

# ***Operating manual***



## ***QTVmini***

***Yarn break detector system  
for Mini-SMG yarn sensors***

*Doc. no. TH-0251-09*

*(Diese Anleitung ist auf Deutsch erhältlich, TH-0275)*

**ELTEX**  
OF SWEDEN

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# General description

The QTVmini + MiniSMG yarn break detector system is designed to monitor any kind of moving yarns. The system is designed for machines with up to 180 yarns, like creels for winders, yarn preparation machines and other multi thread applications.

QTVmini is easy to use with a minimum of parameters to adjust.

All settings, and other user information, are displayed on a LCD display.

Sensitivity and start delay are easily set by potentiometers in the central control unit.

Other settings, such as reaction time and learn mode, are set via a DIP-switch.

A relearn button is easily accessible on the front side of the unit.

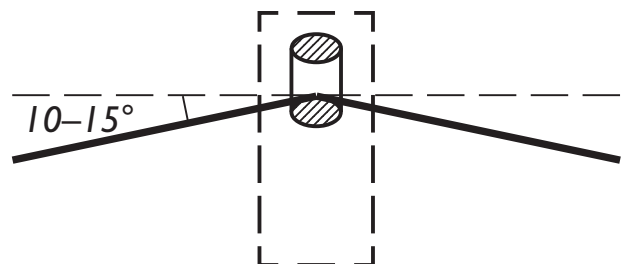
## Main features

- The detection is made with piezo electrical elements sensing the yarn movement.
- The yarn sensor, which is insensitive to dust and dirt, detects a yarn break in a few milliseconds.
- The number of yarns in operation is shown on the display.
- The number of yarns are counted during a learn period. For a style change the operator activates the learn mode under which the QTVmini system counts the number of yarns. Each eyelet is then switched on or off automatically.
- At machine start the system will detect if too many yarns are in operation (ANTI function). This function can be switched off.
- Parameters such as sensitivity and reaction time can easily be set from the central control unit. All settings are common for all sensors.
- Connections are easily made by ribbon cable connectors.

## Mounting

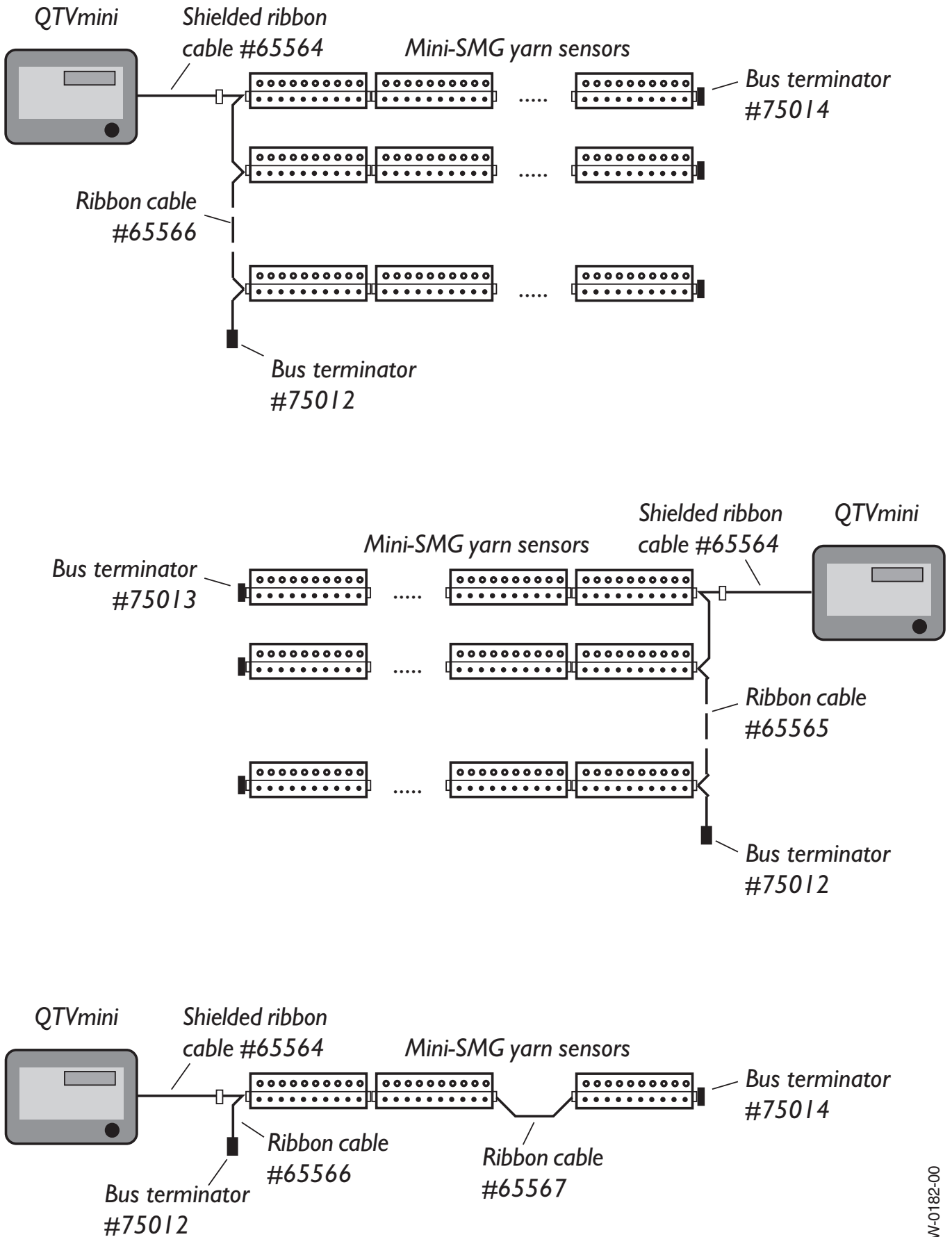
To fit the box to the machine: Open the lid and fix the box to the machine by one screw in each corner. The unit should preferably be mounted so that the display is easily viewed.

