

## Electronic thickness gauge For band saws



### *User Manual*

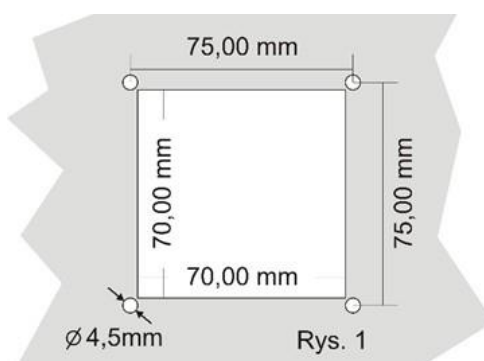
The electronic thickness gauge RLI-04 is designed to be installed in a band sawmill, or other machine where a reading of the machining tool offset is required.

RLI-04 is made in the form of a panel designed for panel mounting in the machine control panel.

The gauge can work with POI-xx rotary encoders, or, if it is not possible to install this type of encoder, with the MSK-320 linear magnetic encoder together with the MB-3200 magnetic tape.

### **Mounting the gauge panel.**

Before installation, cut a 70 x 70 mm rectangular hole in the machine control panel. Any uneven edges remaining after cutting should be smoothed with a fine file and protected against corrosion by painting with a good quality paint or varnish. A mounting hole with a diameter of 4.5 mm must be made at each corner, as shown in Figure 1.



Once the mounting holes have been made, remove the four corner screws from the meter panel, remove the metal washers and plastic sleeves and then insert the panel into the

prepared space. The panel should then be tightened to the control panel, using the screws removed earlier, attaching the sleeve, washer and finally tightening with the mounting screw.

### **Installation of the TSS-4/002 power transformer**

**The cable ends should be cleaned and fitted with sleeve lugs similar to those used in the rotary encoder (or tinned) before tightening. This is important for the correct and trouble-free operation of the gauge in the future.**

The power transformer supplied(**TSS-4/002**) must be fitted in the machine's power cabinet. The mounting of the transformer is provided for the typical TSS-35 mounting rail commonly used in electrical machinery. The place for mounting the transformer should be selected so that it is as far away as possible from other electrical components (frequency converters, contactors, other transformers); this is important as electromagnetic interference can pass through the transformer to the controller electronics.

Wires should be connected to the transformer terminals marked as **PRI 230V** with which the 230V transformer supply voltage will be supplied. For the supply of the transformer, choose the phase of the machine's electrical system to which the contactor coils and inverter are not connected.

Route the 230V power cables as far as possible from other cables in the cabinet.

Connect the wires to the transformer terminals marked as **SEC 12V** with which the electronic board of the RLI-04 gauge will be powered. As with the previous connection, it should be routed as far as possible from the machine's other wires, including the 230V wires that supply the transformer. The length of the power supply cable ( 12V ) should be selected to suit the location where the gauge will be installed.

### **Installation of anti-interference capacitors**

The **CPZ** anti-interference capacitors(**WX1P 224M 440V**) included in the kit prevent the excessive emission of electromagnetic interference generated during the operation of the electrical contactors installed in the machine. Their correct installation is very important for the correct operation of the adjuster.

The CPZ capacitors should be connected in parallel to the coils of the contactors : feed-down, the coil of the feed-up contactor and the coil of the contactor activating the debarker ( if the machine is equipped with one ). (fig.3)

