Eltex Tension Monitor ETM

Operating manual for Eltex Tension Monitor ETM 14600 series

Doc.no. TH-0200-09

ELTEX OF SWEDEN

Operating Manual for Eltex Tension Monitor – ETM,

14600 series, sewing machine model

General Description

The Eltex Electronic Thread Tension Monitor (ETM) is an on-line device for sewing machines and similar applications, to monitor the thread tension and act as a thread break detector. *It enables the operator to keep the thread tension within the desired tension range for best operation and quality of the seam.*

The ETM indicates, with LED's, if the thread tension is too high or too low. If the thread tension goes below or above a selected range, the ETM will generate a stop signal to the machine.

Features

- Monitors thread tension according to selected limits.
- Generates stop pulse when thread tension is below or above the selected range.
- Separate sensor head and electronics enables fitting in tight areas.
- Easy setting and clear readings through standard code switches.
- LED indication at Synchronization input.
- Open collector stop output allows different power sources for stop relay.
- Factory calibrated – no manual reset.
- ESD protected inputs and outputs.
- Standard 9-pin D-sub connector.

Advantages

- Improves sewing quality.
- Allows you to operate with the correct thread tension.
- Acts as a thread stop motion / thread break detector.
- Protects against overtension.
- Alerts the operator to dirt and dust in the thread tensioners.
- Makes it easier for the operator to set the correct bobbin tension.
- Gives you a possibility to equalize the bobbin thread consumption (multineedle machines).

Fitting

1. Fit the sensor head after the existing thread brake. It should be fitted as close to the needle as possible, deflecting the thread as little as possible from the original path.
2. Locate the electronics box so it is possible to watch the LED's and adjust the thread brake at the same time.
3. To make the synchronisation a proximity switch (or similar) should be fitted facing the main shaft of the machine. A metal piece should be fitted to the main shaft to make the proximity switch give one pulse every revolution. The ETM (Eltex Tension Monitor) requires one pulse at a certain moment every revolution of the shaft. It requires a positive edge (high logic level voltage = 6.0–30 VDC) at the synchronisation input when the pull back arm has travelled 2/3 towards the lowest position. The thread tension is then as close to zero as possible. This is very important in order to get the ETM to work properly. The length of the syncronisation pulse is of little importance. It is essential that the positive edge arrives at the right moment on the ETM syncronisation input.

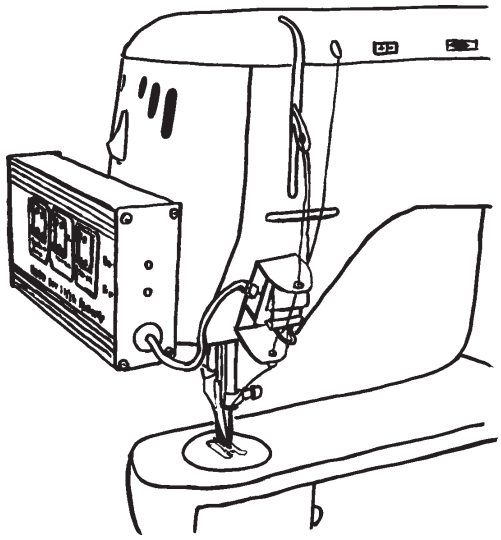


Figure 1. Eltex ETM fitted to a sewing machine

N.B. The sensor head must not be disassembled and the cable between the units must not be cut or exchanged. If this is done, the sensor head must be re-calibrated and adjusted.

Wiring

1. Connect the 12 VDC supply to pin 6 and ground to pin 7 in the ETM D-sub connector. Note that the metal housing of the electronics box is connected to the electronics ground.
2. The metal housing of the electronics box and the metal bracket of the sensor head must be electrically connected. Normally this connection is automatically made since they are both mounted on the same metal machine chassis. If there is no connecting chassis, the connection must be made with an external wire.
3. Connect the synchronization device for example a proximity switch. The proximity switch output should be connected to the synchronizing input (ETM D-sub pin 4). Connect the proximity switch to supply and ground. We recommend the use of a PNP, normally open proximity switch. The proximity switch should have a switching frequency several times the frequency used, to ensure that there is no delay on the sync. input. We recommend a switching frequency of 1000 Hz or higher. The LED at the side of the ETM D-sub connector indicates the state on the sync input. This makes it possible to check a proximity switch without LED indicator.
4. Connect the stop relay coil between the power supply and the ETM stop output (ETM D-sub pin 8). The stop relay is activated for approx. 2 seconds at stop condition and will then go back to passive state. The stop signal is normally used to open up a self holding relay circuit or supplying an input on a machine control input.

