BLOW MOLDING FRAME WORK

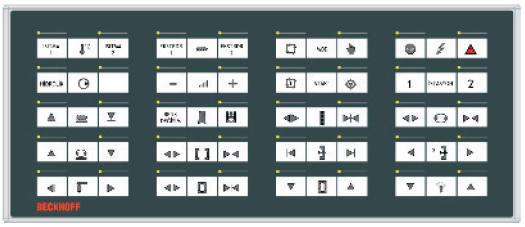
User Manual

DESCRIPTION

This Manual is intented to be used by one who experienced on operating blow molding process.

Blow Molding Frame Work has been developped by Otomotion result of many machine's comissioning and service bussiness.
It includes common issues so custom requirements may not be described in this user manual.
Our solution is generally two parts, main one is Control PC second one is Control Keypad, but some cases control button is used instead of Control Keypad.

CONTROL PC

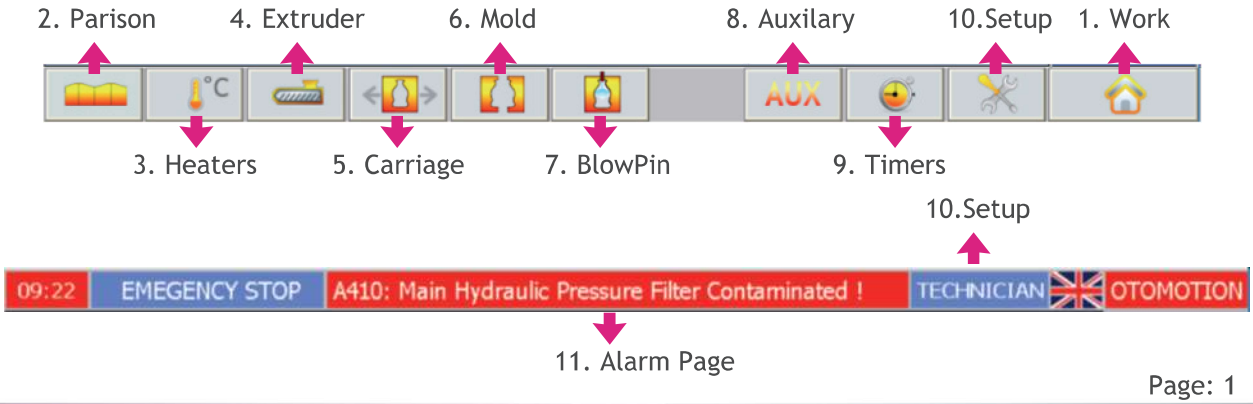


CONTROL KEYPAD

Control PC may be one complete PC or splitted in two parts, PC and Display.

Solution have following main sections pages. This pages may have also their sub pages.
They can be reached by tapping top/bottom Page Dialog bar, which is exist at top and bottom of the pages at the most of the pages.

1. Work Page
2. Parison Page
3. Heaters Page
4. Extruder Page
5. Carriage Page
6. Mold Page
7. BlowPin Page
8. Auxilaries Page
9. Timer Page
10. Setup Page
11. Alarm Page



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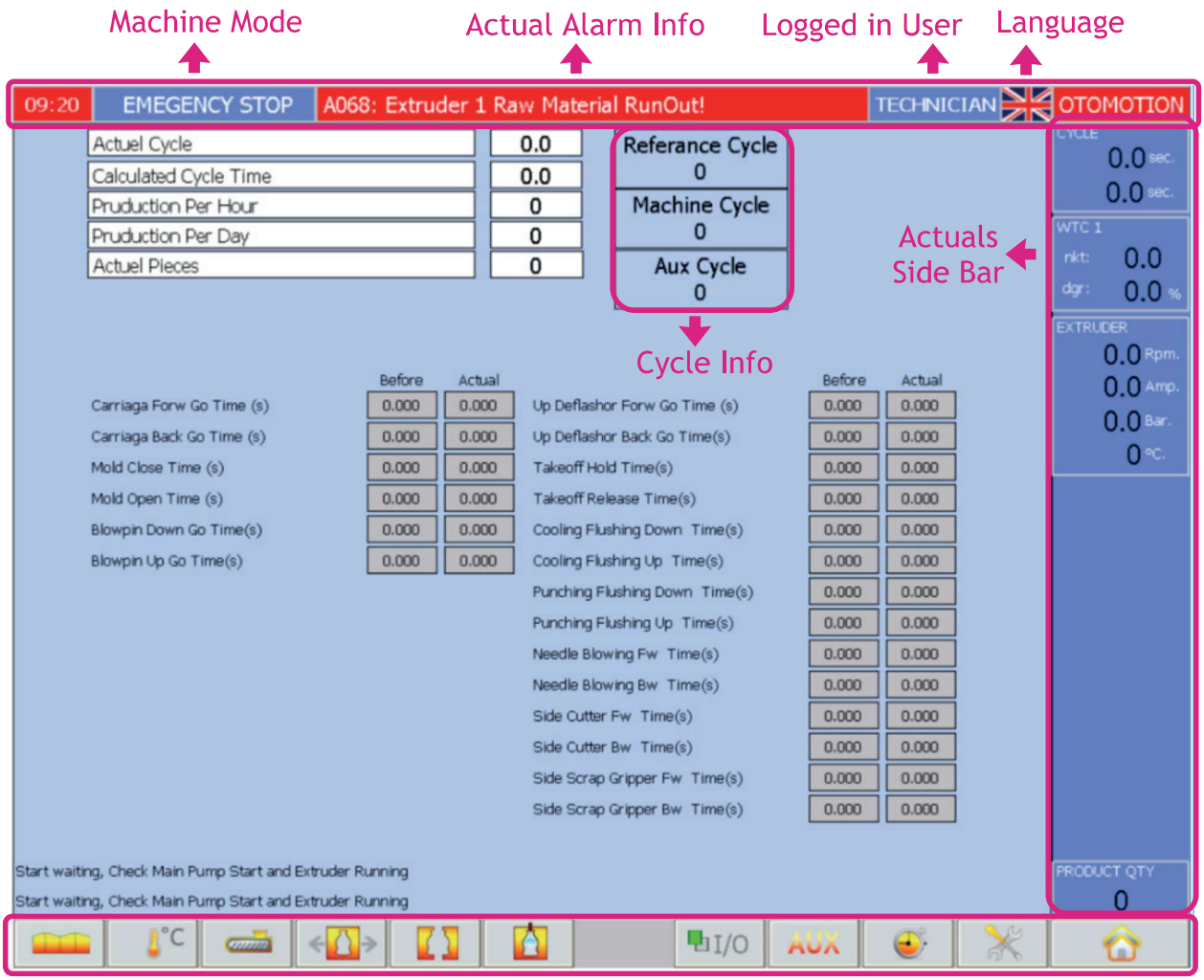
1. WORK PAGE



Bottom Page Selection Dialog Bar

You can reach this page by tapping 1. Work  button wherever displayed.

As you can understand this page present machine actual production and status information

As you request a remote support in case of a problem of the machine, our service stuff may ask you cycle info and active alarm by its Alarm Number (Axxx : Alarm Text) available on this page.

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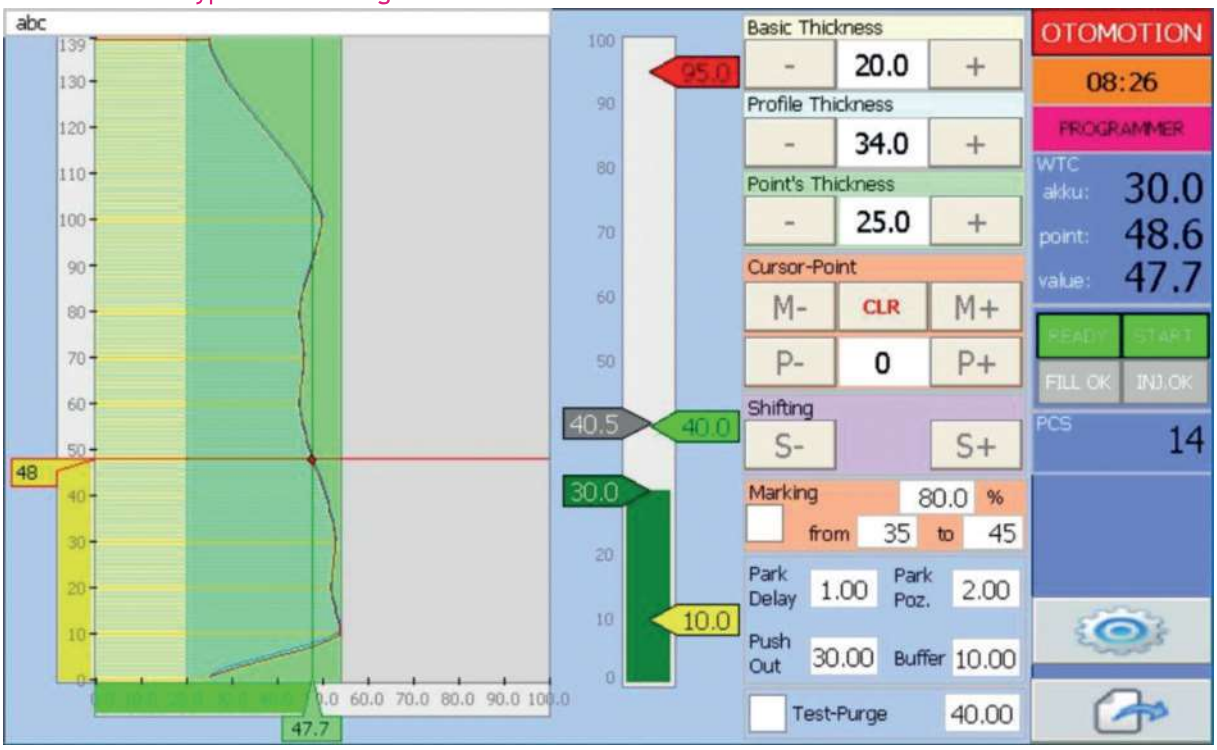
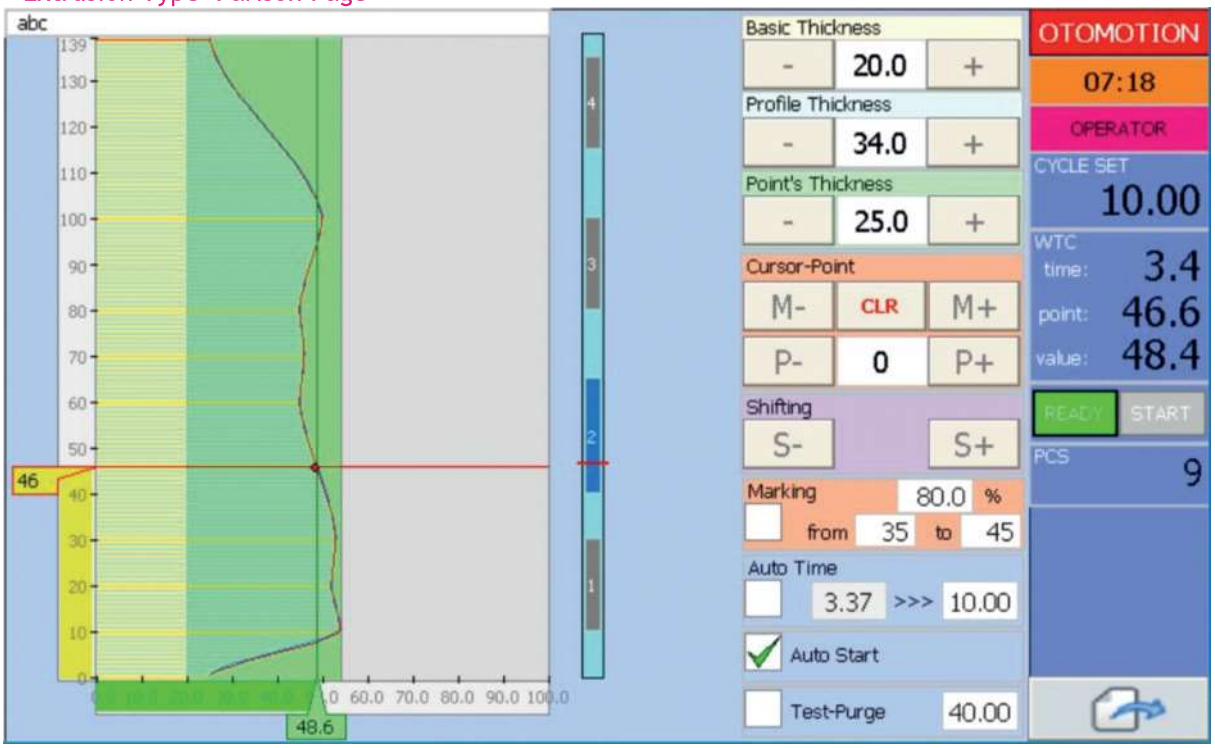
2. PARISON PAGE

You can reach this page by tapping 2. Parison button wherever displayed. One of the types of parison available according to your machine construction.