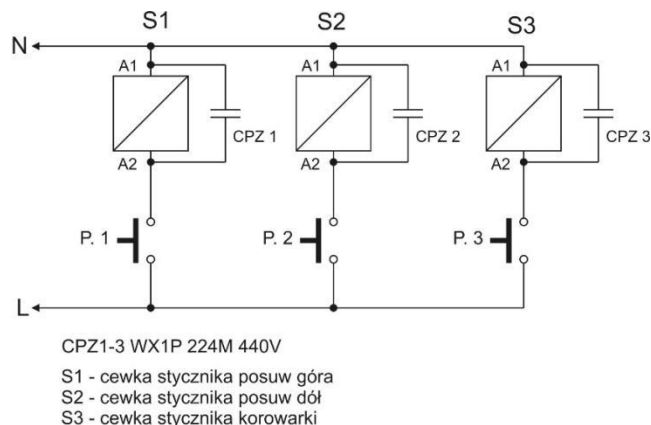
**Fig.3**

CPZ1-3 WX1P 224M 440VS1

- upper feed contactor coil S2

- lower feed contactor coil S3

- barking machine contactor coil



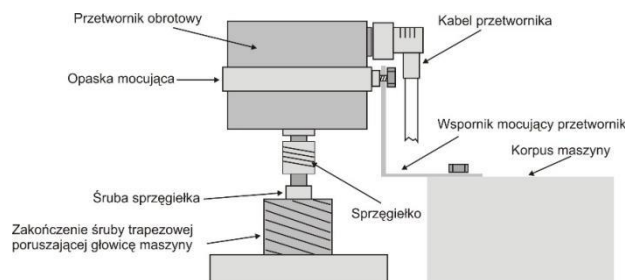
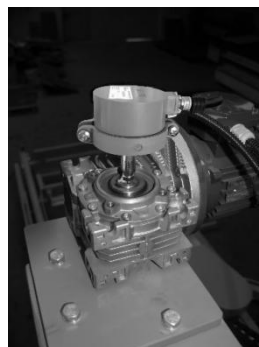
## Rotary encoder mounting

The **rotary encoder** included in the kit is used to convert the rotary movement of the screw moving the head into electrical impulses which are then fed into the gauge. The number of pulses per bolt revolution is dependent on the pitch of the bolt, this relationship is shown in Table 1.

The trapezoidal screw moving the machine head should have one end available (free) so that a hole can be drilled in it to screw in the end of the encoder coupling.

In most sawmills found on the market, the free end of this screw is at the top.

The hole should be drilled **exactly centred**, otherwise the mounted encoder may sway, **which could cause damage**. Once the hole has been drilled to a depth of approx. 15 mm, it should be threaded with an M8 tapping tool. You can now proceed to fix the encoder using the supplied clamp ( Fig. 3 ). The band should be fixed to the machine structure by means of a bracket, which, due to the differences in mechanical constructions found on the sawmill market, should be made in-house. An example view of an encoder mounted on the upper end of a trapezoidal screw is shown in Fig. 1

**Figure 3****Photo 1**

Przetwornik obrotowy - Rotary transducer

Opaska mocująca - Mounting band

Śruba sprzęgielka - Coupling screw

Zakonczenie sruby trapezowejporuszajacej glowice maszyny - End of the trapezoidal screw moving the machine head  
Sprzegielko - Coupling  
Kabel przetwornika - Transducer cable

Wspornik mocujacy przetwornik - Transducer mounting bracket

Korpus maszyny - Machine body

**Table 1**

| Screw pitch ( mm. \ RPM ( mm. ) | Encoder type            | Divisor |
|---------------------------------|-------------------------|---------|
| 3                               | Rotary 42 imp./rev.     | 28      |
| 4                               | Rotary 42 imp./rev.     | 21      |
| 5                               | Rotary 50 imp/rev.      | 20      |
| 6                               | Rotary 48 imp/rev.      | 16      |
| 7                               | Rotary 42 imp./rev.     | 12      |
| 8                               | Rotary 48 imp/rev.      | 12      |
| 9                               | Rotary 50 imp/rev.      | 5       |
| 10                              | Rotary 50 imp/rev.      | 10      |
| Chain band saw                  | Linear MSK 320 + MB 320 | 5       |

**The data contained in the table should be used during the procedure for checking the controller parameters**

Route the cable from the rotary encoder away from other electrical cables. Fixing it with cable ties, we feed it into the place where the adjuster is supposed to be mounted. **The cable connector located in the encoder housing should be carefully tightened to ensure a leak-proof connection.**

#### **Magnetic linear encoder mounting ( *encoder version for chain saws* )**

In the case of a machine with a head moved by a chain, a linear encoder of the MSK-320 type should be used in cooperation with the MB-3200 magnetic tape.

The magnetic measuring tape consists of two parts equipped with a self-adhesive layer.

The thicker part is applied first to a smooth, even and straight surface (after thorough cleaning and degreasing with acetone or spirit).

While gluing, only the part of the tape that protects the adhesive coating should be unfastened and then the first section should be glued starting from the top. Then gradually release the foil from further away while simultaneously sticking the tape to the substrate.