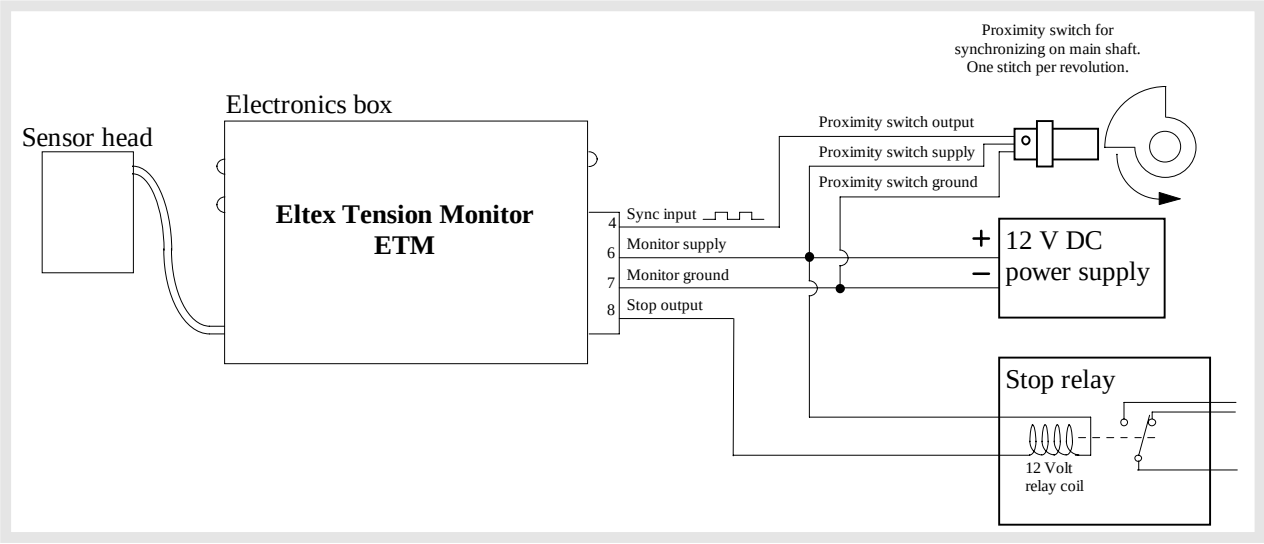


Figure 2. Connection diagram

Setting procedure

1. Begin with temporarily setting these values:

   TENSION SET POINT: 999 cN

   INDICATION LIMITS: 0 %

   STOP LIMITS: 99 %

2. Set the thread brake to the desired tension. Check the seam and make sure the machine works as intended.
3. Adjust TENSION SET POINT while sewing until both LED's are on equally often. Increase the value if the HIGH LED is on, decrease the value if the LOW LED is on.
4. Set INDICATION LIMITS to a suitable value (most applications use about 20%). This value determines how much the measured value can differ from the set value without any of the LED's indicating.
5. Set STOP LIMITS to a suitable value (for example 10%-units higher than the INDICATION LIMITS value). The stop signal will be activated and the LOW LED or HIGH LED will flash when the thread tension goes below or above the STOP LIMITS value.

