MOOG

Manual IMI220-145D001
Parison Controller

MOOG

Revision History

Document Revision	Hardware	Software Rev.	Author	Date
Preliminary	*Preliminary*	*Preliminary*	*Lstrabla - nfrassine*	*6th Dec 2004*
1.02	*1.02*	*1.02*	*rfacchi - nfrassine*	*31st Aug 2005*
MAN145-UM-A02A-EN	*IMI220-145A002*	*2.01*	*rfacchi - nfrassine*	*5th Oct 2005*
MAN145-UM-A03A-EN	*IMI220-145A003*	*3.01*	*sverga - nfrassine*	*29th May 2006*
MAN145-UM-A03B-EN	*IMI220-145A003*	*3.01 - 3.02*	*sverga - nfrassine*	*June 2006*
MAN145-UM-B01A-EN	*IMI220-145B001*	*3.04 - 3.05 4.01 - 4.02 - 4.03 - 4.04 – 4.05*	*sverga - nfrassine*	*June 2010*
MAN145-UM-C01A-EN	*IMI220-145C001*	*5.01*	*nfrassine*	*July 2012*
MAN145-UM-D01A-EN	*IMI220-145D001*	*6.07*	*sverga – mamoruso*	*July 2017*

Revision:	IMI220145D001.6.07
Revision Date:	17/07/2017/17:18:52
MASS Release:	MASS 1.4.0.0 (r5552)
	Firmware: 1.4.0.0 Patch1

Revision: Number of the current revision application inside in the PLC.

Revision Date: Date of the current revision application inside in the PLC.

MASS Release: MASS version related to the actual application.

Firmware: Firmware release; can differ from MASS release

1   Installation.

1.1   Installation Overview.

Since there are many makes, models and vintages of blow moulding machines it is impossible to give specific instructions as to the mounting, wiring and plumbing schemes to use. Different machines have different requirements that the installer must ascertain before beginning the actual physical installation of the system. A careful examination of the machine and some thoughtful planning beforehand will usually produce a good, serviceable installation. There are some suggestions that hopefully will make your installation smooth and provide many years of trouble free operation.

It is recommended that, if space is available on the machine, the programmer and its various electrical components be mounted in a separate enclosure. While it might be possible to mount these components in the machine's main electrical cabinet, quite a bit of electrical "noise" and heat is usually generated there. While the Parison Controller was designed with some degree of tolerance for these conditions it must be remembered that it is, in essence, a computer.

To minimize any detrimental effects on the system that can be sometimes caused in such an environment, it may be easier and wiser to circumvent any problems before they are created. The old adage "An ounce of prevention…" can definitely apply here.

If using a separate enclosure or not, thoughtful layout of components is quite important. Remember, for future troubleshooting it is important to consider accessibility to terminals to allow for voltage readings and the ability to reach fasteners so components can be removed and replaced. Cable routing should also be considered to prevent stretching of cables, straining of connections, pinch points and sharp edges that could damage a wire or cable.

Transducer and valve cables should be run through a "Seal-Tite" type of flexible, liquid tight conduit. Although it is much faster and easier to run them over the machine unprotected, enclosing them in conduit provides protection against physical damage as well as protection against insulation breakdown due to airborne chemical.

Cabling should also be run away from sources of heat (extruders, accumulators, and heater bands) and strong electrical fields (motors, transformers, etc.).

The programmer can be mounted anywhere convenient to the operator station but should be located away from areas where it could be damaged by falling objects or flooded by broken coolant or hydraulic lines.

Cable lengths to valves and transducers should be kept as short as possible to minimize line loss and signal corruption, but long enough to provide movement of machine members for unrestricted operation and machine maintenance. When routing cables it is wiser to avoid possible noise sources or areas of potential damage than to minimize cable lengths.

1.2   Hydraulic Installation.

Hydraulic installation involves the mounting and plumbing of filters, servo-valve manifolds, cylinders, etc.

If the programmer is being installed as a replacement for another programmer all the necessary components should already be in place. If not, the following suggestions are offered:

- Do not reuse old hose, pipe fittings or tubing. Contamination in old plumbing is almost impossible to effectively remove and can cause problems in future servo-valve reliability. Old fittings that have been painted and assembled with old thread sealing compounds will not only introduce contamination, but are harder to work with and can contribute to added installation time.

- Before assembling any new plumbing, inspect it carefully to insure that there are no metal filings or foreign matter left over from cutting or assembly. Now is the best time to clean it out, before it can get into the hydraulic system.

- Replace the hydraulic oil or have it analyzed by a reputable lab. Depending on your maintenance program, the oil may not have been checked for some time. Now is a good time to perform any oil-related maintenance **_BEFORE_** the servo-valves are installed.

- If you are replacing the oil remember to filter it as you pump it into the machine. New oil right from the refinery is sometimes the dirtiest oil in the shop.

1.3   Hydraulic Filtration.

Clean oil is the key to reliable hydraulic system operation. Dirt, silt and sludge in the system increase operating temperatures by decreasing heat exchanger efficiency and create excessive wear on pumps, directional and relief valves and valve seats. Contamination breeds contamination by wearing hoses and other hydraulic components from the inside.

Moog servo-valves are designed to operate with an ISO code of 14/11. While this may be lower than what you are accustomed to, the benefits of improved filtration will show up not only in increased servo-valve life but will help to reduce premature machine wear and the frequency of oil related failures.

Moog offer a full line of filters and filter systems with element ratings starting at 3 microns, flow-rates from 10 to 100 gallons per minute, and operating pressures as high as 3,000 psi. There are a number of good filter systems available and, even if a Moog filter is not chosen, it is strongly urged you employ one of these other filter systems on your machine.

High-pressure filter assemblies should be plumbed between the high-pressure hydraulic supply and the "P" (pressure) port of the servo-valve manifold(s). Plumbing from the filter outlet to the "P" port should be completed with steel tubing or pipe.

If the machine employs a hydraulic accumulator to maintain stability in the machine's hydraulic system, the filter should be installed after the accumulator and before the valve manifold(s).

1.4   Servovalve Manifolds.

Servo-valve mounting is accomplished with the use of manifolds for each head. These manifolds allow for easy removal of the valves to facilitate system flushing or valve replacement in the event of failure.

Moog servo-valves used in blow moulding Parison control are most often internally piloted devices. This means that the manifolds used will have 4 ports that connect to the machine's hydraulic system:

"P" port is the incoming high-pressure supply to the valve.
"T" or "R" port is the servo-valve return to tank.
"A" or "C1" port is one of the controlled ports. This should plumb to one end of the programming cylinder.
"B" or "C2" port is the other controlled port. This should plumb to the other end of the programming cylinder.

Some manifolds may be supplied with an additional fifth port labeled "X". These manifolds are designed for use with hydraulic systems capable of supplying an independent source of pilot pressure. If the need for this port is uncertain, contact Moog Field Engineering for additional information.

There is no specification as to which controlled port should plumb to which end of the programming cylinder. The following suggestions are offered concerning plumbing:

- Try to keep the overall length of the controlled port lines as close to equal as possible.

- Keep the servo-valve manifold as close to the programming cylinders as possible. The shorter the length of the control lines, the more accurate position control will be.

- Try to plumb all the valves the same way. (All "A" ports to the top of the cylinders or all "B" ports to the top of the cylinders.) This will reduce confusion and make wiring easier later.

It is **EXTREMELY IMPORTANT** that plumbing between the controlled ports of the manifolds and the programming cylinders be completed with solid tube or pipe. **Do Not Use Hoses To Make These Connections!** Hydraulic supply up to the filter and the return lines from the servo-valve manifolds can be done with hose if desired.

In a great number of cases, the solid hydraulic lines that connect the controlled ports to the programming cylinders will provide enough support for the servo-valve and manifold combination. If the machine is prone to excessive vibration it would be wise to fabricate some type of bracket to support the servo-valve assembly.
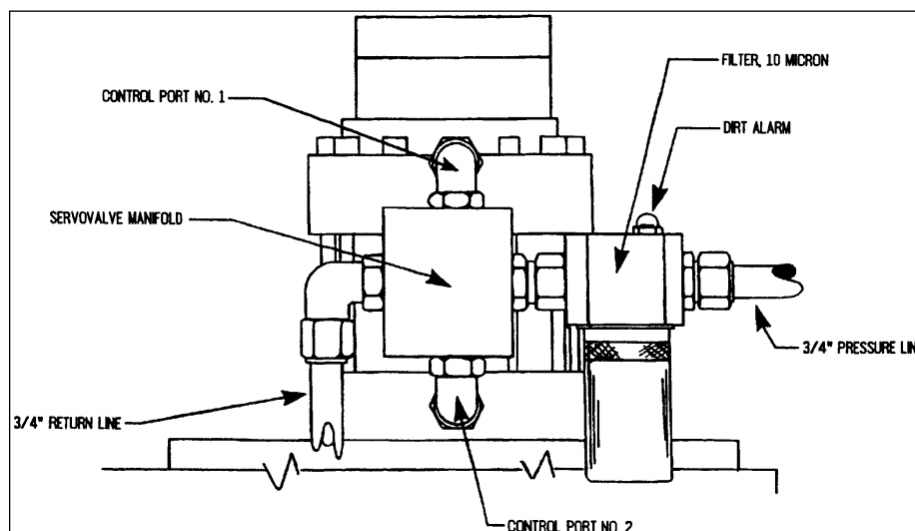A typical servo-valve and manifold installation is depicted below:

Figure 1

1.5 Servoactuators.

A servo-actuator is a device, which can be used to take the place of the standard hydraulic cylinder. It combines the cylinder, DCDT position transducer and servo-valve manifold into one compact, pre-adjusted package. Servo-actuators can help reduce hydraulic installation time significantly and make calibration faster and easier.

There are a number of servo-actuators available with different specifications and mounting hardware, therefore no specific information will be supplied in this document. Please contact Moog if more information is required on a specific model or type.
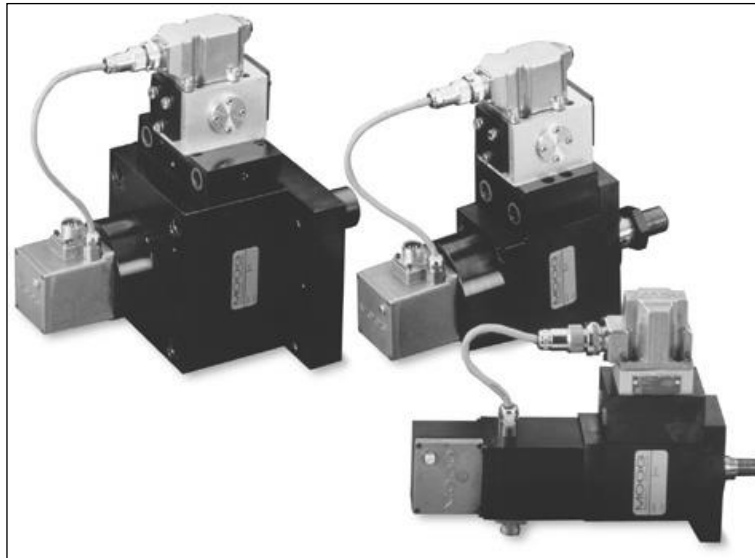
Figure 2

1.6 Flushing.

Once all the hydraulic work has been completed you can start the process of flushing the hydraulic system. This step is recommended to remove as much of the foreign matter left behind in the hydraulic system as possible before installing the servo-valves.

It is also recommended that the system be flushed every time the reservoir is drained and refilled, a cylinder is replaced, or a pump or any other major hydraulic component on the machine is replaced.

The first step in flushing is to remove the servo-valves from their manifolds or actuators and replace with the proper flushing blocks. Install the flushing element in the high-pressure filter assembly and make sure the dirt alarm has been properly reset. (Flushing elements are identified by a red band printed around the filter element.)

Jog the pumps to insure that there are no major leaks in the hydraulic system. If all looks tight start the pumps and allow them to run. After a short run time carefully inspect all the hydraulic fittings and lines to insure there are no leaks.

Periodically check the filter dirt alarm on the high-pressure filter to see if it has tripped. If it has, stop the pumps and replace the flushing element with a new one. Reset the dirt alarm and restart the pumps. Allow them to run while periodically inspecting the dirt alarm.

The system has been satisfactorily flushed when the pumps can run for two complete hours without tripping the dirt alarm.

After flushing is complete, stop the pumps and replace the flushing element with a standard high-pressure filter element. Replace the flushing blocks with the servo-valves. Remember to reconnect the electrical connectors.

CAUTION

The flushing element is a LOW-PRESSURE element designed to be used in conjunction with the flushing blocks. Failure to replace it with the correct high-pressure filter element after removing the flushing blocks will result in the filter element collapsing and possibly damaging the machine.

NOTE

On some machines when the flushing blocks are installed in place of the servo-valves, hydraulically operated devices may not function. The flushing blocks are configured to direct pressure back to tank allowing the system to be flushed at low pressure. Because of this, no pressure will be created in the hydraulic system.

1.7   A Word About Hydraulic Pumps.

One of the most common failures seen in parison control valves is a buildup varnish in the valve. This is usually caused by oil overheating and breaking down. Most standard petroleum based hydraulic fluids begin to reach their temperature specification somewhere between 130 and 150 degrees Fahrenheit (between 55 and 65 degrees Celsius). While you may never surpass this temperature while running, it can easily be exceeded when the pumps are off and the machine heats are on. The stationary oil in the valve absorbs the heat and can quickly surpass the oil's breakdown point.

To reduce the possibility of this happening it is suggested that anytime the heats are on, the pumps should continue to run. The oil moving through the valve will actually act as a coolant and help to prolong servo-valve life.

1.8   Transducers Installation.

The Parison Controller uses DCDT position transducers to feed back programming cylinder position information to the controller. A separate DCDT is required for each individual head.

If servo-actuators of the type described above are being used, the DCDT is integrated into the actuator package and has been pre-adjusted at the factory. No further adjustment is required.

If the programmer is used in a position based application there is also a linear position transducer that is needed to monitor the position of the reciprocating screw or accumulator push-out cylinder.

1.9   DCDT Position Transducers.

In order to maintain accuracy and repeatability of the programming cylinder motion, care must be taken when mounting the DCDT tooling position transducer(s).

A DCDT can be mounted with the transducer body as the stationary element and the core as the moving member or the core can be stationary and the body can move. Whatever method is used, the stationary element must be rigidly mounted on a non-moving portion of the machine frame to provide a reference for piston movement.

Please note the following precautions when mounting the transducer:

- The core must move freely in the body. There should be no side loading of the core nor should the core rod be bent in order to make it align with the transducer body.

- Mountings for both core and transducer body must be rigid. There should be no free play in any of the brackets and the brackets should be made of a stiff material, which will not bend or give, with normal machine vibration.

- Provision must be made to allow for adjustment of the stationary element of the transducer. The transducer's position will need to be adjusted during calibration to bring the programming cylinder's stroke into the usable portion of the DCDT's stroke. The ability to align the body with the core will also make future DCDT replacement easier, if necessary.

- When designing the DCDT mounting brackets allow for some type of anti-rotational device to keep the core and body properly aligned.

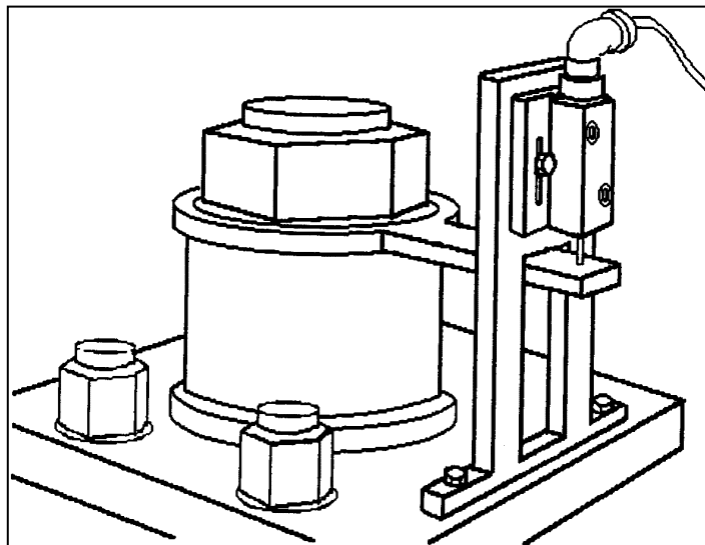A typical DCDT transducer installation using the moving core method is depicted in the drawing below.

Figure 3

Note the provisions made for the vertical adjustment of the DCDT body and the anti-rotational arrangement incorporated to keep the core and body aligned.

1.10 Linear Position Transducer (position based applications ONLY).

Since the profile is synchronized to the position of the push out ram, the Parison Controller requires a means to track the ram throughout the push-out stroke. In addition, to keep the profile points properly positioned on the Parison, the Parison Controller must have control over the accumulator or reciprocating screw's FULL (End of Fill.) and EMPTY (End of Extr.) points. Both of these tasks are accomplished by the signal provided from the linear position transducer, also referred to as a linear pot.

The transducer can be mounted so that the shaft EXTENDS FROM the pot body during push-out, or RETRACTS INTO the body during push-out, whichever makes for a more convenient mounting method.

As with DCDT's, there are several precautions that should be observed when mounting linear position transducers:

- The pot body and shaft must be as parallel to the push out ram as possible. This will prevent side loading of the transducer shaft and premature failure of the bushings in the transducer body.

- The transducer should never be at the full mechanical end of its stroke in either direction. When mounting be sure that the shaft is at least 0.25" (~5 mm) from its mechanical end stop when the push out cylinder is at full bottom (empty).

- The body should be rigidly mounted to eliminate the possibility of movement caused by machine vibration.

- There should be no more than 1/16 inch (~1.5 mm) of end play in the transducer shaft in the direction of ram movement when the shaft is secured to the ram follower assembly.

- The end of the shaft should never be screwed down tightly to the follower assembly. Instead, the ball joint on the shaft should be allowed to "float" slightly up and down the securing screw. This will reduce any stresses caused by the slight misalignment between transducer and cylinder that are always present.
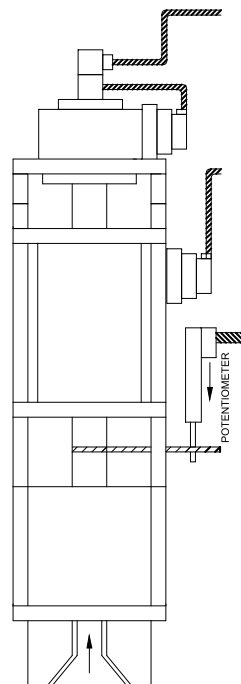

Figure 4

2 System Architecture.

2.1 Terminal (Front).

The Panel Operator is the place where all the interactions happen between the operator and the **Parison Controller**.

The Operative Panel is constituted by a **LCD TFT 10.4** inches touch screen and by groups of buttons.
The Parison Controller looks as follows:

Figure 5

2.1.1 Fast Access Keys and Knob.

Entry Knob: Used to change the value of various functions. Rotation in a clockwise sense to increment and anticlockwise sense to decrement. **It is also used as a SET key to confirm a change.**

Del: Delete key. When a field is focused and this button is pressed the content of the field is erased.

Edit: This button allows to enter the Parison field and edit the profile. The button LED is ON. Push the Edit button again to end the Parison editing. The button LED turns OFF.

X10: Increase the sensitivity of the entry knob by a factor of 10. When **X10** is active the associated led is ON.

Figure 6

Purge: This button starts the movement of the heads to the purge position; as long as the key "PURGE" is active.

Shift: This button used contemporarily with another button changes the operation of it. This is explained for each button in the relative pages.

2.1.2 Usb device.
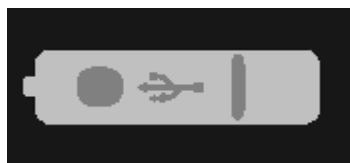
Usb device: Allows to save or load the recipes on an external memory.

Figure 7

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2.1.3   Display Led panel.
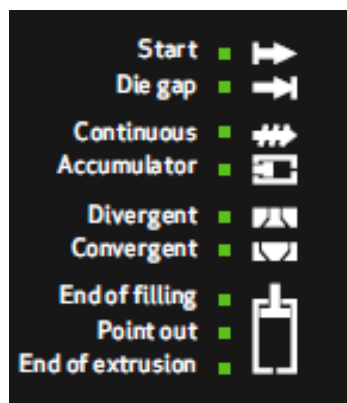
Figure 8

Start: Lit when the cycle Start (1 or 2) signal is received.

Die gap: Lit when the Die Gap signal is received (only in position accumulator mode).

Continuous: Lit when the "Continuous Extrusion" machine type is selected.

Accumulator: Lit when "Accumulator" machine type is selected.

Divergent: Lit when "Divergent" die is selected. Normally it is reported to the head number 1. If the work page visualizes another head this led reports to this same head.

Convergent: Lit when "Convergent" die is selected. Normally it is reported to the head number 1. If the work page visualizes another head this led reports to this same head.

End of filling: Lit at the end of the accumulator filling (only in position accumulator mode).

Point out: Lit when each serial marker point is reached.

End of extrusion: Lit at the end of extrusion. (both in continuous extrusion and accumulator mode)

2.2   General page description.

2.2.1   Colours assignment for all pages:

Green numbers	The fields that can be reached by cursor and can be changed.
Grey numbers	The fields that can't be reached by cursor and can't be changed.
Blue bargraphs	Show the value of an analog output.
Yellow numbers	Show actual value.
Yellow bargraphs	Show actual value (feedback e.t.a.).
White	The texts on the screens.

2.2.2   Page Header:

MOOG	Setup Machine	17:03:20 29/02/2012
Recipe:		Acc_Tech Page: 3

Text left bottom: Shows the actual recipe that is working.

Center: Shows the page title.

Date and time of day: Show the actual day, date and hour of the system. For adjustment go to the **Technical** level or a **Resp.** level password.

Text right bottom: (yellow) Shows the current level state:

Lock	**Lock:** No password inserted.
Acc.Resp.	**Acc. Resp:** Access Responsible Level on. For changing this password enter in Technical Level and enter in setup machine.
Acc.Tech.	**Acc. Tech:** Access Technical Level on. This password is fixed by Moog.

The other one shows the current number **page.**

2.2.3   Page Bottom:

HEAD 1	HEAD 2	HEAD 3	HEAD 4	EXTR.1	EXTR.2	ALARM	MENU 2

Bottom page: soft key to change the page

Alarm line: If there are one or more alarms on the alarms page, the alarms are displayed at the bottom of each page.

[46] - Machine not in automatic

This line shows the last alarm and changes the back colour depending on the priority. On the left of the text the number shows the code of the alarm displayed at the moment.

Min: 0.0	Max: 5000.0

Min and **Max: Minimum** and **maximum** are displayed in the status line. In the example on the left the minimum valid value is 0, while the maximum is 5000.

2.3 Change of Setpoints.

If the cursor is on a numeric, Boolean, multi text list, alphanumeric field (green), the value can be changed.

Numeric fields: insert the desired number with the rotation of the **Entry Knob**. In clockwise the numbers increase. It is possible to insert the decimal value only rotating the Knob and it is possible to insert the value left of the dot with X10 multiplication factor and entry knob. Confirm by **Set key**.

Boolean fields: switch to YES/NO with rotate **Entry Knob**. In clockwise it is YES selection. Confirm by **Set key**.

Multi text list fields: rotate **Entry Knob** (one or more times) to scroll forward or (one or more times) to scroll backward until desired text is displayed. Press **Set key** to accept the change.

Alphanumeric fields: Insert the first character alphanumeric with the rotation of the **Entry Knob,** move to the right using the shift key + entry knob, using again the entry knob insert the following character. When the string is completed confirm by **Set key**.

If a field need **not to be changed** (i.e. after typing a wrong number or changing the intention) move the cursor away.
When a field is in variation with the insertion of a new data the led near **Set Key** is lit and the field changes colour.

It is also possible to modify all the existing fields using the relative keyboard (double click on the field):

Figure 9

Figure 10

Figure 11

Figure 12

2.4   The Parison field.

2.4.1   Field appearance.

When parison field is displayed by browser, it's sub-divided into 4 parts:

Starting from left you can see:
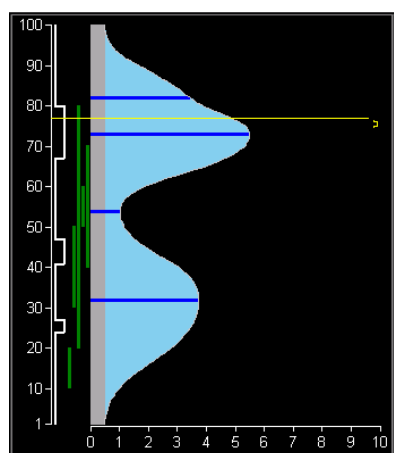
Figure 13

- *Working point panel:* vertical histogram showing current working point (for selected head).

- *Serial markers panel:* (visible if select ON in Setup Machine Page) vertical panel containing a logic status diagram of serial marker status along the profile. The left position is OFF, the right position is ON.

- *Synchronism panel:* (visible if set 1 or plus at number synchronism on Setup Machine Page) vertical panel containing from 0 to max 5 vertical lines as programmed synchronization points; each synchronism signals is defined through start and stop points (which define synchronism line width) and through type.(with accumulator machine).

- *Profile panel:* area where the profile appears (maximum 400 points). Each point can get a value from 0 through 10000 (100.00%); the profile is drawn making an interpolation among some basic points (masters), highlighted by horizontal line. Interpolation can be of various types: Bezier curves, linear, flat, parabolic 1 (parabola with tangent 0 on end point) or parabolic 2 (parabola with tangent 0 on start point); an interpolation can be selected in a different way for each area available between a master and the next one. The parison field, besides showing current profile, can display the offset between programmed profile and the feedback profile actually present on the head. On a profile it is possible to place some markers allowing to physically detect a parison point.

2.4.2   Editing profile.

The cursor can be moved on a parison field using UP, DOWN arrow keys. The cursor position is drawn by a dashed line; when the field is focused, the cursor is drawn by a continuous line. In this phase any operation involving a change in current profile invokes *field editing* (background colour becomes orange); the field shows both original profile and that being edited (changing page is possible going back to original profile).
When focus is on parison field, these operations are allowed:

2.4.3   Normal functioning:

- Arrows
- by pressing *UP/DOWN* arrow keys it's possible to move the cursor by a point upwards or downwards.
- by pressing *+/-* keys it's possible to change the amplitude of the current cursor point; the value changes according to the amount contained in *Increase*; the changed point is setup as a master.

- Entry knob
- by the rotation it's possible to change the amplitude of the current cursor point; the value changes according to the amount contained in *Increment*; the changed point is setup as a master.
- by pressing **SHIFT** + *Rotation* it's possible to move the cursor upwards or downwards.

2.4.4 Other possibilities.

It is possible to select *(F5)* how the **vertical arrows** have to work.

Vertical arrows Move cursor	*Move cursor*: move the cursor up and down (default functioning)
Vertical arrows Next master	*Next master*: move the cursor among the masters
Vertical arrows Drag master	*Drag master*: drag the master up and down
Vertical arrows Next marker	*Next marker*: move the cursor among the markers (visible if select ON in Setup Machine Page)
Vertical arrows Drag marker	*Drag marker*: drag the marker up and down. (visible if select ON in Setup Machine Page)
Vertical arrows Drag SM	*Drag SM*: drag the Serial Marker up and down. (visible if select ON in Setup Machine Page)
Vertical arrows Selects profile	*Selects profile*: select a part of the profile. It is possible to select an area of points (reverse mode): selection is active from previous master to next master
Vertical arrows Drag selection	Drag selection*:* drag the selection up and down. If an area is selected, it is possible to move it: if the motion meets a master, it will be cancelled

It is possible to select *(F6)* how the **Knob** has to work.

