



USER MANUAL

FOR DENEX VERSIONS: 2010



DENEX® Edge Detector II

FLDM 180C1103/S42

READ THIS FIRST

Before installing, operating, opening, or applying the DENEX Edge Detector II sensor, read and understand the contents of this manual.

Always observe the following warnings and cautions when operating or working on the equipment.

CAUTION

Use of controls or adjustments or performance procedures other than those specified herein may result in hazardous radiation exposure.

Do not stare into laser beam.

The DENEX Edge Detector II must be applied, installed, adjusted, and maintained only by qualified personnel who are familiar with the operation of the unit and its associated components.

CONTENTS

1	RECEIVING AND HANDLING	4
2	BASIC FUNCTION	4
3	INSTALLATION	5
3.1	General Precautions	5
3.2	Mechanical Installation	5
3.3	Electrical installation	6
3.3.1	Power Connection	6
3.3.2	Output Signal	6
4	SOFTWARE FUNCTIONS	8
4.1	Blocking Function	8
4.2	DIP-Switch Settings	9
5	LED INDICATORS	10
5.1	The POWER-LED	10
5.2	The LASER OFF-LED	10
5.3	The OUTPUT-LED	10
6	TECHNICAL SPECIFICATIONS	11
7	ACCESSORIES	12
8	LASER SAFETY	12
9	TROUBLESHOOTING	13
9.1	Maintenance at Regular Intervals	14
10	RETURNING EQUIPMENT	15
11	WARRANTY	15
12	APPENDIX	16
13	Supplements	17

1 RECEIVING AND HANDLING

Upon delivery of the equipment, thoroughly inspect the shipping containers and contents for indications of damage incurred in transit. If any concealed loss or damage is discovered, notify the forward agent.

A complete DENEX Edge Detector II shipping box should contain:

- 1 DENEX Edge Detector II
- 1 Female Connector, Amphenol Tuchel T3476 001
- 1 Installation Manual

2 BASIC FUNCTION

The DENEX Edge Detector II is a non-contact sensor, which counts all kinds of printed products on an overlapped stream. It senses the leading edge and generates one output pulse for every product. Product thickness from a single folded sheet up to a maximum stream thickness of 70 mm can be sensed without adjustments.

The laser diode that is used produces a visible and very intensive and focused light beam that is projected onto the stream. The reflected light from the spot is collected by two light sensitive detectors P and R and is analyzed by a microprocessor. The difference in reflected light that occurs, when the light spot is temporarily hidden behind the passing product edge provides the basic data for the sensor to determine a count output pulse.

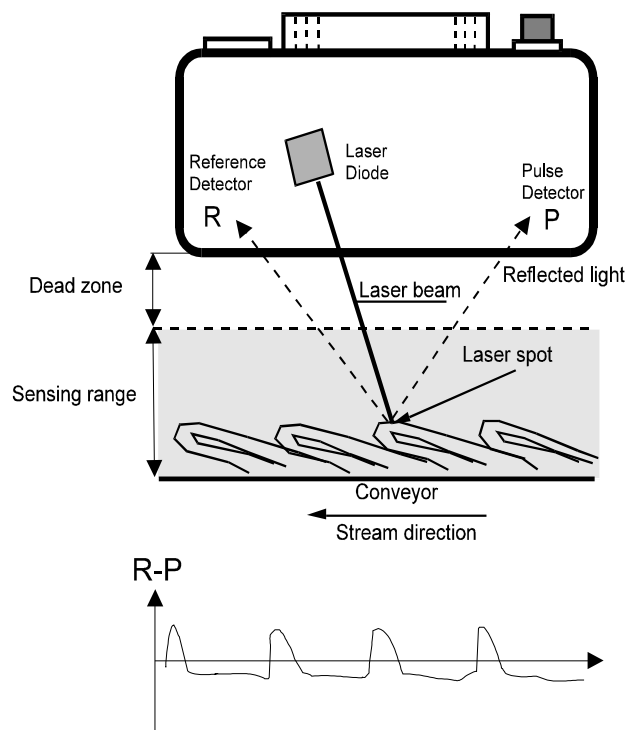


Figure 2.1 The principle of operation

The microprocessor controlled DENEX Edge Detector II can be adapted to different operating modes by changing DIP-switches, which can be reached from outside, via the lid.

