

# COIL WINDING MACHINE ERN T-VERSION

## OPERATING INSTRUCTIONS

Version: 1.3

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### ERN 100T, 200T



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## 1. INTRODUCTION

Floor type universal coil winding machine ERN is designed for winding heavy coils, transformers, chokes, resistors etc with wire up to diameter of - see technical data.

### 1.1 Characteristic features:

- 15" industrial capacitive touch screen for data display and programming
- wide range of application for winding simple or complicated coils, multi-chamber coils, trapezoidal or asymmetric windings
- AC servo, that is used like a spindle drive assures excellent dynamical parameters, constant torque and accurate positioning
- wire guide on ball bearings, traverse drive servo motor
- accurate reversible turn counting
- microprocessor-controlled winding cycle without time waste
- wide programming options
- special functions LAYER-STOP, AUTOMATIC CORRECTION, MANUAL REGIME
- 4 programmable digital outputs
- 4 programmable digital inputs
- 40 GB programme store
- connection : 2x USB 2.0  
1x USB 3.0  
1x LAN

## 2. TECHNICAL DATA

### ERN 100

### ERN 200

Pitch range (mm/rev):	0,000 - 160	0,000 - 160
Winding width (mm):	400 - 800 - 1200	400-800-1200
Winding speed / torque [rpm/Nm]:	600 / 75 300 / 150	150 / 270 75 / 540
Accuracy of spindle stop [rev]:	0,01	0,01
Spindle position pre-set [rev]:	0,01	0,01
Wire guide position pre-set [mm]:	0,01	0,01
Max.speed of wire guide - shift [mm/s]:	100	100
- winding	75	75
Acceleration/deceleration:	table	table
Max.coil diameter [mm]:	600 - 800 - 1000	600 - 800 - 1000
Distance between centres [mm]:	800 - 1200 - 1600	800 - 1200 - 1600
Dimensions (mm):	740x1800 - 2300 - 2500	780x1800 - 2300 - 2500
Weight [kg]:	600 - 750 - 900	700 - 850 - 1000
Power supply [V/Hz]:	3 x 400 / 50-60	3 x 400 / 50-60
Power consumption [kVA]:	max. 7	max. 7
Noise [dB]:	74	74

### 2.1 Climatic conditions

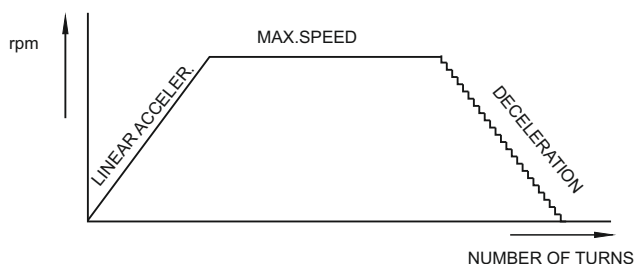
Machine is designed for normal workshop conditions with relative air moisture 70% and temperature in the range of +15 up to +30°C.

## 3. DESCRIPTION OF MACHINE

Coil winding machine ERN consists of the following parts:

- controller containing control electronics
- industrial PC with 15" touch screen
- drive unit containing servomotor with gears, pitch control unit with servomotor, power electronics and control elements
- base frame
- moving tailstock (optional tilting)
- universal wire guide (adjustable for round and flat wire)
- support with spool holders and dereelers (optional accessories)

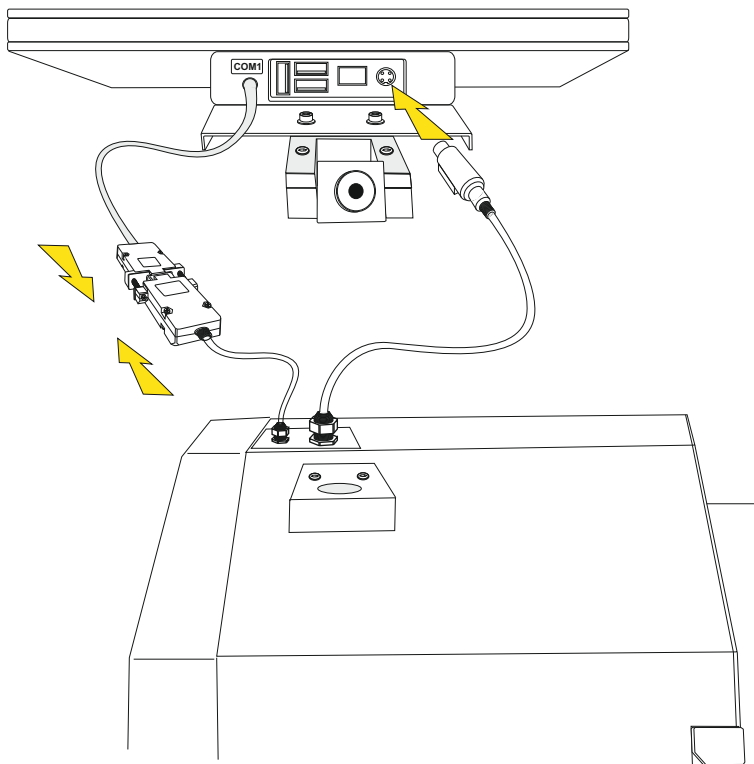
Winding cycle (linear acceleration, max.speed, linear deceleration and stop) is running automatically after pressing the START-button. Deceleration is controlled by microprocessor to ensure accurate stopping and spindle positioning.



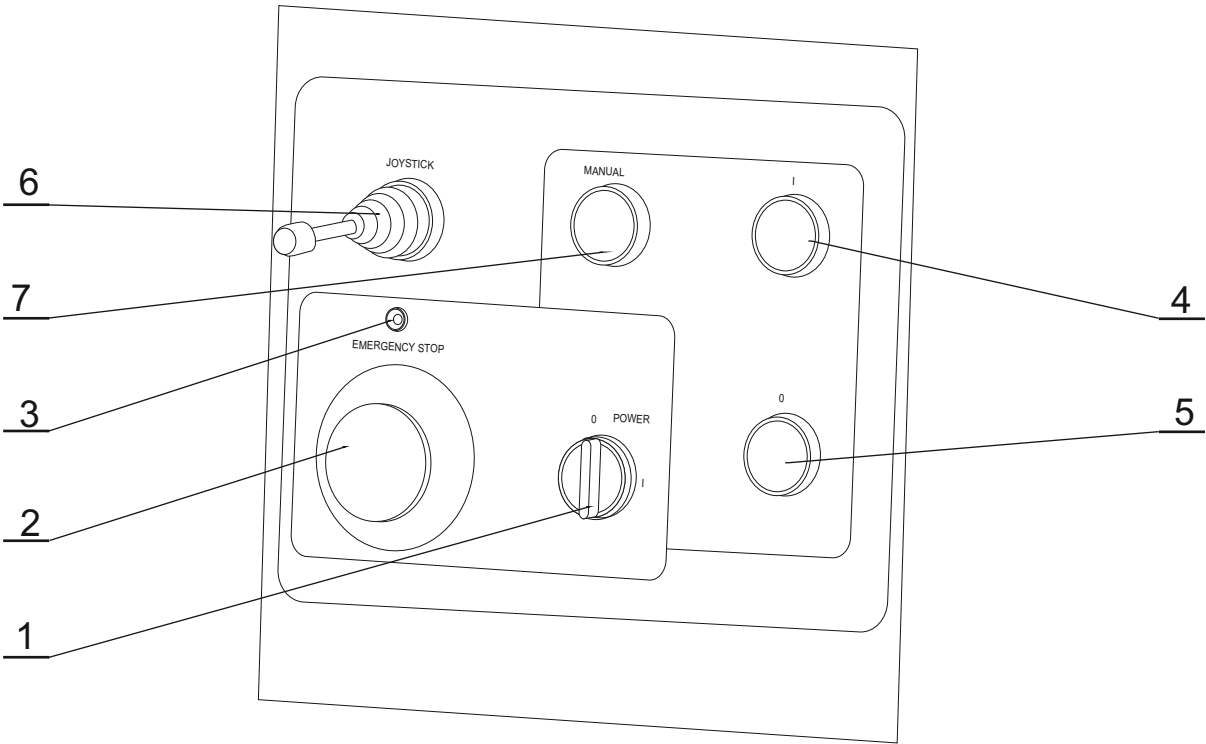
### **3.1 Description of controls**

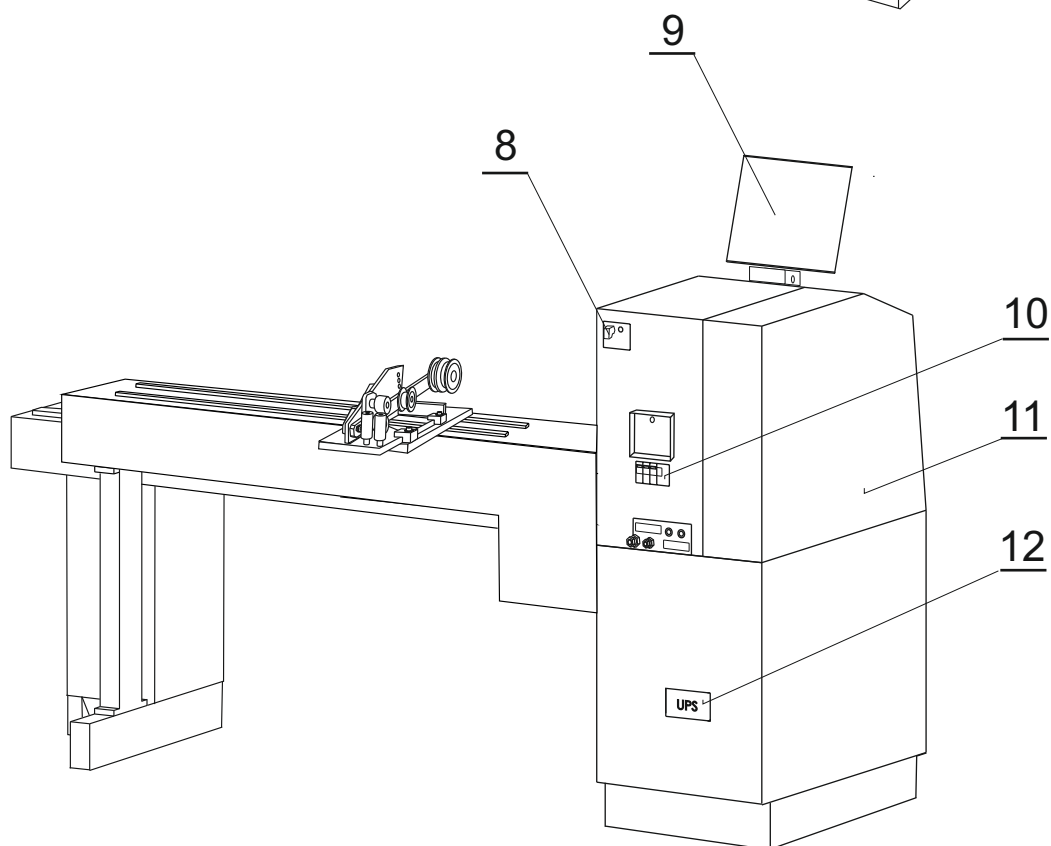
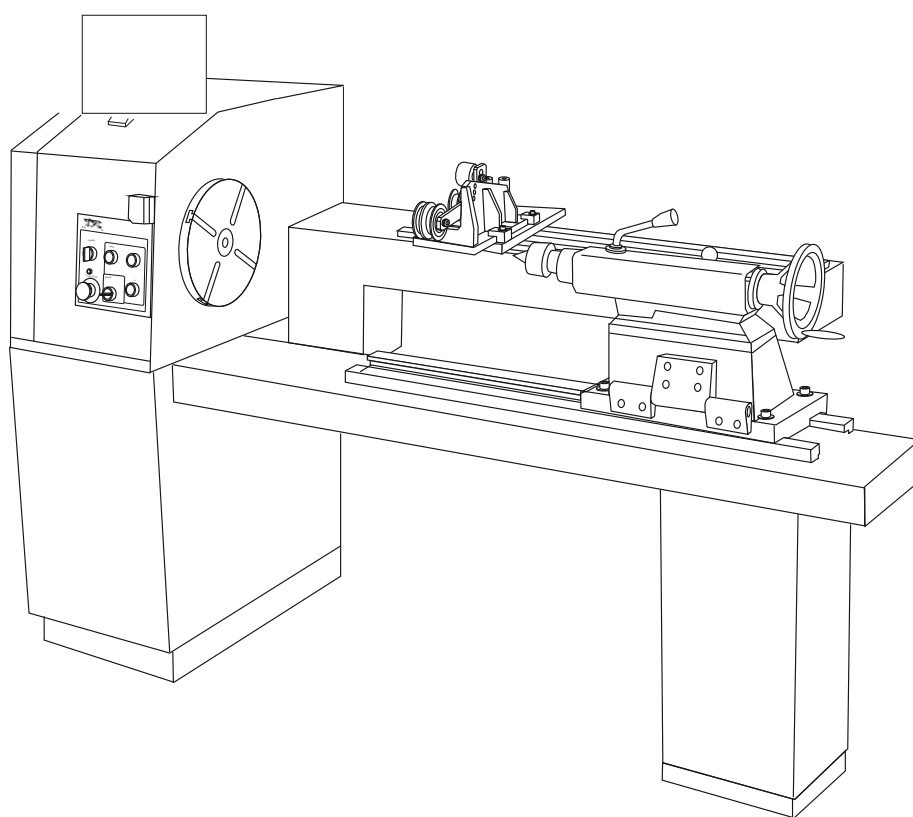
- 1 - POWER ON / OFF switch
- 2 - EMERGENCY STOP - disconnects power in emergency
- 3 - POWER ON indicator
- 4 - START button - starts the winding cycle
- 5 - STOP button - interrupts the winding cycle
- 6 - JOYSTICK
- 7 - MANUAL button
- 8 - Connector for foot pedal
- 9 - Industrial PC
- 10 - AC circuit breaker
- 11 - Gear cover
- 12 - UPS

Monitor cables assembly



Control elements







### 3.2 Description of PC display

Display provides two basic views for standard information during winding:  
**Winding window** and **Programming window**.

Switching from Winding to Programming window it is necessary to touch central display place.  
Switching back - touch ENTER button.

#### Winding window



#### Programming window



In order to work with a PC we can use the supplied mouse, which we plug into the USB port .  
Some advanced computer operations can be performed only with the mouse and keyboard.

## 4. INSTALLATION AND PREPARATION OF WORKING EQUIPMENT

### 4.1 Mechanical installation

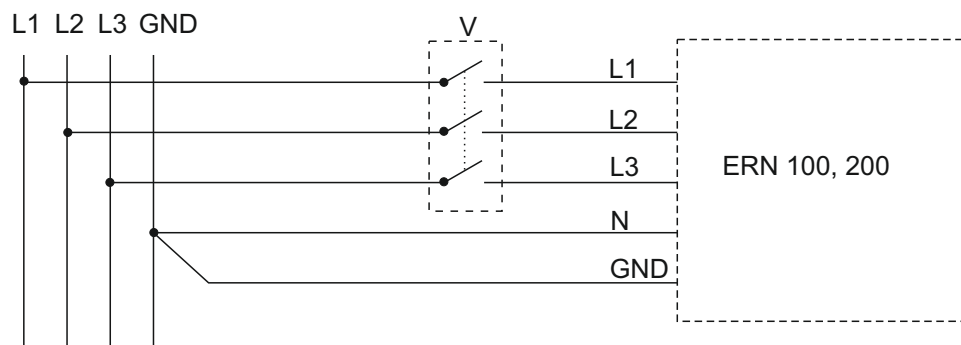
The winding machine is fixed to the transport wooden pallet. It is necessary to prepare a level balanced surface for its final location. The both frame surfaces must be balanced horizontal in one surface. The winding machine is moved by lifting at 3 pendant eyes. At the winding of heavy coils there is recommend to fix the base frame with screws M 12 directly to flooring surface.

### 4.2 Power connection

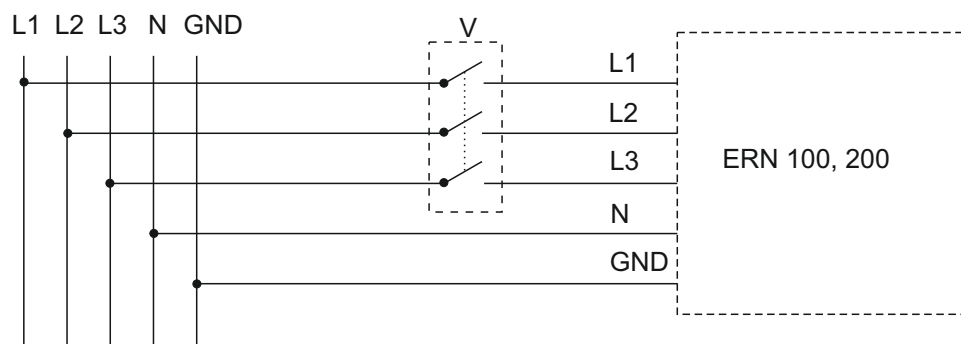
The machine must be connected to four- or five-wire system of the supply voltage 3N/PE400V/230V, 50 Hz TN-S with tolerance  $\pm 5\%$  and max. power consumption 7 kVA. Before plug in the connection cable make sure that electric power accordance with technical requirements. Only professional staff who are qualified in electrical engineering are allowed to install the power connection to the machine.

