

COIL WINDING MACHINE ERN T-VERSION

OPERATING INSTRUCTIONS

Version: 1.3

Date: December 21, 2018



ERN 22, 32, 32S, 42, 52



TPC s.r.o
Pálenica 53/79
03301 Liptovský Hrádok
SLOVAKIA

Tel.: +421-44-5221366

Fax: +421-44-5222088

E-mail: tpc@tpc.sk

www.tpc.sk

1. Introduction	1
1.1 Characteristic features	1
2. Technical data	2
2.1 Climatic conditions	2
3. Description of machine	2
3.1 Description of controls	3
3.2 Description PC display	6
4. Installation and preparation of working equipment	7
4.1 Connection to the power	7
5. Winding operation	8
5.1 Switching the machine ON and gear setting	8
5.2 Backup of winding data in case of an electricity drop	10
5.3 Winding and programming window	11
5.4 Explanation of concepts STANDSTILL, START, STOP	11
5.5 Winding programme selection	12
5.6 Start and Stop of winding cycle	12
5.7 Foot pedal	13
5.8 Protection shield	14
5.9 Winding corrections	15
5.9.1 Spindle reference position setting	15
5.9.2 Wire guide relative position setting	16
5.9.3 Number of turns correction	17
5.9.4 Total counter	17
5.9.5 Wire guide correction	18
5.9.6 Wire guide direction change	18
5.9.7 Abort step	19
5.9.8 Back winding	19
5.9.9 Deceleration ramp for the STOP - button	20
5.9.10 Spindle zero position	20
6. Joystick	21
7. Programming	23
7.1 Basis of programming	24
7.2 Step parameters programming	25
7.2.1 Basic step types	25
7.2.2 Wire guide shift	25
7.2.3 Winding step	27
7.2.4 Wire guide jump	31
7.2.5 Delay	32
7.3 Display and assignment of the layer	33
7.4 Programming corrections	34
7.4.1 Insert empty step	34
7.4.2 Delete step	35
7.4.3 Copy step	35
7.4.4 Global change	36
7.4.5 Coordinate offset	37

7.5 Special functions	38
7.5.1 Layer-stop	38
7.5.2 Layer end	39
7.5.3 Warnings	39
7.5.4 Automatic correction	40
7.5.5 Automatic switch to manual regime	42
7.5.6 Trapezoidal winding	43
7.6 Auxiliary inputs and outputs	44
7.6.1 Window for inputs and outputs	44
7.6.2 Digital inputs programming	45
7.6.3 Digital outputs programming	45
8. Steps list	47
9. Programme saving and opening	51
9.1 Programme opening	51
9.2 Programme saving	53
9.3 Programme copy	54
10. Menu	55
10.1 Programme locking	55
10.2 Error messages	56
10.3 Model selection	57
10.4 Display language	58
10.5 Winding machine number	58
10.6 Access PIN code setting	58
10.7 Zero spindle position mode	59
11. Firmware and upgrade	60
11.1 Upgrade of the application programme	60
11.2 Upgrade of the control board	60
12. Creation and modification of the operator list	61
13. Production log settings	62
13.1 Production log	62
13.2 Terminal mode	63
14. Software GRAPHIC	64
15. Gear change	65
16. Package contents	66
17. Fuse change	66
18. Maintenance	66
19. Warranty period and service	66

1. INTRODUCTION

Bench-type universal coil winding machine ERN is designed for winding the 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 with a separate stepping motor
- accurate reversible turn counting
- microprocessor-controlled winding cycle without time waste
- wide programming options
- special functions Layer-stop, Automatic guide 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

	ERN22	ERN32	ERN32S	ERN42	ERN52
Wire diameter (mm):	0,02 - 1,7	0,02 - 2,5	0,02 - 3,0	0,02 - 5,0	0,02 - 5,0
Pitch range (mm/rev):	0,008 - 40	0,008 - 40	0,008 - 40	0,008 - 40	0,008 - 40
Winding width (mm):	0,01 - 210	0,01 - 300	0,01 - 300	0,01 - 300	0,01 - 450
Winding speed / torque [rpm/Nm]:	12000 / 0,7 6000 / 1,5 3000 / 3	6000 / 1,5 1500 / 6 750 / 12	4000 / 3,5 1000 / 15 500 / 30	4000 / 3,5 1000 / 15 500 / 30	4000 / 3,5 1000 / 15 500 / 30
Accuracy of spindle stop [rev]:	0,01	0,01	0,01	0,01	0,01
Spindle position pre-set [rev]:	0,01	0,01	0,01	0,01	0,01
Wire guide position pre-set [mm]:	0,01	0,01	0,01	0,01	0,01
Max.speed of wire guide - shift [mm/s]:	100	100	100	100	100
- winding	75	75	75	75	75
Acceleration/deceleration:	table	table	table	table	table
Max.coil diameter [mm]:	180	250	250	450	450
Distance between centres [mm]:	250	340	340	330	650
Dimensions (mm):	780 x 420	870 x 460	870 x 460	910 x 530	1235 x 530
Weight [kg]:	85	120	120	140	180
Power supply [V/Hz]:	230 / 50-60	230 / 50-60	3x 400/50-60	3x 400/50-60	3x 400/50-60
Power consumption [kVA]:	1	1,2	1,5	1,5	1,5
Noise [dB]:	74	74	74	74	74

2.1 Climatic conditions

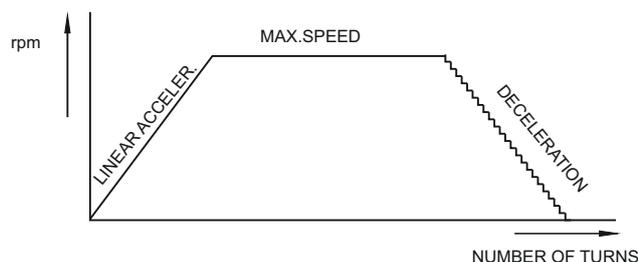
Machine is designed for normal workshop conditions with relative air moisture 70% and temperature in the range of +15 up to +30°C.

3. DESCRIPTION OF MACHINE

Coil winding machine ERN consists of the following parts:

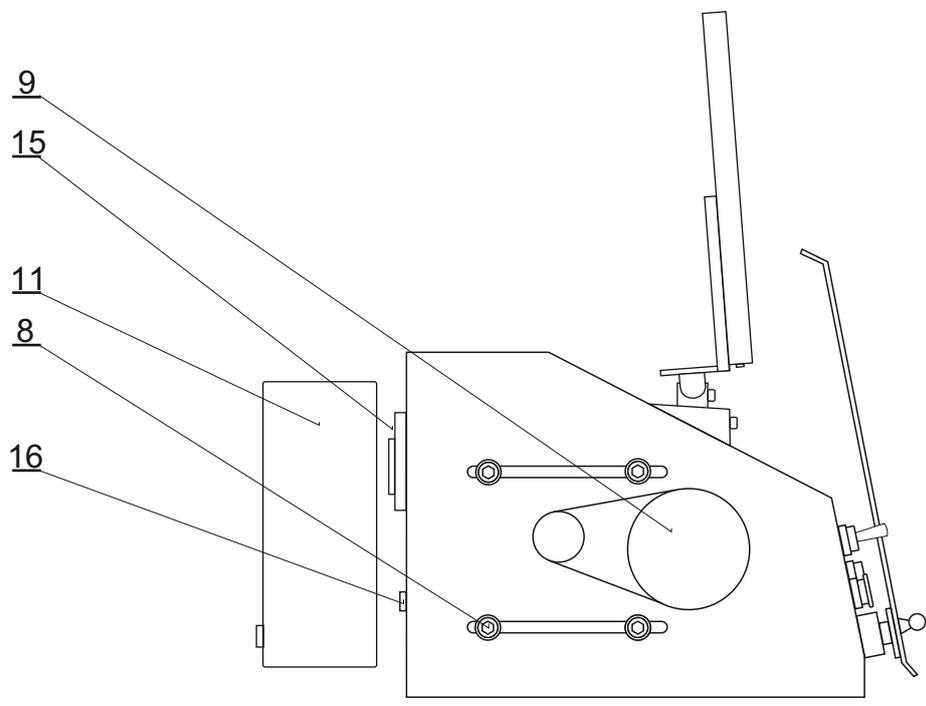
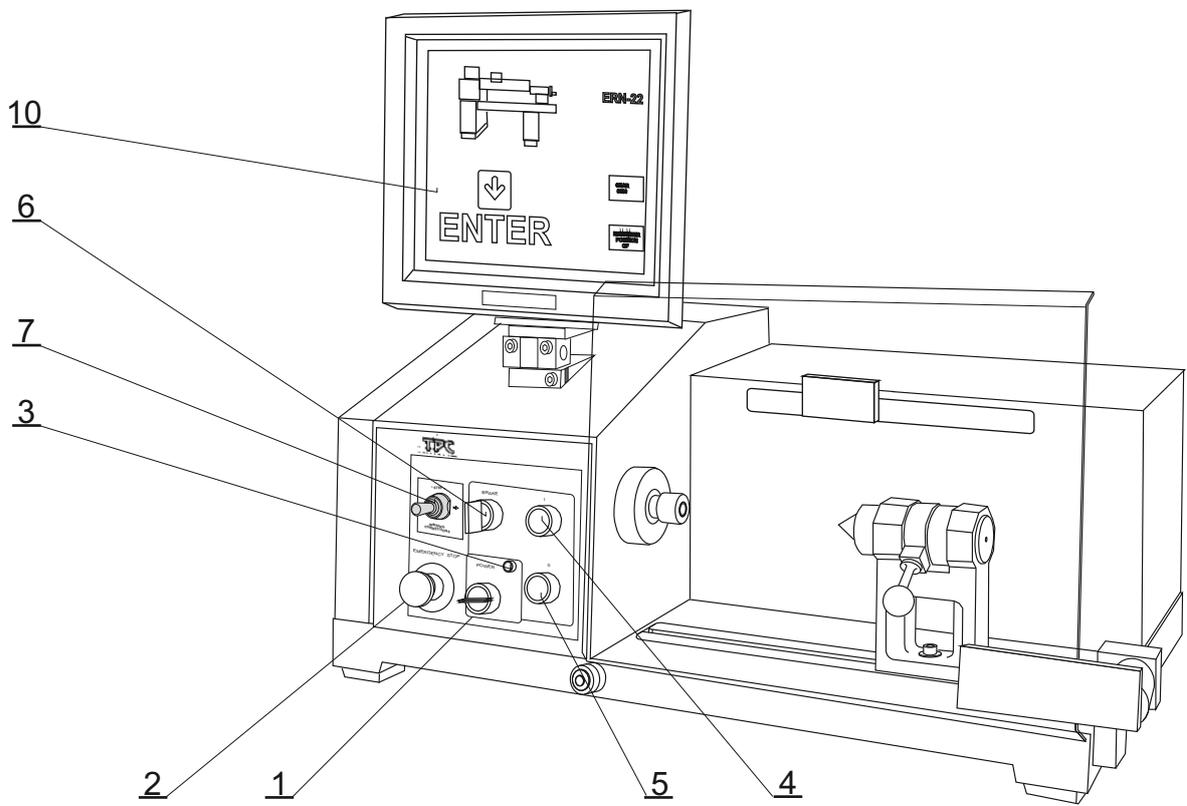
- controller containing control electronics
- industrial PC with 15" touch screen
- drive unit containing servomotor with gears, pitch control unit with stepping motor, power electronics and control elements
- base plate
- protection shield
- support with spool holders and dereelers (optional accessories)
- tailstock (optional accessories)
- wire guides (optional accessories)

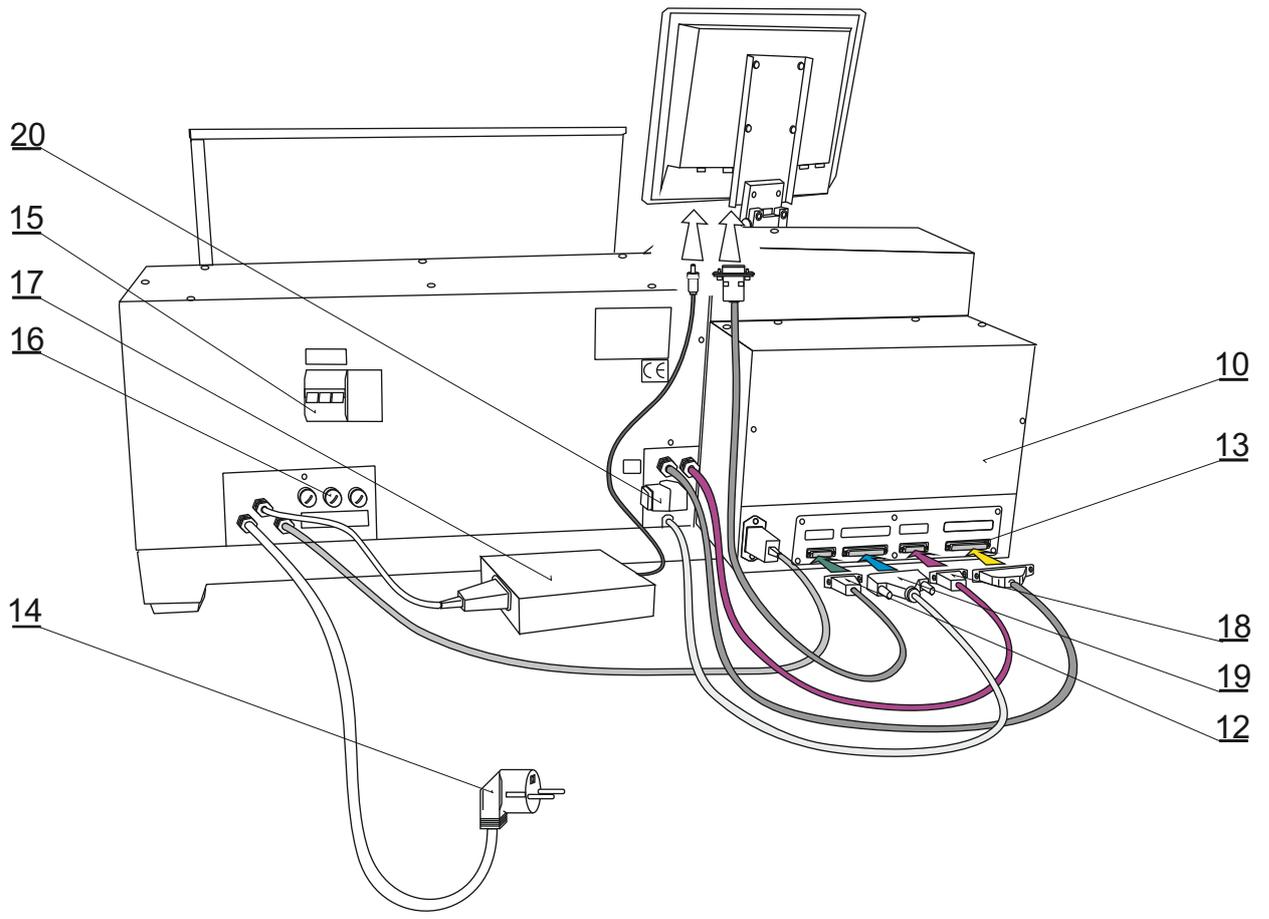
Winding cycle (linear acceleration, max.speed, linear deceleration and stop) is running automatically after pressing the START-button. Deceleration is controlled by microprocessor to ensure accurate stopping and spindle positioning.