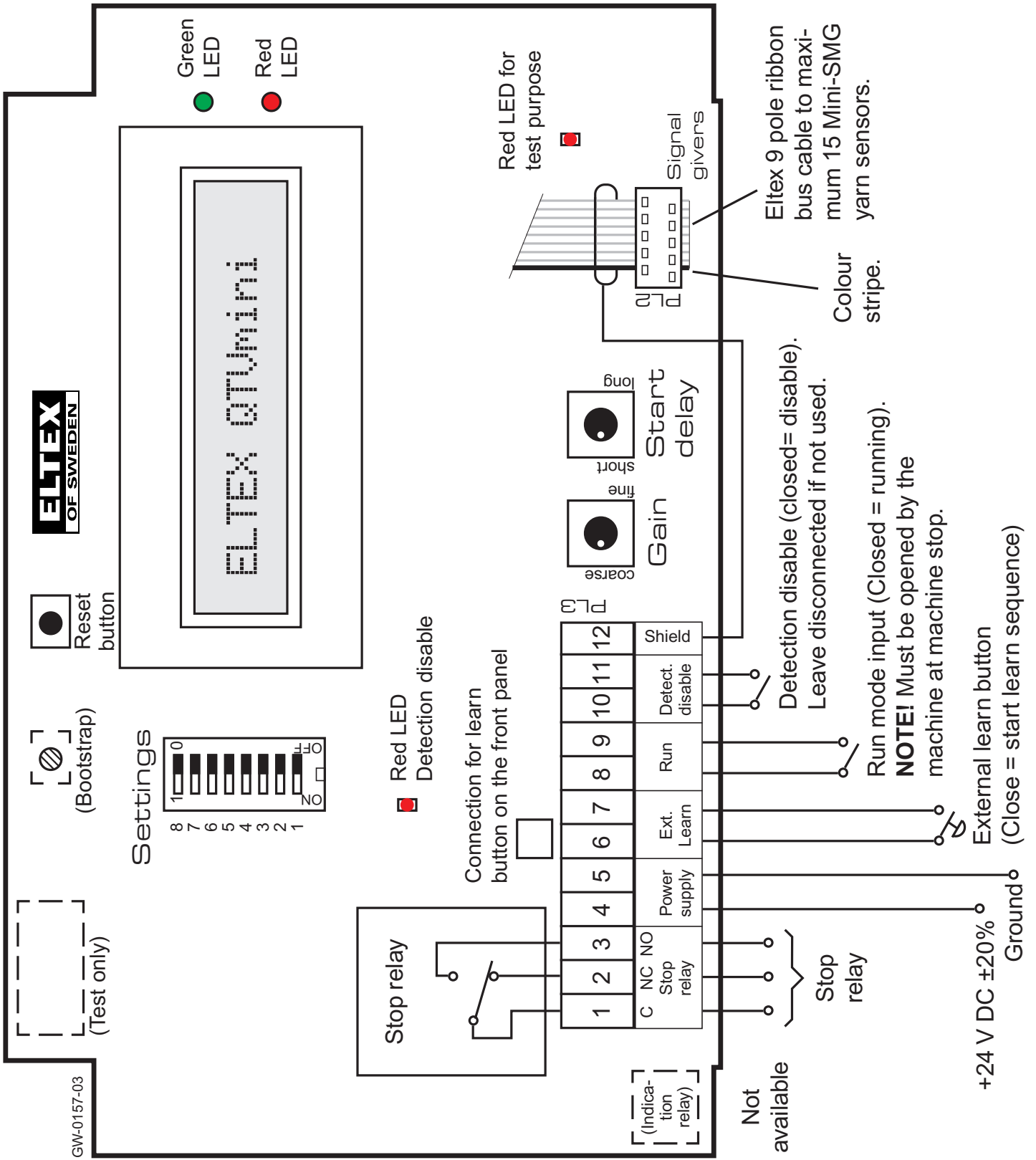
To obtain the best yarn detection, the yarn sensors should be mounted so that the yarn is forming a small angle (10–15°) through the eyelet.



# Connection

Mini-SMG yarn sensors to QTVmini central control unit. Maximum 15 yarn sensors.  
All ribbon cables are made to customer specification.





# Display

The display indicates all major settings (circulating 1 second each). All changes of the settings are displayed for 3 sec. Yarn errors are displayed until next machine start, system errors are displayed until power off–power on or the reset button is pushed.

Messages: see Settings and Error messages.

# Settings

The settings are common for all the yarn sensors.

## Gain

Gain is the sensitivity setting for the Mini-SMG yarn sensors.

To set the gain: start the machine with gain setting “**fine**” ↷ (max. gain) and reduce the setting ↶ slowly, until the machine stops. Then increase the setting one or two steps. If the machine makes false stops, increase the gain setting a little more.

The setting is also visible on the display: `Sensitivity: 15`

## Start delay

Start delay is the time between machine start and start of the yarn supervision. The start delay is used to begin the yarn supervision as soon as the yarns have reached the necessary speed. If problems are encountered at every machine start, increase the start delay. Setting range 0–30 seconds.

