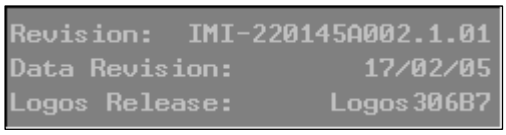
Manual IMI220-145A002/102

4 Channel 400 Point Modular Parison Controller

Revision History

Document Revision	Software Revision	Author	Date
Preliminary	***Preliminary***	L. Strabla, N. Frassine	6th December 2004
1.02	***1.02***	N. Frassine, R. Facchi	31st August 2005
MAN145-M-010201A	***2.01***	N. Frassine, R. Facchi	5th October 2005



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

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

Logos release: Release of Logos related to the actual application.

1 Installation

1.1 Installation Overview.

Since there are many makes, models and vintages of blow molding 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 4 Channel 400 Points Modular 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 "Sealtite" 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 chemicals.

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 Servo-valve 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 molding 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:

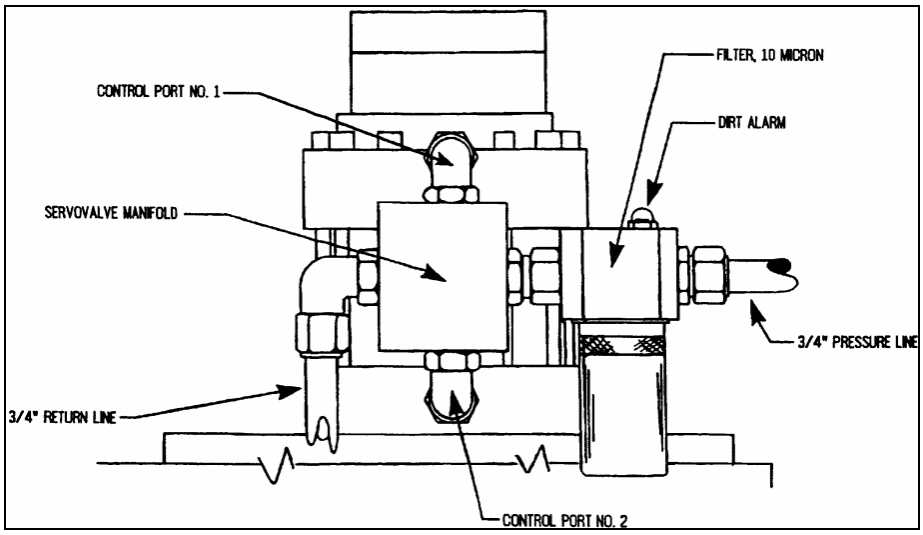


Figure 1

1.5 Servo-actuators.

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.

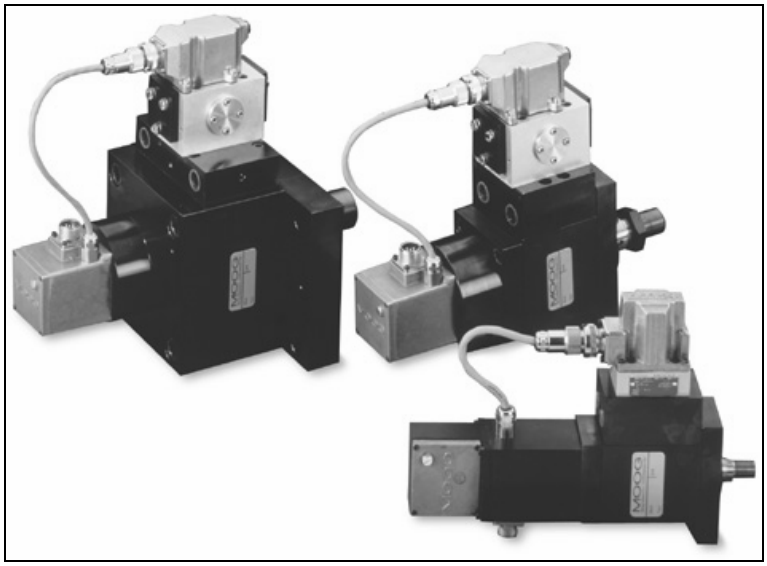


Figure 2

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 Transducer Installation.

The 4 Channel 400 Points Modular 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.

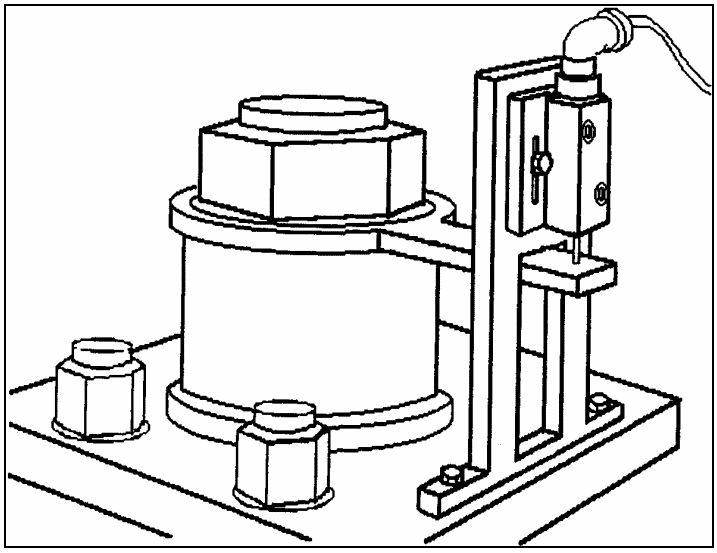


Figure 3

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.

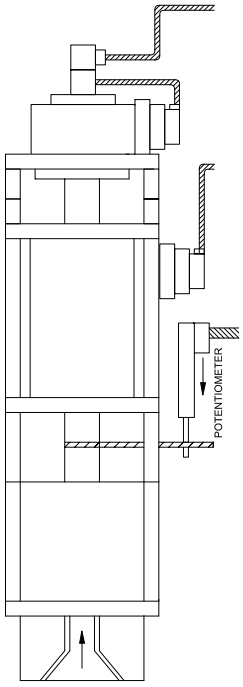
1.10 Linear Position Transducer (position based applications ONLY).

Since the profile is synchronized to the position of the push out ram, the 4 Channel 400 Points Modular 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 4 Channel 400 Points Modular 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.



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 6.5 inches set in the superior left quadrant of the panel and by groups of keys.
Under the display there are 8 Function keys (F1 ÷ F8).

The 4 Channel 400 Points Modular Parison Controller looks as follows:

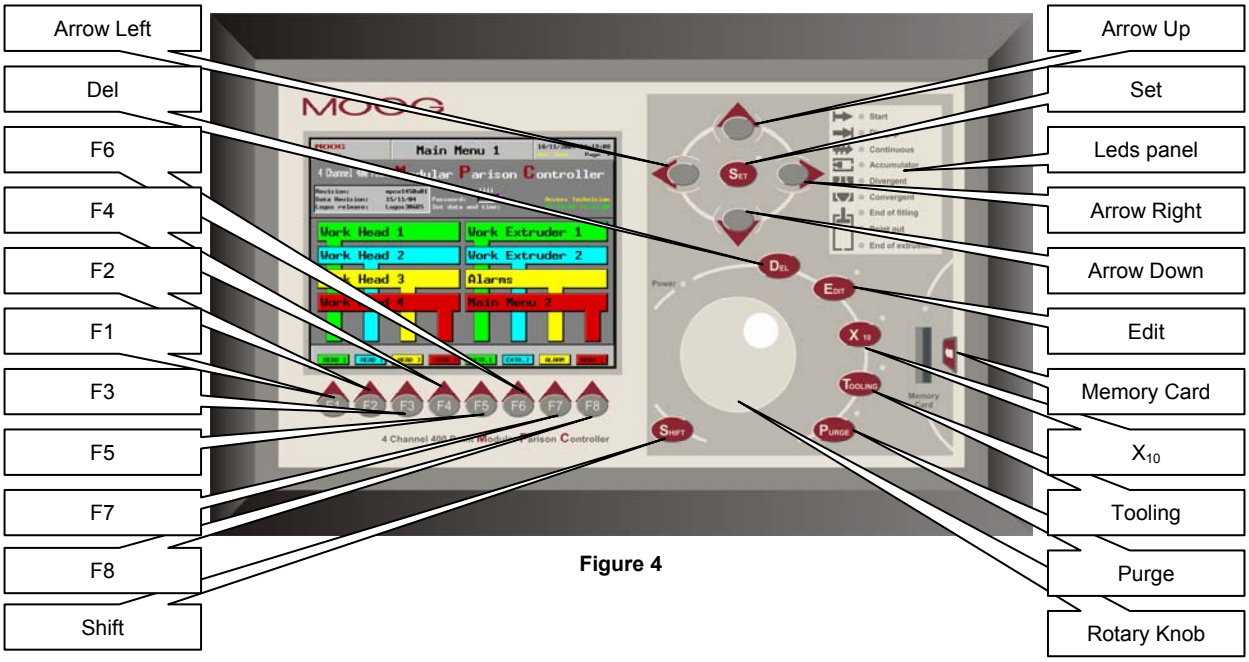
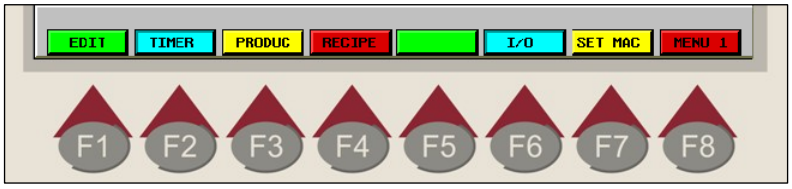


Figure 4

2.2 Keyboard.

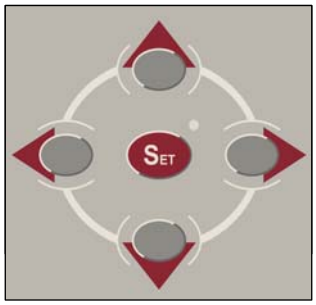
2.2.1 Functions Keys.

Functions Keys (**F1** to **F8**).
Every function key activates the suitable function if this is active (Black writing). The operation that can be activated by the function key vary from page to page.



In this case, for example, pressing the function key F3 it will lead to the production page, pressing the function key F4 it will lead to the recipe page, but pressing the function key F5 it won't have any effect.

2.2.2 Cursor Keys.



Cursor Keys:

Arrow up key

Arrow left key **Set Key** **Arrow right key**

Arrow down key

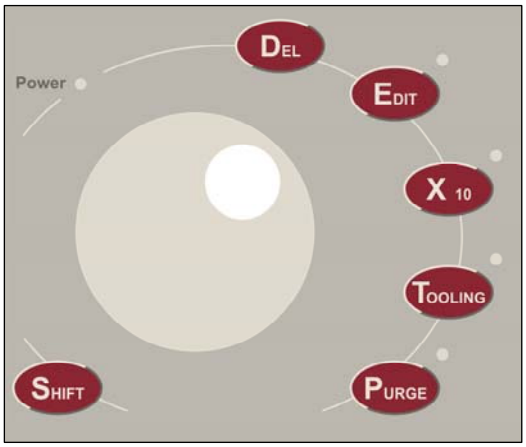
Set Key: ***This key confirms every operation.*** When a field is in variation (the led is turned on) it is necessary to press this key to confirm the operation.

Set Led: When a field is in variation with the insertion of a new data this led is lit until the key Set is pressed.

Arrow right or left key + Shift key: using *arrow right* or *left* key with *shift key* you will increase or decrease X1 the value of the field. If the function X10 is inserted the increase and the decrease will be 10, as the normal operation of the Entry Knob.

Arrow up or down key + Shift key: using *arrow up* or *down* key with *shift key* you will increase or decrease X10 the value of the field. If the function X10 is inserted the increase and the decrease will be 100, as the normal operation of the Entry Knob. Using *arrow up* or *down* key and *shift key* in the parison field the cursor moves among the masters.

2.2.3 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.

Power: With green LED on, the 4 Channel 400 Points modular Parison controller's power is on.

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 entry into the Parison field to edit the profile. The corresponding LED is ON. Push the Edit button again to skip out of editing Parison. The corresponding LED is OFF.
X_{10}: Increase the sensitivity of the entry knob by a factor of 10. When **X_{10}** is active the associated led is ON.

Tooling: This button allows movement of the heads to the tooling position as long as the key "TOOLING" is active.

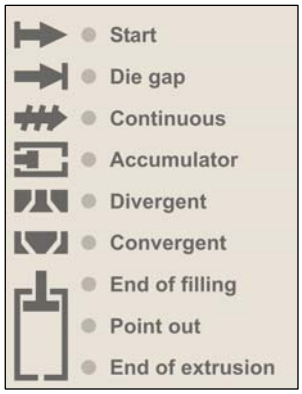
Purge: This button allows movement of the heads to the purge position as long as the key "PURGE" is active.

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

2.2.4 Memory Card.

Memory Card: Allows to manage the recipes on an external memory.

2.2.5 Display Leds panel.



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.

2.3 General page description.

2.3.1 Color assignment for all pages:

Green numbers or switch fields: are setpoint, can be reached by cursor and can be changed.
Green bargraphs show the value of a setpoint**.**
Yellow numbers show actual value.
Yellow bargraphs show actual value (feedback e.t.a.).
White fields are texts.

2.3.2 Page Header:

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:

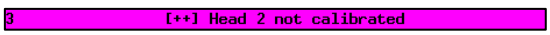
Lock: no password inserted.

Acc. Resp: Access Responsible Level on. For changing this password enter in Technical Level and enter in setup machine.

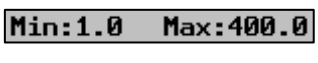
Acc. Tech: Access Technical Level on. This password is fixed by Moog.

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

2.3.3 Page Bottom:



Alarm line: If there are one or more alarms on the alarms page, the alarms are displayed at the bottom of each page. This line shows the last alarm and changes the back color depending on the priority. On the left of the text the number shows the alarms active at the moment.



Min and **Max: Minimum** and **maximum** are displayed in the status line. For example in the figure here on the left the minimum value of the field to introduce is 1.0, while the maximum is 400.0.

2.4 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 X 10 multiplication factor and entry knob. Confirm by **Set key**.

Boolean fields: switch to ON/OFF with rotate **Entry Knob**. In clockwise it is ON 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 desired character alphanumeric with the rotation of the **Entry Knob,** move to the right use the arrow key and insert the following character. When the string is completed confirm by **Set key**.

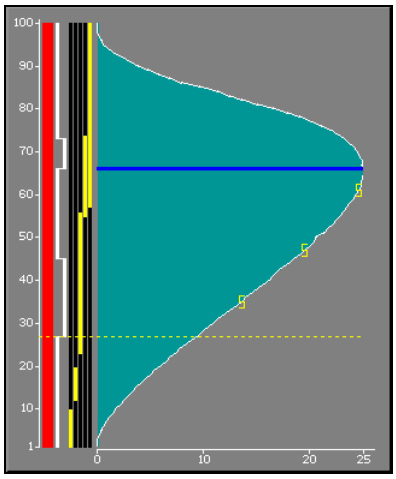
If a field need **not to be changed** (i.e. after typing a wrong number or changing the intention) move the cursor away.
When a field is in variation with the insertion of a new data the led near **Set Key** is lit and the field changes color.

2.5 The Parison field.

2.5.1 Field appearance.

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

Starting from left you can see:



- ***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.

2.5.2 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 color 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:

2.5.3 Normal functioning:

- arrows

- by pressing UP/DOWN arrow keys it's possible to move the cursor by a point upwards or downwards.
- by pressing LF/RH arrow 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.
- by pressing SHIFT+UP/DOWN arrow keys it's possible to move the cursor among the masters.

- 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.

2.5.4 Other possibilities.

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

- *Move cursor:* move the cursor up and down (default functioning).
- *Next master:* move the cursor among the masters.
- *Drag master:* drag the master up and down.
- *Next marker:* move the cursor among the markers (visible if select ON in Setup Machine Page).
- *Drag marker:* drag the marker up and down. (visible if select ON in Setup Machine Page)
- *Drag SM:* drag the Serial Marker up and down. (visible if select ON in Setup Machine Page)
- *Selects profile:* select a part of the profile.

it's possible to select an area of points (reverse mode): selection is active from previous master to next master.

- *Drag selection:* drag the selection up and down.

if an area is selected, it's possible to move it: if the motion meets a master, it will be cancelled.

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

- *Change value:* Rotate the knob to change the Value (default functioning).
- *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
- *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
- *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.
- *Setup SM:* Rotate the knob to setup the Serial Marker (if selected ON in Setup Machine Page).

2.5.5 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 cancel 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 cancel 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 (if selected ON in Setup Machine Page), these operations are allowed:
To modify the SM use F5 to select Vertical arrows as **"Drag SM"** and F6 to select Knob as **"Setup SM".**
The **SM** can be dragged using the arrows**.**

The turning ON/OFF of the SM can be programmed using the knob.

If it is programmed ON anywhere the cursor is moved the SM goes to ON. If it is programmed OFF anywhere the cursor is moved the SM is cancelled.

2.6 Functionality.

2.6.1 Safe Condition.

Necessary conditions to start issuing a new profile are: Temperature Ok ON, Emergencies ON, Alarm OFF, machine in automatic ON, Purge OFF and Tooling OFF

2.6.2 Language packages.

4 CHANNEL 400 POINT MODULAR PARISON CONTROLLER is available in two language packages: Occidental languages (application rev. IMI220145A**0**02.X.XX) or Oriental languages (application rev. IMI220145A**1**02.X.XX). It is possible to choose among more languages related to the software version that has been purchased.
Western languages include: English, German, French, Spanish, Portuguese, Danish, Russian, Turkish, Greek, Italian.
Eastern languages include: English, Japanese, Chinese.

2.6.3 Elements.

4 CHANNEL 400 POINT MODULAR 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.

It is possible to exchange the analog output polarity to ignore the actuator connection polarity. The default polarity value involves that increasing voltage values move the actuator downwards.

4 CHANNEL 400 POINT MODULAR 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.

4 CHANNEL 400 POINT MODULAR 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 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 set points 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 ON time for digital output depending on a manual command.

It is possible to setup the maximum ON time for digital output depending on a manual command.

It can manage a weekly timer switch to activate the machine heating system and it can manage a production counter.