3 INSTALLATION

3.1 General Precautions

The DENEX Edge Detector II should be installed in an environment where:

1. The equipment ambient temperature does not exceed 40° C.
2. The equipment atmosphere is free from highly flammable or combustible vapors, corrosive chemical flumes, oil vapor, steam, excessive moisture and particles.

Avoid mounting the unit in places with strong vibrations since they can produce miscounts, especially when thin products are counted. Make sure that the mounting bracket and means used are rigid to withstand vibrations.

3.2 Mechanical Installation

The sensor should normally be mounted on a flat conveyor. It is possible to mount the sensor on a bent part of the conveyor according to figures below. Do not mount according to Figure 3.2.1 (right) since it will deteriorate the function of the unit.



Figure 3.2.1 Mounting on a non-flat conveyor.

The sensor should be mounted parallel to, and at a distance of 100 mm from the conveyor. When the laser does not hit a product, it should hit a light, matte surface at 100 - 150 mm below the sensor. The reference surface must be smooth. If the surface is wrinkled or coarse, vibrations can cause error pulses. Also, make sure that dust and paper pieces do not stay on the surface, since they could also create output pulses. Make sure that the laser beam is properly stopped by this surface, so that it is impossible for a user to be exposed to the laser beam.

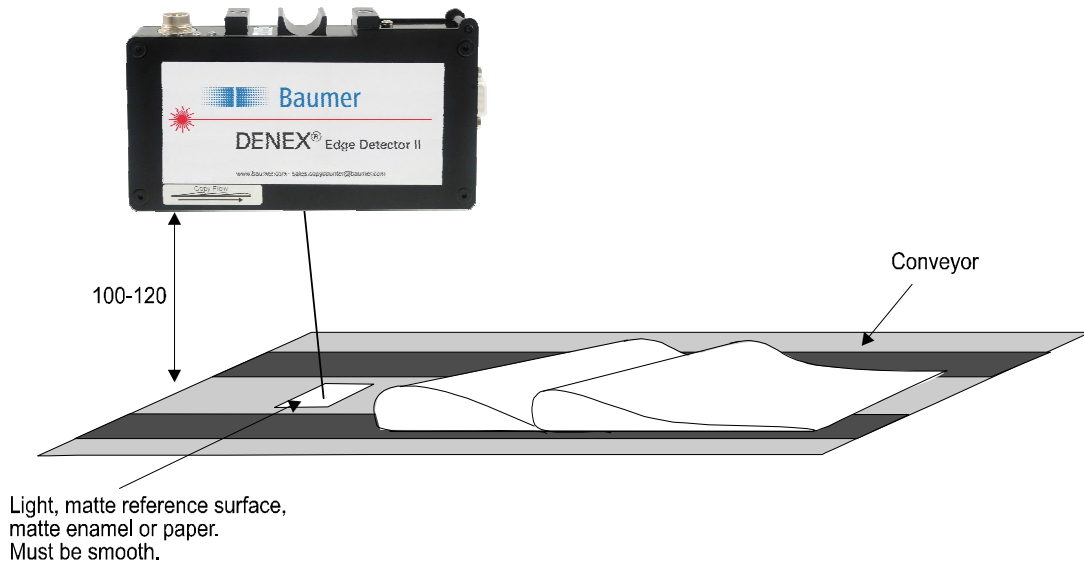


Figure 3.2.2 Mechanical mounting with reference surface.

3.3 Electrical installation

The interface to the copy sensor is a 7-pin connector with the following pin-out:
Matching connector: Amphenol Tuchel T3476 001, delivered with the sensor.

Pin 1 :	+24VDC in
Pin 2 :	+ Output (collector)
Pin 3 :	Not connected
Pin 4 :	Not connected
Pin 5 :	- Output (emitter)
Pin 6 :	0V
Pin 7 :	No function

3.3.1 Power Connection

Proper wiring techniques are essential for successful system installation. To reduce the effects of electrical noise interference and static discharge, the procedures outlined in this section must be strictly followed.

