inside 5 minutes) is shown in parenthesis.

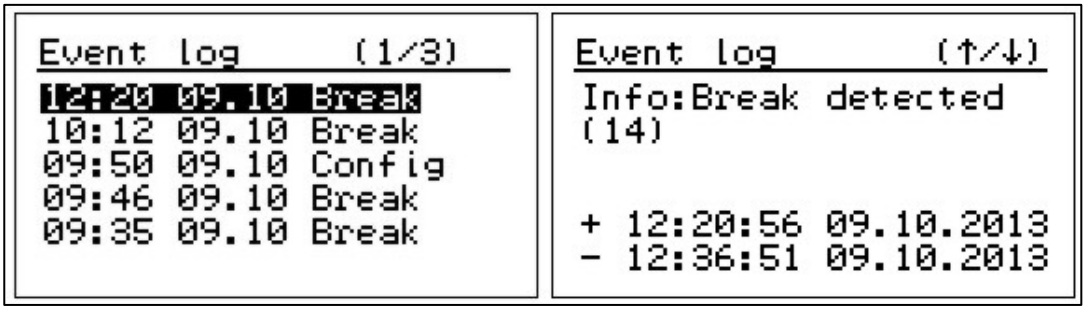



*Fig. 4.17. Event log.*

**Check alarms:** List of maintenance alarms, which are active at the moment. The number of alarms is shown in the brackets. This menu is used for troubleshooting and may contain a help menu how to fix problem. Plus indicates time when alarm has occurred.

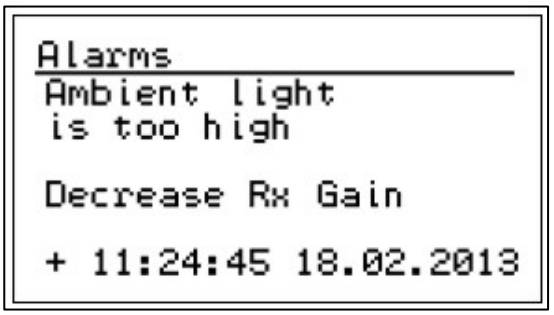



*Fig. 4.18. Alarms.*

**Identification:** Contains ID and version information.

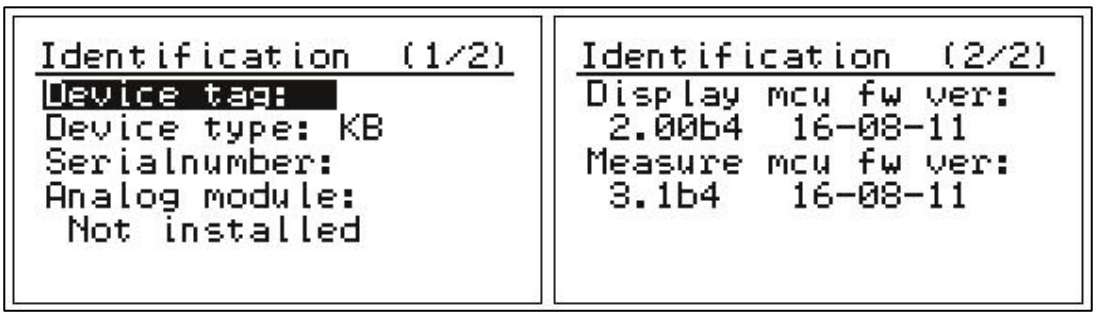



*Fig. 4.19. Identification menus.*

**Default settings:** Reset to configuration settings. Used e.g. if the settings are changed by accident.

**Factory Settings**

**NOTE**
Requires always password (633 or 601).

Factory setting values are set during the initial setting and there is no need for customer to change them. Please contact ABB OY, KPM for more information.