When applying pressure, a rubber roller can be used to apply better pressure. Apply the tape carefully so that no bulging or bubbles form and the tape is applied evenly in a straight line. Once the first part has been glued, apply the protective steel tape to it, following the same instructions as for the first gluing. Both tapes should be applied evenly one on top of the other. The MSK 320 sensor with cable should be mounted on a stationary part of the machine (relative to the controller) so that cable movements do not occur as they could damage it. If the sensor is mounted as a movable sensor, its cable must be secured in moving rails to prevent uncontrolled kinking.

The sensor should be screwed with two screws passing through the housing so that it is guided over the tape at a distance of 1 to 1.5 mm. (Parallel to it)

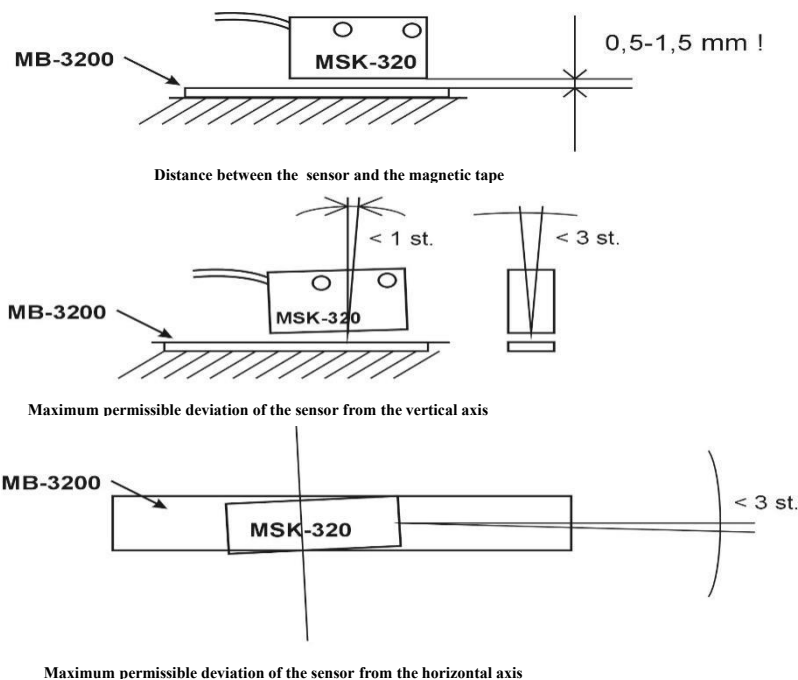
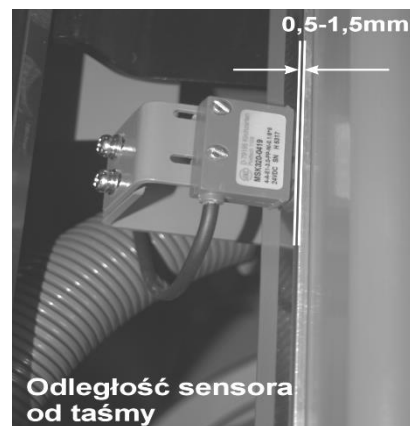
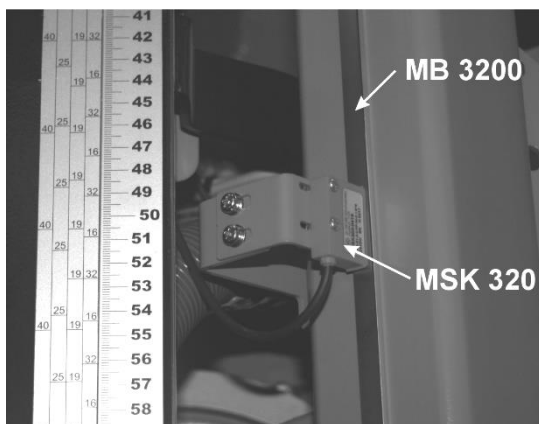
When routing the cable from the sensor, care should be taken to keep it as far away as possible from other cables and electrical equipment. The tape above which the sensor moves must not be brought close to sources of magnetic field (permanent magnets, electromagnets) before, during and after installation under the risk of damage.

From time to time, the surface of the tape should be cleaned of dust and dirt with a soft brush. Do not hit the tape or the sensor. The sensor must be mounted with a sticker with the inscription SCALE SIDE towards the magnetic tape.