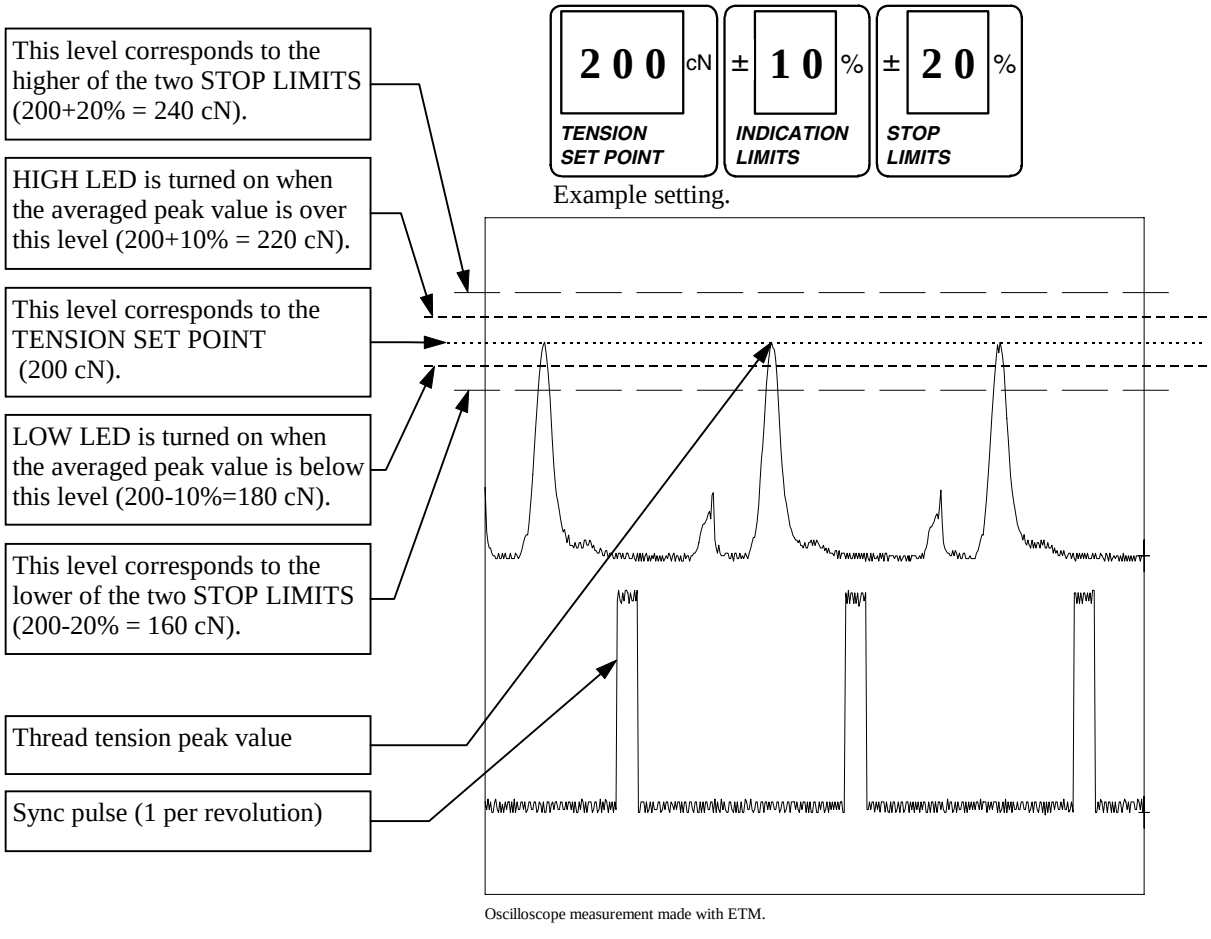


Figure 3. Oscilloscope measurement example

Working with the ETM

Once you are satisfied with the settings you can operate the machine just as normal. With a glance at the LED's now and then you can easily check if the tension is in the selected range or if the thread brake has to be adjusted. If the HIGH LED is on, loosen the thread brake. If the LOW LED is on, tighten the thread brake.

If you do not have the time or the possibility to check the LED's all the time, just let the STOP LIMITS function stop the machine when the tension goes out of the selected range. The machine will stop and the LOW LED will flash if the tension was to low or the HIGH LED will flash if the tension was to high. Adjust the thread brake or find other possible reasons why the thread tension has changed. The LED will continue flashing until the machine is started again.

If the thread tension exceeds 1.4 x calibrated tension*, the ETM will indicate overload by rapidly flashing the HIGH LED and giving a stop pulse. The LED will continue flashing until the machine is restarted.

* Example: A Tension Monitor with art. no. 14606 is, according to the last figure, calibrated to 600 cN. This means that the monitor is intended for thread tension within 0–600 cN. This monitor will indicate overload at 600 x 1.4 = 840 cN.

About the measuring principle

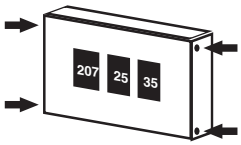
The ETM measures the peak value of the thread tension every stitch. A floating average routine is used for the indicator LED's to reduce flicker. It takes approximately 20 stitches to get the true indication after a big change in thread tension.