The sensor shall be connected to 24 VDC regulated power.

It must be free from transients!

Never connect or disconnect any cables when the power is on!

The normal current consumption is 150 mA.

3.3.2 Output Signal

The output is a normally open, opto-isolated transistor. Every output pulse is signaled as a closing of the output for a certain time; see also "DIP-Switch Settings"

The specification for the output opto-coupler is as follows:

Max load current:	100 mA
Max voltage:	35VDC

3.3.2.1 Output Signal – Connections

The output can be used for both "current source" and "current sink" depending on what is required by the equipment. In current source mode, the sensor output will give a positive pulse to the stacker/totalizer when active. In current sink mode, the sensor output will give a negative pulse. Figure below shows a common 24 VDC as power supply and feeding the pulse. It is possible to have different power supplies. In that case, the 24V power is connected to pins 1 and 6, and the totalizer can be connected to pins 2 and 5.

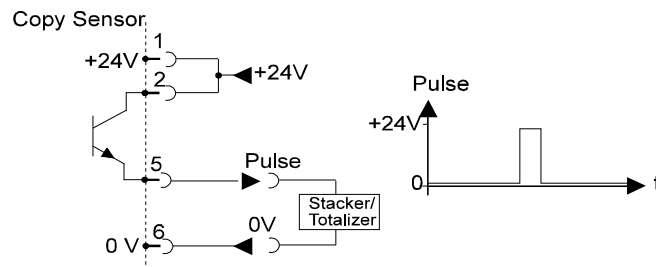


Figure 3.3.2.1.1 Electrical connection, common 24V-supply. Current source (PNP).

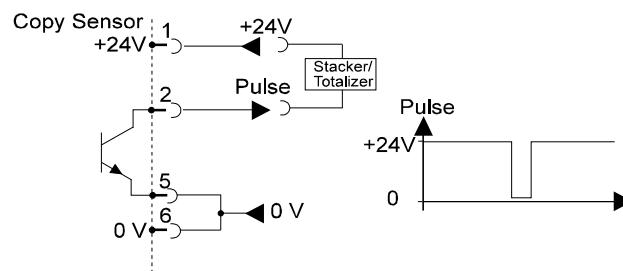


Figure 3.3.2.1.2 Electrical connection, common 24V-supply. Current sink (NPN).

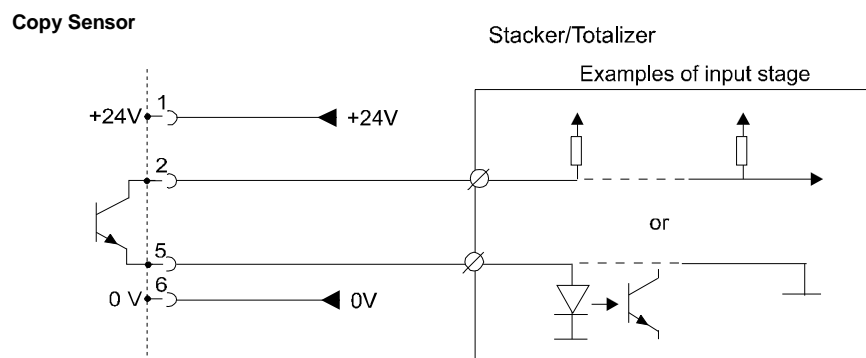


Figure 3.3.2.1.3 Electrical connection, separate supply for power and pulse.

4 SOFTWARE FUNCTIONS

The benefit with the microprocessor-based copy sensor is that the sensor learns what the products and the stream look like and make decisions according to this.

Application Setting

Things like output pulse width, Blocking Function and other parameters are set a little different for each application in order to reach the highest possible accuracy.

There are DIP-switches that tell the sensor which application it should be set for.

It is very important to set the right application!

4.1 Blocking Function

This function will eliminate false counts due to double edges or a cut-edge-first delivery.

The sensor will count edges coming within the blocking zone as one product.

In productions using stitches, extra pulses due to the stitch are blocked out by this function.