The setting is also visible on the display: `StartDelay: 30 s`

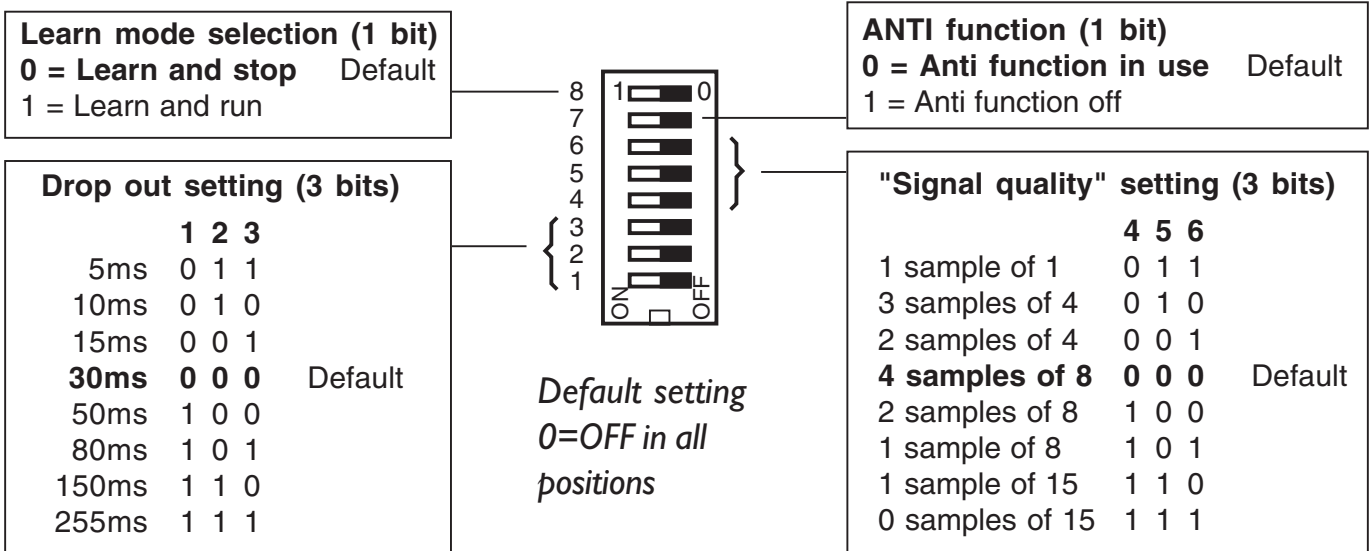
# Learn function

The learn function is used to determine how many yarns are used on the machine and in which yarn sensor eyelets they are positioned. Instead of on/off switches for every eyelet the system automatically learns in which eyelets the yarns are moving when the machine is running.

To start a learn sequence, press the “Learn” button on the front or the external Learn button, if there is one connected. If the machine is not running, you will be prompted to start the machine. The learn sequence will then continue according to the learn mode settings. If the machine is already running, the learn sequence will start immediately.

At the end of the learn mode the number of detected yarns will be displayed. ***Check that the correct number of yarns have been detected.***

# For advanced users only



## Learn mode selection

Default setting is 0 (OFF) = after learning the machine will stop, and the number of running threads will be shown on the display and by the LED's on the yarn sensors.

Setting 1 (ON) = after learning, the machine will continue to run and the number of running threads will be shown on the display for a short moment. No indication on the yarn sensors.

## Drop out setting

Allows for a signal drop out without stopping the machine. Default setting is 30 ms. **To be adjusted only in special cases.** The appropriate setting depends on:

- Yarn quality.
- Yarn speed (Slow yarn speed = increase the drop-out time. High yarn speed = decrease the drop-out time).
- Yarn movement (Jumping/uneven = increase the drop out time. Smooth yarn movement = decrease the drop out time).

The setting is also visible on the display: `DOTime: 30 ms`

## ANTI function

ANTI function means that the system will, at machine start, detect if too many yarns are in operation. **NOTE!** The ANTI function is in use as default setting.

## Signal quality setting

### To be adjusted only in special cases.

Every yarn is supervised several times to determine whether the yarn is moving or not. The signal quality setting allows for an error margin. The default setting is “4 samples of 8” = 50% of all signal samples must indicate yarn movement, otherwise the machine will stop. This also means that max. 4 consecutive signal samples are allowed to fail.

“1 sample of 1” means that every signal sample must indicate yarn movement, otherwise the machine will stop.

“0 samples of 15” is used only for yarn sensor test.

The setting is also visible on the display: `Sig Qual: 4:8`

## LED indicators

Indicator	Yarn detection off	Yarn detection on	Yarn break stop	ANTI fault stop	Error
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### QTVmini

Green LED	On	Flashing	On	On	On
Red LED	Off	Off	Slow flash	On	Fast flash

### Mini-SMG

Green LED	On	Flashing	On	On	-
Red LED	Off	Off	Flashing	On	-

## Reset button

Resets the unit and checks all functions. Is to be used only when troubleshooting the system. Power off–power on will act the same way.



# Specifications

## System

Power supply	24 V DC +/-20%
Stopping time	Typical 70 ms (with default settings)
Minimum yarn speed	Approx. 30 m/min