Knob Change value	Rotate the knob to change the Value (default functioning)
Knob Change base	Rotate the knob to change the Base. To increase the minimum value (base) of the whole profile: all points are translated in such a way that the profile keeps the same look. The base can be changed up to that the maximum value of the profile is 100
Knob Change range	Rotate the knob to change the Range. To increase/ decrease the whole profile range: all points are proportionally changed in such a way that the profile keeps the same look. The range can be changed up to that the maximum value of the profile is 100
Knob Change smooth	Rotate the knob to change the Smooth. The value can be from 0.5 up to 2 and it is only for Bezier interpolation
Knob Setup SM	Rotate the knob to setup the Serial Marker (if selected ON in Setup Machine Page)

2.4.5 Other function keys possibilities.

- by pressing the key *DEL* it's possible to remove a master on the profile, in correspondence to the cursor point.
- by pressing the function key programmed as *Toggle marker (F2)* it's possible to add or remove a marker on the profile in correspondence with the cursor point. By the function key *DEL* it's possible to remove a marker.
  If a master and a marker are both on the same point, press the key *DEL* to remove the marker as first.
- by pressing the function key programmed as *Select interpolation (F4)* it's possible to change the type of the interpolation area between two masters, the choice selection is made among Bezier curves, linear, flat, parabolic 1, parabolic 2.
- by the function key programmed as *Clear (F3)* it's possible to completely delete the current profile. The PLC profile will be updated only when the operation is confirmed by pressing the Set Key.

When the serial marker panel is visible (set the parameter to ON in Setup Machine Page), the following operations are possible:

- modify the serial marker using F5 to set Vertical arrows to Drag SM and F6 to select Knob as Setup SM. The SM can be dragged using the arrows.

- the status of the serial marker can be switched ON and OFF using the knob or **+** and **-** keys.

2.5 Functionality.

2.5.1 Safe Condition.

Necessary conditions to start issuing a new profile are:

- Temperature Ok ON
- Emergencies ON
- Alarm OFF
- machine in automatic ON
- Purge OFF
- Tooling OFF
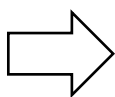
> The digital input "machine in automatic" has to be ON during the normal work and has to be OFF during the machine configuration. (Machine type selection, number of heads selection, number of point selection, number of extruder selection, output command type selection, heads and accumulator calibration and die type selection)

2.5.2 Language packages.

PARISON CONTROLLER is supplied with a language package (application rev. IMI220145D001.X.XX). It is possible to choose among the following languages:
English, Italian, German, French, Spanish, Portuguese, Danish, Russian, Turkish, Greek, Chinese and Japanese.

2.5.3 Elements.

PARISON CONTROLLER can be configured to manage up to 4 heads.
Each regulator uses an analog input to acquire the mandrel opening and an analog output to drive the mandrel positioning actuator.
The regulator can operate in closed loop (with no-intelligent actuators) or in open loop (with intelligent actuators that operate in closed loop stand alone).

The input value is calibrated in range 0% - 100.00% through definition of upper extreme voltage and lower extreme voltage. In case of intelligent actuators the calibration points are set to 0 mV and 10000 mV if it is not necessary to make the calibration.

PARISON CONTROLLER can be configured to manage 1 accumulator.
A regulator in position in accumulation mode requires that the accumulator management is setup on fourth channel. The setpoint generated by thickness regulator depends on the accumulator position in injection stroke relating to the total injection stroke.
Input value is calibrated in range 0% - 100.00% through definition of full accumulator voltage (100% and input higher than empty position) and empty accumulator voltage (0% and input lower than full position). It is possible to exchange the analog output polarity to ignore the actuator connection polarity. The default polarity value waits for increasing voltage values to bring the accumulator to empty position.
The input calibration should be made in this way:
It is possible to indicate a voltage to be applied on extrusion control output and activate empty accumulator calibration procedure. The system automatically detects mechanical end-of-stroke, stores this value and interrupts extrusion control. Using manual methods, the accumulator should be brought to empty and full position and it is possible to manually confirm the positions.

PARISON CONTROLLER can be configured to manage up to 2 extruders.
It is possible to decide whether to use the extruder or not and which channel it should be associated to. It can be associated to:

- A thickness regulator in continuous extrusion.
- A thickness regulator in time accumulation.
- Accumulator.

It is possible to decide whether the extruder is driven by an analog or digital command. In case of analog command the output voltage of a channel is the speed setpoint. In case of a digital command two digital outputs allow increase or decrease of speed.

- Extruder with analog command:
    - It is possible to calibrate the input with: 0 speed voltage, maximum voltage, and maximum speed. The speed is expressed in RPM.
    - It is possible to calibrate the output with: maximum speed, voltage to reach maximum speed.
    - These setpoints can be setup: speed to be reached, rising ramp in RMP/sec., falling ramp in RPM/sec., minimum speed, maximum speed.
- Extruder with digital command:
    - You can setup the maximum ON time for digital output depending on a manual command.

Timer Switch
The Parison Controller can manage a weekly timer switch to activate the machine heating system and it can manage a production counter.

2.5.4 Access.

PARISON CONTROLLER manages 3 access levels to protect data entry:
1. minimum access for machine user. **Lock:** no password inserted.
2. responsible access for responsible. **Acc. Resp.** For changing this password enter in Technical Level and enter in setup machine.
3. service access for installer/serviceman. **Acc. Tech.** This password is fixed by Moog.

Access to levels 2 and 3 is password-protected. Level 2 persists at power down and power up, while level 3 does not.

2.5.5 Keyboard test page.

From the input/output page and in manual mode (digital input 13 has to be OFF)

Keeping pressed the button F7 (next to the button MENU 2) for 5 seconds it is possible to access the test page

Figure 14

In this page it is possible to:

Reset the password:
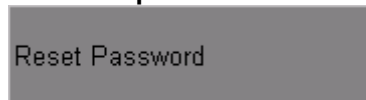
Figure 15

Print the pages:

chose the page number and press the softkey

Figure 16

Perform the touch calibration:
-
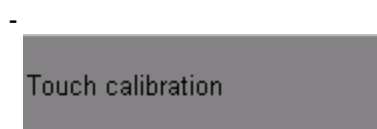
it is also possible to perform the touch calibration keeping pressed the **SET** key (entry knob) for 10 seconds

Figure 17

2.5.6 Machine configuration.

Parison Controller can be configured to run in:

- continuous extrusion with independent profiles
- in continuous extrusion with unique profile
- with accumulator position
- time accumulator.

In the following figures it is possible to evaluate all the configurations supported by PARISON CONTROLLER (as continuous extrusion or position accumulator).

2.5.7 Continuous Extrusion or Time Accumulator.

1st Channel Analogic	2nd Channel Analogic	3rd Channel Analogic	4th Channel Analogic	Digital output Card IMI220-415 **Output 9 - 10**	Digital output Card IMI220-415 **Output 11 - 12**
Head 1					
Head 1		Extruder 1			
Head 1				Extruder 1	
Head 1		Extruder 1	Extruder 2		
Head 1		Extruder 1		Extruder 2	
Head 1				Extruder 1	Extruder 2
Head 1	Head 2				
Head 1	Head 2	Extruder 1			
Head 1	Head 2			Extruder 1	

Figure 18

1st Channel Analogic	2nd Channel Analogic	3rd Channel Analogic	4th Channel Analogic	Digital output Card IMI220-415 **Output 9 - 10**	Digital output Card IMI220-415 **Output 11 - 12**
Head 1	Head 2	Extruder 1	Extruder 2		
Head 1	Head 2	Extruder 1		Extruder 2	
Head 1	Head 2			Extruder 1	Extruder 2
Head 1	Head 2	Head 3			
Head 1	Head 2	Head 3	Extruder 1		
Head 1	Head 2	Head 3		Extruder 1	
Head 1	Head 2	Head 3	Extruder 1	Extruder 2	
Head 1	Head 2	Head 3		Extruder 1	Extruder 2
Head 1	Head 2	Head 3	Head 4		
Head 1	Head 2	Head 3	Head 4	Extruder 1	
Head 1	Head 2	Head 3	Head 4	Extruder 1	Extruder 2

Figure 19

In continuous extrusion with independent profiles there are 2 command sets to make regulators 1 and 2 running independently from regulators 3 and 4. In this way it is possible to have a completely synchronized operation of both parts. Regulators 1 and 2 will run with digital input **START1** and regulators 3 and 4 will run with digital input **START2**.

If a new start front is received before the current profile ends, this is interrupted and the next profile immediately starts. If the new start front is received after the profile ends, the last point value is kept on output.
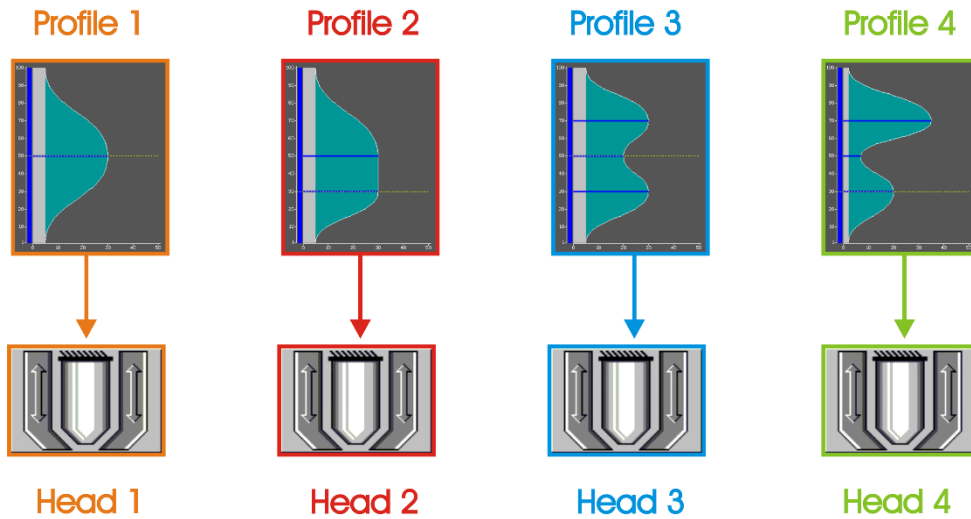
Figure 20

In continuous extrusion with unique profile there are 4 thickness regulators available (ranging from 1 to 4) and one unique profile drives all of them. The profile issue for all the regulators is with digital input **START1**.
There is only one work page (Profile) and more setup page of setup for the calibration of the used heads.
In the work page it is possible to change the weight of the profile for every single head. The markers are active only on head 1.
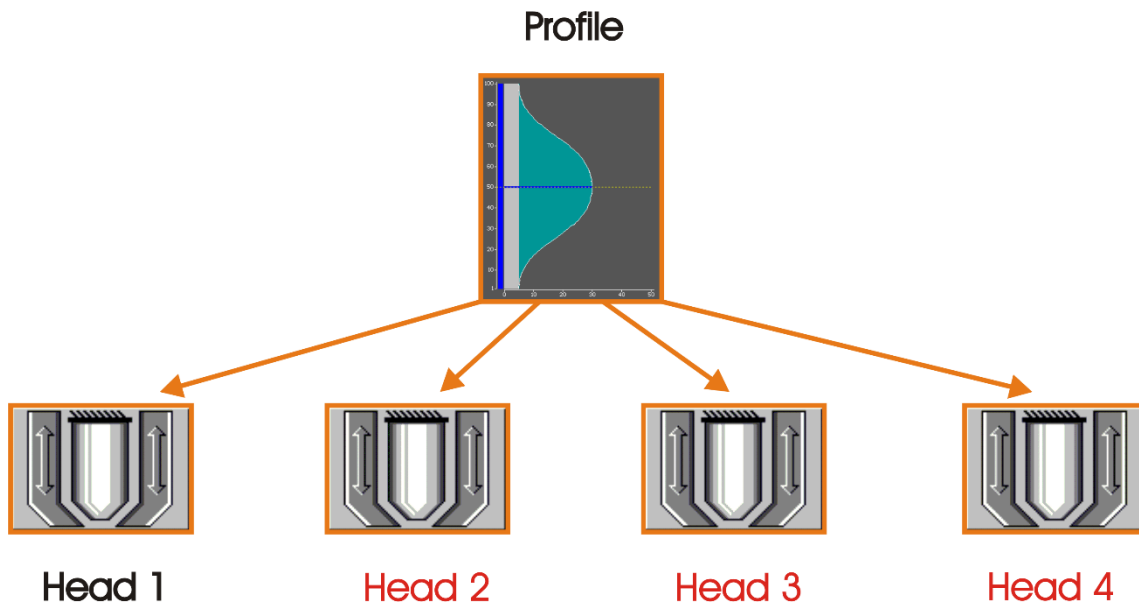
Figure 21

In continuous extrusion with unique profile and with **only one head** it is possible to enable the **alternate parison** function.
Every profile has the start signal (Start 1 => Profile 1, Start 2 => Profile 2), the cycle time and the correction independent.
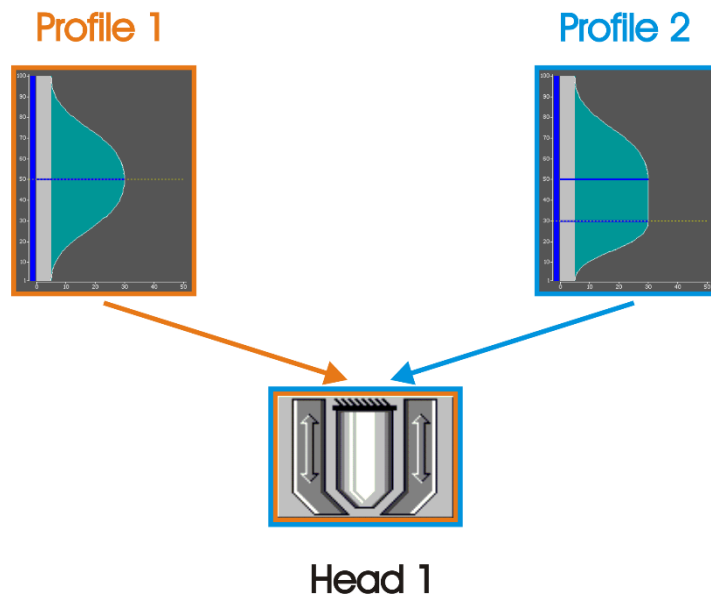
Figure 22

Example alternate profile:

Profile 1 and Profile 2 work with output head 1 in alternate mode. The Profile 1 starts with Start group 1 and the profile 2 starts with Start group 2.
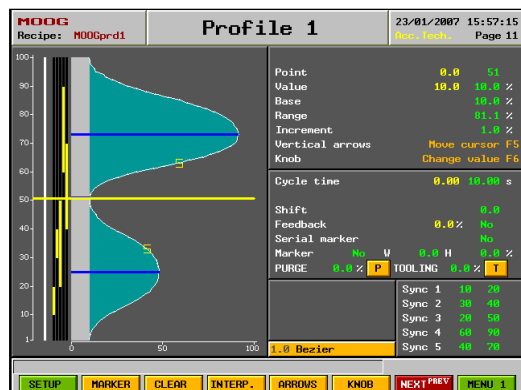
Figure 23
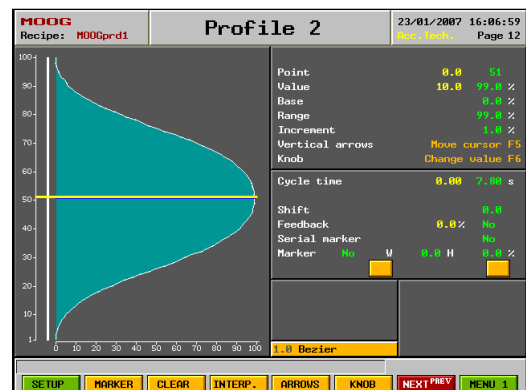
Figure 24

2.5.8 Position Accumulator.
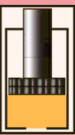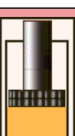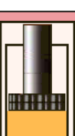
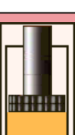| 1st Channel Analogic	2nd Channel Analogic	3rd Channel Analogic	4th Channel Analogic	Digital output Card IMI220-415 **Output 9 - 10**	Digital output Card IMI220-415 **Output 11 - 12**
Head 1			Accumulator 1		
Head 1		Extruder 1	Accumulator 1		
Head 1			Accumulator 1	Extruder 1	
Head 1		Extruder 1	Accumulator 1	Extruder 2	
Head 1			Accumulator 1	Extruder 1	Extruder 2
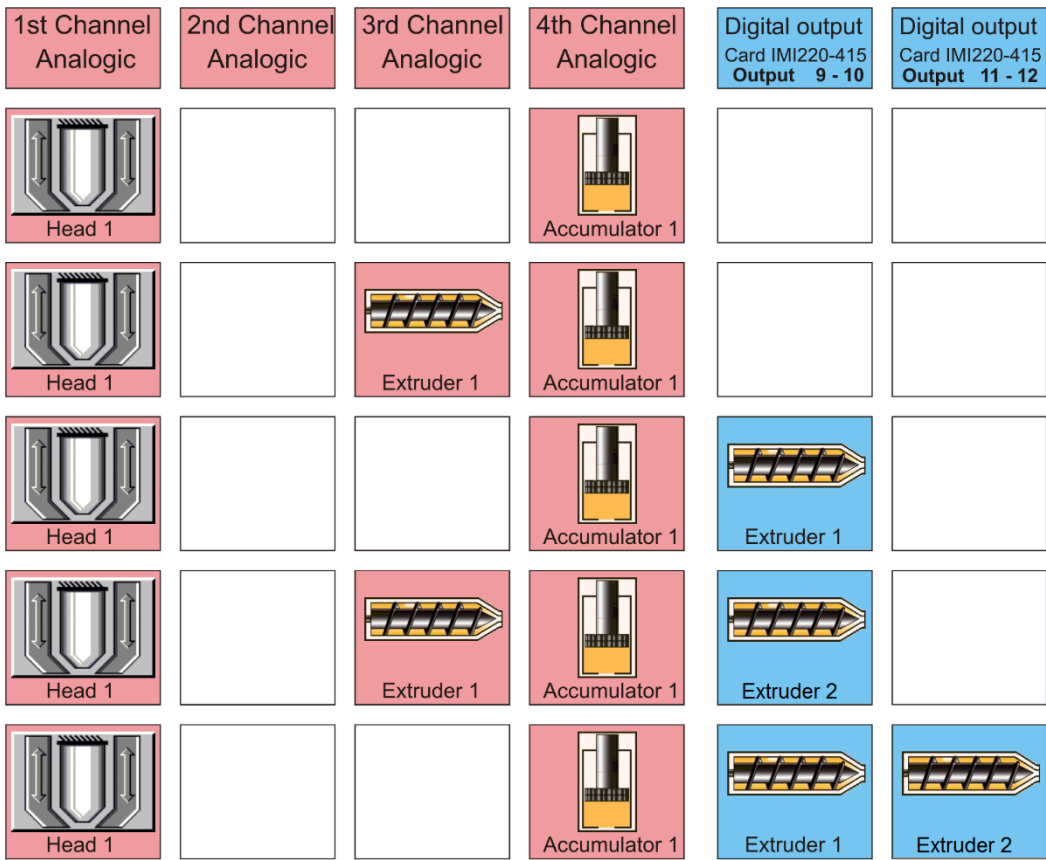
Figure 25

1st Channel Analogic	2nd Channel Analogic	3rd Channel Analogic	4th Channel Analogic	Digital output Card IMI220-415 **Output 9 - 10**	Digital output Card IMI220-415 **Output 11 - 12**
Head 1	Head 2		Accumulator 1		
Head 1	Head 2	Extruder 1	Accumulator 1		
Head 1	Head 2		Accumulator 1	Extruder 1	
Head 1	Head 2	Extruder 1	Accumulator 1	Extruder 2	
Head 1	Head 2		Accumulator 1	Extruder 1	Extruder 2
Head 1	Head 2	Head 3	Accumulator 1		
Head 1	Head 2	Head 3	Accumulator 1	Extruder 1	

Figure 26

With accumulator position there are 3 position-dependent thickness regulators available (ranging from 1 to 3). The thickness regulators follow the accumulator position. Thickness regulators work with independent profiles. The accumulator extrusion is driven by the digital input **START1**.
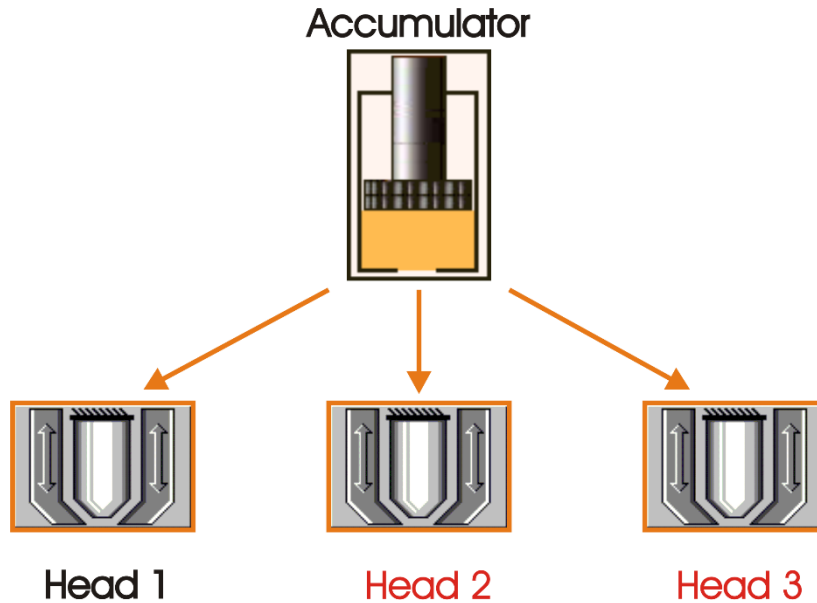

Figure 27

With time accumulator there are 4 thickness regulators available (ranging from 1 to 4). The thickness regulators are time-base driven by a single start signal (**START1**). Thickness regulators work with independent profiles.

- **Cycle time automatic correction not enabled**: profile is generated by a fixed setpoint.
- **Cycle time automatic correction enabled:** the time between rising edge of Start1 signal and its falling edge it is measured; this time becomes the setpoint for the profile generation at next start.
- **Average correction enabled**: carry out the average of 3 latest cycles. The average becomes the setpoint for profile generation at next start.

If the falling edge of Start1 signal is received before the end of the current profile, the profile is interrupted. If the falling edge is received after profile end, the setpoint holds the last point value.

In every machine configuration type (except for alternate parison) it is possible to assign any profile to each head. If the function **Free Profiles Assignment** is not enabled (see Setup Machine Page) the assignment of the profiles is fixed (head 1 = profile 1; head 2 = profile 2, etc.).
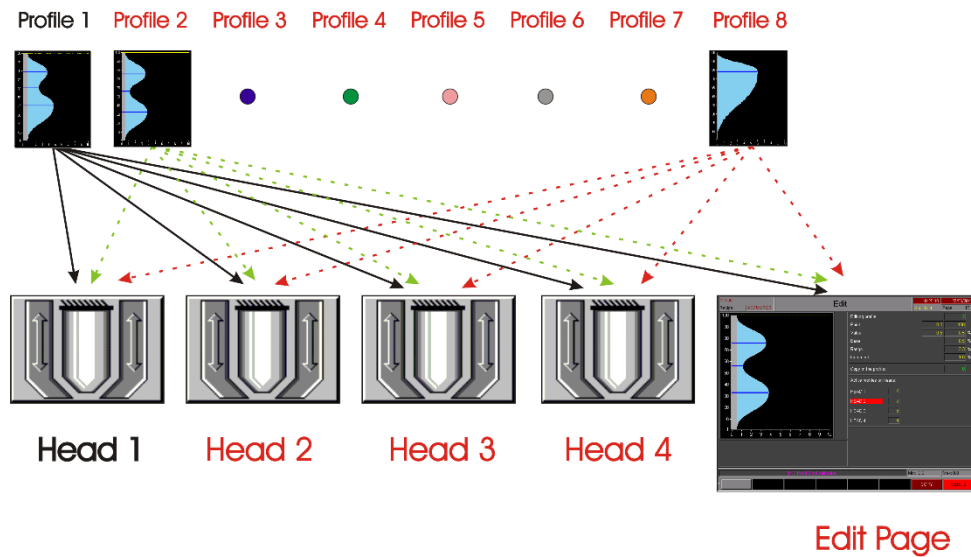
Figure 28

If the function **Free Profiles Assignment** is enabled (full edit mode; see Setup Machine Page) it is possible to assign to each head anyone of the 8 profiles available.
The 8 profiles can be displayed, modified and copied (if they are not already assigned to some head) in the Edit page. In this page it is possible to know which profile each regulator is using.

2.5.9   Control Update Rate.

The close loop sampling time is normally 2 ms.
In continuous extrusion with only one head the control is faster (only 1 ms sampling time).

3   Hardware Description.

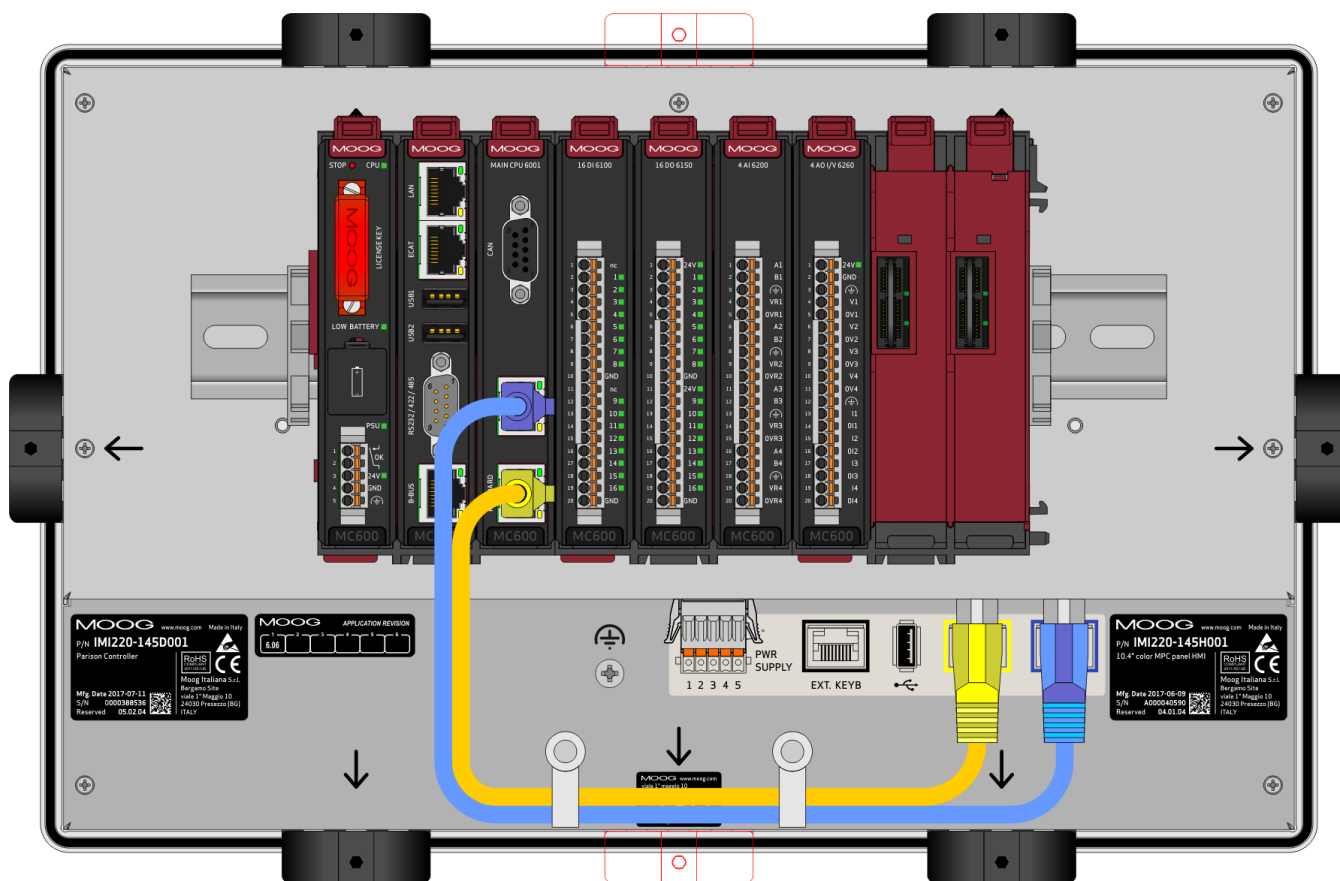## 3.1   Parison Controller Rack based 600 Series (Rear).