2.6.4 Access.

4 CHANNEL 400 POINT MODULAR 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.

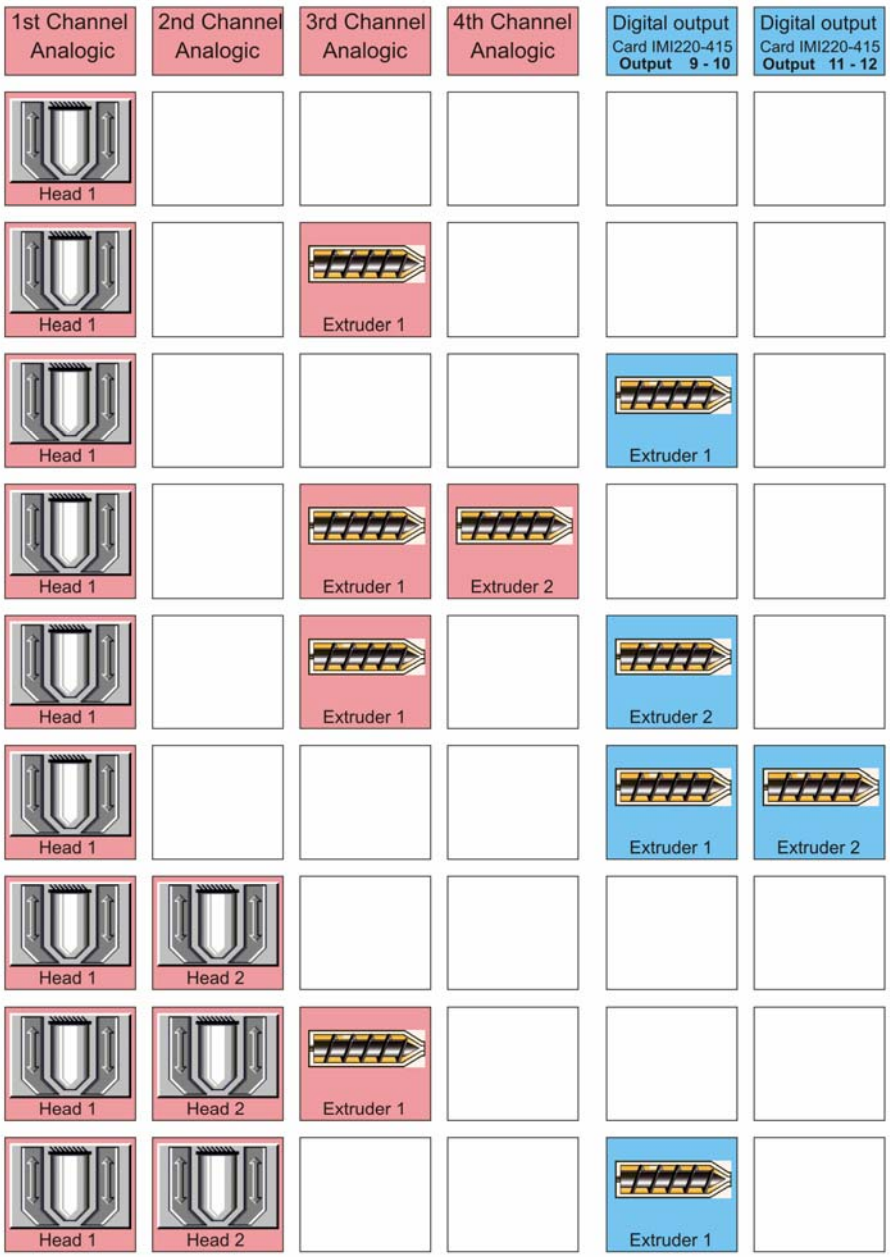
Access to levels 2 and 3 is password-protected. Level 2 persists at power down and power up, while level 3 does not.

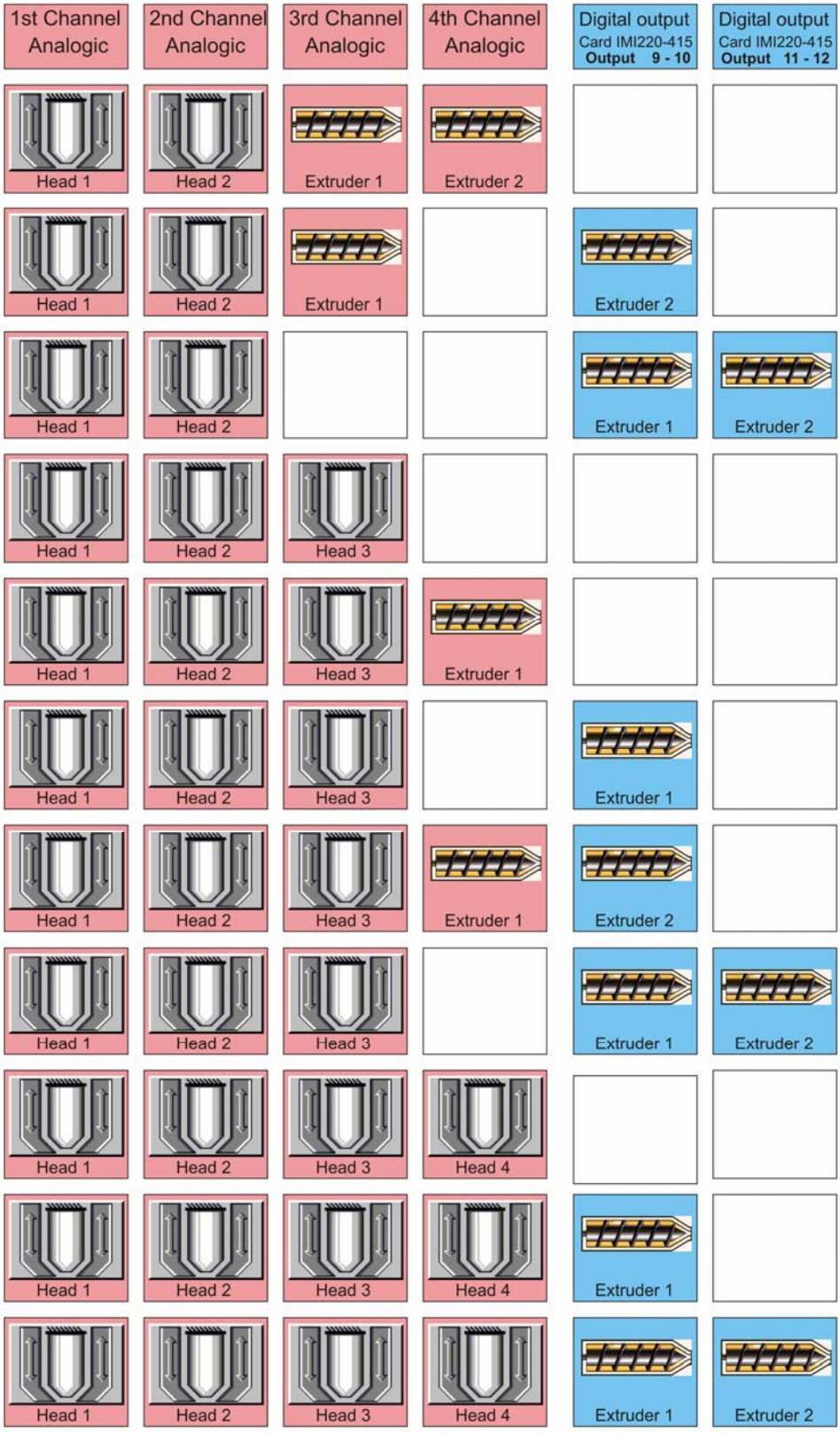
2.6.5 Machine configuration.

In the following figure it is possible to evaluate all the configurations supported by 4 CHANNEL 400 POINT MODULAR PARISON CONTROLLER (as continuous extrusion or position accumulator).

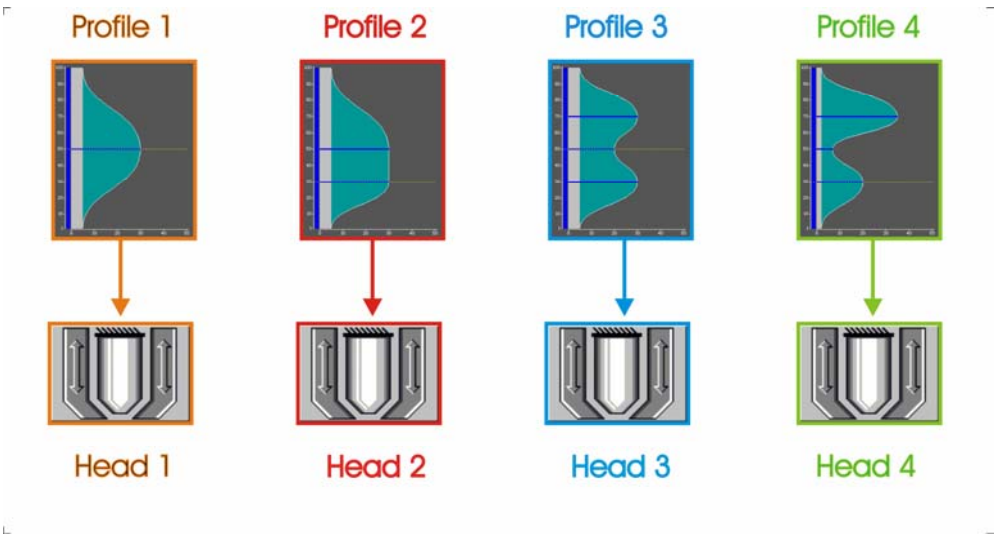
4 channel 400 point Modular Parison Controller can be configured to run in continuous extrusion with independent profiles, in continuous extrusion with unique profile, with accumulator position or with time accumulator.

2.6.6 Continuous Extrusion or Time Accumulator.

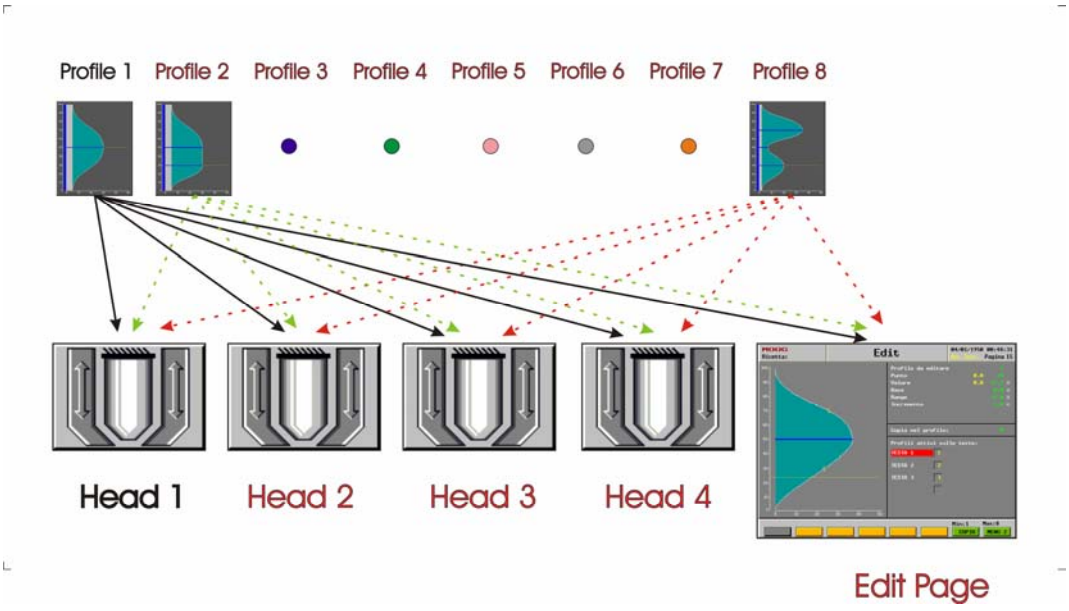



1st Channel Analogic
2nd Channel Analogic
3rd Channel Analogic
4th Channel Analogic
Digital output Card IMI220-415 Output 9 - 10
Digital output Card IMI220-415 Output 11 - 12
Head 1
Head 2
Extruder 1
Extruder 2
Head 3
Head 4

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.
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.

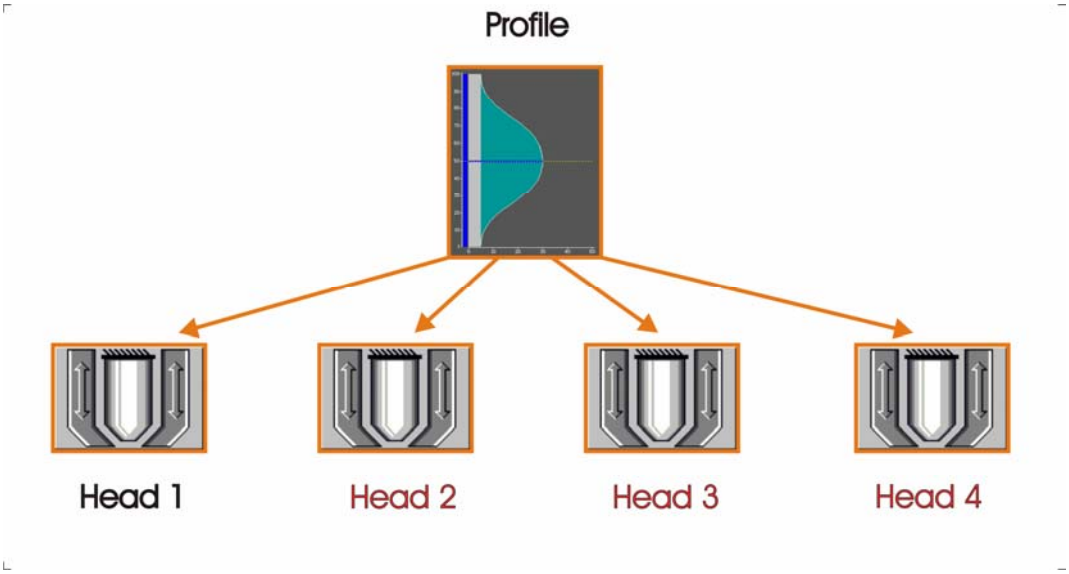


With the Continuous Extrusion to independent profiles every head has its own page of work to set the profile. If the function **Free Profiles Assignment is not enabled** (see Setup Machine Page) the assignment of the profiles is fixed (head 1 = profile 1; head 2 = profile 2, etc.). You see the figure above.



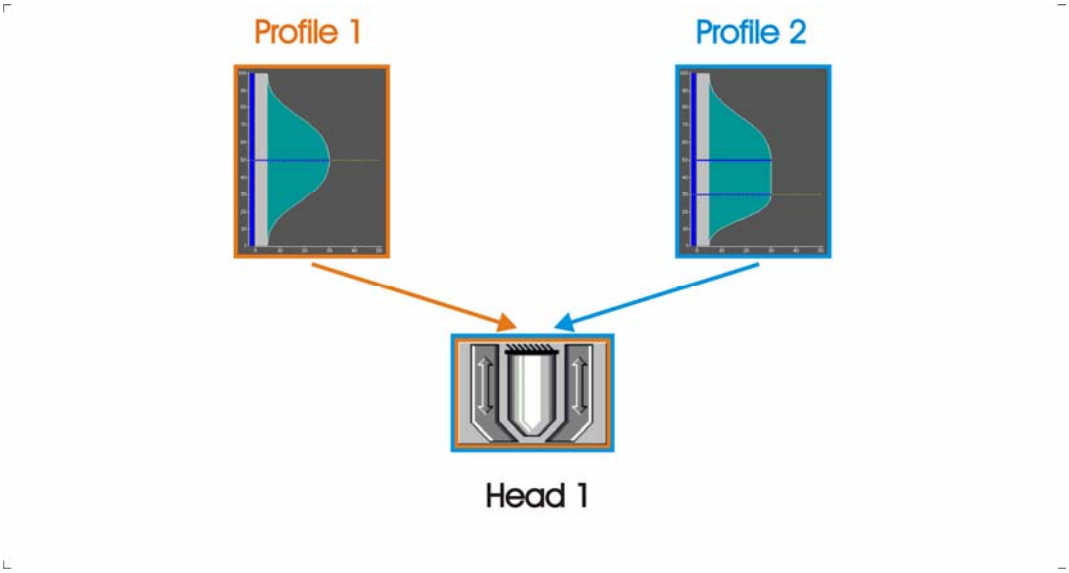
If the function **Free Profiles Assignment is enabled (full edit mode)** (see Setup Machine Page) is it is possible to assign a profile choosing among 8 profiles.
The 8 profiles can be displayed, modified and copied (if they are not already active on some head) in the Edit page. In “full edit” mode there is an additional page to edit the profiles and to know which profile each regulator is using. You see the figure above.

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.



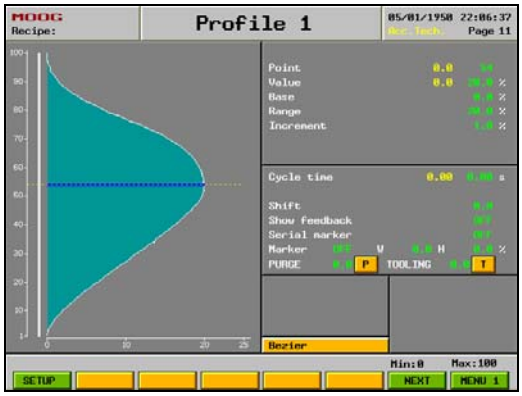
There is only one work page (Profile) and more setup page of setup for the calibration of the used heads.
In the work page it is possible to change the weight of the profile for every single head.
The markers are active only on the head 1.
You see the figure above.

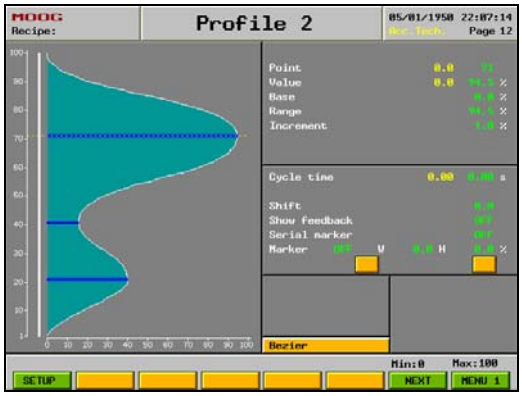
In continuous extrusion with unique profile and with **only one head** it is possible to enable the **alternate parison** functions.
Every profile has the start signal, the cycle time and the correction independent.