## Central control unit, QTVmini I I450

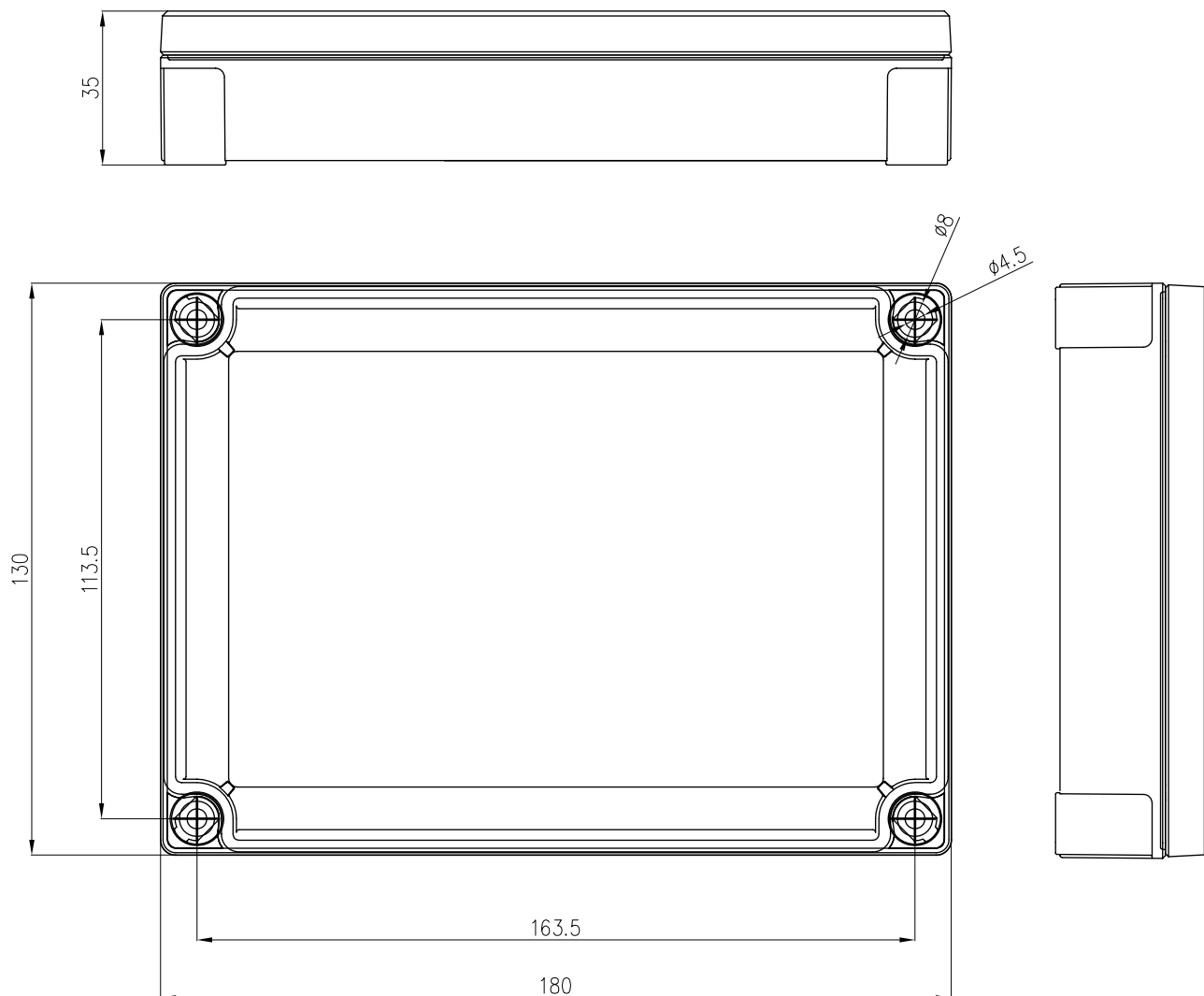
Current consumption	<250 mA (QTVmini only)
Inputs	Power supply Yarn sensors (max. 15 Mini-SMG yarn sensors) Run mode signal External learn button
Outputs	Stop relay
Display	1 x 16 characters, back light LCD

## Mini-SMG yarn sensor

See also separate leaflet for Mini-SMG yarn sensor.

Current consumption	65 mA/yarn sensor
Eyelets	Diam. 6 mm, ceramic
Eyelet spacing	15mm
Scanning speed	Typical 2 ms/eyelet
Outputs	9-pole D-sub connector
Indicators	One red lamp/eyelet for yarn indication. One green lamp/yarn sensor for running mode indication.

# Dimensions, mm



# Troubleshooting

## Error messages

When an error is found, either by the test at power-up or while the machine is running, the QTVmini central control unit (11450) enters an error state. The stop relay is activated, the red LED is turned on and an error message is written to the display. Use the troubleshooting manual and eliminate the cause of the error. If it does not work, it is also possible to run the machine without the yarn stop motion active if you turn off the power to the QTVmini.

An error message is displayed in one of the two following ways:

1. \*ERR x\*
2. \*ERR x, SG n\*

**x** is the error number and **n** is the sensor number where the problem is found.

If the error is not in the MiniSMG sensors or if the software can not determine in which sensor the problem lies, then message type 1 is used.

The following errors can appear:

<b>Error text</b>	<b>Description</b>
<i>ERR 1</i>	<i>Illegal Instruction</i>
<i>ERR 2</i>	<i>CPU Oscillator Fail</i>
<i>ERR 3</i>	<i>Watchdog Reset</i>
<i>ERR 4</i>	<i>System EEPROM Defect</i>
<i>ERR 10</i>	<i>Read Parity Error</i>
<i>ERR 11</i>	<i>Send Parity Error</i>
<i>ERR 12</i>	<i>Daisy Return Low</i>
<i>ERR 13</i>	<i>No Daisy Return</i>
<i>ERR 14</i>	<i>Count Error</i>
<i>ERR 17</i>	<i>Unexpected Signal</i>
<i>ERR 18</i>	<i>Early Daisy Return</i>
<i>ERR 19</i>	<i>Stop Line Locked</i>
<i>ERR 20</i>	<i>Read Line Locked</i>
<i>ERR 21</i>	<i>Sensor EEPROM Defect</i>

## Detailed description

If an error comes when the system is working, write down the error message and press the Reset Button, under the cover, just above the display (see picture on page 3). If an error is found, look below for an explanation, if not, contact service personnel about the original error message written down. After every action taken, press the Reset Button to see if the error has been fixed.

## **ERR 1      Illegal Instruction**

### **Explanation:**

The microprocessor in the QTVmini central control unit has encountered an unknown command in its program memory because of interference or defective hardware.

### **Action:**

Try replacing the central control unit. If that does not help, try to find the source of the interference and eliminate it.

## **ERR 2              CPU Oscillator Fail**

### **Explanation:**

The crystal for the microprocessor in the QTVmini central control unit has, for a short time, stopped oscillating. It is caused by interference or defective hardware.

### **Action:**

Try replacing the central control unit. If that does not help, try to find the source of the interference and eliminate it.

## **ERR 3              Watchdog Reset**

### **Explanation:**

The microprocessor in the QTVmini central control unit has a watchdog, that checks that the program is running normally. If the program does not clear this watchdog regularly it will reset the central control unit. That is what has happened here. The reason is interference or defective hardware.

### **Action:**

Try replacing the central control unit. If that doesn't help try to find the source of the interference and eliminate it.