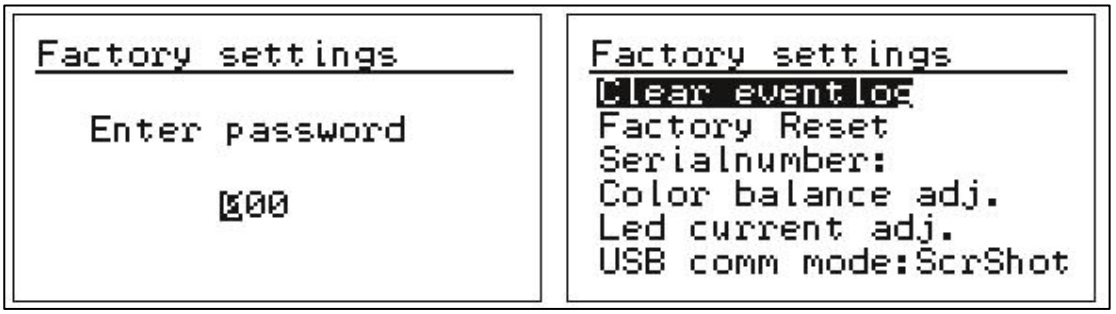



*Fig. 4.20. Factory settings.*

**Clear event log:** Clears the event log.

**Factory reset:** Reset to factory settings.

**Serial number:** Set serial number.

**Color balance adj(ustment):** Individual gain adjustment of R, G, B, and IR lights.

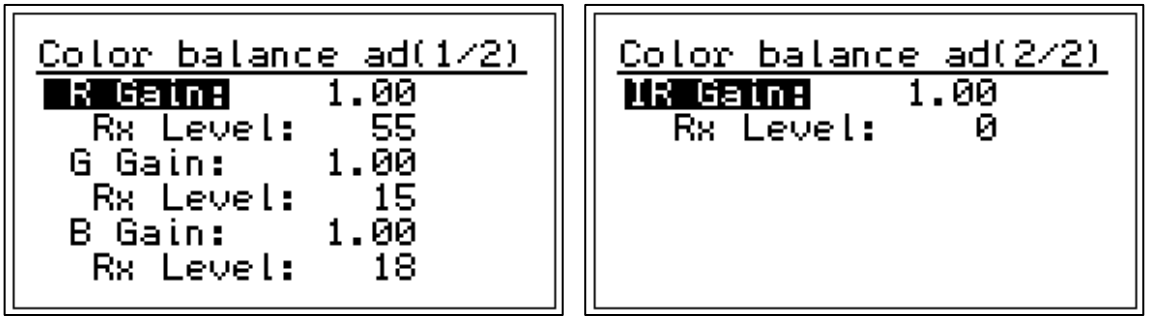



*Fig. 4.21. Color balance adjustment.*

**Led current adj(ustment):**

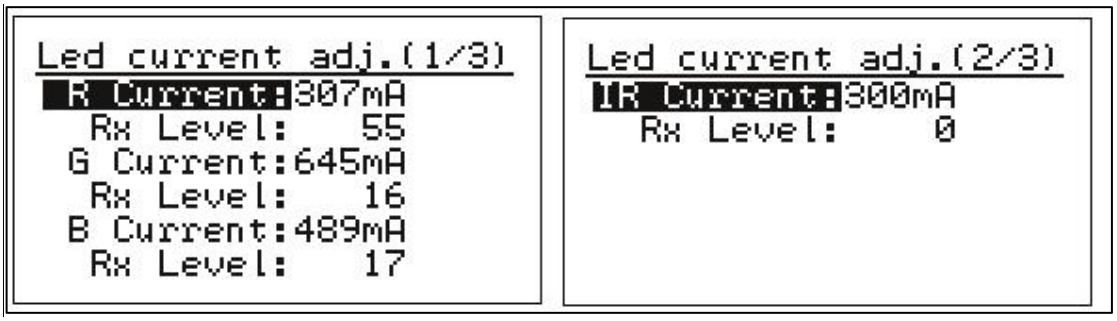



*Fig. 4.22. LED current adjustment, pages 1 and 2.*

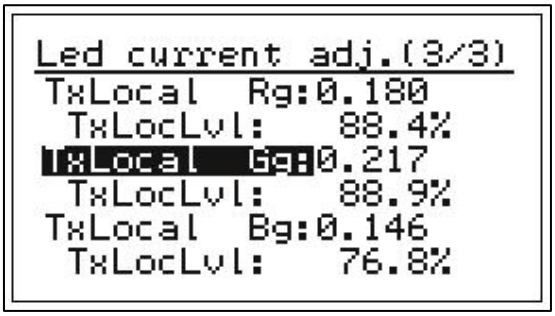



*Fig. 4.23. Tx local values, indicate LED light intensity level.*

**USB comm(unication) mode:** Select communication port mode: ScrShot/Normal.

**Analog output trim:** KPM KB2 sends in the edit mode 4 and 20 mA in turn to the selected analog output. With S (gain) and Z (zero offset) the output can be trimmed to correspond 20 mA (gain) and 4 mA (zero).

## 4.6 Parameters

The "Parameters" display contains normally needed parameters, and they can be modified in this display.

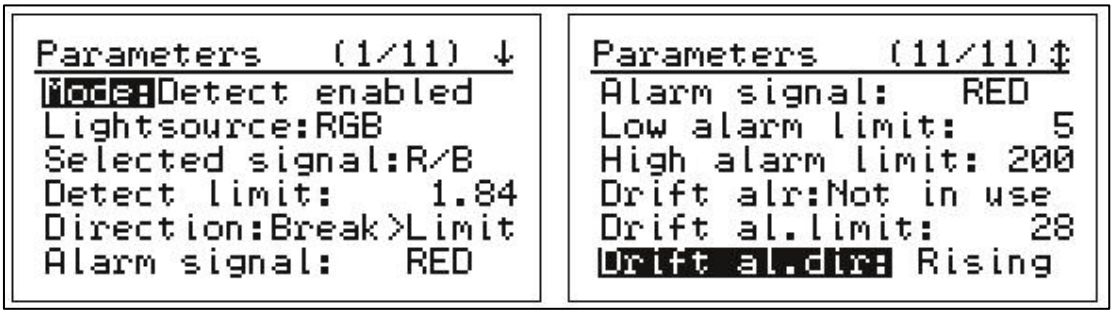



*Fig. 4.24. Parameters display.*

# 5 Start-up

## 5.1 Tuning sensor position

Purpose of tuning is to direct light beam so that reflectance from paper is strongest.