The sensor and tape should be mounted in such a way that during the entire working movement of the head, the MSK-320 sensor along its entire length remains within the range of the magnetic tape beneath it.

Particular attention must be paid to the stability of the sensor and tape mounting so that these components do not vibrate during operation.

### Magnetic sensor and tape mounting method



## Electrical assembly of the gauge :



### ATTENTION!

Due to the risk of electric shock, any and all connections should only be made when the power supply to the machine is completely disconnected! The best way to do this is to switch off the machine's main switch !!!

## Connecting the wires to the adjuster plate.

Once all the steps described earlier have been completed, we can proceed to connect the wires to the meter board.

The **12V** supply leads from the **TSS 4/002** transformer, after preparing the terminals, are tightened to the connector marked **PWR** on the meter board.

## Connection of the POI-xx rotary encoder in a sawmill with a screw-moving head :

Connect the rotary encoder cable sequentially to the connectors marked:

- **brown** wire to the meter connector marked **+12**
- **blue** wire to the meter connector marked **GND**
- **white** cable to the meter connector marked **In1**
- **black** wire to the meter connector marked **In2**

## Connection of the magnetic encoder MSK-320 in a sawmill with a head moved on a chain:

Connect the magnetic encoder cable sequentially to the connectors marked:

- **the brown** wire of the MSK-320 to the meter connector marked **+12**
- **the black** wire of the MSK-320 to the meter's connector marked **GND**
- **the red** wire of the MSK-320 to the meter's connector marked **In1**
- **orange** cable MSK-320 to the meter's connector marked **In2**



**Attention !!! Incorrect wiring in the case of a rotary or magnetic encoder will result in serious damage to the encoder!**

Once all connections have been made, the power supply to the meter can be switched on. The display will briefly show horizontal lines and after a short while the dimension 0.0 will be displayed.

It is now necessary to check that the counting direction of the gauge is consistent, in order to do this it is necessary to actuate, using the manual control button, the upward feed of the machine head while checking that the dimension displayed by the gauge is decreasing (negative values ). Similarly, by triggering a downward movement of the head, we check that the displayed dimension is increasing (positive values).

If the counting direction is not correct, swap the wires, white and black in the case of the POI-xx rotary encoder, or red and orange, in the case of the MSK-320 linear encoder, connected to the gauge board ( In1, In2 connectors ).

## Checking the controller parameters

In order to be able to use the suggestions, it is necessary to check the pitch of the screw used in the machine on which the head is lowered. The pitch of the screw should be measured and recorded in the space below:

**The pitch of the trapezoidal screw on this machine is - ..... mm**

Now check what type of encoder is fitted to the machine at the end of the screw ( photo 1 ). The encoder type is marked on the sticker and indicates how many pulses per revolution the encoder produces. After reading the number, ( for example 42 imp/rev ) write it down below:

**The type of rotary encoder on this machine is - ..... imp/rev**

Now, using Table 1, check what divider should be stored in memory for the gauge to work correctly for a given screw pitch. For example: with a screw pitch of 7 mm and a 42 imp/rev transducer installed in the machine, the divisor read from the table is 12

Once the correct divisor for the machine has been determined according to the table, it should be recorded below:

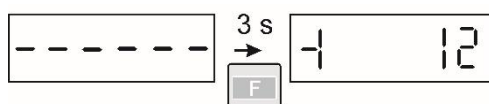
**The input divisor for this machine is - .....**

**If the adjuster is working in a chain saw and the magnetic encoder MSK-320 is mounted, the input divider according to the table will be equal to 5**

Once we have established the type of encoder and the correct divider for it, we can check the meter parameters and adjust them if necessary.

### Checking the input divider:

To check the value of the input divider, turn off the power of the meter, turn it on again and immediately after the horizontal dashes appear, press the key marked with the letter F, holding it for about 3s ( the dots of the display flash when the function is activated).



After this operation, the divider symbol should be visible on the left side of the display, and its current value on the right side. If the divisor value shown on the display does not correspond to the value determined from the table, it must be corrected using the keys marked UP and DWN. When pressed, the UP key increases the value of the divisor by 1, the DWN key decreases the value of the divisor by 1.

Once you are sure that the divisor value is correct, save it to the meter's memory by briefly pressing the KERF key.

### Saw height adjustment:

To set the height at which the saw is located (value shown on the display), press and hold approx. 3s key marked **MODE**.