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 - BRAKE ON / OFF - switches on/off the electromagnetic brake
- 7 - JOYSTICK
- 8 - Fixing screws
- 9 - Gear cover with timing belt
- 10 - Industrial PC
- 11 - Controller
- 12 - Serial interface between Controller and PC
- 13 - Connectors for joystick, inputs and outputs
- 14 - Power plug
- 15 - AC circuit breaker (only for ERN 32S,42,52)
- 16 - Fuses
- 17 - PC power supply
- 18 - CAN-BUS cable
- 19 - Control unit cable
- 20 - Connector for foot pedal





3.2 Description of PC display

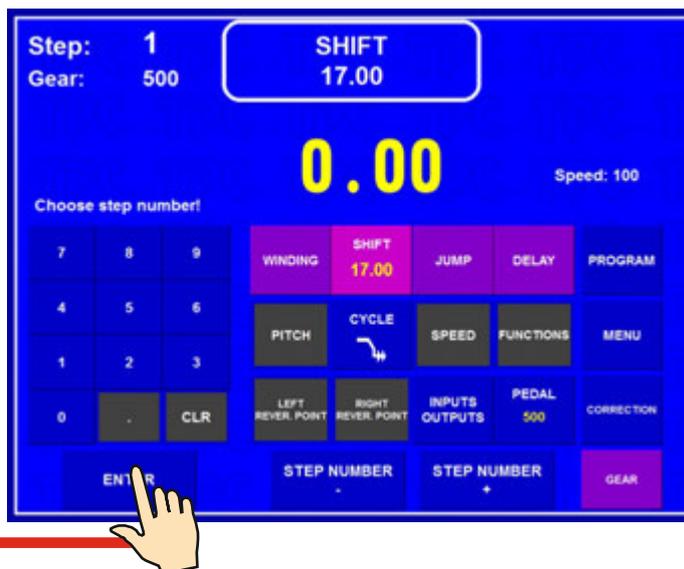
Display provides two basic views for standard information during winding: **Winding window** and **Programming window**.

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

The machine should be operated by a skilled person who is acquainted with operating manual and safety formualars. The training is provided by manufacturer 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 controller and display on the drive unit. Connect cables in accordance with the picture - page 5
- b) Check and fasten the fuse cartridges on the back panel of the drive unit
- c) Assemble support with spool holders and dereelers
- d) Connect the foot pedal to the connector (20)

Assembly is now complete and the machine is ready for use.

4.1 Connection to the power

The machine must be powered:

ERN 22,32 - by N/PE 230V/50 Hz AC with tolerance + - 5% and max. power consumption 1,2 k VA.
ERN 32S,42,52 - by 3N/PE 400V/50 Hz AC , tolerance + - 5%, max.power consumption 1,5 kVA.

Before plugging in the connection cable make sure that electric power is in accordance with conforms to technical requirements. Only professional staff who are qualified in electrical engineering are allowed to install the power connection to the machine.

Since the leakage current to PE is more than 3,5 mA, in compliance with IEC 61800-5-1 the PE connection must be doubled.

USE THE PE TERMINAL ON THE BACK OF THE MACHINE FOR THIS PARALLER PE CONNECTION.

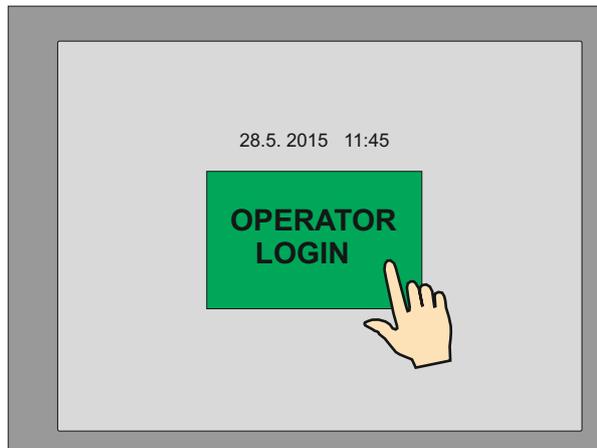
If a residual current protective device is used, we recommend that each winding machine be protected individually using a 30 mA RCD.

<p>There is no guarantee for damages caused by wrong or out of range connection to the power supply.</p>
--

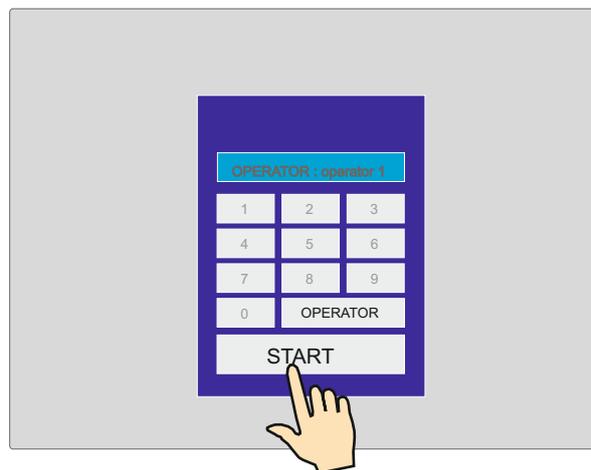
5. WINDING OPERATION

5.1 Switching the machine on and gear setting

After switching on (1) the start window appears



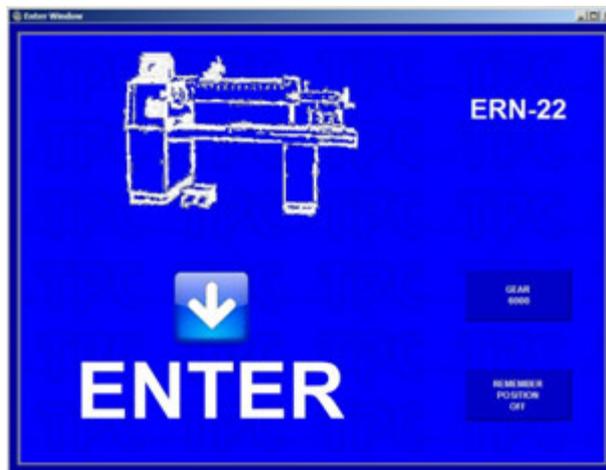
After pressing "OPERATOR" it is possible to choose operator name and continue by pressing START. This window appears only if you choose operator login (see chap. 13.)



Display provides information about the type of machine the controller is set for. In this window the set gear can be changed. This must be in ABSOLUTE ACCORDANCE with how the mechanical gear is set.



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.

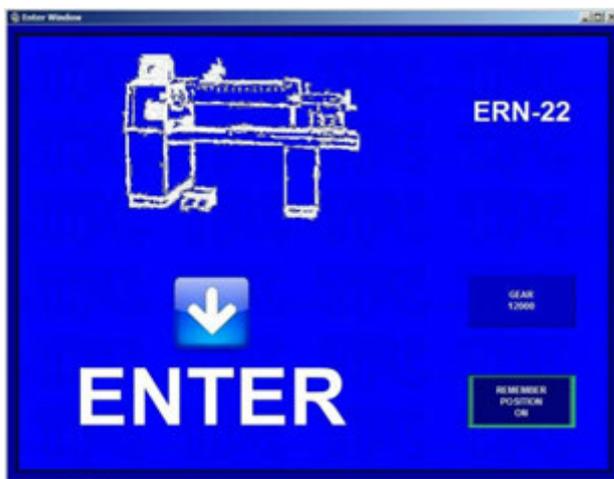
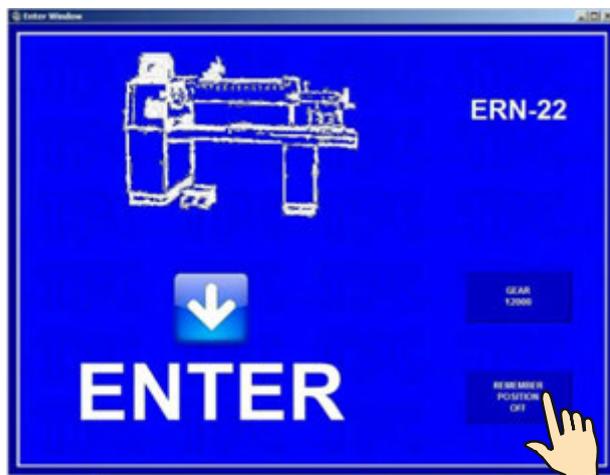


After pressing ENTER the initial setup is complete. This means that the wire guide is shifted to left home (zero) position - zero number of turns, step 0 and the last programme is set.



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.



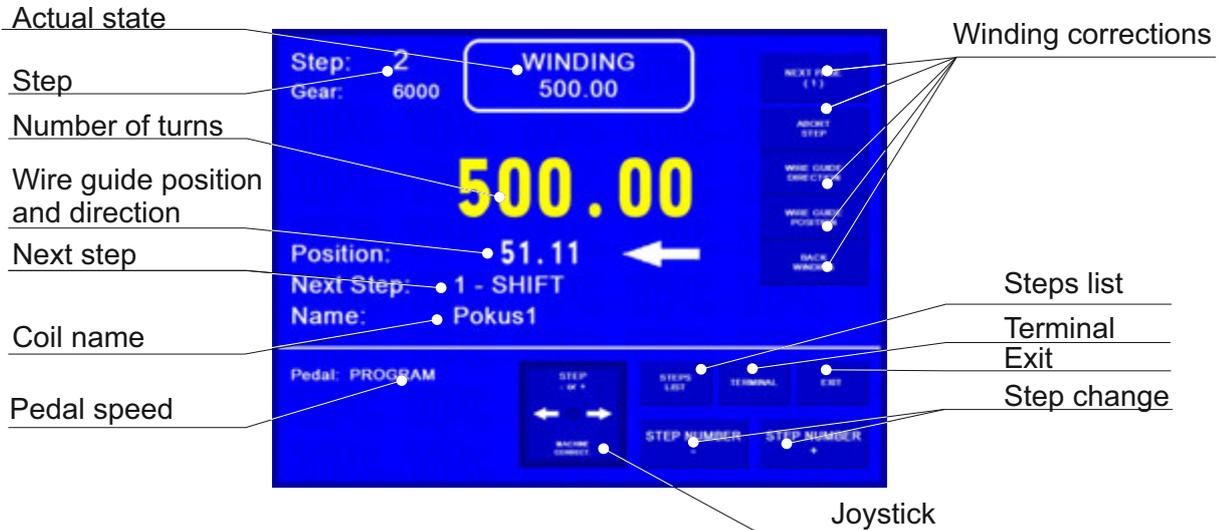
After the activation of this function (MEM.POS.ON) will be updated with values as they were before the electricity drop.

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

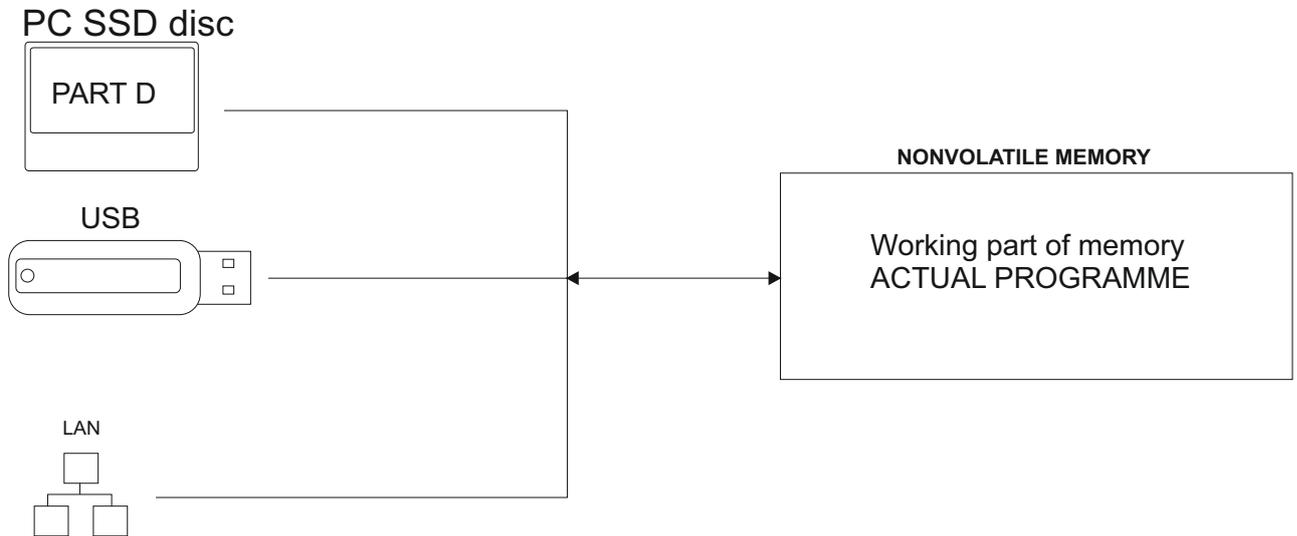
STANDSTILL: State after switching on the machine and pressing ENTER, or after a step finished. Starting from this state will shift the programme one step forward.
Eg.: If we are in the step 0, after pressing START, step 1 will be running.