Figure 29

Place 1/2/3 **Card IMI220-6001A001** (POWER SUPPLY – MAIN CPU – HMI DRIVER).
Place 4   **Card IMI220-6100A001** (16 Digital Input card 24Vdc).
Place 5   **Card IMI220-6150A001** (16 Digital Output 24V 0.5A card).
Place 6   **Card IMI220-6200A001** (4 Analog Input 16 Bit).
Place 7   **Card IMI220-6260A001** (4 Analog Output I/V 16 Bit).

P/N: Ordering code (Product Code: 145; Release Level: D; hardware equipment: 001).

Mfg. Date: Release date.

S/N: Serial number.

Reserved: Code reserved to the qualified personnel.
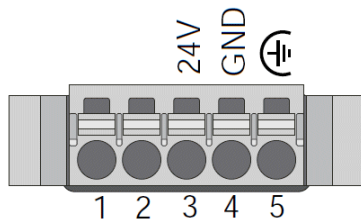
Application Revision

PLC Power Supply:.

Figure 30

N°	Signal
1	OK Rely NO contact
2	OK Rely (Common)
3	+ 24V
4	GND
5	Earth

Figure 31
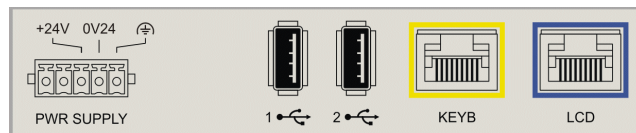
System label: Description of the position of the USB and video connectors.
PWR SUPPLY: Power Supply of the display.
USB1: front USB device.
USB2: not to use
KEYB: LVDS keyboard connection
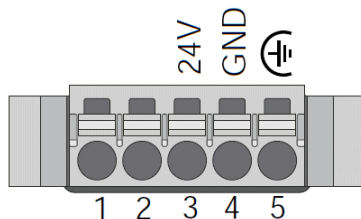**LCD:** LVDS display connection

Display Power Supply:

Figure 32

N°	Signal
1	Not used
2	Not used
3	+ 24V
4	0V24
5	GROUND

MOOG

3.2 Digital Input (Card IMI220-6100A001).

Pin n°	Name	Description
1	nc	
2	Start profile group 1	Profile start signal for group 1 regulators
3	Photocell parison group 1	Measure signal of parison length for group 1 regulators
4	Mould ready group 1	Signal for mould ready to collect group 1 parison
5	Purge group 1	External enable for group 1 purge
6	Start profile group 2	Profile start signal for group 2 regulators
7	Photocell parison group 2	Measure signal of parison length for group 2 regulators
8	Mould ready group 2	Signal for mould ready to collect group 2 parison
9	Purge group 2	External enable of group 2 purge
10	**GND**	
11	nc	
12	Stand by die gap	Die gap closing signal during accumulation phases
13	Temperature OK	Operation enable of regulators and extruders
14	Emergency	Operation enable
15	Presence alarm in machine	Indication of machine alarm pieces
16	Machine in automatic	Indication of machine in automatic or manual mode
17	Piece discard	Decrease of produced pieces caused by a rejection
18		*Not used.*
19		*Not used.*
20	**GND**	

3.3 Digital Output (Card IMI220-6150A001).

Pin n°	Name	Description
1	**+24V**	Supply voltage +24V.
2	End filling	Indication of reached accumulator end of filling quota
3	End extrusion	Indication of reached end of extrusion quota
4	Synchronism 1	Sync command n°1 of first thickness regulator
5	Synchronism 2	Sync command n°2 of first thickness regulator
6	Synchronism 3	Sync command n°3 of first thickness regulator
7	Synchronism 4	Sync command n°4 of first thickness regulator
8	Synchronism 5	Sync command n°5 of first thickness regulator
9	Serial marker	Command of serial marker actuator
10	**GND**	Supply voltage 0V.
11	**+24V**	Supply voltage +24V.
12	Increment extruder 1	Increase command for extruder 1
13	Decrement extruder 1	Decrease command for extruder 1
14	Increment extruder 2	Increase command for extruder 2
15	Decrement extruder 2	Decrease command for extruder 2
16	Enable timer switch	Enable command from timer switch
17	End production	End of product signal
18	Alarm	Alarm signal
19	Head in calibration	Head number 1 in calibration mode
20	**GND**	Supply voltage 0V.

3.4   Analog Input (Card IMI220-6200A001).

Pin n°	Name	Description
1	A1	Positive analog input 1
2	B1	Negative analog input 1
3	**PE**	Ground pin for connecting ground and shield
4	**VR1**	+10V reference voltage for sensors
5	**0VR1**	0V reference voltage return line
6	A2	Positive analog input 2
7	B2	Negative analog input 2
8	**PE**	Ground pin for connecting ground and shield
9	**VR2**	+10V reference voltage for sensors
10	**0VR2**	0V reference voltage return line
11	A3	Positive analog input 3
12	B3	Negative analog input 3
13	**PE**	Ground pin for connecting ground and shield
14	**VR3**	+10V reference voltage for sensors
15	**0VR3**	0V reference voltage return line
16	A4	Positive analog input 4
17	B4	Negative analog input 4
18	**PE**	Ground pin for connecting ground and shield
19	**VR4**	+10V reference voltage for sensors
20	**0VR4**	0V reference voltage return line

3.5   Analog Output (Card IMI220-6260A001).

Pin n°	Name	Description
1	**24V**	Positive analog input 1
2	**GND**	Negative analog input 1
3	**PE**	Ground pin for connecting ground and shield
4	V1	Analog output (voltage) 1
5	0V1	Analog output (voltage) return line 1
6	V2	Analog output (voltage) 2
7	0V2	Analog output (voltage) return line 2
8	V3	Analog output (voltage) 3
9	0V3	Analog output (voltage) return line 3
10	V4	Analog output (voltage) 4
11	0V4	Analog output (voltage) return line 4
12	**PE**	Ground pin for connecting ground and shield
13	I1	Analog output (current) 1
14	0I1	Analog output (current) return line 1
15	I2	Analog output (current) 2
16	0I2	Analog output (current) return line 2
17	I3	Analog output (current) 3
18	0I3	Analog output (current) return line 3
19	I4	Analog output (current) 4
20	0I4	Analog output (current) return line 4

3.6   Wiring.

In the following pages some wiring examples with different types of parison controls are presented.

For the actuators which are equipped with a position current feedback signal of 4÷20 mA it has been indicated to use a buffer to convert the current signal into a voltage signal. This is required because the analog input card 4 AI 6200 accepts only voltage signals.

It is possible to use a 500 Ω resistor to convert the current signal into a voltage signal that can be connected to the analog input card. The following drawings help to clarify this application; note that one side of the resistor is connected to input A and to the current signal coming from the actuator; the other side of the resistor is connected to input B and to the signal zero volt.
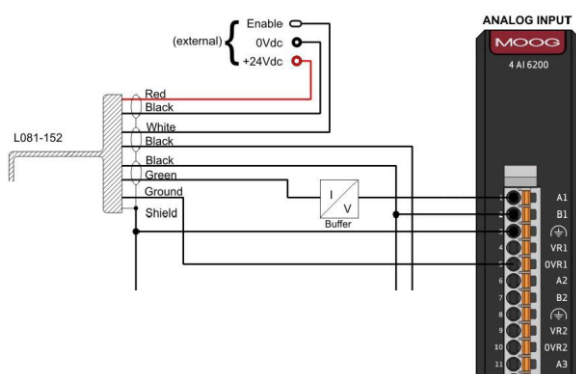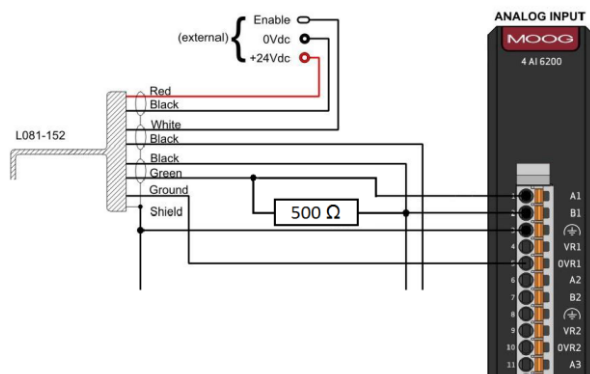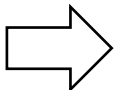

Figure 33

Figure 34

For those actuators which have the same wiring arrangement but a voltage feedback instead of a current feedback, it is possible to directly route the signal to the A pin of the relevant analog input and connect pin B to the signal common as depicted in the following picture.
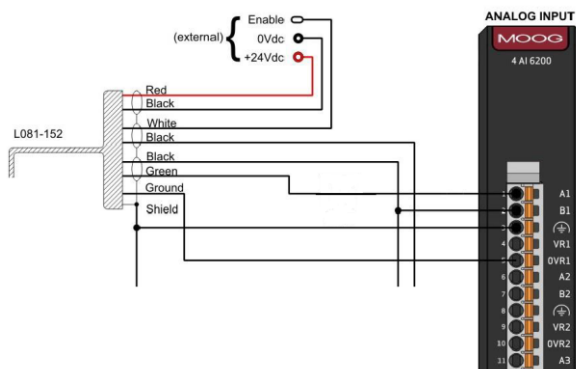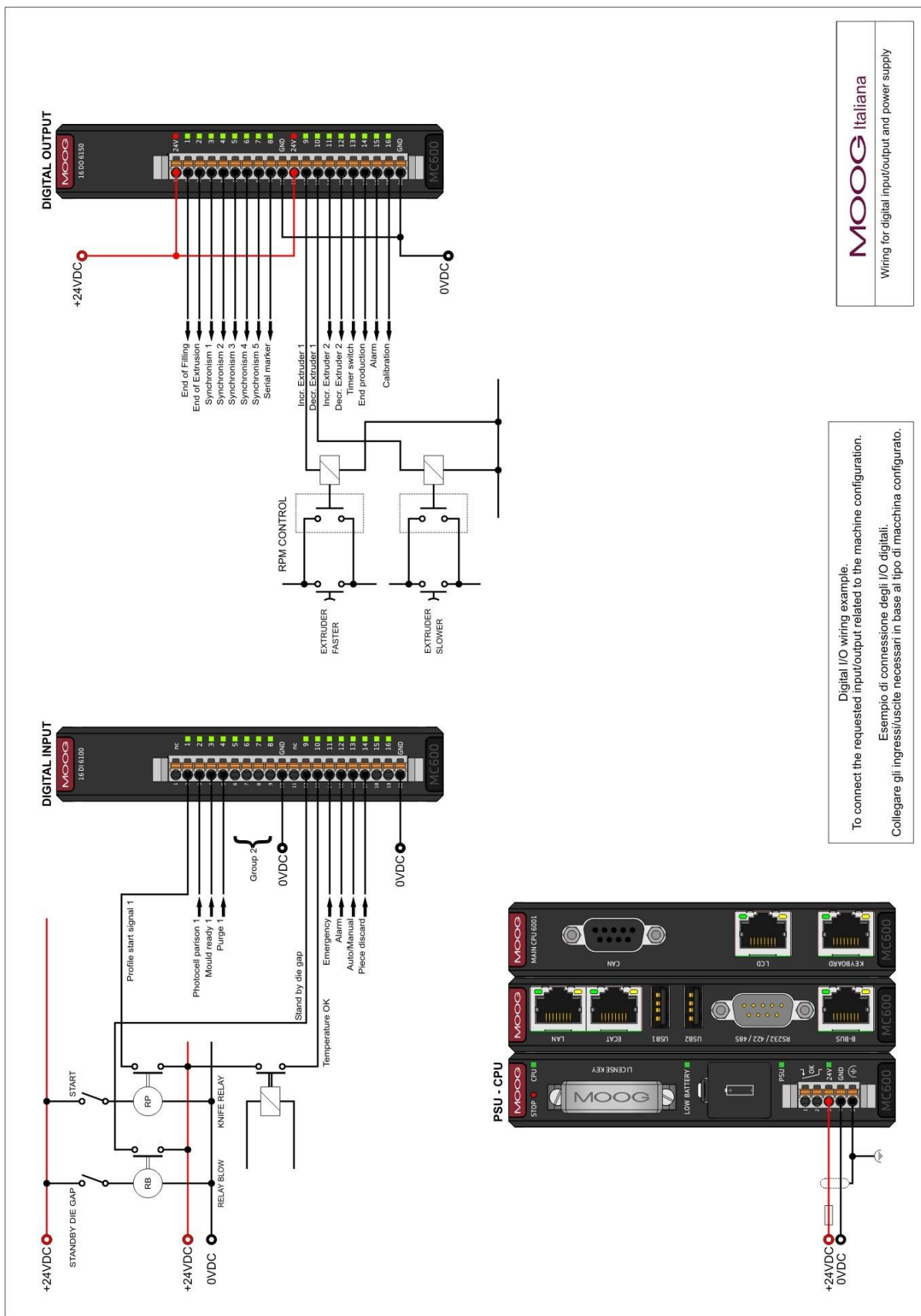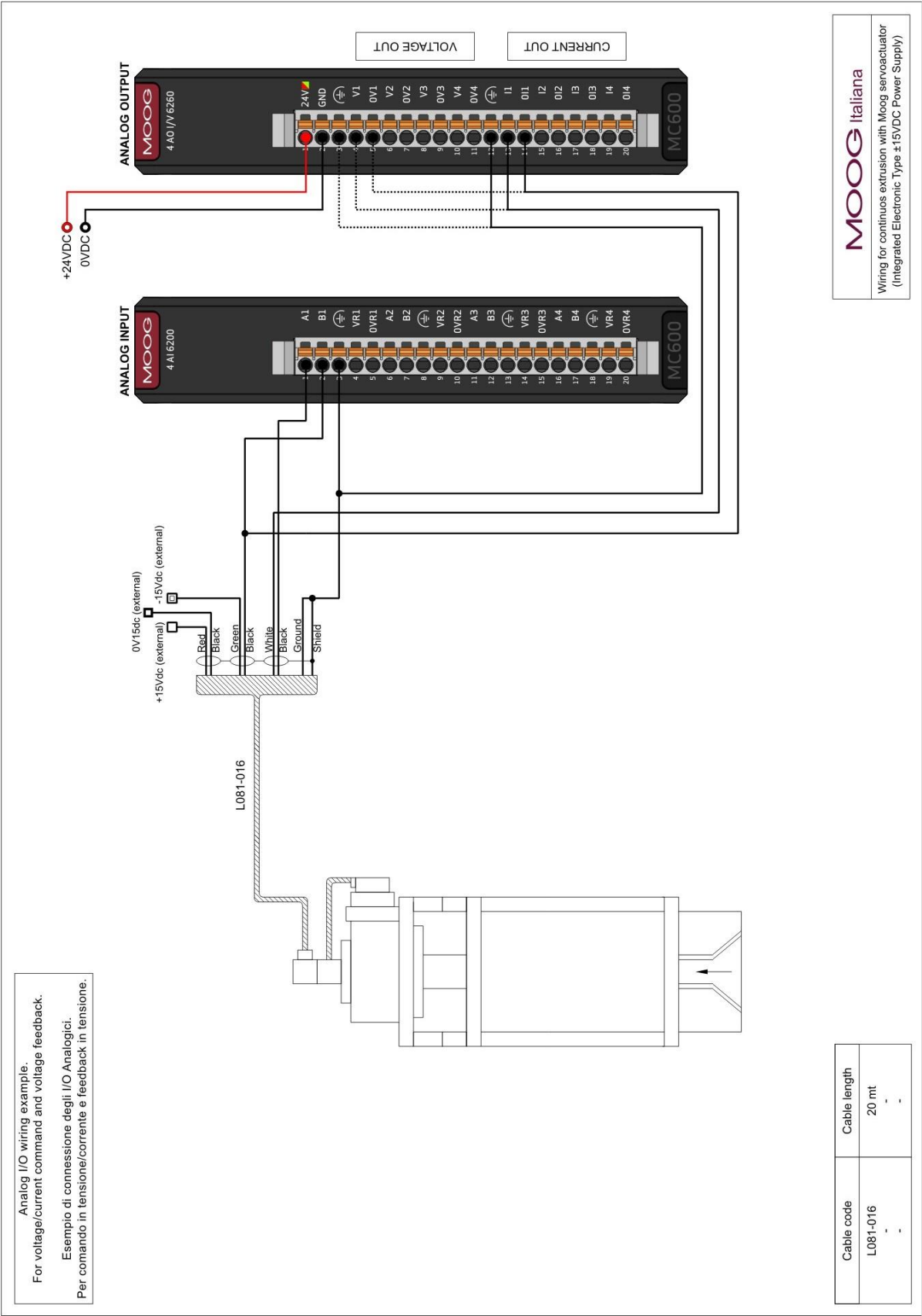

Figure 35

Wiring for Digital Input/Output and Power Supply.

PARISON CONTROLLER

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Wiring for continuous extrusion with Moog servo actuator cable L081-016 (Integrated Electronic Type 15Vdc).

MOOG Italiana

Wiring for continuos extrusion with Moog servoactuator (Integrated Electronic Type ±15VDC Power Supply)

Analog I/O wiring example.
For voltage/current command and voltage feedback.

Esempio di connessione degli I/O Analogici.
Per comando in tensione/corrente e feedback in tensione.

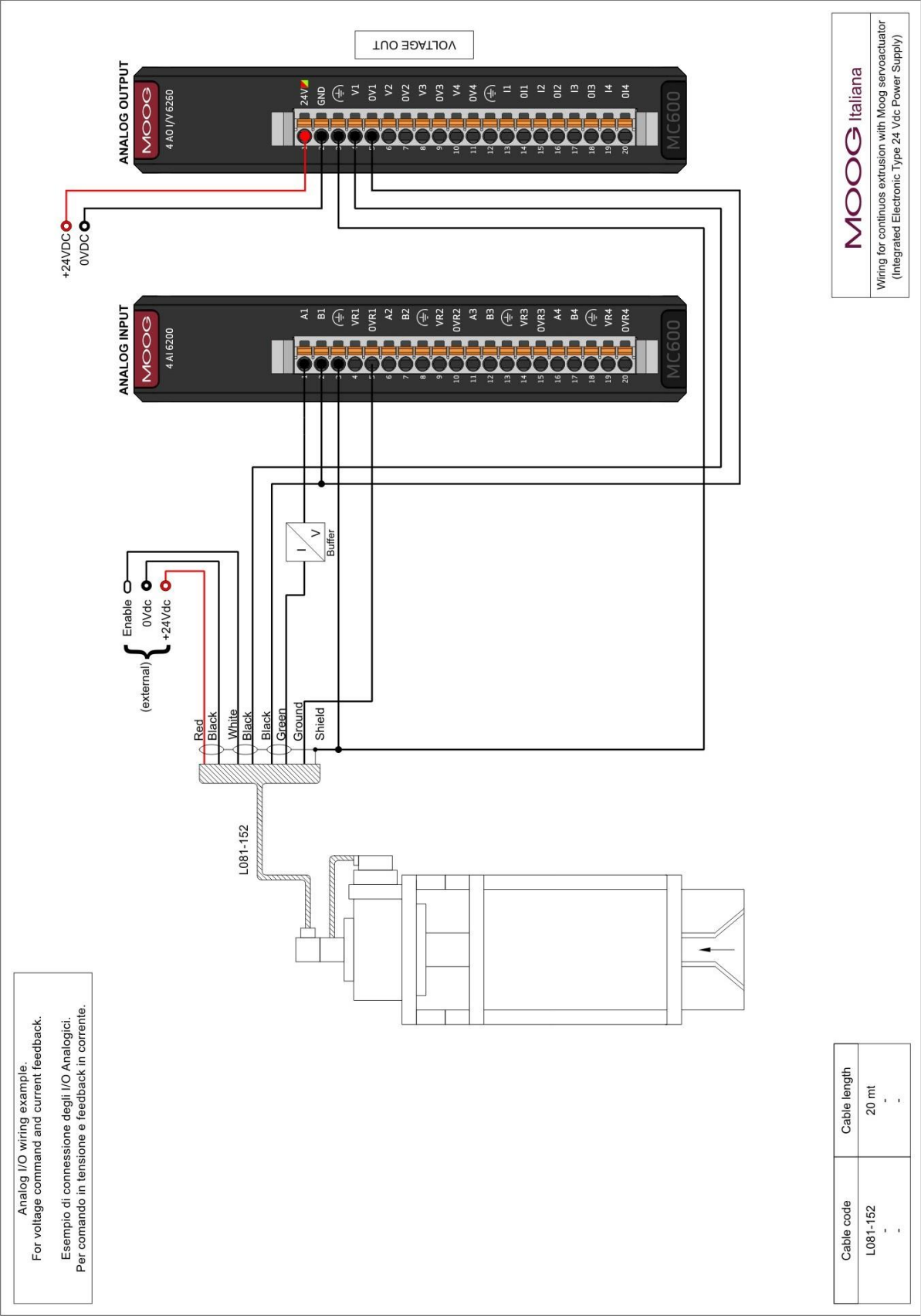| Cable code	Cable length
L081-016	20 mt
-	-
-	-

PARISON CONTROLLER

MOOG

Wiring for continuous extrusion with Moog servo actuator cable L081-018 (Integrated Electronic Type 15Vdc).