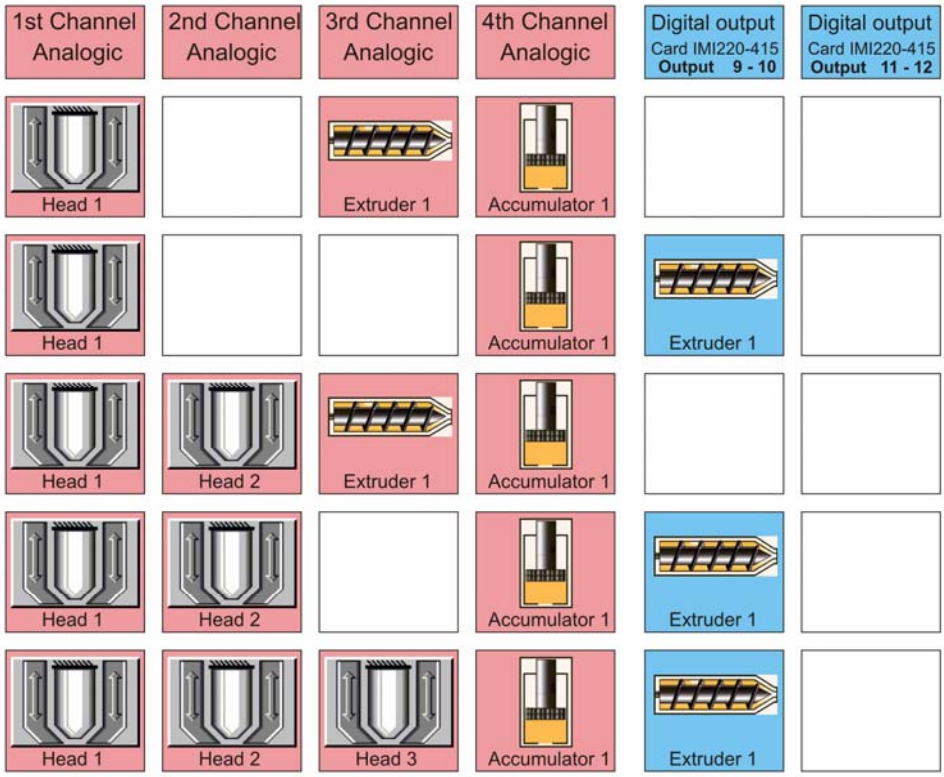
Example alternate profile:

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.

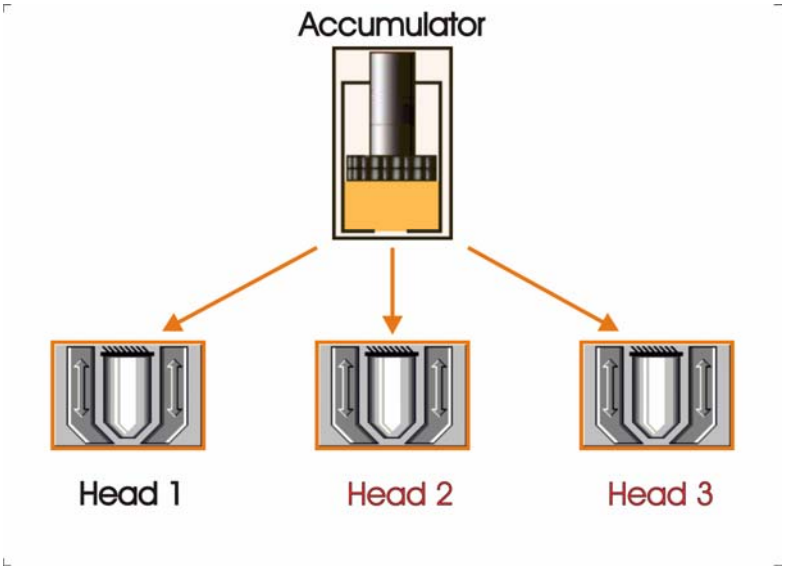




2.6.7 Position Accumulator.



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.



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. Thickness regulators work with independent profiles.

- **Cycle time automatic correction not enabled**: this is given by a fixed setpoint.
- **Cycle time automatic correction enabled:** it is measured the time between rise front of start1 signal and its descent front. The time measured becomes the setpoint for 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 start descent front is received before the end of current profile, this is interrupted. If the start descent front is received after profile end, the last point value is kept at output.

2.6.8 Control timing.

The close loop sampling time normally works every 4 ms.
In continuous extrusion with only one head the control is faster (only 2 ms).

3 Hardware Description.

3.1 4 channel 400 point Modular Parison Controller Rack based 400 Series (Rear).

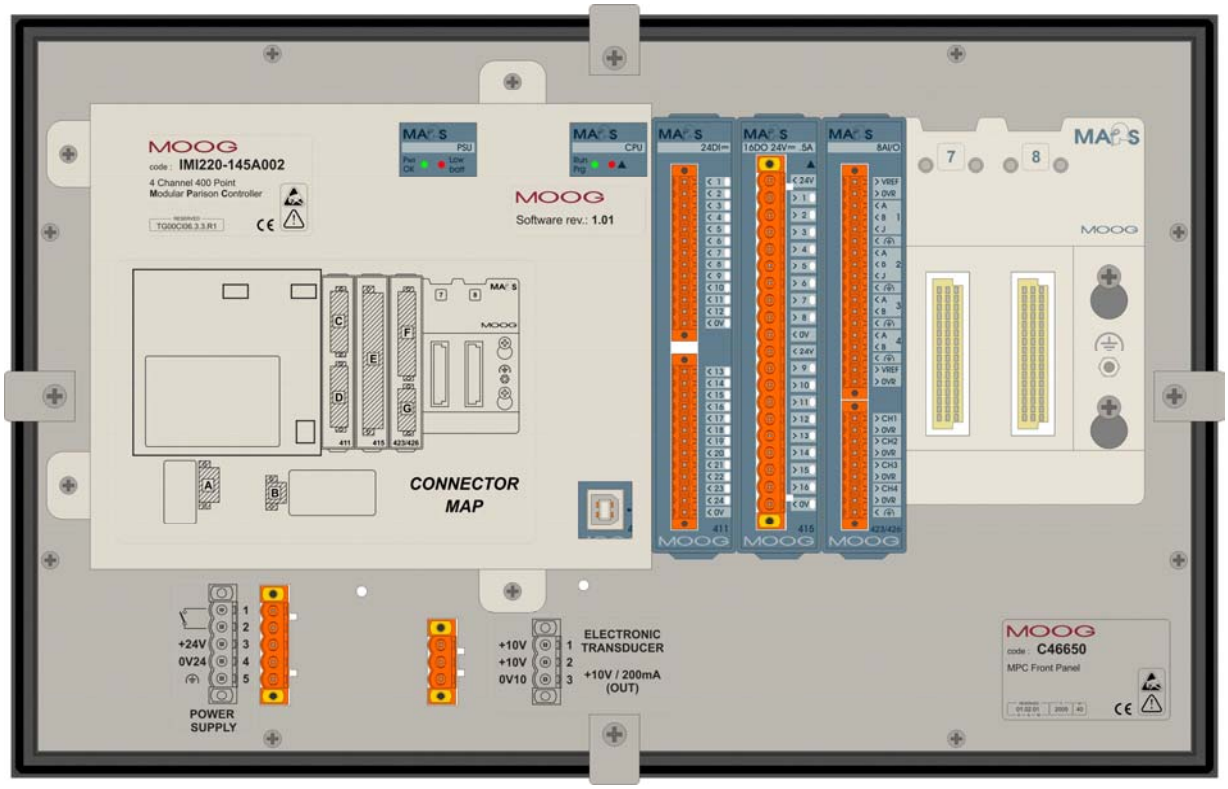
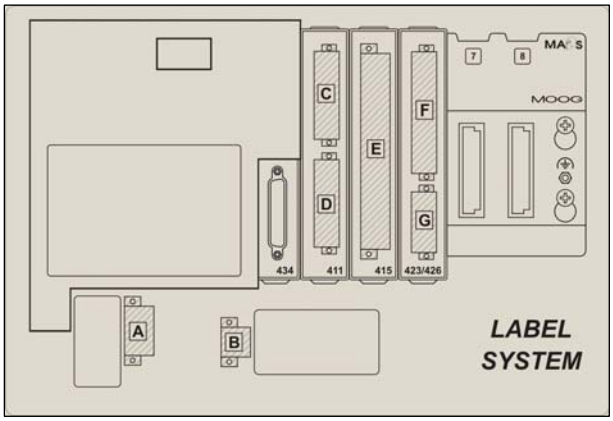


Figure 5

Place 1 **Card IMI220-405A001** (Power Supply Unit).
Place 2/3 **Card IMI220-434D001** (CPU card + Video card).
Place 4 **Card IMI220-411A001** (24 Digital Input card).
Place 5 **Card IMI220-415A001** (16 Digital Output 24V 0.5A card).
Place 6 **Card IMI220-423A001** (8 Analog Input/Output 16/14 Bit).

Code: Ordering code (i.e.: 145 – Product Code; A – Release Level; 002 – Language and hardware equipment).

Software Rev.: Software revision.



Label system: Description of the position of the connectors.
A: Power Supply.
B: Electronic trasducer power
C: Digital input 1 -12.
D: Digital input 13 – 24.
E: Digital output.
F: Analog input.
G: Analog output.

Power Supply: Connector **A**.

1

5

N°	Signal
1	NO (Normal Open)
2	C (Common)
3	+ 24V
4	0V24
5	GROUND

Electronic Trasducer: Connector **B**.

1

3

N°	Signal
1	+ 10V (out)
2	+ 10V (out)
3	0V10 (out)

3.2 Digital Input (Card IMI220-411A001).

Pin n°	Input n°	Name	Description
		CONNECTOR "**C**"	
1	< 1	Start profile group 1	Profile start signal for group 1 regulators
2	< 2	Photocell parison group 1	Measure signal of parison length for group 1 regulators
3	< 3	Mould ready group 1	Signal for mould ready to collect group 1 parisons
4	< 4	Purge group 1	External enable of group 1 purge
5	< 5	Start profile group 2	Profile start signal for group 2 regulators
6	< 6	Photocell parison group 2	Measure signal of parison length for group 2 regulators
7	< 7	Mould ready group 2	Signal for mould ready to collect group 2 parisons
8	< 8	Purge group 2	External enable of group 2 purge
9	< 9	Stand by die gap	Die gap closing signal during accumulation phases
10	< 10	Temperature OK	Operation enable of regulators and extruders
11	< 11	Emergency	Operation enable
12	< 12	Presence alarm in machine	Indication of machine alarm pieces
13	< 0V	**< 0V**	
		CONNECTOR "**D**"	
1	< 13	Machine in automatic	Indication of machine in automatic or manual mode
2	< 14	Piece discard	Decrease of produces pieces caused by a rejection
3	< 15	-	Not used.
4	< 16	-	Not used.
5	< 17	-	Not used.
6	< 18	-	Not used.
7	< 19	-	Not used.
8	< 20	-	Not used.
9	< 21	-	Not used.
10	< 22	-	Not used.
11	< 23	-	Not used.
12	< 24	-	Not used.
13	< 0V	**< 0V**	

3.3 Digital Output (Card IMI220-415A001).

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

3.4 Analog Input/Output (Card IMI220-423A001).

Pin n°	Name	Description
	CONNECTOR "**F**" (ANALOG INPUT)	
1	> VREF	+10V power for sensors to be powered up.
2	> 0VR	0V reference analog input.
3	< A1	Positive analog input 1.
4	< B1	Negative analog input 1.
5	< J1	Current analog input 1.
6	< GND	Ground signal for connecting ground and shield
7	< A2	Positive analog input 2.
8	< B2	Negative analog input 2.
9	< J2	Current analog input 2.
10	< GND	Ground signal for connecting ground and shield
11	< A3	Positive analog input 3.
12	< B3	Negative analog input 3.
13	< GND	Ground signal for connecting ground and shield
14	< A4	Positive analog input 4.
15	< B4	Negative analog input 4.
16	< GND	Ground signal for connecting ground and shield
17	> VREF	+10V power for sensors to be powered up.
18	> 0VR	0V reference analog input.

Pin n°	Name	Description
	CONNECTOR "**G**" (ANALOG OUTPUT)	
1	> CH1	Analog output signal 1.
2	> 0VR	0V reference for analog output 1.
3	> CH2	Analog output signal 2.
4	> 0VR	0V reference for analog output 2.
5	> CH3	Analog output signal 3.
6	> 0VR	0V reference for analog output 3.
7	> CH4	Analog output signal 4.
8	> 0VR	0V reference for analog output 4.
9	< GND	Ground signal for connecting ground and shield.

3.5 Wiring.

Wiring for continuos extrusion with Moog servoactuator (Integrated Electronic Type 15Vdc).

Wiring for continuos extrusion with Moog servoactuator (Integrated Electronic Type 24Vdc).

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

Wiring for accumulator head with Moog servoactuator (Integrated Electronic Type 24Vdc).

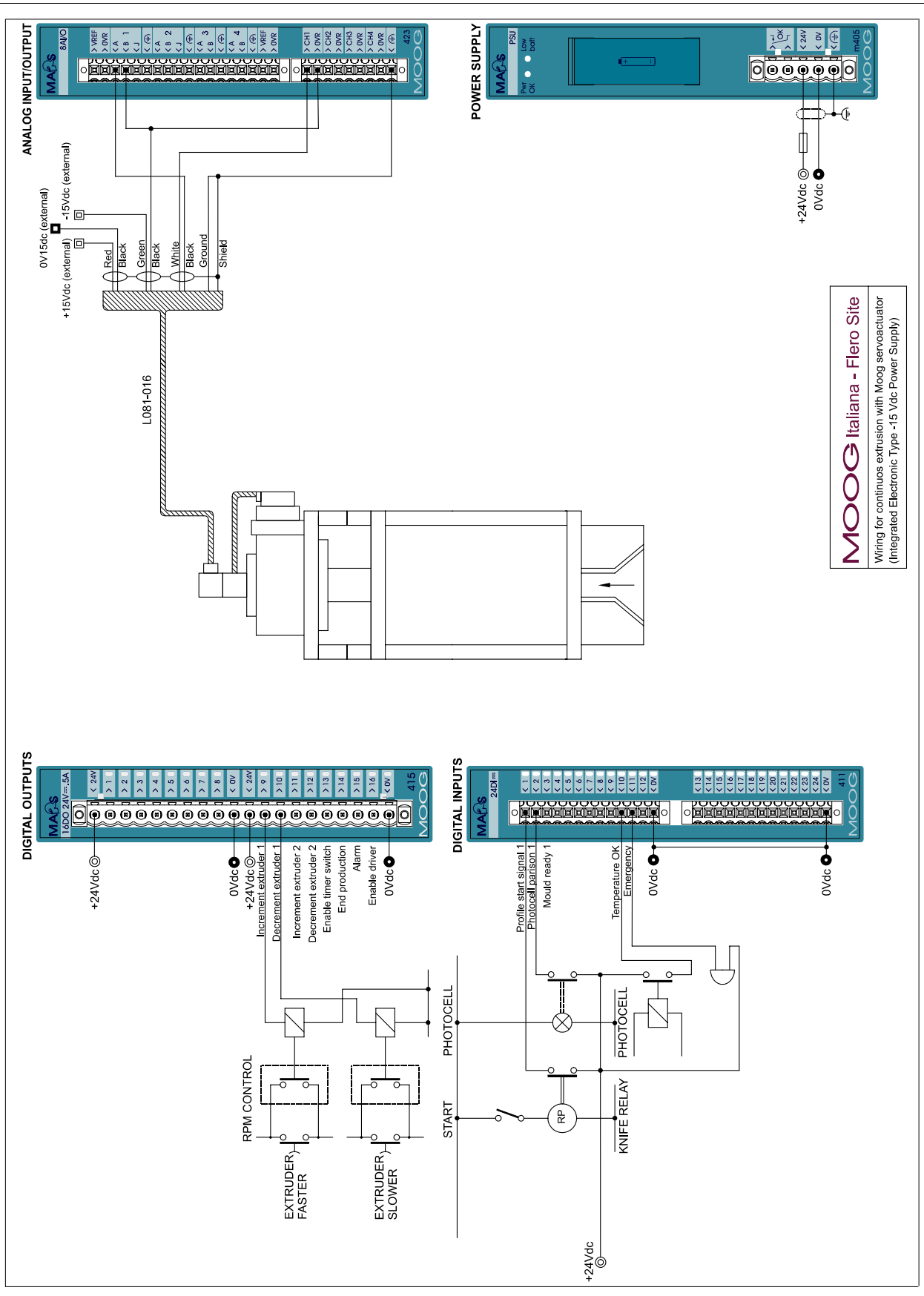
Wiring for continuos extrusion with customer actuator.

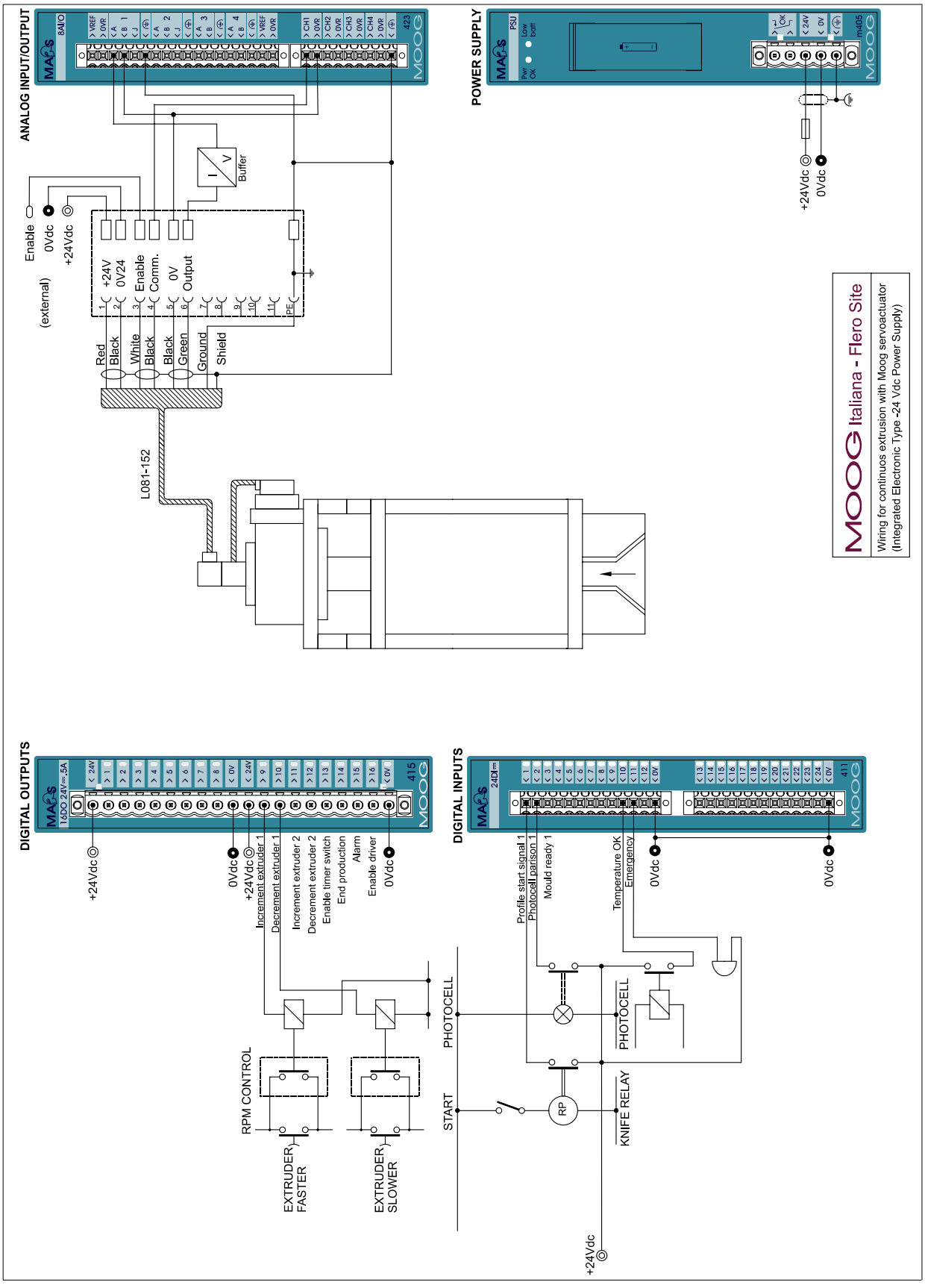
Wiring for accumulator head with customer actuator.