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.

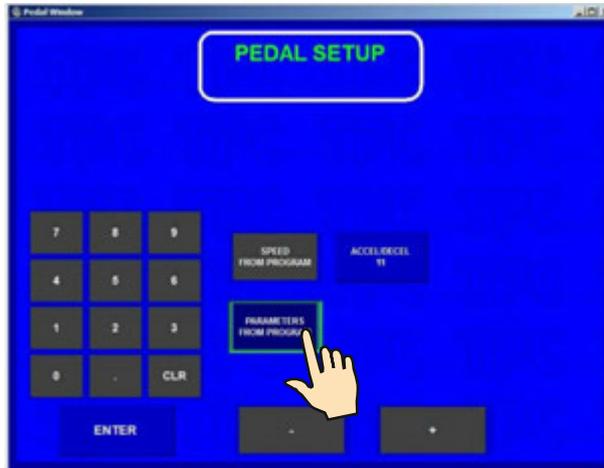


Accel. and dec. ramp for pedal

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 Protection shield

Protection shield may be programmed as:

CLOSED

It is possible for winding to only work if the protection shield is closed. If the shield is opened, the cycle is interrupted.

OPENED

It is possible for winding to work whilst the protection shield is open but in such case the spindle speed will be automatically limited to only work up to pre-set safety values. When the shield is closed during the winding, the cycle continues with the programmed speed values.

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.

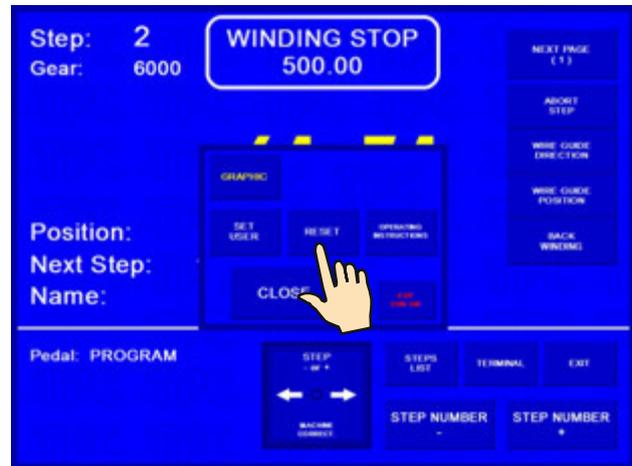
Reference (zero) spindle position is set up as follows:

- 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)

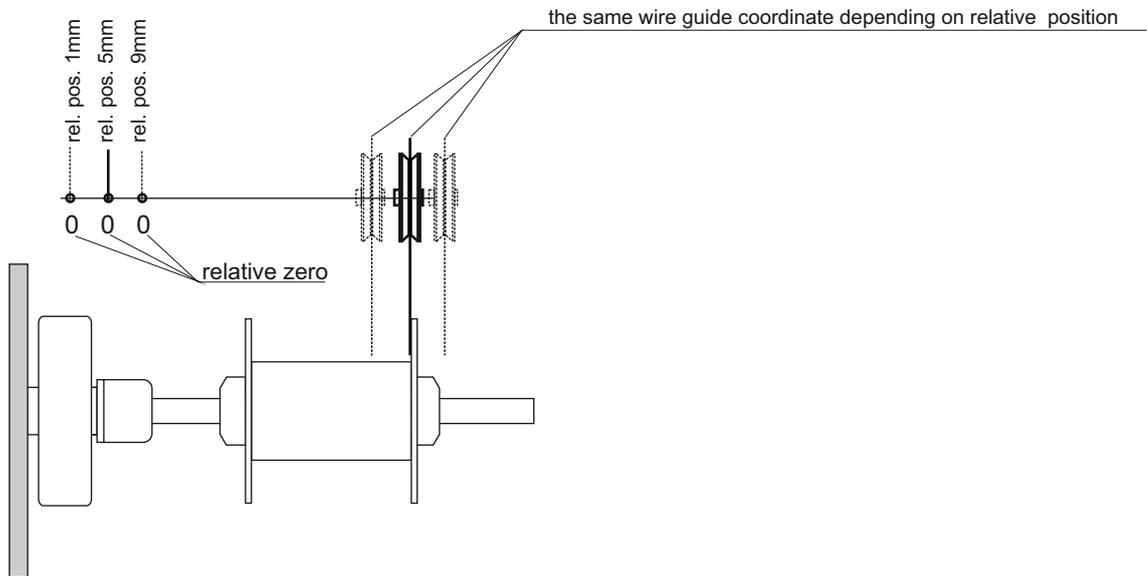
Note: When you switch the machine ON (by switch POWER or EMERGENCY STOP), RESET is running automatically and the spindle position is taken as reference position.



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

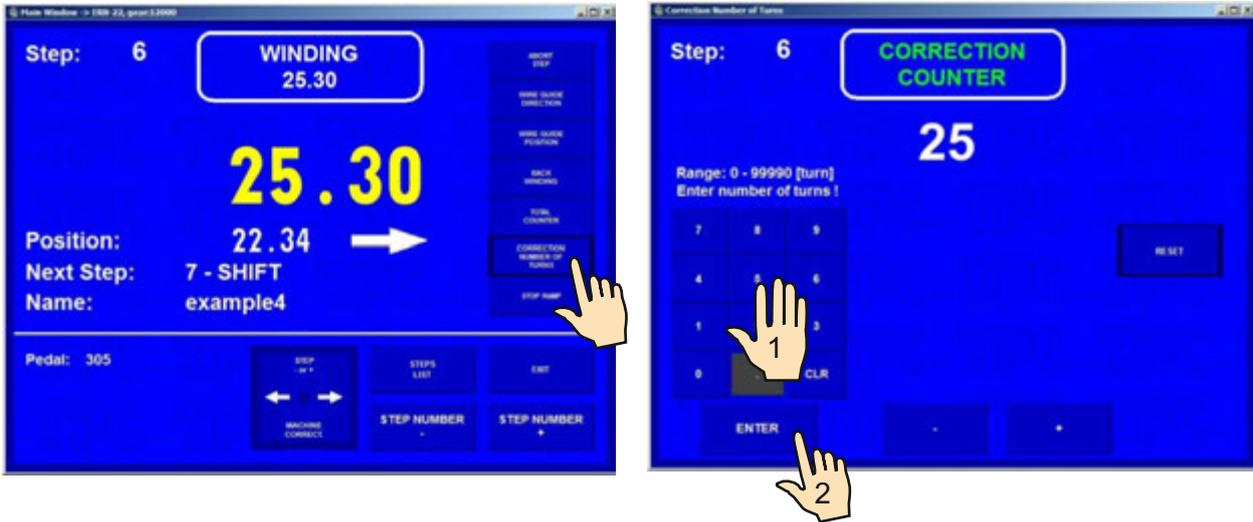


pressed (cca 0,5 s) moves the wire guide continuously.

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.

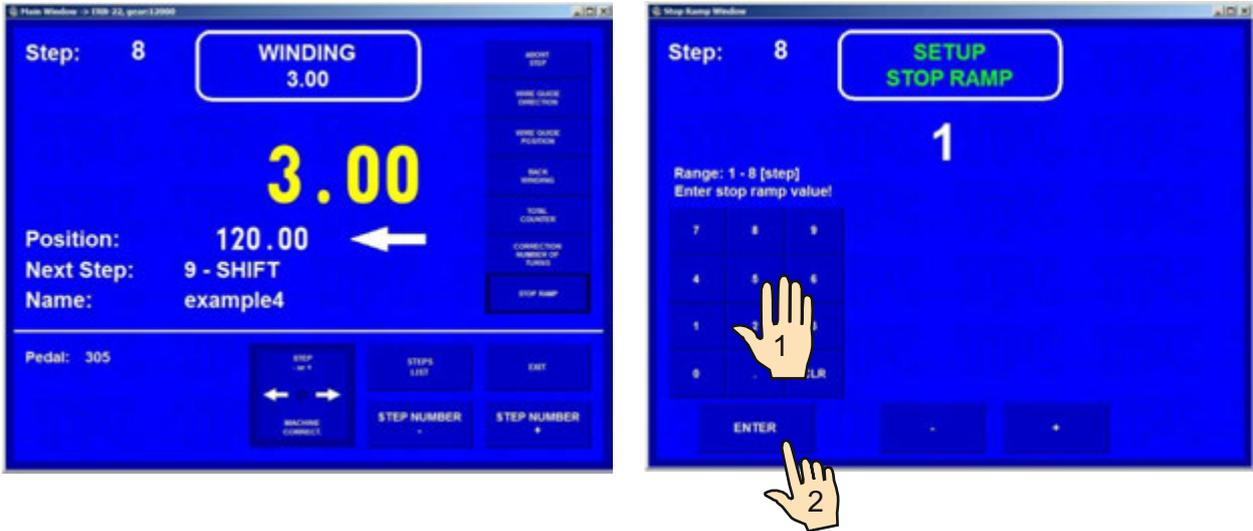


We can wind back the number of turns required only by using the pedal. The number of turns is counted back and the wire guide moves in opposite direction.

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

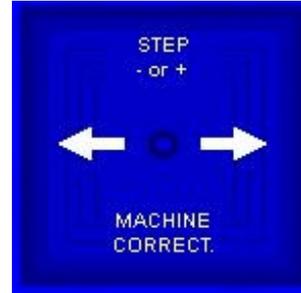
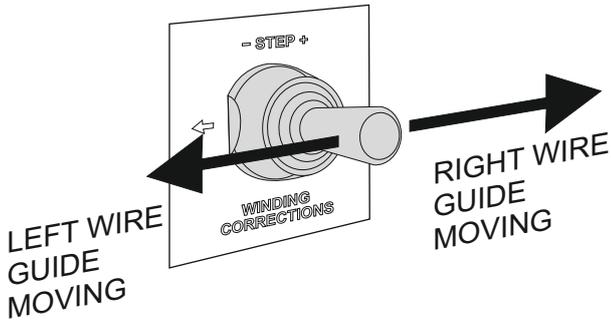
This allows you to taken new spindle zero position without machine reset, counter is canceled.



6. JOYSTICK

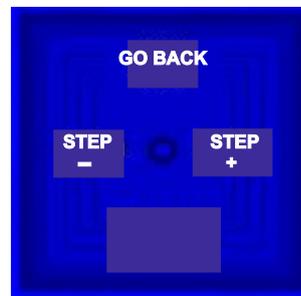
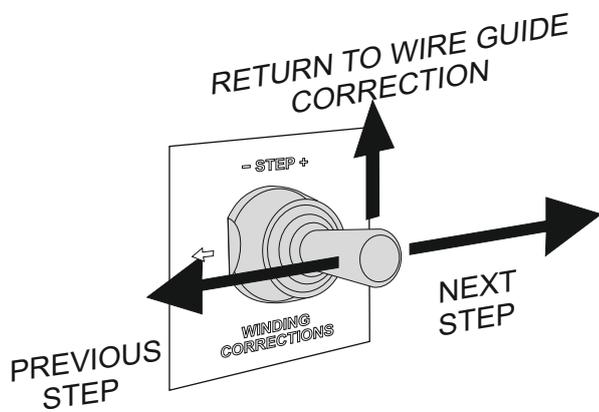
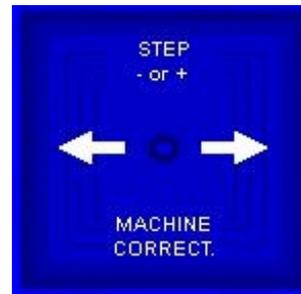
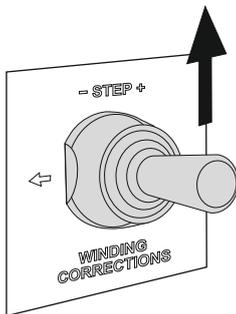
Each model is equipped with a four way JOYSTICK which provides the following actions:

- wire guide corrections

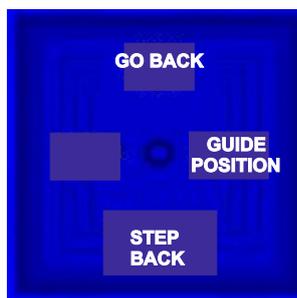
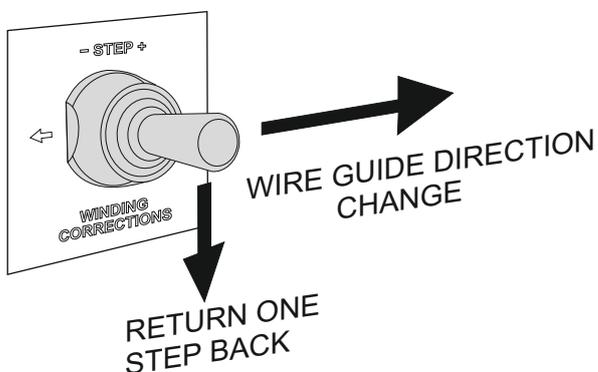
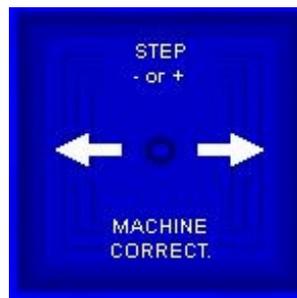
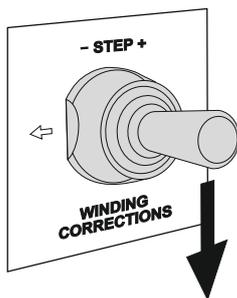


Holding the left or right position pressed (cca 0,5 s) moves the wire guide continuously.