PARISON CONTROLLER
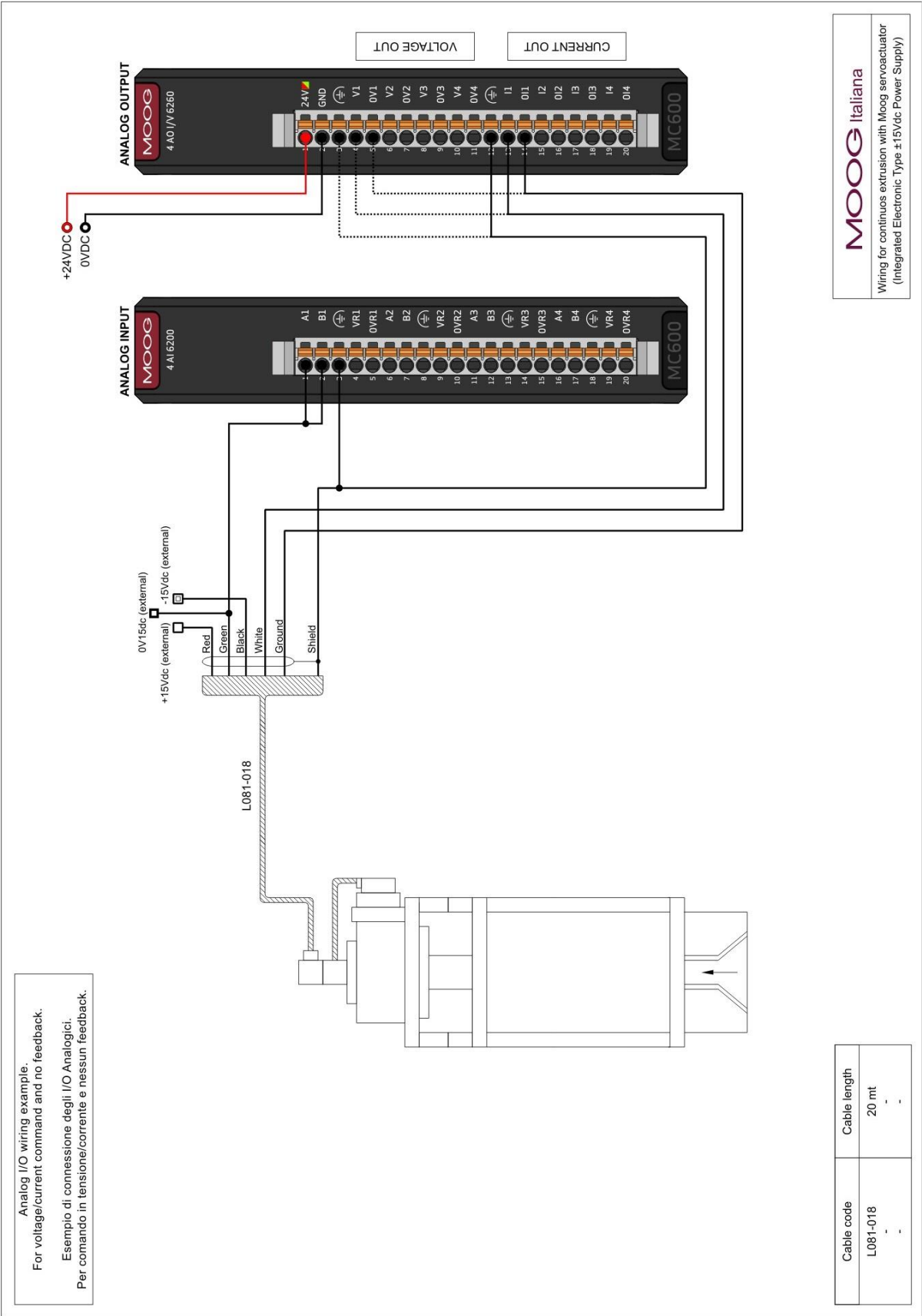
MOOG

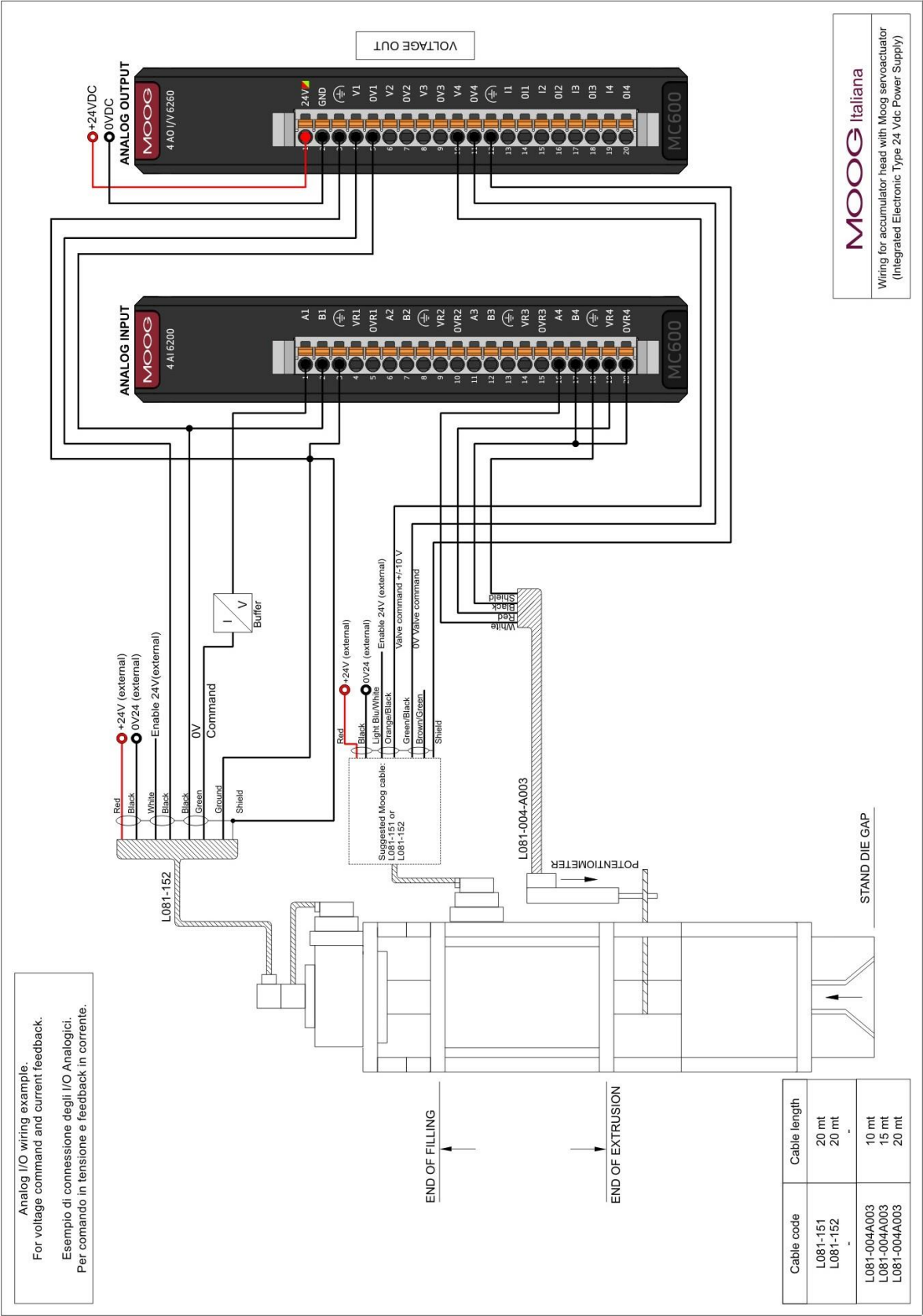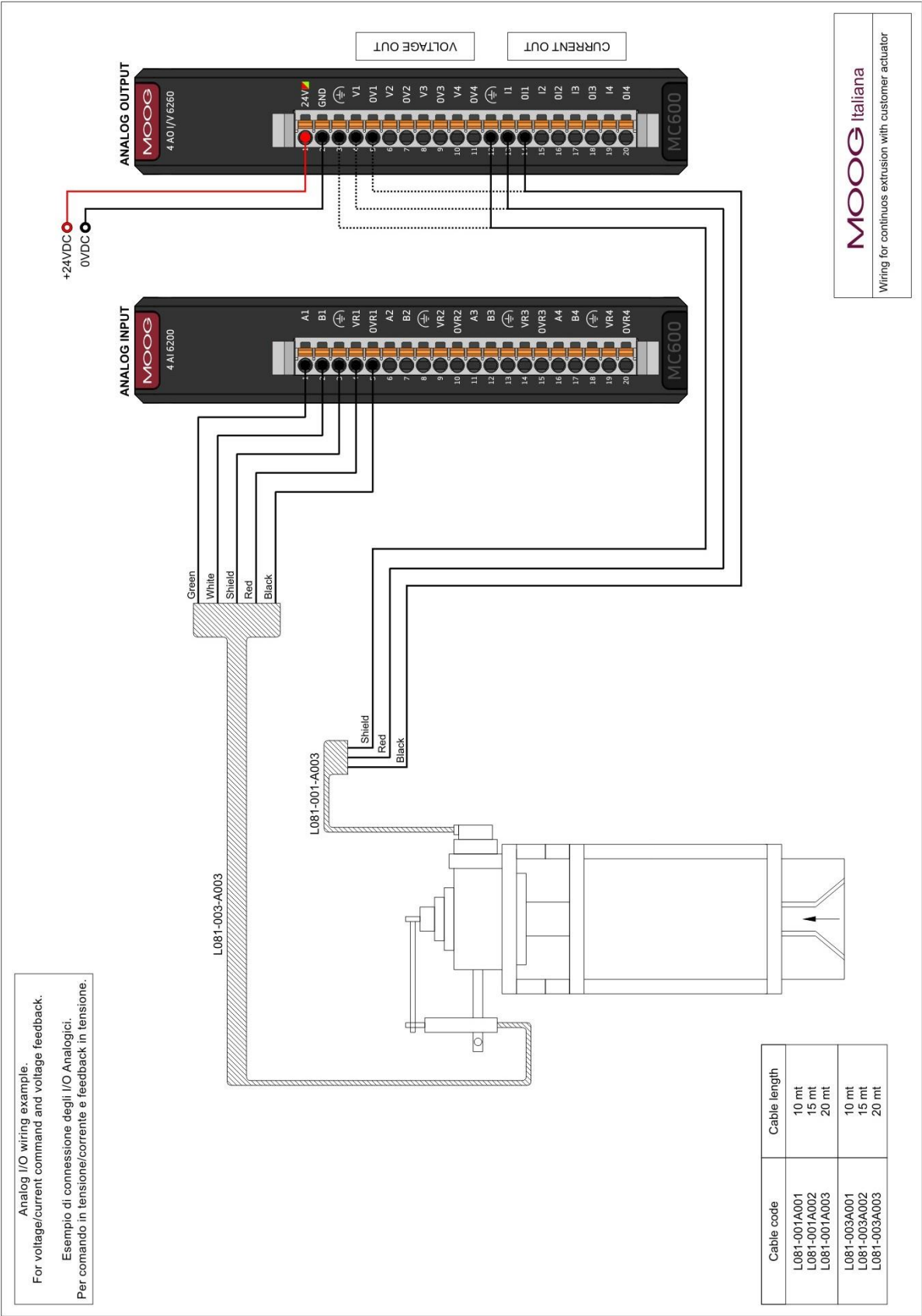Wiring for continuous extrusion with Moog servo actuator in current (Integrated Electronic Type 24Vdc).

Wiring for accumulator head with Moog servo actuator (Integrated Electronic Type 15Vdc).

Wiring for accumulator head with Moog servo actuator (Integrated Electronic Type 24Vdc).
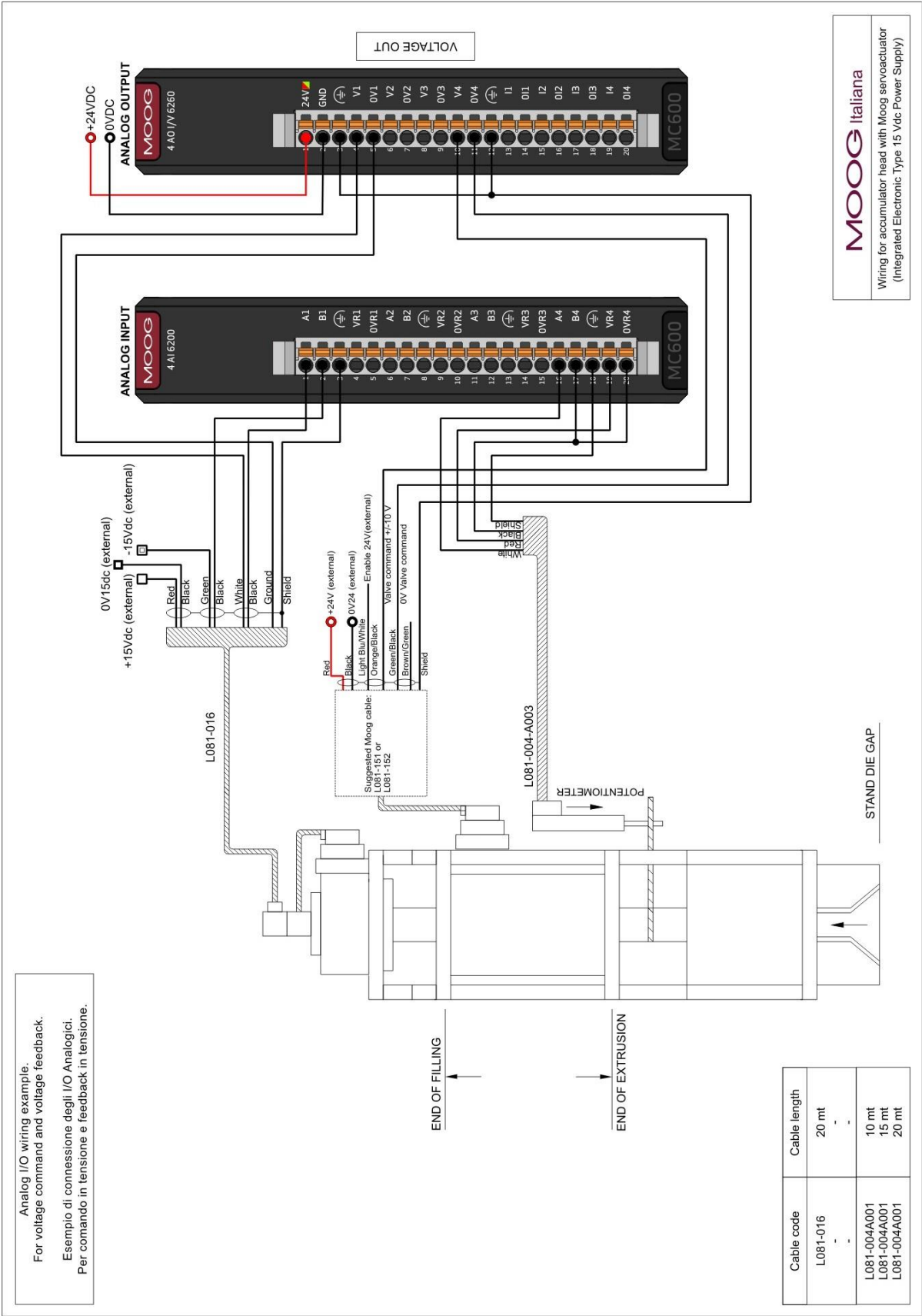
Wiring for accumulator head with Moog servoactuator (Integrated Electronic Type 24 Vdc Power Supply)
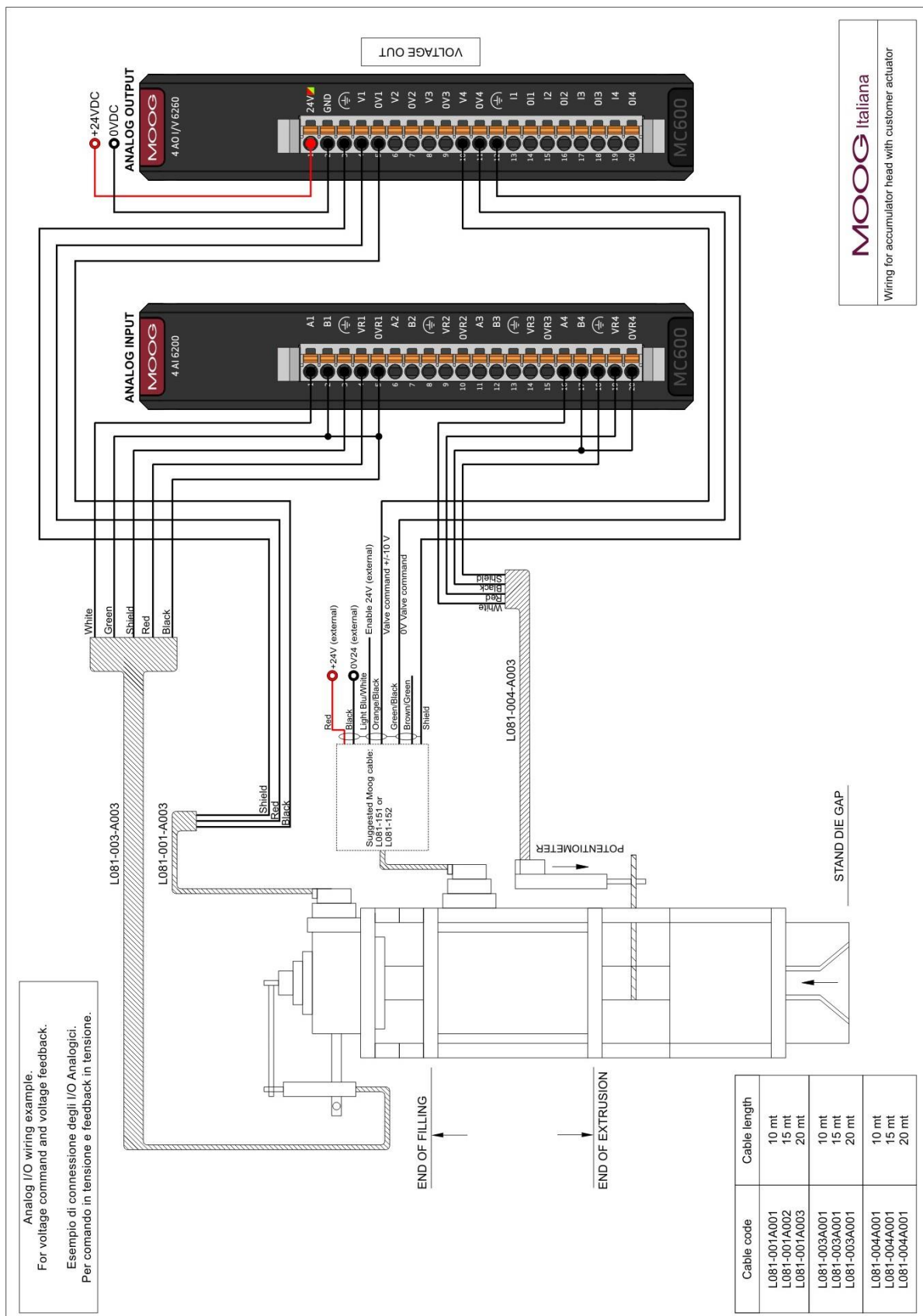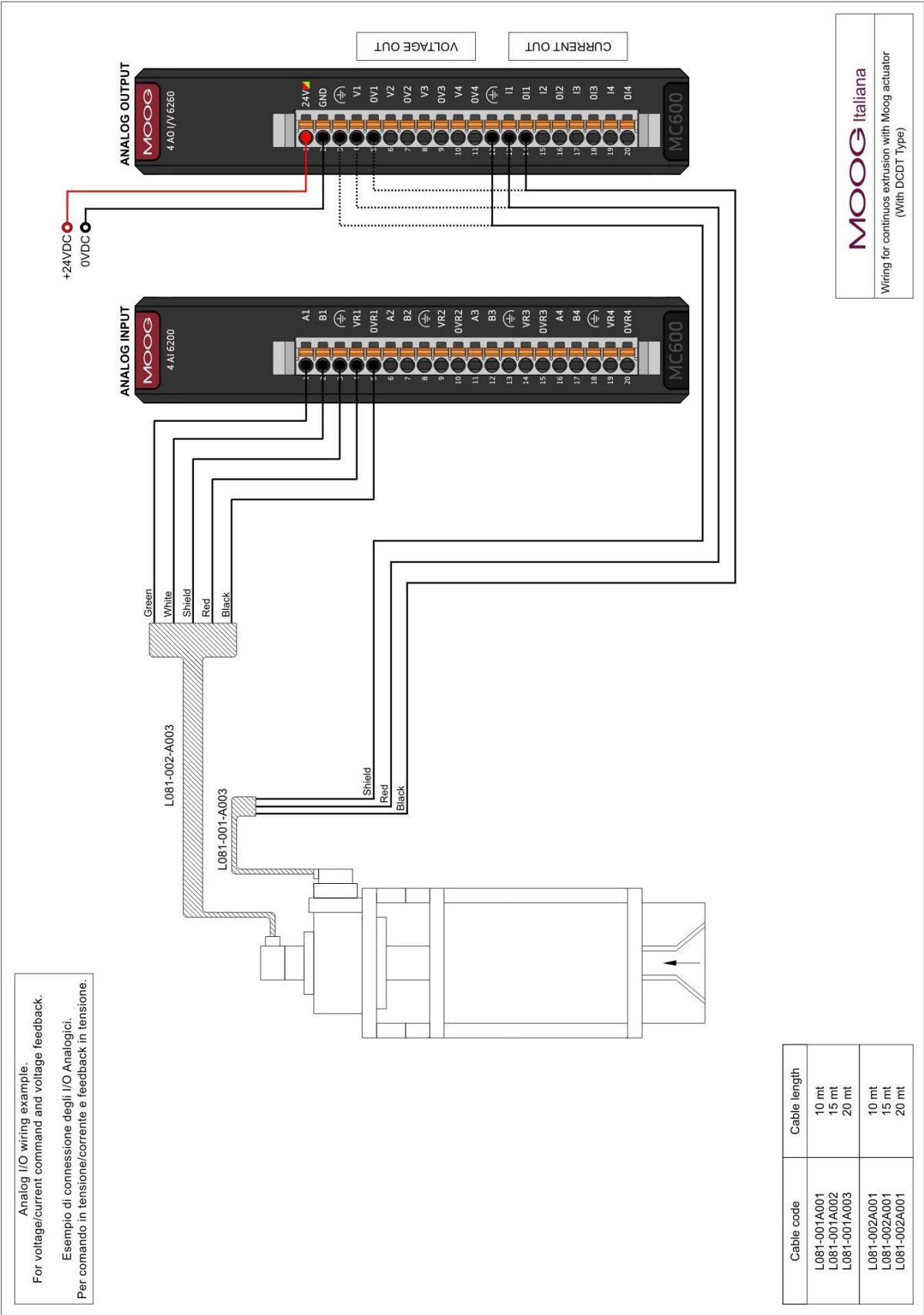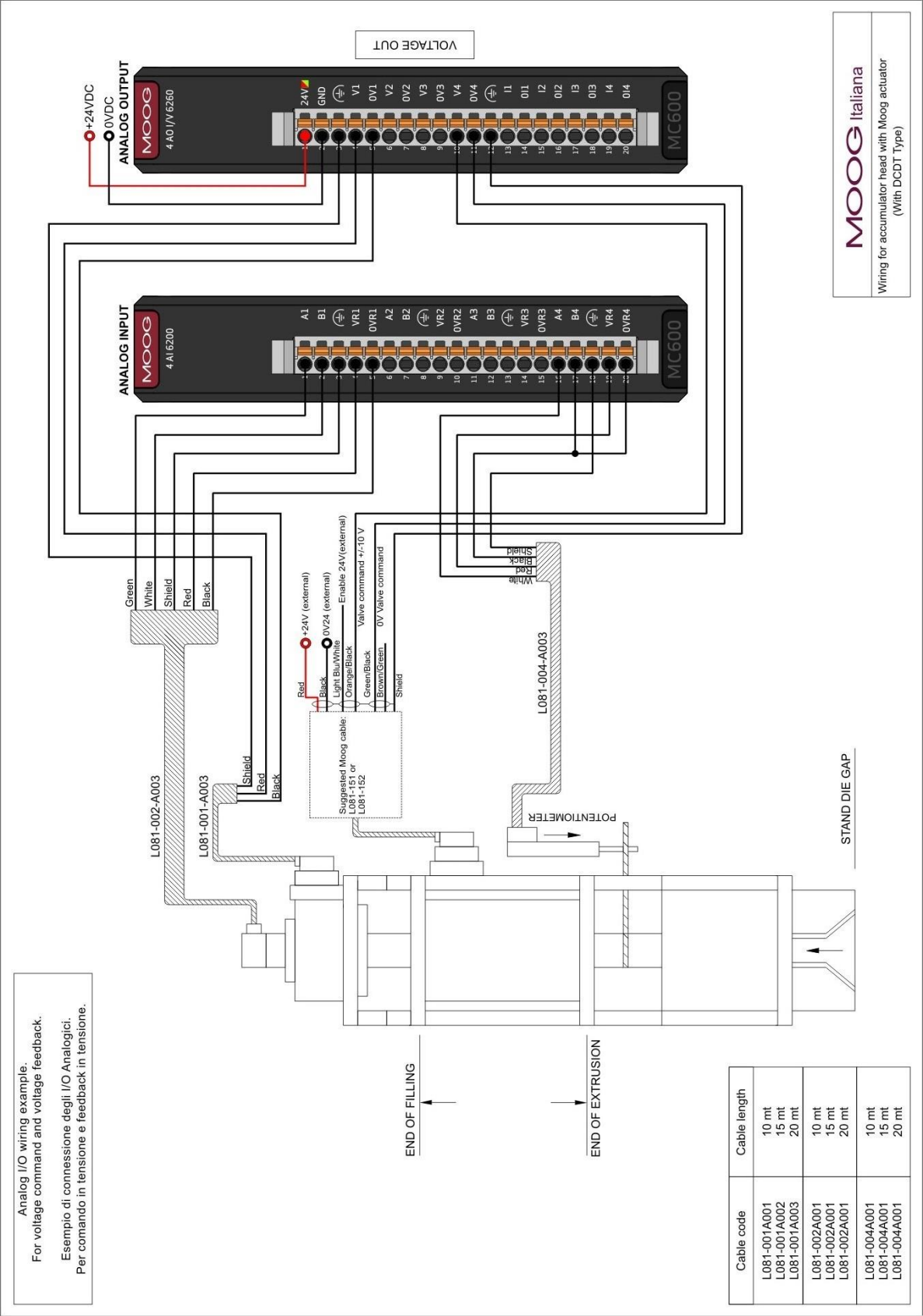
Wiring for continuous extrusion with customer actuator.

Wiring for accumulator head with customer actuator.

Wiring for continuous extrusion with Moog actuator (With DCDT Type).

PARISON CONTROLLER

Wiring for accumulator head with Moog actuator (With DCDT Type).

Wiring for accumulator head with Moog actuator (With DCDT Type)

Cable code	Cable length
L081-001A001	10 mt
L081-001A002	15 mt
L081-001A003	20 mt
L081-002A001	10 mt
L081-002A001	15 mt
L081-002A001	20 mt
L081-004A001	10 mt
L081-004A001	15 mt
L081-004A001	20 mt

Analog I/O wiring example.
For voltage command and voltage feedback.

Esempio di connessione degli I/O Analogici.
Per comando in tensione e feedback in tensione.

Wiring for continuous extrusion Moog EMA L875-XXX.
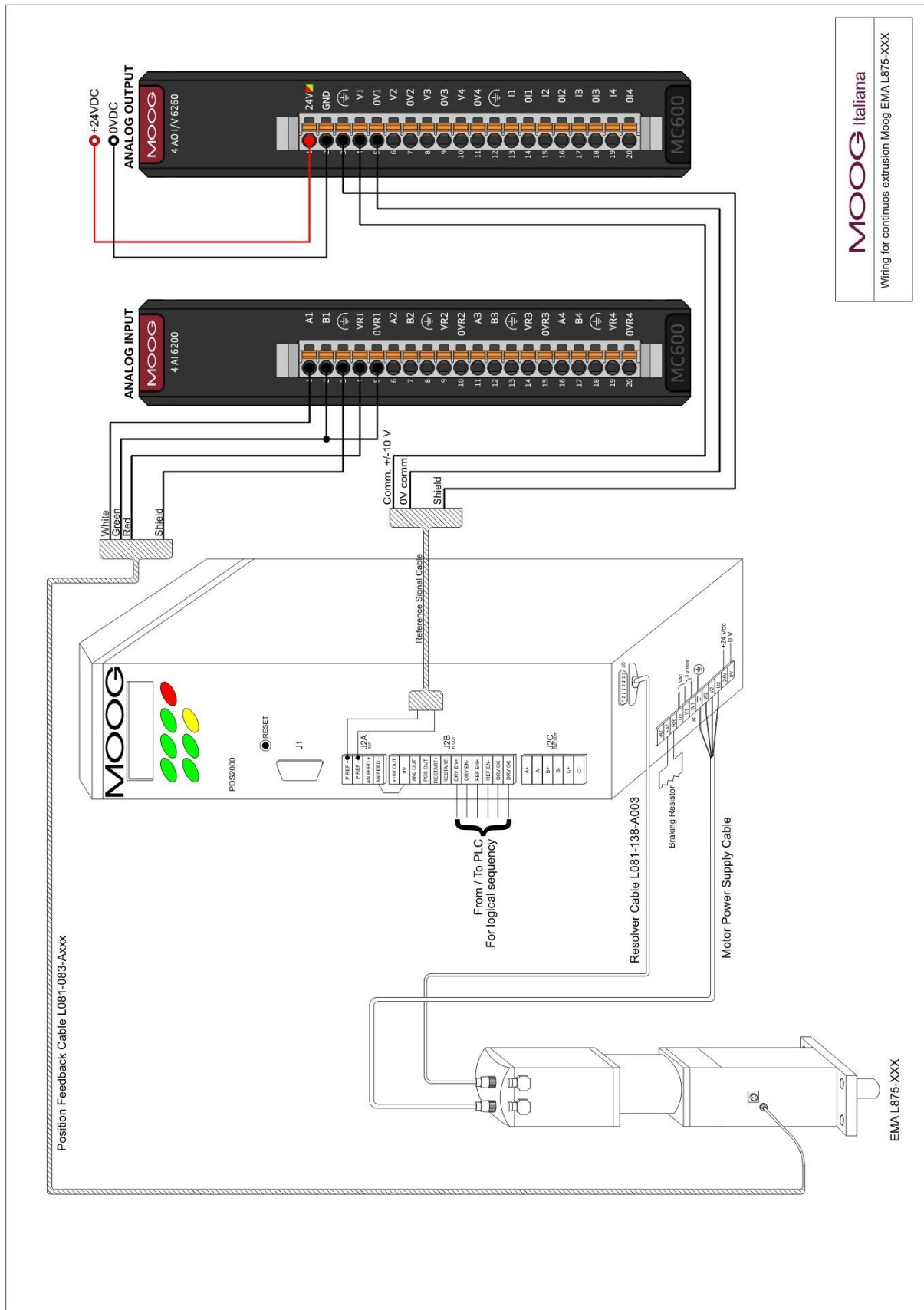
3.7   Terminal measures.