The blocking zone is a dynamic value that constantly adapts to the average distance between copies. It will be 15%, 30% or 46% of the average lap, depending on application.

The average distance between copies is 100%, see figure 4.1.

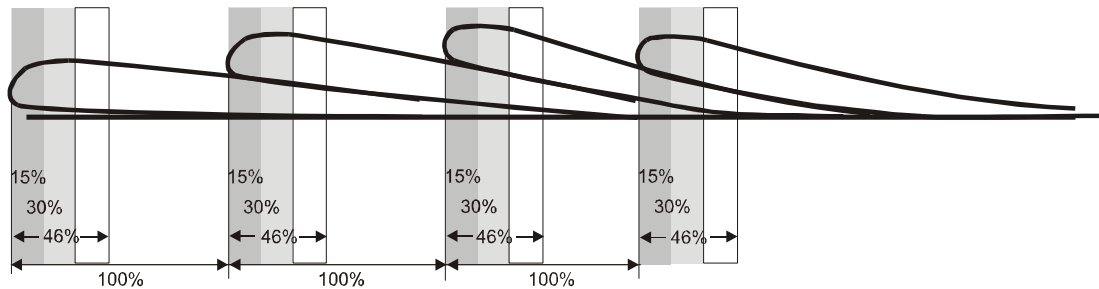


Figure 4.1 The principle of the blocking function. The blocking zone is marked with grey. 15% is dark grey, 30% both grey sections. The 46% blocking zone is marked with arrows.

For irregular product streams where the lap distance between each copy varies much, the above described blocking function, can block out copies. This gives the result that there are too many copies in each bundle. For such cases a special mode is available in the software, Mode 11.



Our general recommendation is to try to adjust the machinery and get correct stream conditions, so the lap distance between each copy becomes equal.

4.2 DIP-Switch Settings

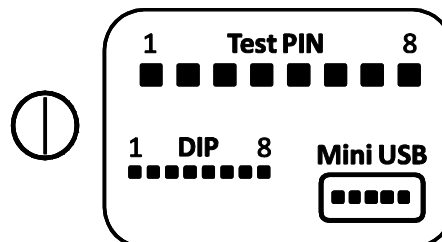
An 8-pole DIP-switch can be reached via the lid on top of the sensor. Unscrewing the screw opens the lid.

The software functions can be controlled via the DIP switches.

DIP-Switch positions

 = OFF
 = ON

DIP-switches 1-4 are reserved for factory.
 DIP-switches 5-8 are for selecting operation mode
All in OFF-position is the default setting.



DIP-Switches

5	6	7	8	
				Mode 0 = Default
				Mode 1
				Mode 2
				Mode 3
				Mode 4
				Mode 5
				Mode 6
				Mode 7
				Mode 8
				Mode 9
				Mode 10
				Mode 11

Commercial products: For timing applications, Blocking 15%, Output 5 ms
 Counting application: Blocking time 30%, Output 5 ms
 Timing application: Blocking time 15%, Output: 20 ms
 Counting mode: Blocking time 15%, Output: 20 ms
 Newspapers, Blocking time 30%, Output: 20 ms
 Edge detecting: Blocking time 15%, Output: 5 ms
 Edge detecting: Blocking time 15%, Output: 20 ms
 Cut edge first mode: Blocking time 46 %, Output 20 ms
 Counting mode: Fixed blocking time = 7 ms, Output 5 ms.
 Commercial: No Blocking, Output 5 ms
 reserved
 reserved

Laser power save mode is activated in all Counting/newspaper modes.
 This means the laser power will be reduced to 50% after a 60 seconds gap.

5 LED INDICATORS

There are four LED's that are placed close to the connector.



5.1 The POWER-LED

The green POWER-LED indicates that the sensor has power and should be operating.

For laser safety reasons never mount or adjust the sensor when Power-LED is on!

5.2 The LASER OFF-LED

The LASER OFF-LED is an indication that the laser is off. The laser will be shut off for the following reasons:

- The laser power has exceeded the allowed limits (electronic problem inside sensor)
- The laser power has reached lower than acceptable level (laser is worn out, or electronic problem)

If the laser levels are outside of the allowed limits, the sensor must be sent for repair.