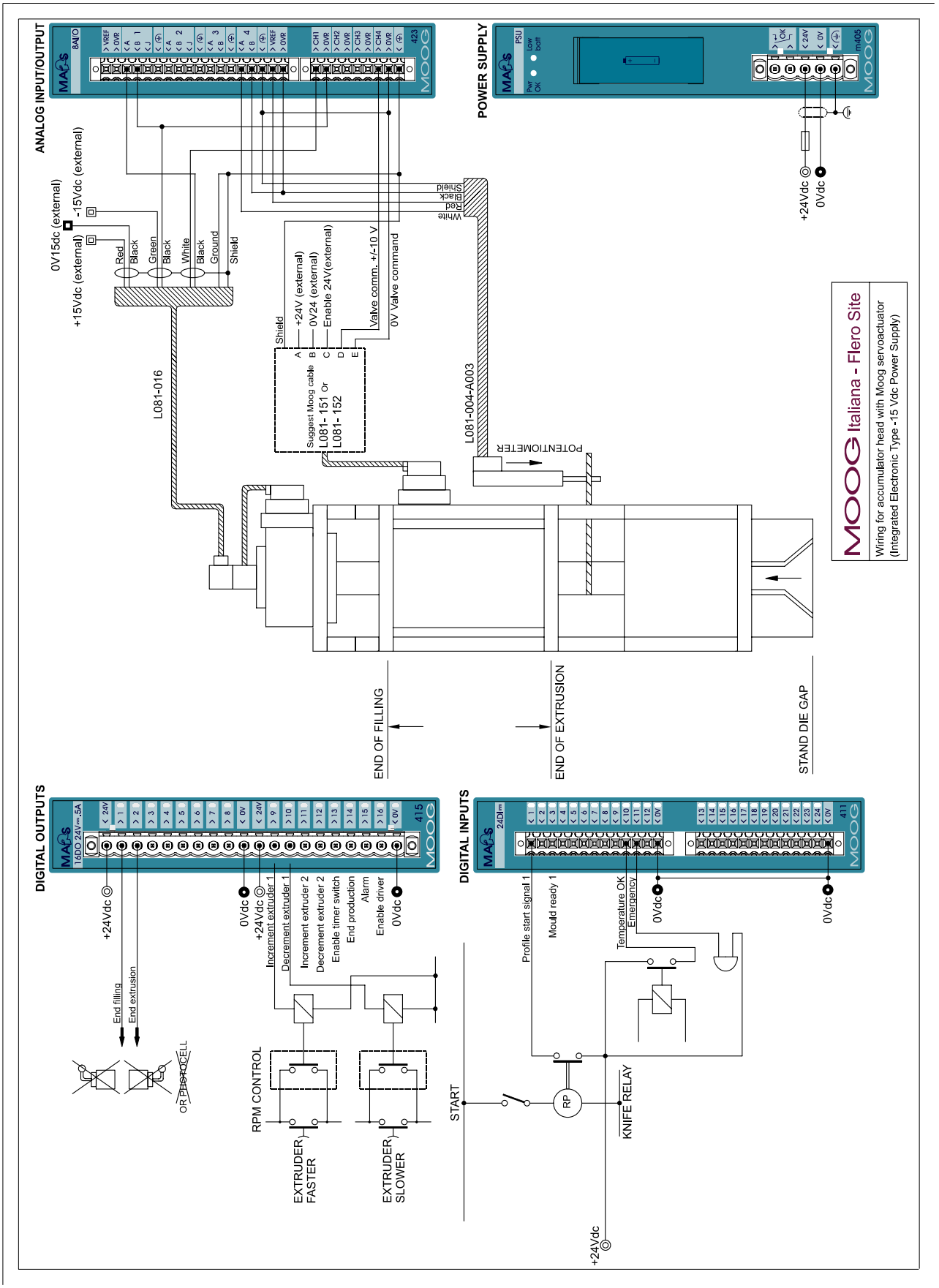
Wiring for continuos extrusion with Moog actuator (With DCDT Type).

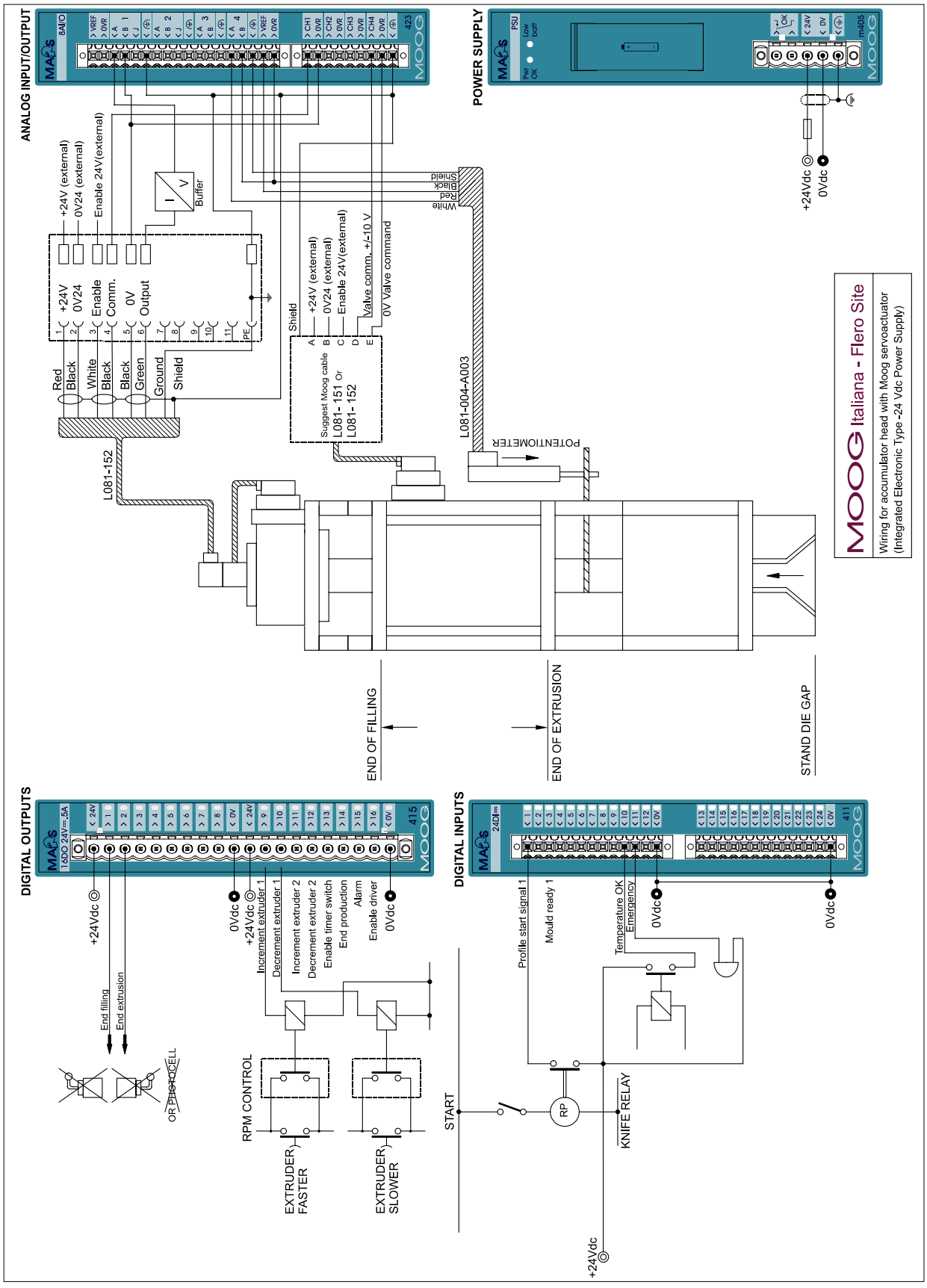
Wiring for accumulator head with Moog actuator (With DCDT Type).

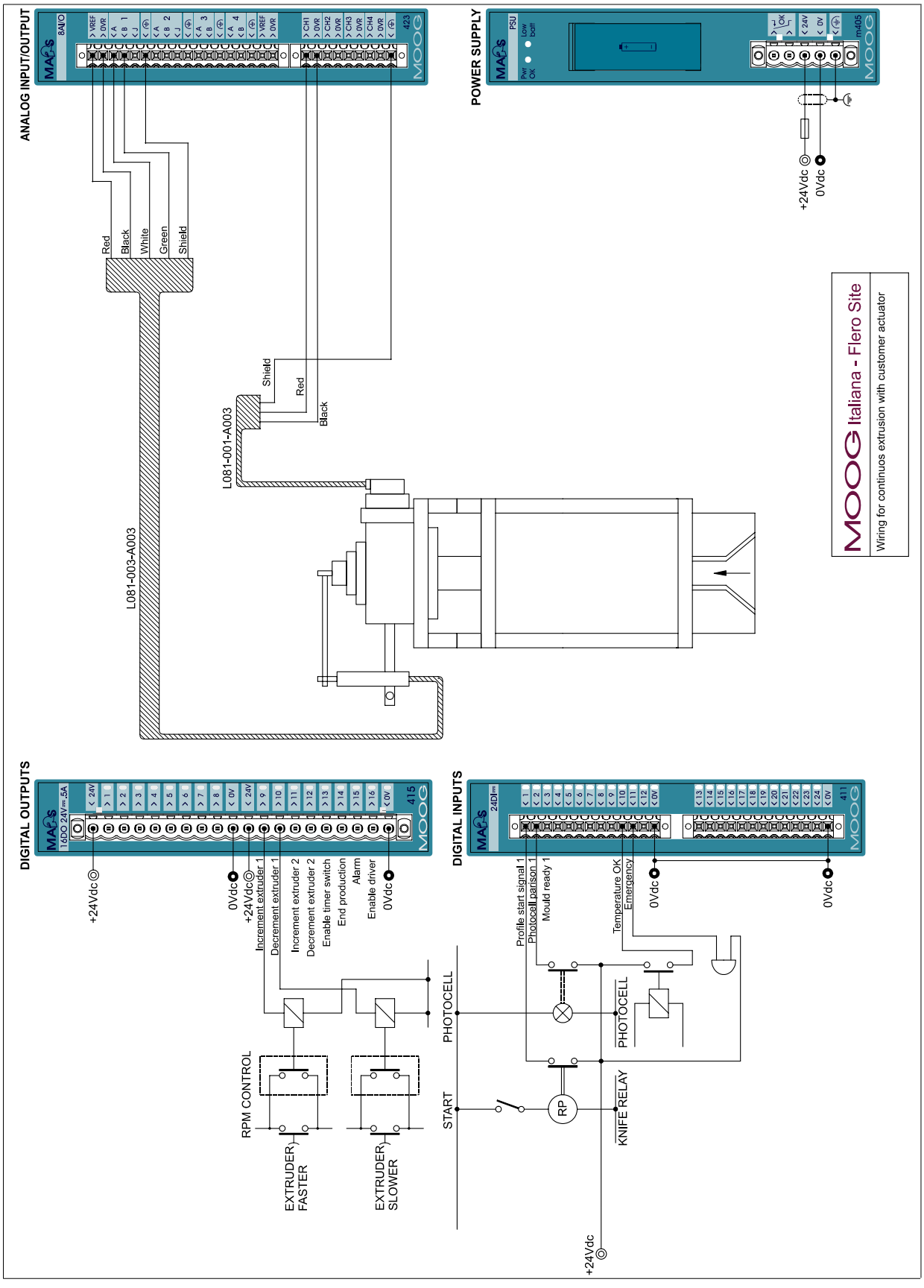
Wiring for continuos extrusion Moog EMA L875-XXX.

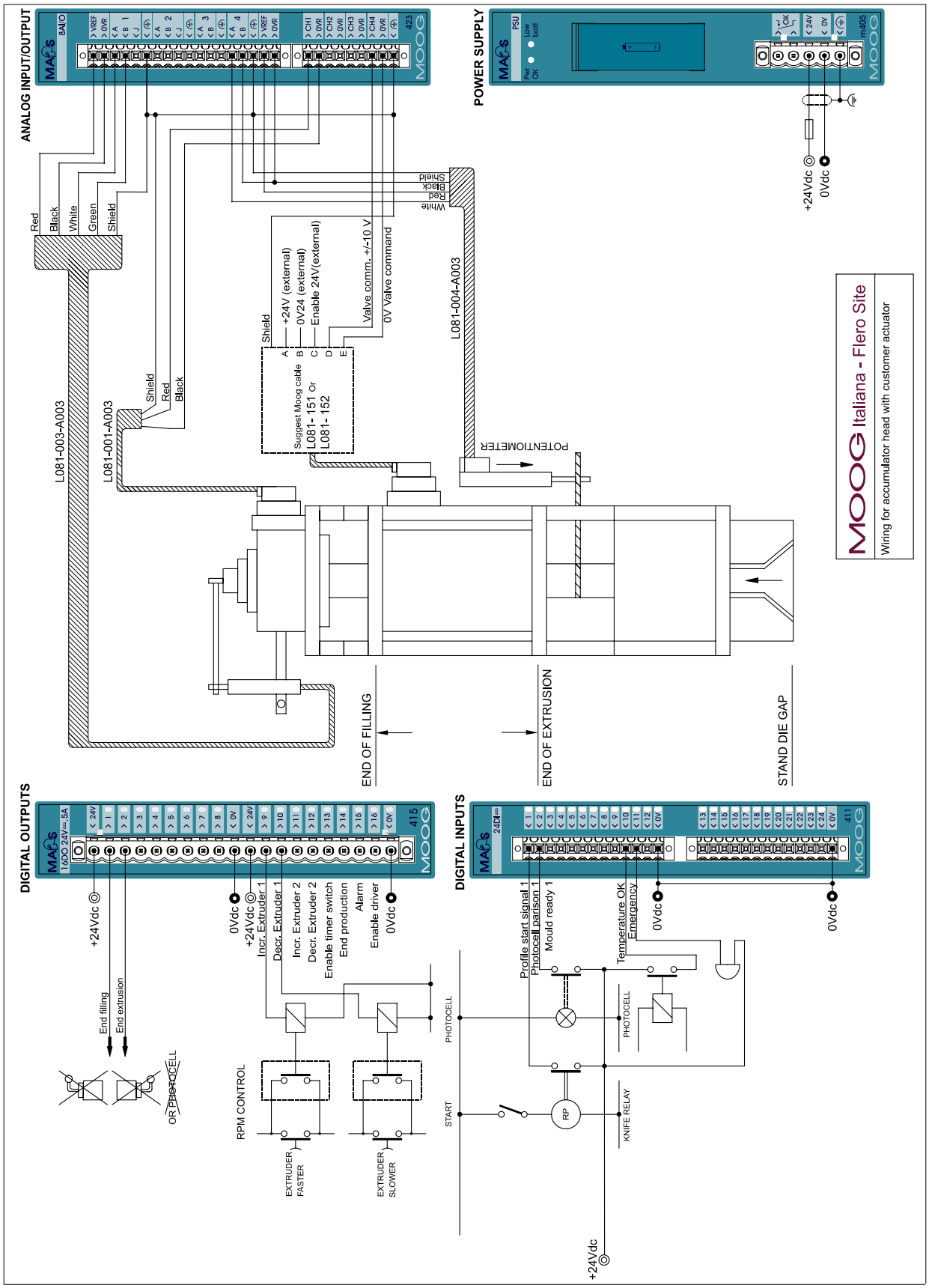

ANALOG INPUT/OUTPUT
POWER SUPPLY
DIGITAL OUTPUTS
DIGITAL INPUTS
0V15dc (external)
-15Vdc (external)
+15Vdc (external)
Red
Black
Green
Black
White
Black
Ground
Shield
L081-016
+24Vdc
0Vdc
Increment extruder 1
Decrement extruder 1
Increment extruder 2
Decrement extruder 2
Enable timer switch
End production
Alarm
Enable driver
Profile start signal 1
Photocell parison 1
Mould ready 1
Temperature OK
Emergency
RPM CONTROL
EXTRUDER FASTER
EXTRUDER SLOWER
PHOTOCELL
START
RP
KNIFE RELAY
MOOG Italiana - Flero Site
Wiring for continuos extrusion with Moog servoactuator
(Integrated Electronic Type -15 Vdc Power Supply)