UNIT: mm

Figure 36

215 mm

60 mm min | **114 mm** | **41 mm** | **6 mm**

245 mm

215 mm

228 mm

UNIT: mm

2.0 min - 5.0 max
Customer Panel

5.0 mm

Figure 37

418.0

348.0 $^{+2\ -0}$

216.0 $^{+2\ -0}$

286.0

PANEL CUTOUT

UNIT: mm

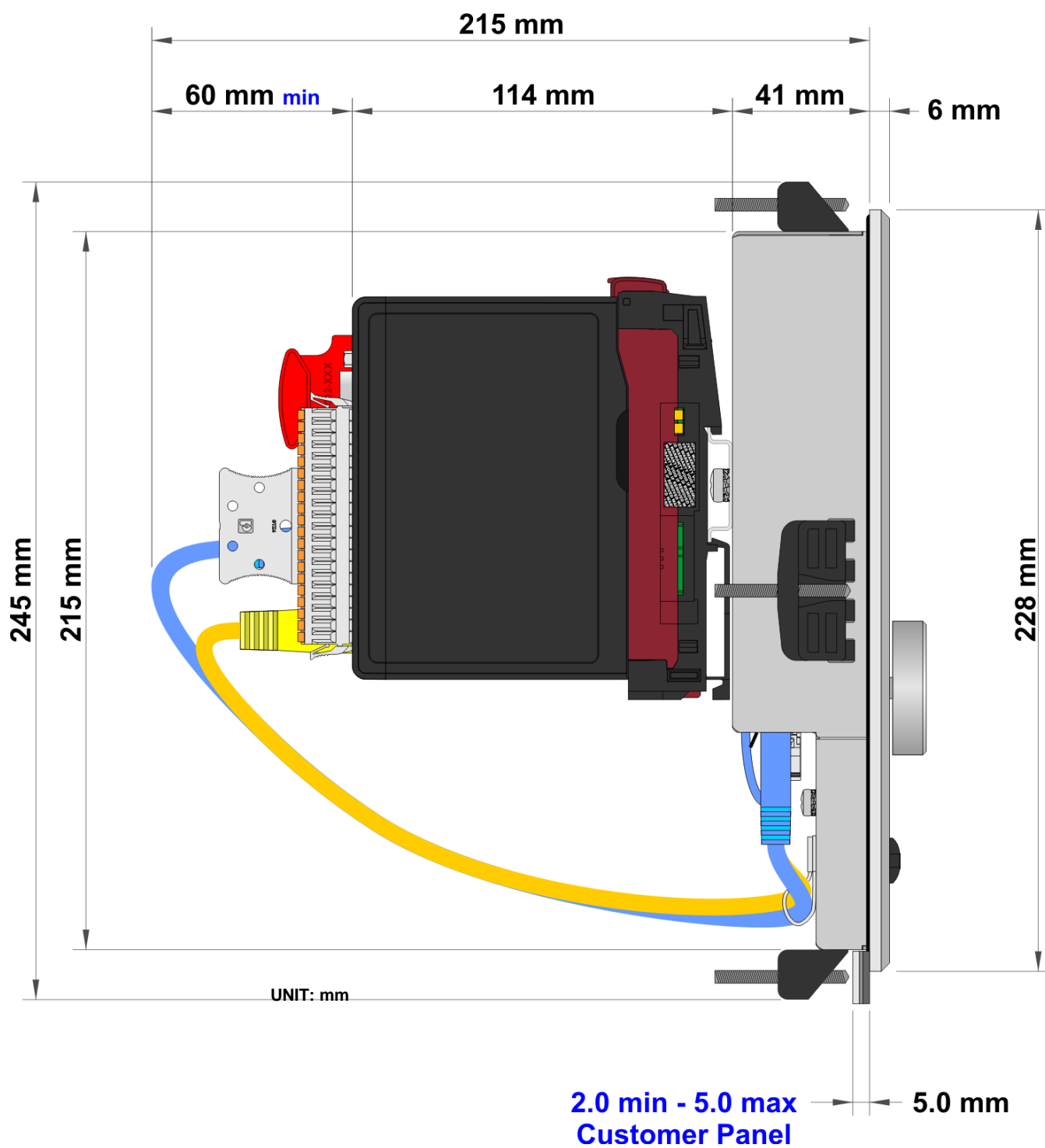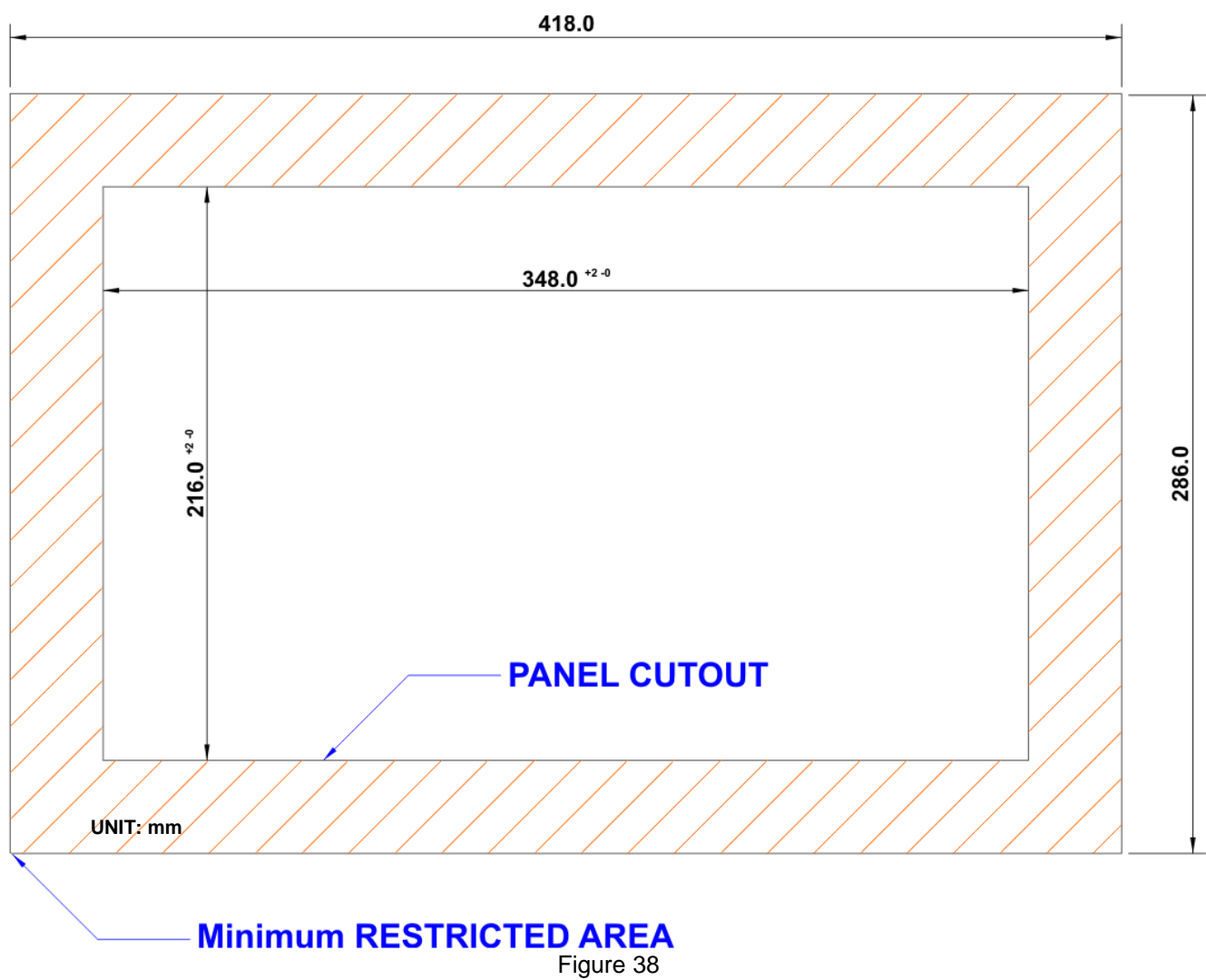**Minimum RESTRICTED AREA**
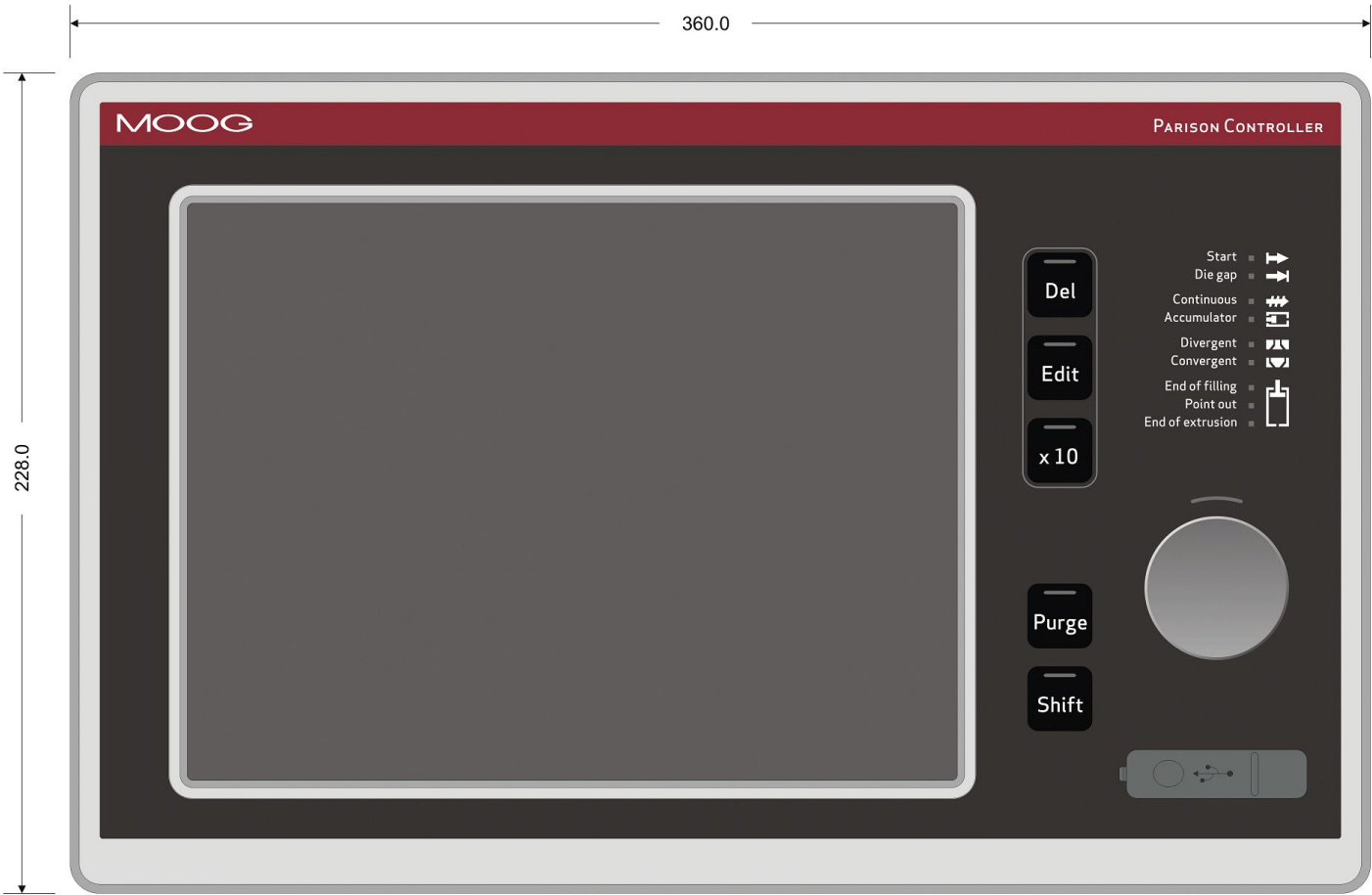
Figure 38

4   Description of the Screen Functions.

4.1   Main Menu.

Figure 39

Main Menu: Main part of the Main Menu.
Access: From all pages with key **F8**.
Use: Change page to submenus using keys **F1** to **F8**.

4.1.1   Password.

The password is a 4 character string; to insert the value:
* double-click on the field and then insert the string with the relative keyboard
* press Ent key to confirm the entry
* press Esc key to abandon the insertion

4.1.2   Date Change.

Figure 40

With Technician or Responsible password, the fields date, actual time and data format will appear. To change any value double-click the appropriate field and set the desired value.

For example if you want to set 03/08/2017 (dd/mm/yy), you type 03082017 (as numeric fields) followed by Ent key.
Similarly for the actual time: if you want to set 08:50:00, you type 085000 followed by Ent key.
Is possible to select between European data format (dd/mm/yy) or American data format (mm/dd/yy).

MOOG

4.1.3 Function Keys.

HEAD 1 **Work head 1:** Setup and display the Parison profiles.

PROF1 **Profile 1:** Setup and display the alternate profiles.

HEAD 2 **Work head 2:** Setup and display the Parison profiles.

PROF2 **Profile 2:** Setup and display the alternate profiles.

HEAD 3 **Work head 3:** Setup and display the Parison profiles.

HEAD 4 **Work head 4:** Setup and display the Parison profiles.

ACCUM. **Accumulator:** Setup and display the Accumulator profile.

EXTR.1 **Work extruder 1:** Setup and display the extruder.

EXTR.2 **Work extruder 2:** Setup and display the extruder.

ALARM **Alarms:** Display alarms from PLC and from system.

MENU 2 **Main Menu 2:** Go to main menu 2.
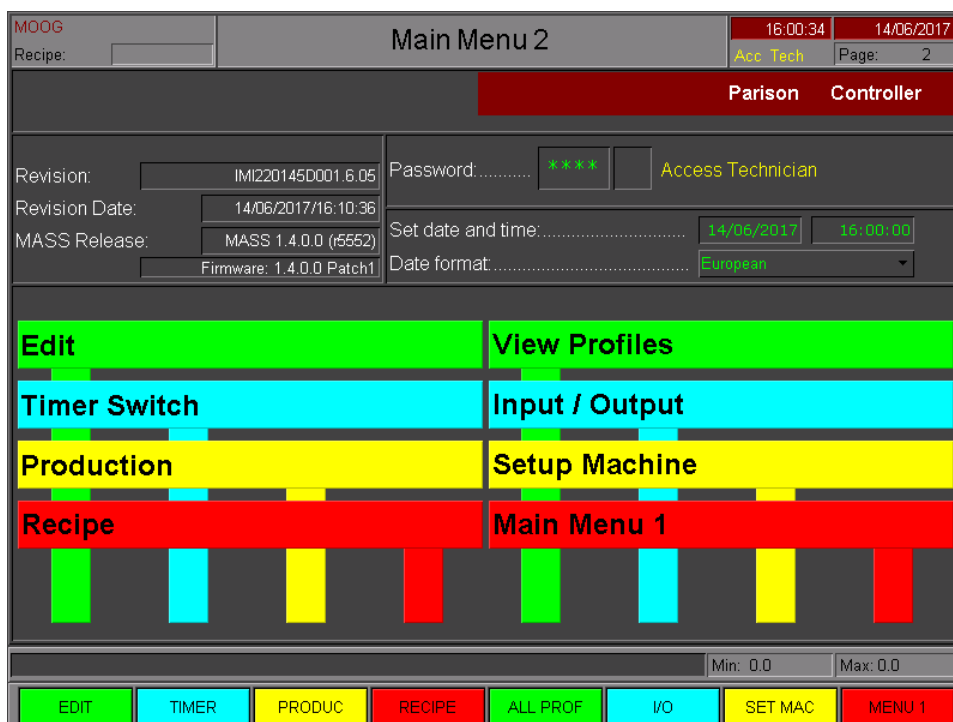
4.2 Main Menu 2.

Figure 41

Main Menu 2: Second part of the Main Menu.
Access: From Main Menu with key **F8**.
Use: Enter submenus.

4.2.1 Function Keys.

Edit: Editing the Parison profiles. It is possible to access the Edit page only if on Setup Machine Page the Free Profiles Assignment ON.

Timer Switch: Setup the time of turning on and off the heating. It is possible to access the Timer Switch page only if on Setup Machine Page you set Management timer switch ON.

Production: Production data management. It is possible to access the Production page only if on Setup Machine Page you set Production Control ON.

Recipe: Recipe management. It is possible to access the recipe page only if you insert a Technician or Responsible password.

All Profiles: open the all profiles page where it is possible to view all active profiles at a glance.
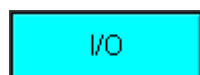
Input / Output: Monitor status input/output digital/analogical data.

SET MAC

SET MAC

Setup Machine: Setup the machine configuration. It is possible to access the machine setup page only if you insert a password of Technician level.

MENU 1

Main Menu: Go to main menu 1.

4.3 Machine Setup.

Figure 42

Machine Setup: Configure the machine.
Access: From Main Menu 2 with key **F7**.
Use: Configure the PARISON CONTROLLER according to the typology of the machine that will be connected.

ATTENTION: to modify some parameters the digital input number 13 (machine in automatic mode) has to be OFF. This operation is permitted only if the machine is in manual mode.

4.3.1 Function of the machine.

It is possible to select one of the following types of machine (in manual mode):

- *Continuous extrusion to independent profile.*
- *Continuous extrusion to unique profile.*
- *With accumulator position.*
- *With time accumulator.*

4.3.2 General setup of the machine.

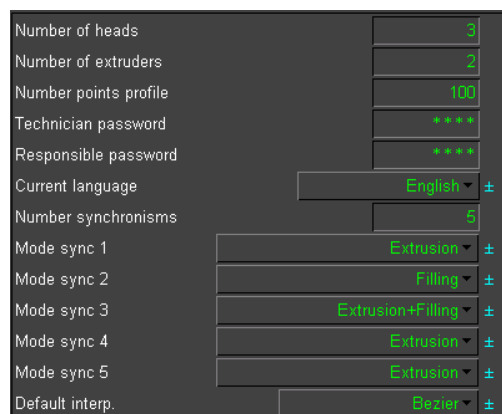| Number of heads | 3 |
Number of extruders	2
Number points profile	100
Technician password	****
Responsible password	****
Current language	English
Number synchronisms	5
Mode sync 1	Extrusion
Mode sync 2	Filling
Mode sync 3	Extrusion+Filling
Mode sync 4	Extrusion
Mode sync 5	Extrusion
Default interp.	Bezier

Figure 43

Number of heads: Select(in manual mode) how many heads are connected (range 1 ÷ 4).

Number of extruders: Select (in manual mode) how many extruders have to be managed by the controller. (0 to 2).

Number points profile: Select (in manual mode) how many points the Parison profile wants (range 10 - 400 points). The change of the points number of the profile could show some anomalies in the visualization of the profile shape. It is necessary to reset the old profiles and draw the new one (see the reference table).

Technician password: Write the password for Technician level. This Password is permanently saved. With this level password is possible to modify every field.

Responsible password: Write the password for Responsible level. This Password is permanently saved. With this level password is possible to modify every field but all the setup pages are disabled.

Current language: Select the visualization language. The following languages are available:
English, Italian, German, French, Spanish, Portuguese, Danish, Russian, Turkish, Greek, Chinese, Japanese.

Number synchronisms: Number of synchronisms. The controller can manage up to 5 sync points driving a specific output. With the Continuous extrusion mode the syncs are edited in the Work Head page where Profile 1 is active. With Accumulator position mode they are edited in the Accumulator page.

Mode sync 1 (or 2/3/4/5): (visible in Accumulator position mode) Select synchronism mode: Filling, Extrusion or both. This parameter sets the accumulator movement in which the sync is active.

Default interpolation: Select default interpolation used when you insert a new master in the profile.

4.3.3 How to chose the correct points number:

Task Time is 1 ms if 1 head is active in continuous extrusion mode. Task Time is 2 ms in all other cases.
Reference table:

Task Time 1 ms				
Cycle time	> 0.4 sec	0.3 ÷ 0.4 sec	0.2 ÷ 0.3 sec	0.1 ÷ 0.2 sec
Suggested points	400	300	200	100

Task Time 2 ms				
Cycle time	> 0.8 sec	0.6 ÷ 0.8 sec	0.4 ÷ 0.6 sec	0.2 ÷ 0.4 sec
Suggested points	400	300	200	100

Points = Cycle time (s) / Task time (s)

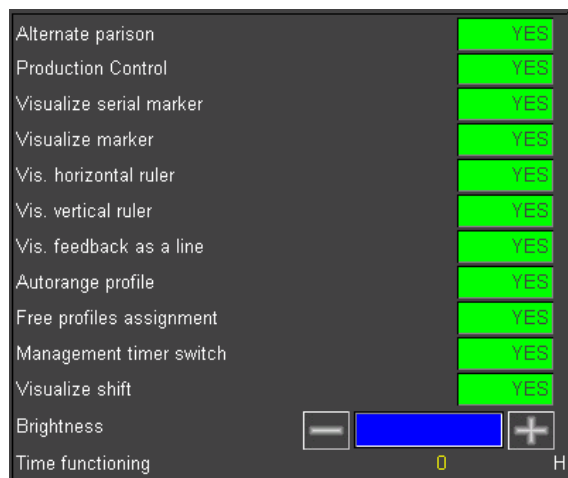### 4.3.4 Machine Settings.

Figure 44

Alternate parison: (visible in Continuous extrusion to unique profile mode and with only one head) Decides if the head has to work with one or two alternated profiles.

Production Control: Enable or disable the visualization of the Production page.

Visualize serial marker: Enable or disable the visualization of the serial marker in head 1 work page.

Visualize marker: Enable or disable the visualization of the markers in all heads pages.

Vis. horizontal ruler: Enable the visualization of the horizontal ruler in the profile pages.

Vis. vertical ruler: Enable the visualization of the vertical ruler in the profile pages.

Vis. Feedback as a line: Enable the feedback visualization as a line in the profile pages. It is recommended with cycles times shorter than 5 seconds.

Autorange profile: Enable auto-range profile to resize the horizontal rulers. (Range 0 - 25, 0 - 50, 0 - 100).

Free profiles assignment: (not visible when Alternate parison is enabled) Enable the visualization of the Edit Profile page and the possibility to assign different profiles to each head (from 1 to 8).

Management timer switch: Enable or disable the visualization of the Timer page.

Visualize shift: To enable the function in case of use of the shift on the profile. It allows a better interpolation between the first and the last point of the profile.

Brightness: Manage the TFT Brightness (seven levels: **+** to increase, **-** to decrease).

Time functioning: Counter indicating how long the Parison Controller has been ON.

4.3.5 Output selection.

Figure 45

Output N°x type: is possible to select (in manual mode) the command output type, Voltage or Current, for each channel. The yellow labels on the right show what actuator is connected to each channel.

With current command is possible to select the current range:
- Current Command +/- 7.5 mA.
- Current Command +/- 15 mA.
- Current Command +/- 30 mA.
- Current Command +/- 50 mA.
- Current Command +/- 75 mA.
- Current Command +/- 100 mA.

4.3.6 Languages.

It is possible to select one of the following languages:
English, Italian, German, French, Spanish, Portuguese, Danish, Russian, Turkish, Greek, Chinese, Japanese.

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4.3.7   Function Keys.

SET MAC2: Select Setup page 2.

PREV | NEXT: Fast selection of the next or previous Setup page. The next and previous Setup Page depends on the current machine configuration.

MENU 2: Select Main menu, page 2.

4.4   Machine Setup 2.

Machine setup: Configure the machine.
Access: From Setup Machine with key **F2**.
Use: Configure the PARISON CONTROLLER according to the typology of the machine that will be connected.

4.4.1   Machine settings - page 2.

Enable digital output during calibration	YES
Diegap management with continuous extrusion	YES
Auto change page with alternate parison	YES
Touch sound (0=NO, 1=YES)	1
Base/Range/Purge level access	No Level ▼
Enable PWDS	NO YES YES NO
PWDS in mm	YES NO
Calibration Min:	-4.00
Max:	4.00

Figure 46

Enable digital output during calibration	Enable digital output number 16 (output is ON when head 1 is in calibration mode)
Die gap management with continuous extrusion	Enable the die gap function also in continuous extrusion. To reach the die gap position is necessary to use digital input number 9: Stand by die gap (connect digital output 2 and digital input 9 to reach the die gap position at the end of extrusion)
Auto change page with alternate parison	Enable the automatic selection of profile 1 and profile 2 pages. With Start 1 signal, profile 1 page is selected; with Start 2 signal, profile 2 page is selected
Touch sound	Enable the beep at every keypress on the display
Base/Range/Purge level access	Set the password level required to activate the purge function
Enable PWDS	Configure the selected control channel as a Partial Wall Thickness Distribution System (PWDS); the relevant axis is used to control a deformable die used to obtain more material on certain portions of the extruded material and less on the others
PWDS in mm	The deformation of the die will be expressed in mm rather than in percentage
Calibration	When the deformation is expressed in mm these fields are used to set the admissible range that will be available in the work page

4.4.2   Function Keys.

SET MAC: Select Setup page 1

PREV | NEXT: Fast selection of the next or previous Setup page. The next and previous Setup pages depend on the current machine configuration

MENU 2: Select Main menu, page 2.
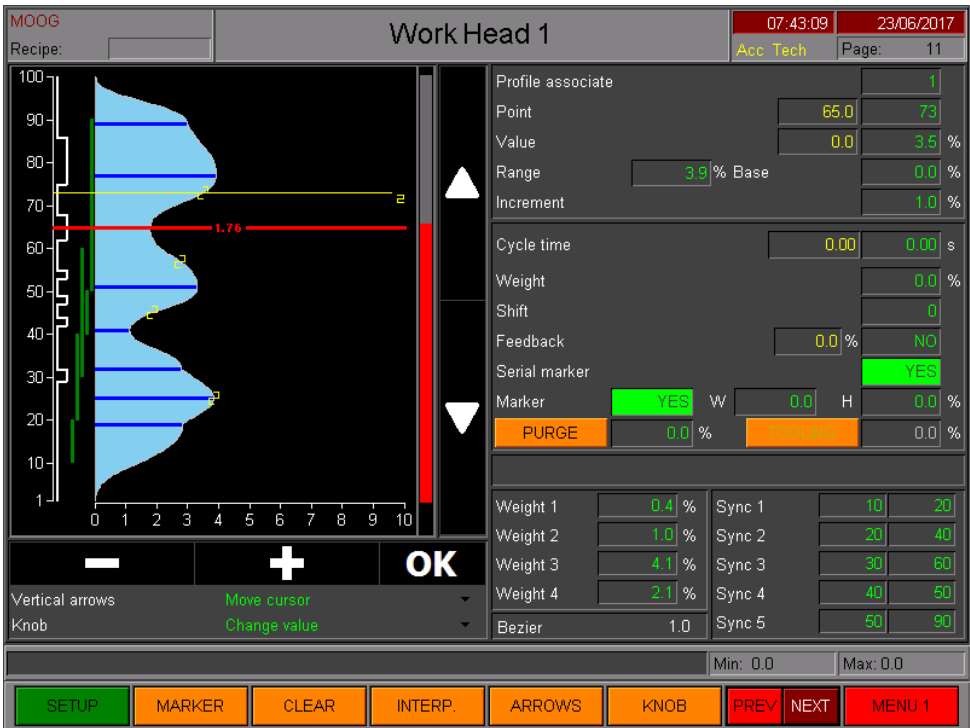
4.5 Work Head n / Profile n.

Figure 47

Work Head n: Parison page n° (n° = 1 to 4).
Access: From Main Menu with key **F1...F4**.
Use: Edit parison profile and parameters for the die opening. Each regulator uses an analog input to read the mandrel actual position and an analog output to drive the mandrel positioning actuator.

4.5.1 Profile Editor.
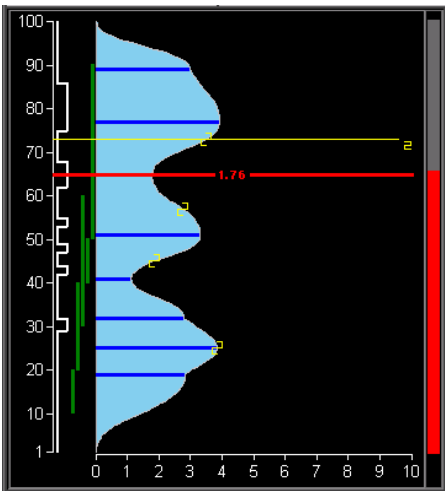
Figure 48

From left to right:

Vertical ruler: (white) If enabled in Setup Machine Page (**Vis. vertical ruler**). From 1 to max 400 points to navigate.

Horizontal ruler: (white) If enabled in Setup Machine Page (**Vis. horizontal ruler**). Percentage scale from 1 to 100 % max. Default number is 100, but if **Autorange profile** in Setup Machine Page is enabled, the horizontal ruler is resized.

Serial Marker: Vertical logical state diagram showing the serial marker activation along the profile.

Synchronisms: (only if enabled): 5 vertical lines that display 5 synchronisms signals defined by a couple of **start** and **stop** points.

Bargraph: Shows the working point of selected head as feedback. In case of **extrusion** (or time based mode) the bargraph will be red and start at point 1. In case of **Filling** the bargraph will be blue and start at max point.

The line is yellow, if working during **Extrusion**, green if working during **Filling** and red if working both in **Extrusion** and **Filling**. Synchronisms are visible only on profile 1.
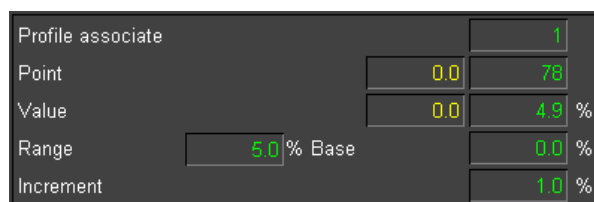
4.5.2 Profile parameters.

Figure 49

Profile associate		1
Point	0.0	78
Value	0.0	4.9 %
Range	5.0 % Base	0.0 %
Increment		1.0 %

Profile associate: (Only if Free profiles assignment is enabled) Profile number associated to the head.

Point: Shows in yellow the actual point during the movement in accordance with the red bar graph on the right side of the screen. In green the position of the cursor in the Parison field. Value can be changed from 1 to 400 to set the cursor position.

Value: Shows in yellow the desired percentage setting and in green the value of the point where the cursor is in the Parison field. By changing this value (0 to 100% max) it is possible to add a new setpoint or modify the existing one at the cursor position.

Base: Displays the minimum profile value. By changing the base it is possible to shift the whole profile. Range: 0% to Max limit (Profile). The max limit added to the range must be less or equal to 100% (base + range <= 100).

Range: Displays the profile range as difference between maximum and minimum value. By changing the range it is possible to resize the entire profile. Range: 1% to Max limit (Weight). The max limit added to the base must be inferior or equal to 100% (base + range <= 100).

Increment: This is the amount by which the setpoint value is incremented or decremented when editing the profile at the cursor position.

Vertical arrows: Shows the vertical arrows active function (chapter 2.5.4).

Knob: Shows the entry knob active function (chapter 2.5.4).