- step change



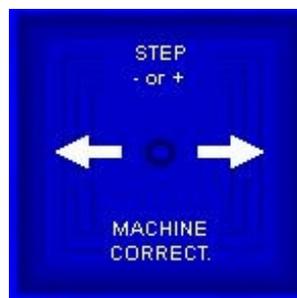
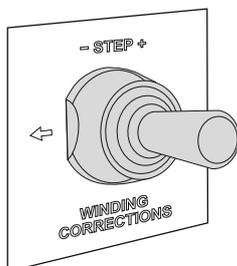
- return one step back and wire guide direction change



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.

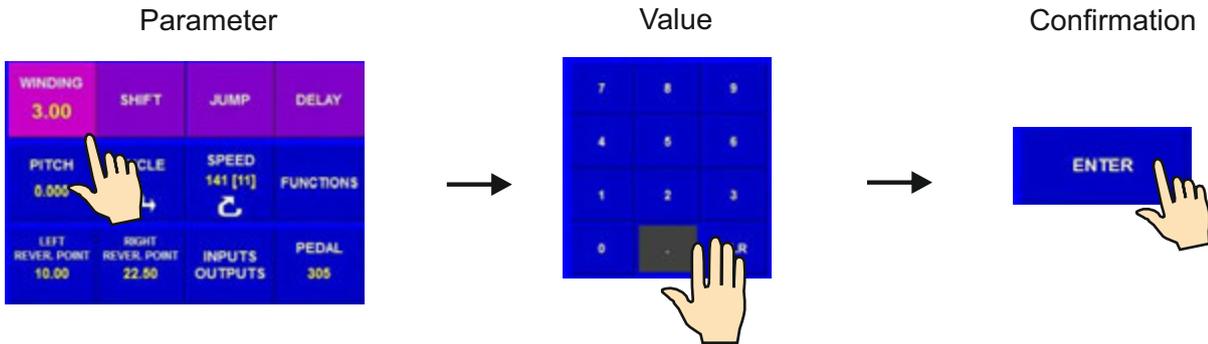
JOYSTICK returns from this state to the wire guide correction after 3 seconds automatically.

After 3 seconds



7. PROGRAMMING

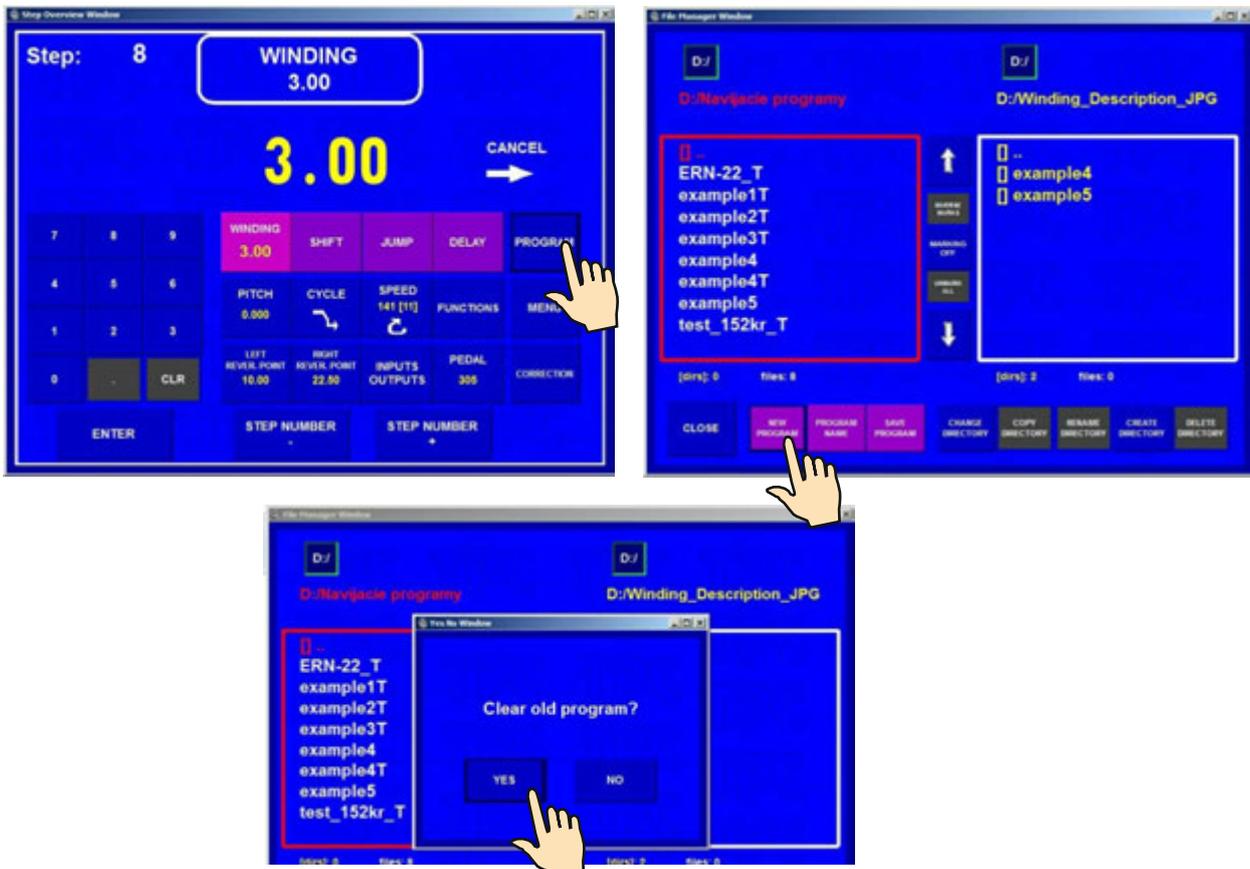
Entering the data:



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 button  or use the numeric keyboard.

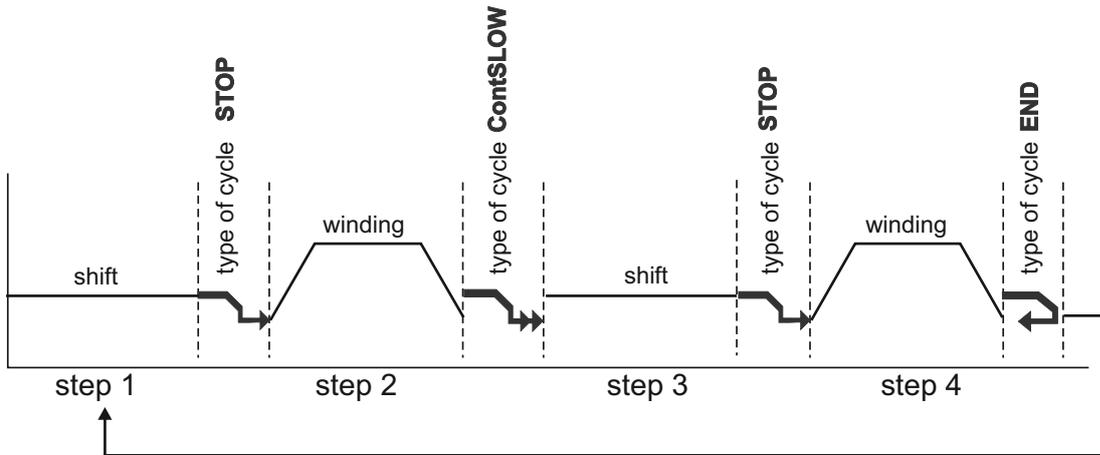
Created programme is saved to the working part of memory (programme in this memories is designated as an ACTUAL PROGRAMME). We can either overwrite (or modify) the already existing programme, or open the new one.





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 or DELAY.

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

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:



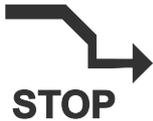
Type of cycle

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.



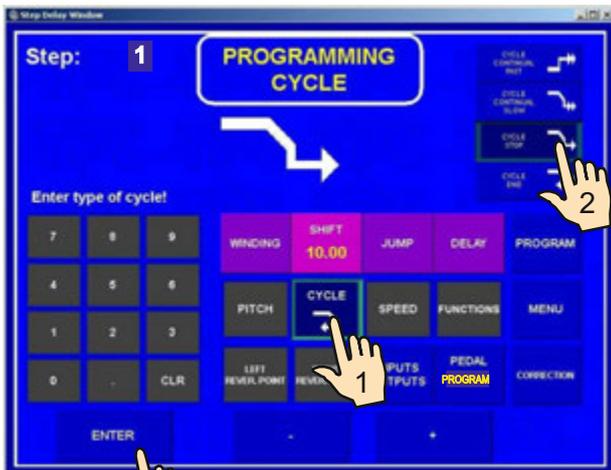
Continual cycle with deceleration

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 number of turns

Wire guide direction after start

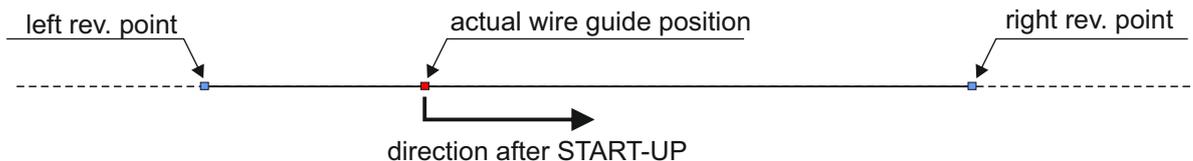
Cancelation of the previous number of turns

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	1,2	1,2
2	1,5	1,5
3	2,0	2,0
4	2,5	2,5
5	3,0	3,0
6	4,0	4,0
7	6,0	6,0
8	8,0	8,0

Pitch



Left reversal point



Right reversal point



Switching OFF the wire guide shifting during programming

The wire guide shifting can be shifted 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.