## **ERR 4              System EEPROM Defect**

### **Explanation:**

The microprocessor in the QTVmini central control unit contains a small memory used for storing installation values. This error means that a write to the memory has failed.

### **Action:**

Replace the central control unit.

## **ERR 10                      Read Parity Error**

### **Explanation:**

The serial communication between the yarn sensors and the central control unit includes an even parity check. This error means that the serial message read from one yarn sensor has been corrupted due to interference or hardware problems.

### **Action:**

Press the Reset Button and look up the new error message. If no error is found the problem is most likely interference. Try to find the source of the interference and eliminate it.

## **ERR 11                      Send Parity Error**

### **Explanation:**

The serial communication between the yarn sensors and the central control unit includes an even parity check. This error means that the serial message sent to the yarn sensors has been corrupted due to interference or hardware problems.

### **Action:**

Press the Reset Button and look up the new error message. If no error is found the problem is most likely interference. Try to find the source of the interference and eliminate it.

## **ERR 12                      Daisy Return Low**

### **Explanation:**

In the 9 pole ribbon cable, that is connected to the yarn sensors, one lead is for the daisy chain return signal. The QTV bus terminator 75012 at the end of the yarn sensor cable and terminator 75013 or 75014 on the yarn sensor have the responsibility to return this signal to the central control unit. This error means that the signal is permanently held low (zero volt) because of some hardware problem.

### **Action:**

Try to find the defect yarn sensor with the methods described in section 'Fault searching techniques' below. Continue until error disappears or only one sensor remains.

Disconnect the remaining sensor and press the Reset Button (**NOTE!** Do not replace this last sensor with a bus terminator, just disconnect it). If ERR 13 appears then the sensor is defective, otherwise replace the yarn sensor cable or the central control unit.

## **ERR 13 [, SG n]      No Daisy Return**

### **Explanation:**

In the 9 pole ribbon cable that is connected to the yarn sensors, one lead is for the daisy chain return signal. The QTV bus terminator 75012 at the end of the yarn sensor cable and terminator 75013 or 75014 on the yarn sensor have the responsibility to return this signal to the central control unit. This error means that the signal is not returned because of hardware problems or interference.

### **Action:**

First, make sure that all bus terminators are in place. Both connectors on each yarn sensor must be connected to something, either to another sensor, a bus terminator 75013/75014 or the yarn sensor cable. All the connectors on the cable must also be used. The last cable connector must have a 75012 bus terminator.

Next, try to find the defect yarn sensor with the methods described in section 'Fault searching techniques' below. Continue until error disappears or only one sensor remains.

Finally, replace the remaining sensor and press the Reset Button (**NOTE!** This last sensor must be replaced with a bus terminator). If ERR 12 appears then the sensor is defective, otherwise replace the yarn sensor cable or the central control unit.

## **ERR 14 [, SG n]      Count Error**

### **Explanation:**

At power-up the central control unit counts the number of yarn sensors a few times. This error comes if any of these counts differ from the others. This can be the result of bad cables or defective hardware.

### **Action:**

If a yarn sensor number is displayed, then check that the cables between yarn sensor (n) and (n-1) and between (n) and (n+1) are OK.

Try to find the defective yarn sensor with the methods described in section 'Fault searching techniques' below.

Finally, try to replace the central control unit and the yarn sensor cable.

## **ERR 17 [, SG n]            Unexpected Signal**

### **Explanation:**

At power-up the central control unit checks that no yarn sensor detects signal. The reason for this error can be a yarn moving during power-up, vibrations in the creel or a defect yarn sensor.

### **Action:**

See that no yarn is moving and press the Reset Button. If the same error comes again, do the following:

Check if the creel vibrates. If so, try to eliminate vibrations or set the yarn sensor sensitivity a little lower.

Otherwise, replace yarn sensors whose LEDs are flashing.

## **ERR 18                    Early Daisy Return**

### **Explanation:**

In the 9 pole ribbon cable, that is connected to the yarn sensors, one lead is for the daisy chain return signal. The QTV bus terminator 75012 at the end of the yarn sensor cable and terminator 75013 or 75014 on the yarn sensor have the responsibility to return this signal to the central control unit. This error means that the central control unit did not expect the signal to come back so soon. It is caused by interference or defective hardware.

### **Action:**

Press the Reset Button and look up the new error message. If no error is found, the problem is most likely interference. Try to find the source of the interference and eliminate it.

## **ERR 19 [, SG n]            Stop Line Locked**

### **Explanation:**

At power-up the central control unit checks the stop line in the 9 pole yarn sensor cable. This error comes if one of the yarn sensors' stop line can not be toggled.

### **Action:**

Try to find the defective yarn sensor with the methods described in section 'Fault searching techniques' below. Continue until the error disappears or only one sensor remains.

Replace the remaining sensor with another sensor and press the Reset Button. If ERR 19 still appears then replace the yarn sensor cable and/or the central control unit.

## **ERR 20 [, SG n]      Read Line Locked**

### **Explanation:**

At power-up the central control unit checks the data read line in the 9 pole yarn sensor cable. This error comes if one of the yarn sensors' data read line can not be toggled.

### **Action:**

Try to find the defective yarn sensor with the methods described in section 'Fault searching techniques' below. Continue until error disappears or only one sensor remains.

Replace the remaining sensor with another sensor and press the Reset Button. If ERR 20 still appears, then replace the yarn sensor cable and/or the central control unit.

## **ERR 21                      Sensor EEPROM Defect**

### **Explanation:**

The microprocessor in the central control unit contains a small memory used for storing values for the yarn sensors. This error means that a write to the memory has failed.

### **Action:**

Replace the central control unit.



## **Fault searching techniques**

After each action, press the Reset Button to see if the error has been found.

No connectors on the cable or the sensors may be left open during the test, unless the 'Action' section in the error explanation says so. A sensor that is removed, must be replaced with either another sensor or with a bus terminator, type 75013 or 75014. A cable terminator 75012, must always be mounted at the end of the yarn sensor cable.