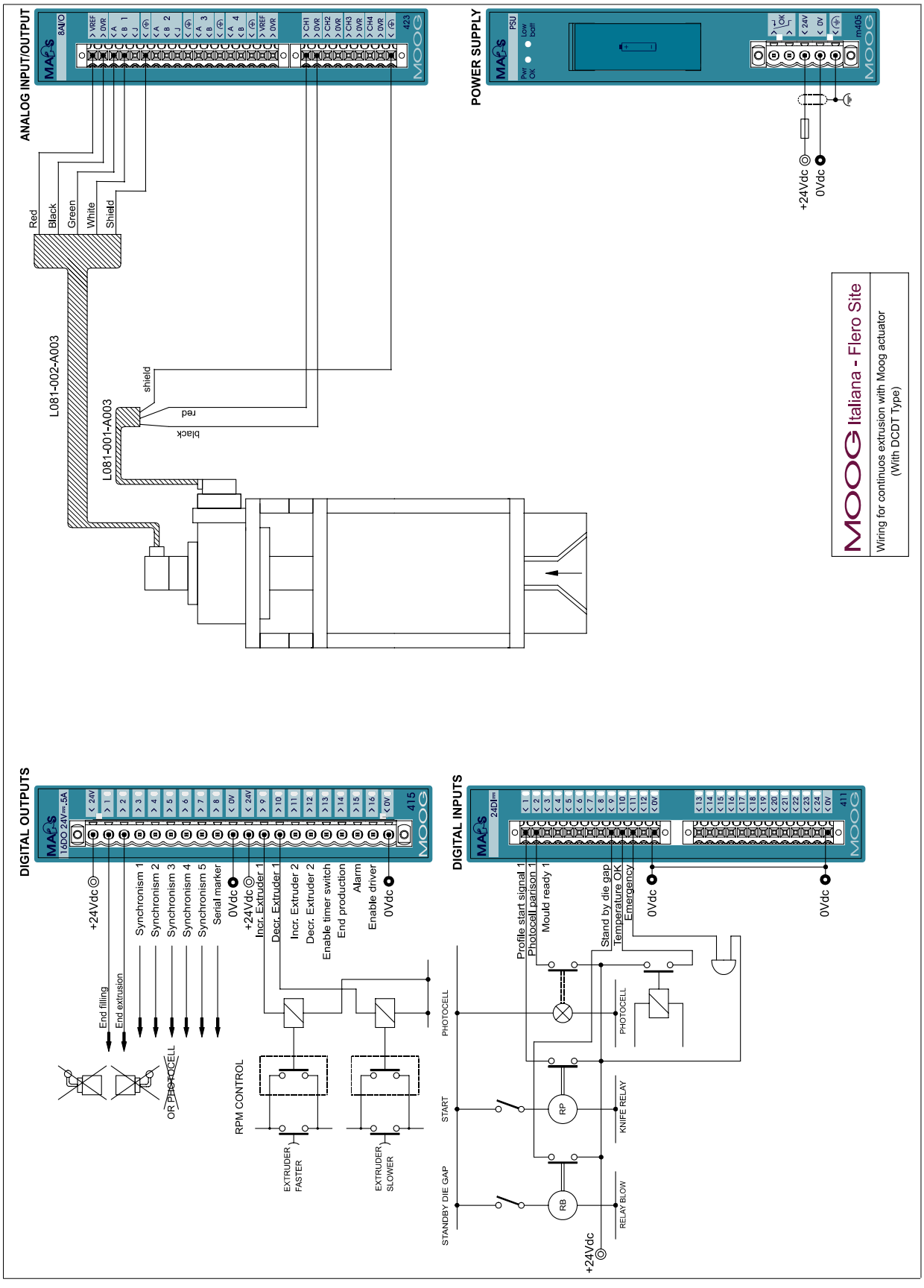

ANALOG INPUT/OUTPUT
POWER SUPPLY
DIGITAL OUTPUTS
DIGITAL INPUTS
Enable
0Vdc
+24Vdc
(external)
Buffer
+24V
0V24
Enable Comm.
0V
Output
Red
Black
White
Black
Black
Green
Ground
Shield
PE
L081-152
+24Vdc
0Vdc
Increment extruder 1
Decrement extruder 1
Increment extruder 2
Decrement extruder 2
Enable timer switch
End production
Alarm
Enable driver
Profile start signal 1
Photocell parison 1
Mould ready 1
Temperature OK
Emergency
RPM CONTROL
EXTRUDER FASTER
EXTRUDER SLOWER
PHOTOCELL
START
RP
KNIFE RELAY
MOOG Italiana - Flero Site
Wiring for continuos extrusion with Moog servoactuator
(Integrated Electronic Type -24 Vdc Power Supply)

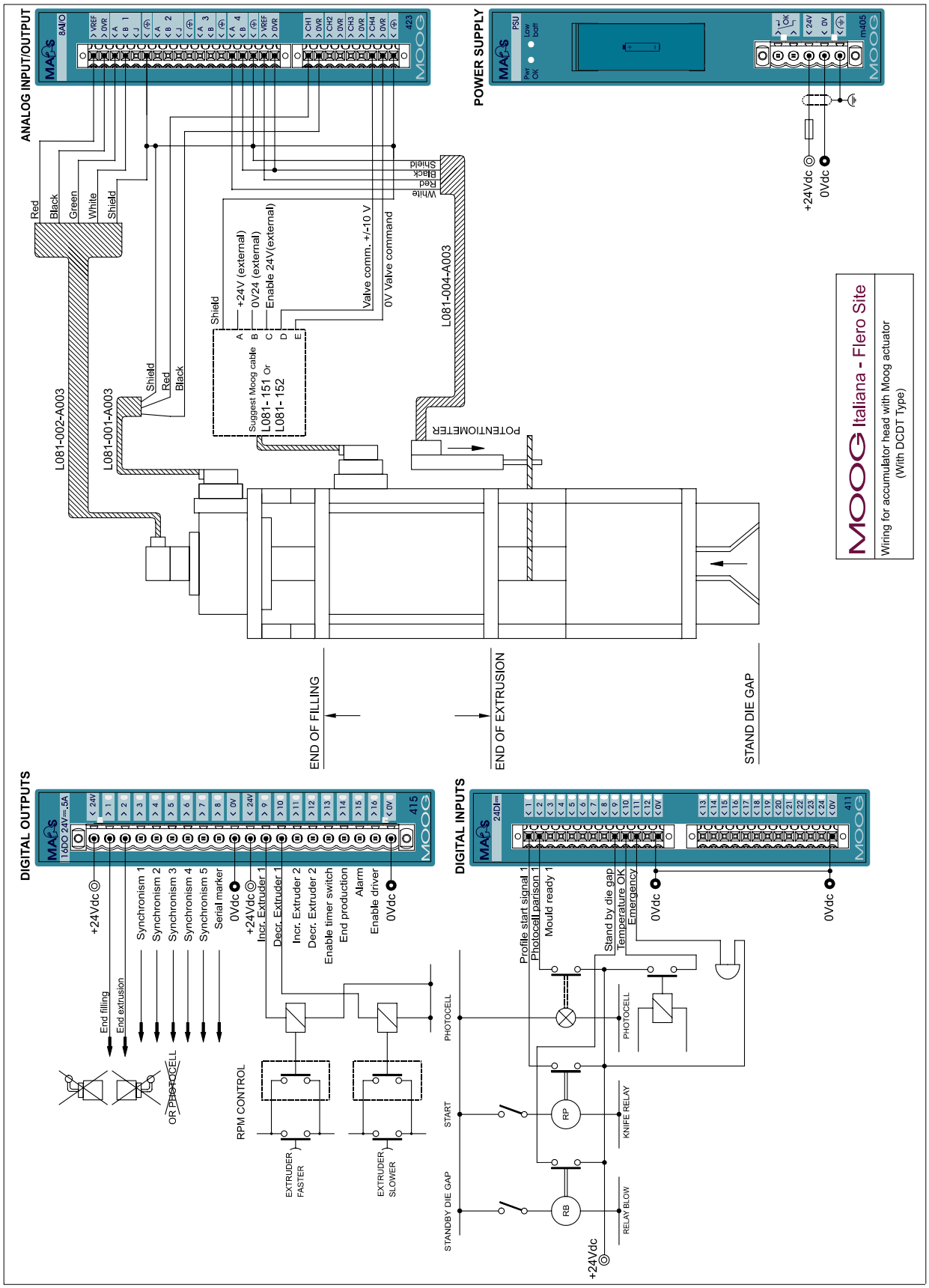

ANALOG INPUT/OUTPUT
POWER SUPPLY
0V15dc (external)
-15Vdc (external)
+15Vdc (external)
Red
Black
Green
Black
White
Black
Ground
Shield
L081-016
Shield
+24V (external)
0V24 (external)
Enable 24V(external)
Valve comm. +/-10 V
0V Valve command
Suggest Moog cable
L081- 151 Or
L081- 152
White
Red
Black
Shield
L081-004-A003
POTENTIOMETER
+24Vdc
0Vdc
MOOG Italiana - Flero Site
Wiring for accumulator head with Moog servoactuator
(Integrated Electronic Type -15 Vdc Power Supply)
END OF FILLING
END OF EXTRUSION
STAND DIE GAP
DIGITAL OUTPUTS
DIGITAL INPUTS
+24Vdc
End filling
End extrusion
OR PHOTOCELL
0Vdc
+24Vdc
Increment extruder 1
Decrement extruder 1
Increment extruder 2
Decrement extruder 2
Enable timer switch
End production
Alarm
Enable driver
0Vdc
RPM CONTROL
EXTRUDER FASTER
EXTRUDER SLOWER
Profile start signal 1
Mould ready 1
Temperature OK
Emergency
0Vdc
0Vdc
START
RP
KNIFE RELAY
+24Vdc

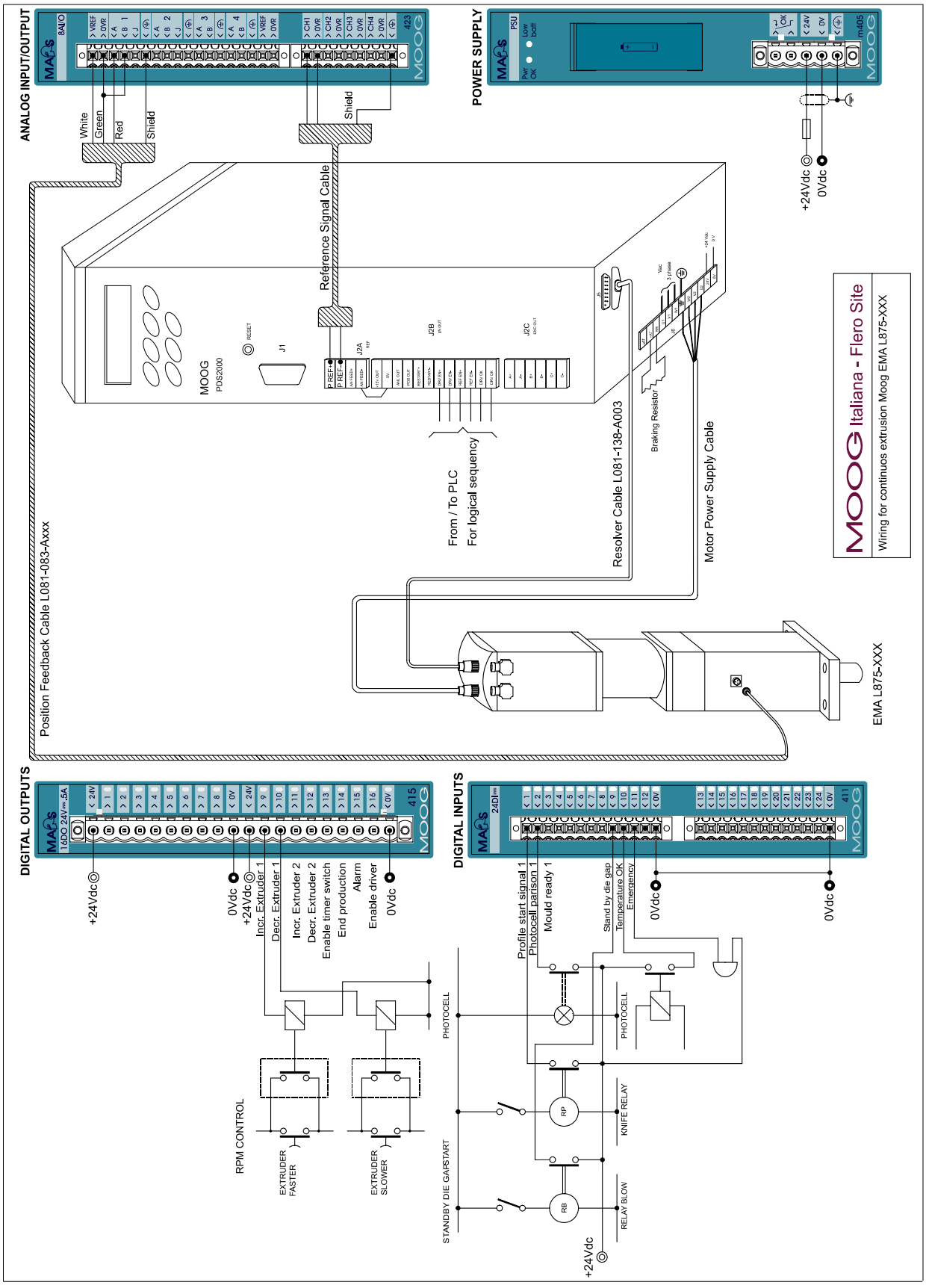

ANALOG INPUT/OUTPUT
POWER SUPPLY
DIGITAL OUTPUTS
DIGITAL INPUTS
+24V (external)
0V24 (external)
Enable 24V(external)
Buffer
+24V
0V24
Enable Comm.
0V
Output
Red
Black
White
Black
Black
Green
Ground
Shield
L081-152
Shield
Suggest Moog cable L081- 151 Or L081- 152
Valve comm. +/-10 V
0V Valve command
White
Red
Black
Shield
L081-004-A003
POTENTIOMETER
+24Vdc
0Vdc
MOOG Italiana - Flero Site
Wiring for accumulator head with Moog servoactuator
(Integrated Electronic Type -24 Vdc Power Supply)
END OF FILLING
END OF EXTRUSION
STAND DIE GAP
End filling
End extrusion
OR PHOTOCELL
Increment extruder 1
Decrement extruder 1
Increment extruder 2
Decrement extruder 2
Enable timer switch
End production
Alarm
Enable driver
RPM CONTROL
EXTRUDER FASTER
EXTRUDER SLOWER
Profile start signal 1
Mould ready 1
Temperature OK
Emergency
START
RP
KNIFE RELAY


ANALOG INPUT/OUTPUT
POWER SUPPLY
DIGITAL OUTPUTS
DIGITAL INPUTS
Red
Black
White
Green
Shield
L081-001-A003
L081-003-A003
+24Vdc
0Vdc
Increment extruder 1
Decrement extruder 1
Increment extruder 2
Decrement extruder 2
Enable timer switch
End production
Alarm
Enable driver
Profile start signal 1
Photocell parison 1
Mould ready 1
Temperature OK
Emergency
RPM CONTROL
EXTRUDER FASTER
EXTRUDER SLOWER
PHOTOCELL
START
RP
KNIFE RELAY
MOOG Italiana - Flero Site
Wiring for continuos extrusion with customer actuator

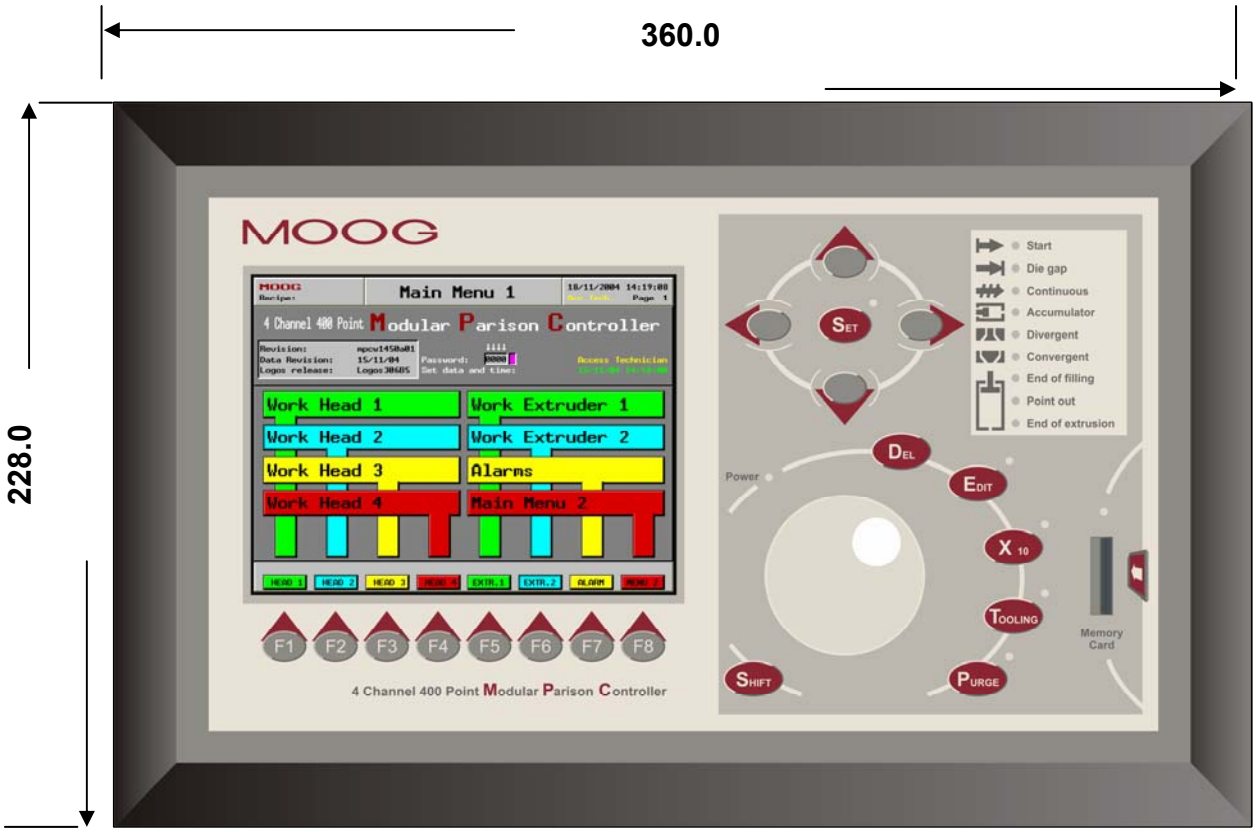

ANALOG INPUT/OUTPUT
POWER SUPPLY
DIGITAL OUTPUTS
DIGITAL INPUTS
Red
Black
White
Green
Shield
L081-003-A003
L081-001-A003
L081-004-A003
Suggest Moog cable
L081- 151 Or
L081- 152
+24V (external)
0V24 (external)
Enable 24V(external)
Valve comm. +/-10 V
0V Valve command
POTENTIOMETER
+24Vdc
0Vdc
END OF FILLING
END OF EXTRUSION
STAND DIE GAP
MOOG Italiana - Flero Site
Wiring for accumulator head with customer actuator
End filling
End extrusion
OR PHOTOCELL
RPM CONTROL
EXTRUDER FASTER
EXTRUDER SLOWER
Incr. Extruder 1
Decr. Extruder 1
Incr. Extruder 2
Decr. Extruder 2
Enable timer switch
End production
Alarm
Enable driver
Profile start signal 1
Photocell parison 1
Mould ready 1
Temperature OK
Emergency
PHOTOCELL
START
RP
KNIFE RELAY