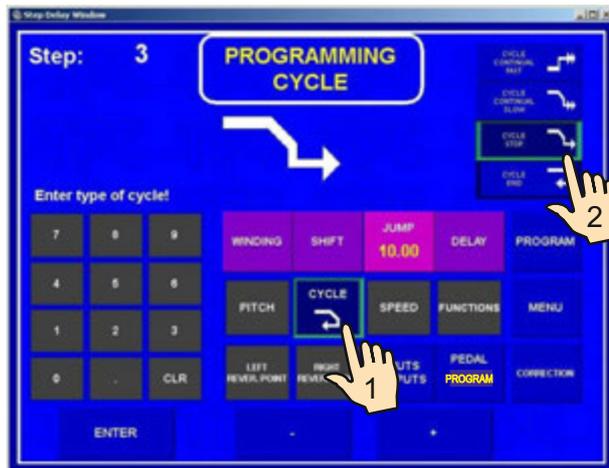


7.2.4 Wire guide jump

Length of jump and direction



Type of cycle

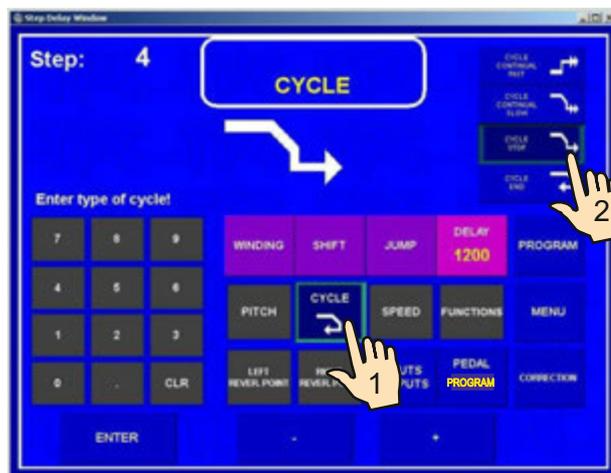


7.2.5 Delay

Time of delay

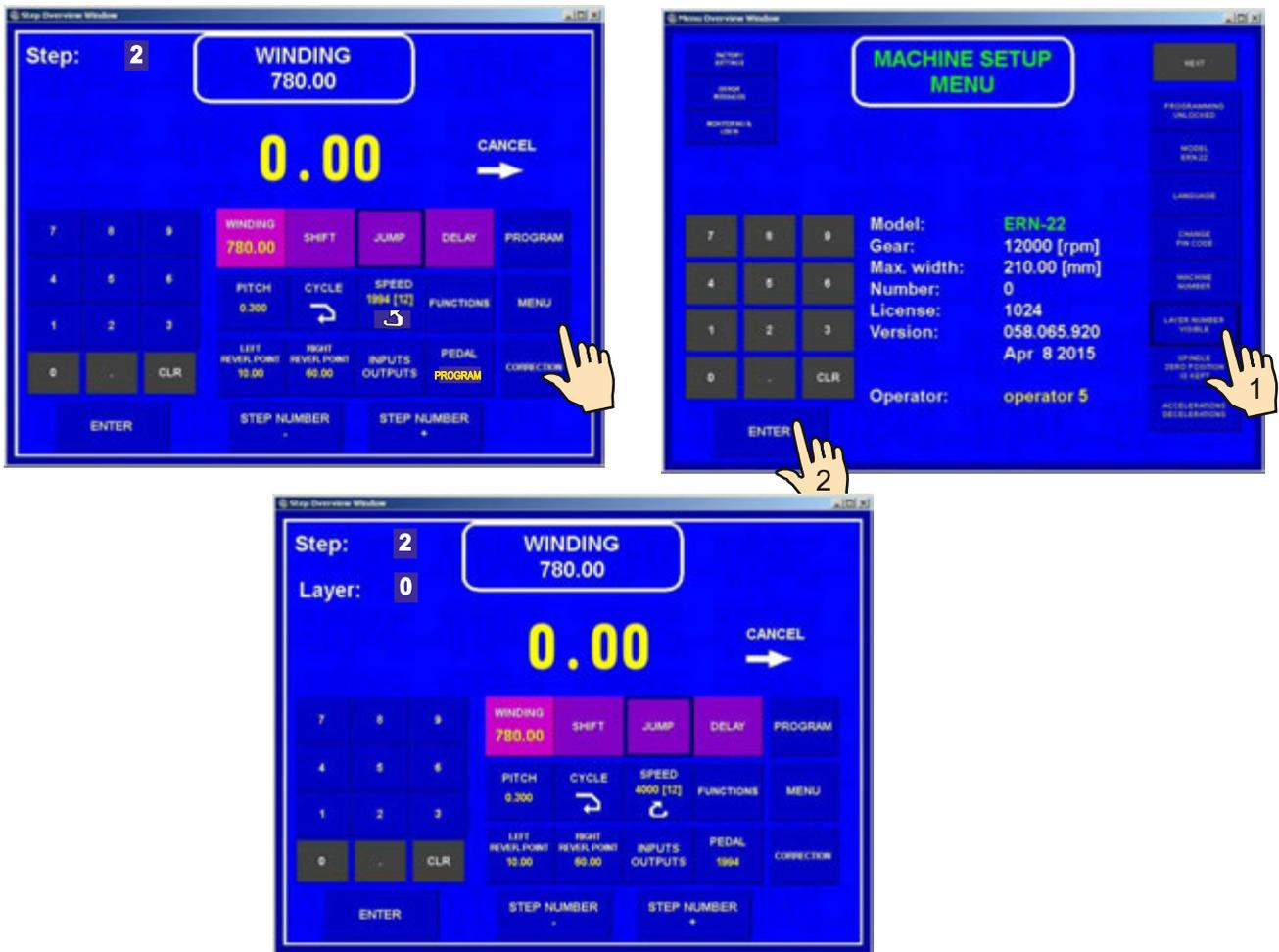


Type of cycle

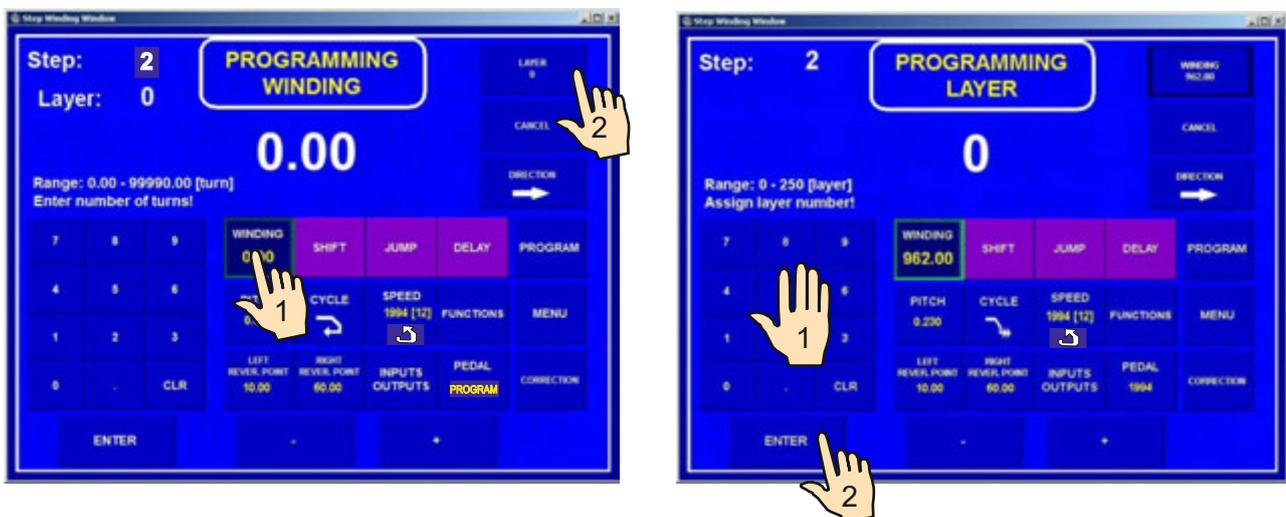


7.3 Display and assignment of the layer

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.



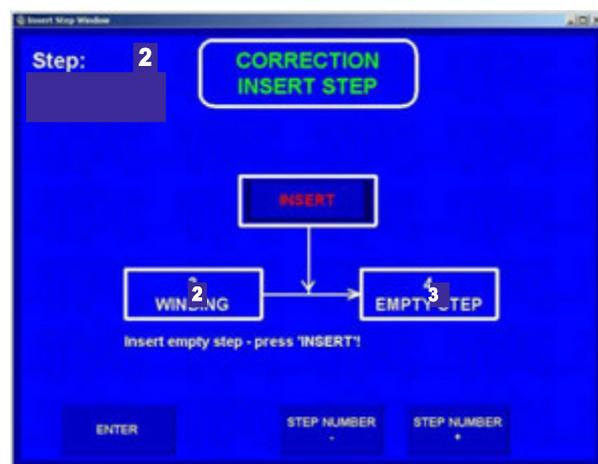
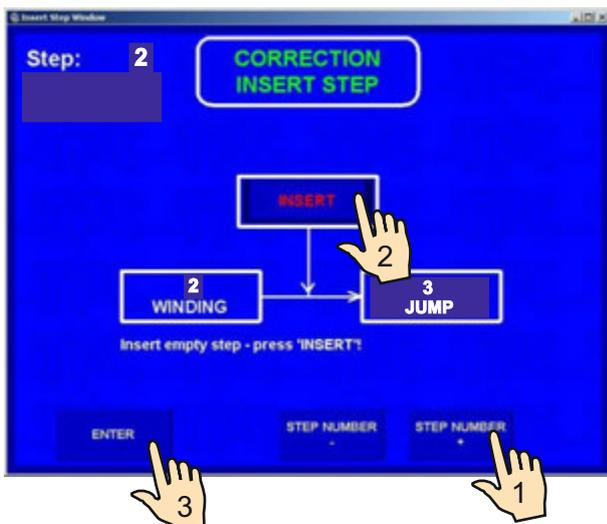


7.4 Programming corrections

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

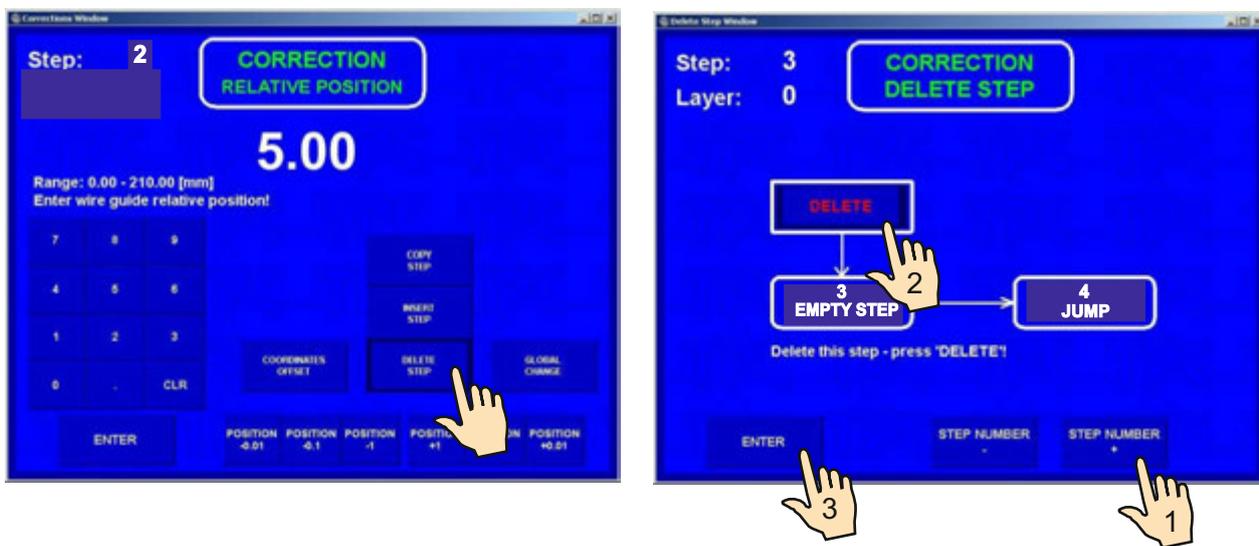


or



7.4.2 Delete step

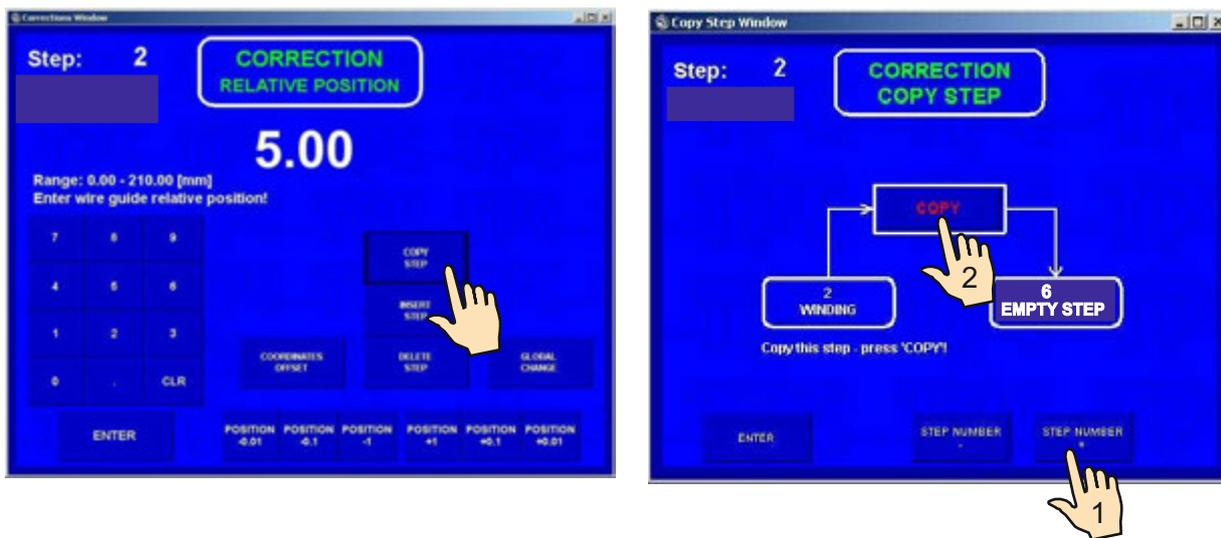
Each step in the programme can be canceled. Subsequent steps are shifted in value "-1" automatically.



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

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  or 

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).



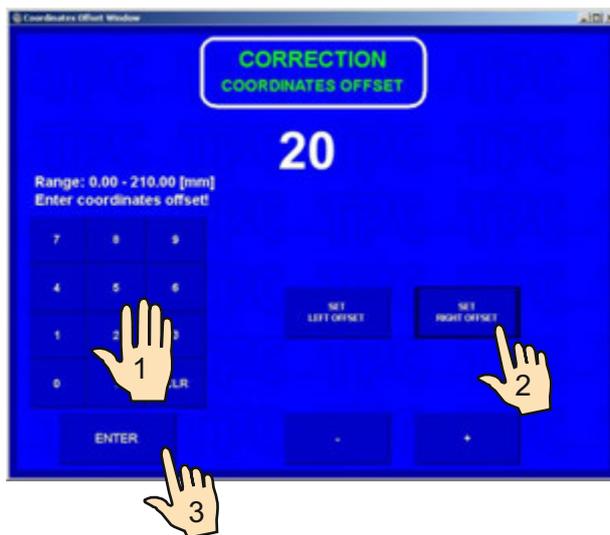
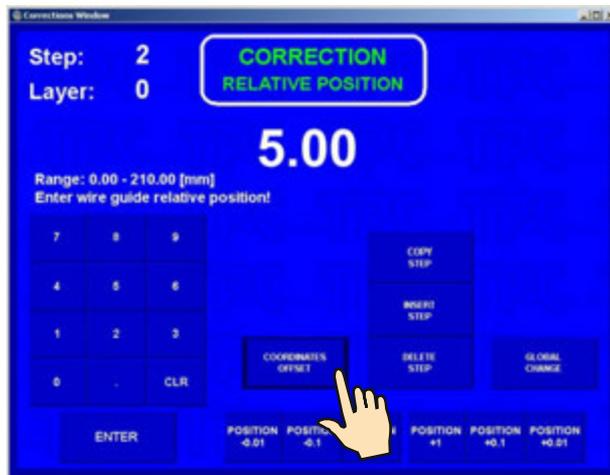
Choose a parameter to be changed - eg. pitch



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.