**There is no guarantee for damages caused by wrong or out of range connection to the power supply.**

#### Four-wire system - recommended connecting



#### Five-wire system - recommended connecting



An additional switch "V" is recommended to use in case, if the lead-in cable is fixly connected to the line distribution. If the moving terminal is used for the installation, this switch will be not necessary.

### 4.3 UPS

The UPS is alive constantly, if the main switch (10) is in off-position, as well. In common running the UPS must be switched on constantly. In case of continual fall-out loss of the line voltage, e.g. electric distribution breakdown, repairs and re-designs or when the running is dead, it is necessary to set the UPS to off, that the useless discharge of storage batteries does not arise. Press the buttons by instruction on label.

Repeated switch on is made by pressing the on button.

If the electric power supply was broken in the whole system - e.g. by setting the switch EMERGENCY STOP (2) to off, by the main switch (10) or the length of fall-out loss of the line voltage surpassed the battery capacity of the UPS (more than 90 minutes), the hard RESET will arise after renewing electric power supply. After pressing the ENTER button the last remembered data from EEPROM will be set up.

If the electric power supply is broken while winding, the spindle will stop and the winding machine switch over to the stand-by after few second. After renewing electric power supply the machine returns to the initial regime, but in the position like after pressing the STOP button.

**Keep always the following order at switching off and on the winding machine:**

SWITCH ON: a) the UPS - if it was off  
b) the main switch (10)  
c) the power on switch (1)

SWITCH OFF: a) the power on switch (1), wait till the dark power on indicator  
b) the main switch (10)  
c) the UPS only if it is necessary

### 4.4 Machine preparation for running

The machine operating is allowed only by skilled person who is acquainted with user's guide and safety formulas. The training is provided by producer or qualified person.

The machine is delivered partly disassembled for easier packing and transport. Before you switch the machine on, for the first time, assemble it as follows:

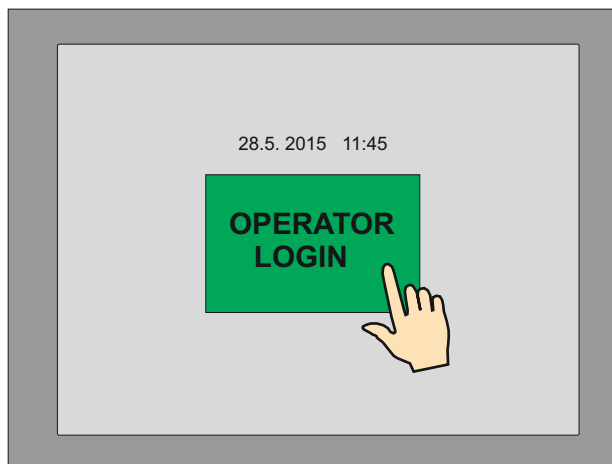
- a) Mount the display on the drive unit. Connect the power plug and serial interface.
- b) Check and fasten the fuse cartridges on the back panel of the drive unit
- c) Connect the foot pedal to the connector (8)
- d) The UPS (12) is switched on by pressing the button

Assembly is completed by this and prepared to work.

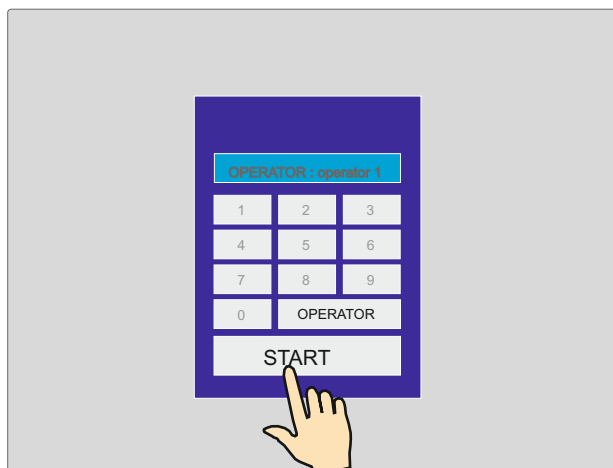
## 5. WINDING OPERATION

### 5.1 Switching the machine on and gear setting

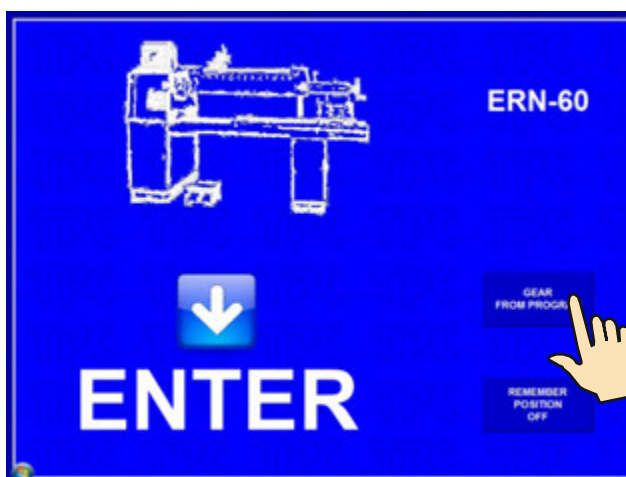
After switching on (1) the start window appears



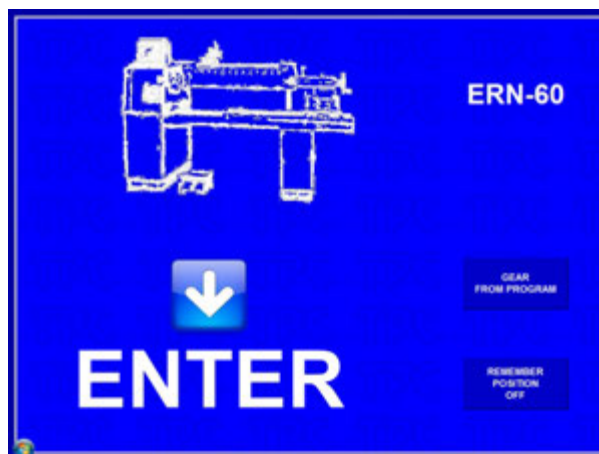
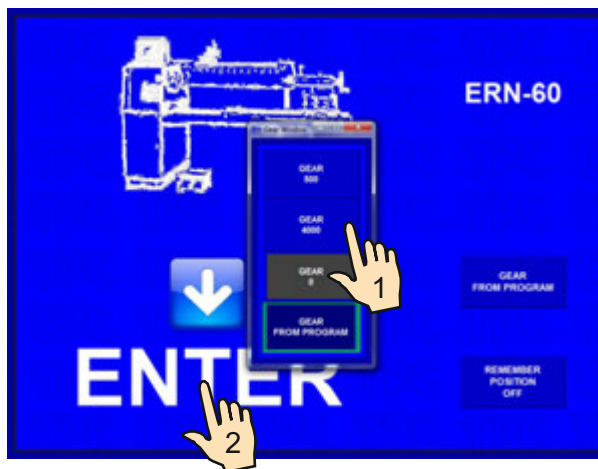
After pressing "OPERATOR" it is possible to choose operator name and continue by pressing START. This window appears only if you choose operator login (see chap. 13.)



Display provides information about the type of machine the controller is set for. In this window the set gear can be changed.



The gear change requires the use of password - Master code (listed in the warranty card) as a confirmation that the change is done by an authorized person.

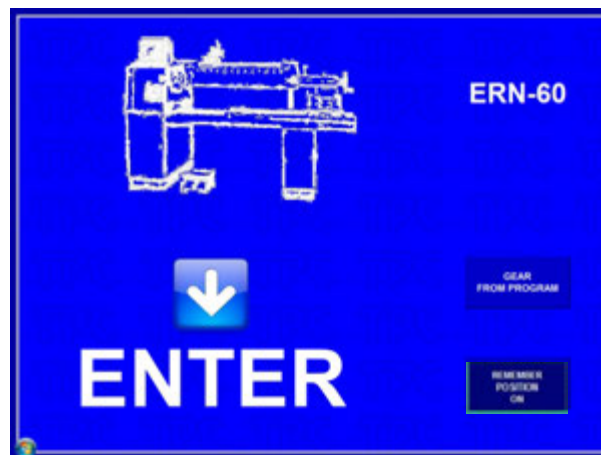
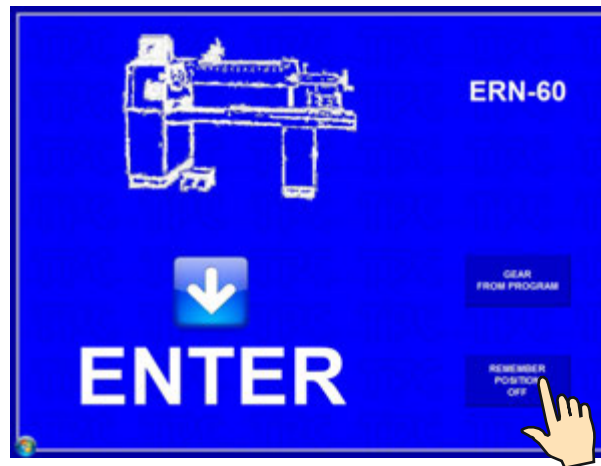


After pressing ENTER the initial setup is complete. This means that the wire guide is shifted to left home (zero) position - zero number of turns, step 0 and the last programme is set.



## 5.2 Backup of winding data in case of an electricity drop

In this window the initial setting of the machine (wire guide position, number of turns and step) can be activated.



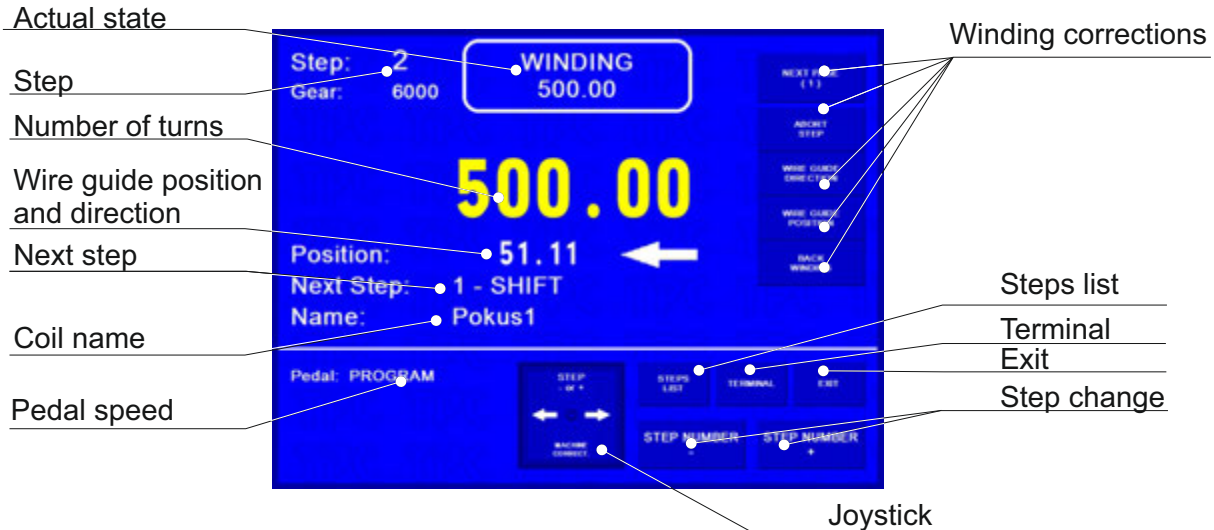
After the activation of this function (MEM.POS.ON) will be updated with values as they were before the electricity drop.

IN ORDER TO USE THIS FUNCTION THE MACHINE MUST BE EQUIPPED WITH THE UNINTERRUPTIBLE POWER SUPPLY UNIT (UPS) AND THE REPORT OF ELECTRICITY DROP (relay for POWER) MUST BE INSTALLED. IF THE MACHINE IS NOT EQUIPPED WITH THIS, THE INITIAL SETTINGS WILL BE SET TO ZERO VALUES.

### 5.3 Winding and programming window

There are two basic windows.

**Winding window** - provides actual information about the winding process



**Programming window** - displays the view of programmed step parameters



Winding is possible only in these two windows and STEPS LIST window .  
If any other window is opened, the cycle start is blocked.

### 5.4 Explanation of concepts STANDSTILL, START, STOP

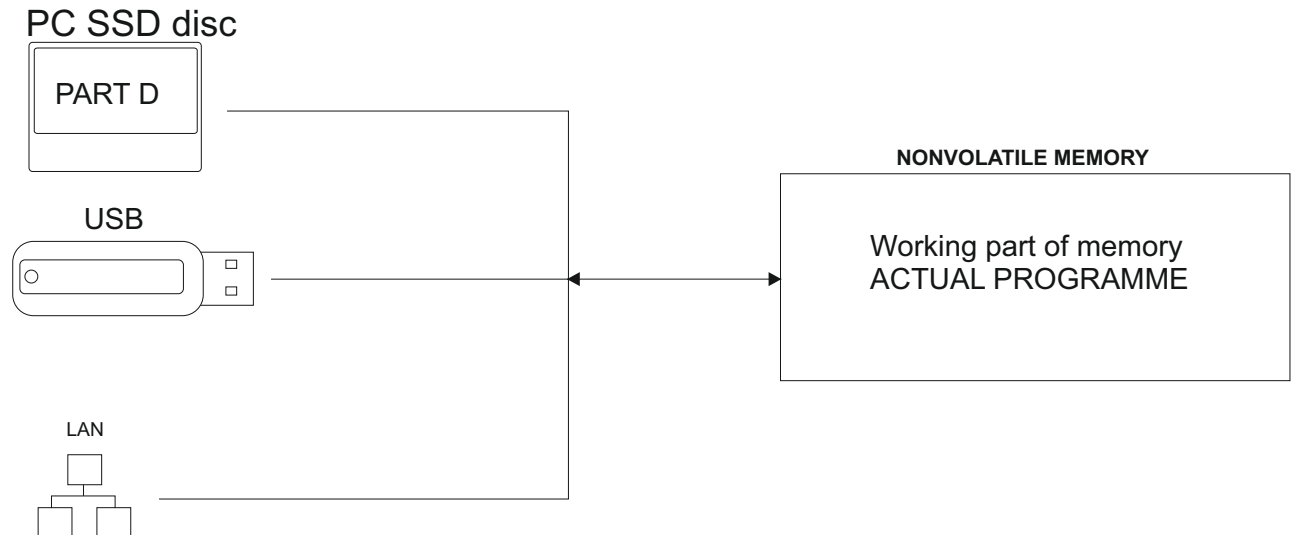
**STANDSTILL**: State after switching on the machine and pressing ENTER, or after a step finished. Starting from this state will shift the programme one step forward.  
Eg.: If we are in the step 0, after pressing START, step 1 will be running.

**START**: Active run of some step type (winding, shift, jump and pause).

**STOP**: State after pressing the STOP-button (cycle interruption).  
Pressing the START-button again will reactivate the interrupted cycle. There is no step shifting.

## 5.5 Winding programme selection

The winding programme we are currently using with (winding or programme creation can be performed) is called **ACTUAL PROGRAMME**. Actual programme is located in so-called working part of memory. Desired winding programme can be loaded to the working part of memory either from PC memory, USB flash drive or a LAN network.



Proceeding with programme selection: see section 9.

Data store in the working part of memory will remain there even if power is disconnected!

## 5.6 Start and Stop of winding cycle (programme)

Winding cycle is initiated by pressing START-button (4), or foot pedal. It is possible to start programme from each step. Required step is set up

by the touch buttons  -  , numeric keyboard or joystick.

STOP-button (5) interrupts the winding cycle. It is the priority button, which means, that the cycle interruption at incorrect time (while deceleration), may cause inaccurate stopping and positioning of the spindle. Cycle interruption at the step "Winding" allows almost all corrections and adjustments.



## 5.7 Foot pedal

Winding machine may be equipped with the following types of foot pedal:

Double foot pedal controls START, BRAKE RELEASE

- left pedal releases the spindle brake
- right pedal works in parallel with the START-button

Double foot pedal controls SPEED, BRAKE RELEASE

- left pedal releases the spindle brake
  - right foot pedal controls spindle speed depending how hard the pedal is pressed.
- Maximum speed, acceleration and deceleration ramp can be set up by PEDAL button.