5.3 The OUTPUT-LED

The OUTPUT-LED is active when the output stage is active (set). The LED will flash for every output pulse.

6 TECHNICAL SPECIFICATIONS

Maximum Count Rate	< 600.000 copies/hour
Maximum Product Speed	1 m/s (200 ft/min) for thinnest product, up to 2 m/s otherwise
Maximum Stream Thickness	70 mm (2.76") standard range
Minimum Product Thickness	0,25 mm (0.01") standard range
Distance From Conveyor	100 mm (3.94") standard range
Minimum Spacing Between Copies	1-5 mm (0.039-0.20") dep. on thickness, speed and pulse width
Stream Conditions	Folded edge first. Cut edge first possible, but not recommended.
Operating System	RISC microprocessor
Pulse Width	5 ms (preset) and 20ms
Output Signal	Opto-isolated transistor 5 to 30V max. 150 mA
Matching Female Connector	Amphenol-Tuchel C91A T 3476 001
Laser System	Visible, switched laser diode, 650 nm, with laser safety monitor
Laser Safety Class	Class II
Estimated Lifetime of Laser	> 50,000 h @ 20°C
Weight	800 g, 1.75 lbs.
Size	175 x 96 x 31mm 6.89 x 3.78 x 1.22"
Power	24 VDC, 150 mA typical
Temp. Range	+10 to 40°C 50 to 104°F

DENEX Edge Detector II is a Class II Laser Product.

7 ACCESSORIES

There are a number of accessories available from Baumer that can save you time and ensure a good operation of the sensor. Kits for replacing mechanical or older sensors are available. See web site www.baumer.com or www.denex.com for more updated information.

8 LASER SAFETY

A Class II-laser product as the DENEX Edge Detector II is said to be safe if a person does not stare into the beam. If a person accidentally would look into the laser, the strong light would cause the eyes to shut automatically before any damage to the eyes could occur. If the following precautions are followed, nothing can happen.

CAUTION

- Do not stare into the laser beam or a reflection of the beam from a mirror-like surface!
- Do not move or adjust the DENEX Edge Detector II, without first turning off the power! The green LED must be off!
- Service on the sensor should be made by qualified personnel only!
- The sensor must be installed in such way, that the laser does not hit a glossy, mirror-like surface!

Visible Warning-LED

The green LED is the POWER-LED, which indicates that the laser is on!

Never move or adjust the sensor when the green LED is on!

9 TROUBLESHOOTING

The green LED (POWER) is OFF

- The sensor is not connected to +24V on pin 1 and 0V on pin 6 on the Tuchel connector.
- If the sensor previously has been working, there could be transients damaging the sensor. Make sure that the voltage is 24VDC and is well regulated.

The red LED (LASER-OFF) is lit constantly, and no laser is present

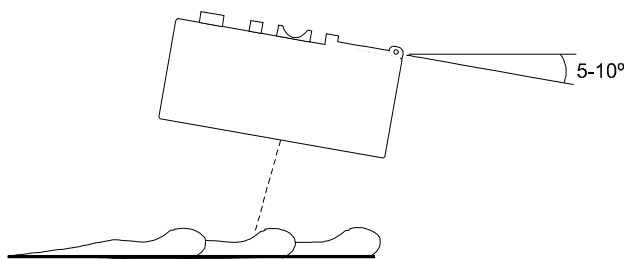
- Re-power the sensor. Check that the laser is lit. Is the laser turned off after a while? If so, the laser settings have changed and the sensor must be sent back for repair.

The orange LED (OUTPUT-signal) is lit for every copy, but no pulse, or a different number of pulses, is received by the connected equipment

- The interfacing is bad. Check the connection of the sensor. Is the sensor supposed to source or sink the signal? Should the pulse be positive or negative? See chapter 3.3.
- Is the totalizer used, a battery powered device? It can be a problem because of the voltage drop over the output transistor in the sensor. There is approx. 0.8V voltage drop over emitter and collector at 2 mA which could mean that the totalizer does not see any changes in state, i.e. from "high" to "low". Check with a scope between pulse and ground.
- The opto-coupler in the sensor can be faulty.