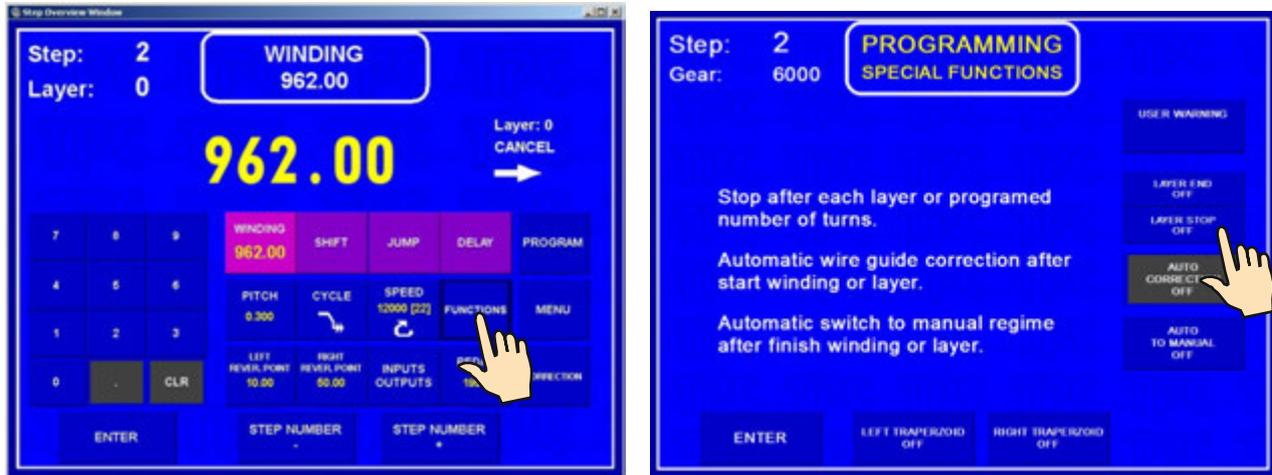


All programmed coordinates (left, right reversal points and shifts) are increased by the value of 20,0 mm.

7.5 Special functions

7.5.1 Layer stop

This function activates winding step STOP after each wound layer.



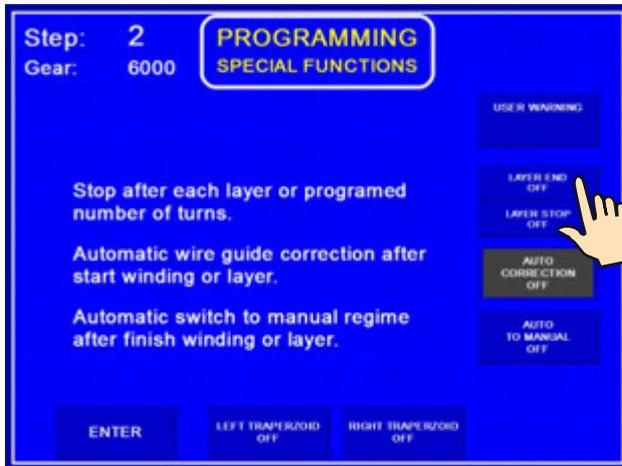
The machine will stop after each layer at both left and right reversal points. This will continue until the programmed number of turns is reached.

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



7.5.2 Layer end

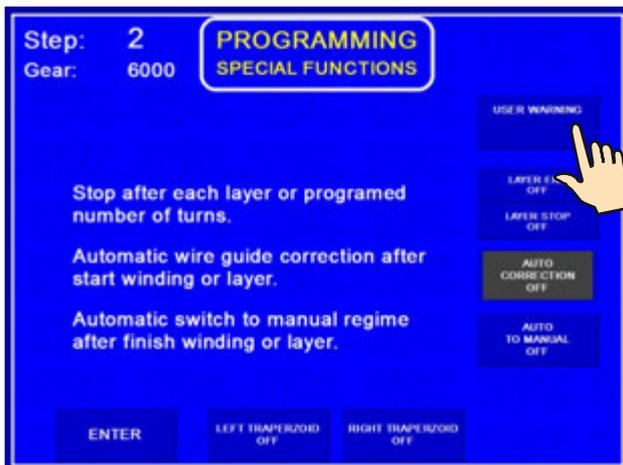
This function activates winding step STOP in desired layer in reversal point.



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

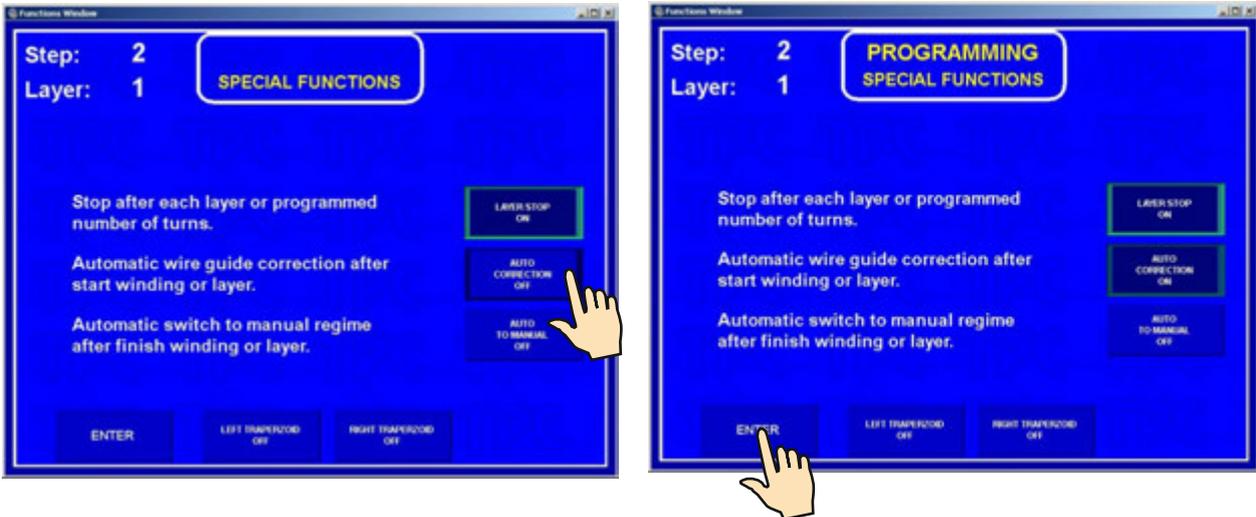
7.5.3 Warnings

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

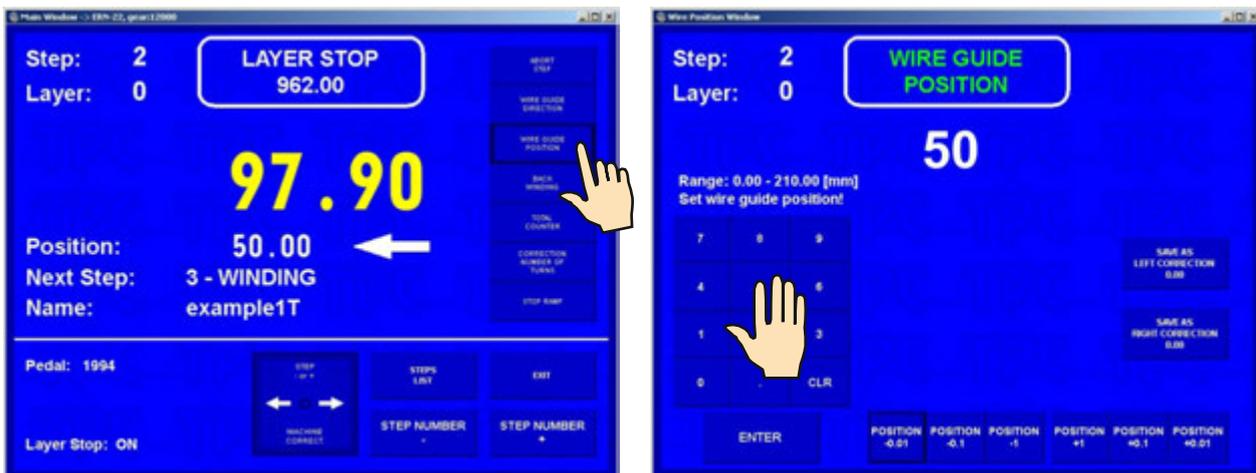


7.5.4 Automatic correction

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.



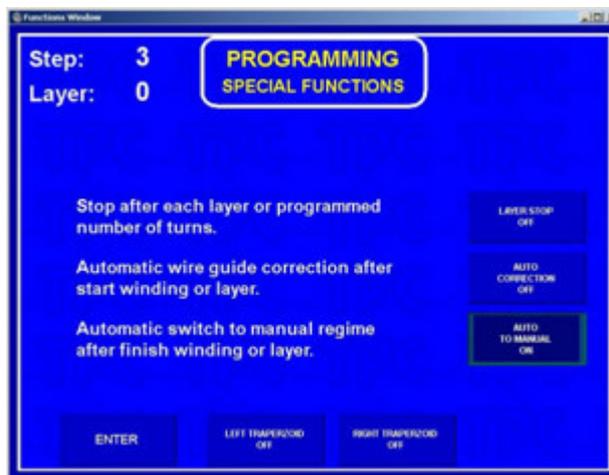
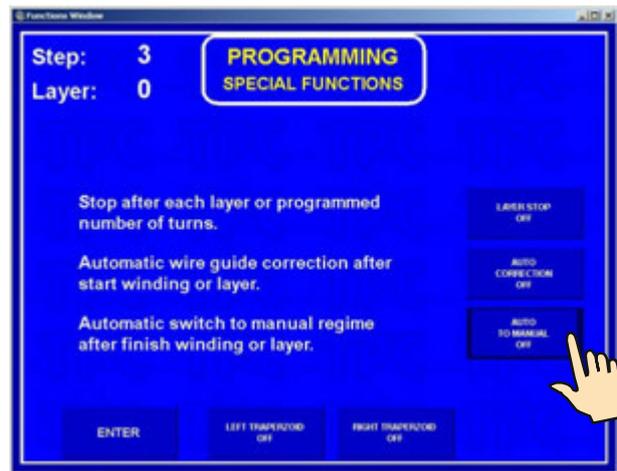


Maximum value for wire guide correction can not be greater than ± 10 mm after a layer is wound. Value higher than this will be ignored !

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.



Cancellation

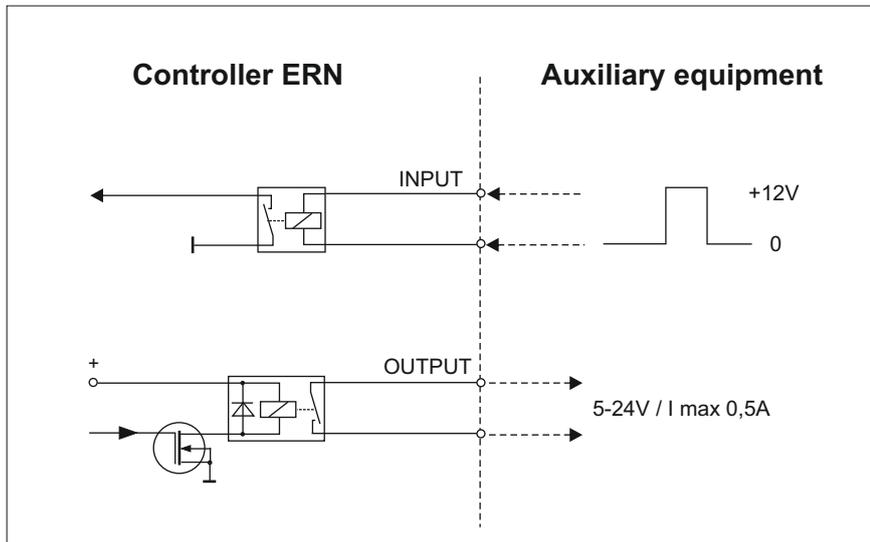
Trapezoid form change

Available form of trapezoidal windings :

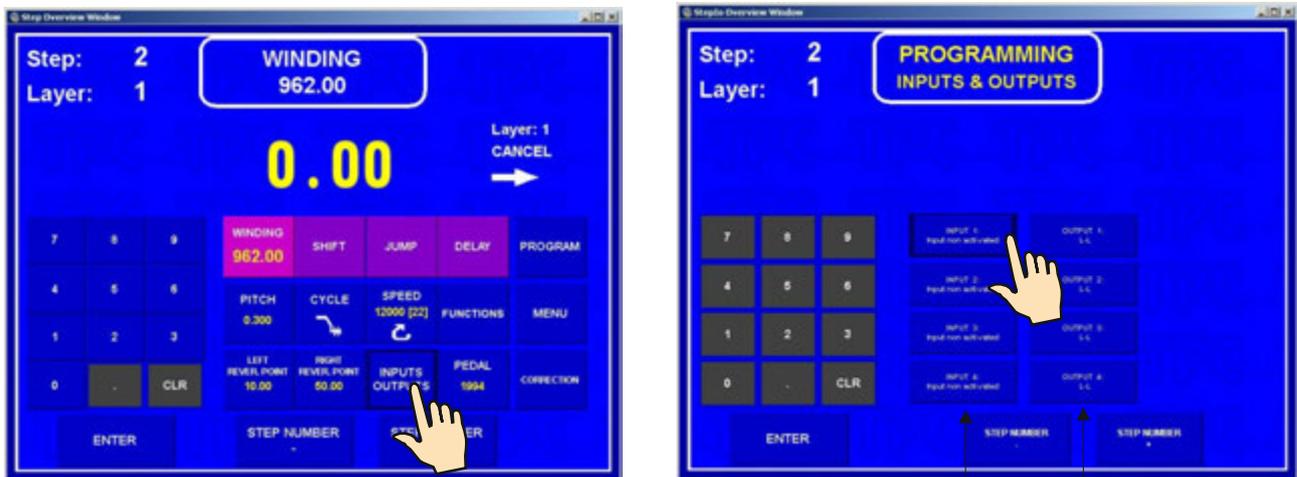
	left trapezoid : OFF	right trapezoid : / X,X
	left trapezoid : OFF	right trapezoid : \ X,X
	left trapezoid : \ X,X	right trapezoid : OFF
	left trapezoid : / X,X	right trapezoid : OFF
	left trapezoid : \ X,X	right trapezoid : / X,X
	left trapezoid : / X,X	right trapezoid : \ X,X
	left trapezoid : \ X,X	right trapezoid : \ X,X
	left trapezoid : / X,X	right trapezoid : / X,X