The STOP LIMITS function is using the same floating average value. If the thread tension goes outside the range selected at the STOP LIMITS setting during 3 stitches in a row, the stop output will be activated. The HIGH LED will flash if the high limit has been passed and LOW LED will flash if the low limit has been passed.

For qualified service staff only

Checking the analogue signal

1. Remove the lid by removing the four T-8 screws closest to the front.



2. Connect an oscilloscope channel 1 to test pin 4 (analogue signal) and channel 2 to test pin 11 (test sync pulse). The ground can be connected at test pin 3. See picture below.
3. Check that the sync pulse is in a position were the thread tension is zero. The oscilloscope picture should look similar to figure 3.

The test sync pulse is a signal supplied by the processor. The pulse starts, when the ETM gets a positive edge on the sync input line. The pulse ends, when all measurements, that has to be made at zero thread tension, has been executed.

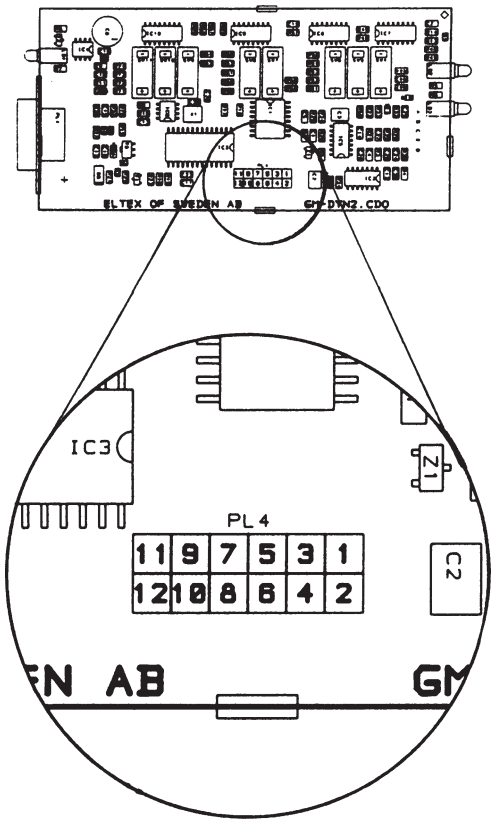


Figure 4.Test socket

Characteristics

for The Eltex Yarn Tension Monitor, Sewing machine model

Supply voltage	9–14 V DC	
Maximum current consumption	50 mA (typical consumption 32 mA)	
Maximum current into stop output	300 mA	
Maximum voltage at stop output (relay coil)	30 V DC	
Speed range	80–10 000 RPM	
Maximum voltage at Synchronisation input	30 V DC.	V_{in}low: 0–1.2 V V_{in}high: 6.0–30 V
Working ambient temperature range	15–45°C (60–110°F)	
Stop pulse length	2 seconds	
Cable length between sensor head end electronic box	100 mm (50–500 mm on request)	
Electronic box dimensions (width x height x depth)	115 x 61 x 25 mm	
Sensor head dimensions (width x height x depth)	25 x 42 x 29 mm	
Accuracy	±10% of measuring range	

If the ETM unit is used in an application where periodic calibration is required, Eltex recommend to do this yearly at Eltex of Sweden main office.

Other calibration interval can be decided by the user.

N.B. The sensor head must not be disassembled and the cable between the units must not be cut or exchanged. If this is done, the sensor head must be re-calibrated and adjusted.

Declaration of conformity according to the EMC Directive 89/336/EEC

The Eltex Tension Monitors (ETM) 1460x conform to the standard EN 61326-1 (1997)

We reserve the right to modify the design.

Eltex of Sweden AB
is an innovative company manufacturing and marketing high-technology electronic equipment.
The company was founded in 1964 and has affiliated companies in many countries.

Eltex of Sweden is the market leader in the world of electronic
yarn movement detectors and yarn tension monitors for textile machines.
We have a large range of load limiters and control equipment for electrical heating systems.
Eltex also manufacture data acquisition systems for online operation and small data loggers
for temperature, air humidity, voltage and current.

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2007-11-14/Manual ETM Sew 14600 en.pmd/TH-0200-09