To observe the signal levels:

1. Go to "Maintenance" -› "On-line signals".
2. Locate large piece of paper on the estimated place of measured sheet to simulate paper on situation to find the maximum signal level. Paper distance has effect on the signal level.
3. Rotate the sensor head until the signal levels indicated in the display unit are at their strongest (normally from 50 – 500 with paper). This is usually the perpendicular position against the web.
4. Check the ambient light percentage ("Maintenance" -› "On-line signals"). This should be below 60 % level. If the ambient light is too high, reduce the receiver sensitivity Rx Gain.
5. Fasten the position memory ring.

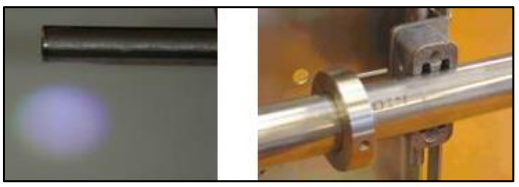


*Fig. 5.1. Sensor head light and position memory ring adjustment.*

## 5.2 Reference values for Paper and Break

1. Teach the unit to recognize the Break-ON conditions.
   Press "SAMPLE". After a short time measured values are displayed. Save those numbers as reference values for break “Save as break level”.
2. Teach the unit to recognize the Paper-ON conditions. While Paper is on, press "SAMPLE". After a short time measured values are displayed. Save those numbers as reference value for paper “Save as Paper level”.

## 5.3 Auto Limit = Configuring KPM KB2 for break detection

Auto-limit Calculation can be performed when above mentioned both reference values have been stored in KPM KB2 memory. This procedure calculates detection limit for break detection.

1. Go to "Configuration" -› "Auto-limit&Auto-alarm" -› "Calculate Auto-Limit". KPM KB2 has calculated from the Paper ON / Break ON signals "Ratio" (Paper to Break) for all the light components plus 7 calculated combinations thereof. The highest rated signal normally gives the best performance.
2. Select the 1st displayed signal for break detection with arrow right and "ENTER". KPM KB2 sets the break trigger level (Detection limit) to the mid-point (50 % value) between the "Break"-on/"Paper"- on levels of the selected signal. KPM KB2 selects the detection "Direction".
3. Set "Configuration" -› (operating) "Mode: Detect enabled" to activate the break measurement. In the "Maintenance" mode the break relay is deactivated to prevent false alarms while working on the unit.

## 5.4 Auto Alarm

1. Go to "Configuration" -› "Auto-limit&Auto-alarm" -› "Calculate Auto-Alarm".
2. Choose a signal for alarming purposes. Only one base color R, G, B or IR (no combination) can be chosen. Normally, the same signal should be taken for alarming than for the break detection.

3. Pressing the right arrow key calculates proper alarm limits. Low limit is normally between 3 and 10 and high limit around 400 - 1000. They can be changed also manually. Drift alarm is calculated to be 70 % value between paper and break.

## 5.5 Examples

**Open draw**

**Auto-limit&Auto-alarm values:**

Break: R: 6, G: 7, B: 8

Paper on: R: 104, G: 121, B: 144

**Auto-limit calculation results:** 1. B (blue light gives the highest difference), 144/8=18 (paper-to- break "Ratio" = Normal to Break Ratio), 8 (blue level on "Break"), 144 (blue level on "Paper").

KPM KB2 selects blue light for break detection and sets "Detect(ion) limit" to 76 =((144+8)/2)

KPM KB2 sets detect "Direction" to "Break < Limit" = break relay activates as soon as B-signal drops below 76.

**Alarm settings:**

- **Observed signal:** Select signal which is used for break detection (B in this case).
- **Low alarm Limit:** Set for example 3.
- **High alarm Limit:** Set for example 1000.
- **Drift Alarm:** Select required action of "Drift Alr", recommended "Report Only".
- **Drift al(arm) limit:** 103 (= 0.70*(144-8)+ 8) = 70 % of range between paper on and break.
- **Drift al(arm) dir(ection):** Falling signal (Break < Limit).

**Paper on red wire**

**Auto-limit&Auto-alarm values:**

Break: R: 85, G: 24, B: 26

Paper on wire: R: 94, G: 125, B: 119

**Auto-limit calculation results:** 1. G (green light gives the highest difference), 125/24=5.2 (paper-to-break "Ratio"), 24 (green level on "Break"), 125 (green level on "Paper").

KPM KB2 selects green light for break detection and sets the trigger point to 74 (= (125+24) /2).

**Alarm settings:**

Same way as above in chapter "Open draw".

- **Observed signal:** Select signal which is used for break detection (G in this case).
- **Low alarm Limit:** Set for example 3.
- **High alarm Limit:** Set for example 1000.
- **Drift Alarm:** Select required action of "Drift Alr", recommended "Report Only".
- **Drift al(arm) limit:** 94 (= 0.70*(125-24)+24) = 70 % of range between paper on and break.
- **Drift al(arm) dir(ection):** Falling signal (Break < Limit).

# 6 Maintenance

## 6.1 Regular maintenance

KPM KB2 does not require any regular maintenance. Built-in self-diagnostics monitors internal signals and raises alarm flag in case of a malfunction or certain signals reach alarm limits.