ANALOG INPUT/OUTPUT
POWER SUPPLY
DIGITAL OUTPUTS
DIGITAL INPUTS
Red
Black
Green
White
Shield
L081-002-A003
L081-001-A003
shield
red
black
+24Vdc
0Vdc
MOOG Italiana - Flero Site
Wiring for continuos extrusion with Moog actuator
(With DCDT Type)
Synchronism 1
Synchronism 2
Synchronism 3
Synchronism 4
Synchronism 5
Serial marker
Incr. Extruder 1
Decr. Extruder 1
Incr. Extruder 2
Decr. Extruder 2
Enable timer switch
End production
Alarm
Enable driver
End filling
End extrusion
OR PHOTOCELL
RPM CONTROL
EXTRUDER FASTER
EXTRUDER SLOWER
Profile start signal 1
Photocell parison 1
Mould ready 1
Stand by die gap
Temperature OK
Emergency
PHOTOCELL
START
STANDBY DIE GAP
RP
RB
KNIFE RELAY
RELAY BLOW


ANALOG INPUT/OUTPUT
POWER SUPPLY
DIGITAL OUTPUTS
DIGITAL INPUTS
Red
Black
Green
White
Shield
L081-002-A003
L081-001-A003
L081-004-A003
Suggest Moog cable
L081- 151 Or
L081-152
+24V (external)
0V24 (external)
Enable 24V(external)
Valve comm. +/-10 V
0V Valve command
POTENTIOMETER
+24Vdc
0Vdc
END OF FILLING
END OF EXTRUSION
STAND DIE GAP
MOOG Italiana - Flero Site
Wiring for accumulator head with Moog actuator
(With DCDT Type)
Synchronism 1
Synchronism 2
Synchronism 3
Synchronism 4
Synchronism 5
Serial marker
Incr. Extruder 1
Decr. Extruder 1
Incr. Extruder 2
Decr. Extruder 2
Enable timer switch
End production
Alarm
Enable driver
End filling
End extrusion
OR PHOTOCELL
RPM CONTROL
EXTRUDER FASTER
EXTRUDER SLOWER
Profile start signal 1
Photocell parison 1
Mould ready 1
Stand by die gap
Temperature OK
Emergency
PHOTOCELL
START
STANDBY DIE GAP
RP
RB
KNIFE RELAY
RELAY BLOW

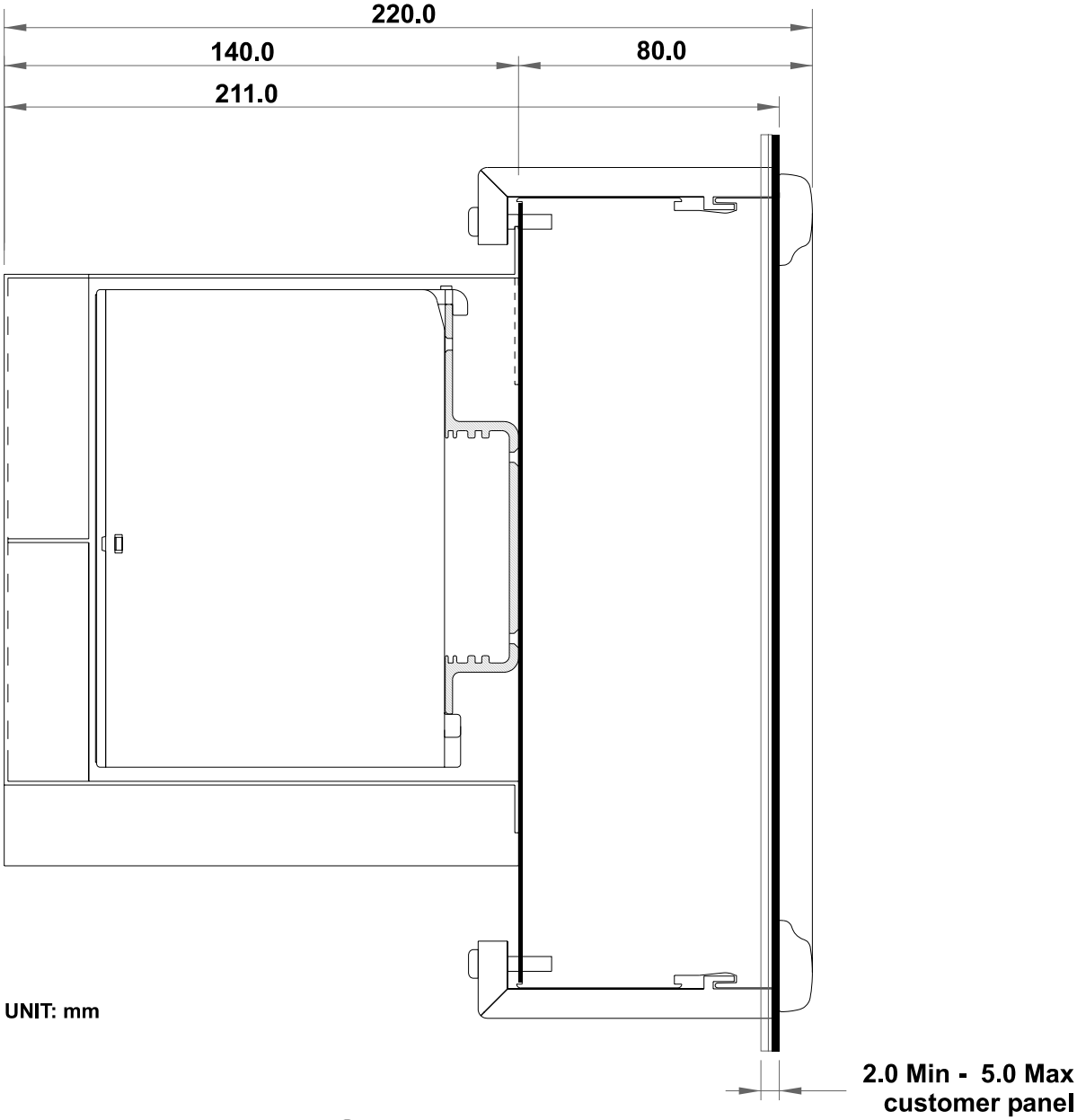

ANALOG INPUT/OUTPUT
POWER SUPPLY
DIGITAL OUTPUTS
DIGITAL INPUTS
White
Green
Red
Shield
Shield
Reference Signal Cable
+24Vdc
0Vdc
MOOG
PDS2000
From / To PLC
For logical sequency
Resolver Cable L081-138-A003
Braking Resistor
Motor Power Supply Cable
Position Feedback Cable L081-083-Axxx
EMA L875-XXX
MOOG Italiana - Flero Site
Wiring for continuos extrusion Moog EMA L875-XXX
+24Vdc
0Vdc
+24Vdc
Incr. Extruder 1
Decr. Extruder 1
Incr. Extruder 2
Decr. Extruder 2
Enable timer switch
End production
Alarm
Enable driver
0Vdc
Profile start signal 1
Photocell parison 1
Mould ready 1
Stand by die gap
Temperature OK
Emergency
0Vdc
0Vdc
RPM CONTROL
EXTRUDER FASTER
EXTRUDER SLOWER
PHOTOCELL
PHOTOCELL
RP
KNIFE RELAY
RB
RELAY BLOW
STANDBY DIE GAPSTART
+24Vdc

3.6 Terminal measures.



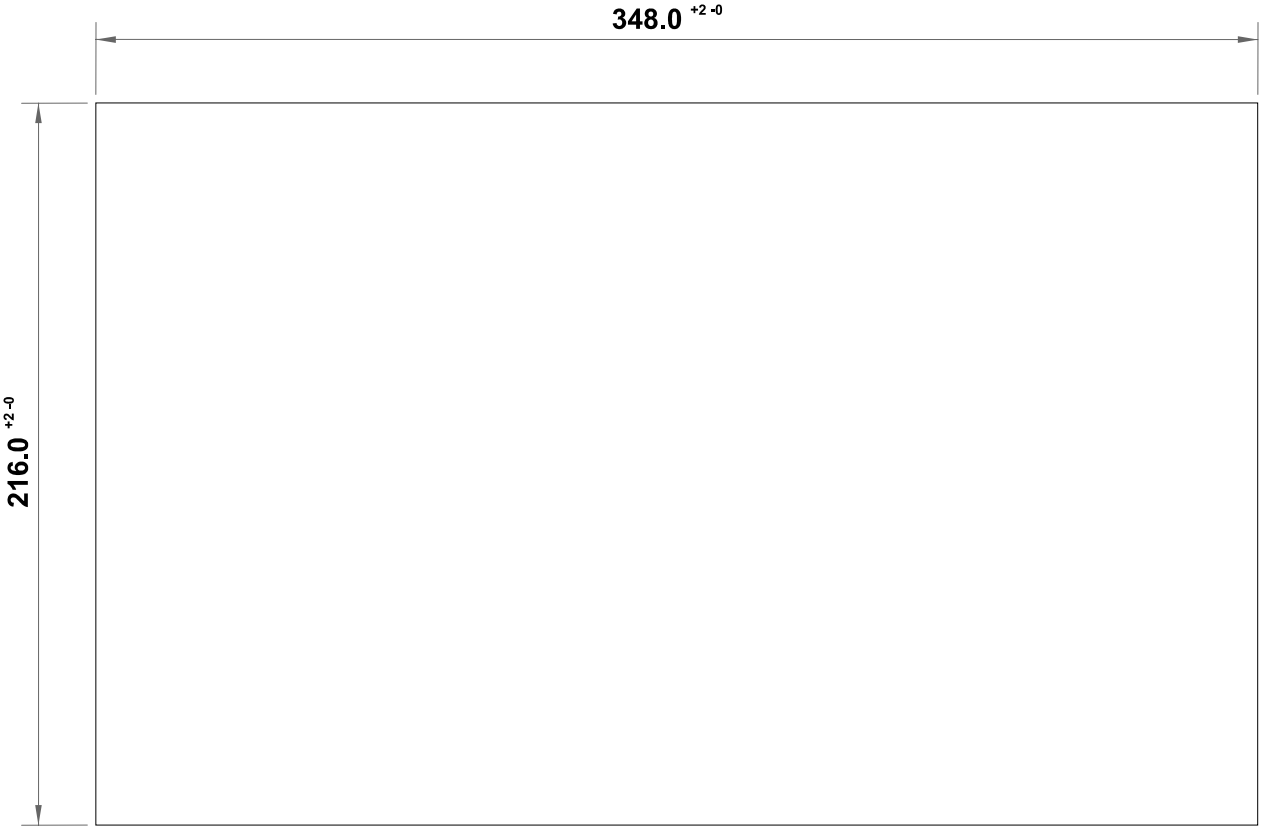
FRONT VIEW

Figure 6



SIDE VIEW

Figure 7



PANEL CUTOUT

UNIT: mm

Figure 8

4 Description of Screen Functions.

4.1 Main Menu.

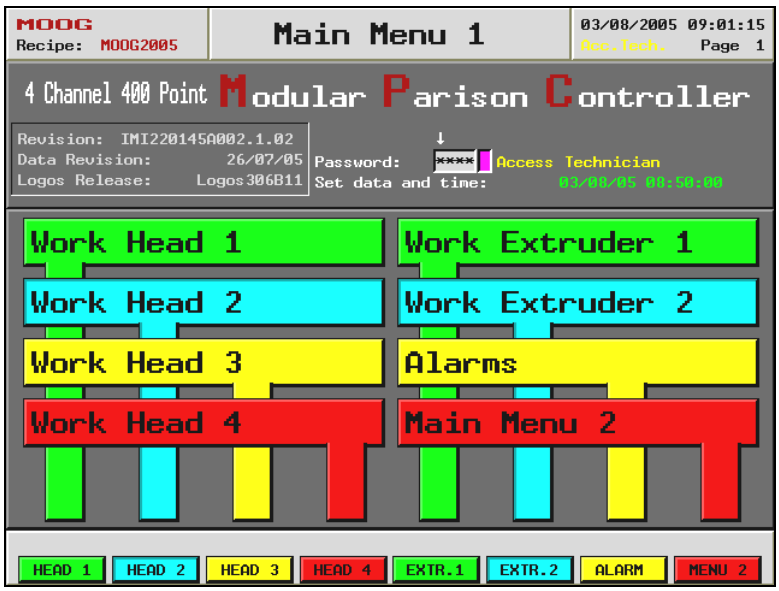


Figure 9

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**.

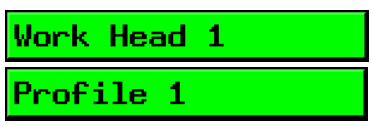
4.1.1 Password insertion.

To insert the password position the cursor in the appropriate field, turn the Entry Knob up to the desired value and press the Set key. The arrow will move to the next digit. Repeat until the insertion of the correct password is complete.

4.1.2 Change date.

With Technician or Responsible password, the field date and actual time will appear.
To change the date position the cursor in the appropriate field and set the desired value. For example if you want to set 03/08/05 (dd/mm/yy), you write 030805 (as alphanumeric fields) followed by the Set key.
The same for the field actual time. If you want to set 08:50:00, you write 085000 followed by the Set key.

4.1.3 Function Keys.



Work head 1: Setup and display the Parison profiles.
Profile 1: Setup and display the alternate profiles.

Work Head 2

Profile 2

Work head 2: Setup and display the Parison profiles.
Profile 2: Setup and display the alternate profiles.

Work Head 3

Work head 3: Setup and display the Parison profiles.

Work Head 4

Accumulator

Work head 4: Setup and display the Parison profiles.
Accumulator: Setup and display the Accumulator profile.

Work Extruder 1

Work extruder 1: Setup and display the extruder.

Work Extruder 2

Work extruder 2: Setup and display the extruder.

Alarms

Alarms: Display alarms from PLC and from system.

Main Menu 2

Main Menu 2: Go to main menu 2.

4.2 Main Menu 2.

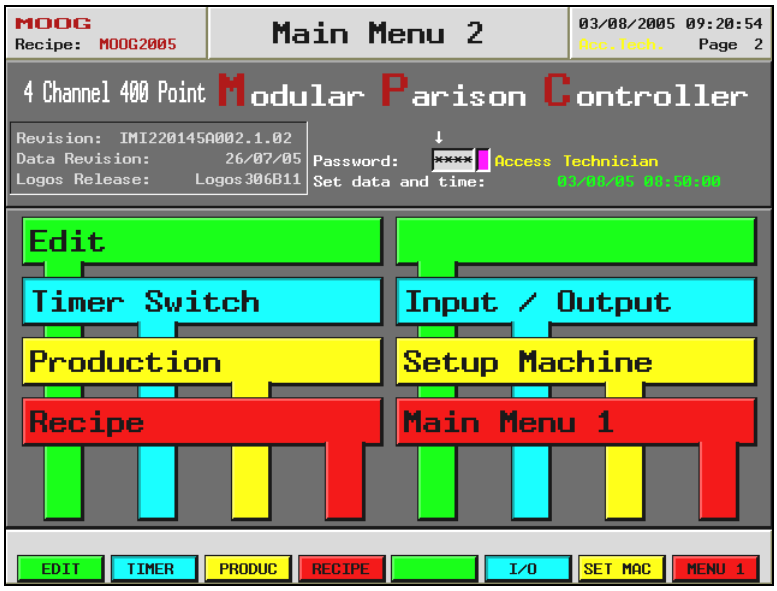


Figure 10

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

4.2.1 Function Keys.

F1 — Edit

Edit: Editing the Parison profiles. It is possible to access the Edit page only if on Setup Machine Page the Function of machine is Continuous extrusion to Independent profiles and if you set Free Profiles Assignment ON.

F2 — Timer Switch

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.

F3 — Production

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

F4 — Recipe

Recipe

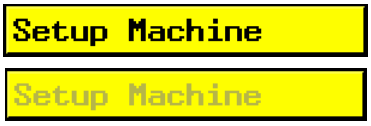
Recipe: Recipe management. It is possible to access the recipe page only if you insert a Technician or Responsible password.

F5

Not Used.

F6 — Input / Output

Input / Output: Monitor status input/output digital/analogical data.



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

Main Menu: Go to main menu 1.

4.3 Machine Setup.

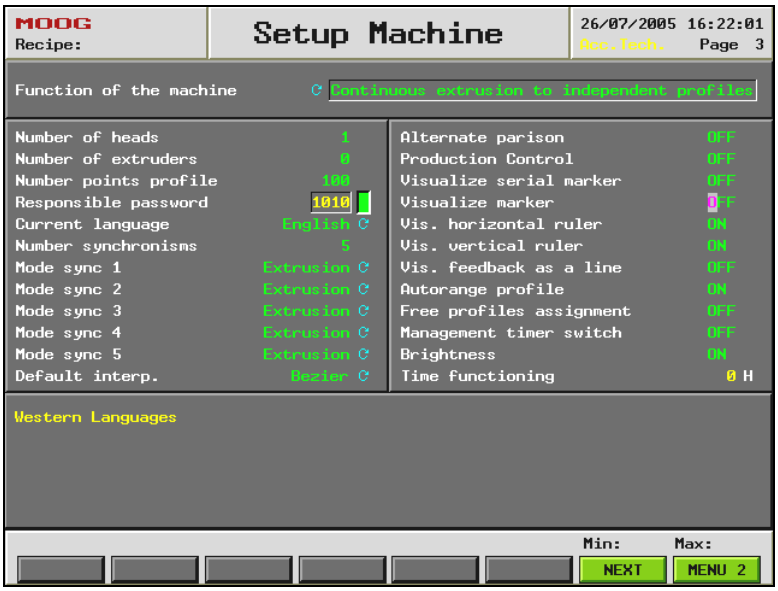


Figure 11

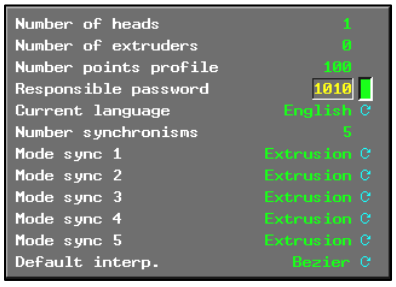
Setup machine: Configure the machine.
Access: From Main Menu 2 with key **F7**.
Use: Configure the 4 CHANNEL 400 POINT MODULAR PARISON CONTROLLER according to the typology of the machine that will be connected.

4.3.1 Function of the machine.

It is possible to choose one of these functions of the machine:

- *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: Select how many heads are connected (range 1 ÷ 4).

Number of extruders: Select how many extruders are connected (0 to 2).

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

Responsible password: Write the password for Responsible. This Password is permanently saved.

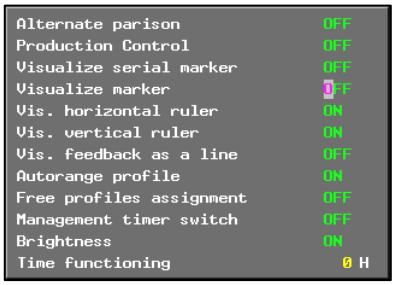
Current language: Select the current language to visualize in all pages. It is possible to choose among more languages according to the software version that has been purchased. You can seen what group of languages you have access (Western languages or Eastern languages) checking the last voice of this page.
Western languages include: English, German, French, Spanish, Portuguese, Danish, Russian, Turkish, Greek, Italian.
Eastern languages include: English, Japanese, Chinese.