- Accumulator Type Parison Page



- Extrusion Type Parison Page



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You can adjust **Basic Thickness, Profile Thickness, Point's Thickness** by tapping + and – buttons or you can input directly on the keypad dialog by giving on value of it.

In order to Interpolate between two points, this points should have **Master Point** property,

This Master property can be given/removed by tapping **ADD** or **CLR** button to the point when the cursor on it.

You can scroll and select the point by tapping **P+** or **P-** or write directly number of the point on the keypad dialog by giving on value of it.

As soon as you change Point's Thickness value of a point, this point will be Master Point automatically.

You can scroll and select the Master Point by tapping **M+** or **M-** then change the **Point's Thickness** and also **Master Point** property easily.

You can shift the profile up an down by tapping **S+** and **S-** buttons.

You can also put a **mark** temprorarily on the parison by giving **from & to** points to be marked beetween and **%:** Percentage of the mark thickness.

Test-Purge: When you check this option, the parison goes to specified value for maintenance purpose.

Injection Type Specific Parameters;
Park Delay: When Push out completed, then WTC start command released parison waits for the this park delay time at the last point value then goes to **Park Position** value.
Push Out: This volume is injected out, and parison profile is synchronised to this volume, It means that melt pushing out (0-PushOut) calls for (0-MaxPoint) value. For 7" Parison package MaxPoint is 139, this can be 179 or 199 for other sizes.
Buffer: This volume is intend to left in the akku (melt container).

Extrusion Type Specific Parameters;
Auto Time: When this is ticked, the parison triggered by means of for instance knife cut, the time between sequential two trigger signals is calculated automatically and sets **Parison Time** otherwise **Parison Time** will be static parameter which user can change.
Parison Time: Parison profile synchronised to this time, It means that melt pushing out (0-Parison Time) calls for (0-MaxPoint) value.
Auto Start: This parameter is for test purpose, to start the parison by without a trigger signal.

So far so good this was general how operate informations let us jump over WTC Setup Page for

Technician Level by taking user permision for minimum Technician then tapping 

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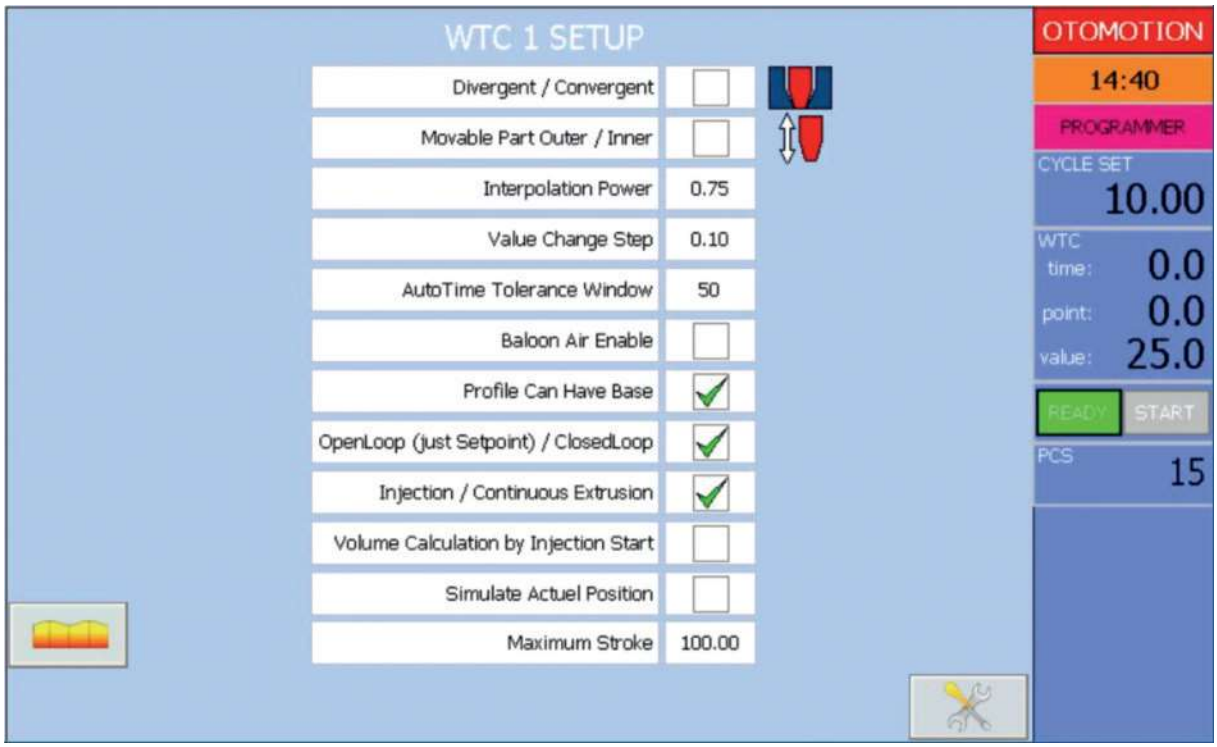
WTC SETUP PAGE (Technician User Level)



Divergent / Convergent: Parison Die type needs to be selected according to your type. This parameter effects calibration minimum and maximum points automatically.
Movable Part Outer / Inner: Like Parison Die type this parameter also needs to be selected according to your movable part. This parameter effects calibration minimum and maximum points automatically too.
Interpolation Power: This parameter specifies interpolation power for transition between master points (for smooth S set it to 0.75) it is recomended , (for linear set it to 1.0).
Value Change Step: This parameter specifies increasing or decreasing step of a value when you adjust **Basic Thickness, Profile Thickness, Point's Thickness** by tapping + and - buttons
AutoTime Tolerance Window: This parameter specifies a window percentage when calculating AutoTime between sequential triggers, newly Calculated AutoTime should be greater than Minus Percentage and less than Plus Percentage of just before calculated AutoTime, otherwise newly calculated AutoTime is dissmised, the old AutoTime still valid.
Baloon Air Enable: When Extrusion type selected, parison tip is may closed by helping of a guillotine cut, then parison needs to be blowed slightly while flowing through the Die before going to mold, this option gives you a possibility control an air valve according to parison points in 4 zones by helping of a digital output.
Profile Can Have Base: When this is selected, Basic Thickness is static and not updated as profile changed. This way profile can have it's own offset thickness between Basic Thickness and Profile Thickness. Otherwise every change of profile, the minimum point of profile is calculated and assumed Basic Thickness so Basic Thhickness refreshed.
OpenLoop (just setpoint) / ClosedLoop: Some of the hydraulic valves has it's own control logic, and can do position control itself, this time it is enough to drive them by a reference setpoint. Select this option if your configuration so that. Otherwise ClosedLoop is done internally and PID parameters are active.

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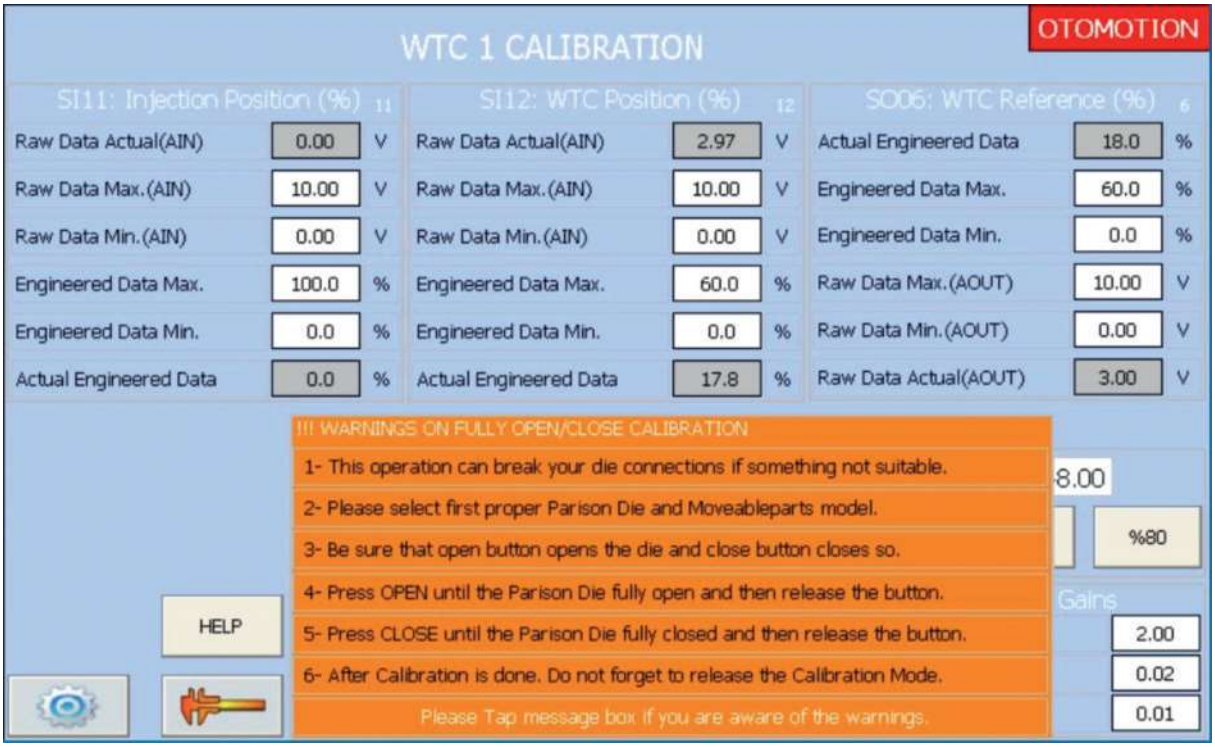
Injection / Continuous Extrusion: Two different work model should be selected first, according to this selection working scnerio and related pages will be active.
Volume Calculation by Injection Start: This parameter is very useful when Injection mode, Accumulator level (volume) is captured in every injection start, and push out volume taken this volume to do so every injection synchronised by push out volume. INJ OK and FILL OK outputs also activated to help your machine automation handshaking.
Simulate Actual Position: When this is selected, Output Reference value is used as if feedback. It is mostly used for maintenance purpose.
Maximum Stroke: This parameter defines your maximum Parison Die gap distance.
You can work 100% as default or you can give real measures XXmm. Visulation and some parameters will be changed and recalculated for this parameter.
This parameter will affect calibration Maximum Engineered values also.
So This parameter must be changed before the calibration process.

Let us jump over the WTC Calibration Page for Author Level by taking user permision for minimum Author then tapping 

WTC CALIBRATION (Author User Level)



Our Analog Inputs and Outputs uses following calibration method,

Raw Value is analog voltage value, **Calibrated Value** is engineered and displayed value which is used in the program calculations.

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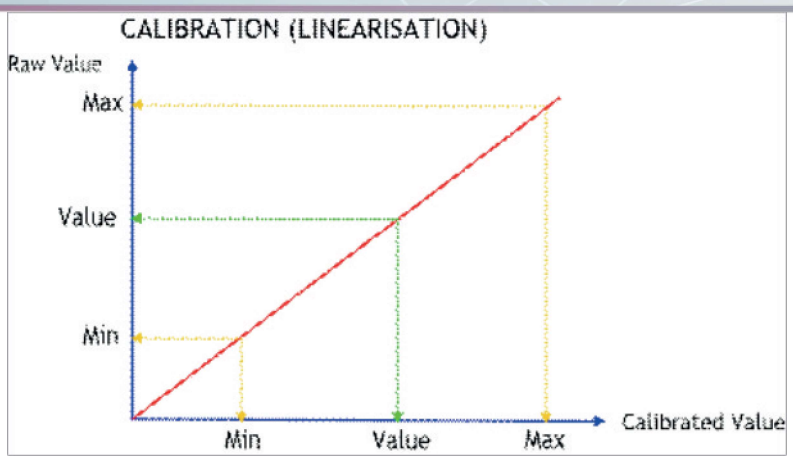

Injection Position: Accumulator melt volume (if you work model Injection).
WTC Positon : Actual position of the Parison.
WTC Reference: Valve control voltage for bare valves or Setpoint Reference Controller for Closed Loop Valves.
! Please tap message box if you red warnings

Injection Position Calibration
! This operation should be carried out fully empty akku (melt container).

*Please take the level sensor probe physically as if at the minimum level, at this point, write **Injection Position**'s **Actual Raw Data** value into **Raw Data Min** value.*

*Please take the level sensor probe physically as if at the maximum level, at this point, write **Injection Position**'s **Actual Raw Data** value into **Raw Data Max** value*

☺ Now your Injection (Akku) Position is Calibrated.
Test if it is running properly at a few levels you put randomly.

WTC Position Calibration

Fully Open/Close Calibration Mode

Tap the Calibration button 

Now you are in fully open/close calibration method for WTC Position.