Sometimes an error message includes the sensor number, for example '\*ERR 19, SG 5\*'. The first thing to do then is to replace sensor no. 5 with a spare or move the bus terminator 75013 or 75014 from sensor no. 5 to the cable connector. Then press the Reset Button.

If the error still has not been found, then try the sensor before the one in the error message, in our example sensor no. 4. After each action press the Reset Button to see if the error has disappeared.

Finally try replacing the sensor after the one in the error message, in our example sensor no. 6.

If the problem remains, or if the sensor number is not displayed, then use the binary search method below:

### **Do the following:**

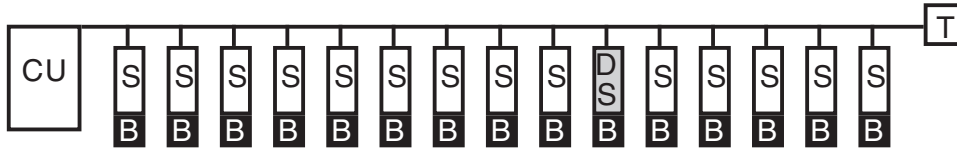
1. Remove half of the sensors starting at the end of the cable. Press the Reset Button.
2. If error, remove half of the existing sensors starting with the last one. Otherwise connect half of the sensors previously removed. Press the Reset Button.
3. If error, remove the remaining sensors one at a time starting with the last one until the Reset Button test is OK. Otherwise reconnect the sensors removed in step 2, one at a time, until the Reset Button test is OK, or reconnect the rest of the sensors removed in step 1, one at a time, until the Reset Button test says error again.

### **Examples:**

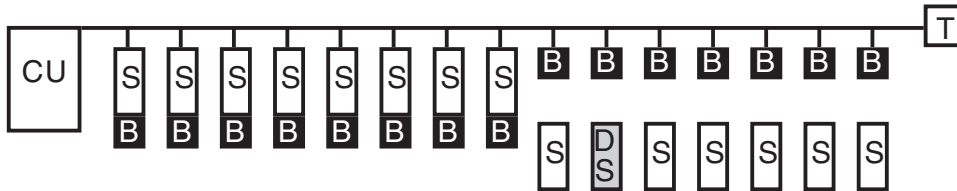
CU	Central control unit QTVmini
S	MiniSMG yarn sensor
DS	Defect MiniSMG yarn sensor
B	Bus terminator 75013 or 75014
T	Cable terminator 75012

## Error example I

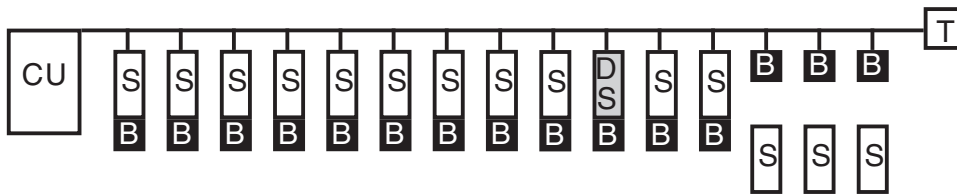
**NOTE!** After each step, press the Reset Button.



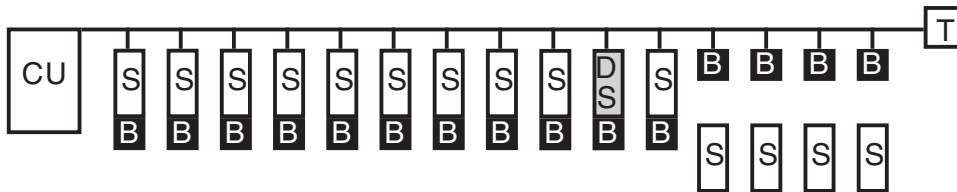
Replace half of the sensors with bus terminators.



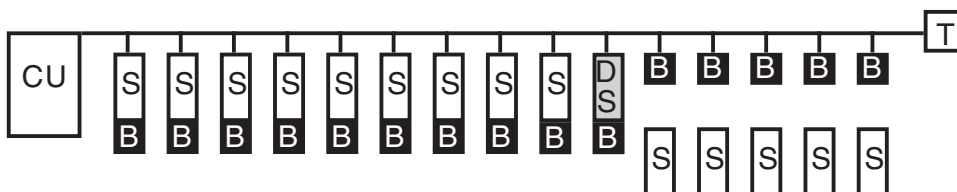
Error has disappeared. Reconnect half of the removed sensors.



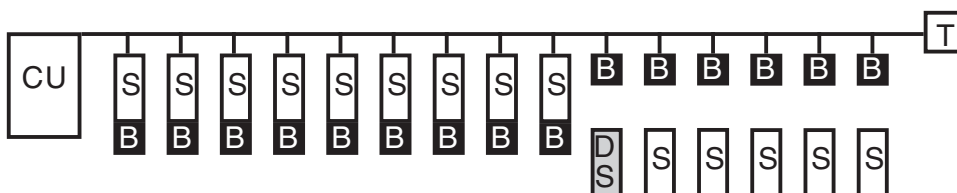
Error is back. Remove last sensor.



Error is still there. Remove last sensor.



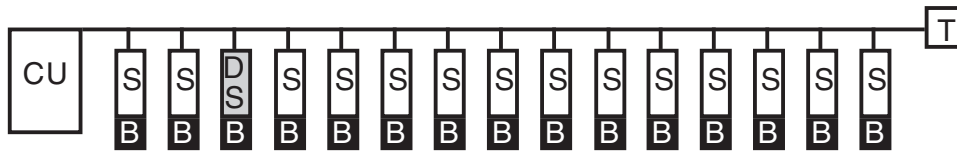
Error is still there. Remove last sensor.