Number synchronisms: Number of synchronisms. It can manage up to 5 sync points driving a special output. If it is enabled the Continuous extrusion they are edited on the Work Head Pages where the Profile 1 is active. If it is enabled the Accumulator positions mode they are active and edited in the Accu Page.

Mode sync 1 (or 2/3/4/5): (appear in accumulator position mode) Select synchronism mode: Filling, Extrusion or both.
With accumulator position mode it is possible to decide and set when the sync has to work.

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

4.3.3 Editing setup of the machine.



Alternate parison: (appear in Continuous extrusion to unique profile mode and with only one head) Enable the possibility to work on only 1 head with 2 alternate profiles.

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

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

Visualize marker: Enable or disable the visualization of the marker in the 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 Head pages. It is recommended with cycles times inferior to 5 seconds

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

Free profiles assignment: (appear only in Continuous extrusion to independent profile mode) Enable the visualization in the Edit Profile page of the possibility to assign the profiles to the heads.

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

Brightness: Manage the TFT Brightness (two levels: On or OFF).

Time functioning : Counter indicating how long the 4 channel 400 point Modular Parison Controller has been ON.

4.3.4 Languages.

Languages: You can seen what group of languages you have access (Western languages or Eastern languages).

4.3.5 Function Keys.

NEXT: Enter in the next Setup page. The next Setup Page depends on the current machine configuration.

MENU 1: Go to main menu 1.

4.4 Work Head n / Profile n.

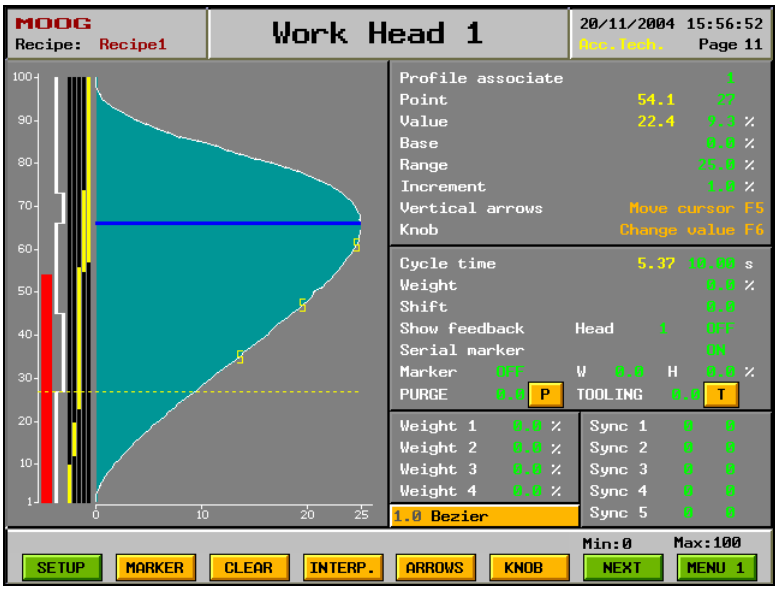
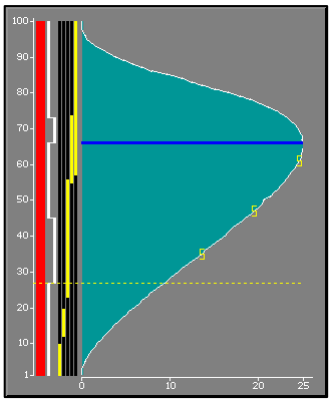


Figure 12

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 acquire the mandrel opening and an analog output to drive the mandrel positioning actuator.

4.4.1 Profile Editor.



From left to right:

Vertical ruler: (white) If enabled the visualization (**Vis. horizontal ruler)** in Setup Machine Page. From 1 to max 400 helps to navigate.

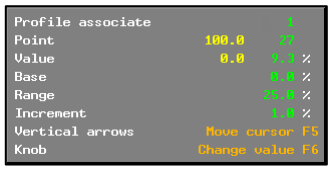
Horizontal ruler: (white) If enabled the visualization (**Vis. vertical ruler)** in Setup Machine Page. Percentage number (white) from 1 to 100 % max. Default number is 100, but if **Autorange profile** in Setup Machine Page is enabled, the auto-range profile resizes the horizontal rules.

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.

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

Synchronisms: (only if enabled): 5 vertical lines that display 5 synchronisms signals defined by a couple of **start** and **stop** points. The color is yellow if working during **Extrusion** (or time based mode). Synchronisms are visible only on the profile 1.

4.4.2 Profile parameters.



Profile associate: (Only if in the Setup Machine Page the function of the machine is Continuous extrusion to independent profiles and Free profiles assignment is enabled ON) Number profile associated to the head.

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

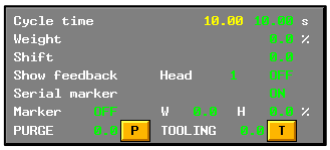
Value: (yellow) Shows the actual feedback in %. (green) Shows the value of the point (in percentage) where the cursor is on. By changing this variable (0 to 100% max) it is possible to add a new set point or modify the existing one at cursor position.

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 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).

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

4.4.3 Cycle parameters.



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

Weight: Change the weight of the profile.

Shift: It is possible to indicate how many points (N) to issue at the end of profile. Once the last point of the programmed profile is reached, it continues from first point to point N-1.(shift). Shift the profile of the number of the points planned. It allows to move the issue of the profile on the head of a number of points. If i.e. the profile is 100 points and shift is 10, the first point will be 10, it will reach 100 and it will continue up to 9.

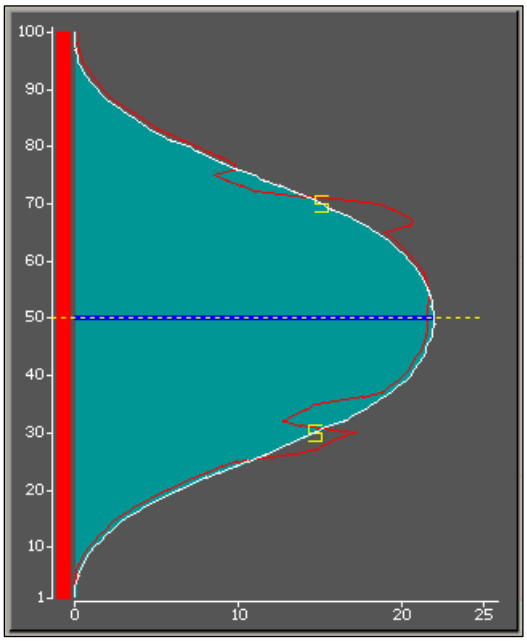
Show the feedback: If activated, it allows to see the profile actually detected by transducers (in red) beside the theoretical one.

Serial marker: Enable (ON) or disable (OFF) the serial marker in the profile.
Enable the digital output command of serial marker actuator on card Card IMI220-415A001 to identify the points of the profile on the final product

Marker: Enable (ON) or disable (OFF) 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 preceeding and following points related to the position where the Marker has been setted.

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 setted.

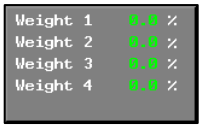


In the example the markers are placed to the point 30 and to the point 70. If the Markers are enabled (ON), with the red line it's possible to see the feedback in the case that W (Width) = 5 points and H (Height) = 3%.
If the marker is placed to the point 30, the value will begin to be modified in positive (+ 3%) from the point 25 (30-5) up to the point 30 and in negative (-3%) from the point 30 to the point 35 (30+5).

PURGE: Single Purge referred to this Head. It is possible to indicate a quota within 0% to 100% range for head purge. 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.

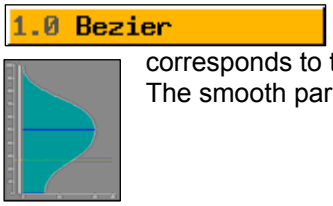
TOOLING: Single Tooling referred this Head. It is possible to indicate a quota within 0% to 100% range for tooling function. Tooling is driven through a special function key. This command activated during the issuing of a profile becomes active only at the end of the same profile. . The buttons that control this function are toggle type.

4.4.4 Weight.



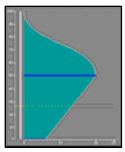
Weight: With unique profile it allows to add an additional weight on every single head. (it's not visualized in profile).

4.4.5 Interpolation.

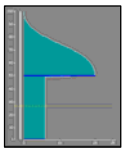


Bezier: Interpolation between two masters: the interpolation type visualized corresponds to the area where the cursor is placed.
The smooth parameter is included between 0,5 and 2,0 with step 0,1.

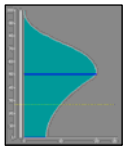
Linear: Interpolation between two masters: the interpolation type visualized corresponds to the area where the cursor is placed..



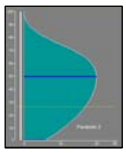
Flat: Interpolation between two masters: the interpolation type visualized corresponds to the area where the cursor is placed.



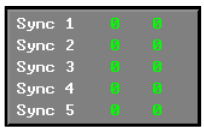
Parabolic 1: (parabola with tangent 0 on end point) Interpolation between two masters: the interpolation type visualized corresponds to the area where the cursor is placed.



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



4.4.6 Synchronisms.



Synchronisms: Only if enabled in Setup Machine 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.

4.4.7 Function Keys.

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

MARKER: Put or remove the marker on the profile.

CLEAR: Clear all the profile points.
Before creating a new profile (only in this case) it's necessary to use this function to be sure that all the areas of the memory are correctly initialized.

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. Normally there is the default interpolation setted in the Setup Machine 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 smooth:* rotate the knob to change the Smooth.
- *Setup SM:* rotate the knob to setup the Serial Marker.

NEXT: (yellow) Disable. (black) Fast choose of the work head pages (only if present).

MENU 1: Go to main menu 1.

4.5 Head Setup.

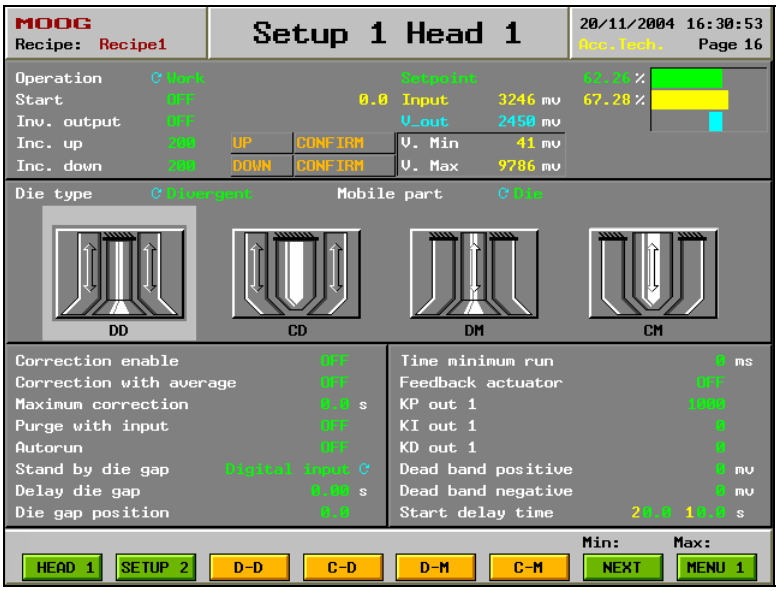


Figure 13

Setup 1 Head n: Setup Head page n° in (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 in closed loop stand alone).
The input value is calibrated in range 0% - 100.00% through the 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.
It is possible to change the analog output polarity to ignore actuator connection polarity. The default polarity wants that the increasing voltage values move the actuator downwards.

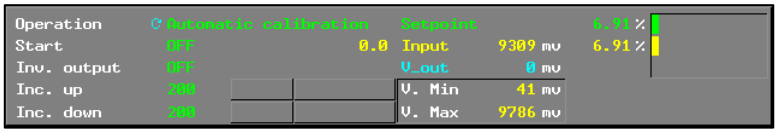
4.5.1 Calibration.

Select the head operation mode:

Work: in work mode the loop is closed, the machine works normally. Any calibration is active.

Open loop: in open loop mode it's possible to move the head Up or Down with the written voltage. (i.e. 1000). When the head is in mechanical stroke you have to confirm the Min. or Max. value (Velocity control).

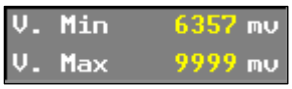
Manual calibration: in manual calibration mode the loop is closed and it is possible to move the head Up or Down till the key is pushed. When the key is released the head maintains the position (Position control).



Automatic calibration: in automatic calibration mode select **Start** ON and the head will search the minimum and the maximum position. When the automatic calibration is finished the operation mode goes back to Work mode.

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

Inc. up / **Inc. down:** With *calibration in open loop* these variables correspond to the acceleration value (expressed in mV/s). It's the ramp increment value on the analog output voltage (**Vout**). **Inc. up** determines the slope ramp toward +10000 mV. **Inc. Down** determines the slope ramp toward -10000 mV.
With *manual and automatic calibration* these variables correspond to the velocity increment (%/s) to move the head in close loop.
With *intelligent actuator* these variables correspond to the acceleration value (mv/s) of the ramps that determine the head position.



V. Min and **V. Max:** In these fields the minimum and the maximum values are visualized in mV relevant to the head total stroke.

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. Output command during manual motion rises as a ramp while buttons are kept depressed and stay fixed when released. The output command is expressed in % of maximum value, while the ramp is expressed in % per second.

MANUAL OPEN LOOP CALIBRATION WITH INTELLIGENT ACTUATORS:
Through manual commands it is possible manage two kinds of ramp. (0 - 10000 mV and 10000 – 0 mV) Output command during manual motion rises as a ramp while buttons are kept depressed 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 states a regulator position (expressed in %) kept in the loop. Through manual commands it is possible to change the stated position causing the actuator to move up or down. The operator visually realizes that the mechanical limits have been reached and confirms. Change of stated position is made by setting up two ramp values in % second.

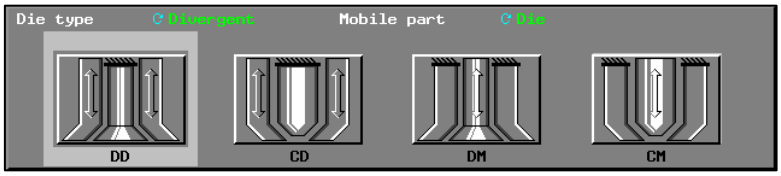
MANUAL CLOSED LOOP CALIBRATION WITH INTELLIGENT ACTUATORS:
It automatically produces the ramps with the pressure of the button (UP or DOWN). The movement is interrupted with a new pressure by the same button.

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 stated position is made by setting up two ramp values in % second.

AUTOMATIC CALIBRATION WITH INTELLIGENT ACTUATORS:
Starting the procedure produces a ramp 0 – 10000 mV to move the head down. At the end of this after 5 seconds produces a ramp 10000 – 0 mV to move the head up. It automatically saves the voltage values.

4.5.2 Die type.

It is possible to indicate whether the actuator moves the mandrel or the die and whether the mandrel is convergent or divergent. This univocally states if the 0 condition is true when the actuator is at upper or lower extreme point.

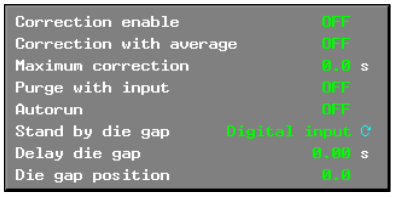


Die type: Select the die type with knob then press set to confirm:
- *Convergent*.
- *Divergent*.

Mobile part: Select the mobile part with 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.**

4.5.3 Run parameters.

It is possible to enable the automatic cycle time correction.



Correction enable: Enable the time correction.

WITH CONTINUOUS EXTRUSION: The time between two next rise fronts of start impulse becomes the setpoint for profile generation at next start.
If average correction is enabled, it is necessary to calculate the average of the 3 last cycles. The average becomes the setpoint for profile generation at next start.
WITH TIME ACCUMULATOR: If cycle time automatic correction is not enabled, the profile generation is given by a fixed setpoint.
If cycle time automatic correction is enabled, the time between the rise front of start1 signal and its fall front is measured. The time measured becomes the setpoint for profile generation at next start.

Correction with average: Enable the time correction with average.

Maximum correction: Set the maximum time for the correction. If the data is 0 s, the previous cycle time is applied to the next start. This happens only if the value is three times inferior to the one planned in Work Head Page.

Purge with input: Enable the purge with digital input (in manual mode).

Auto run: Enable the Auto run. (***Only for demonstrations***). It is possible to configure the regulator in auto run mode. In this case at the end of the profile generation a new one begin without waiting for a new start. This mode ignores cycle time correction.

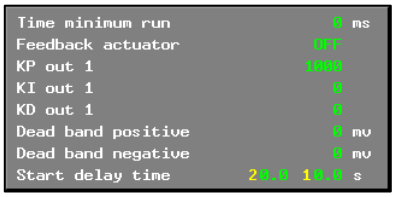
Stand by die gap (Only in accu mode)**:** Select how to reach the die gap position (with digital input or end extrusion). The digital signal called “Stand by die gap” indicates that the mandrel must be closed to avoid material loss during filling. With machine in accu mode a signal activates a timer. At the end of the count the head goes to die gap position. In case of no external “Stand by die gap” signal it is possible to reach the position with the end of extrusion signal. The die keeps this position until next start signal.

Delay die gap (Only in accu mode)**:** Delay before starting the movement to reach the die gap position.

Die gap position (Only in accu mode)**:** Head position.

4.5.4 Regulator parameters.

It is possible to indicate a minimum time to complete the total mandrel stroke. This time determines a maximum slope of the actuator control voltage. It’s possible to insert parameters to eliminate valves dead band.
It is possible to set a delay time on start movement.



Time minimum run: 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. If for example set 1 second the maximum ramp will be 20000 mV/s. Every movement will be performed according to the calculated ramp.

Feedback actuator: Select if the actuator has feedback.

KP out 1: Proportional gain. Range: 0...10000. **If for example write a KP = 1000 the gain of the regulator = (KP / 256) * (Vmax – Vmin / 10000 if KI and KD are void.**

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

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

Dead band positive: Voltage added to the output already calculated by the PID controller to eliminate the dead band. Range: 0...+5000 mV.

Dead band negative: Voltage subtracted from the output already calculated by the PID controller to eliminate the dead band. Range: 0...+5000 mV.

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

4.5.5 Function Keys.

HEAD 1: Enter in the Head page.

SETUP 2: Enter in the Setup 2 Head 1.

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

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**.

NEXT

NEXT: Enter in the next Setup page.

MENU 1

MENU 1: Go to main menu 1.