## 6.2 Alarms

| Alarm name | Possible cause | Action |
|---|---|---|
| Check cleaning | Sensor eyelet holes blocked.<br><br>Fiber optic cable in the sensor getting dirty.<br><br>A LED of the RGB light source has failed or loses the intensity. | Check that the sensor head is free of debris.<br><br>Check that the purge air is on and flow s out from the sensor eyelet holes (pressure 0.5 - 3 bar).<br><br>Clean the ends of the fiber optic cables using e.g. cotton stick wetted with alcohol containing cleaning agent.<br><br>Check the signal levels of all light components. If the one which is used f or break detection show s low intensity select another signal (Configuration -> auto limit calculation -> signal selection). |
| Ambient light too high (on-line signals, ambient light 60%) | Sensor head too close to the web surface.<br><br>A shiny surf ace close to the sensor head.<br><br>A strong light beam from a nearby lamp aimed at the sensor head.<br><br>Reflection from the web surf ace still too high. | Move the sensor further away from the web or redirect the sensor eyelet holes slightly slantwise at the surface.<br><br>Redirect the sensor to avoid the disturbing reflection.<br><br>Move the disturbing light or redirect the sensor away from the light.<br><br>Reduce the Rx (light receiver) gain in the "Measurement config" menu (Available gains 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0). |
| Optic data timeout | Communication between the display and connection board has jammed.<br><br>The flat cable connector in the connection board is loose.<br><br>Measuring Board failure. | Turn off the power and restart the unit.<br><br>Check that the flat cable connector is tight.<br><br>Replace the measuring board. |
| Signal out of range, clean meas. probe | Piece of paper on the sensor head. | Check the sensor head. |

The R, G or B signal (or IR if in use) is used to monitor the light intensity drift. Gradual drift can be caused e.g. by dust, which is slowly building up on the fiber optics or by dirty water, which gets inside the sensor head and stains the surface of the fiber optics.

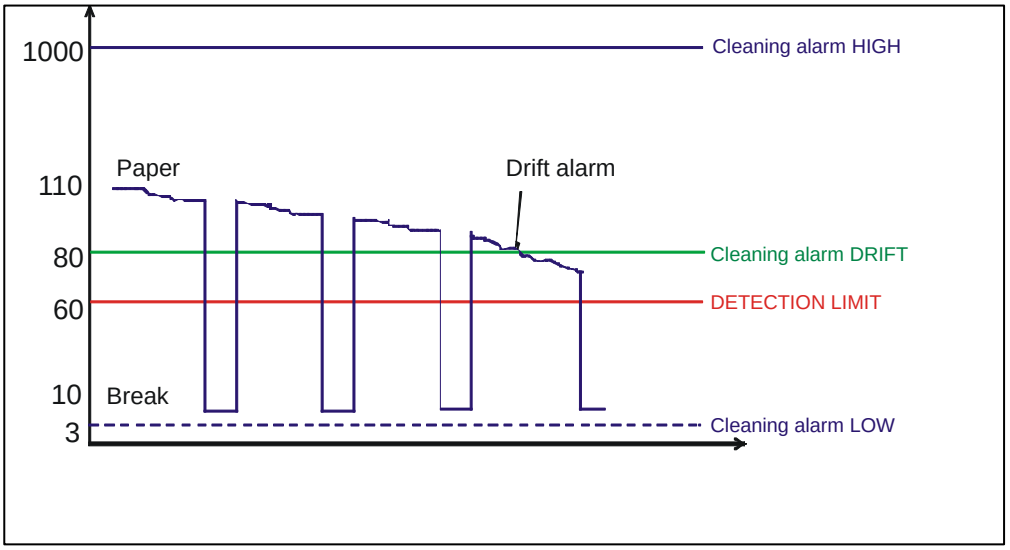



*Fig. 6.1. Example of alarm limits and break detection.*

KPM KB2 alarms if signal goes

above "Cleaning alarm HIGH" = 1000

or

below "Cleaning alarm LOW" = 3

"Drift Alarm" goes on when signal level drops below "Cleaning alarm DRIFT" (here limit = 80 which is 70 % from break (10) to Paper (110). "Detection limit" is set to 60 (50 % value between paper and break). KPM KB2 informs break whenever signal drops below 60.

## 6.3 Cleaning the sensor

Fiber optic lenses should be clean all the time. Cleaning should primarily to be done through the fiber optics opening in the sensor head. Cotton stick is the preferred means.

In case cleaning requires disassembly of the sensor head, remove sensor head and conduit from installation and place them on the floor.

1. Release the fiber optic cable from the display unit and remove also the conduit bushing in order to get the cable to slide inside the conduit. Fiber optic may be stuck on conduit.
2. Remove the end plate from the sensor head by removing the two fastening screws.
3. Remove the locking ring.
4. Pull the fiber optic cable through the optical sensor housing.
5. Wipe the lenses clean with soft fabrics or paper and reinstall.
6. Eyes must be centered over the holes in the pipe.