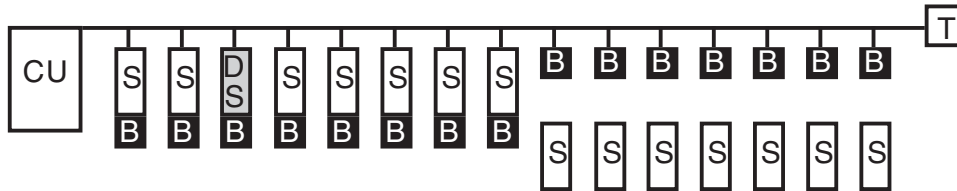
Error has disappeared. Defective sensor is found.

## Error example 2

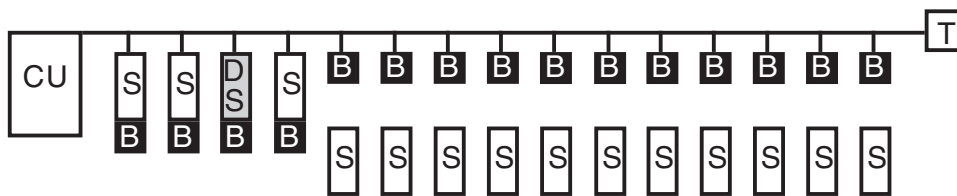
NOTE! After each step, press the Reset Button.



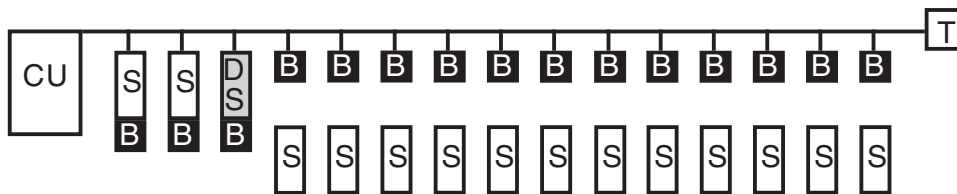
Replace half of the sensors with bus terminators.



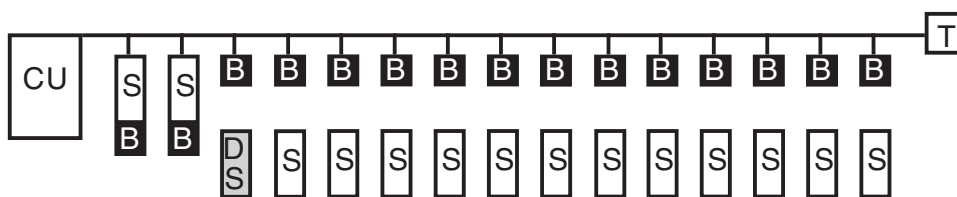
Error is still there. Remove half of the remaining sensors.



Error is still there. Remove last sensor.



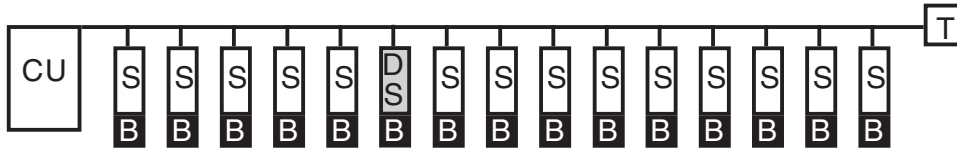
Error is still there. Remove last sensor.



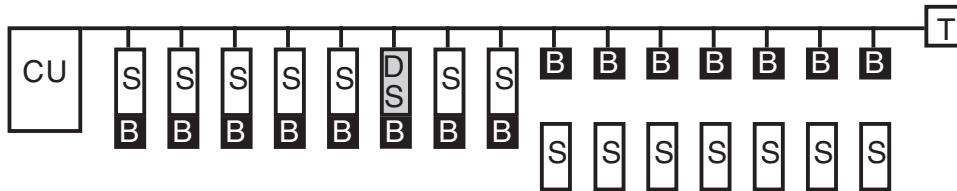
Error has disappeared. Defective sensor is found.

### Error example 3

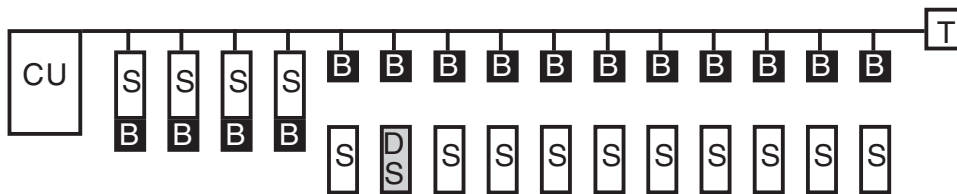
**NOTE!** After each step, press the Reset Button.



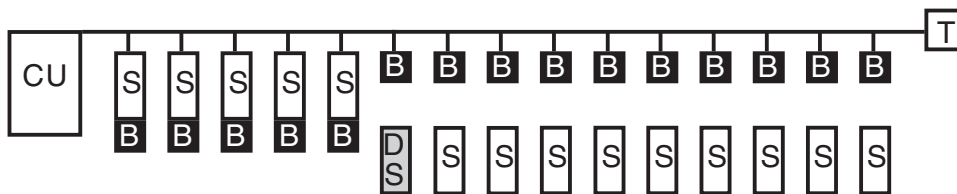
Replace half of the sensors with bus terminators.



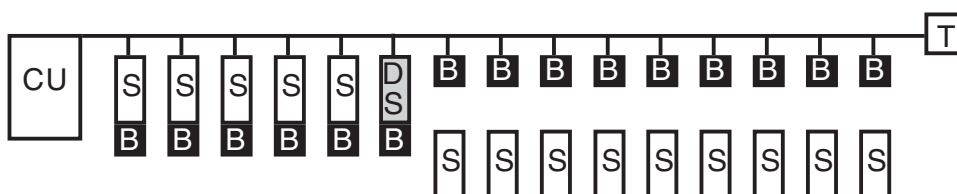
Error is still there. Remove half of the remaining sensors.



Error has disappeared. Reconnect one sensor.



Still no error. Reconnect one sensor.



Error is back. Defective sensor is found.

These examples assume that there is only one sensor for each cable connector. The MiniSMG sensors can be connected to each other, thus needing less cable connectors. The binary search technique above can still be used though.