4.5.3   Cycle parameters.

Figure 50
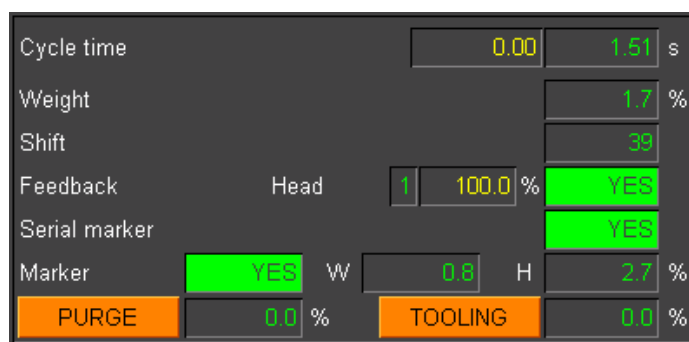
Cycle time	0.00	1.51	s
Weight		1.7	%
Shift		39	
Feedback	Head 1 100.0 %	YES	
Serial marker		YES	
Marker	YES W 0.8 H	2.7	%
PURGE	0.0 %	TOOLING 0.0	%

Cycle time: Displays in yellow the Parison cycle time during the movement and in green the Parison cycle time in seconds.

Weight: Change the weight of the profile.

Shift: It is possible to indicate by how many points (N) to shift the profile. Once the last point of the profile is reached, the setpoint continues from point 1 until point N-1.

Feedback: If activated, it allows to see the actual value of the profile measured by the transducer (in red) beside the theoretical one. **Head:** Allows to choose the feedback of the desired head in case of unique profile. The yellow field shows the actual value in percentage.

Serial marker: Enable (YES) or disable (NO) the serial marker in the profile. Enable the digital output command of serial marker actuator on card IMI220-415A001 to identify the points of the profile on the final product.

Marker: Enable (YES) or disable (NO) all markers in the profile. It is possible to setup the markers on each profile. For each profile you can setup different values of marker length in points and width in percentage.

W: Marker Width (in points). Value corresponding to the working gap with the preceding and following points related to the position where the Marker has been set.

H: Marker Height (in percentage). Value corresponding to the working gap with the opening and closing points related to the position where at the Marker has been set.
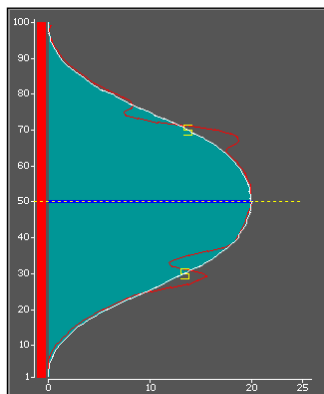
Figure 51

In the example two markers are placed at points 30 and 70. The red line shows the feedback.

With W (Width) = 5 points and H (Height) = 3%, the value will be increased up to 3% from point 25 (30 - 5), reset to the programmed value at point 30 and decreased by 3% until point 35 (30 + 5).

PURGE: Purge referred to this head. It is possible to indicate a setpoint, expressed in %, for the head opening. Purge is driven by a special function key or digital input. Purge through digital input is possible only if the function is configured and the machine is in manual mode. This command activated during the issuing of a profile becomes active only at the end of the same profile. The buttons that control this function are toggle type.

TOOLING: Tooling referred to this Head. It is possible to indicate a setpoint, expressed in %, for the tooling function. Tooling is driven through a special function key. This command activated during the issuing of a profile becomes active only at the end of the same profile. The buttons that control this function are toggle type.

4.5.4 Die gap

Die gap position: Available with accumulator or continuous extrusion. If enabled it sets the die gap position of the head.

4.5.5 Weight
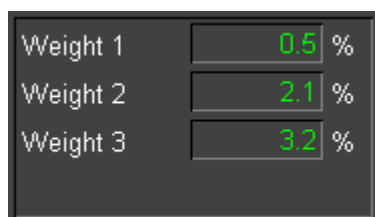
Figure 52

Weight: With unique profile it allows to add an additional weight on every single head. (not visible in profile).

4.5.6   Interpolation.
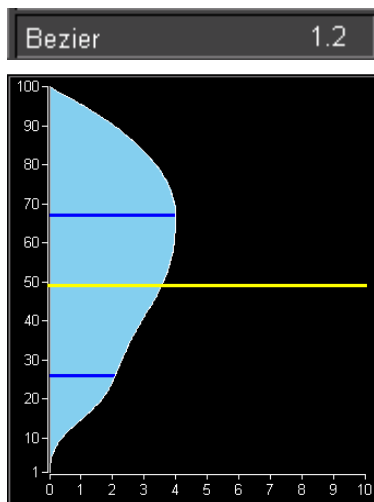
Figure 53

Bezier: Interpolation between two masters: the interpolation type visualized corresponds to the area where the cursor is placed. The smooth parameter is included between 0.5 and 2.0 with step 0.1.
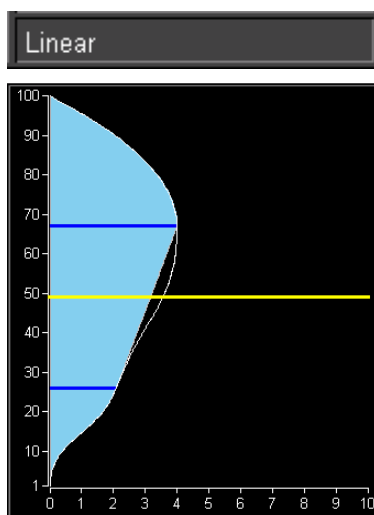
Figure 54

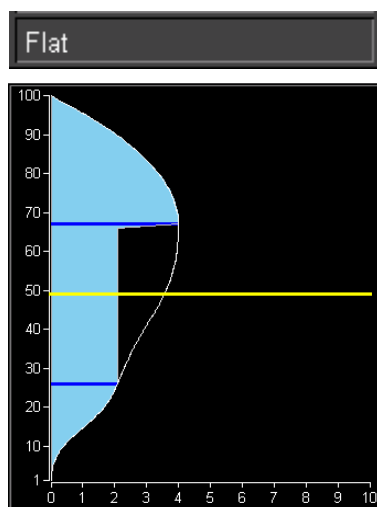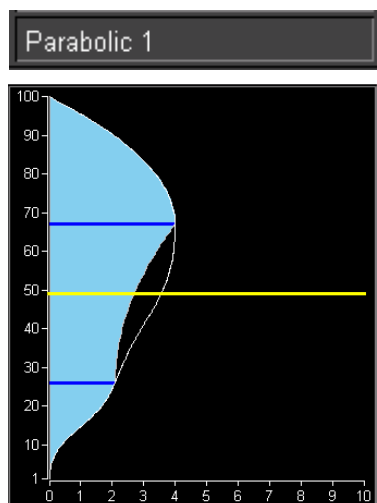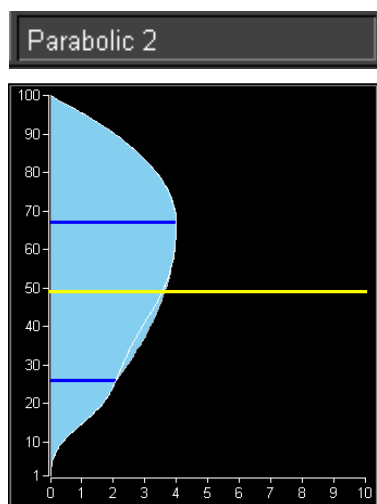**Linear:** Interpolation between two masters: the interpolation type visualized corresponds to the area where the cursor is placed.

Figure 55

Flat: Interpolation between two masters: the interpolation type visualized corresponds to the area where the cursor is placed.

Figure 56

Parabolic 1: (parabola with tangent 0 on start point) Interpolation between two masters: the interpolation type visualized corresponds to the area where the cursor is placed.

Figure 57

Parabolic 2: (parabola with tangent 0 on end point) Interpolation between two masters: the interpolation type visualized corresponds to the area where the cursor is placed.

4.5.7 Synchronisms.

Sync 1	10	20
Sync 2	20	40
Sync 3	30	60
Sync 4	40	50
Sync 5	50	90

Figure 58

Synchronisms: Only if enabled in Machine setup page. Each synchronism is defined by a pair of start and stop points along the profile (1…400 max). They are represented also by vertical lines on the left of the profile-edit-field.

4.5.8 Work Head n for PWDS Control

Any channel can be dedicated to control a Partial Wall Thickness System (PWDS). When a control channel is configured for this function, some of the parameters available for a normal parison head are meaningless and therefore are not visible both in the setup and working pages.
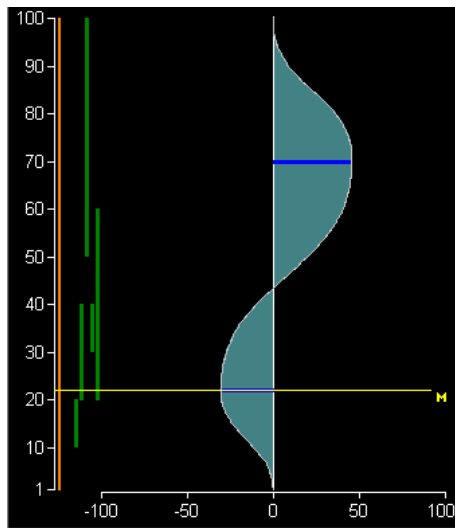
Figure 59
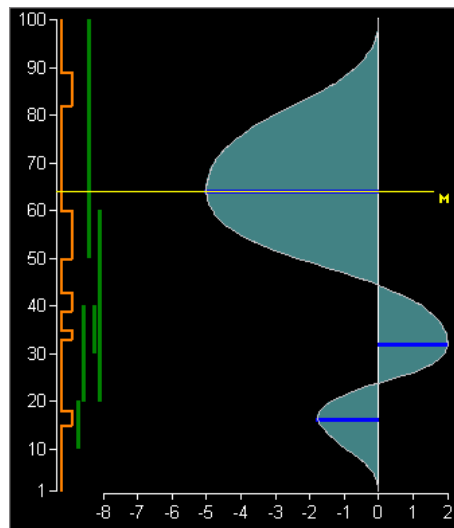
Figure 60

The Profile editor is similar to the normal head's one except that the zero point of the horizontal axis is not always on the left side but depends on the calibration settings

In Figure 59 the PWDS is setup in % and the zero point is in the middle

In Figure 60 the PWDS is setup in mm and is calibrated from -8 to +2 mm.

In the working page the following parameters are not present:

- Base
- Weight
- Head
- Tooling
- Die gap position

4.5.9 Function Keys.

SETUP: (yellow) Disable. (black) Enter in the setup page.

MARKER: Add or remove a marker on the profile.

CLEAR + SHIFT: Clear all the profile points. Before creating a new profile (only in this case) it's necessary to use this function to ensure a correct initialization of the new profile.

INTERPOLATION: Change the interpolation. Changes the interpolation type between the two masters where the cursor is placed. There are 5 possibilities: Bezier, Linear, Flat, Parabolic 1, Parabolic 2. The default interpolation is the one that has been set in the Machine setup page.

ARROWS: Selects how the **Vertical Arrows** have to work:
- *Move cursor:*   move the cursor up and down.
- *Next master:*   move the cursor on the master.
- *Drag master:*   drag the master up and down.
- *Next marker:*   move the cursor on the marker.
- *Drag marker:*   drag the marker up and down.
- *Drag SM:*   drag the Serial Marker up and down.
- *Selects profile:* select a part of the profile.
- *Drag selection:*   drag the selection up and down.

KNOB: Selects how the **Knob** has to work:
- *Change value:*   rotate the knob to change the value.
- *Change base:*   rotate the knob to change the base.
- *Change range:*   rotate the knob to change the range.
- *Change interp:*   rotate the knob to change the interpolation.
- *Change smooth:*   rotate the knob to change the Bezier smoothness value.
- *Setup SM:*   rotate the knob to setup the Serial Marker.

NEXT: Fast selection of the next or previous work head page.

MENU 1: Go to main menu 1 page.

4.6 Head Setup.

Figure 61

Setup 1| Head n: Setup 1 | Head n. page (n. = 1 to 4).
Access: From Work Page n. with key **F1**.
Use: For the calibration and the setup of the head parameters.

The regulator can operate in closed loop (with no-intelligent actuators) or in open loop (with intelligent actuators that operate with an on-board closed loop). The input value is calibrated in range 0% - 100.00% through the definition of upper stroke voltage and lower stroke voltage. In case of intelligent actuators the calibration points are set to 0 mV and 10000 mV which are the correct values if no calibration is required.
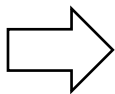
> In the normal polarity an increasing output command moves the actuator downwards (rod extracts) and the feedback input value increases too.

It is possible to correct the polarity of both the command and feedback with specific settings in the setup page. The procedure to check the wirings is described in the next chapter: "Check wirings".

**4.6.1   Check wirings.**

To check the correct wiring:

☐   Choose **open loop** calibration.

☐   With the UP/DOWN keys **verify the correct movement**: if the UP key is pressed, the moving part has to move up, if the DOWN key is pressed the moving part has to move down.

- o   **If the movement is OK :**
    - ▪   Check the bar graphs movement (yellow and blue). If bar graphs are moving in the same direction, also the input is OK and it is possible to perform the calibration in close loop.

    - ▪   If the bar graphs are moving in opposite directions, reverse the input polarity by inverting the parameter Inv. input in the head setup page

- o   **If the movement is not OK :**

    - ▪   Reverse the input polarity by inverting the parameter **Inv. output** in the head setup page

    - ▪   After this, the movement should be correct. If bar graphs are moving in the *same direction*, also the input is OK and it is possible to perform the calibration in close loop.

    - ▪   If the bar graphs are moving in *opposite directions*, reverse the input polarity by inverting the parameter **Inv. input** in the head setup page

To better understand how to perform a correct calibration see the following flow chart.

```
                        ┌──────────────────────┐
                        │  Select open loop    │
                        │  calibration         │
                        └──────────┬───────────┘
                                   ▼
                        ┌──────────────────────┐
                        │  Verify UP/DOWN      │
                        │  movement            │
                        └──────────┬───────────┘
                                   ▼
              No              ◇ Movement OK ◇          Yes
        ┌──────────┬─────────────────────────────────────────┐
        ▼          ▼                                          ▼
 ┌────────────┐ ┌────────────┐                        ┌──────────────┐
 │ Put YES the│ │ Change the │                        │ Verify bar   │
 │ output     │ │ output     │ ─────────────────────▶ │ graphs       │
 │ inversion  │ │ wiring     │                        │ movement     │
 │ variable   │ │            │                        │              │
 └─────┬──────┘ └────────────┘                        └──────┬───────┘
       ▼                                                      ▼
 ┌────────────┐                                    No  ◇ Same       ◇  Yes
 │ Verify bar │                              ┌─────────── direction ──────┐
 │ graphs     │                              ▼                            │
 │ movement   │                    ┌──────────────────┐                   │
 └─────┬──────┘                    │ Change the input │                   │
       ▼                           │ wiring or put YES│                   │
  No ◇ Same ◇ Yes                  │ the input        │                   │
 ┌──── direction ────┐             │ inversion        │                   │
 │                   └───────────▶ │ variable         │                   │
 │                                 └────────┬─────────┘                   │
 │                                          ▼                             │
 │                              ┌──────────────────────┐                  │
 └────────────────────────────▶ │ It is possible       │ ◀────────────────┘
                                │ the calibration      │
                                │ in close loop        │
                                └──────────────────────┘
```
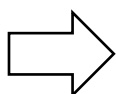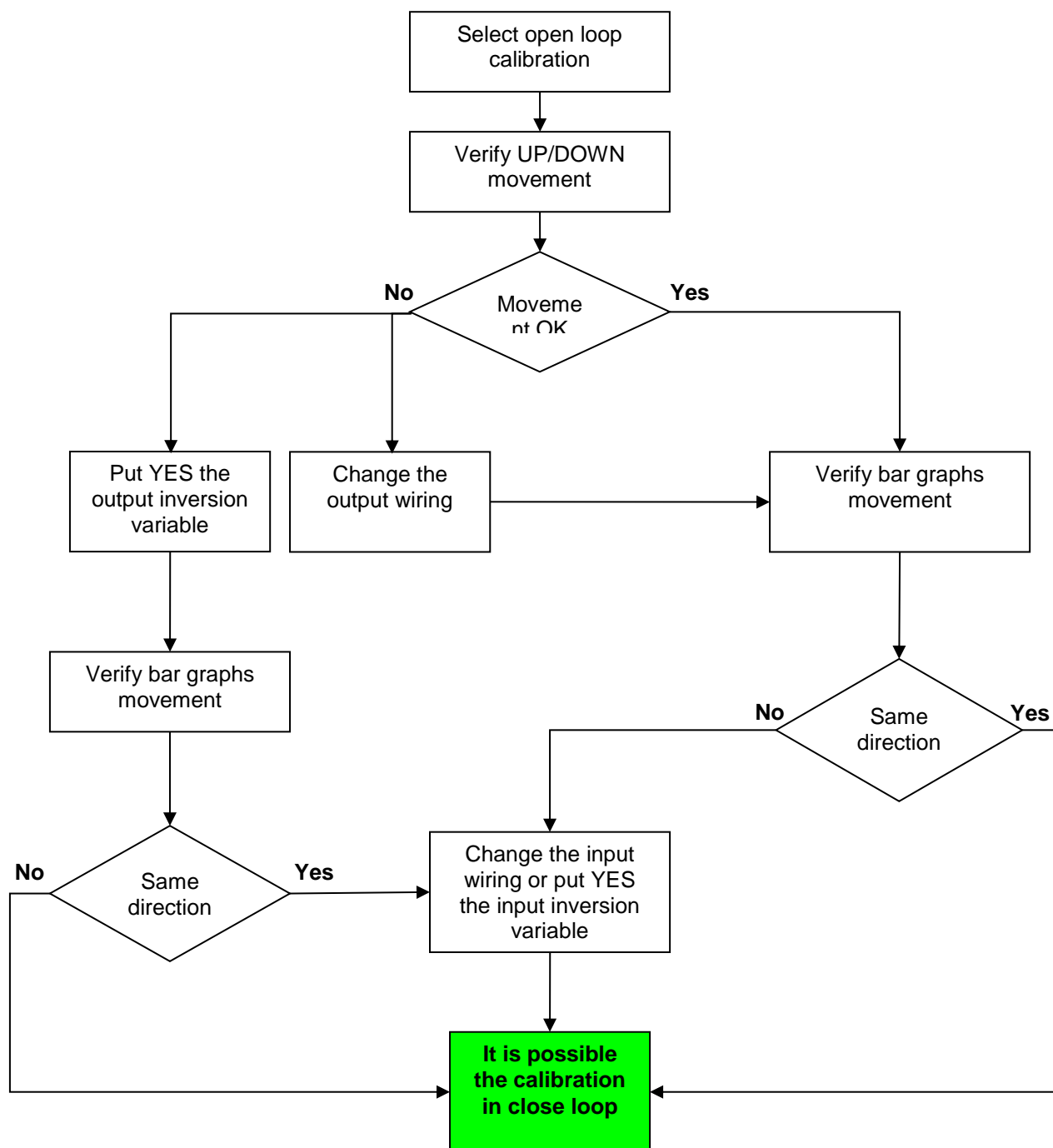
⇨ The parameter used to reverse the input polarity is only used during the close loop calibration. In work mode the polarity is derived by the values of "Vup" and "Vdown" and the polarity reversal parameter is ignored

4.6.2 Calibration.
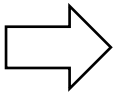
To perform the calibration digital input 13 (machine in automatic mode) has to be OFF. The calibration is permitted only if the machine is in manual mode.

Select the head operation mode only in manual mode (digital input 13 OFF):

Work: in work mode the position loop is closed, the machine works normally. No calibration is active. The calibration points are those written in the fields V.Up and V.Down.

Open loop: in open loop mode it is possible to move the head with UP or DOWN keys; speed can be set in the Inc.up and Inc.down parameters. When the head is in an end-of-stroke, set V.Up. or V.Down values by pressing the relevant CONFIRM key.

Manual calibration: in manual calibration mode the loop is closed and it is possible to move the head UP or DOWN till the key is pressed. When the key is released the head maintains the current position (Position control).

Automatic calibration: in automatic calibration mode select **Start** to YES: the head will move to the two end-of-strokes and record the relevant V.Up and V.Down values. When the automatic calibration is finished the controller switches to Work mode.

Figure 62

Start: to automatically start the procedure that moves the actuator down, intercepts the mechanical end-of-stroke, moves the actuator up, intercepts the mechanical end-of-stroke and saves the corresponding voltage values.

Inv. Output: if you select YES you reverse the analog Output.

Inv. Input: if you select YES you reverse the analog Input only during the calibration. See the chapter "4.6.1 Check wirings" to understand the use of this parameter.

Out: it is possible to select the output command between voltage and current. (the same setting is available in the machine setup page)

Inc. Up / Inc. Down: With *calibration in open loop* these variables correspond to the acceleration value of the output command (expressed in mV/s or mA/s). It's the ramp increment or decrement value on the analog Output. **Inc. Up** determines the slope ramp toward max. output. **Inc. Down** determines the slope ramp toward min. output. With *manual and automatic calibration* these variables correspond to the velocity increment (%/s) to move the head in close loop.
With an *intelligent actuator* these variables correspond to the acceleration value (mV/s) of the ramps that determine the head position.

Figure 63

V. Up and **V. Down:** In these fields the minimum and the maximum values are visualized in mV relevant to the head total stroke. It is possible to modify manually these values.

MANUAL OPEN LOOP CALIBRATION WITH NO-INTELLIGENT ACTUATORS:

The input calibration can be made in manually open loop state. The purpose can be input calibration or manual movement. Through manual commands it is possible to issue an output voltage that moves the actuator up or down. The operator can visually check that the mechanical limits have been reached and confirms them. Output command during manual motion ramps up while buttons are pressed and stay fixed when released. The output command is expressed in % of maximum value, while the ramp is expressed in mV per second.

MANUAL OPEN LOOP CALIBRATION WITH INTELLIGENT ACTUATORS:

Through manual commands it is possible manage two kinds of ramps: from 0 to max and from max to 0. Output command during manual motion ramps up while buttons are pressed and stay fixed when released.

MANUAL CLOSE LOOP CALIBRATION WITH NO-INTELLIGENT ACTUATORS:

The input calibration can be made manually in closed loop. The system generates a position setpoint (expressed in %) and holds it in close loop. Through manual commands it is possible to change the position setpoint causing the actuator to move up and down. The operator visually acknowledges when a mechanical limit has been reached and confirms. The position setpoint is set by generating ramp signals increasing in % per second.

MANUAL CLOSED LOOP CALIBRATION WITH INTELLIGENT ACTUATORS:

It automatically generates the ramps with the pressure of the UP or DOWN buttons. The movement is interrupted with a new pressure of the same button.

AUTOMATIC CALIBRATION WITH NO-INTELLIGENT ACTUATORS:

The input calibration can be made automatically in closed loop. By keeping the regulator in loop it is possible to automatically start the procedure that moves the actuator down, intercepts the mechanical end-of-stroke, moves the actuator up, intercepts the mechanical end-of-stroke and saves the corresponding voltage values. Change of position setpoint is made by setting up two ramp values in % per second.

AUTOMATIC CALIBRATION WITH INTELLIGENT ACTUATORS:

Starting the procedure generates a ramp from 0 to max. to move the head down. At the end of this phase after 3 seconds it generates a ramp from max. to 0 to move the head up. It automatically saves the input values.

4.6.3   Die type.

It is possible to indicate if the actuator moves the mandrel or the die and if the mandrel is convergent or divergent. This univocally identifies if the zero position is when the actuator is at upper or lower end-point.
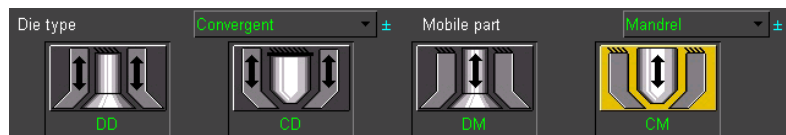
Figure 64

Die type: Select the die type with the knob then press SET to confirm:
- *Convergent.*
- *Divergent.*

Mobile part: Select the mobile part with the knob then press SET to confirm:
- **D-D:** Die type **Divergent** and mobile part **Die.**
- **C-D:** Die type **Convergent** and mobile part **Die.**
- **D-M:** Die type **Divergent** and mobile part **Mandrel.**
- **C-M:** Die type **Convergent** and mobile part **Mandrel.**

4.6.4 Run parameters.

Correction enable	YES
Correction with average	NO
Maximum correction	1.5 s
Purge with input	YES
Autorun	NO
Stand by die gap	Digital input ▾ ±
Delay die gap	0.00 s
Die gap position	0.0 %

Figure 65

Correction enable: Enable the time correction.

WITH CONTINUOUS EXTRUSION: The time between two next rising edges of Start signal becomes the reference for the profile generation at next start.
If average correction is enabled, the average of the 3 last cycles will be calculated. This value becomes the reference for the profile generation at next start.

WITH TIME ACCUMULATOR: If cycle time automatic correction is not enabled, the profile generation is made with a fixed timing. If cycle time automatic correction is enabled, the time between the rising edge of Start1 signal and its falling edge is measured. This value becomes the reference for profile generation at next start.

Correction with average: Enable the time correction with average. (over last 4 cycles)

Maximum correction: Set the maximum correction to the cycle time. If the value is 0, the last cycle time is applied to the next start. After correction the cycle time will be not less than 1/3 of the value set in the work head page.

Purge with input: Enable the activation of the purge function with a digital input (only when machine is in manual mode).

Auto run: Enable the Auto run. (***Only for demonstration***). When the regulator auto run is active the profile generation starts immediately after the previous profile is complete without waiting for a new start signal. Cycle time correction will be ignored.

Stand by die gap: (Only in accumulator position mode) Select how to reach the die gap position (with digital input or after end extrusion) or if to stay at the last profile point:
- Digital input: Digital input 9 called "Stand by die gap" requests the head to move to the die gap position after the programmed delay to start the filling.
- End extrusion: In case of no external "Stand by die gap" signal it is possible to trigger the movement with the end of extrusion signal after the programmed delay.
- Last point: At the end of extrusion the head holds the last profile point and after the delay it starts the filling.

After this action the die holds the position until next start signal.

Delay die gap: (Only in accumulator position mode or in continuous extrusion if enabled) Delay before starting the filling.

Die gap position: (Only in accumulator position mode or in continuous extrusion if enabled) Head position after profile is completed.

4.6.5 Regulator parameters.

It is possible to indicate a minimum time to complete the total mandrel stroke. This time determines the maximum ramp time of the position command signal. It is possible to compensate the valves dead band and to delay movement starting.

Maximum output slope	0	ms
Feedback actuator	NO	
Vout Min/Vout Max	0 / 10000	mV
KP/KI/KD	1000 / 0 / 0	
Divisor	256	
Dead band positive	0	mV
Dead band negative	0	mV
Start delay time	1 0.0 2 0.0	s

Figure 66

Maximum output slope: Minimum time for the maximum excursion of the head (from all open to all close). It allows us to define a ramp for the maximum variation of the analog output. In this way very fast movements of the head are not allowed. If the time is 0 every movement is free. With a value of 1 second, for example, the position command increment will be 20000 mV/s. Every movement will be performed according to the calculated ramp.

Feedback actuator: Select if the actuator has a feedback transducer (intelligent actuator).

Vout Min/Vout Max: (only if feedback actuator is YES). It allows to choose between which values the intelligent actuators has to work. The default parameters are 0 / 10000 [mV]

KP gain: Proportional gain. Range: 0...10000.

KI gain: Integral gain. Range: 0...10000.

KD gain: Derivative gain. Range: 0...10000.

Divisor: It allows to choose the divisor of the formula to calculate the output command: the divisor allows to insert the parameters PID with different resolutions.

$$OUT = (KP * DEV + KI * (integral\ add\ DEV) + KD * (derivate\ DEV)) / DIV$$

DEV=Actual Value[%] - Setpoint[%]

Calibration Mode	→	100%= 20000 mV
Work Mode	→	100%= Vup – Vdown

Dead band positive: Value added to the output already calculated by the PID controller to compensate the positive dead band. Range: 0...+5000 mV or max value mA.