Speed set up in this way is applicable only for the current programme. It is independent of the speed programmed in a specific programme step. Eg.: maximum speed set up by START pedal may be differ to maximum speed set up by START button.

There is a time delay 0,5 sec between repeated presses for safety work to prevent unintended start of the next step.



Accel. and dec. ramp for pedal

CODE	ACC.TIME ( sec )	DEC.TIME ( sec )
1	1,0	0,5
2	1,6	0,8
3	2,4	1,2
4	3,0	1,5
5	4,0	2,0
6	5,0	2,5
7	6,0	3,0
8	8,0	4,0

Acceleration and deceleration ramp values are always taken from window PEDAL SETUP.

If we require the same maximum pedal speed as speed programmed in the current programme step, we need to press the PARAMETERS FROM PROGRAM button.



Max. pedal speed is controlled by values programmed in individual programme steps.

### **Winding cycle start continuity**

This option is utilized during winding start. Wire application and winding of the first turns is done by pedal and then by pressing START button (4) cycle continues. Winding cycle can continue seamlessly without interruption.

## **5.8 Security measure – OPTO-SENSOR**

OPTO-SENSOR TURCK type QMT42VN6FF1000 with range of 1 m (2 m), which logs body moves, is placed in a spindle axis in front of the workspace.

Sensor function is set not responding by low speed. It makes possible for operating staff to do specific operations, e.g. taping.

From 25 rpm is the sensor activ and it stops the winding machine by ray break.

Marginal speed is to be programmed by PC and SERVOSTAR-software.

The winding machine can be activated by pressing the button START then.

## 5.9 Winding corrections

Program corrections and adjustments are allowed only in the state "STANDSTILL" or "Winding STOP". Keys are blocked in other states.

### 5.9.1 Spindle reference position setting

The spindle can be positioned in the range  $\pm$  a few degrees and exact position is kept for any amount of windings.

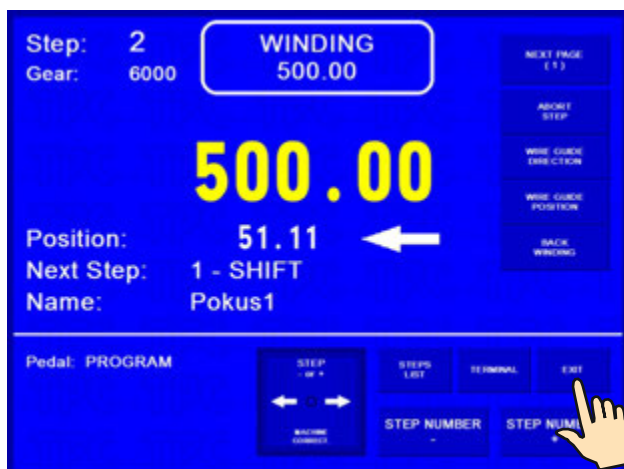
Reference (zero) spindle position is set up as follows:

- switch the brake off by the switch (6)
- turn the spindle manually to the required position and return the switch (6) to the former position
- press EXIT and then RESET

OR

- press correction button ZERO SPINDLE POSITION 5.9.10 (new spindle position was changed without machine reset)

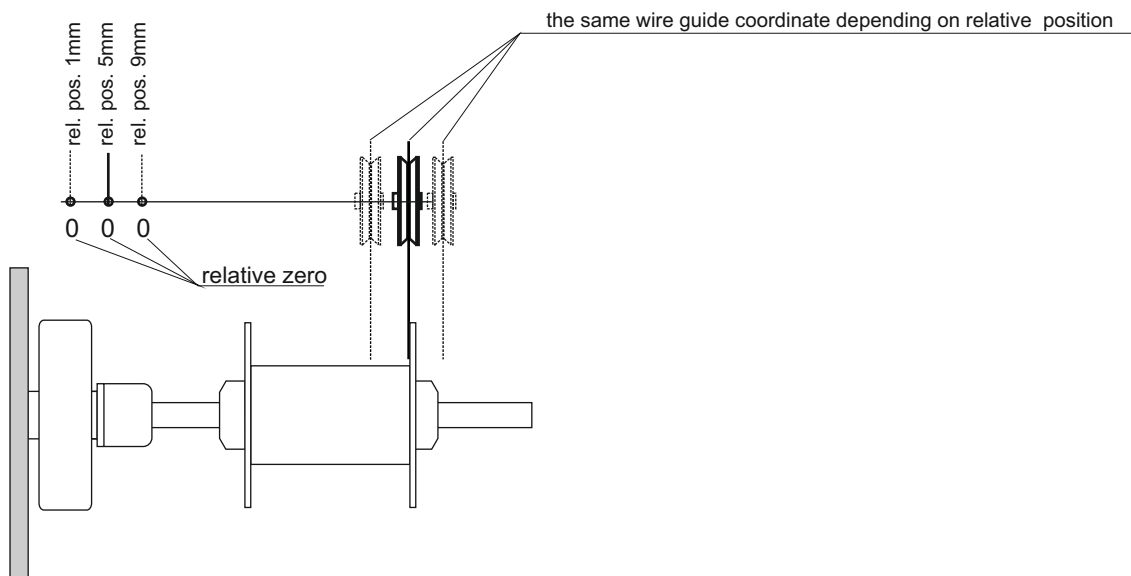
Note: When you switch the machine ON (by switch POWER or EMERGENCY STOP), RESET is running automatically and the spindle position is taken as reference position.



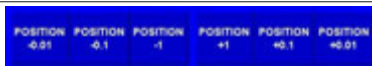
## 5.9.2. Wire guide relative position setting

This correction shifts zero coordinate of the wire guide (relative zero position). It allows you to correct the wire guide position to be in accordance with the bobbin or winding tool.

Default: 5 mm



Holding any of the buttons

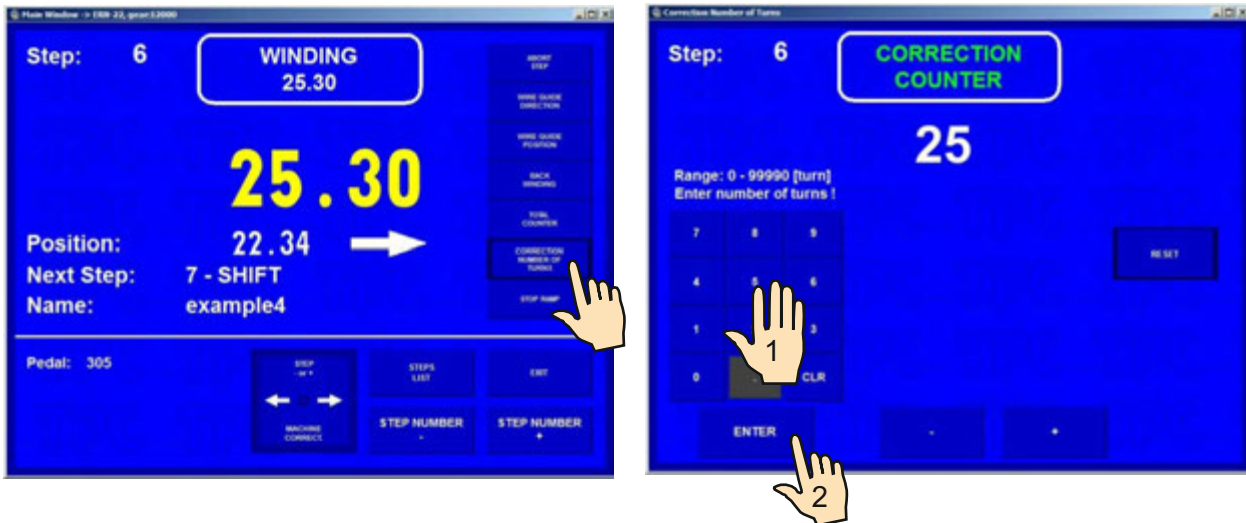


pressed (cca 0,5 s) moves the wire guide continuously.

### 5.9.3. Number of turns correction

It is possible to change the number of turns actually counted.

Correction of decimal and hundredths turn number e.g. XX.36 to XX.30 without adequate spindle turn, leads to the loss of reference position.



Pressing the RESET button will change the actual number count to zero.

### 5.9.4 Total counter

We can switch between TOTAL COUNTER and COUNTER. TOTAL COUNTER counts all spindle turns until it is set to zero by RESET, or is set differently by numeric keyboard.

Both counters are independent. By switching is only displayed one of it !





### 5.9.5. Wire guide correction

This allows you to correct the wire guide position during the winding process.



Holding any of the the buttons 

POSITION -0.01	POSITION -0.1	POSITION -1	POSITION +1	POSITION +0.1	POSITION +0.01
----------------	---------------	-------------	-------------	---------------	----------------

 pressed (cca 0,5 s) moves the wire guide continuously.

### 5.9.6. Wire guide direction change

This allows you to change the direction of wire guide during winding.



### 5.9.7. Abort step

This allows you to abort current running step.

By pressing the ABORT STEP button the machine will return to the STANDSTILL state.



### 5.9.8. Back winding

This allows you to wind back the required number of turns.

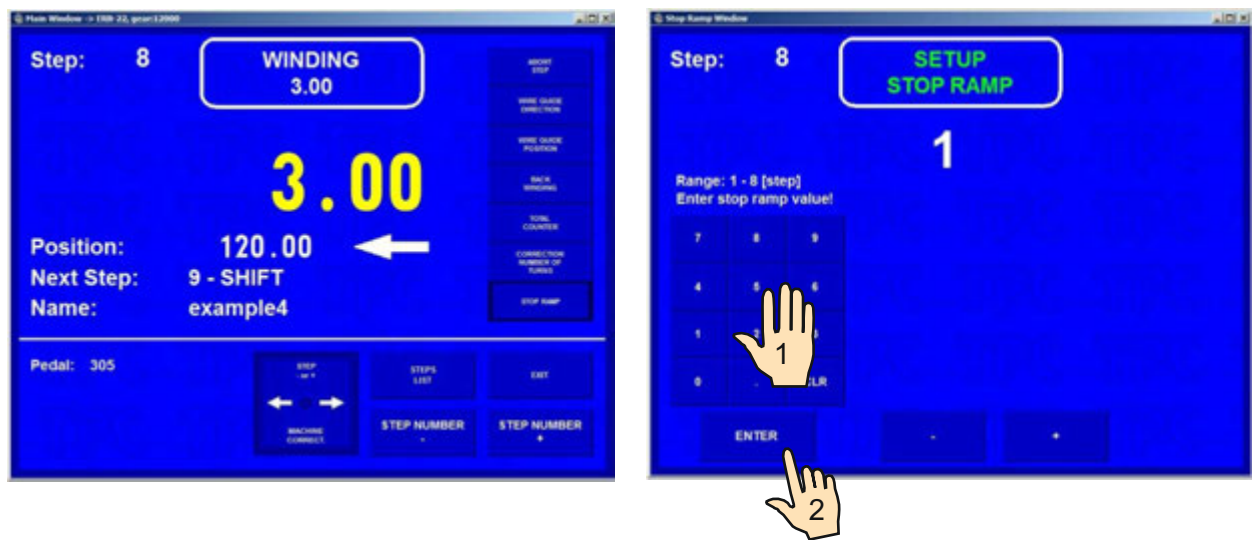


We can wind back the number of turns required only by using the pedal. The number of turns is counted back and the wire guide moves in opposite direction.

Pressing of button "WINDING" ends back winding.

5.9.9. Deceleration ramp for the STOP-button

Deceleration ramp for the STOP button can be set. This ramp is slightly faster than programmed deceleration ramp. This is controlled by the software.



Code table

CODE	TIME (s)
1	1,0
2	1,3
3	1,8
4	2,3
5	2,8
6	3,8
7	5,8
8	7,8

Presentated values are valid for max.speed.

5.9.10. Spindle zero position

This allows you to taken new spindle zero position without machine reset, counter is canceled.

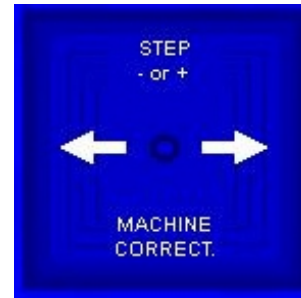
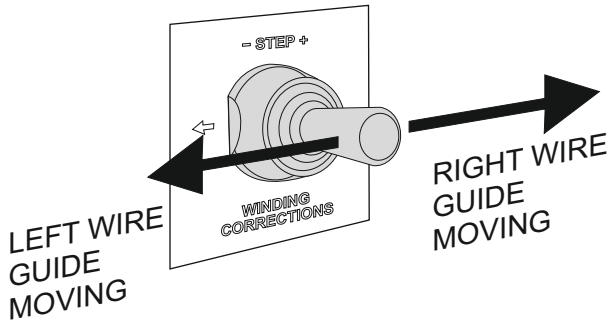




## 6.JOYSTICK

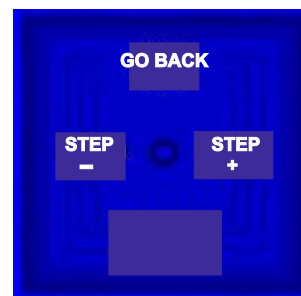
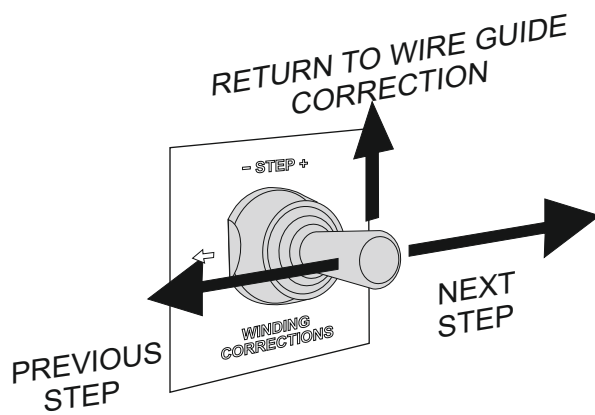
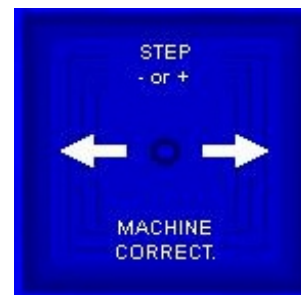
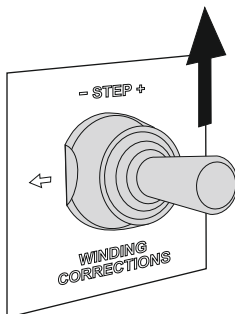
Each model is equipped with a four way JOYSTICK which provides the following actions:

- wire guide corrections

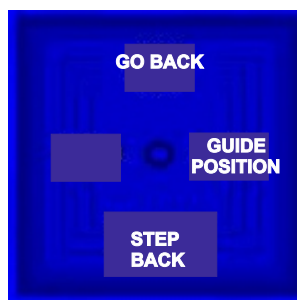
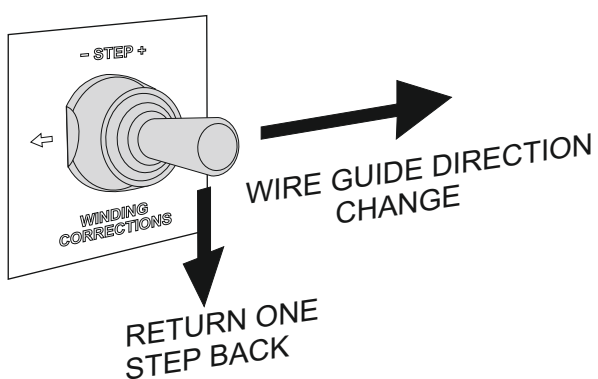
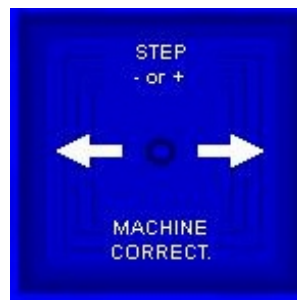
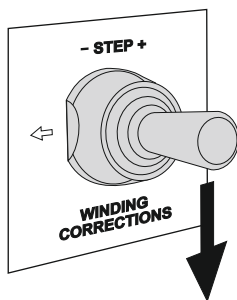


Holding the left or right position pressed (cca 0,5 s) moves the wire guide continuously.

- step change



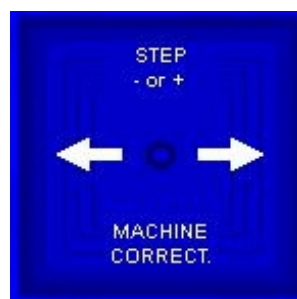
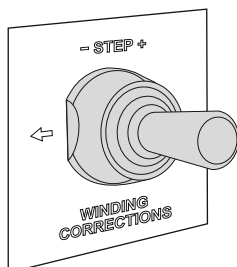
- return one step back and wire guide direction change



RETURN ONE STEP BACK - this action returns winding programme to the end of the previous step, and sets correct positions of the wire guide and the spindle.