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)

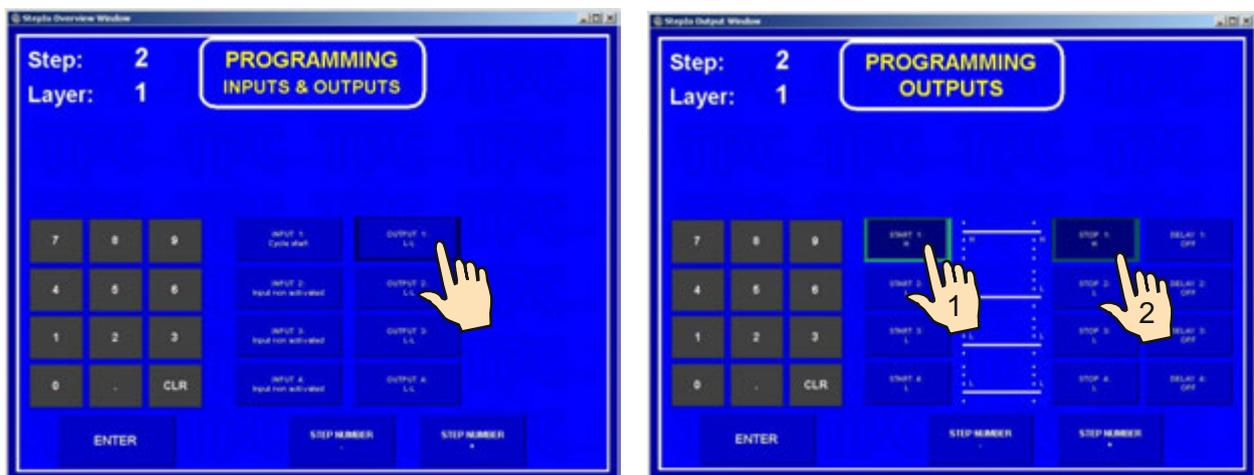
CYCLE START - winding cycle start is done if input is high (+12 V)

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

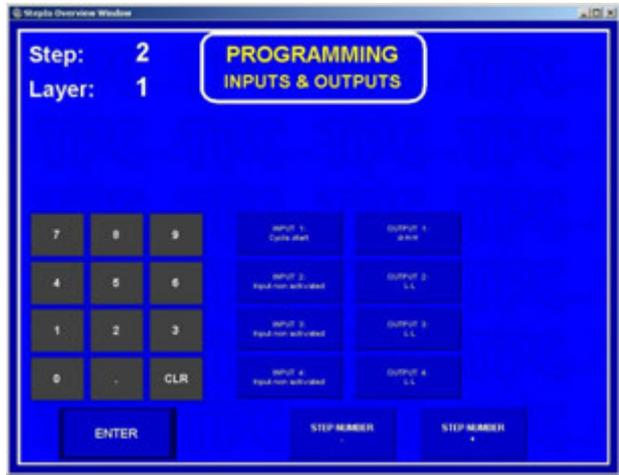
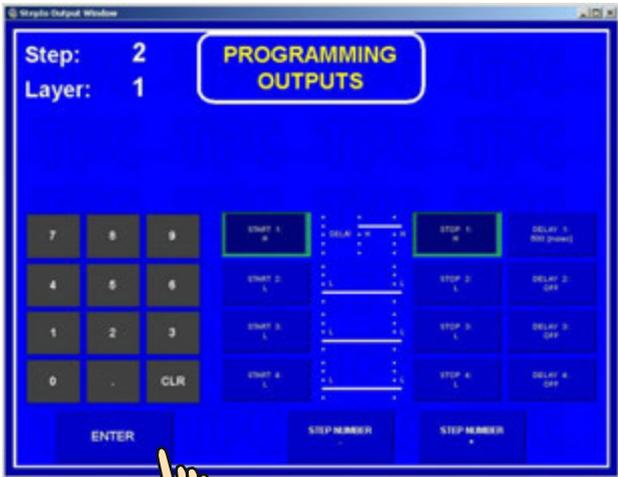
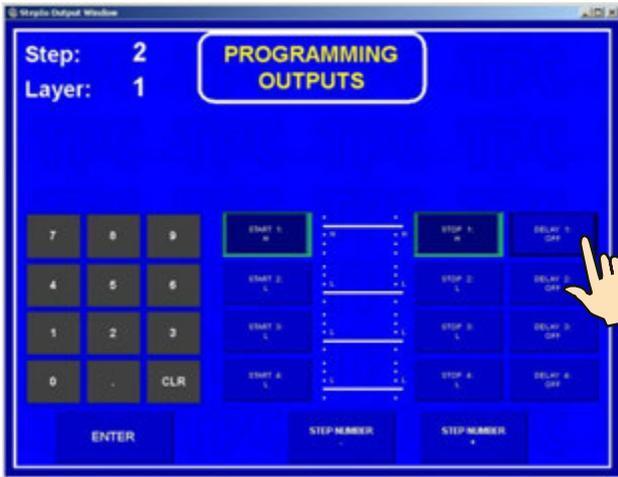
7.6.3 Digital outputs programming

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.



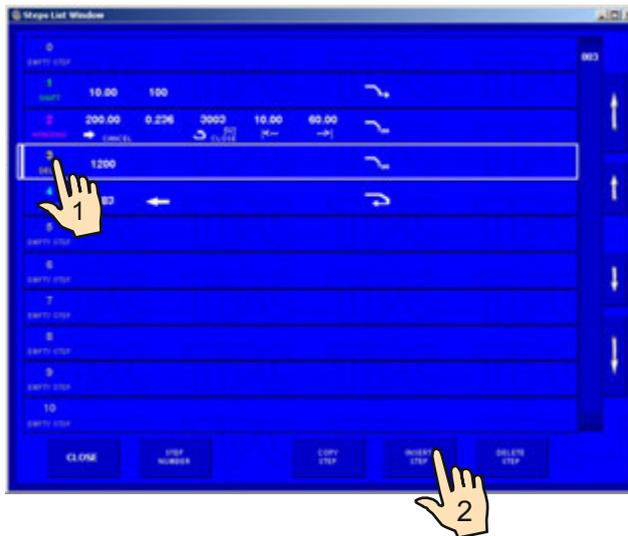
- Parameter correction





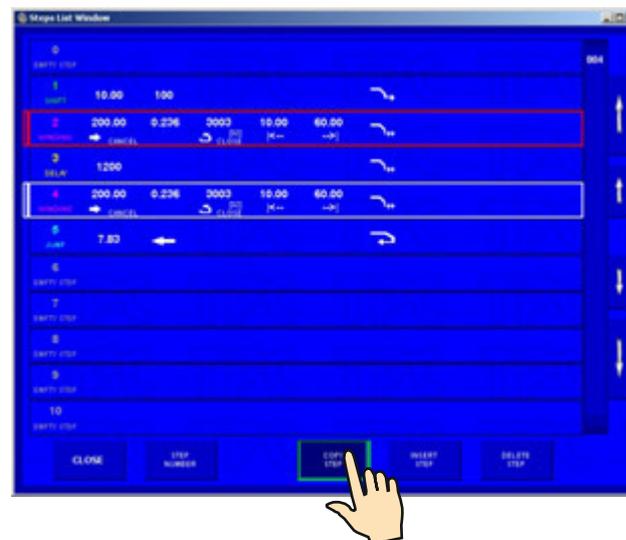
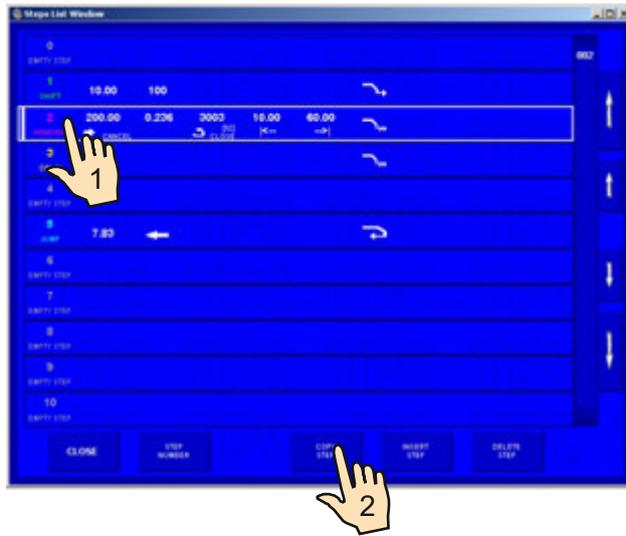
Each parameter can be changed in this way.

- Insert empty step



empty step

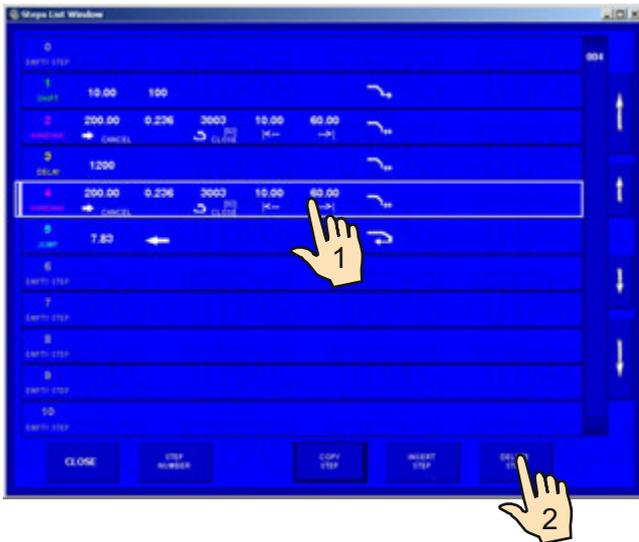
- Copy step



Pressing of button "COPY STEP" ends copying.



- Delete step



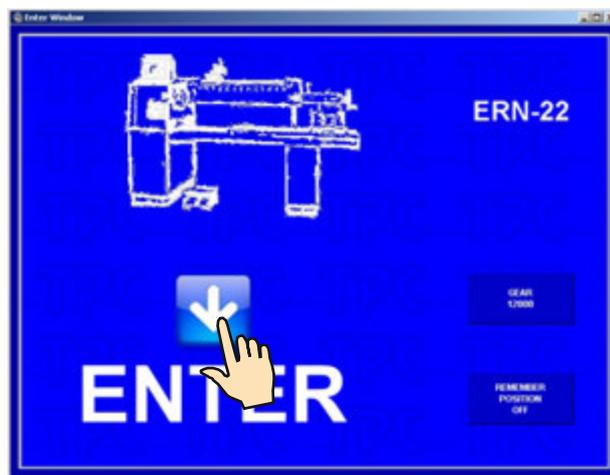
9. PROGRAMME SAVING AND OPENING

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.



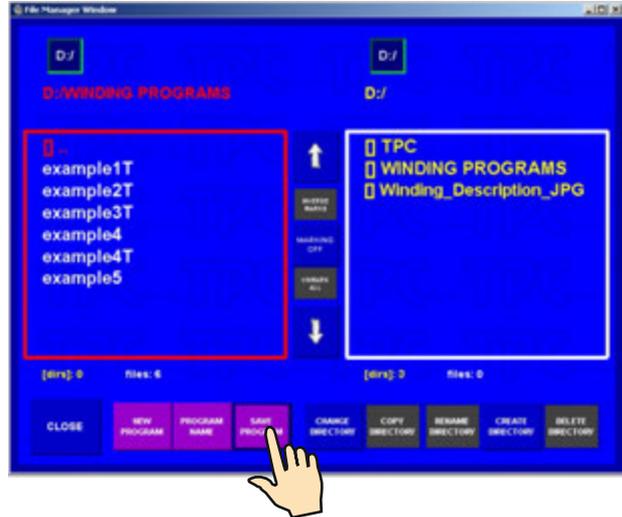
9.1 Programme opening





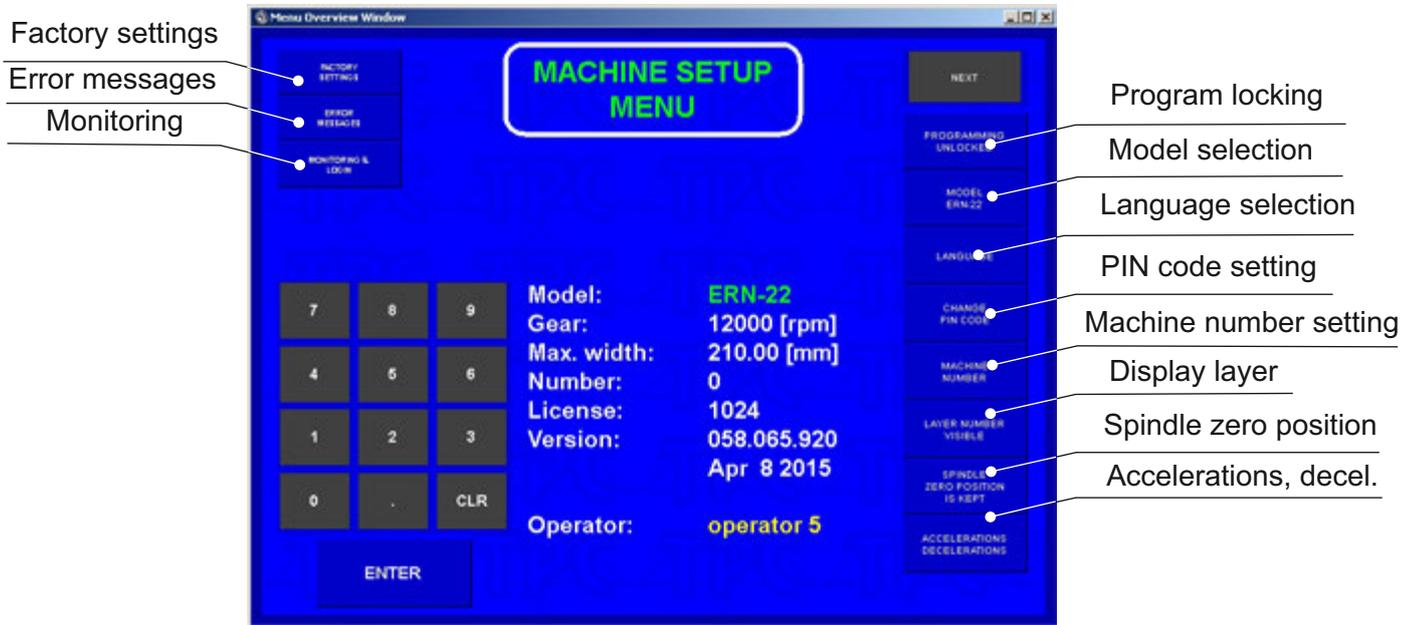
9.2 Programme saving

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).