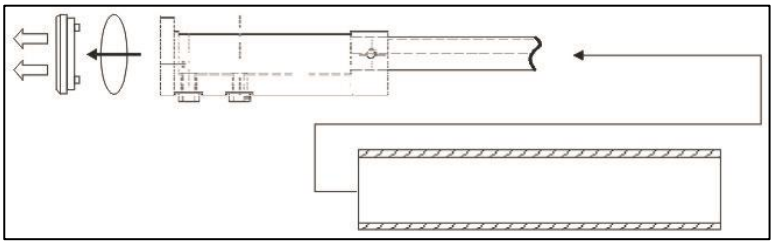


*Fig. 6.2. Dismantling the sensor housing.*

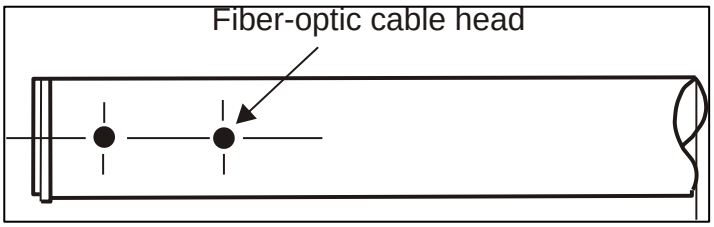



*Fig. 6.3. Fiber optic cable head.*

# Appendix 1: Quick start-up guide

This quick guide leads the way to install start-up and configure parameters in the normal cases.

**1. Preparing installation**

☐ Install fiber optic cable inside conduit. This is easier done when temperature is cool and conduit is straight on the floor. In new devices this cable is installed.

**NOTE**
DO NOT PULL FIBER OPTIC CABLE STRONGLY. It may break or cut or connector may get loose.

☐ Connect conduit to sensor head tube.
☐ Install sensor head mounting rack or mounting clamps.

**2. Sensor unit installation**

☐ Check that dry clean purge air is connected (pressure between 0.5 - 3.0 bar / 7-40 psi).
☐ Check that the eyelet holes are aimed at the web.
☐ Check that the sensor distance from the web is 10 – 30 cm (4 - 12").
☐ Check that the measurement point distance to paper edge is about 30 cm (12").
☐ Fix position preliminary. Tuning may change this slightly.

**3. Display unit installation**

☐ Check that fiber optic conduit bushing is tight.
☐ Check that fiber optic cable is connected to the optics block:
  – Other optic cable to RX.
  – Another cable to RGB or IR.
☐ Check the wiring of the power supply.
☐ Check the wiring of alarm signal.

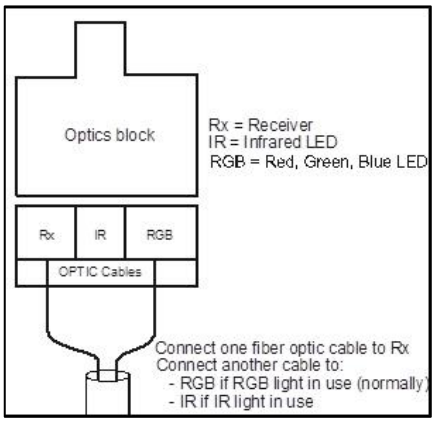



*Fig. 1.1. Fiber optic cable connection.*

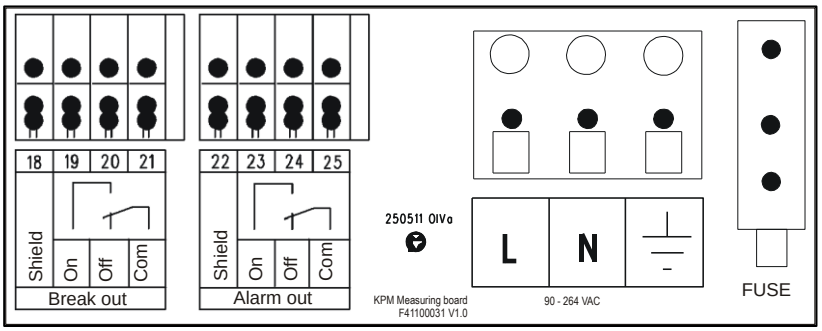



*Fig. 1.2. Wiring diagram for 110 – 230 VAC.*

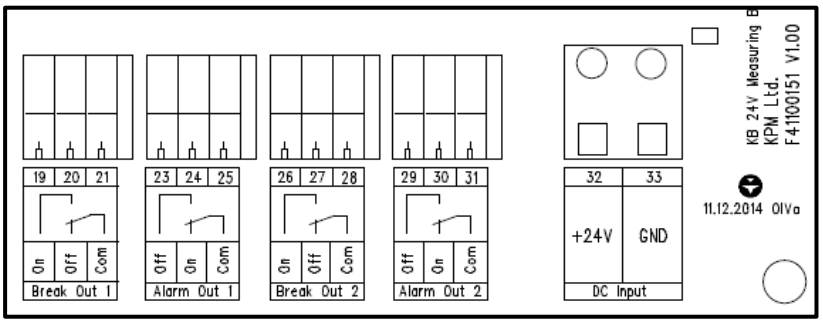



*Fig. 1.3. Wiring diagram for +24 VDC.*

**4. Start-up and tuning**

Preliminary tuning can be done during installation at the actual place by simulating paper on situation with dry paper on front of sensor head. Final tuning should be always done with real paper running situation.