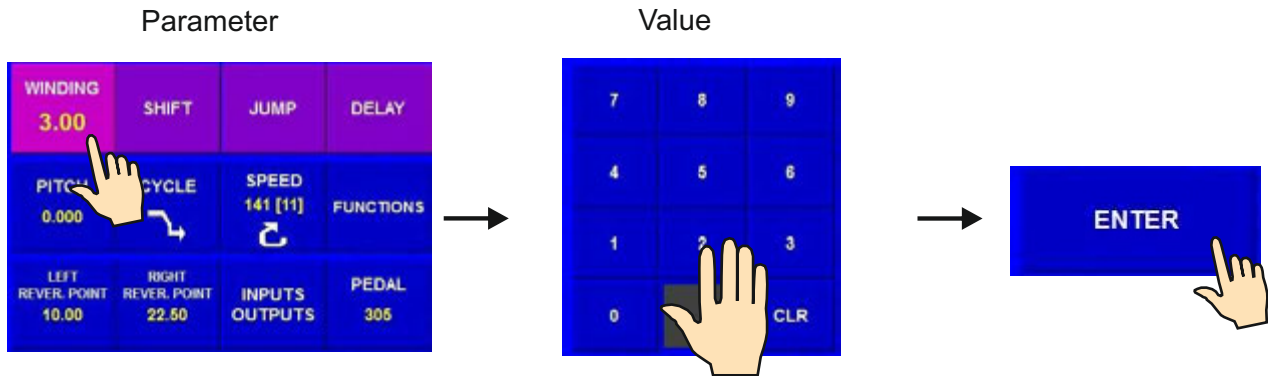
JOYSTICK returns from this state to the wire guide correction after 3 seconds automatically.

After 3 seconds



## 7. PROGRAMMING

Entering the data:



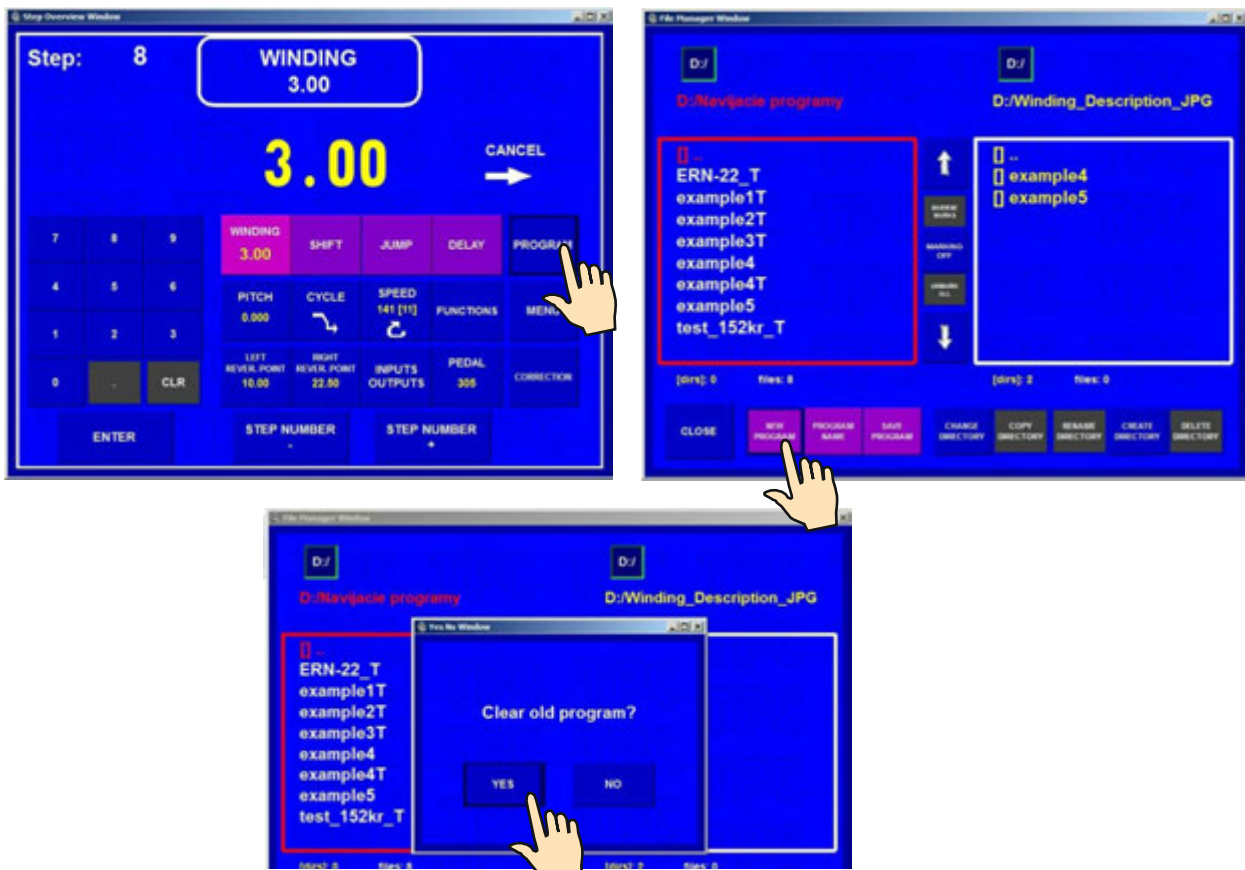
Use the ENTER button to execute the entered value or to return from any function.

Programming is not possible in step 00. In order to move to a particular step, either use the

STEP NUMBER

or use the numeric keyboard.

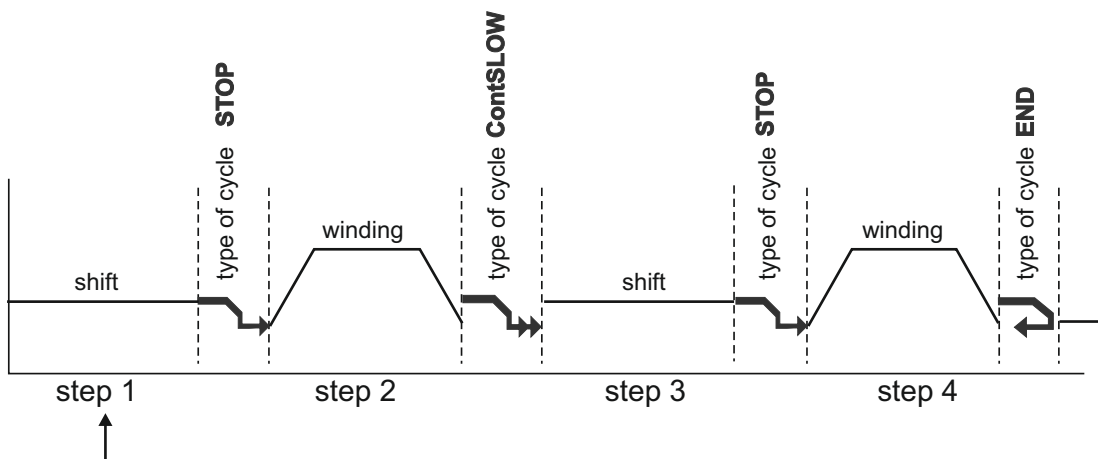
Created programme is saved to the working part of memory ( programme in this memories is designated as an ACTUAL PROGRAMME ). We can either overwrite ( or modify ) the already existing programme, or open the new one.





## 7.1 Basis of programming

The winding programme is a logical sequence of a few (1-350) joined steps.



Joining to the next step is defined by the type of cycle. If the type of cycle "END " is programmed within a specific step, this will end the programme. After pressing START the programme will restart at step 1.

Max.step capacity for one winding program is 350 !

## 7.2 Step parameters programming

### 7.2.1 Basic step types

Every step can be programmed as SHIFT, WINDING, JUMP, DELAY or GEAR.

**Shift** - spindle is not turning and the wire guide is shifting to the programmed coordinate

**Winding** - defined by the following parameters: number of turns, speed and spindle direction, pitch, left and right reversal point

**Jump** - spindle is not turning and the wire guide is shifting from its position to the left or right, in accordance with the programmed value

**Delay** - spindle and wire guide are idle, the duration of the pause depends on the programmed time

**Gear** - setting of requested gear, provides change of gear during cycle

### 7.2.2 Wire guide shift

#### Coordinating of the shift



#### Speed of the shift

The speed of shift is preset to 100 mm/sec during the programming stage. If lower speed is required, this can be changed as follows:



## Type of cycle

Set the type of cycle and choose, how to continue to the next step.



### End of program

By pressing START-button, program is restarted and step 1 is running.



### Cycle stop

After step finish, program stops and the next step is activated by START-button.



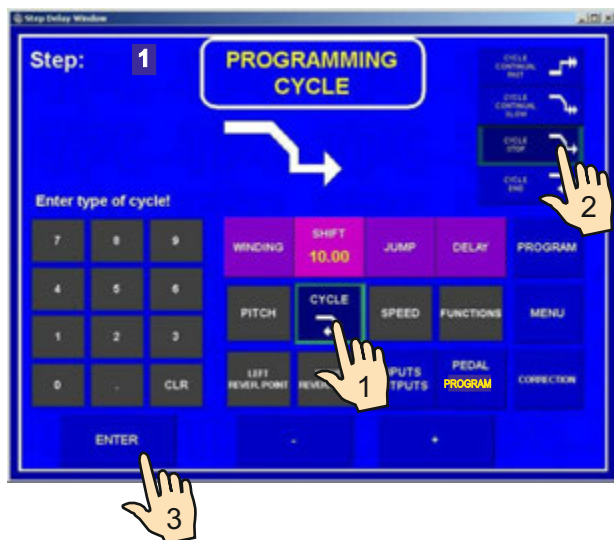
### Continual cycle with deceleration

After step finish, program starts the next step automatically, without pressing the START-button. Winding step decelerates to zero, at first.



### Continual cycle without deceleration

After step finish, program starts the next step automatically, without pressing the START-button. Spindle deceleration is canceled. Only winding steps can form this cycle.





### 7.2.3 Winding step

#### Number of turns



Assignment of the layer

Cancelation of the previous No. of turns

Wire guide direction after start



#### Cancelation of the previous number of turns

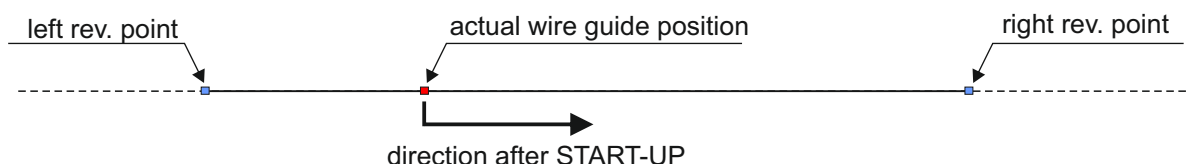
CANCEL - previous counted number of turns is cancelled after START-UP of the winding step type

NOT

CANCEL - counted number of turns is not cancelled

#### Wire guide direction after start

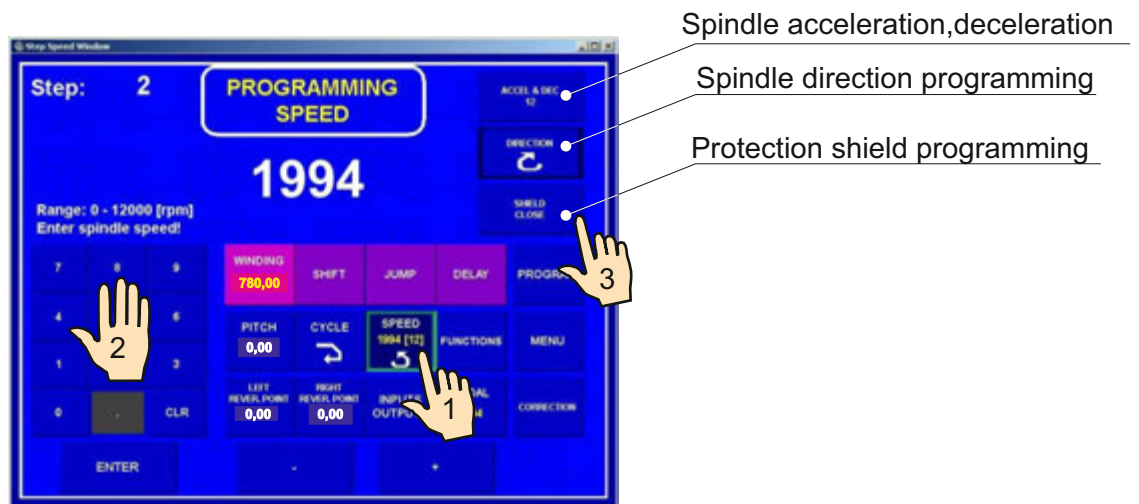
➡ -right moving the wire guide after START -UP if its position is between left and right reversal point



⬅ - the same, but left moving

If " 0 " is programmed for the number of turns, this winding step turns the spindle to the zero reference position. Direction of the spindle speed is taken from the previous winding step !

## Spindle speed ,direction ,acceleration ,deceleration, and protection shield



Enter values between 1 and 8 for acceleration and deceleration according to the table below:

CODE	ACCEL. ( s )	DECEL. ( s )
1	3,0	3,0
2	3,5	3,5
3	4,0	4,0
4	5,0	5,0
5	6,0	6,0
6	7,0	7,0
7	8,0	8,0
8	9,0	9,0



## Pitch



## Left reversal point



## Right reversal point



## Switching OFF the wire guide shifting during programming

The wire guide shifting can be switched OFF by pressing the SHIFTING ON/OFF button during programming.



## Type of cycle

Set the type of cycle and choose how to continue to the next step.

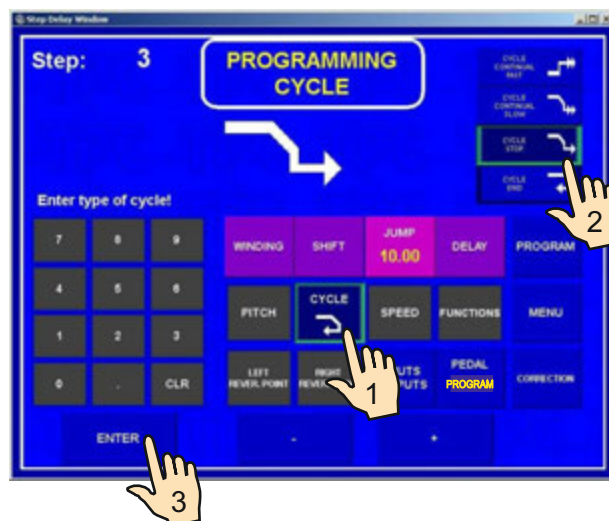


## 7.2.4 Wire guide jump

Length of jump and direction



Type of cycle

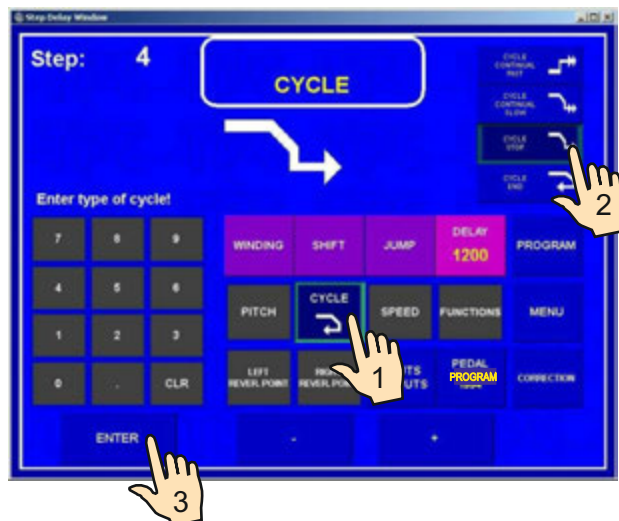


## 7.2.5 Delay

### Time of delay



### Type of cycle



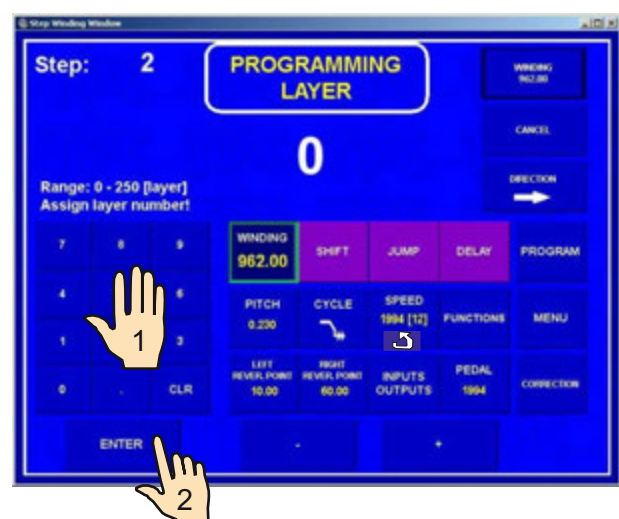


### 7.3 Display and assignment of the layer

The number of layers can be displayed . Readout showed on display can be switched as follow :



The layer number of every step can be assigned according to winding instruction. The same number of layer can be assigned to a few consecutive steps. While winding, the assignment is displayed as it is programmed.