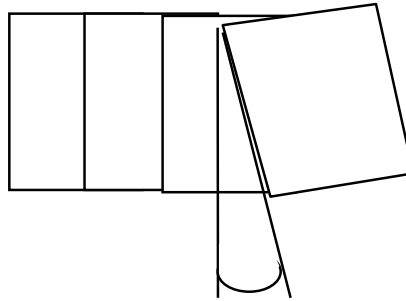
There is an over count (too few copies in the bundles)

- Check the mechanical installation. The sensor must be parallel to the stream.
- Back-edges could be counted. Check by running one paper at a time, and see if there is an extra pulse sent at the end of the paper.
- If the surface of the product is wavy, try tilting the sensor 5 - 10° according to figure below.
- If there is a stitch or something near the edge, try a longer blocking or output pulse, see chapter 4, "DIP-SWITCH SETTINGS"



Some products are not counted (too many copies in the bundles)

- Check the mechanical installation. The sensor must be parallel to the stream.
- Check the Application setting; DIP 5-8.
- Check the interface. See previous page.
- If the product stream is very irregular, it could be that the sensor is blocking out products coming too close. Try choosing an application with a shorter blocking.
- See chapter 4, "SOFTWARE FUNCTIONS".
- Make sure that the stacker has not got an internal Blocking Zone which is set in a way that it blocks out pulses from the sensor.
- If the product with the problem is very black and very thin, try lowering the sensor 10-20 mm closer to the product stream.
- Are the products very tilted when they pass the sensor? The max angle allowed is 15° for a 0.25 mm product.



9.1 Maintenance at Regular Intervals

To ensure the best operation, by following the steps above:

- Clean the glass aperture with alcohol to remove ink dust.
- Remove any loose pieces of paper that can produce false counts
- Check that the target plate is still mounted the way it should be

10 RETURNING EQUIPMENT

If it is necessary to return a DENEX Edge Detector II for service, the following procedure should be followed.

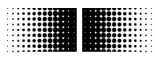
1. Tag the unit with the following:
 - Company and contact person returning the item
 - Phone, fax or email to the contact person for additional information
 - Information regarding the malfunction and picture of installation. A good description reduces trouble shooting cost.

If the unit has been disassembled, reassemble it, making certain that all hardware is in place. Missing parts will be charged at spare part prices.

2. Carefully pack the unit and apply appropriate cautionary stickers.
3. Advice way of returning the unit: Post (DPD), UPS, DHL or other.
4. Return unit to your dealer or directly to Baumer (see address on back page).