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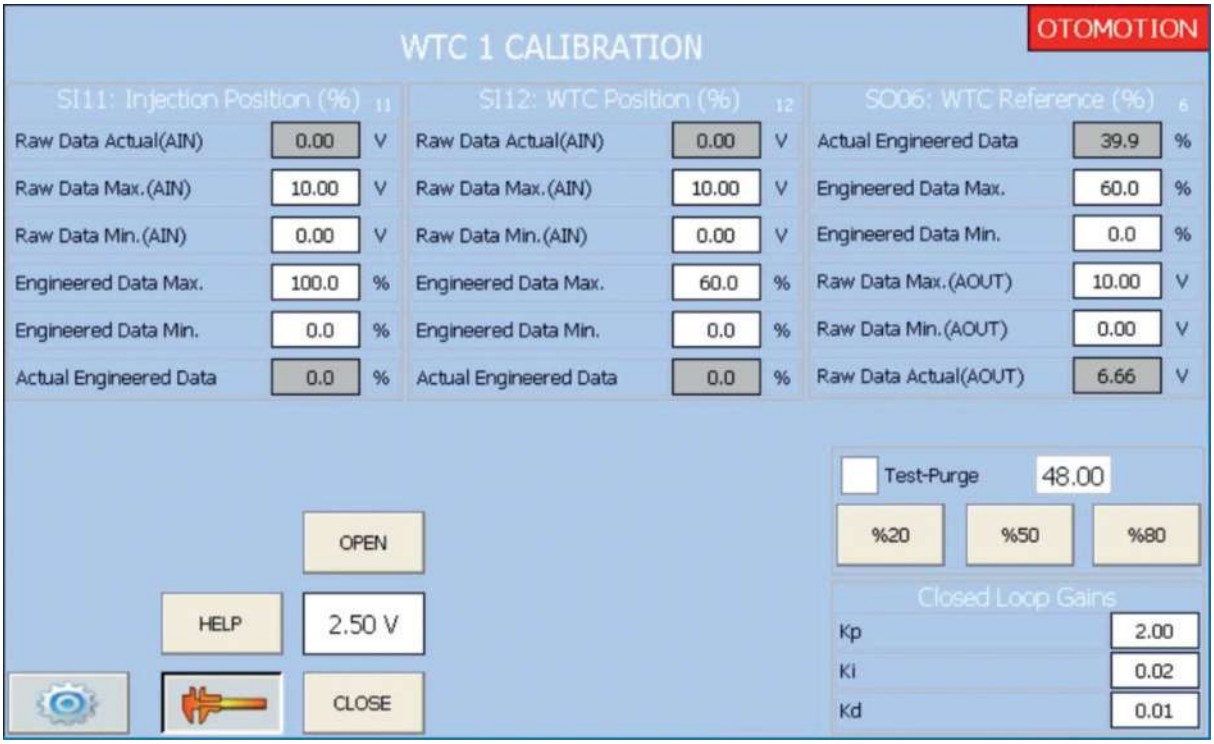

Adjusting the WTC Position in Closed Loop

Please Remove the Parison Die in order to prevent any breakeage of it by means of oscillation or forcing the limits. Normally this should not be any problem, but some parison hydraulics more than enough strong or some Parison Dies less than enough strong so Parison Die can get broken as touches and forces at the limits.

!!! So Remove the Parison Die, You do not take a risk.

- ***Please Select proper Parison Die Model and Movable Part model which you have.***

- ***Please check OPEN and CLOSE button works by shortly pressed and seeing the Die movement. Be sure that OPEN button Opens the Die and CLOSE button closes the Die.*** If not please change the valve connection polarity.

Parison valve needs 0 to +10V reference for let say + opening direction, 0 to -10V reference for - closing direction commonly.

- *You will give +2.5V for + direction as long as by tapping OPEN button, and see the Die **fully opened and stucked** then release the button. Now you have set **WTC Position**'s Raw Data Max by Actual Raw Data value.*

- *You will give -2.5V for - direction as long as by tapping CLOSE button, and see the Die **fully closed and stucked** then release the button. Now you have set **WTC Position**'s Raw Data Min, by Actual Raw Data value.*

☺ Now your WTC Position is Calibrated.

!!! Do not forget to exit fully open/close calibration method by tapping  button.

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Adjusting the WTC Position in Open Loop

- *You can follow same steps for closed loop. But since the parison valve expect only position reference this time, you need to try and find correct reference voltage for **fully open** Die then at this point you have set **WTC Position**'s Raw Data Max by Actuel Raw Data value by releasing OPEN button.*

  Keep this voltage value found for setting WTC Reference's Raw Data Max.

- *Try and find correct reference voltage for **fully closed** Die, at this point you have set **WTC Position**'s Raw Data Min by Actuel Raw Data value by releasing CLOSE button.*

  Keep this voltage value found for setting WTC Reference's Raw Data Min.

☺ Now your WTC Position is Calibrated.
!!! Do not forget to exit fully open/close calibration method by tapping  button.

WTC Reference Calibration
Engineered Data Max and Engineered Data Min parameter is already defined by Maximum Stroke parameter. It is nothing to do more.
Adjusting the WTC Reference in Closed Loop
Raw Data Max= 10.00V and Raw Data Min= -10.00V is okay if you want parison valve as fast possible. That is all for closed loop.
Adjusting the WTC Reference in Open Loop
While adjusting WTC position in Open Loop you already found and kept *WTC Reference's* Raw Data Max and Raw Data Min parameter.

☺ Now your WTC Refence is Calibrated.
!!! Do not forget to exit fully open/close calibration method by tapping  button.

Closed Loop Gain Adjustment
When calibrations has done, the last step is Closed Loop Gains Kp, Ki, Kd should be tuned for good control.
Please set Kp=0.1 Ki=0.01, Kd=0.01 for the begining and select Test-Purge and set Test Position=%50 of Max Stroke (you can do it easily by tapping %50 button),
and increase Kp by step of 0.1 starting from Kp= 0.1 as long as see the oscillation on the Parison Die, find the maximum value satisfies without oscillation. Then you can increase Ki by step of 0.1 and find minimum value satisfies without swing. Leave Kd=0.01
☺ It Is OKAY.
You can test the performance of the PID by changing Test Position (you can do it easily by tapping %20 %50 %80 buttons or set it whatever) and watching the WTC Actual Position following this changes.

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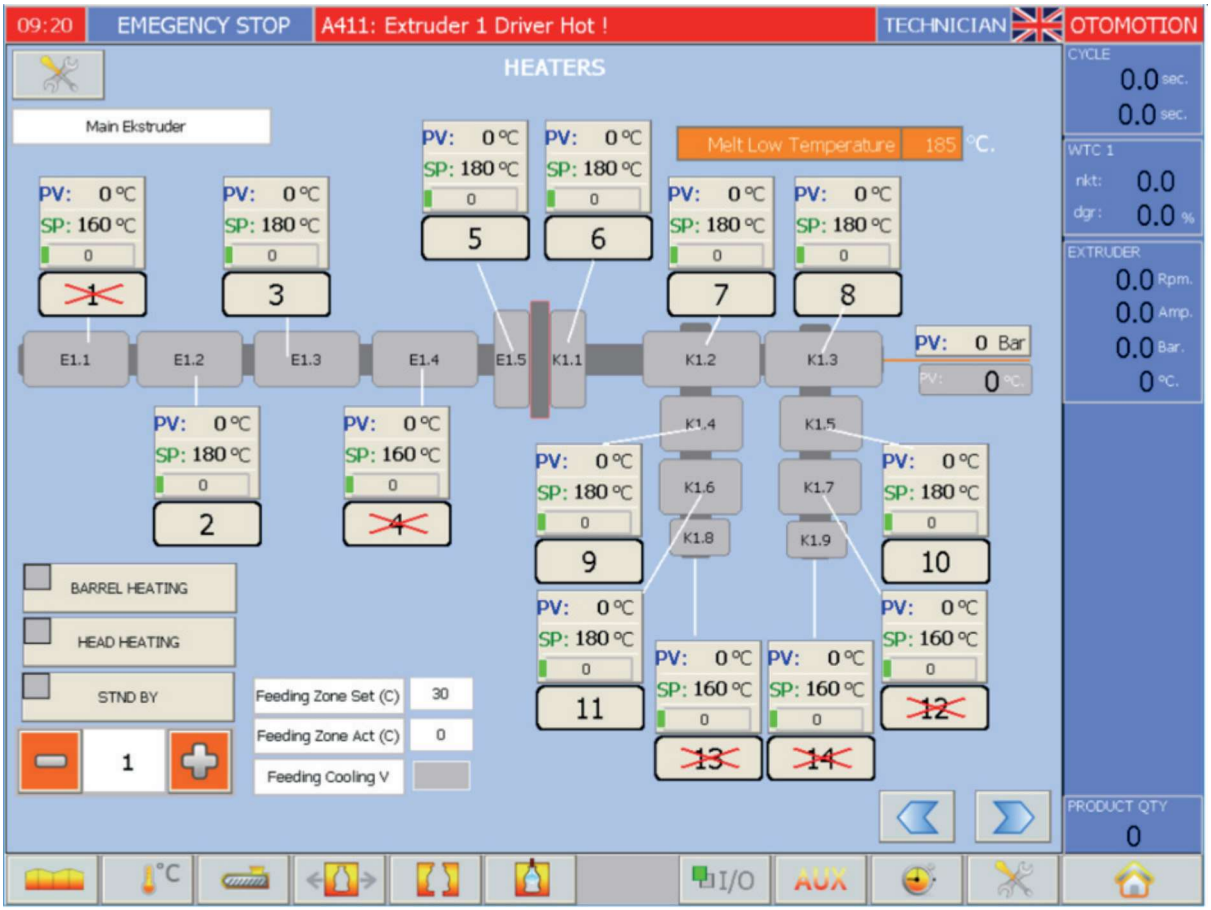
3. HEATERS PAGE

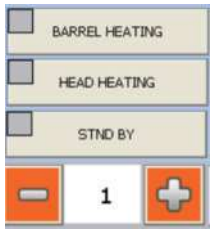
You can reach this page by tapping 3. Heaters  button wherever displayed.



Your machine heaters mnemonic is shown at this page according to your construction for your better understanding.

Heater

- Actual Temperature of the Zone
- Target Temperature of the Zone
- Actual Output Power of the Zone
- Number of the Zone (Red crossed when disabled)



- Barrel Heating turn ON/OFF (This also possible by KeyPad/Button)
- Head Heating turn ON/OF (This also possible by KeyPad/Button)
- All Target Temperatures enabled set to StandBy Temperature.
- All Target Temperatures enabled are inc/decremented by a X value.

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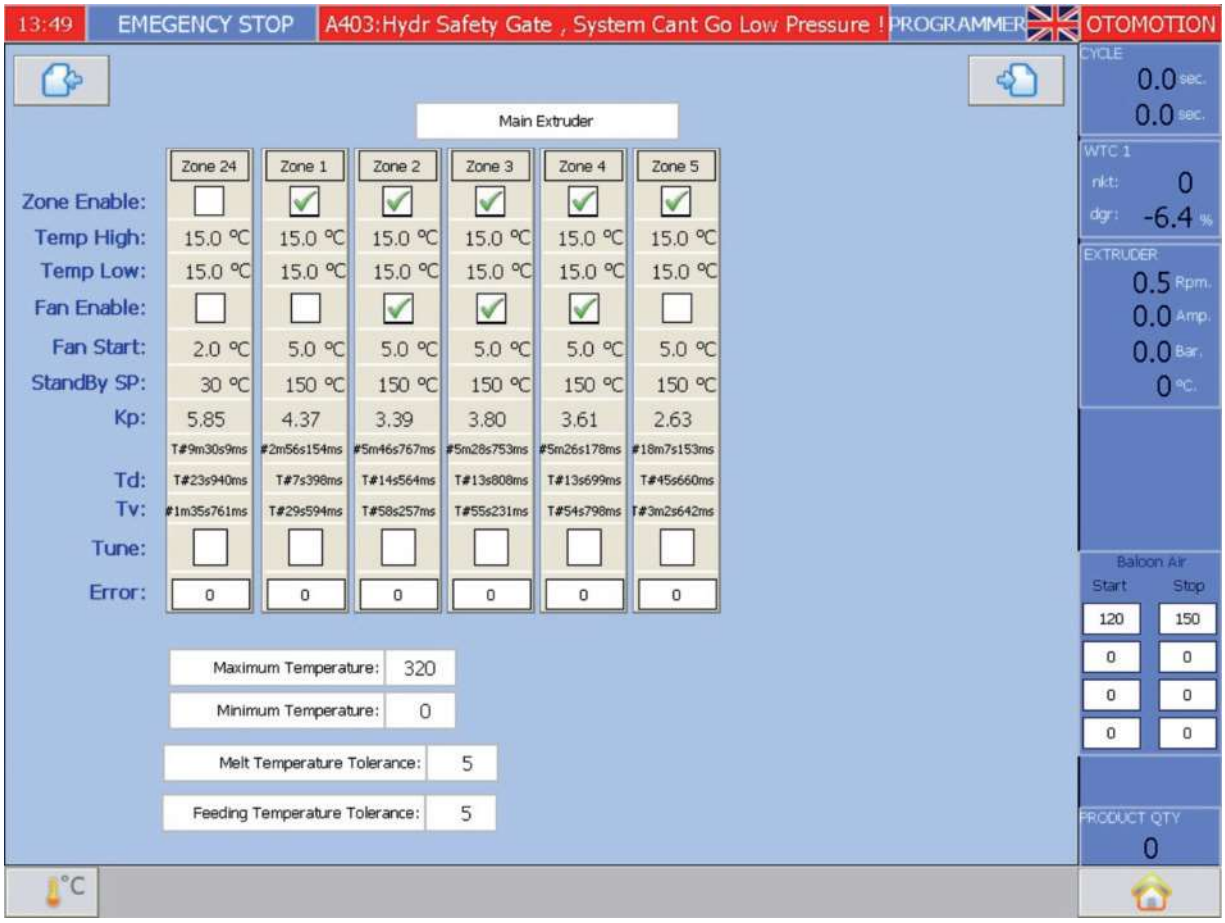
You can reach this page by tapping  button from the 3.Heaters Page.