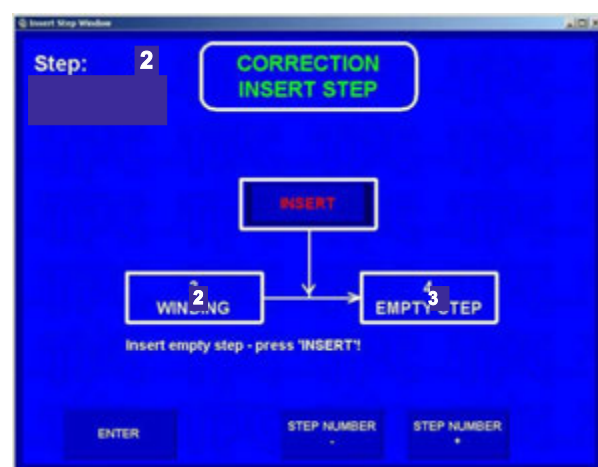
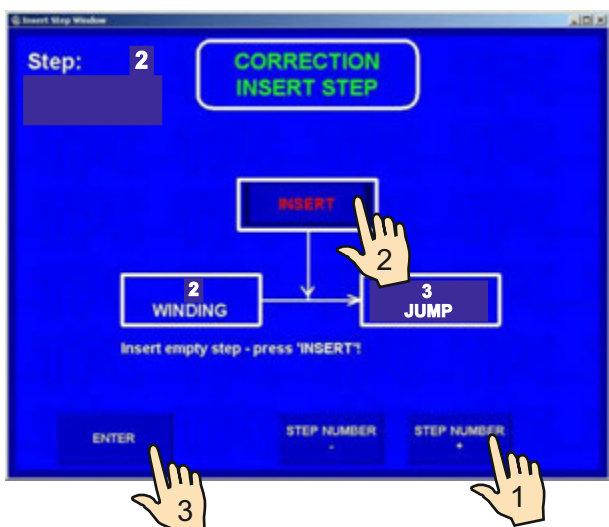


## 7.4 Programming corrections

The following functions simplify programming or corrections.

### 7.4.1 Insert empty step

An empty step can be inserted anywhere within the programme. It can then be completed with the required parameters. Subsequent steps are shifted in value "+1" automatically.



Position for step insertion is chosen by buttons

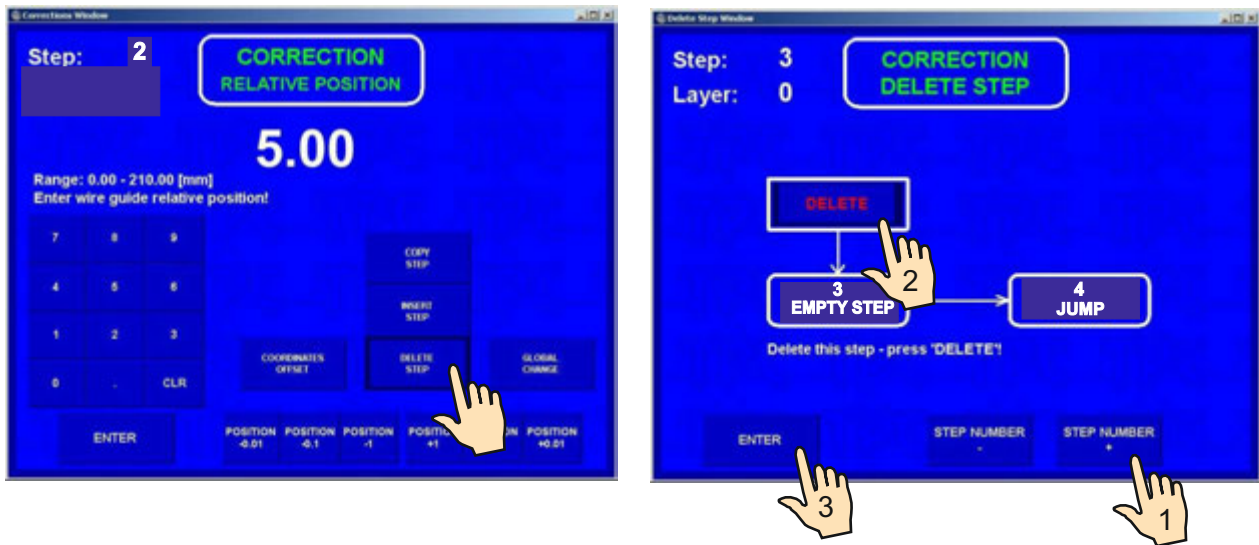


or

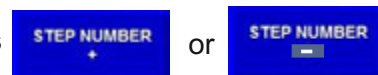


### 7.4.2 Delete step

Each step in the programme can be canceled. Subsequent steps are shifted in value "-1" automatically.

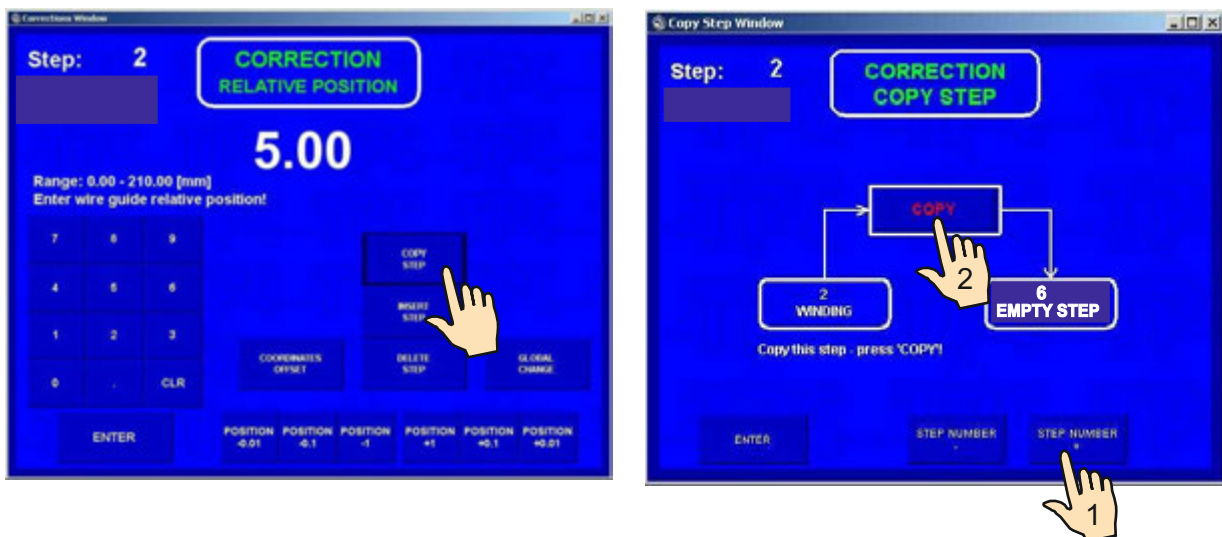


Step, which we wish to cancel can be chosen by buttons



### 7.4.3 Copy step

Each already programmed step can be copied to another step (previous or next).



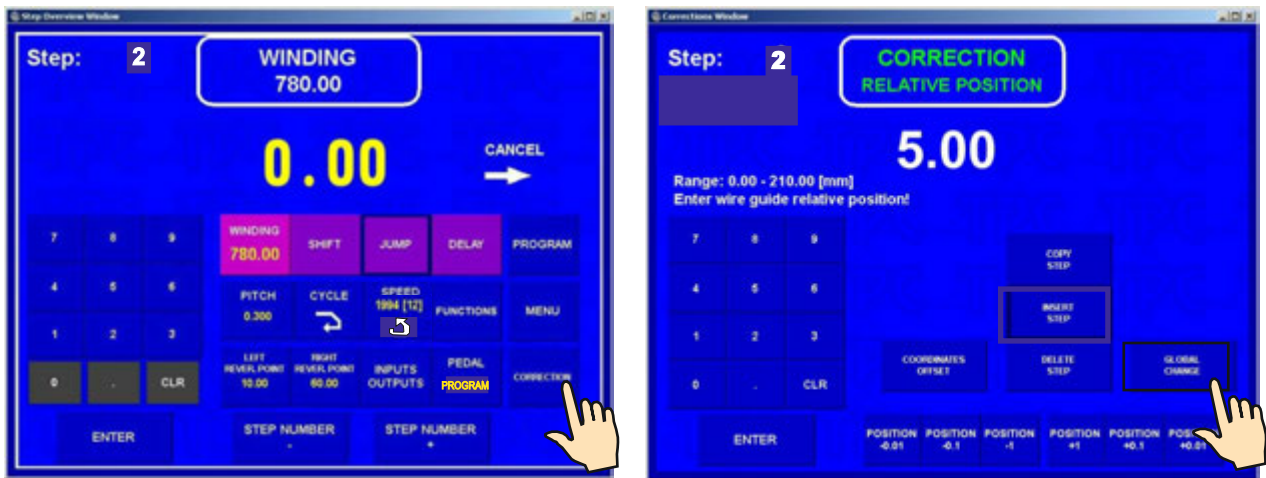
Current step is copied and inserted to the step, which can be chosen by buttons





## 7.4.4 Global change

This function allows you to change one chosen parameter in all the subsequent steps. These must be of the same type. Eg.: if the current step is winding, the chosen parameter will be changed in all subsequent winding steps. This is valid for all other step types ( SHIFT, JUMP, PAUSE ).



Choose a parameter to be changed - eg. pitch

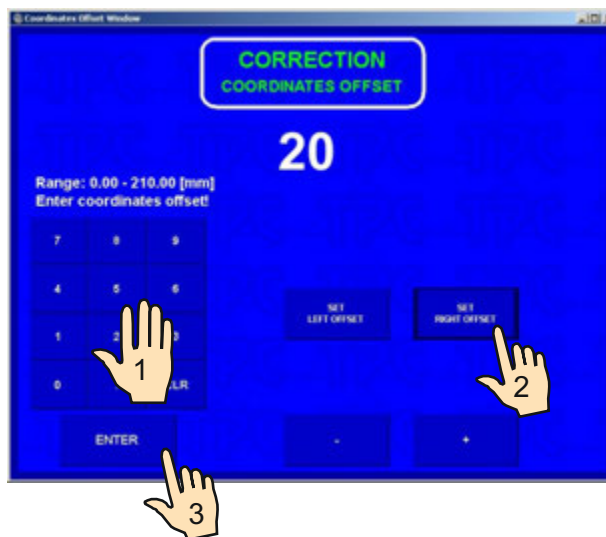


The pitch is changed in all the subsequent winding steps.



### 7.4.5 Coordinate offset

This correction provides offset for all coordinates in the programme to the left or right of the entered value.

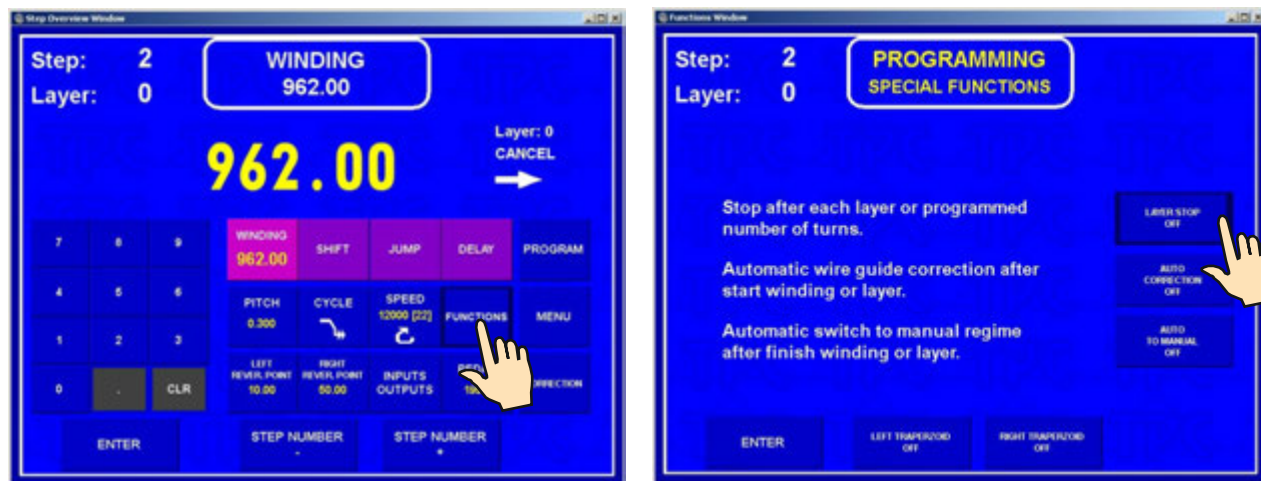


All programmed coordinates (left, right reversal points and shifts) are increased by the value of 20,0 mm.

## 7.5 Special functions

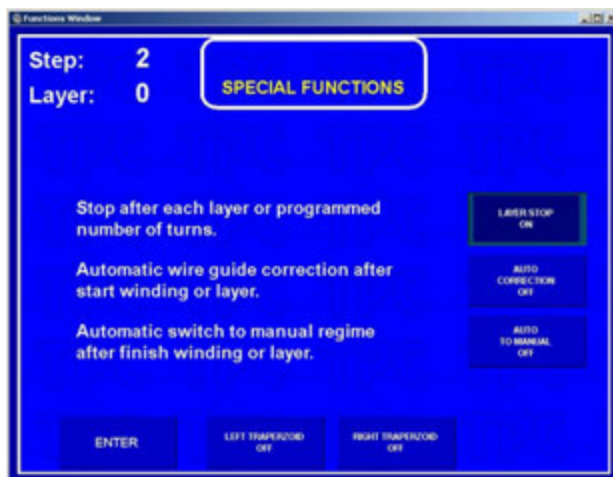
### 7.5.1 Layer stop

This function activates winding step STOP after each wound layer.



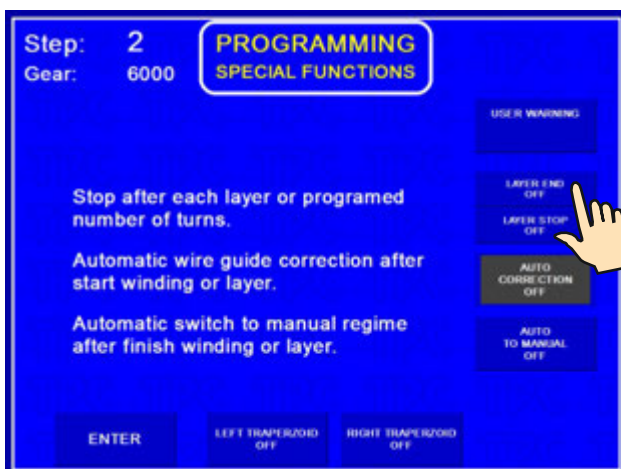
The machine will stop after each layer at both left and right reversal points. This will continue until the programmed number of turns is reached.

If the assigned layer is displayed, this function will increase its value automatically after each layer.



### 7.5.2 Layer end

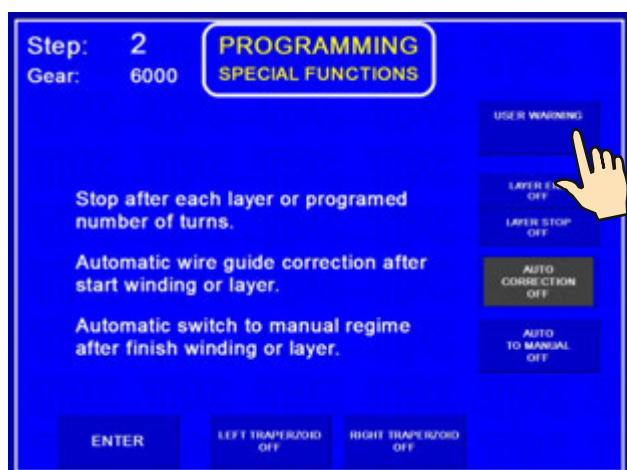
This function activates winding step STOP in desired layer in reversal point.



The machine will stop in desired layer in desired reversal point and the entire winding step terminates.