- ☐ Set unit to "Mode: Maintenance" in the "Configuration" menu.
- ☐ Turn on the power.
- ☐ Select from the "Maintenance" menu "On-line signals".
- ☐ Turn the sensor head light beam so that signal levels are on their maximum values (normally 100 - 700) when simulating paper in front of sensor. Paper sheet should be close its correct position. Signal level can be adjusted with "TX Power" and "RX gain" in the "Measurement config" menu. Ambient light should be < 60 %.
- ☐ Simulate break: Press "SAMPLE". Store signals as "Break level".
- ☐ Simulate paper: When the paper is front of the sensor close to its normal position, press "SAMPLE". Store signals as "Paper level".
- ☐ Perform "Calculate Auto-limit" to find the best break detection signal.
- ☐ Select the signal suggested by KPM KB2 pressing right arrow and "ENTER".
- ☐ Select "Auto-alarm" to set the alarm signal Low/High limits. Drift alarm action, alarm limit and direction should be set as well.
- ☐ Activate the break relay by selecting operating mode ("Configuration" -› "Mode"): "Detect enabled".
- ☐ Check that the position memory ring is locked.

**5. Final tuning**

Final tuning should be always done with real paper running situation and real break situation.

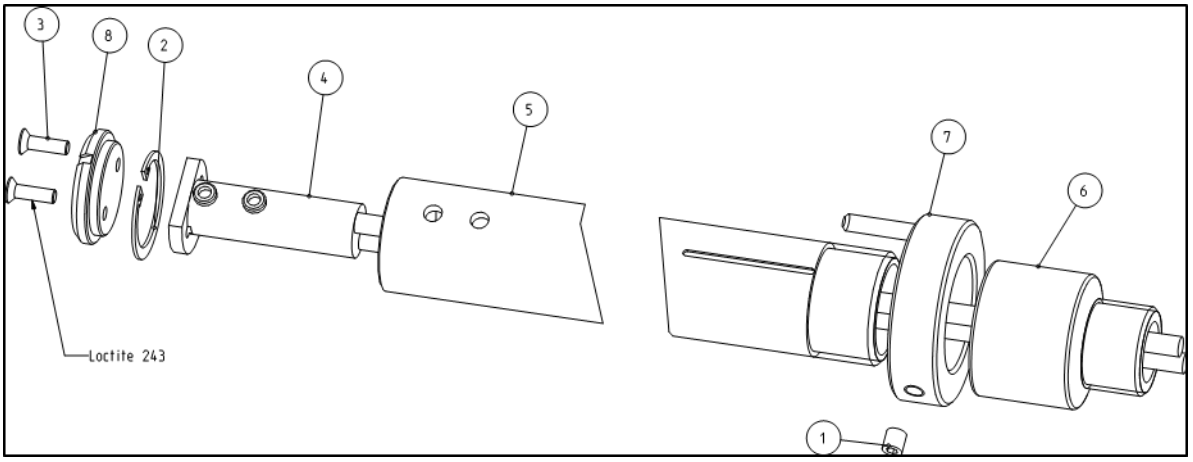
This time paper distance to the detector is stable and temperature as normal running temperature.

- ☐ Select "Configuration" -› "Mode" -› "Maintenance" (break relay deactivated).
- ☐ While the machine is running without paper press "SAMPLE" and store signals as "Break level". This can be done when the paper machine is warm and before paper sheet is on.
- ☐ When the web (paper) is on press "SAMPLE" and store signals as "Paper level".
- ☐ Perform "Calculate Auto-Limit" to find the best break detection signal.
- ☐ Select the signal suggested by KPM KB2 by pressing right arrow and "ENTER".
- ☐ Activate the break alarm relay by selecting operating mode ("Configuration" -› "Mode"): "Detect enabled".

# Appendix 2: Spare parts

**KPM KB2 Sensor Head Assembly**

| | | |
|---|---|---|
| 1. | 2000018 | Set screw |
| 2. | 2000033 | Lock ring |
| 3. | 2000205 | Screw M 4x14 |
| 4. | Fiber optic cable | |
| | 315001 | Fiber optic cable 6 m |
| | 315002 | Fiber optic cable 9 m |
| | 315003 | Fiber optic cable 12 m |
| 5. | H31100059V1.0 | KB Front Sensor head tube with eyelets |
| | H31100060V1.0 | KB Back Sensor head tube |
| 6. | H41100103V1.0 | Tube adapter |
| 7. | H41110025V1.0 | Set collar |
| 8. | H41110043V1.0 | End cap |