HEATERS SETUP PAGE (Technician User Level)



Zone Enable: Heating Enabled and any relation to this zone temperature is establised.
Temp High: One of the temperatures go above the High Temp, mains for the heaters is cut off.
Temp Low: One of the temperatures go below the High Temp, permission for extruder run is cut off.
Fan Enable and Start: If enabled and actual temperature is higher than (target+start) temperature then fan start running.
StandBy SP: This overrides to all target temperatures as long as standby function activated. This is usefull when the machine waits longer at not automatic state, but Heaters ON
Tune: Turn ON/OFF autotune function which is very usefull for better temperature regulation. Instead of adjusting Kp, Tn, Td, Tv parameters manually.

Before turning ON the autotune function, zone should be enabled, waited for cool down to ¼ of target temperature, then Tune ON as soon as heaters turned ON.
If many zones need tuning it is better Tune them together.

Maximum Temperature: User can not set above this temperature as the target temperature.
Minimum Temperature: User can not set below this temperature as the target temperature.
Melt Temperature Tolerance: Melt temperature is a safety for Extruder but on the other hand it gets stopped the Extruder frequently when this parameter is not set properly.
Feeding Zone Temperature Tolerance: Feeding zone generally cooled down while the other zones heated up. Generally a valve is used for cooling down process and it is basic ON/OFF control instead of PID. This tolerance value is used as dead band of valve control. You can find a right value by testing.

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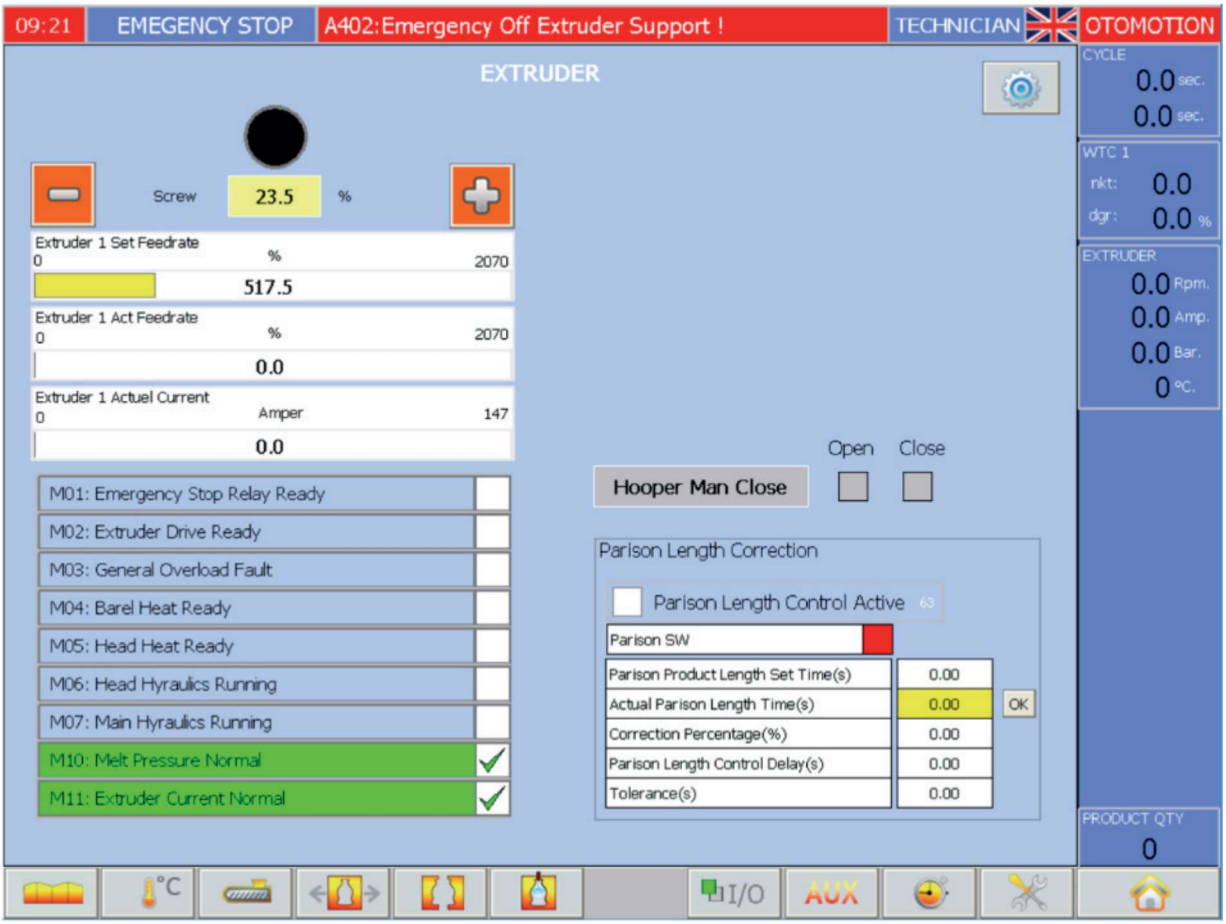
4. EXTRUDER PAGE

You can reach this page by tapping 4. Extruder  button wherever displayed.



Extruder page has user friendly controls for adjusting-diagnostic screw speed, and diagnostic for extruder load as current consumption.

Beside those you can check prerequisites for Extruder run, Hooper Open/Close and Parison length correction function.

Increase/Decrease of Extruder Speed (this also possible from keypad/buttons)

Parison length correction function is useful when cycle of machine changes (due to hydraulic oil viscosity/heat changes) or melt flow changes (due to raw material and steady state heating) at long duration production, it tolerates those changes and play with extruder speed, so It is better than operator intervention frequently.

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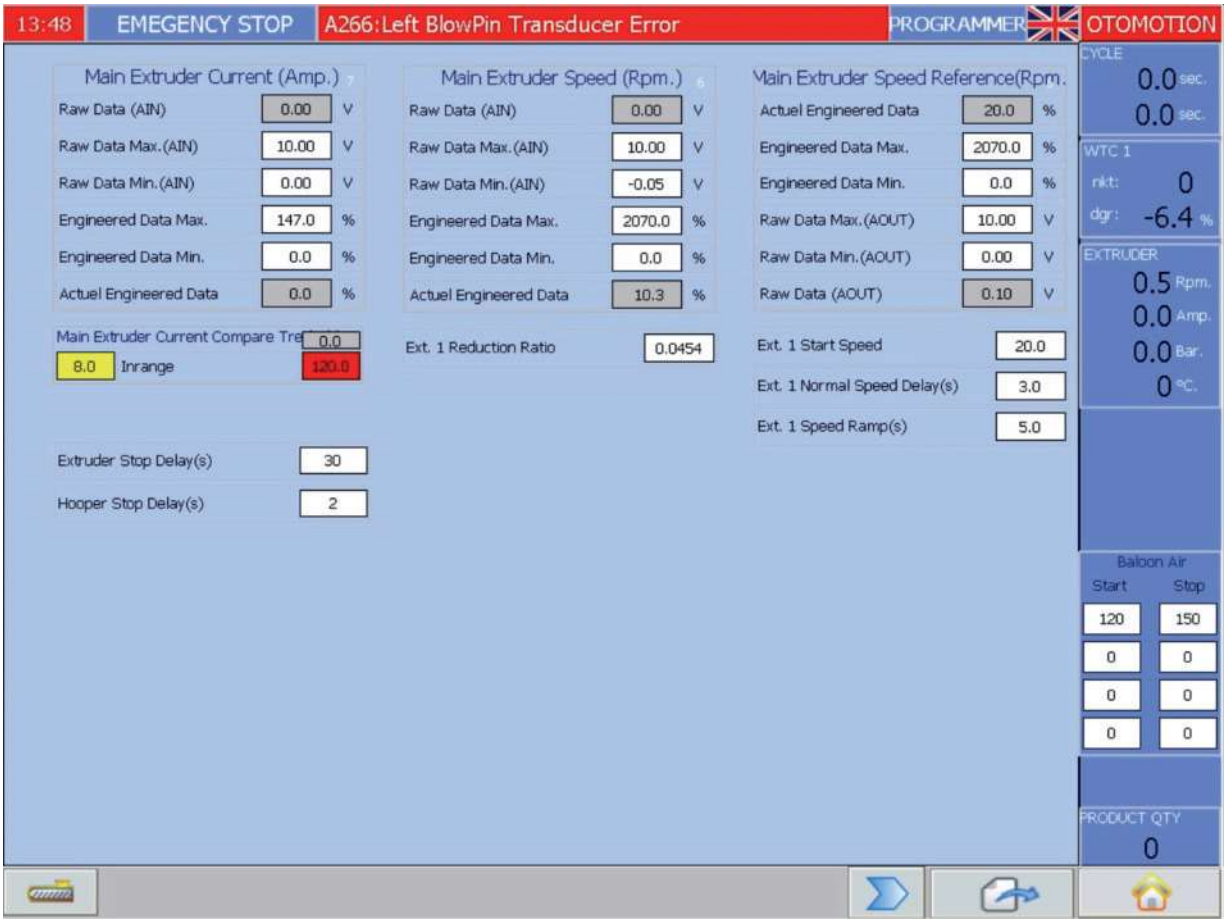
You can reach this page by tapping  button from the 4.Extruder Page.

EXTRUDER SETUP PAGE (Technician User Level)



You can calibrate Extruder Current Actual, Speed Actual, and Speed Reference and Melt Pressure at this page.
Calibration is same as described at Page: 7

You also can put current treshold and melt pressure treshold for stopping extruder to prevent unwanted situations.

Ext. 1 Reduction Ratio: Is the coefficient for turning extruder speed into screw speed.

Ext. 1 Start Speed: Extruder starts running with base speed.

Ext. 1 Normal Speed Delay: Extruder runs at start speed as log as this time then goes up for production normal speed.

Ext. 1 Speed Ramp: This ramp time is used for every extruder speed change.

Ext. 1 Stop Delay: In same requirements Extruder stops end of this delay time for emptying barrel.

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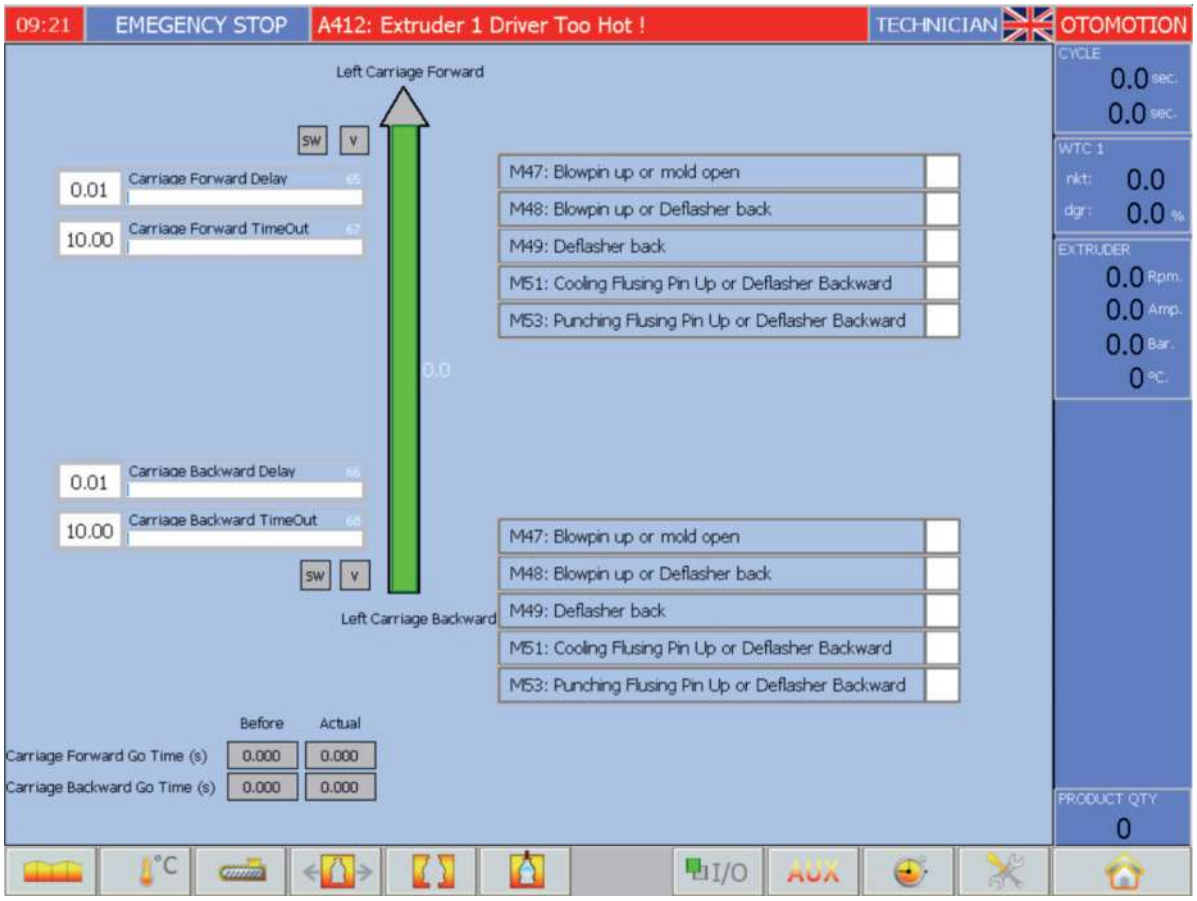
5. CARRIAGE PAGE

You can reach this page by tapping 5. Carriage  button wherever displayed.