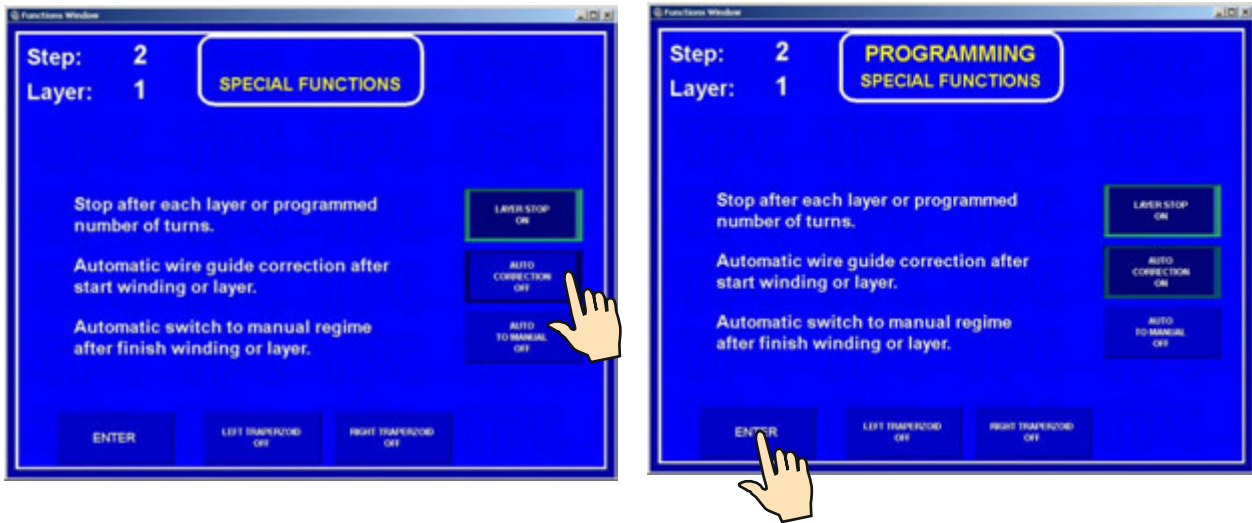
### 7.5.3 Warnings

This function allows to write important warning for any step. It shows automatically after step finish and disappears after next pressing START (or pedal).

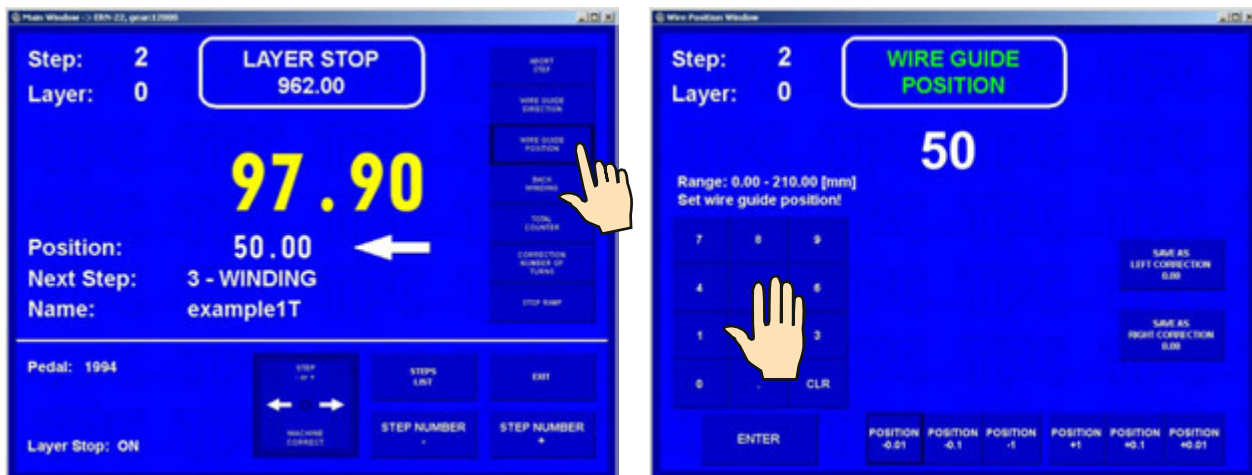


## 7.5.2 Automatic correction

Utilization of this function is mainly related to previous function LAYER STOP. It allows you to correct wire guide position for all subsequent layers.



After the first layer is wound (eg. from left to the right), press the wire guide correction button and correct the wire guide position. This corrected position is saved by pressing SAVE AS RIGHT CORRECTION button. Likewise, insert and save the left correction after the second layer (from right to the left) is wound. For all the subsequent layers within this step these corrections will be made automatically.





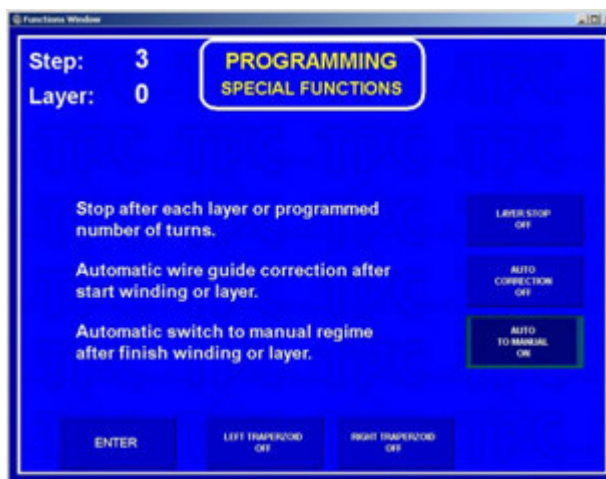
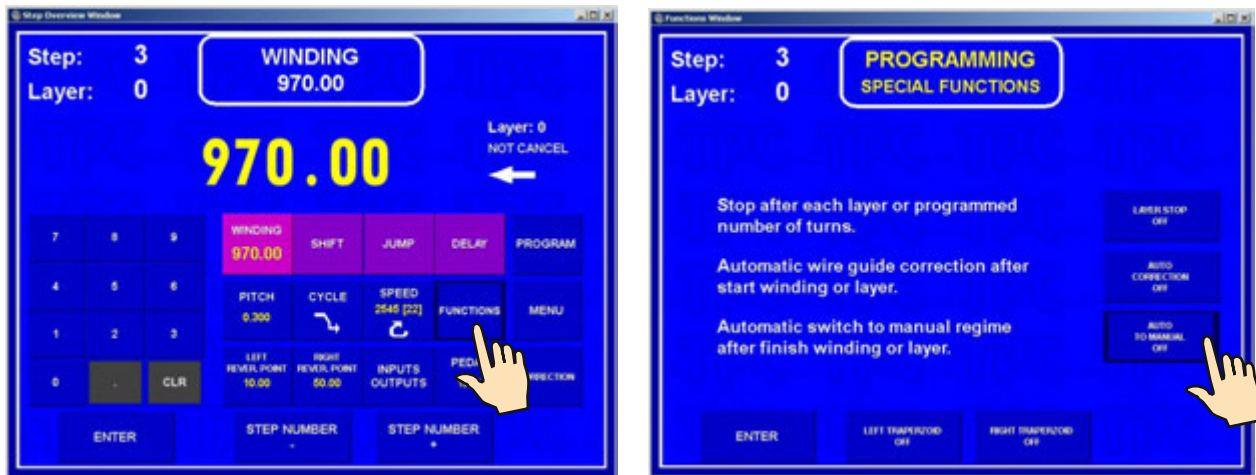
Maximum value for wire guide correction can not be greater than  $\pm 10$  mm after a layer is wound. Value higher than this will be ignored !



### 7.5.5 Automatic switch to manual regime

This function will automatically switch manual regime after a certain pre-programmed number of turns have been completed.

In the manual regime the winding is done by the foot pedal. The value of the pitch is taken from the current step. The wire guide direction is controlled by WIRE GUIDE DIRECTION button. The number of turns wound in this regime is not defined.



Pressing of button "STOP" ends manual regime and programme continues in automatic regime.

## 7.5.4 Trapezoidal winding

This function automatically shifts the reversal points after each layer is wound.



Cancelation

Trapezoid form change

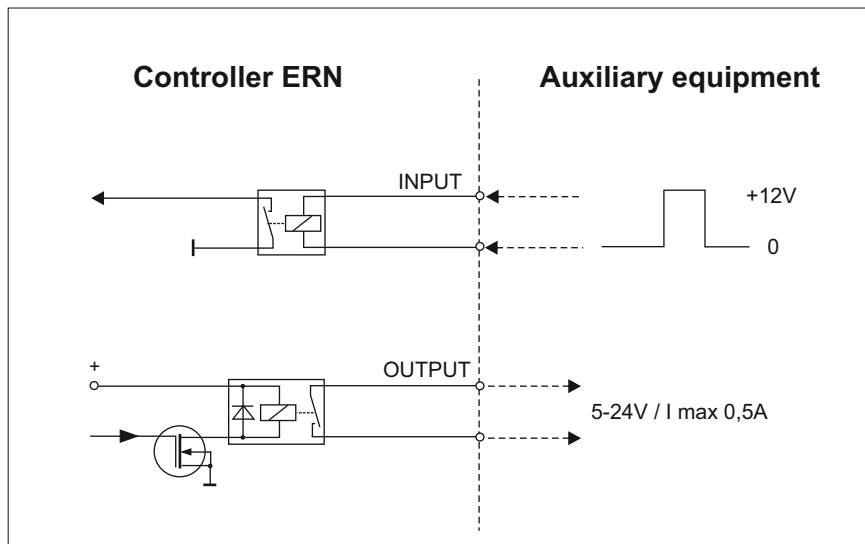
Available form of trapezoidal windings :

	left trapezoid : <b>OFF</b>	right trapezoid : / <b>X,X</b>
	left trapezoid : <b>OFF</b>	right trapezoid : \ <b>X,X</b>
	left trapezoid : \ <b>X,X</b>	right trapezoid : <b>OFF</b>
	left trapezoid : / <b>X,X</b>	right trapezoid : <b>OFF</b>
	left trapezoid : \ <b>X,X</b>	right trapezoid : / <b>X,X</b>
	left trapezoid : / <b>X,X</b>	right trapezoid : \ <b>X,X</b>
	left trapezoid : \ <b>X,X</b>	right trapezoid : \ <b>X,X</b>
	left trapezoid : / <b>X,X</b>	right trapezoid : / <b>X,X</b>

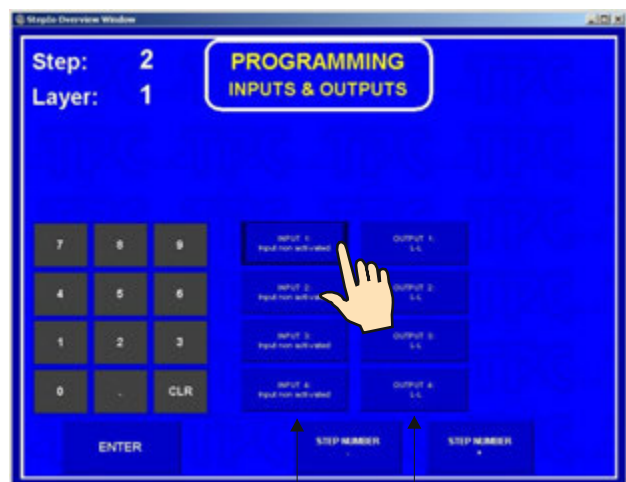
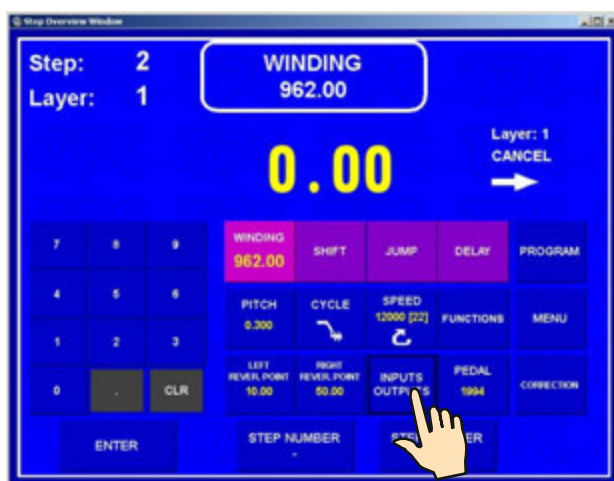


## 7.6 Auxiliary inputs and outputs

Machine provides an opportunity to program and control up to 4 auxiliary digital outputs and 4 digital inputs. Digital inputs and outputs are galvanically isolated. Relay is applied in standard equipment.



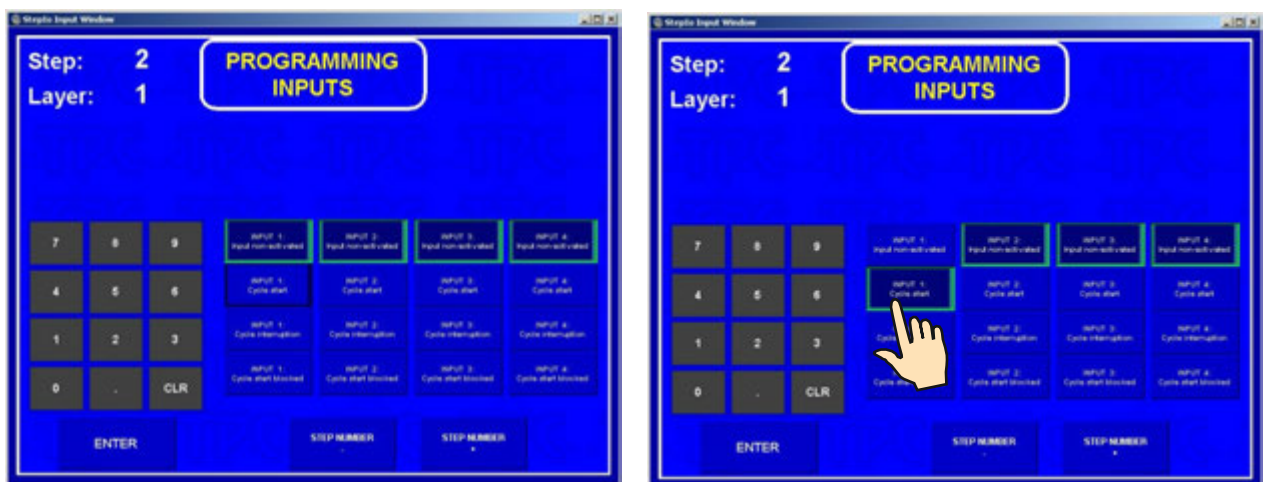
### 7.6.1 Window for inputs and outputs



Digital inputs 1-4

Digital outputs 1-4

## 7.6.2 Digital inputs programming



Each digital input can be programmed as:

**INPUT NON-ACTIVATED** - input is inactive

**CYCLE INTERRUPTION** - winding cycle interruption is done if input is high (+ 12 V)

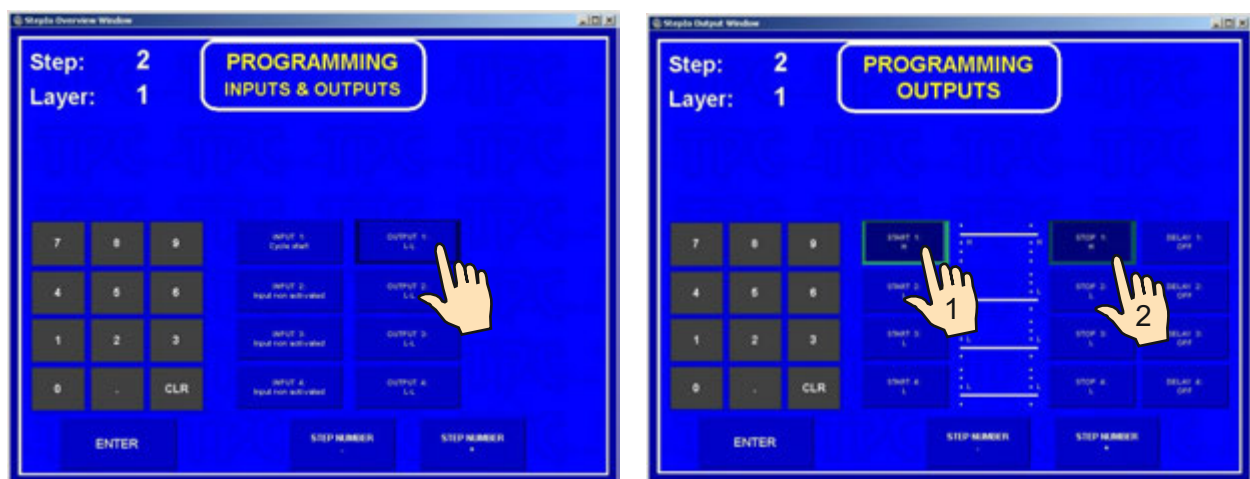
**CYCLE START** - winding cycle start is done if input is high (+12 V)