If no defective sensor is found and if the error types or sensor numbers seem to appear randomly, then it is probably a defective sensor cable.

## **Sensor numbering**

If only one sensor is connected to each cable connector, then the numbering is straightforward. The sensor closest to the central control unit is no. 1. The next one is no. 2 and so on. The bus terminators 75013 and 75014 are not counted. If sensor 1 is replaced with a bus terminator then sensor 2 will become sensor 1.

It is when a sensor is connected to another sensor, instead of the cable, that it is not so easy. Which one that is before the other depends on how the sensor cable is manufactured and which end of the sensor is connected to the cable.

If each cable connector supports two sensors, then the first two are no. 1 and 2. The following two are no. 3 and 4. If error message says sensor 5 then the sensor is connected to cable connector 3. Instead of trying to find out which one is sensor 5, it is safer (and probably faster) to just replace them, one at a time, until the system is tested OK.

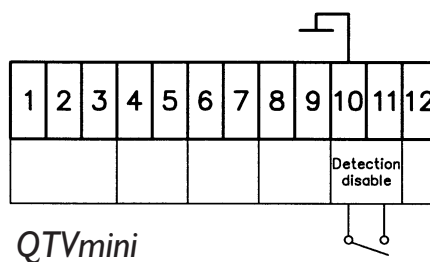
# Installation of QTVmini control unit 11451 and MiniSMG sensor on a Multiaxial Warp Knitting machine

The Eltex sensors are sensing the movement of the yarn.

On this type of machine the weft yarns are not moving continuously during machine operation. It is necessary to synchronise the QTVmini unit with the yarn movement. This can be done by using the “Detection Disable” input (10–11) on the QTVmini unit.

No. 11 must be connected to No. 10 ground (GND) when the yarns are not moving.

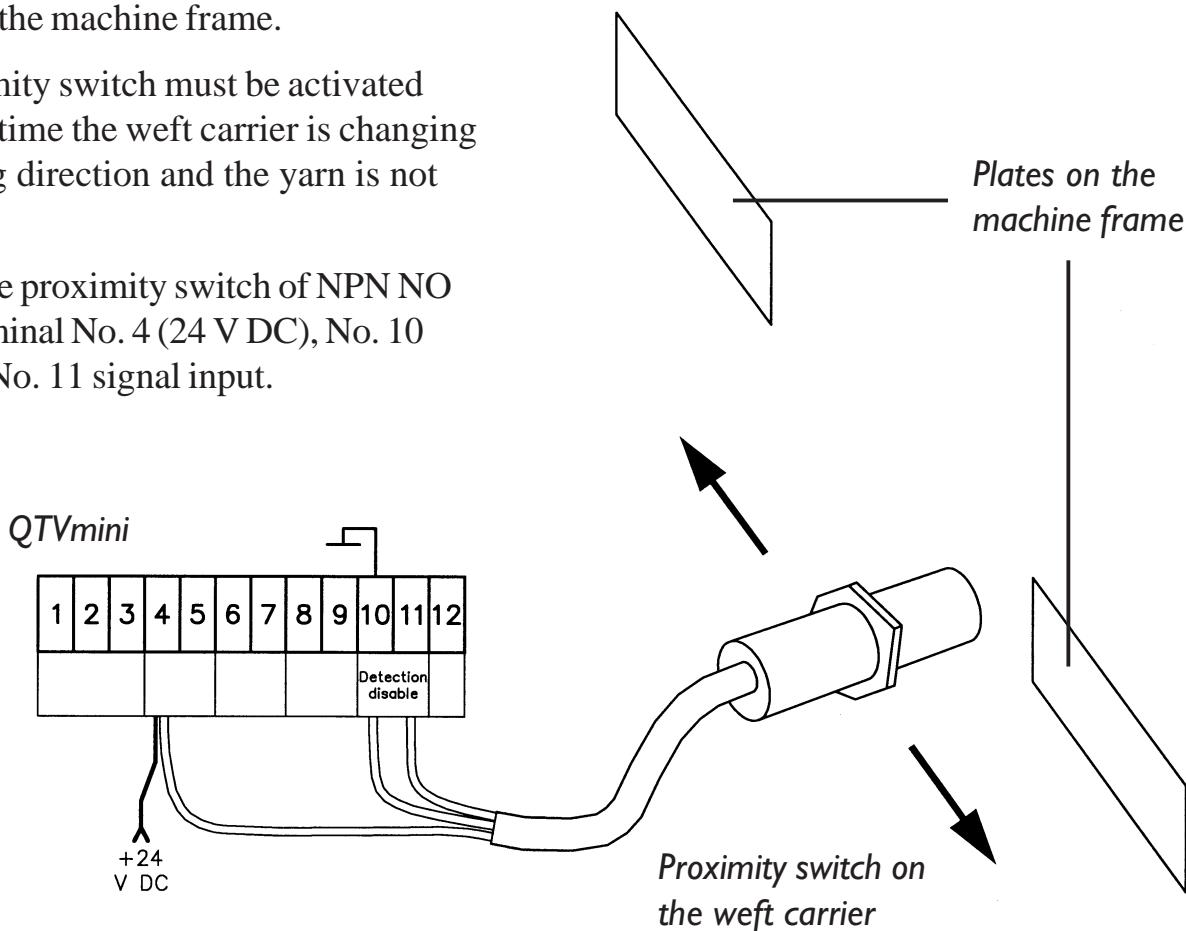
The signal to the “Detection Disable” input can come from the machine control box if the machine is prepared to have this output. Please contact the machine builder.



In case this output function is not available from the machine control box, it can be done by using a proximity switch located on the *weft carrier* and two metal plates located on the machine frame.

The proximity switch must be activated during the time the weft carrier is changing the moving direction and the yarn is not moving.

Connect the proximity switch of NPN NO type to terminal No. 4 (24 V DC), No. 10 GND and No. 11 signal input.





## **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 control equipment and load limiters 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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