Dead band negative: Value subtracted from the output already calculated by the PID controller to compensate the negative dead band. Range: 0...+5000 mV or max value mA.

Start delay time: delay time on movement starting (1). The second time (2) refers to the profile 2 with alternate profiles.

4.6.6   Head Setup for PWDS

The setup page for channels managing the PWDS function is almost identical as the one for normal parison control: the only difference is that the configuration of the die type, with the four big icons in the middle of the page, is not present; for the same reason also the function keys F3 to F6 are gray.

Also the second Start delay time, the one used in case of alternated profiles, is not present

4.6.7   Function Keys.

HEAD 1 **HEAD 1:** Select Head page.

SETUP 2 **SETUP 2:** Select Setup 2 Head 1 page.

D-D **D-D:** Select die type **Divergent** and mobile part **Die**.

C-D **C-D:** Select die type **Convergent** and mobile part **Die**.

D-M **D-M:** Select die type **Divergent** and mobile part **Mandrel**.

C-M **C-M:** Select die type **Convergent** and mobile part **Mandrel**.

PREV NEXT **NEXT:** Fast choose of the next or previous setup head pages .

MENU 1 **MENU 1:** Select Menu 1 page.

4.7   Head Setup 2.

Figure 67

Setup 2 Head 1:   Setup 2 Head 1 page.
Access: From Setup1 Head1 Page with key **F7**. (only with acc. position)
Use: With accumulator position it is possible to activate the parison length control. Comparison between photocell signal and programmed point.

At photocell signal, the currently issued point is detected and compared with a reference value. The difference between the two values (in points) is the error. If the error is lower than Minimum error, no correction is made. If the error is greater than Maximum error it is possible to decide whether making the maximum correction or making no correction at all. If the error is between minimum and maximum a proportional correction is calculated. The correction is made by changing the additional weight value on the regulator (Trim). A single photocell drives all the regulators.

4.7.1   Control length parameters.

Figure 68

Control length profile (Only with accumulator position)**:** Enable the length control on the profile.

Point for control: Set the reference point for the control.

Maximum error: Maximum allowed error calculated between the programmed point and the point triggered by the photocell signal.

Minimum error: Minimum allowed error.

Maximum correction: correction to be applied if the calculated error is greater of the maximum allowed error.

Correction type: no correction or maximum correction if the error is greater of the maximum allowed error.

When the error is smaller than the **Minimum error** no correction is made. When the error is included between the **Minimum error** and the **Maximum error** the correction is proportioned to the **Maximum correction**.

When the error is greater than Maximum error the correction can be of two types:
- **Correction type** = Maximum (The correction is the **Maximum correction**).
- **Correction type** = Nothing (No correction is made).

Correction Type = Maximum

Correction

Maximum Correction

Minimum Error   Maximum Error   Error

Correction Type = Nothing

Correction

Maximum Correction

Minimum Error   Maximum Error   Error
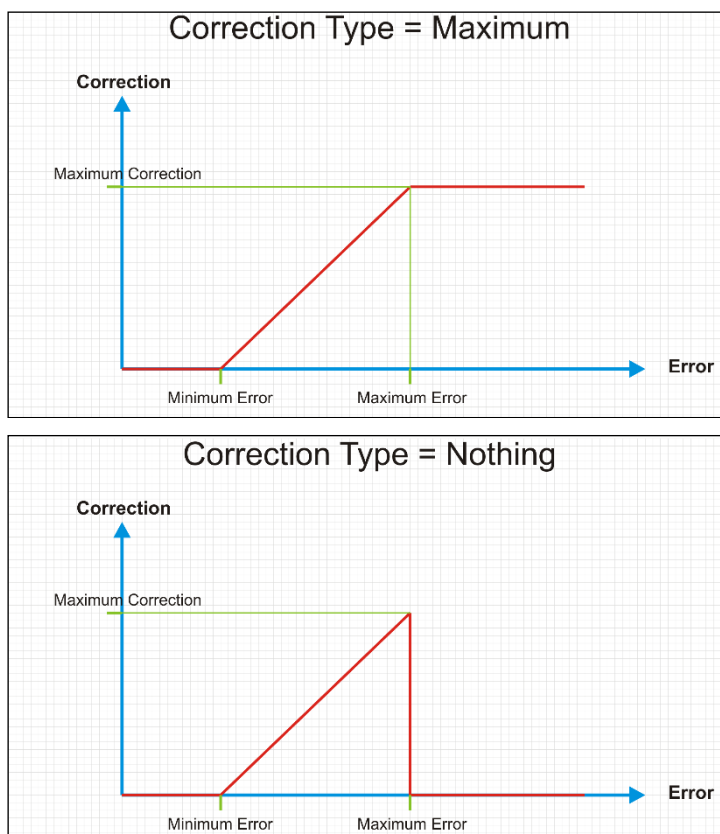
Figure 69

4.7.2   Correction.

Actual point	0.0	
Photocell point	0.0	
Error	0.0	
Correction	0.0	%
Feedback	0.0	%

Figure 70

Actual point: current point

Photocell point: working point triggered by the photocell signal

Error: difference between the control point and photocell point.

Correction: calculated value of correction that will be added to the weight planned on the heads.

Feedback: real actual value.

4.7.3 Function Keys.

HEAD 1: Select Head page.

SETUP 1: Select Setup 1 Head 1 page.

NEXT: Fast selection of the next or previous setup pages .

MENU 1: Select Menu 1 page.

4.8   Accumulator.
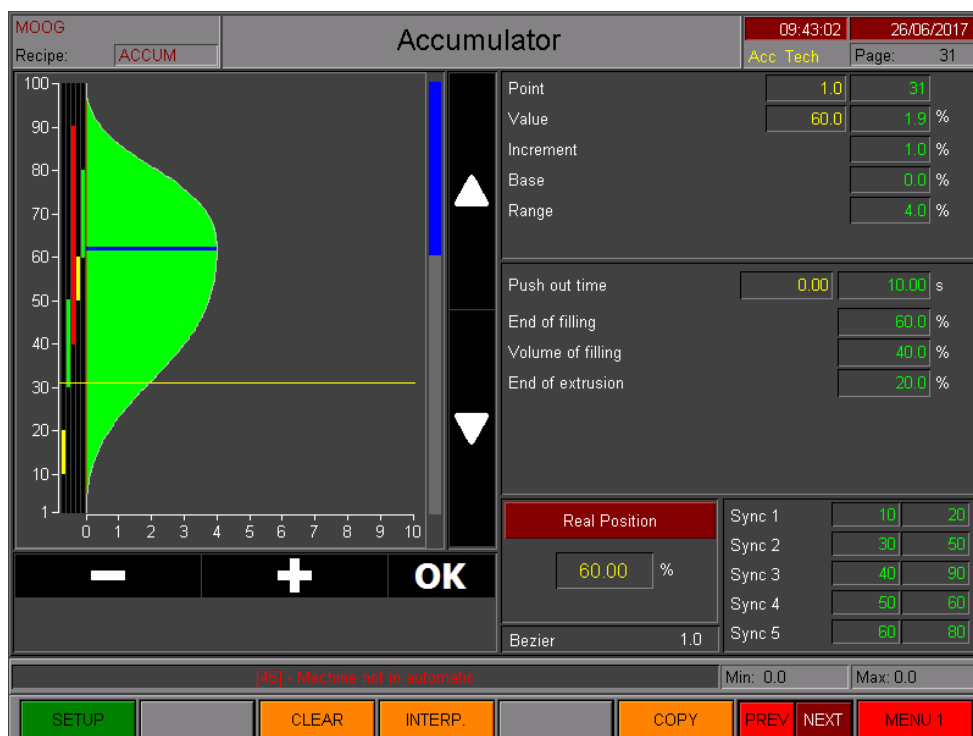
Figure 71

Accumulator: Parison page in accumulator position mode.
Access: From Main Menu with key **F4**.
Use: Set accumulator stroke and edit profile and parameters for injection speed control. A regulator in accumulation mode requires that the accumulator management is setup on the fourth channel. The setpoint generated for the thickness regulator depends on the accumulator position in injection phase related to the total injection stroke.

With **start** signal (digital input number 1) begins the push out up to the position of end extrusion (even if the signal start is not more active). The output command is related to the planned profile.

With **end extrusion** if start is OFF the output command goes to a clamp value that it can be adjustable on setup page. The output stays in this condition even if the actual profile point goes back below the last point. The heads position stays in close loop on the last point.

With **end extrusion** if start is ON the output command stays at the value of the last point. The output stays in this condition even if the actual profile point goes back below the last point. The heads position follows backward its profile in close loop if accumulator position goes back.

With **die gap** signal (start signal has to be OFF) the output command goes to filling value (only negative) and is latched. This value is adjustable on setup page. The heads go on die gap position or stay on the last point. With the next start the output goes to the push out value.

In **Manual mode** (digital input number 13 OFF) the push out is active only if start is ON. If start is OFF the output command goes to filling value.

With **Digital Accumulator** (no output command) when the **start1** signal goes ON a red bar graph visualized the accumulator position during the external push out. With **end extrusion** the digital output number 2 goes ON. With **die gap** signal (digital input number 9) or end extrusion signal (see setup 1 head x page chapter 4.6.4) a blue bar graph visualized the filling and the digital output of end extrusion will go OFF if accumulator position is different from end extrusion position. When the accumulator position reaches the **end of filling**, the digital output number 1 goes ON.

4.8.1 Profile Editor.
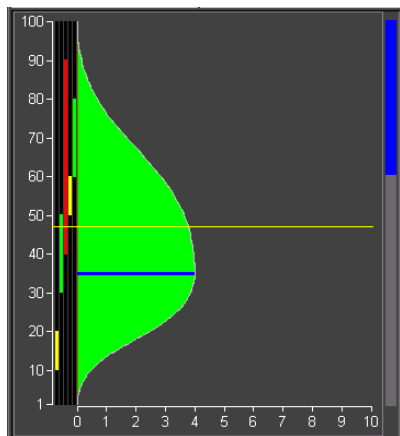
Figure 72

From left to right:

Vertical ruler: (white) From 1 to max 400 helps to navigate.

Horizontal ruler: (white) From 1 to max 100 %.

Serial Marker: Vertical logical state diagram that shows the state along the profile.

Synchronisms: (only if enabled): 5 vertical lines, displays 5 synchronisms signals defined by a couple of **start** and **stop** points. The line is yellow, if working during **Extrusion**, green if working during **Filling** and red if working both in **Extrusion** and **Filling**. Synchronisms are visible only on profile 1.

Bar graph: shows the working point of selected head as feedback. In case of **extrusion** (or time based mode) the bar graph will be red and start at point 1. In case of **filling** (only accumulator mode) it is blue and starts at point max 400 (from top to bottom).

4.8.2 Profile parameters.
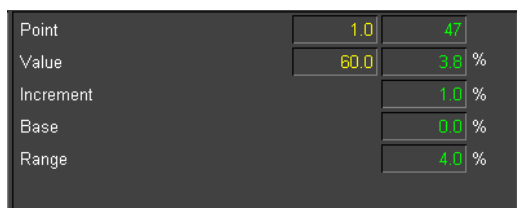
Figure 73

Point: The yellow value shows the actual point during the movement; it follows the red bar graph on the right side of the parison field. The green value shows the position of the cursor in the parison field. Set this value (1 to 400 max) to change the cursor position.

Value: The yellow value shows the actual feedback in %. The green value shows in % the setpoint of the cursor point. By changing this value it is possible to add a new setpoint or modify an existing one.

Increment: This is the increment / decrement that changes the setpoint of the cursor position in the parison field.

Base: Displays the minimum profile value. By changing the base it is possible to shift the whole profile. Range: 0% to Max limit (Profile). The max limit added to the range must be inferior or equal to 100% (base + range <= 100).

Range: Displays the profile range as difference between maximum and minimum value. By changing the profile it is possible to resize the entire profile. Range: 1% to Max limit (Weight). The max limit added to the base must be inferior or equal to 100% (base + range <= 100).

4.8.3   Accumulator parameters.

Figure 74

Push out time: Active only if in Setup Accumulator Page the Time control extrusion is ON. (yellow) Actual cycle time. (green) Cycle time extrusion.

End of filling: End of filling expressed in percentage.

Volume of filling: Volume of filling expressed in percentage.

End of extrusion: End of extrusion expressed in percentage.

Volume of filling is always equal to the difference between **End of filling** and **End of extrusion**.
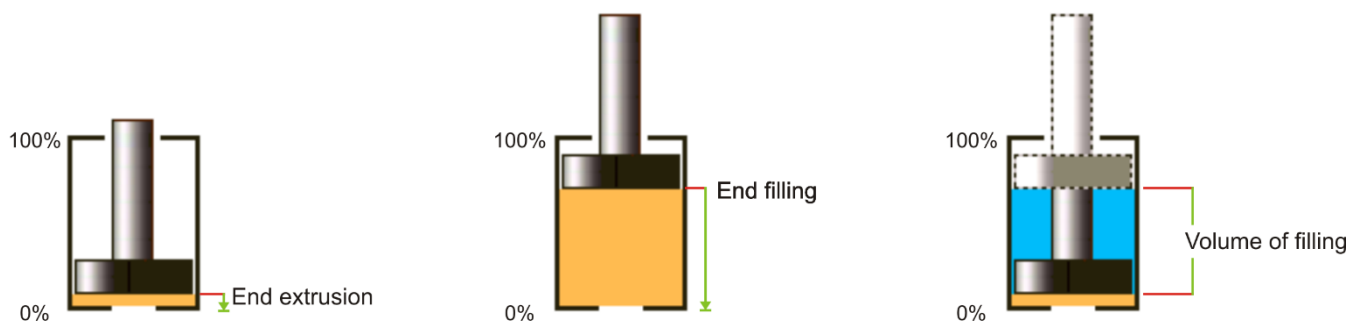
Figure 75

In accordance with the **Setting** and **Priority** parameters set in the setup page, these three parameters can be modified in the following ways:

Setting: **Free:**
*   Priority: **End filling** - The priority parameter End filling is fixed when you change Volume of filling.
*   Priority: **End extrusion** - The priority parameter End extrusion is fixed while the other parameter End filling changes when you change Volume of filling.

Setting: **End extr. / Volume**:
*   End filling is always fixed. It's possible to change only End extruder and Volume of filling.

Setting: **End filling / Volume**:
*   End extruder is always fixed. It's possible to change only End filling and Volume of filling.

Setting: **End filling / Extr.**:
*   Volume of filling is always fixed. It's possible to change only End extruder and End filling.
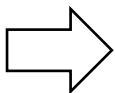
The analogical input referred to 100% (V. Full) has to be greater than the analogical input referred to 0% (V. Empty).

4.8.4   Real Position.

Figure 76

Real Position: real accumulator position.

This soft key selects the Accumulator popup window.
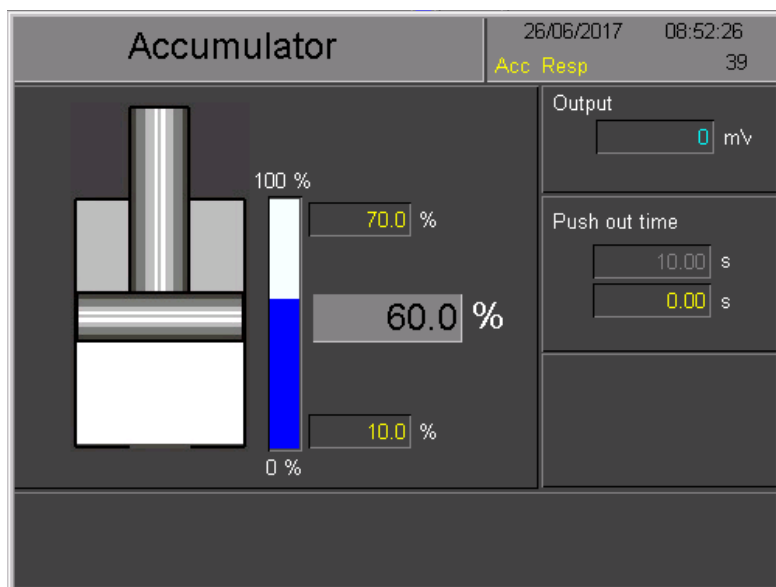
Figure 77

Accumulator popup window.

Output: output command value.

Push out time: extrusion time; if Time control extrusion is enabled.

The red bar graph shows the real accumulator position. (the value is the yellow field with red background colour).

The two yellow fields without background colour show the real end of filling and end of extrusion values in case of the start correction is enabled.
The led shows if the accumulator is in end of filling position or in end of extrusion position.
Last correction: last velocity correction if enabled in the setup extruder page

4.8.5   Synchronisms.

Figure 78

Synchronisms: Only if enabled in machine setup page. Each synchronism is defined by a pair of start and stop points along the profile (1…400 max). They are represented also by vertical lines on the left of the profile-edit-field. They can be activated during the extrusion, during the filling or in both movements.

4.8.6 Function Keys.

SETUP: (yellow) Disable. (black) Select accumulator Setup page.

CLEAR: Clear all the profile.

INTERPOLATION: Change the interpolation.

COPY: Copy the profile placed on Head 1 in the extrusion speed profile of the Accumulator.

NEXT: Select the next or previous page.

MENU 1: Select main menu 1.

4.9 Setup Accumulator.

Figure 79

Setup Accumulator: Setup accumulator page in accumulator position mode.
Access: From Accumulator Page key **F1**.
Use: The input calibration should be made in this way: it is possible to indicate a voltage to be applied on extrusion control output and activate empty accumulator calibration procedure. The system automatically detects mechanical end-of-stroke, stores this value and interrupts extrusion control. Using manual movements, the accumulator should be brought to empty and full position and it is possible to manually confirm the two positions.
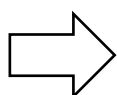
The analogical input referred to 100% (V. Full) has to be greater than the analogical input referred to 0% (V. Empty).

4.9.1 Digital Accumulator.

Digital Accumulator: to externally manage the accumulator without the profile speed control (if YES).

The parison controller catches only the feedback position to manage the movement of the head.

Operation: Select the operation mode of the accumulator:

Work: in work mode the loop is closed, the machine works normally. No calibration is active. The calibration points are those written in the fields V. Full and V. Empty.

Open loop: in open loop mode is possible to move the accumulator down pushing **DOWN** key. Pushing **UP** key it is possible to move the accumulator Up because the output becomes negative and the material moves up the accumulator. When the accumulator is in mechanical stroke you have to confirm the Full. or Empty. values for the calibration.

Calibration: in calibration mode set **Start** to YES and the accumulator automatically searches for the empty position. Pushing **UP** key it is possible to move the accumulator Up because the output is negative and the material moves up the accumulator. When the accumulator is in position you have confirm the values for the calibration.

Figure 80

Inv. Output: Select YES to reverse the analog Output polarity.

Inc. Up / Inc. Down: these variables correspond to the acceleration value of the output command (expressed in mV/s or mA/s). It is the ramp increment or decrement value on the analog Output. **Inc. Up** determines the slope ramp towards +Max value. **Inc. Down** determines the slope ramp towards Min value.

The accumulator uses analog Input 4 to read the position and analog Output 4 to drive the extrusion (if the digital accumulator is not enabled).

V. Full and **V. Empty:** In these fields the full and the empty values are visualized in mV.

Figure 81

4.9.2 Run parameters.

Time control extrusion: Enable the control time during the extrusion. If the control is set to NO the accumulator extrusion speed is managed in open loop. In this case output voltage depends on the profile assigned by accumulation. The profile point to be output depends on the same accumulator position.
If the control is set to YES the accumulator extrusion speed is managed in closed loop. In this case the profile is output in a preset total time with a speed setpoint reflecting the profile.

Figure 82

The position closed loop performs the extrusion in order to follow the velocity profile.

Enable start correction: Enable the correction on the injection start position.

If this correction is **NO**, the filling quota passed to the head is calculated always from "end of filling" point to "end of extrusion" point.

ENABLE START CORRECTION OFF

Accu position with start injection

START - End filling

STOP - End extrusion

The extrusion is always performed between START and STOP.
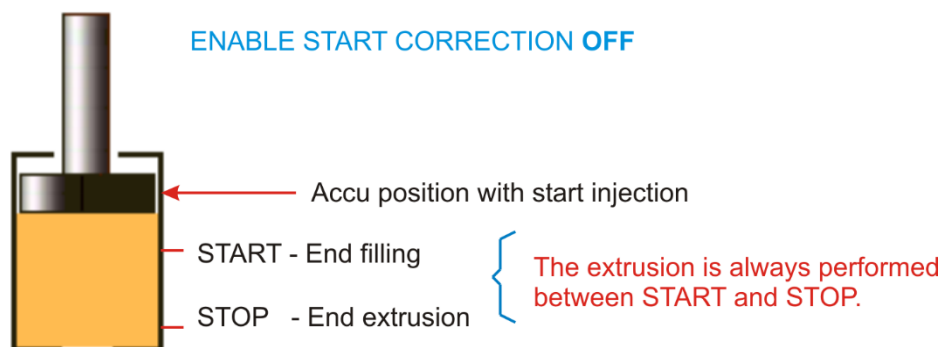
Figure 83

If this correction is **YES** is possible to chose a shift value to move the end extrusion position. If the difference between the first value (STOP1) and the new value (STOP2) is lower than the shift value the correction is made. The filling quota passed to the head is calculated from the new start point for a stroke equal to programmed injection stroke.

ENABLE START CORRECTION ON

Accu Position with start injection

START1
Y
STOP1
+ Shift
- Shift

START2
Y
STOP2

- Y: Volume
- START1: End of filling
- STOP1: End of extrusion
- START2: New End of filling
- STOP2: New End of extrusion
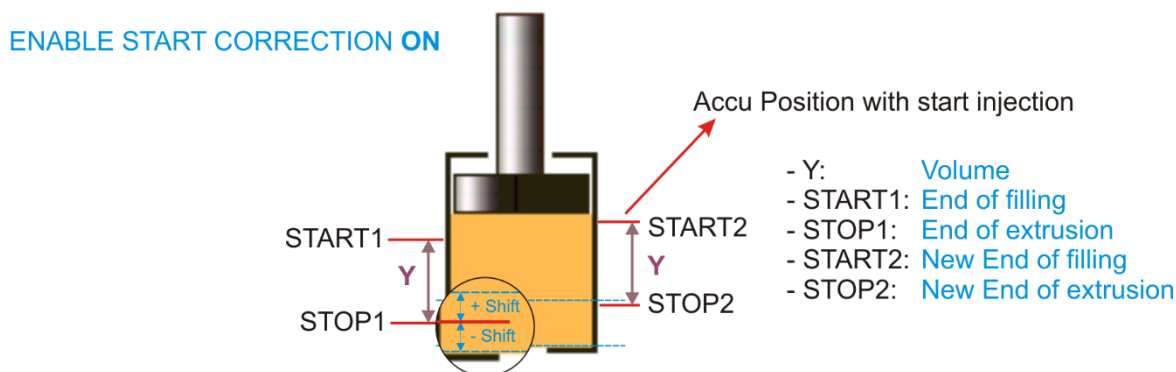
Figure 84

Setting: Allows to choose the parameters to plan (see Figure 18).
It is possible to indicate whether the machine user can freely change the parameters defining machine filling and extrusion or there are any limitations. It is possible to select among:
1. Free entry of end of filling point, volume, end of extrusion point.
2. Entry of end of extrusion point and volume.
3. Entry end of filling point and end of extrusion point.
4. Entry end of filling point and volume.
Limitations on data entry are not valid for service level access.

Priority: Allows to choose the parameter which has to be fixed in case of free setting (see Figure 18).

Filling voltage/current: Output voltage or current to let the filling (to help the valve during the filling). During the filling it is possible to define fixed output command.

Clamp voltage/current: Output voltage or current when the end of extrusion is reached.

Push out delay: Delay before starting the push out.

4.9.3 Regulator parameters.

Figure 85

KP out 1: Proportional gain. Range: 0 to 10000.

KI out 1: Integral gain. Range: 0 to 10000.

KD out 1: Derivative gain. Range: 0 to 10000.

Divisor: It allows to choose the divisor of the formula. (see Setup Head)

Dead band positive: Value added to the output already calculated by the PID controller to eliminate the dead band. Range: 0...+5000 mV or max value mA.

Dead band negative: Value subtracted from the output already calculated by the PID controller to eliminate the dead band. Range: 0...+5000 mV or max value mA.

4.9.4 Function Keys.

 ACCUM.: Enter the Accumulator page.

 NEXT: Enter the next Setup page.

 MENU 1: Go to main menu 1.

4.10 Work Extruder.

Figure 86

Work Extruder n.: Work Extruder page n° (n° = 1 to 2).
Access: From Main Menu 1 key **F5** (Extruder 1) or **F6** (Extruder 2).
Use: It is possible to decide whether to use the extruder or not and which channel it should be associated to. It can be associated to:

- A thickness regulator in continuous extrusion.
- A thickness regulator in time accumulation.
- Accumulator.

It is possible to decide whether the extruder is driven by an analog or digital command. In case of analog command the output voltage of a channel is the speed setpoint. In case of a digital command two digital outputs allow increase or decrease of speed.

- **Extruder with analog command:**

  - It is possible to calibrate the input with: 0 speed voltage, maximum speed voltage, and maximum speed. The speed is expressed in RPM.
  - It is possible to calibrate the output with: maximum speed, voltage to reach maximum speed.
  - These setpoints can be setup: speed to be reached, rise ramp in RMP/sec., descent ramp in RPM/sec., minimum speed, maximum speed.

- **Extruder with digital command:**

  - You can setup the maximum time for digital output. (manual command or maximum velocity control).

4.10.1 Extruder command.
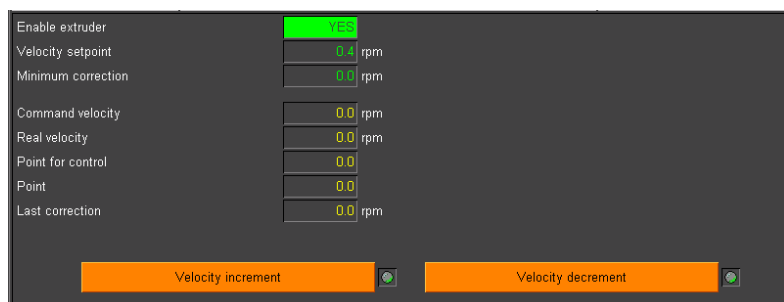
Figure 87

Enable extruder: enable the output command to control the extruder velocity. The command velocity goes to 0 (if Enable extruder is NO) or to the velocity setpoint by a ramp.

Velocity setpoint: insert the velocity setpoint. (visible with "Analog extruder").

Minimum correction: with the velocity control if the error is lower to the planned minimum one (in point) it is possible to apply a minimum correction however (in rpm).

Command velocity: Output command velocity. (visible with "Analogical extruder").

Real velocity: Show the real velocity in rpm. (visible with "Analogical extruder").

Point for control: (if enabled "Control length profile") Show the point for control.

Point: (if enabled "Control length profile") Current point from select head or point of accumulator extrusion.

Last correction: (with "Control length profile") increment or decrement value with Analogical extruder.(rpm).

Last correction: (with "Control length profile") increment or decrement value with Digital extruder.(ms)

4.10.2 Velocity increment and decrement.
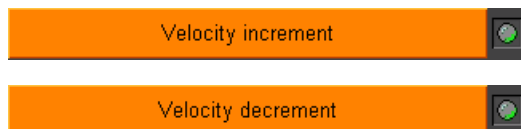
Velocity increment: (visible with "Digital extruder") show the digital output for increment.

Velocity decrement: (visible with "Digital extruder") show the digital output for decrement.

4.10.3 Function Keys.
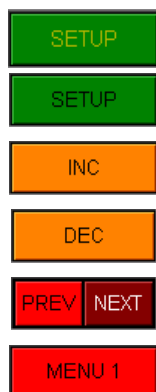
SETUP: (yellow) Disable. (black) Enter in the setup Extruder.

INC: (visible with "Digital extruder") Velocity increment key.

DEC: (visible with "Digital extruder") Velocity decrement key.

NEXT: Enter the next Setup page.

MENU 1: Go to main menu 1.