**CYCLE START BLOCKED** - start is blocked while duration of high (+ 12V)

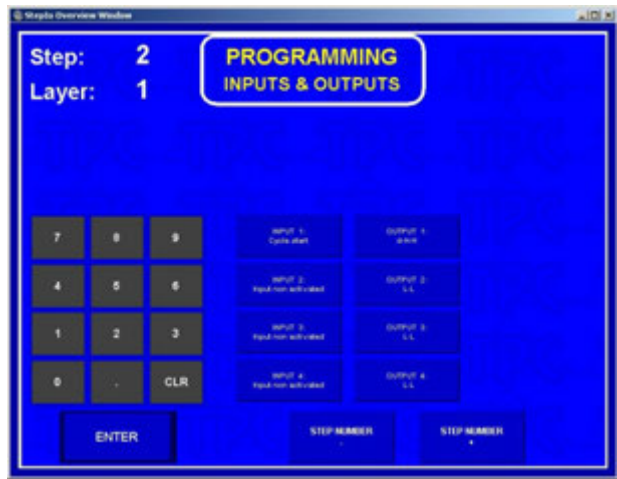
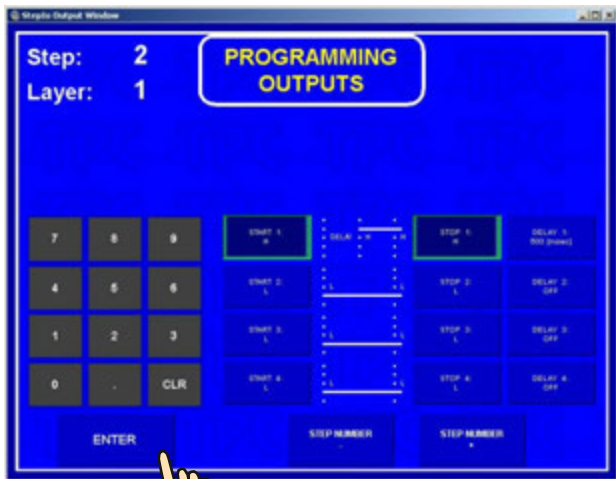
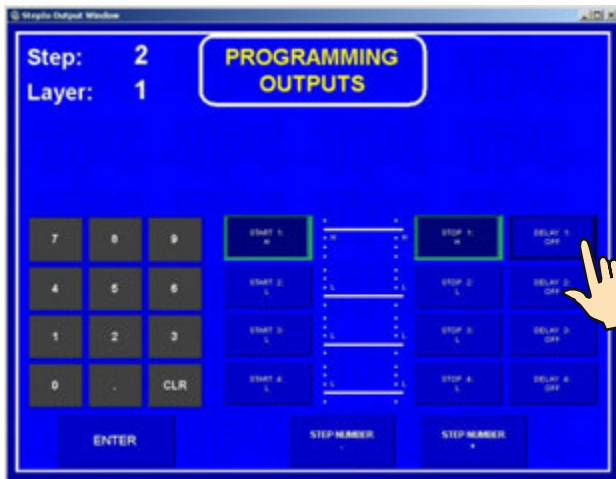
## 7.6.3 Digital outputs programming

The following 3 parameters can be programmed in digital outputs 1 - 4:

- level of output after step start - up ( L - relay on, H - relay off )
- level of output after step finish - up ( L - relay on, H - relay off )
- delay of output action



## Delay



## 8. STEPS LIST

Steps list displays view of programmed steps and provides the following possibility for programming and corrections.



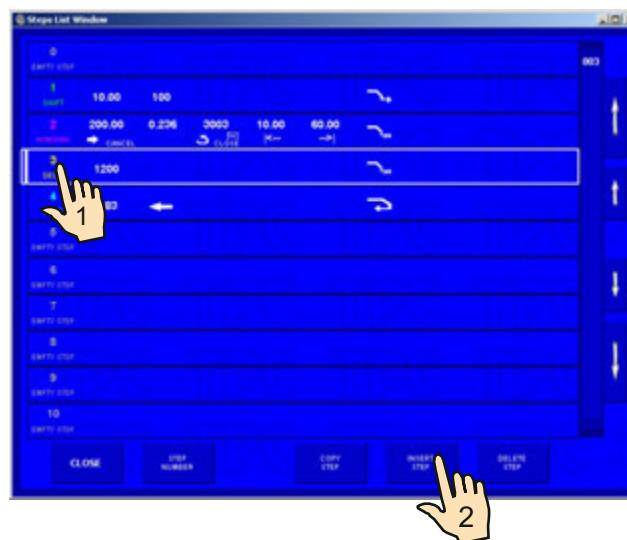
### - Parameter correction





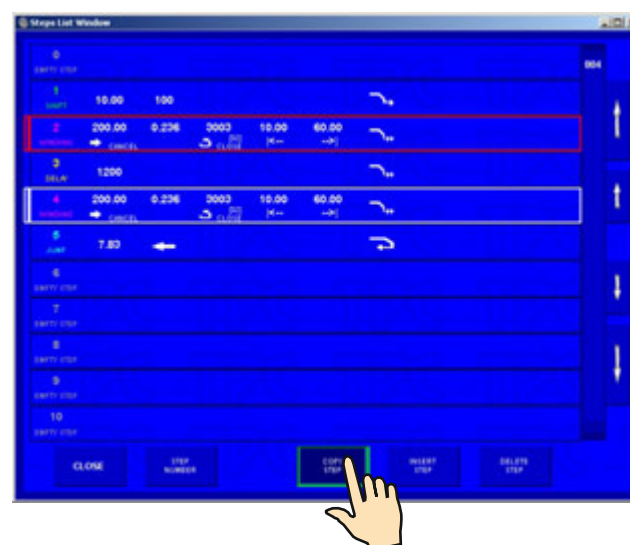
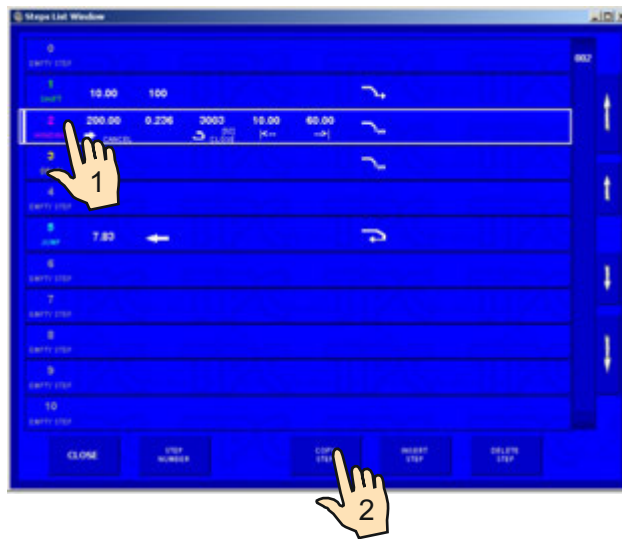
Each parameter can be changed in this way.

### - Insert empty step





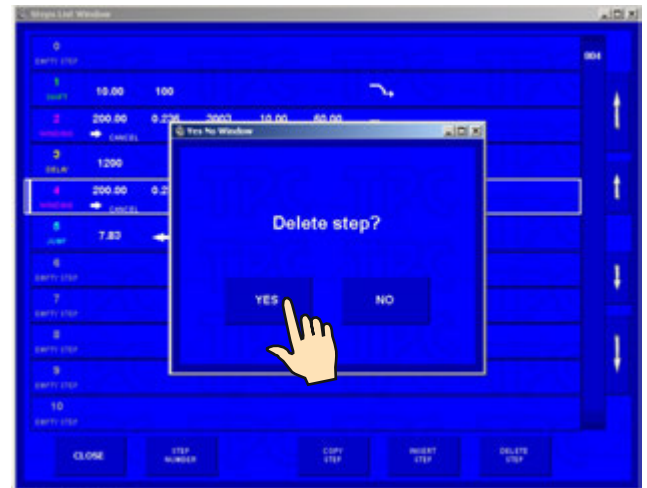
## - Copy step



Pressing of button "COPY STEP" ends copying.



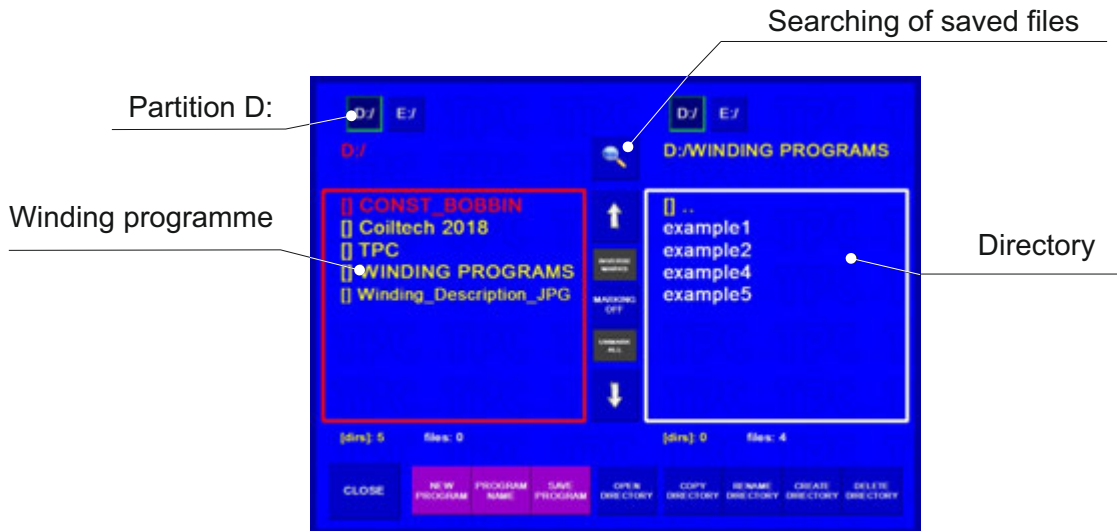
- Delete step





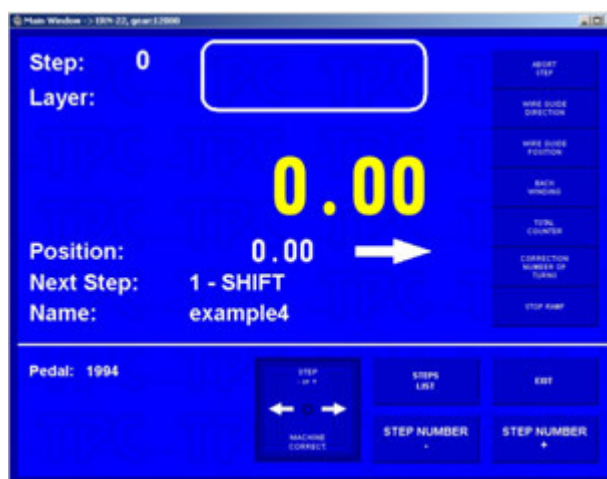
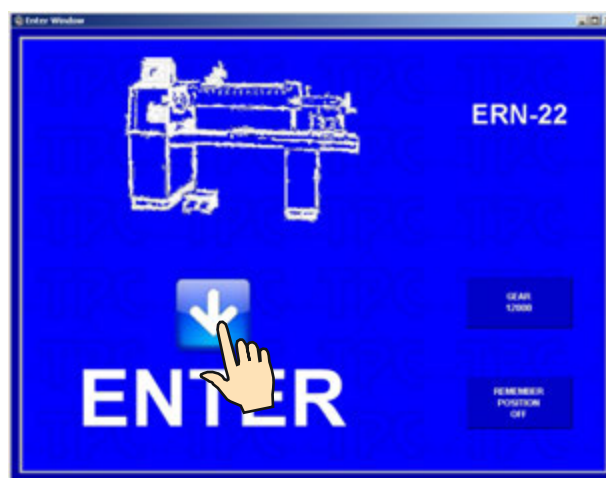
## 9. PROGRAMME SAVING AND OPENING

T-version is equipped with computer control with touch screen and Windows .  
SSD is used as the storage medium. PC memory space is divided into two partitions C: and D:.  
The operating system is installed on C:. Access to partition C: is blocked.  
Partition D: is used for manufacturer application programmes and winding programmes.  
This can be accessed and modified.



### 9.1 Programme opening





## 9.2 Programme saving

Each programme can have a maximum of 350 steps. Once a programme is created it can then be saved. Provide a name for the programme and save it into directory (or subdirectory).



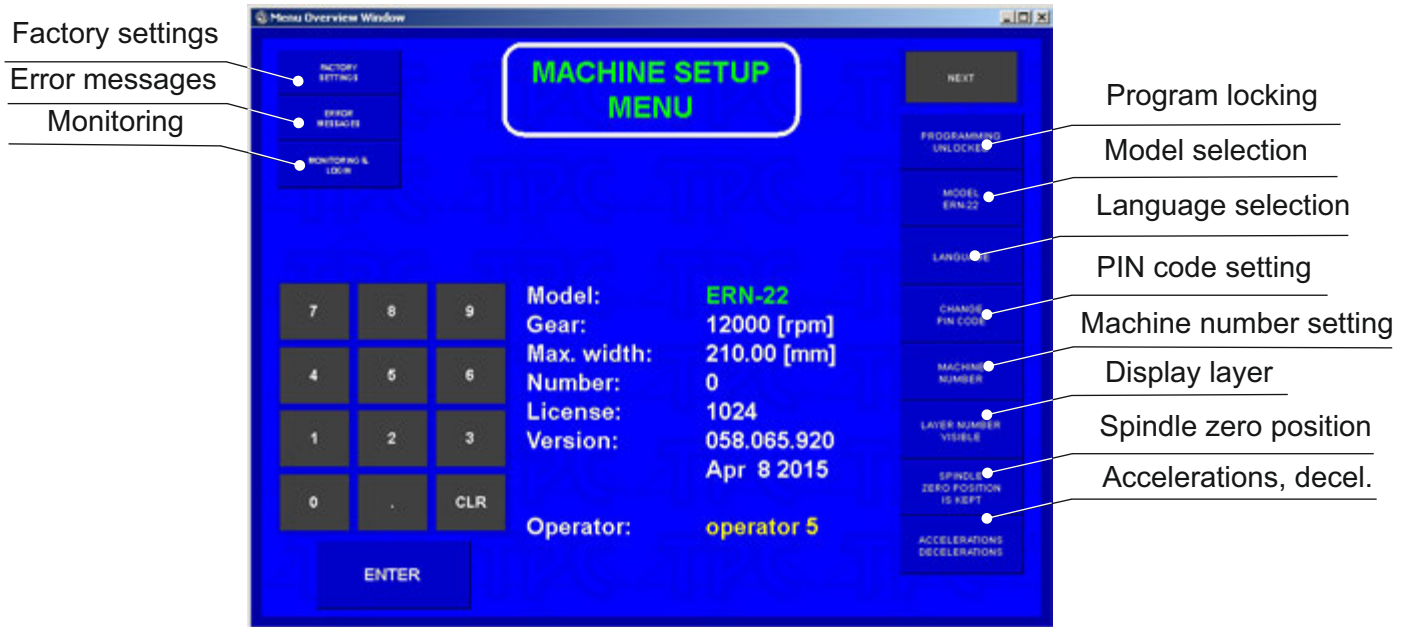
### 9.3 Programme copy

This function allows to copy programmes already created.



## 10. MENU

Displays and allows the change of some basic settings of the machine.



### 10.1 Programme locking

Programming can be locked or unlocked by entering MASTER or PIN code. Corrections which are performed during the winding process (wire guide correction, back winding, abort step etc.) are not blocked.





## 10.2 Error messages

If mistakes occur, these will trigger the following error messages:

### ERROR Microswitch

Mechanical displacement of the wire guide. It occurs if the lateral power on the wire guide overcomes the torque of the step motor.