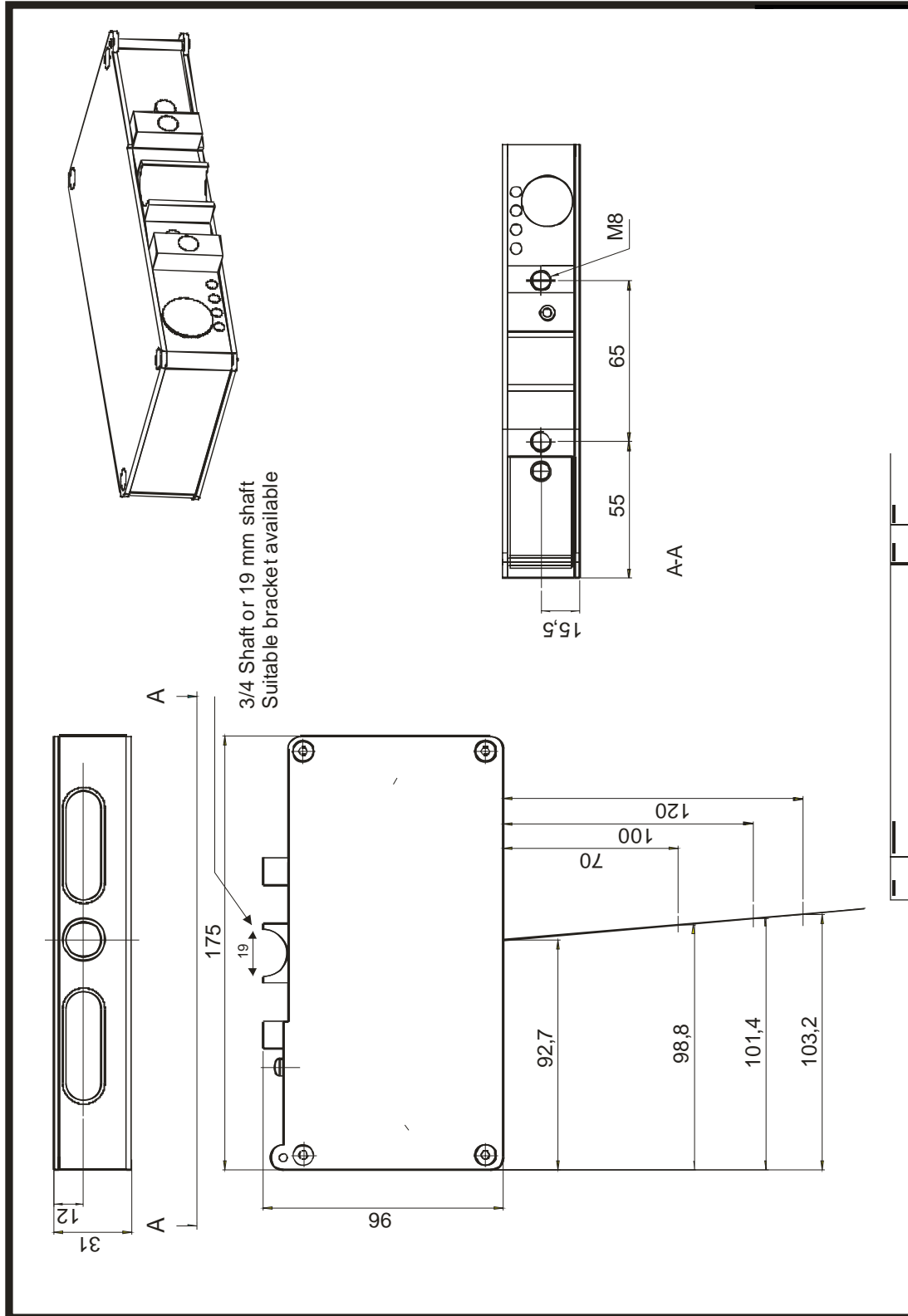
11 WARRANTY

Baumer Electric AG gives a warranty to the customer for quality and suitability of its products within the scope of its technical specifications. A warranty is only given according to prior agreement for parts which are used as safety parts within the meaning of the EU Machinery Directive. The guarantee of Baumer Electric AG is limited to replacement or repair of defective parts and causes which occurred before the passing of risk. Liability for further direct and indirect losses are excluded to the extent permissible at law, more particularly, no compensation shall be owed for any incidental loss, loss of production etc. The guarantee lapses in any event if the customer does not use original Baumer Electric AG replacement parts. The guarantee is not valid in any instance where the goods have been tampered with. The customer is under a duty to examine the consignment for completeness and transport damage immediately on receipt. Any complaints in connection with the product shall be made in writing without delay, and evidence of such incidence must be produced. Complaints may be made about product defects during the complete period of guarantee at any time before and/or after processing and/or re-sale, but they are to be notified in writing enclosing the defective part without delay after emergence. The customer may only invoke these guarantee conditions if he proves that the defects emerged despite proper assembly and use. The guaranty period is 24 months from dispatch from Baumer Electric AG. The period of guarantee for replacement parts or repairs delivered under guarantee ends with the period for the products originally supplied. Baumer Electric AG reserves the right to charge the processing costs for sales returns and performance tests without claim to guarantee.



12 APPENDIX

Size Diagram with Laser Beam Projection



13 Supplements

Baumer Electric AG

Sensor Solutions

Hummelstrasse 17

CH - 8500 Frauenfeld

Phone +41 (0) 527281122

Fax +41 (0) 527281110

sales.copycounter@baumer.comwww.baumer.com

Technical data subject to change

Printed in Switzerland No. 11084088