Carriage page has user friendly controls for adjusting-diagnostic carriage related parameters and signals which are position transducers, limit switches and timers.
You also adjust carriage's motion profile if it is available.

Beside those you can check prerequisites for Carriage Movement.

Delay Time: You can change this parameter to postpone movement as long as this delay time when command of forward/backward

TimeOut Time: When forward/backward command applied to the carriage and can not be taken feedback about target reached along with the TimeOut time, a Movement TimeOut Allarm triggered.

☝ Delay Time and TimeOut Time behavior is the same for all movements.

☝ Screen Shots may differs from yours.

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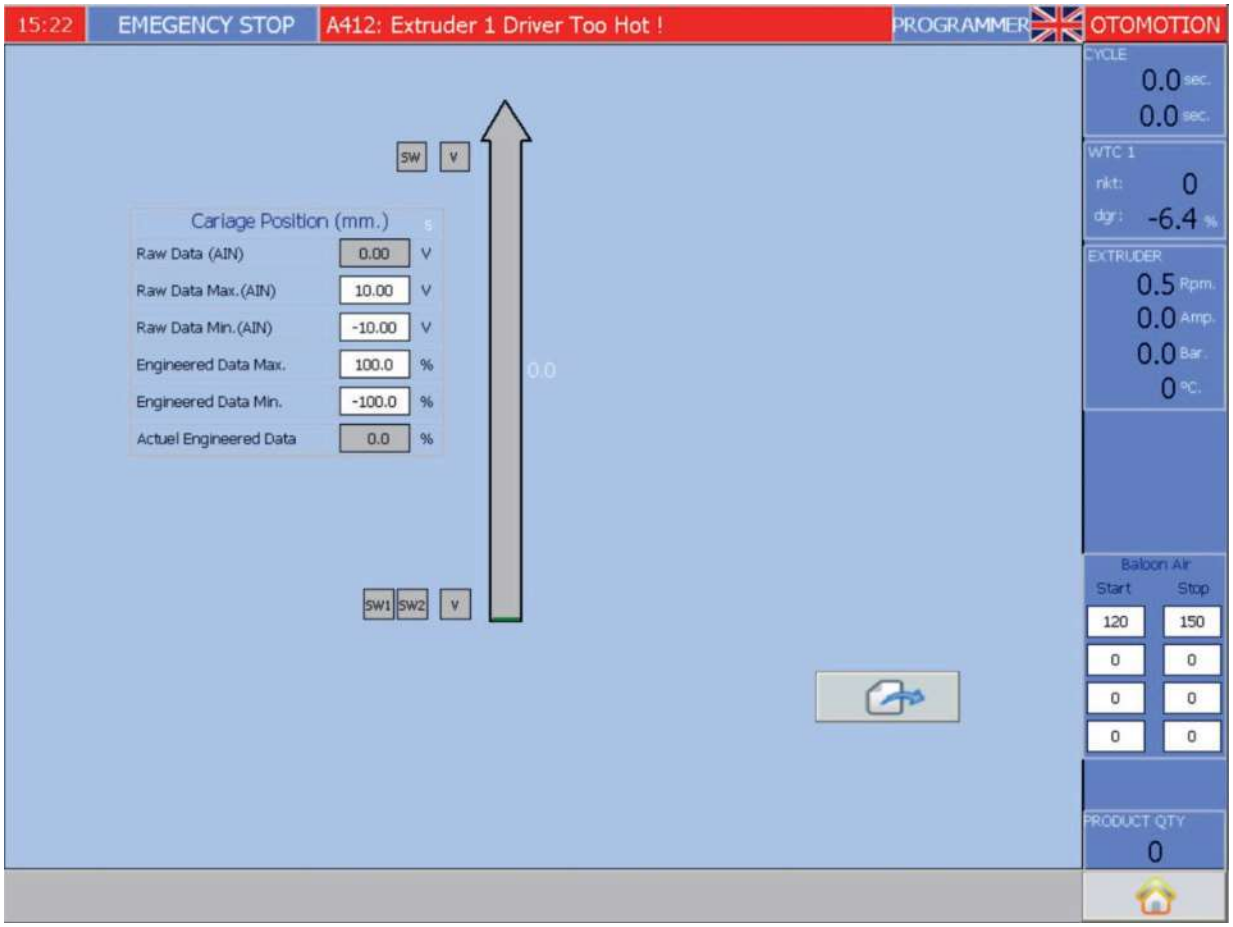
You can reach this page by tapping  button from the 5.Carriage Page.

CARRIAGE SETUP PAGE (Technician User Level)



You can calibrate Carriage Position at this page.

Calibration is same as described at Page: 7

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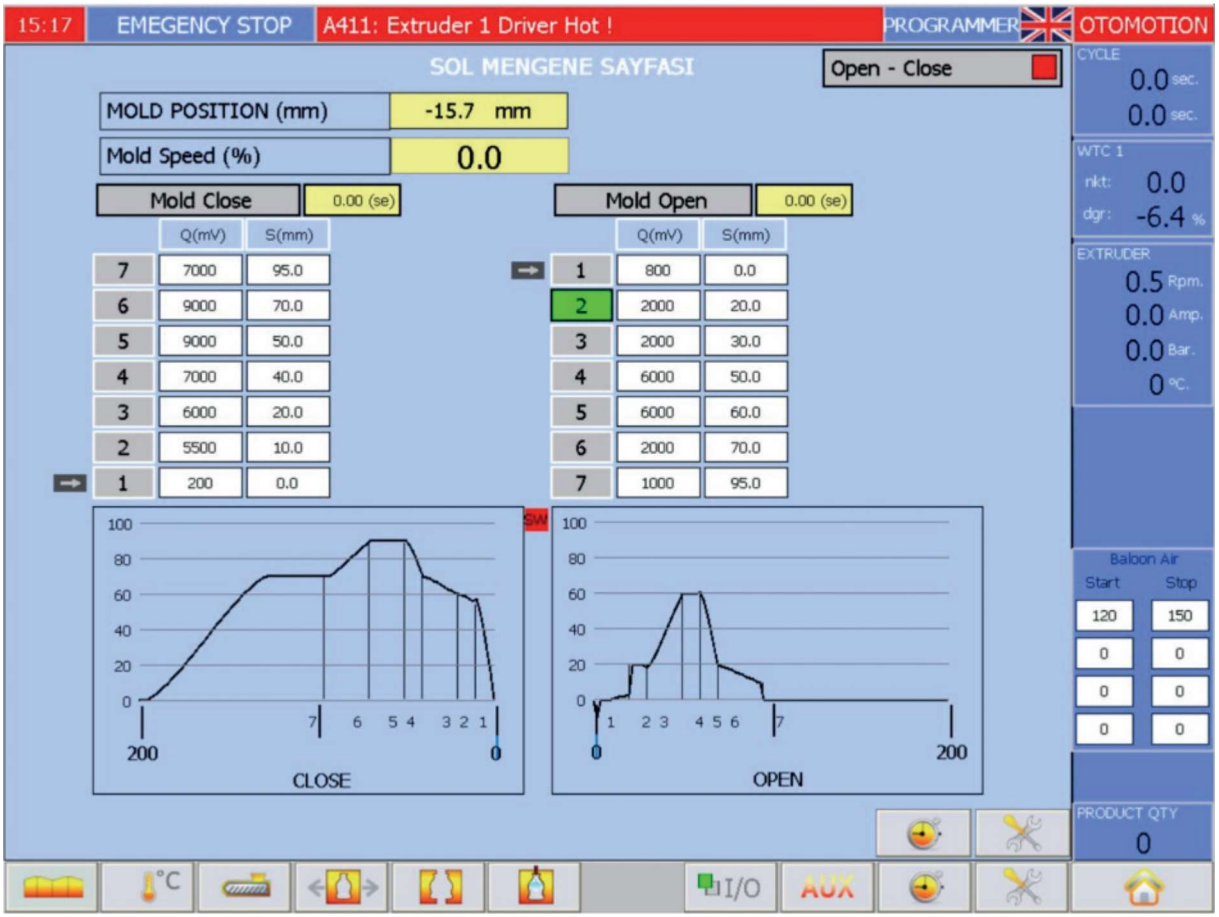
6. MOLD PAGE

You can reach this page by tapping 6. Mold  button wherever displayed.



Mold page has user friendly controls for adjusting-diagnostic mold related parameters and signals which are position transducers, limit switches and timers.
You also adjust mold's motion profile if it is available.

Beside those you can check prerequisites for Mold Movement.

Delay Time: You can change this parameter to postpone movement as long as this delay time when command of close/open

TimeOut Time: When close/open command applied to the mold and can not be taken feedback about target reached along with the TimeOut time, a Movement TimeOut Allarm triggered.

Delay Time and TimeOut Time behavior is the same for all movements.

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You can reach this page by tapping  button from the 6.Mold Page.

MOLD SETUP PAGE (Technician User Level)

You can calibrate Mold Position at this page.

Calibration is same as described at Page: 7

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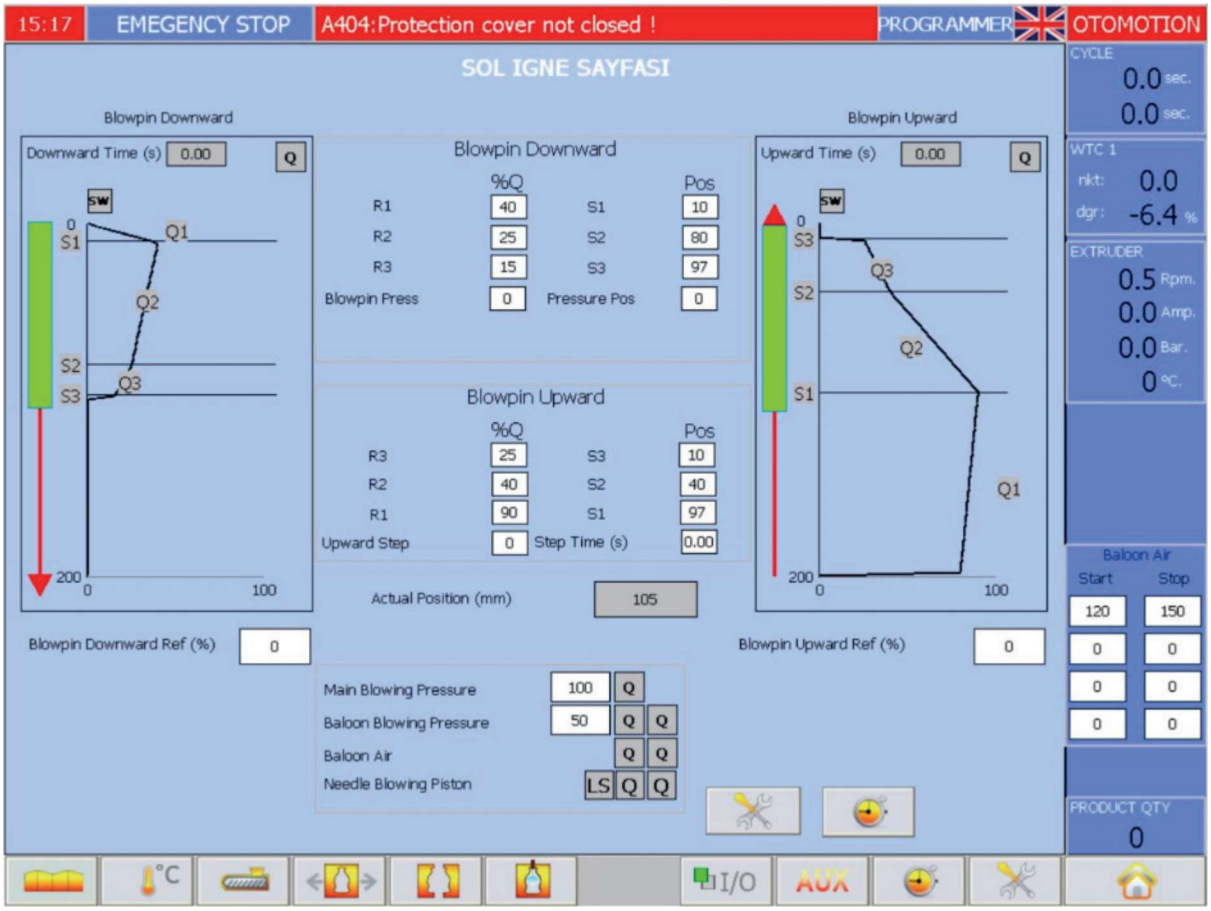
7. BLOW PIN PAGE

You can reach this page by tapping 7. BlowPin  button wherever displayed.