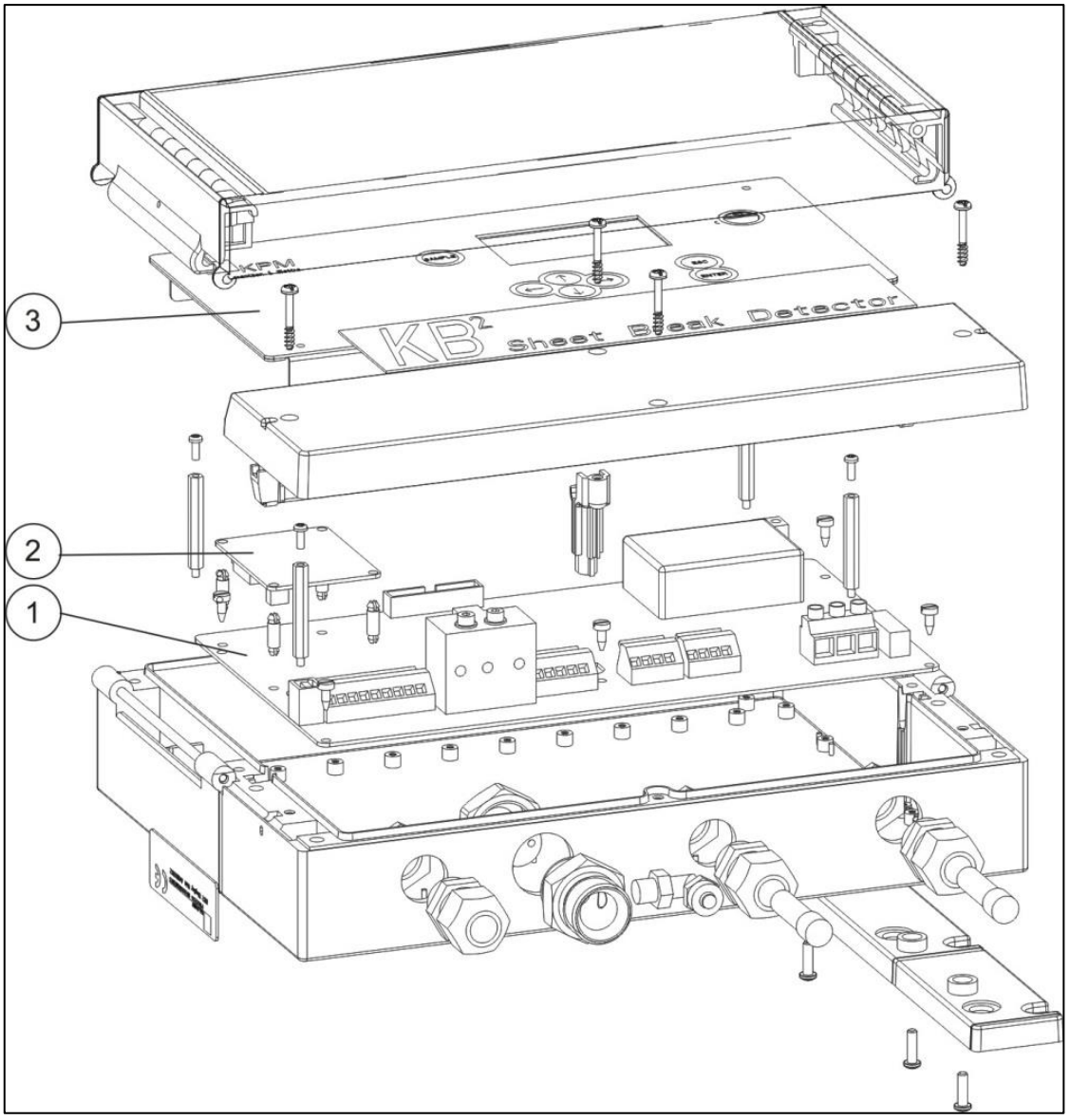



| | |
|---|---|
| 2350011 | KB/6 Conduit, L=4370 |
| 2350012 | KB/9 Conduit, L=7370 |
| 2350013 | KB/12 Conduit, L=10370 |
| A41100096V1.0 | KB Sensor Head Assembly 6 m |
| A41100097V1.0 | KB Sensor Head Assembly 9 m |
| A41100098V1.0 | KB Sensor Head Assembly 12 m |
| A41100095V1.0 | KB Mounting Assembly |
| A41100094V1.0 | KB Mounting Rack |
| A41100058V1.0 | KB Mounting Adapter PosiEye |

**KPM KB2 Display unit**

| | |
|---|---|
| 1. A41100152V1.0 | KB² Measuring board 24 VDC |
| A41100032V1.0 | KB² Measuring board 110 – 230 VAC |
| 2. A41100021V1.1 | KB Analog board |
| 3. E31140033V1.0 | KB Display plate assembly |
| 300002 | Graphic display board |
| A41100027V1.0 | Keyboard KB-KC7 |

| | |
|---|---|
| A41100102V1.0 | KB² Display Unit 90 – 264 VAC |
| A41100200V1.0 | KB² Display Unit 24 VDC |