The first digit starts flashing on the display, setting the value is done using the arrow keys, to set subsequent digits press the **MODE** key again, each time the **MODE** key is pressed the setting moves to the next digit.

The digit after the decimal point is set every 0.5 mm.

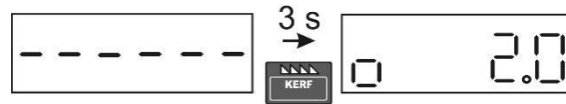
Once the correct saw height value has been set, it is stored in the adjuster's memory by briefly pressing the **KERF** key.

### Attention!!!

The height of the saw is recorded automatically whenever the power to the RLI-04 is switched **off**; therefore, avoid switching off the power while the machine is still running, as this may result in an incorrect saw height value being recorded!

## Checking the value of the saw cut entered in the gauge's memory :

To check the value of the kerf, turn off the power of the gauge, turn it on again and immediately after the horizontal lines appear, press the key marked with the letter F, holding it for about 3s ( the dots of the display flash when the function is activated).



After this operation, the display should show the saw cut symbol on the left and its current value on the right. If the value shown on the display does not match the kerf value of the saw used in the machine, correct it by using the keys marked UP and DWN. When pressed, the UP key increases the cut by 1, the DWN key decreases the cut by 1.

Once you are sure that the ordinate value is correct, save it to the meter's memory by briefly pressing the KERF key.

## Operation of the RLI-04 gauge

### Reset function - RESET

The meter has the possibility of resetting the readings; resetting is performed by briefly pressing the key marked RESET. The zeroing function is signalled by displaying a small u on the left, on the right, the value 0.0 is displayed after zeroing. The gauge, during zeroing, is used to measure the displacement of the saw **without taking into account the kerf!**

## Measuring dimensions taking into account the saw kerf

Measurement of the dimensions to be cut, taking into account the saw cut, is carried out by pressing the key marked KERF. Each time this key is briefly pressed, the counter is reset to zero, with three horizontal dashes displayed on the left and 0.0 displayed on the right.

Raising the saw above the position at which the KERF key was pressed is indicated by the display of a row of horizontal dashes in the upper part of the display. Moving the saw down starts counting as soon as the saw's lowering is greater than the value of the saw cut previously entered into the gauge's memory.

In practice we measure the material as follows:

- 1- position the saw on the line of the first cut (so-called Scrap )
  - 2- press the key marked KERF
  - 3- cut the log
  - 4- remove the cut-out material
  - 5- raise the saw to such a height that it safely returns to its initial position  
( during this time the meter displays a row of horizontal lines )
  - 6- lower the saw by the required dimension (the gauge takes the kerf into account, if you lower the saw by e.g. 28 you will obtain the actual cut dimension of 28 mm! )
  - 7- after lowering the saw to the required dimension, briefly press the key described as KERF again and make another cut.
  - 8- after cutting, remove the cut material and, as before, lift the saw up to return to the initial position and, after returning to the cutting position, lower it by the next necessary dimension.
- By repeating the above steps sequentially, we cut out all the necessary dimensions from the log in question.



## Operational guidelines

Do not press the keypad of the adjuster with hard objects, this may cause irreparable damage to the keypad.

If the keyboard is dirty, common cleaners can be used to clean it, making sure not to press the membrane keys too hard. Pressing the keys too hard can damage them and result in the need to replace the entire keyboard.

The adjuster should not be exposed to direct wetness, flooding with water or other liquids.



## EMC compatibility

The RLI-04 controller conforms to the electromagnetic compatibility ( EMC ) standards in force in this respect.

The RLI-04 controller should be installed and configured in accordance with European and national standards. Fitters of electrical system of the machine's control system are responsible for adjusting the device and they should comply with EMC directive.

The RLI-04 must be considered as a component, it is not a machine or a ready-to-use device according to the European directives (Machinery Directive and EMC Directive). It is the responsibility of the end user installing the RLI-04 adjuster to meet these standards.

The product and the equipment described in this documentation may be changed and modified several times, both from a technical point of view and in the way it is operated.

Their description cannot in any way be regarded as a contract.



As a component integrated into the machine in which it is installed, the RLI-04 is not designed for stand-alone operation. It should be disposed of as specified by the manufacturer of the entire machine, as an industrial large-scale appliance in the sense of the WEEE Directive.