BlowPin page has user friendly controls for adjusting-diagnostic BlowPin related parameters and signals which are position transducers, limit switches and timers.
You also adjust BlowPin's motion profile if it is available.

Beside those you can check prerequisites for BlowPin Movement.

Delay Time: You can change this parameter to postpone movement as long as this delay time when command of Up/Down

TimeOut Time: When Up/Down command applied to the BlowPin and can not be taken feedback about target reached along with the TimeOut time, a Movement TimeOut Allarm triggered.

Delay Time and TimeOut Time behavior is the same for all movements.

Screen Shots may differs from yours.

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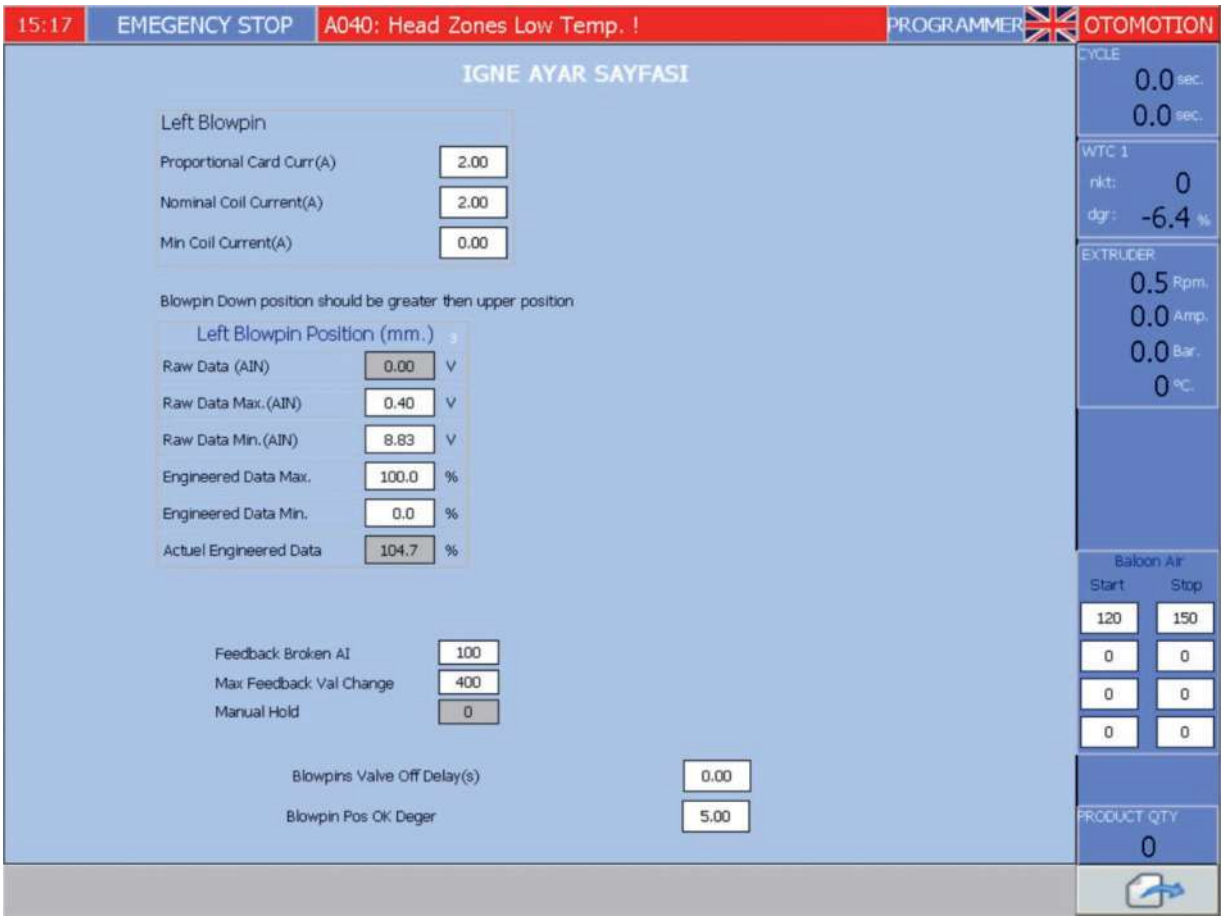
You can reach this page by tapping  button from the 7. BlowPin Page.

BLOWPIN SETUP PAGE (Technician User Level)



You can calibrate BlowPin Position at this page.

Calibration is same as described at Page: 7

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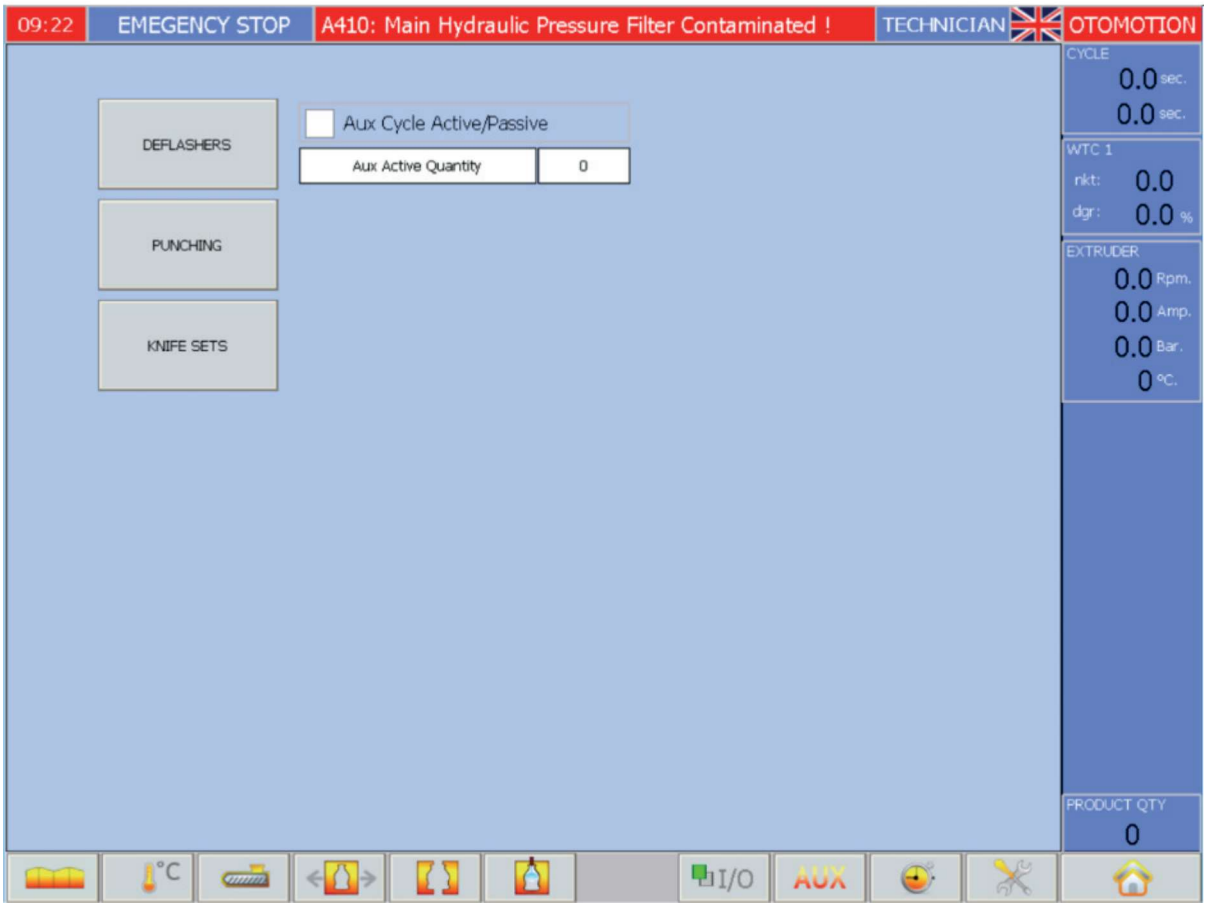
8. AUXILARIES PAGE

You can reach this page by tapping 8. Auxilaries AUX button wherever displayed.



Auxilaries page has helper organs of the machines such as punches, needles, deflashers settings and their sensors and valves status.

Settings generally timers setting and option setting.

Delay Time: You can change this parameter to postpone movement as long as this delay time when command of Go/Back

TimeOut Time: When Go/Back command applied to the organ and can not be taken feedback about target reached along with the TimeOut time, a Movement TimeOut Allarm triggered.

Delay Time and TimeOut Time behavior is the same for all movements.

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9. TIMERS PAGE

You can reach this page by tapping 9. Timers  button wherever displayed.

Timers page presents some of the timers which is not belong to a motion organ.

Even if every motion organ page has possibility to set and check it's own timers, seeing some of the timers together might be useful.

Screen Shots may differs from yours.

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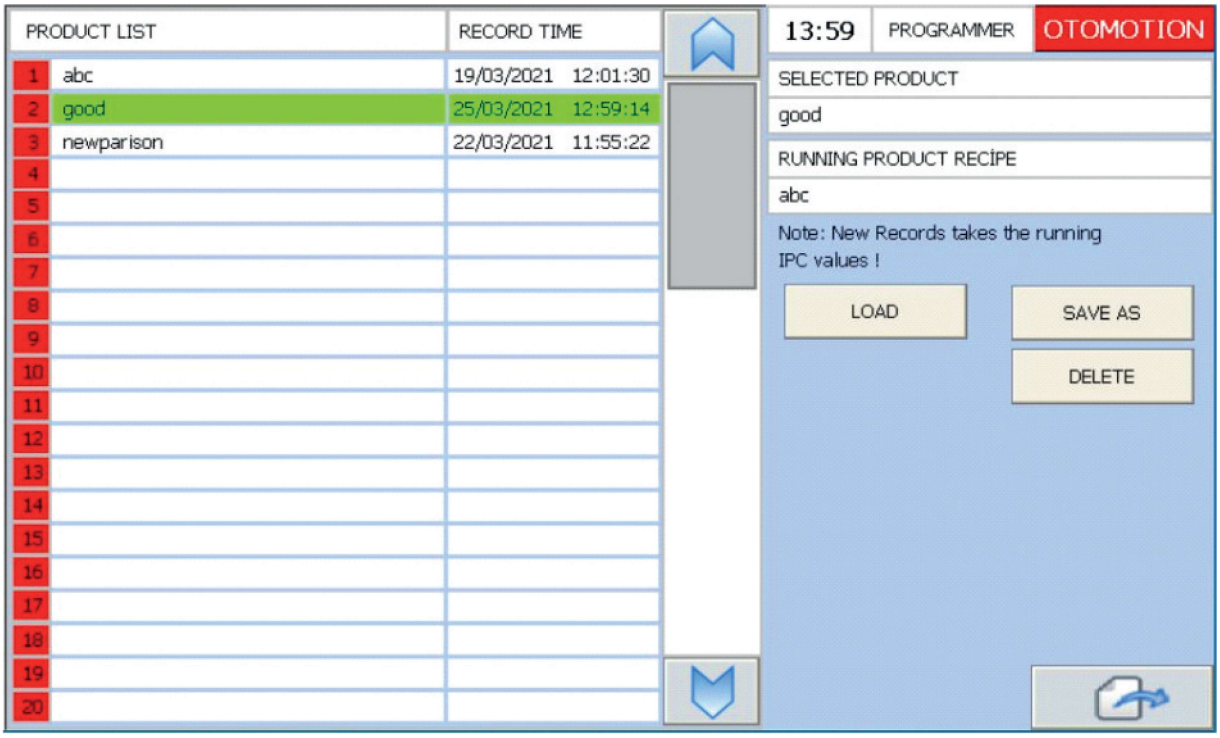
10. 1. RECIPE PAGE

You can reach this page by tapping 10.1.Recipe  button on the setup page.



You can store well adjusted product settings in the recipe container folder for further call back. This operations can be carried out at this Recipe Page.

! New recipe record data keeps actual values running in the controller.
For a new product record, tap **SAVE AS** button, and give a name in the dialog and then tap the **YES** button.
☺ Now your new product record has been created.

Whenever you want to call a product record back then select the record in the product list (tap on it to select) and then tap **LOAD** button that is all you need to do.
! LOAD function can not be carried out when machine runs in automatic mode.