# Appendix 3: KPM KB2 model selection

| SHEET BREAK DETECTORS | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Type** | **Order Code** | | | | | | **Description** |
| **K B 6** | | | | | | | **KB/6 Sheet Break Detector, 6 meters (20ft) Fiber Optic Cable, 1,5m Sensor Head rod**<br>**KB2 Display Unit, 85...264VAC, 2 x RELAY outputs included** |
| **K B 6P** | | | | | | | **KB/6 Sheet Break Detector, 6 meters (20ft) Fiber Optic Cable, 1,5m Sensor Head rod**<br>**KB2 Display Unit, 24VDC, 4 x RELAY outputs included** |
| **K B 9** | | | | | | | **KB/9 Sheet Break Detector, 9 meters (30ft) Fiber Optic Cable, 1,5m Sensor Head rod**<br>**KB2 Display Unit, 85...264VAC, 2 x RELAY outputs included** |
| **K B 9P** | | | | | | | **KB/9 Sheet Break Detector, 9 meters (30ft) Fiber Optic Cable, 1,5m Sensor Head rod**<br>**KB2 Display Unit, 24VDC, 4 x RELAY outputs included** |
| **K B 12** | | | | | | | **KB/12 Sheet Break Detector, 12 meters (40ft) Fiber Optic Cable, 1,5m Sensor Head rod**<br>**KB2 Display Unit, 85...264VAC, 2 x RELAY outputs included** |
| **K B 12P** | | | | | | | **KB/12 Sheet Break Detector, 12 meters (40ft) Fiber Optic Cable, 1,5m Sensor Head rod**<br>**KB2 Display Unit, 24VDC, 4 x RELAY outputs included** |
| | **N C** | | | | | | **Flexible Conduit for Fiber optic cable**<br>No Conduit<br>Full Flexible SS316 Conduit 25mm (1") with Connectors |
| | | **N R P W** | | | | | **Mounting Rack**<br>No adjustable mounting rack, only mounting clamps<br>Adjustable Mounting Rack<br>PosiEye Adaptor with standard 1,5m rod<br>Posi Eye Adaptor, short rod with screw mount to posi Eye tube. |
| | | | **N A** | | | | **Analog output**<br>No Analog outputs for DCS trending ( Analog outputs not needed for break alarm)<br>3x 4-20 mA outputs for DCS trending |
| | | | | **N C** | | | **KB-Connection PC Program**<br>No KB-Connection PC Program<br>KB-Connection PC Program on CD disk |
| | | | | | **N R** | | **RS485 / USB Converter for PC program**<br>No RS485 / USB Converter for PC program<br>RS485 / USB Converter for PC program, Rack mounting |
| | | | | | | **T** | High temperature fiber optics cable max. 220C |

# Appendix 4: Technical specifications

| | |
|---|---|
| **Ambient temperature** | Sensor head and fiber optic cable: -10 to 180 ºC (15 ºF to 356 ºF)<br>Electronics unit: -10 to 60 ºC (15 ºF to 140 ºF) |
| **Fiber optic cable** | KPM KB2-6: 6 m (20'), KPM KB2-9: 9 m (30') or KPM KB2-12: 12m (40') |
| **Fiber optic cable conduit** | Airtight conduit 25,4 mm (1") OD, AISI 316 (L6= 4370, L9=7370, L12=10370) |
| **Installation** | Sensor distance from the web 5...30 cm (2...12"). |
| **LED pulse frequency** | 1 kHz |
| **Power supply** | 90 - 264 VAC, 50/60 Hz or +24 VDC |
| **Power consumption** | 15 W |
| **Enclosure class** | IP 66 (Nema 4X) |
| **Purge air connection** | Dry instrument air 0.5 – 3.0 bar (7 - 40 psi), 6/4 mm (1/4") connector, normal consumption 30-100l/min (1- 3,5 cfm) |
| **Digital outputs** | 2 x Closing or opening contact max. 250 VAC, 2A; 220 VDC, 2 A for Break signal and Maintenance alarm |
| **Alarm output delay** | Min. 15 ms from the actual break |
| **Analog outputs** | Optional 3 pcs 4 - 20 mA max 600 ohm |
| **Dimensions (L x H x D) and weight** | Electronics Unit 323 x 237 x 70 mm (12,7 x 9,3 x 2,8"), 3 kg (6,6 lbs)<br>Sensor head Ø 33 mm (1"1/4) AISI 316, pipe 1500 mm (59") long, 4 kg (9 lbs) |

# Appendix 5: Settings and variables

**Parameters:**

Mode: Detect Enabled or Maintenance
Light source: RGB or IR
Selected signal: _____
Detect limit: _____
Direction: Break < Det.Limit or Break > Det. Limit
Alarm signal: _____
Low alarm limit: _____
High alarm limit: _____
Drift Alarm: _____
Drift Alarm limit: _____
Drift Alarm direction: _____

**Configuration**

Autolimit&Autoalarm

| Sampled signal levels: | Paper | Break |
|---|---|---|
| RED | ____ | ____ |
| GREEN | ____ | ____ |
| BLUE | ____ | ____ |
| IR | ____ | ____ |

Measurement configuration:

Detect filter: _____
Tx power: _____
Rx gain: _____

**Set-up**

| Analog signals: | Low limit | High limit |
|---|---|---|
| Analog output 1: _____ | _____ | _____ |
| Analog output 2: _____ | _____ | _____ |
| Analog output 3: _____ | _____ | _____ |

**Waste Electronics and Electrical Equipment (WEEE)**

This product is labelled with this symbol in accordance with European Directive 2012/19/EU, to indicate that it must not be disposed with your other household waste. Disposing of this product correctly will help save valuable resources and prevent any potential negative effects on human health and the environment, which could otherwise arise from inappropriate waste handling.

**In the European Union**

Please contact your local ABB representative who will inform you about the take-back of the product. Small products (and small amounts) might be taken back by your local collection facilities.

**In countries outside the European Union**

Please contact your local authorities and ask for the correct method of disposal.

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