Solution: press RESET

### ERROR Spindle speed versus pitch

Pitch or spindle speed is too high (exceeds the max.wire guide speed 75 mm/sec)

Solution: press ENTER and correct either spindle speed or pitch

### ERROR Wire guide position out of range

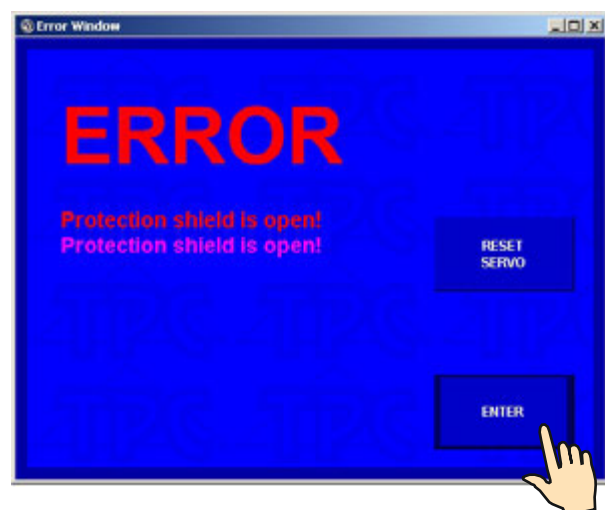
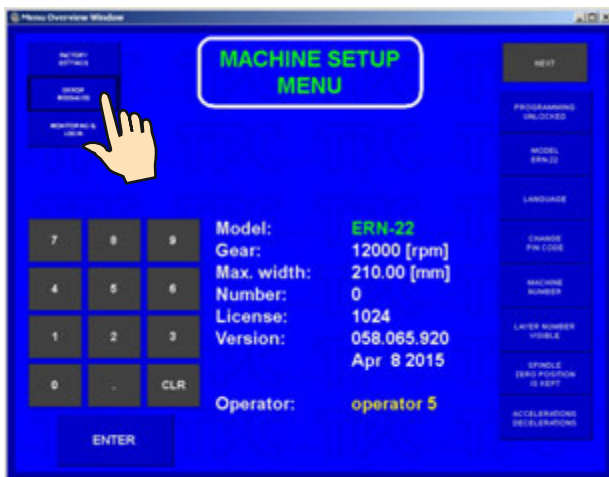
Winding width is out of range.

Solution: press ENTER and correct either relative position or reversal points

### ERROR Program is not logical

In the ContFAST cycle type if the programming is not logical, the next step can not be the shift, jump or winding with the opposite speed direction.

Digital control by CAN- bus provides the storage and display of errors of Servo Drive. Displayed errors are intended for service purposes.

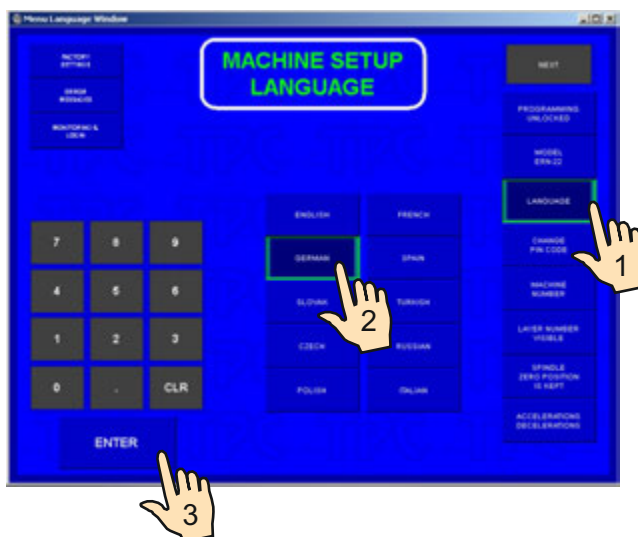


### 10.3 Model selection



### 10.4 Display language

Allows a selection of display language.





## 10.5 Winding machine number

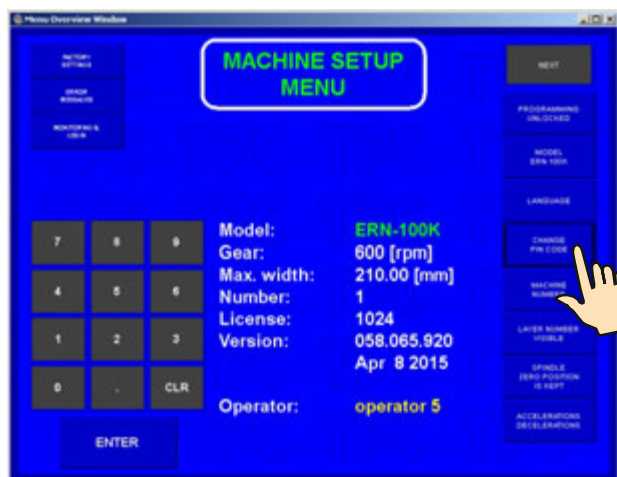
Winding machine number can be set for easy network identification.



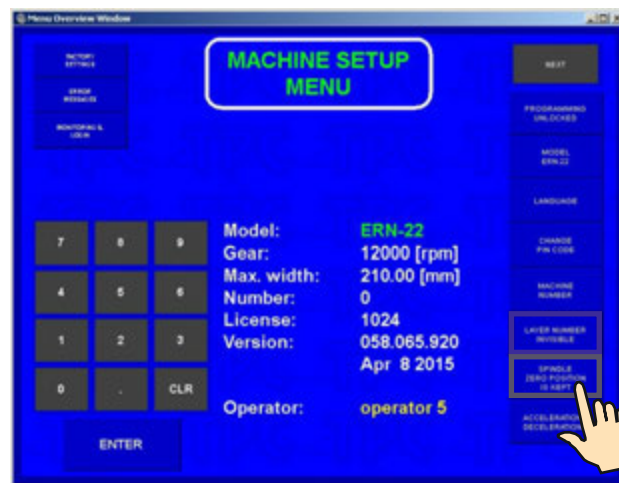
## 10.6 Access PIN code setting

Available codes for user :

- MASTER code - allows you to change all settings in menu. This code is fixed by producer and is referred to guarantee certificate.
- PIN code - lock and unlock programming. This code can be set by user in range 0 - 999999  
Default : "0"



## 10.7 Zero spindle position mode



There are two possibilities for set :

- Absolute zero spindle position ON - zero spindle position as set during reset is kept for all winding steps and manual spindle handling
- Absolute zero spindle position OFF - zero spindle position starts at actual spindle position and the new one is always set by winding step START

## 11. FIRMWARE AND UPGRADE

Upgrade files can be delivered via e-mail.

There are two types of upgrade files:

- tpccrxxx.tpc – control board upgrade, where xxx is number of version (e.g. tpccr060.tpc)
- PC application programme upgrade

### 11.1. Upgrade of the application programme

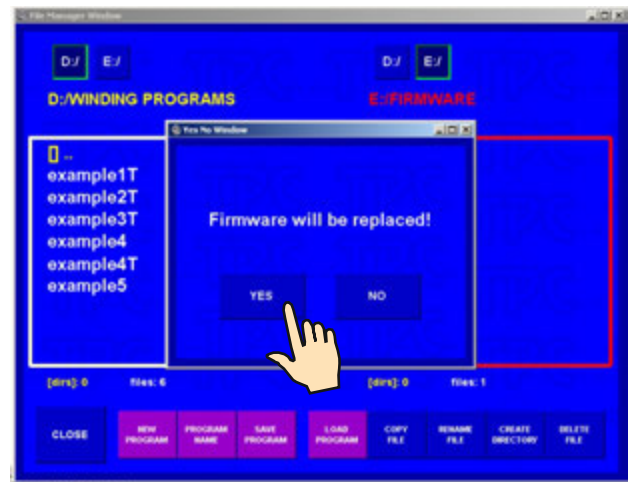
Procedure of the application programme upgrade is as follows:

- copy (unpack) received upgrade file
- connect flash disc, keyboard and mouse to the USB ports of the PC
- close the winding application ( for example CTRL +ALT+DEL)
- install upgrade in accordance with received instructions

### 11.2. Upgrade of the control board

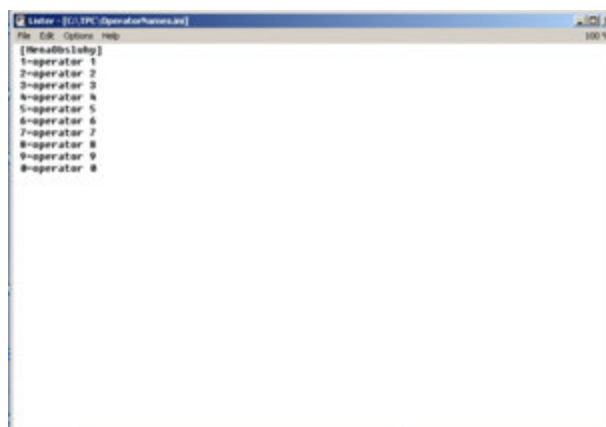
Connect flash disc to the PC and load upgrade file tpccrxxx.tpc :





## 12. Creation and modification of the operator's list

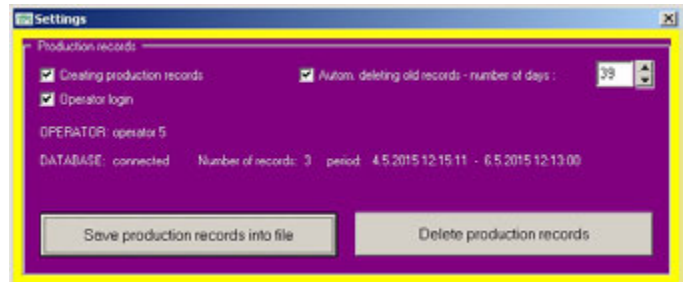
Operator's name is used for the identification when production log is created. The names and codes information are stored in the file C:\TPC\OperatorNames.ini, this can be edited.



Note:

- never change the header, it has to remain on the first row, in the form [MenaObsluhy]
- all the following rows have to be in form: numerical code of the operator = name and surname of the operator, e. g. 127 = John Smith

## 13. Production log setting



### 13.1 Production log

**Create log records** – check this option if you want to monitor coil production

**Operator login** – check this option if you want to assign operator names

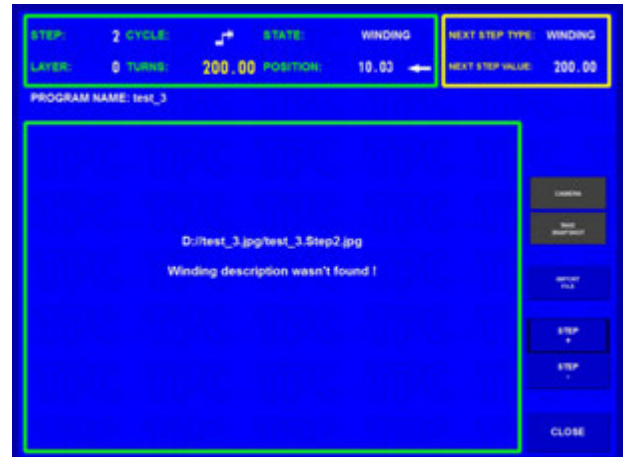
**Delete old records automatically** – check this option if you want the old records to be deleted automatically and set number of days after which records should be deleted

**Save production log to file** – production records will be saved to a XML file. After pressing the button a dialog box appears for the file saving and a preset file name is proposed: „TabProd\_ERN\_num\_X”, where X= numerical code of the winding machine. The production log can be transferred via the flash disc from the winding machine into the PC for further processing e.g. with the help of the MonitorERN programme.

**Delete production log** – all the records of the winding machine production will be deleted. If you do not use the function of the automatic deletion of the old records it is a good practise to save them to the xml file regularly, transfer it for further processing on the PC and delete them in the winding machine.

## 13.2 Terminal mode

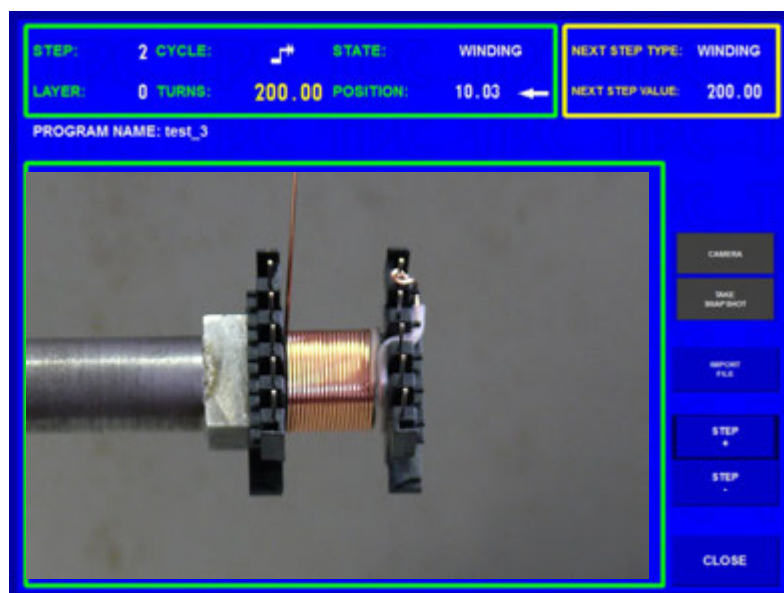
**TERMINAL** = displays winding instructions



Winding procedures are able to provide winding machine operators with additional important information on winding. If a winding programme is accompanied with a corresponding winding procedure a current winding step technological operation description is displayed on the winding machine monitor automatically. This information comes from the winding procedure and it can be represented in form of texts or images.

Application of the winding procedures can:

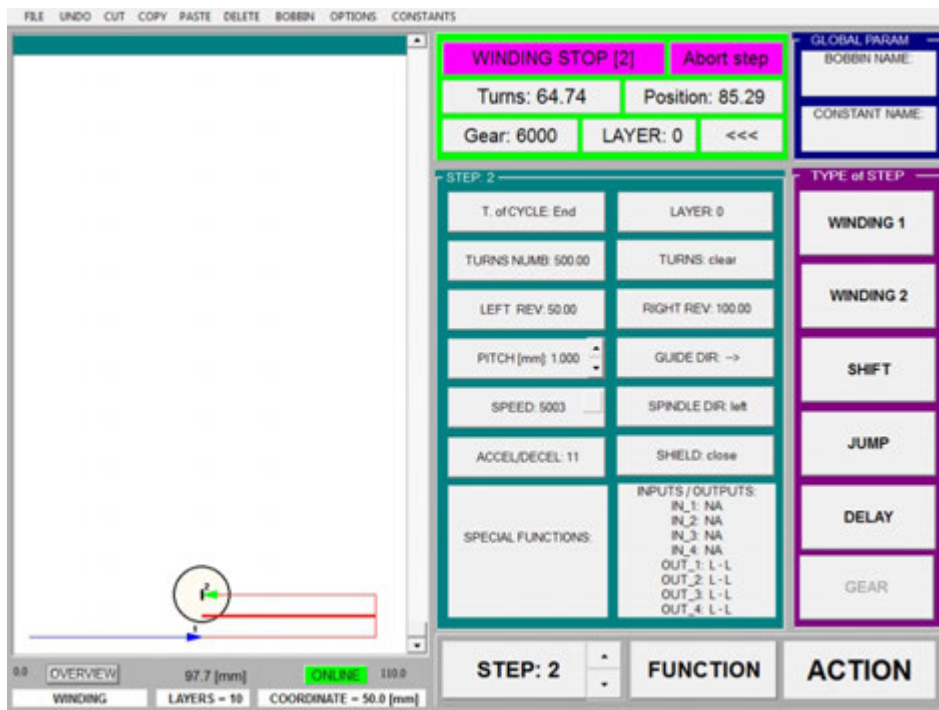
- support a technological discipline and reduce a frequency of operator failures according to ISO standards requirements
- help to change produced assortment operatively even in the case of complicated winding procedures
- quicken and simplify new personnel training





## 14. Software GRAPHIC

The GRAPHIC software is a comfortable design program, connected online with a winder. It allows the creation of complicated long programs with an overview of the position of the wire guide and has special features such as layer spread or correction.



The operating instructions are supplied with the supplied USB key.

## 15. PACKAGE CONTENTS

### ERN 100

Documents delivered with the machine:

- 1 pc certificate of quality and completeness
- 1 pc user's guide

#### Supplied Accessories:

- 2 pcs fuse T 315 mA/250 V
- 2 pcs fuse T 1,25 A/250 V
- 1 pc timing belt 5MR - 600 -25
- 1 pc timing gear 60 5M 25 - 6W
- 3 pcs allen key

### ERN 200

Documents delivered with the machine:

- 1 pc certificate of quality and completeness
- 1 pc user's guide

#### Supplied Accessories:

- 2 pcs fuse T 630 mA/250 V
- 2 pcs fuse T 1,25 A/250 V
- 1 pc timing gear 36 teeth
- 3 pcs allen key

## 16. FUSE CHANGE

Change the blown fuse. Note the main power plug must be disconnected.  
The fuses are on the back panel of the drive box. Be sure to only use a type of fuse specified by the manufacturer.

## 17. MAINTENANCE

As the machine contains a minimal number of mechanical gears, the maintenance is simple. To ensure trouble-free operation, the following steps are recommended:

- the winding space should be regularly cleaned of dust, dirt and wire ends
  - tension of the timing belt should be checked regularly
- Note: the ball bearings have permanent grease filling, no lubrication is needed

## 18. WARRANTY PERIOD AND SERVICE

Warranty period is 24 months from the date of delivery.  
Warranty and after warranty repairs are provided by the manufacturer.