You can delete a product record by the same way, then select the record in the product list (tap on it to select) then tap **DELETE** button.
☺ Now your product record has been deleted from the product list.

☝ You will see background is green in the product list and it's name will appear on the **SELECTED PRODUCT** field when a product selected.

☝ Screen Shots may differs from yours.

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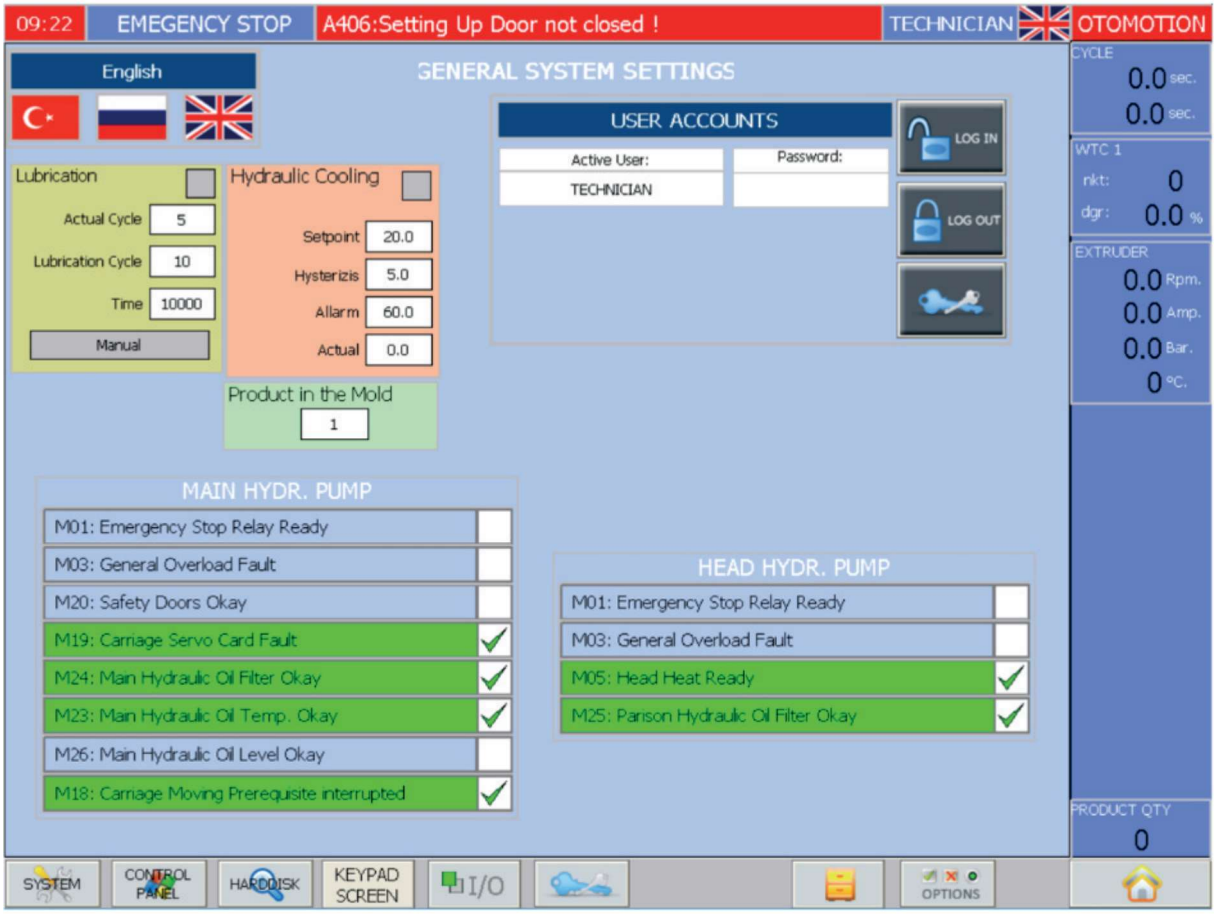
10. SETUP PAGE

You can reach this page by tapping 10. Setup  button on the page dialog bar.



Setup page has many sub pages such as Recipe, Options, I/O test, Soft KeyPad, System Calibrations, etc.
Additionally you can reach of the PC's File Explorer, and Device Setting (setting date&time, IP adresses etc).

You can change user language which is comfortable for you by tapping on a flag easily.

You can change user level by giving the correct password and tapping 

By default **AUTHOR** password is "**12345**" and **TECHNICIAN** is "**11111**", they can be changed by their

upper level users. To change the default passwords please log in as programmer and tap 

PROGRAMMER password "**649049**" is the highest level and has the ability of change other passwords. Programmer password is static and can not be changed.

This page has also prerequisites for hydraulic pumps and setting of cooling of hydraulic.

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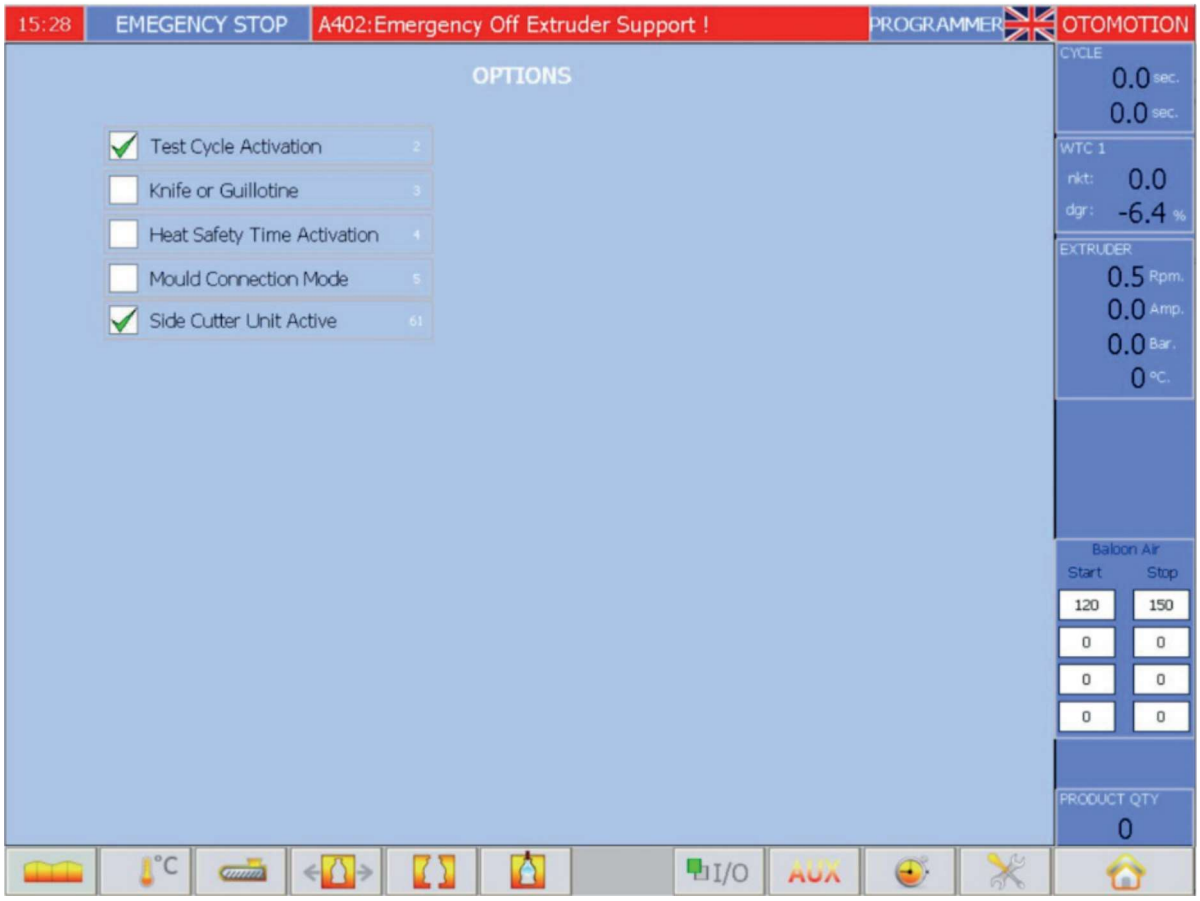
10. 2. OPTIONS PAGE

You can reach this page by tapping 10.2.Options 

button on the setup page.



Options page presents some of the Options which is not belong to a motion organ.

Even if every motion organ page has possibility to set and check it's own options, seeing some of the options together might be useful.

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10.3. I/O TEST PAGE

You can reach this page by tapping 10.3. I/O Test  button on the setup page.

09:23 | EMEGENCY STOP | A068: Extruder 1 Raw Material RunOut! | TECHNICIAN | OTOMOTION

1. EL1008	3. EL1008	5. EL1008	7. EL1008
Carriage 1 down	Cutting Device in Operation Position	Blowing Air Locking Decomp 1	Carriage 1 Upward
Mould 1 Fully open	Take Off 1 Open	Release blowing air 1	Carriage 1 Downward
Welding Unit 1 Rear	Take Off 1 Closed	Vacuum 1 Active	Mould 1 Closing
Blowpin 1 vertical half up	Punch 1 rear	Locking Vacuum 1	Mould 1 opening
Blowing Needle 1 Rear	Cooling station 1 Flushing Pin Up	Support air steam barrier 1	Blowpin 1 Vertical Downward
Punch Half in Front	Punching Station 1 Flushing Pin Up	Support air barrier 1	Blowpin 1 Vertical Upward
Carriage 1 Up	Input 3.7	Support air steam barrier 2	Take Off 1 Closing
Article Inside Pressure 1 Monitoring	Input 3.8	Support air barrier 2	Take Off 1 Opening

1. EL2008	3. EL2008	5. EL2008	7. EL2008
Digital Output DO1.1	Extr. 1 drive on	Take-off 1 closing	Blowing air filter condensate 1
Blowmoulding machine on	Extr. 1 drive cooling on	Take-off 1 opening	Blowing decomp. 1 on
Hydr. pump 1 drive main contactor on	Extr. 1 speed increasing	Cooling Station 1 flushing pin downwards	Blowing decomp. release 1
Hydr. pump 1 drive start contactor on	Extr. 1 speed reducing	Cooling Station 1 flushing pin upwards	Locking blowing air pipe 1
Hydr. pump 1 drive delta contactor on	Extr. 1 drive controller enable on	Punching Station 1 flushing pin downward	Vacuum 1 on
Signal lamp 1 on	Digital Output DO2.6	Punching Station 1 flushing pin upwards	Vacuum filter condensate 1
Operation hours counter 1 on	Digital Output DO2.7	Cutting 1 backward	Vacuum release 1
Signal horn 1 on	Conveyor belt on	Cutting 1 forward	Digital Output DO4.8

1. EL3318		2. EL3318		3. EL3318	
0 C	Extr. 1 heating zone 1	0 C	Head 1 Heating zone 4	0 C	Head 1 Heating zone 12
0 C	Extr. 1 heating zone 2	0 C	Head 1 Heating zone 5	0 C	Head 1 Heating zone 13
0 C	Extr. 1 heating zone 3	0 C	Head 1 Heating zone 6	0 C	Head 1 Heating zone 14
0 C	Extr. 1 heating zone 4	0 C	Head 1 Heating zone 7	0 C	Head 1 Heating zone 15
0 C	Extr. 1 heating zone 5	0 C	Head 1 Heating zone 8	0 C	Head 1 Heating zone 16
0 C	Head 1 Heating zone 1	0 C	Head 1 Heating zone 9	0 C	Head 1 Heating zone 17
0 C	Head 1 Heating zone 2	0 C	Head 1 Heating zone 10	0 C	Head 1 Heating zone 18
0 C	Head 1 Heating zone 3	0 C	Head 1 Heating zone 11	0 C	Extruder 1 feeding zone

I/O AUX

I/O test page is useful for the technician to see the machine's I/O without measuring it.