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.



9.3 Programme copy

This function allows to copy programmes already created.



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 Protection shield is open

Solution: press ENTER and close the shield

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.

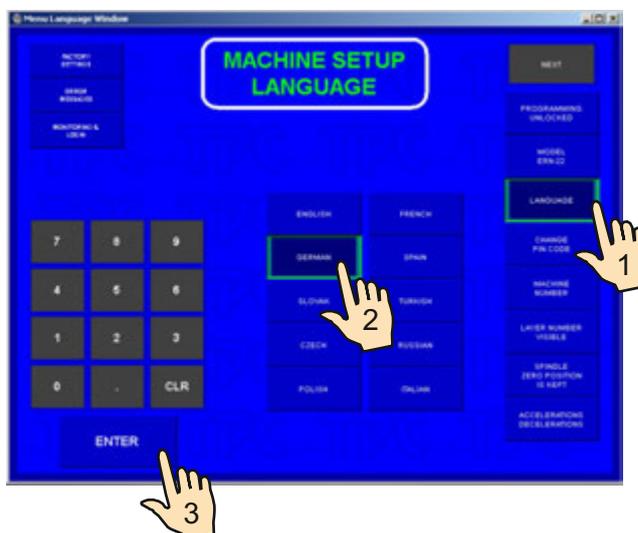


10.3 Model selection



10.4 Display language

Allows a selection of display language.



10.5 Winding machine number

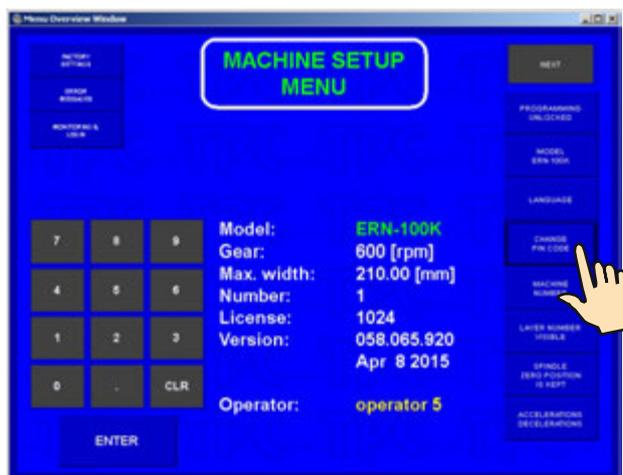
Winding machine number can be set for easy network identification.



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:

- tpcrxxx.tpc – control board upgrade, where xxx is number of version (e.g. tpcr060.tpc)
- PC application programme upgrade

11.1. Upgrade of the application programme

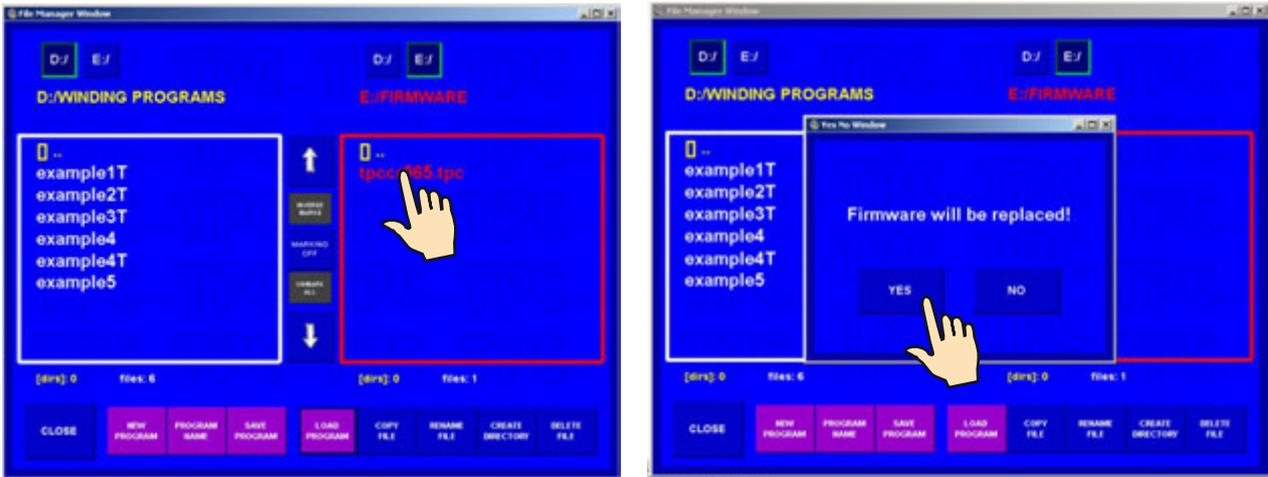
Procedure of the application programme upgrade is as follows:

- copy (unpack) received upgrade file
- connect flash drive, 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

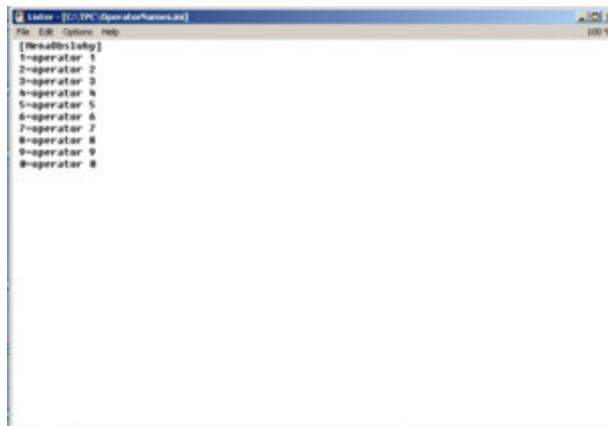
Connect flash drive to the PC and load upgrade file tpcrxxx.tpc :





12. Creation and modification of the operator's list

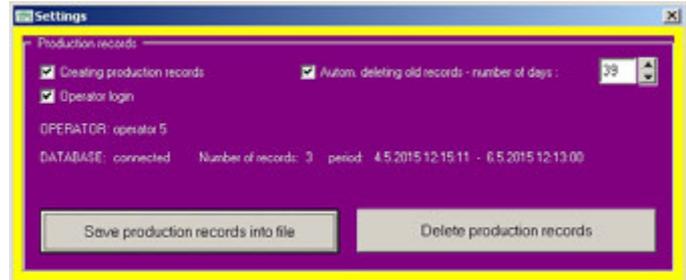
Operator's name is used for the identification when production log is created. The names and codes information are stored in the file C:\TPC\OperatorNames.ini, this can be edited.



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

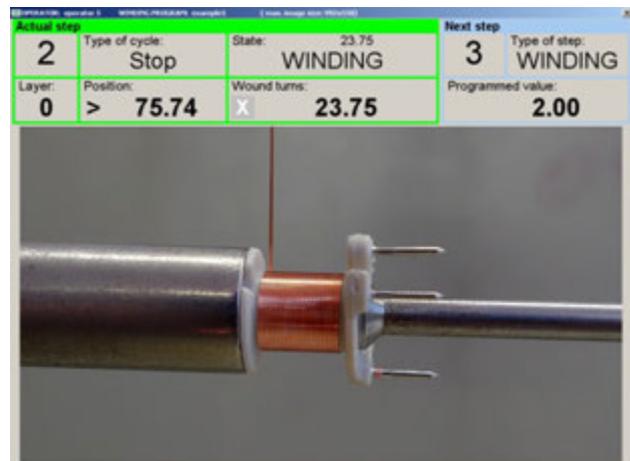
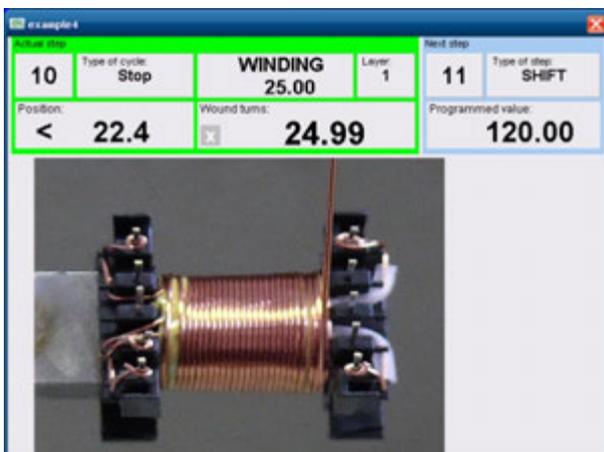


Winding procedures are able to provide winding machine operators with additional important information on winding. If a winding programme is accompanied with a corresponding winding procedure a current winding step technological operation description is displayed on the winding machine monitor automatically.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

Application of the winding procedures can:

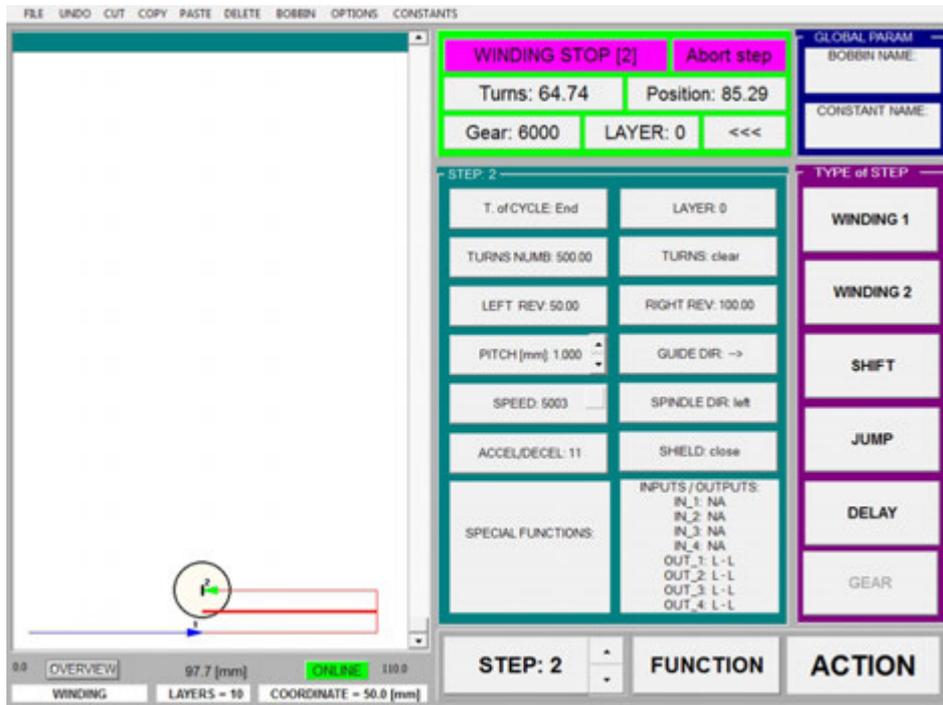
- support a technological discipline and reduce a frequency of operator failures according to ISO standards requirements
- help to change produced assortment operatively even in the case of complicated winding procedures
- quicken and simplify new personnel training

Winding sheet instructions in the form of images



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. GEAR CHANGE

Timing belt drive is under the cover (9). The machine is delivered with the default "middle" gear.

Changing the gear:

- switch OFF the machine and unplug it
- remove the cover (9) attached by 3 screws
- loosen 4 screws (8) and remove the timing belt

Changing to the gear "low"

- remove the "middle" timing gear and replace it with the "low" gear
- use the longer timing belt, put on, adjust tension and attach it with the screws (8)

Changing to the gear "high"

- remove both timing gears. Put the gear with the arm flange on the spindle shaft and gear "high" on the motor shaft
- put on the shorter narrower timing belt, adjust tension and attach it with the screws (8)

After each gear change it is necessary to rewrite the new gear to the controller.

16. PACKAGE CONTENTS

Documents delivered with the machine:

1 pc certificate of quality and completeness
1 pc operating instructions

Supplied Accessories :

	ERN 22	ERN 32	ERN 32S	ERN 42,52
1 pcs fuse	T 630mA/250V	T 630mA/250V	T 630mA/250V	T 630mA/250V
1 pcs fuse	T 1,2A/250V	T 1,2A/250V	T 1,2A/250V	T 1,2A/250V
2 pcs fuse	T 6,3A/250V	T 6,3A/250V		
1 pc timing gear	25 teeth	100 teeth	100 teeth	100 teeth
1 pc timing gear	64 teeth	32 teeth	32 teeth	32 teeth
1 pc timing belt	XL 160	046 019	PGGT-5MR-650 -25	PGGT -5MR-650 -25
1 pc timing belt	XL 210	042 012	PGGT-5MR-500 -25	PGGT-5MR-500 -25
allen key	4 pcs	4 pcs	4 pcs	4 pcs
2 pcs spanner	No 19, 24	No 27, 32	No 27, 32	No 36,41

17. 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.

18. 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

19. WARRANTY PERIOD AND SERVICE

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