4.11   Analog Extruder Setup.

Figure 88

Extruder setup n.: Extruder Setup page n° (n° = 1 to 2).
Access: From Work Extruder Page 1 key **F1**.
Use: It is possible to setup the Extruder parameters.

4.11.1   Extruder Type.

Extruder type: to select the extruder type.

Number combined head: Only with continuous extrusion and control length profile enabled. Select the number of the Head associated to the Extruder (1 to 4).

4.11.2   Input Calibration.

Figure 89

INPUT CALIBRATION

Voltage input: Analog input (input N° 3 for extruder 1, N° 4 for extruder 2).

Minimum voltage: Minimum voltage in input related to 0 rpm velocity.

Maximum voltage: Maximum voltage in input related to the maximum velocity.

Velocity with V max: Corresponding velocity with Maximum voltage.

4.11.3 Output Calibration.
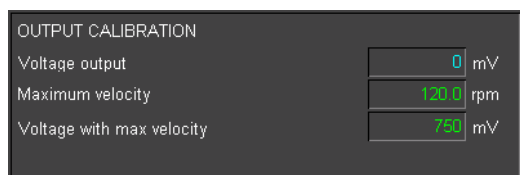
Figure 90

Voltage output: Analog voltage output. (output N° 3 for extruder 1, N° 4 for extruder 2).

Maximum velocity: Maximum velocity in rpm.

Voltage with max velocity: Voltage output to get the maximum velocity.

4.11.4 Velocity planned.

Figure 91

Min vel. output limit: Minimum value for the velocity setpoint.

Max vel. output limit: Maximum value for the velocity setpoint.

Increment slope: Increase slope for the ramp expressed in rpm/sec.

Decrement slope: Decrease slope for the ramp expressed in rpm/sec.

4.11.5 Velocity control.

It is possible to enable the extruder speed correction.
If the **extruder is coupled to a continuous extrusion** or time accumulation head, the error is calculated between **photocell and a programmed point or between photocell and die ready**. The error is expressed in points.

If extruder speed is enabled and the **extruder is coupled to the accumulator**, the error is calculated between **end of filling signal and start injection signal**. The error is expressed in percentage.

Speed correction is made in accordance with the following algorithm.

Errors lower than dead band values (in point with continuous extrusion, in percentage with accumulator) are not considered (or is possible to apply a minimum correction).

An error between the maximum and minimum error (inside the window) is scaled on a maximum correction value (in percentage or in millisecond). The correction is applied to extruder speed (with a ramp) or to the two digital output (increment or decrement).

An error greater than the window can be ignored or cause the maximum correction.

Extruder velocity control	YES					
Control type	Photo-Point ▼	±				
Point for control	0.0 %	0.0	CONFIRM	0.0		
Minimum error	0.4					
Maximum error	0.7					
Maximum correction	1.7	rpm				
Correction type	Nothing ▼	±	Correction every n. cycles		1	0
Delay time for photocell	0.00	s	Errors number for warning		1	

Figure 92

Extruder velocity control: Enable or disable the control length profile.

Control type: Select Photo/Mould or Photo/Point control type only with continuous extrusion. In Photo/Mould mode, the control is run by photocell digital input and mould digital input.

In Photo/Point mode, the control, is run by photocell digital input and Point for control. With accumulator the control is always made between end of filling and start injection. (see chapter 4.11.5 Velocity control)

Point for control: (the row is enabled when Photo/Point mode is selected) Point for the control (green). Yellow point (on the left) is the point intercepted by the photocell. It is possible copy this value in point for control with the confirm button. Yellow point (on the right) is the current point during the extrusion.

Minimum error: Minimum allowed error. (in point or in percentage)

Maximum error: Maximum allowed error. (in point or in percentage)

Maximum correction: Correction to be applied if the calculated error is greater of the maximum error. Maximum correction applied at the velocity setpoint.

Correction type: Select from None to Maximum correction type. Correction - None: Output - None. Maximum correction: use the Maximum correction value.

When the error is smaller of the **Minimum error** there is no correction.
When the error is inclusive between the **Minimum error** and the **Maximum error** the correction it is proportional knowing the **Maximum correction**.

When the error is greater to the Maximum error the correction can be of two types:
- **Correction type** = Maximum (The correction is the **Maximum correction**).
- **Correction type** = Nothing (There is no correction). See Figure 15.

Delay time for photocell: Time before which the signal of the photocell has to be ignored. Only with continuous extrusion.

Correction every n. cycles: Number of cycles after which make the correction.

Error number for warning: Number of consecutive errors to visualize a warning message.

4.11.6 Function Keys.

EXTR.1: Enter the Extruder page.

NEXT: Enter the next or previous Setup page.

MENU 1: Go to main menu 1.

4.12   Digital Extruder Setup.

Figure 93

Extruder setup n.: Extruder Setup page n° (n° = 1 to 2).
Access: From Work Extruder Page 1 key **F1**.
Use: It is possible to setup the Extruder parameters.

Extruder type: to select the digital extruder.

Number combined head: Only with continuous extrusion and control length profile enabled select the number of the Head associated to the Extruder (1 to 4).

Maximum duration inc\dec: maximum duration in millisecond of the increment or decrement.

Figure 94

Errors lower than dead band values (in point) are not considered.

An error between the maximum and minimum error (inside the window) is scaled on a maximum correction value (in millisecond). The correction is applied to the inc\dec digital output (output 9\10 extruder 1, output 11\12 extruder 2).

An error greater than the window can be ignored or cause the maximum correction (maximum duration).

See Analogical extruder setup.

Figure 95

4.12.1 Function Keys.

  EXTR.1: Enter the Extruder page.

  NEXT: Enter the next or previous Setup page.

  MENU 1: Go to main menu 1.

4.13   Timer Switch.

Figure 96

Timer switch: Timer switch page.
Access: From Main Menu 2 with key **F2** (when the page is enabled in the setup machine).
Use: This page is visualized only if in the Setup Machine Page the field Management timer switch is ON.
Manage Timer Switch for temperature control. The time switch allows defining, for each weekday, a time interval defined by a start and a stop time. When the time indicated by the system falls within this interval the "time switch" digital output is set on.

4.13.1   Enable Timer Switch.

Figure 97

Timer switch: Status for the timer switch.

Current day: Show the current day.

4.13.2 Weekly start and stop time.

Figure 98

The input is enabled from Responsible level.

Time ON: Insert the start time. Hours and minutes for every day of the week.

Time OFF: Insert the stop time. Hours and minutes for every day of the week.

4.13.3 Function Keys

MENU 2   **MENU 2:** Go to main menu 2.

4.14   Input / Output.
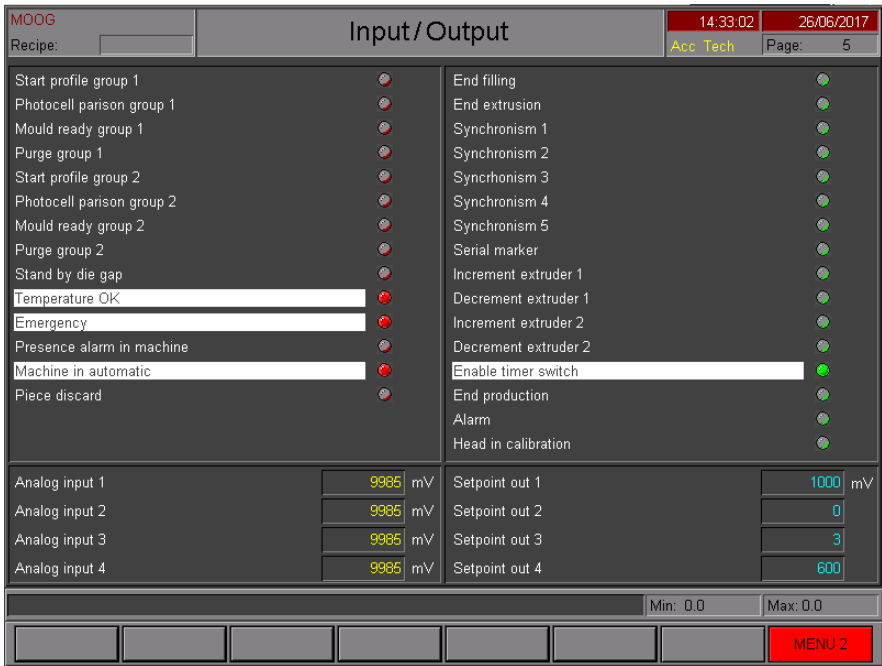
Figure 99

Input / Output: Menu for the System State pages.
Access: From Main Menu 2 with key **F6**.
Use: To view digital/analog inputs/outputs. I/O digital monitoring show ON/OFF status of all digital inputs and outputs. I/O analog monitoring shows voltage of all inputs and outputs.

4.14.1   Digital Input.
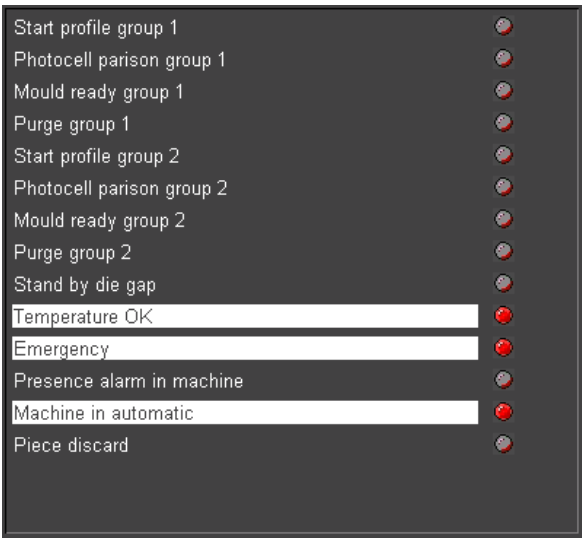
Figure 100

Start profile group 1:	Digital Input number 1.
Photocell parison group 1:	Digital Input number 2.
Mould ready group 1:	Digital Input number 3.
Purge group 1:	Digital Input number 4.
Start profile group 2:	Digital Input number 5.
Photocell parison group 2:	Digital Input number 6.
Mould ready group 2:	Digital Input number 7.
Purge group 2:	Digital Input number 8.
Stand by die gap:	Digital Input number 9.
Temperature OK:	Digital Input number 10.
Emergency:	Digital Input number 11.
Presence alarm in machine:	Digital Input number 12.
Machine in automatic:	Digital Input number 13.
Piece discard:	Digital Input number 14.

4.14.2 Digital Output.
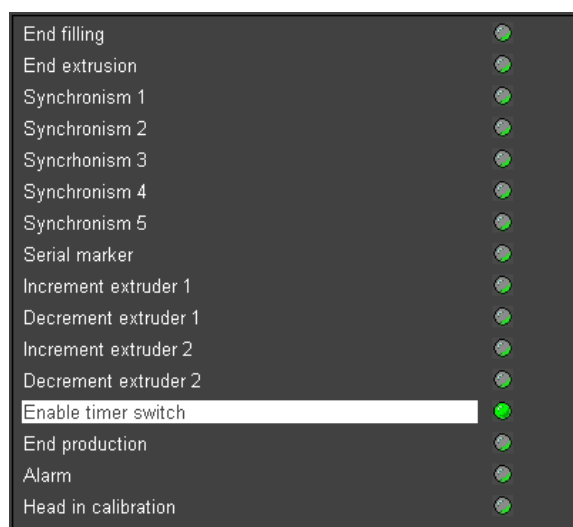
Figure 101

End filling:	Digital Output number 1.
End extrusion:	Digital Output number 2.
Synchronism 1:	Digital Output number 3.
Synchronism 2:	Digital Output number 4.
Synchronism 3:	Digital Output number 5.
Synchronism 4:	Digital Output number 6.
Synchronism 5:	Digital Output number 7.
Serial marker:	Digital Output number 8.
Increment extruder 1:	Digital Output number 9.
Decrement extruder 1:	Digital Output number 10.
Increment extruder 2:	Digital Output number 11.
Decrement extruder 2:	Digital Output number 12.
Enable timer switch:	Digital Output number 13.
End production:	Digital Output number 14.
Alarm:	Digital Output number 15.
Head in calibration:	Digital Output number 16

4.14.3 Analog Input.

Figure 102

Analog Input 1:	Analog Input number 1.
Analog Input 2:	Analog Input number 2.
Analog Input 3:	Analog Input number 3.
Analog Input 4:	Analog Input number 4.

4.14.4 Analog Output.

Figure 103

Setpoint Out 1:	Analog Output number 1.
Setpoint Out 2:	Analog Output number 2.
Setpoint Out 3:	Analog Output number 3.
Setpoint Out 4:	Analog Output number 4.

4.14.5 Function Keys.

MENU 2   **MENU 2:** Go to main menu 2.

4.15 Production.

Figure 104

Production: Production page.
Access: From Main Menu 2 with key **F3** (when the page is enabled in the setup machine).
Use: This page is visualized only if in the Setup Machine Page the field Production Control is ON. It is possible to setup this data: Number of pieces to be produced, number of die cavities, average machine cycle time.
When the good pieces are the same of pieces produced, "**Production complete**" appears on the screen. There is also a lacking pieces counter.(the difference between pieces produced and good pieces). The time needed to complete the production is available.
At the end of production, "End of Production" output is set ON.

4.15.1 Production Parameters.
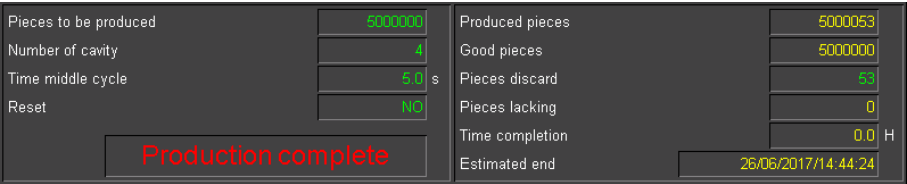
Figure 105

Pieces produced: Pieces planned. The counter of produced pieces increases at each start 1 signal according to the number defined by the cavities.

The counter of pieces discard increases of the same quantity with a rise front of "Reject" input. The difference between these two counters defines the good pieces.

Number of cavity: Mould cavity.

Time middle cycle: Time middle cycle.

Reset: Reset production counter.

Produced pieces: Real number of produced pieces.

Good pieces: Good pieces.

Pieces discard: Discarded pieces.

Pieces lacking: Lacking pieces.

Time completion: Lacking time for end production.

Estimated end: Estimated date and hour of end production.

4.15.2 Function Keys.

MENU 2   **MENU 2:** Go to main menu 2.

4.16 Edit Profile.
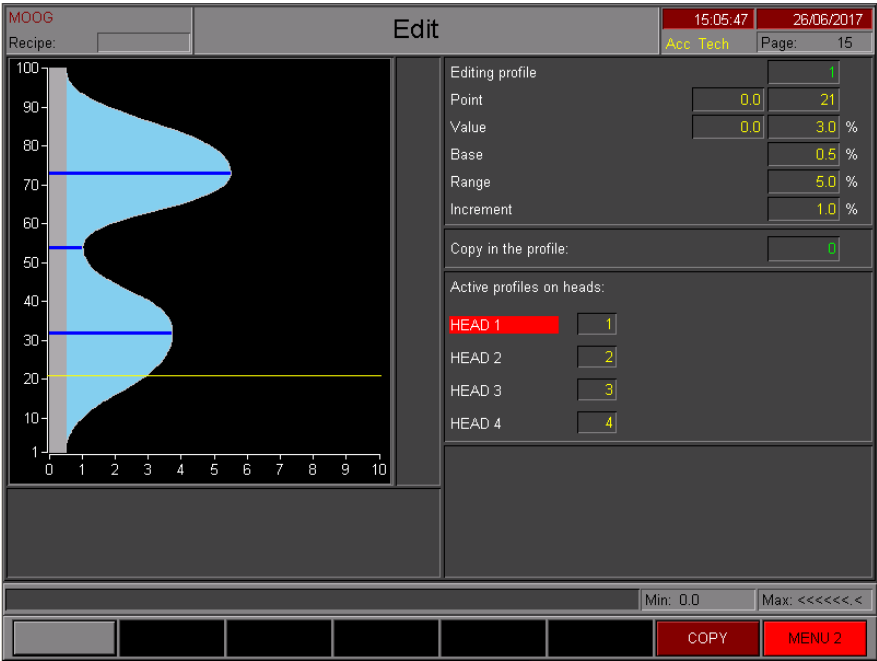
Figure 106

Edit: Edit page.

Access: From Main Menu 2 with key **F1** (Edit) with the field **Free profiles assignment ON** (in the setup machine page).

Use: In this page it is possible to create a new profile and copy the one visualized in another if it is not already active on a head.

With the red line it is possible to see where the displayed profile is already active.

4.16.1 Copy in the profile.

Copy in the profiles: Pressing the function key **F7** the profile currently visualized is copied in the suitable profile in this field. It's not possible to perform this function if the suitable profile is already assigned to a head (See Active profiles on heads).

4.16.2 Active profiles on heads.
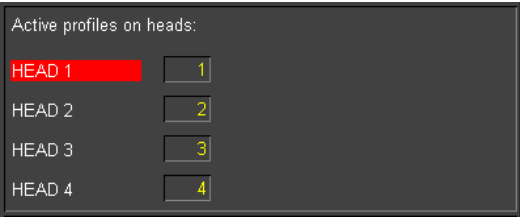
Active profiles on heads: It is possible to see the used heads and which profile is associated to the relative head. The red line displays where is active the selected profile.

Figure 107

4.16.3 Function Keys.

COPY: The profile currently visualized is copied in the profile showed in the field "**Copy in the profiles"**.

MENU 2: Go to main menu 2.

4.17 Recipe.

Figure 108

Recipe: Recipe page.
Access: From Main Menu 2 with key **F4**.
Use: In this page it's possible to manage the recipes. It's possible to save, load (only with machine in manual mode) cancel or copy a recipe both on internal **Ram Disk** and on external **USB** by selecting the correct device.
It's also possible to format the device.
Only a few recipes can be saved on Ram Disk (Max 6) while on USB it's possible to save a lot of recipes.

4.17.1 Recipe Management.

Recipe Type: With Technical level it is possible to select the recipe type choosing between **Product**, **Configuration or both**.

With Responsible level it is possible to use only **Product** recipe. The .PRD file contains data relating to the mould. (Work Head data, Extruder data, Accumulator data, Production data, Timer Switch data). The .CFG file contains data relating to the configuration of the machine (Calibration Machine setup data, Number heads, Work Head setup data, Extruder setup data, Accumulator setup data).

Recipe Name: Write the name of the recipe. The maximum number of characters is 8.

Device: Select the device where to save the recipe (Ram Disk or USB).
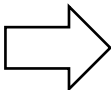
To safely execute the commands in this page (SAVE - LOAD - DELETE - FORMAT - COPY) it is necessary to confirm the operation with the following popup.

Figure 109

4.17.2 Index of the recipes.

Name/Type: Name and type of the file **.PRD** (product) or **.CFG** (configuration).

Dimension: File dimension in bytes.

Last updating: Last date and time of saving file.

Figure 110

With the files saved on the USB it is possible modify the order by pressing on the softkey **Name** and **Last Updating**

4.17.3 Copy Recipe.

It is possible to copy a recipe file from RAM to USB or from USB to RAM.

Select a recipe file and then Press COPY.
Chose the correct operation or press DEL to abort the operation.

Figure 111

4.17.4 Info of the recipes.

Figure 112

Info 1/2/3/4: it is possible to add some information related to the recipe. This operation is possible only with the product recipe. (file .PRD)

When you have to **SAVE** a recipe you can also save this additional information

When you have to **LOAD** a recipe, by pressing the softkey **info** you can read all the information related to the selected recipe and then decide if to load or not this recipe.

The softkey **info** also copies the name of the selected recipe into the Recipe name

Figure 113

4.17.5 Function Keys.

SAVE: Save the file written in "Name recipe" or selected in the list (up/down with cursor).

LOAD: Load the file written in "Name recipe" or selected in the list (up/down with cursor).

DEL: Delete the file selected in the list (up/down with cursor).

NEXT: Scroll next the list of the files.

PREVIOUS: Scroll previous the list of the files.

COPY: Copy the selected recipe from RAM to the USB or vice versa.

MENU 2: Go to main menu 2.

4.18   Alarms.

Figure 114

Alarms: Alarms page.
Access: From Main Manu 1 with key **F7**.
Use: Display alarms from PLC and from system.

4.18.1   Definitions alarms parameters.

Figure 115

Colours: There are two types of colours that differentiate the importance of the alarms. (red used for important errors and purple used for less important errors)

Cod: Number code alarm.

On: Alarm activation Time.

Off: Alarm deactivation Time.

Event: Alarm description displayed in selected language.

Present events: Number of the present events.

Previous events: it indicates that there are some previous alarms in the list

Next events: it indicates that there are some following alarms in the list

4.18.2 List of the alarms.

- [001] PARISON CONTROLLER not Configured.

  Active if in the Setup Machine Page there is nothing selected in "**Function of machine**." In practice to the startup, when the machine is not configured.

- [002] Head 1 not calibrated.

  Active if without feedback actuator the limits of calibration are equal (**V. Up** and **V. Down** at Setup 1 Head 1 Page).

- [003] Head 2 not calibrated.

  Active if without feedback actuator the limits of calibration are equal (**V. Up** and **V. Down** at Setup 1 Head 2 Page).

- [004] Head 3 not calibrated.

  Active if without feedback actuator the limits of calibration are equal (**V. Up** and **V. Down** at Setup 1 Head 3 Page).

- [005] Head 4 not calibrated.

  Active if without feedback actuator the limits of calibration are equal (**V. Up** and **V. Down** at Setup 1 Head 4 Page).

- [006] Accumulator not calibrated.

  Active if in Setup Machine Page Function of the machine is set in **Accumulator Position** and the limits of calibration are equal (**V. Full** and **V. Empty** at Setup Accumulator Page).

- [007] Extruder 1 not calibrated.

  Active if in Extruder setup 1 Page (if Extruder 1 is present in Setup Machine Page) with Analogical Extruder Type:
  the limits of input calibration are equal (**Minimum Voltage** and **Maximum Voltage**);
  the **Velocity with V max** is 0 rpm;
  the **Vel. Min Planned** and **Vel. Max Planned** are equal;
  the **Maximum Velocity** (output calibration) is 0 mV;
  the **Voltage/Current with max Velocity** is 0 mV.
  With Digital Extruder Type:
  the **Maximum Duration Inc/Dec** is 0 ms.

- [008] Extruder 2 not calibrated.

  Active if in Extruder setup 2 Page (if Extruder 2 is present in Setup Machine Page) with Analogical Extruder Type:
  the limits of input calibration are equal (**Minimum Voltage** and **Maximum Voltage**);
  the **Velocity with V max** is 0 rpm;
  the **Vel. Min Planned** and **Vel. Max Planned** are equal;
  the **Maximum Velocity** (output calibration) is 0 mV;
  the **Voltage/Current with max Velocity** is 0 mV.
  With Digital Extruder Type:
  the **Maximum Duration Inc/Dec** is 0 ms.

- [021] Temperature not OK.

  Active if the Digital Input number 10 **Temperature OK** is OFF.

- [022] Emergency not OK.

    Active if the Digital Input number 11 **Emergency** is OFF.

- [023] Machine in alarm.

    Active if the Digital Input number 12 **Presence alarm in machine** is ON.

- [024] Completed production.

    Active when in Production Page (if enable) the **Good Pieces** are equal to **Pieces to be produced** (Different to 0).

- [025] Head 1 not worked.

    Active when in Setup 1 Head 1 Page the **Operation** is different to **Work** (**Open Loop** or **Manual Calibration** or **Automatic Calibration**).

- [026] Head 2 not worked.

    Active when in Setup 1 Head 2 Page (if Head 2 is enable) the **Operation** is different to **Work** (**Open Loop** or **Manual Calibration** or **Automatic Calibration**).

- [027] Head 3 not worked.

    Active when in Setup 1 Head 3 Page (if Head 3 is enable) the **Operation** is different to **Work** (**Open Loop** or **Manual Calibration** or **Automatic Calibration**).

- [028] Head 4 not worked.

    Active when in Setup 1 Head 4 Page (if Head 4 is enable) the **Operation** is different to **Work** (**Open Loop** or **Manual Calibration** or **Automatic Calibration**).

- [029] Accumulator not worked.

    Active when in Setup Accumulator (if Accumulator is enable) the **Operation** is different to **Work** (**Open Loop** or **Calibration**).

- [030] Purge general enable.

    Not managed.

- [031] Purge external 1 enable.

    Active if the Digital Input number 4 **Purge Group 1** is ON.

- [032] Purge external 2 enable.

    Active if the Digital Input number 8 **Purge Group 2** is ON.

- [033] Purge head 1 enable.

    Active if the single Purge on the Work Head 1 Page is enable. It is active even used the Fast Access Key on the front panel (All the Head).

- [034] Purge head 2 enable.

    Active if the single Purge on the Work Head 2 Page is enable. It is active even used the Fast Access Key on the front panel (All the Head).

- [035] Purge head 3 enable.

    Active if the single Purge on the Work Head 3 Page is enable. It is active even used the Fast Access Key on the front panel (All the Head).

- [036] Purge head 4 enable.

  Active if the single Purge on the Work Head 4 Page is enable. It is active even used the Fast Access Key on the front panel (All the Head).

- [037] Master Tooling active.

  Not managed.

- [038] Tooling head 1 active.

  Active if the single Tooling on the Work Head 1 Page is enable. It is active even used the Fast Access Key on the front panel (All the Head).

- [039] Tooling head 2 active.

  Active if the single Tooling on the Work Head 2 Page is enable. It is active even used the Fast Access Key on the front panel (All the Head).

- [040] Tooling head 3 active.

  Active if the single Tooling on the Work Head 3 Page is enable. It is active even used the Fast Access Key on the front panel (All the Head).

- [041] Tooling head 4 active.

  Active if the single Tooling on the Work Head 4 Page is enable. It is active even used the Fast Access Key on the front panel (All the Head).

- [042] Feedback error channel 1.

  Active if:
  the analog input 1 is greater or equal 10000 mV and **Feedback Actuator** on Setup 1 Head 1 Page is OFF;
  the analog input 1 is greater or equal 10000 mV and **Feedback Actuator** on Setup 1 Head 1 Page is ON and contemporarily **Show Feedback** on Work Head 1 Page is ON.

- [043] Feedback error channel 2.

  Active if:
  the analog input 2 is greater or equal 10000 mV and **Feedback Actuator** on Setup 1 Head 2 Page is OFF;
  the analog input 2 is greater or equal 10000 mV and **Feedback Actuator** on Setup 1 Head 2 Page is ON and contemporarily **Show Feedback** on Work Head 2 Page is ON.

- [044] Feedback error channel 3.

  Active if:
  the analog input 3 is greater or equal 10000 mV and **Feedback Actuator** on Setup 1 Head 3 Page is OFF;
  the analog input 2 is greater or equal 10000 mV and **Feedback Actuator** on Setup 1 Head 3 Page is ON and contemporarily **Show Feedback** on Work Head 3 Page is ON.

- [045] Feedback error channel 4.

  Active if:
  the analog input 4 is greater or equal 10000 mV and **Feedback Actuator** on Setup 1 Head 4 Page is OFF;
  the analog input 2 is greater or equal 10000 mV and **Feedback Actuator** on Setup 1 Head 4 Page is ON and contemporarily **Show Feedback** on Work Head 4 Page is ON.

- [046] Machine not in automatic.

  Active if the Digital Input number 13 **Machine in automatic** is OFF.

- [047] Unloaded battery.

  Active with unloaded battery.

4.18.3 Function Keys.

DELETE   **DELETE:** Delete all the alarms. (With maximum level password)

MENU 1   **MENU 1:** Go to main menu 1.

4.19 Print on file.

It is possible to save on USB the selected page.

Pressing the softkey the page will change automatically and will appear the following bitmap on every pages.

When the bitmap disappear the file is saved on USB.

ATTENTION: don't change page during this operation.

To see the images on PC to use windows image browser or other program, but not Paint.

PARISON CONTROLLER

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