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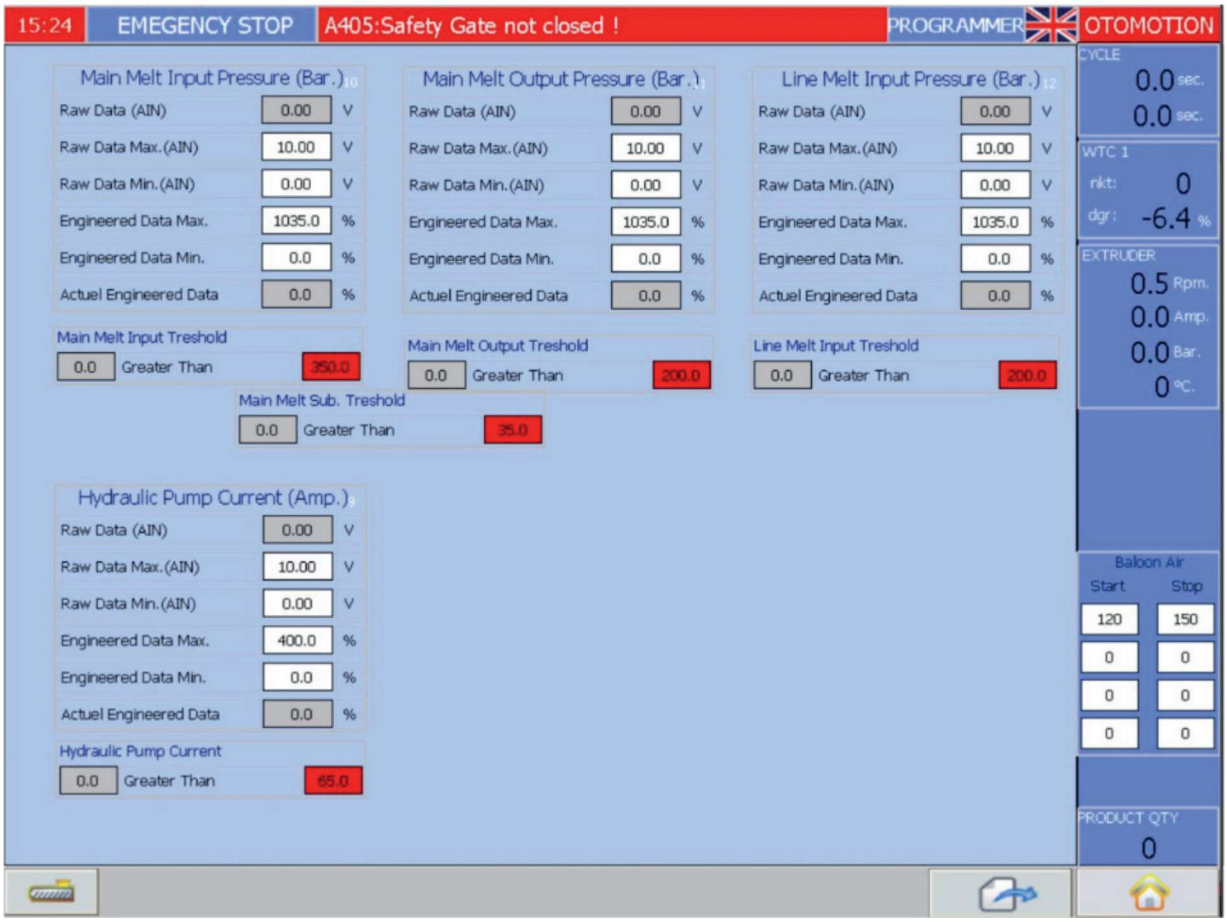
10. 4. SYSTEM PAGE

You can reach this page by tapping 10.4. System 

button on the setup page.



You can calibrate Melt Pressures, Hydraulic Accu Pressures at this page.
Calibration is same as described at Page: 7

You also can put tresholds and melt pressure treshold for stopping extruder to prevent unwanted situations.

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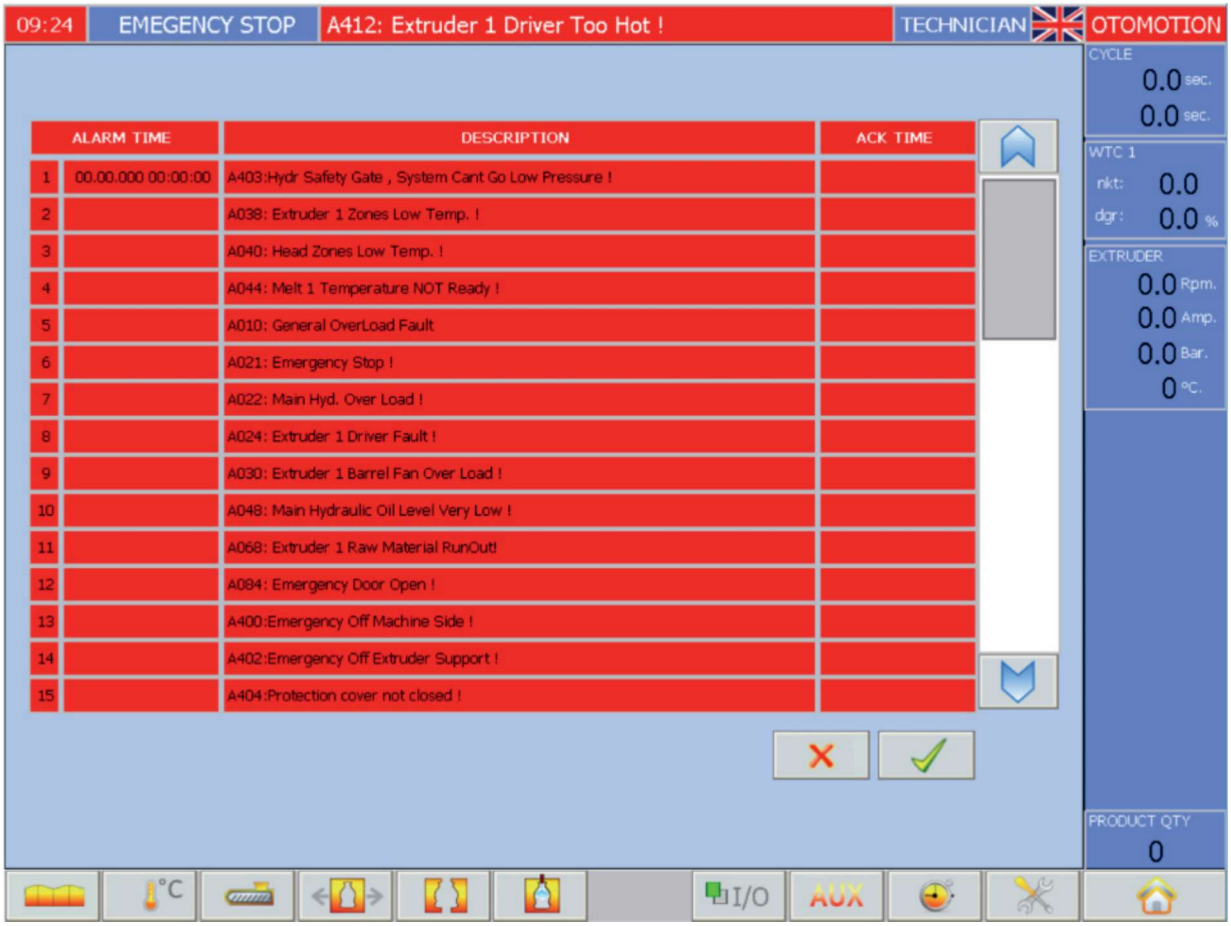
11. ALARM PAGE

You can reach Alarm page by tapping Allarm rotator object

wherever displayed.



You can reset alarms by tapping  and clear passived allarms by tapping 

You can not reset and clear still active alarms anyway.

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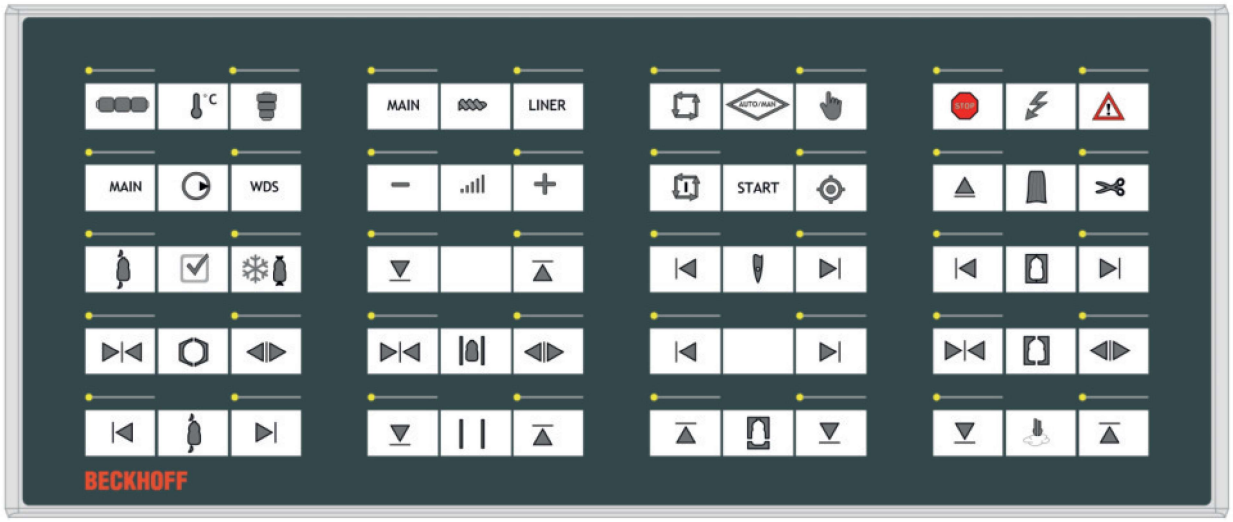
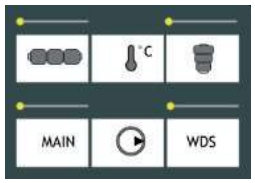
12. CONTROL KEYPAD



Using Keypad 40 Keys&Leds is useful since it shorten cabling, servicing for new machine while easing the control of operations.

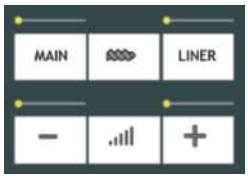


ON/OFF Barrel Heaters

ON/OFF Head Heaters

ON/OFF Main Hydraulic Pump

ON/OFF Parison Hydraulic Pump



ON/OFF Main Extruder

ON/OFF Liner Extruder

Slow Down Extruders

Speed Up Extruders

Automatic Mode

Manual Mode

Automatic Start

Reference Position Before Automatic Start

Machine Stop

Alarm Reset

Barrel Up After Cut

Knife or Guillotine Cut

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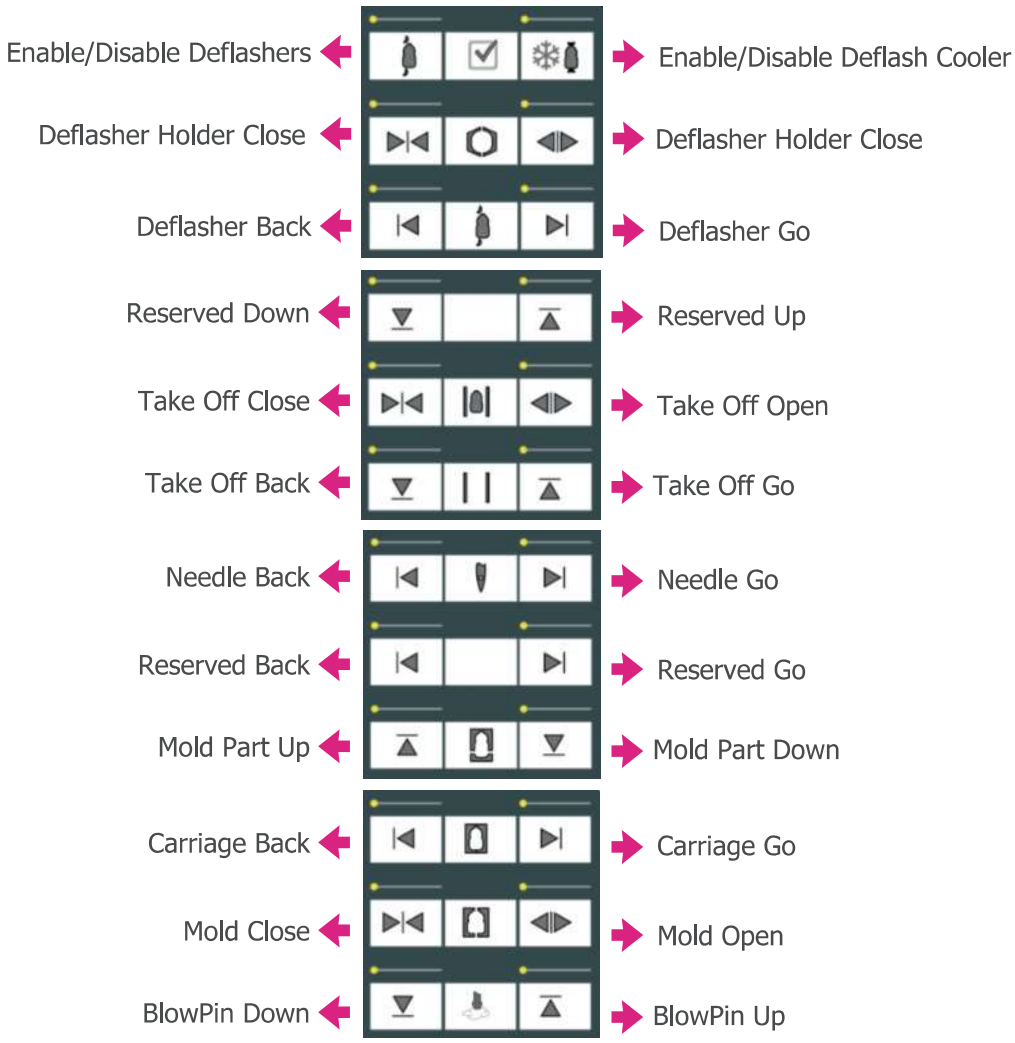

The Led of the Key is the status of the Key function.

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