4.6 Head Setup 2.

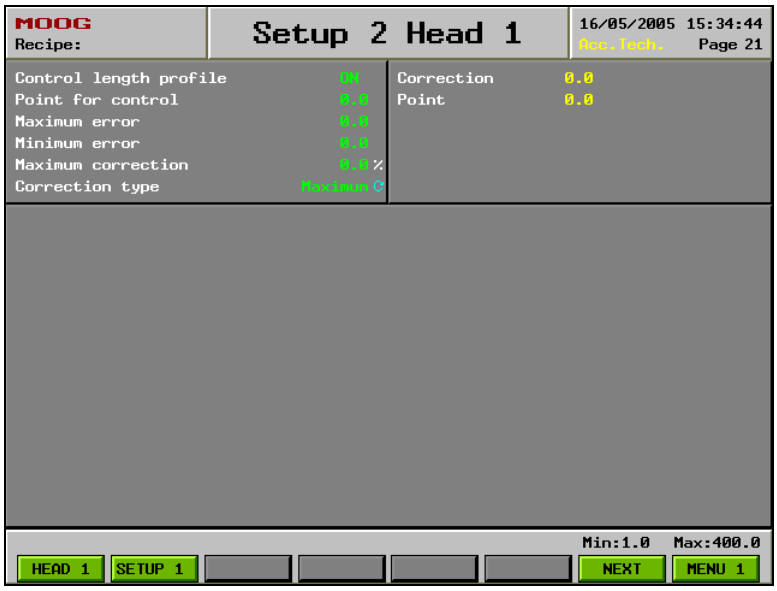
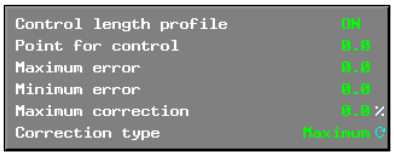


Figure 14

Setup 2 Head n: Setup 2 Head 1 page.
Access: From Setup Head Page n with key **F7**.
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 signal is detected and compared with a reference value. The difference between the two values is the error. If the error is lower than a given range, no correction is made. It is calculated a correction proportional to the error on a maximum correction value. If the error is greater than the range value it is possible to decide whether making maximum correction or making no correction at all. The correction is made by changing the additional weight value on the regulator (Trim). A single photocell drives all the regulators.

4.6.1 Control length parameters.



Control length profile (Only with acc. position)**:** Enable the control of profile length.

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

Maximum error: Maximum allowed error Calculated between the programmed point and the point registered by the photocell.

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).

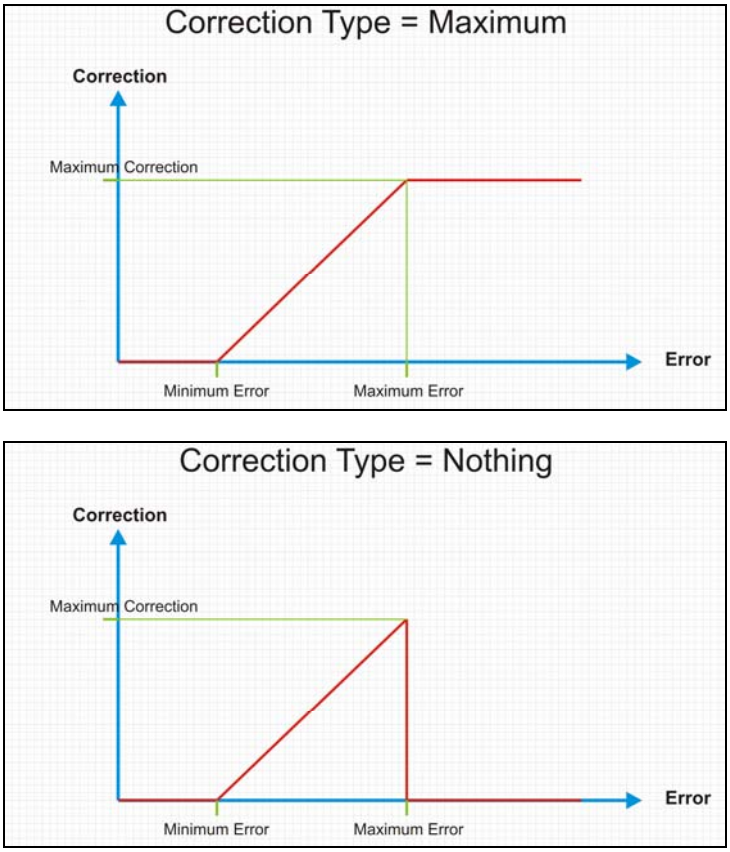
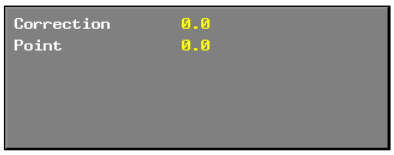


Figure 15

4.6.2 Correction.



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

Point: current point.

4.6.3 Function Keys.

HEAD 1: Enter in the Head page.

SETUP 1: Enter in the Setup 1 Head 1.

NEXT: Enter in the next Setup page.

MENU 1: Go to main menu.

4.7 Accumulator.

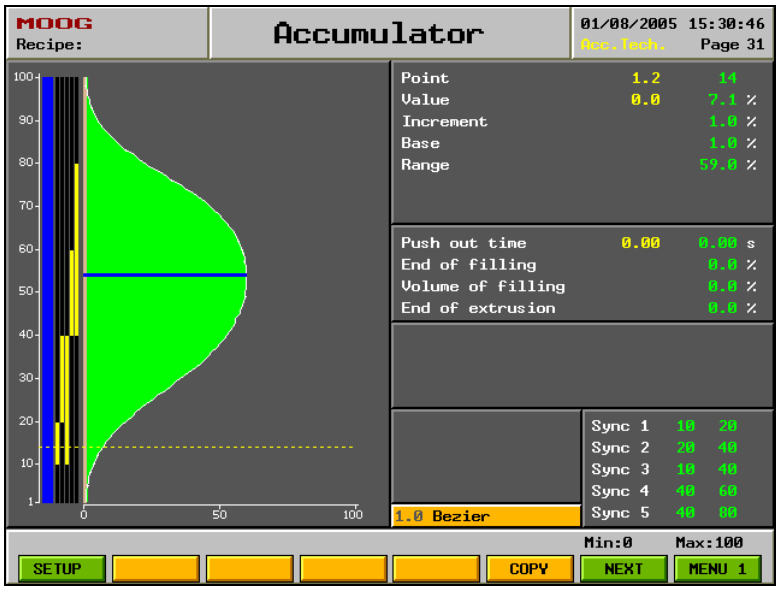
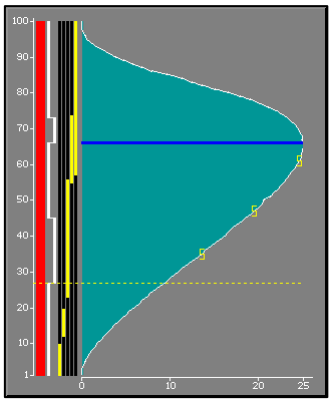


Figure 16

Accumulator: Parison page in accumulator position mode.
Access: From Main Menu with key **F4**.
Use: Input accumulator stroke and edit profile and parameters for pushing out speed control. A regulator in accumulation mode requires that the accumulator management is setup on the fourth channel.
The setpoint generated by thickness regulator depends on the accumulator position in injection phase related to the total injection stroke.
With the start signal begins the push out till to the position of end position (even if the signal start is not more active), during the wait of die gap signal (when the end extrusion position is reached) the accumulator is held in close loop if the start signal is already on, otherwise the output is zero volt. The head held the last point in close loop.
With the die gap signal or with the signal of end extrusion begins the filling. During the filling the push out is allowed also if the filling is not completed. When the start signal is received the push out function starts.

4.7.1 Profile Editor.



From left to right:

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

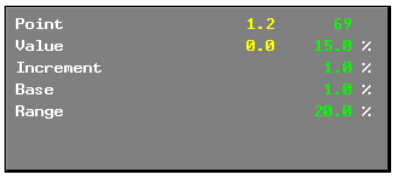
Horizontal ruler: (white) From 1 to max 100 %.

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** (only accumulator mode) it is blue and starts at point max 400 (from top to bottom).

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 color is yellow, if working during **Extrusion**, is pink if working during **Filling** and is red if working both in **Extrusion** and **Filling** . Synchronisms are visible only on the profile 1.

4.7.2 Profile parameters.



Point: (yellow) Shows the actual point during the movement, following the red bar graph on the left side of the screen. (green) Shows the position of the cursor in the Parison field. Value can be changed (1 to 400 max) to set the cursor.

Value: (yellow) Shows the actual feedback in %. (green) Shows the value of the point (in percentage) where the cursor is on. By changing this variable (0 to 100% max) it is possible to add a new setpoint or modify an existing one at cursor position.

Increment: This is the increment / decrement that changes the set point 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).

4.7.3 Accumulator parameters.

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**.

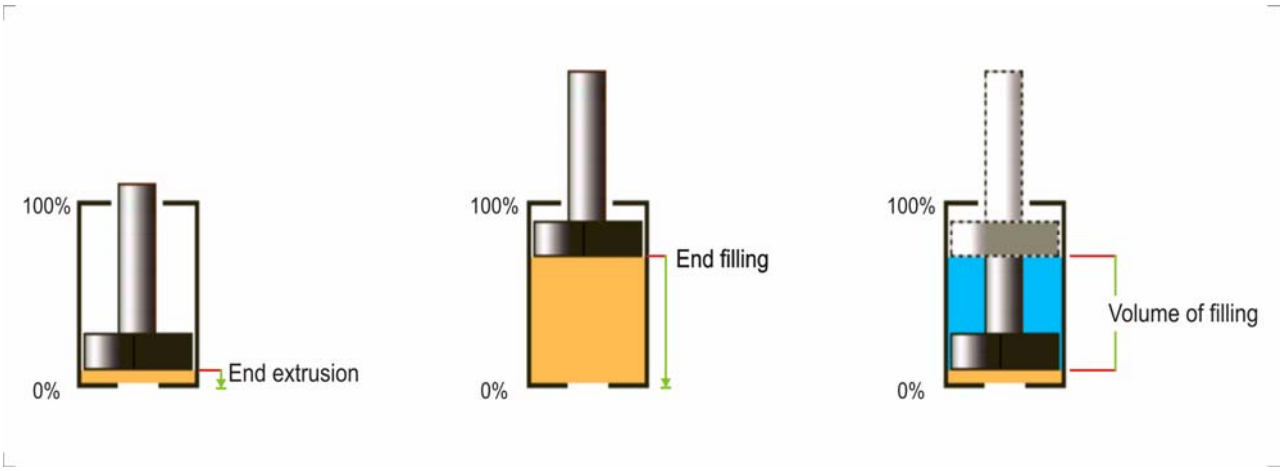


Figure 17

In accordance with the parameters **Setting** and **Priority** set in the page of setup, 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.

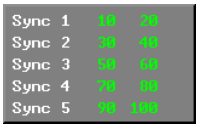
Setting: **End extr. / Volume**:
- End filling is always fixed. It's possible to change only End extruder and Volume of filling.

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% has to be greater than the analogical input referred to 0%.

4.7.4 Synchronisms.



Synchronisms: Only if enabled in Setup Machine 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. It can work during the extrusion, during the filling or both.

4.7.5 Function Keys.

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

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: Go to the next page.

MENU 1: Go to main menu 1.

4.8 Setup Accumulator.

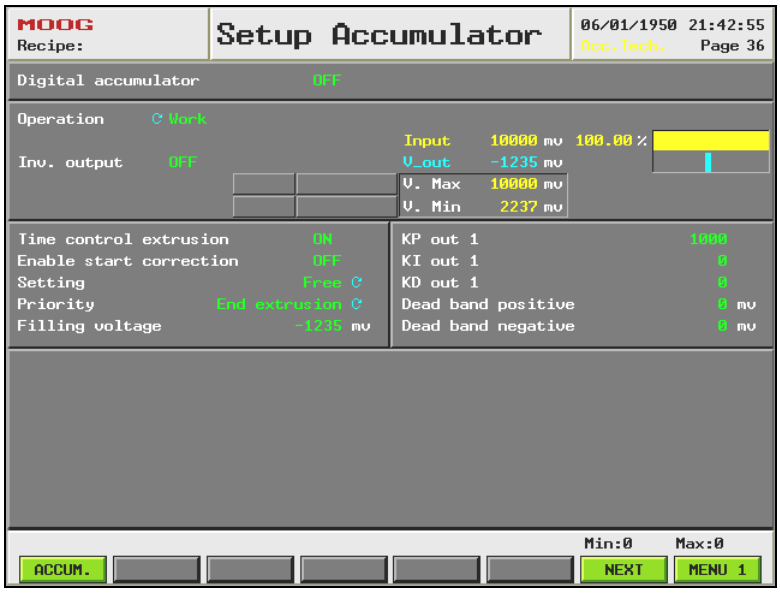


Figure 18

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 methods, the accumulator should be brought to empty and full position and it is possible to manually confirm the positions.

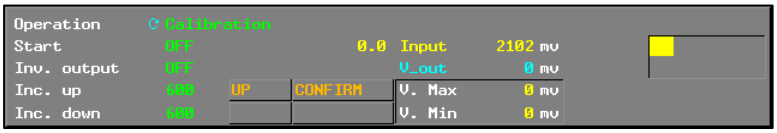
4.8.1 Digital Accumulator.

Digital Accumulator: to externally manage the accumulator without the profile speed control. The modular 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. Any calibration is active.

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 Min. or Max. values for the calibration.



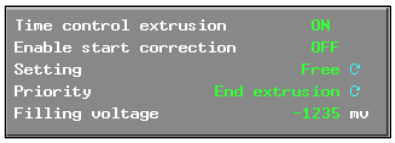
Calibration: in calibration mode put **Start** ON and the accumulator searches automatically the void.
Pushing **UP** key it is possible to move the accumulator Up because the output is negative and the material moves up the accumulator. When the accumulator is in position you have confirm the values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

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

Inc. up / Inc. down: these variables correspond to the acceleration value (expressed in mV/s). It's the ramp increment value on the analog output voltage (**Vout**). **Inc. up** determines the slope ramp toward +10000 mV. **Inc. Down** determines the slope ramp toward -10000 mV.

The accumulator uses an analog input to acquire filling quota and an analog output to drive the extrusion control actuator.

4.8.2 Run parameters.



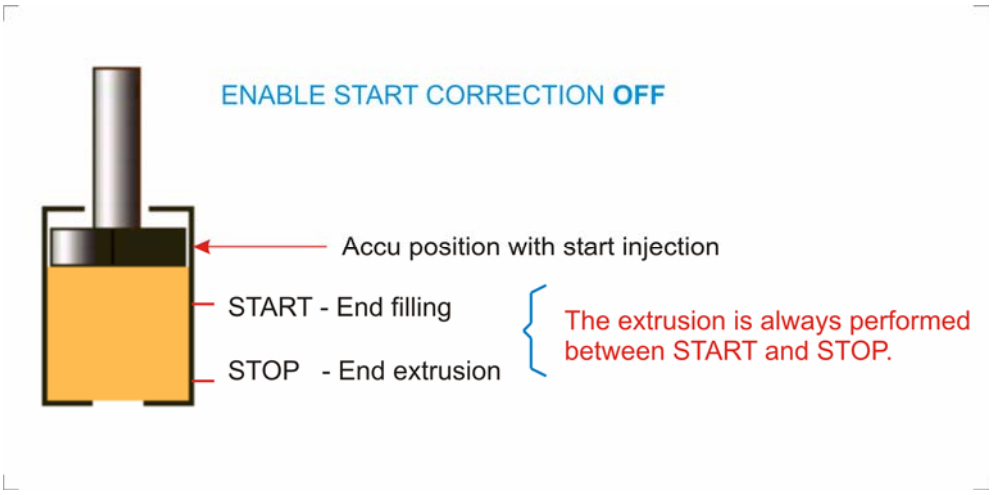
Time control extrusion: Enable the control time during the extrusion.

If the control is **OFF** 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.

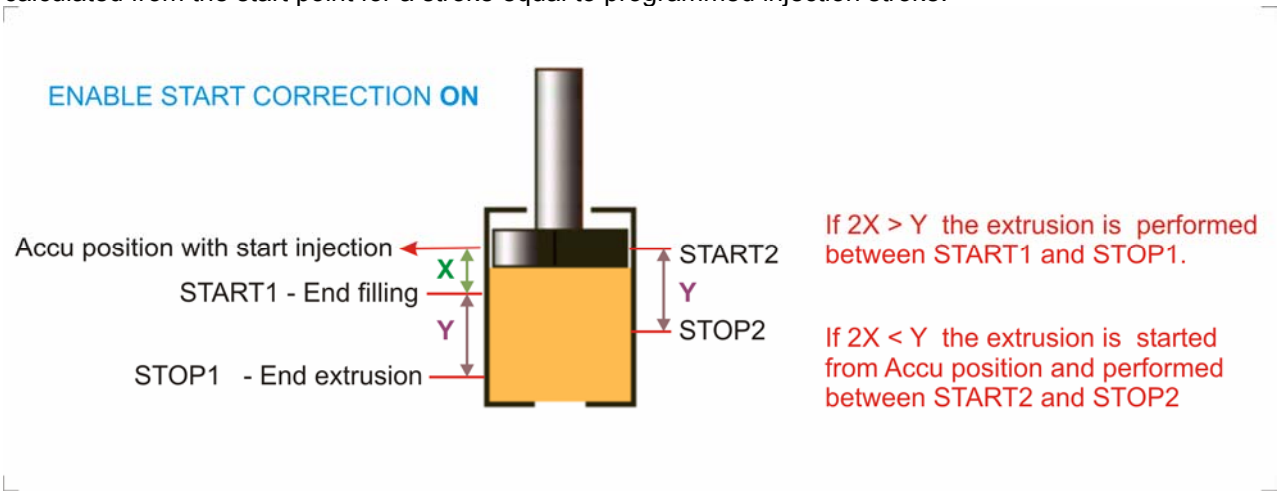
If the control is **ON** the accumulator extrusion speed is managed in closed loop. In this case the profile is output in a preset total time with a speed outline reflecting the profile.
A position's regulator in closed loop performs the extrusion opportunely maintaining the shape of the velocity profile.

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

If this correction is OFF, the filling quota passed to the head is calculated always from “end of filling” point to “end of extrusion” point.



If this correction is ON and the difference between the start position (accu position when start injection is received) and the end of filling exceeds 50% of injection stroke the filling quota passed to the head is calculated from the end of filling point to the end of extrusion point.
If this correction is enabled and the difference is lower than 50%, the filling quota passed to the head is calculated from the start point for a stroke equal to programmed injection stroke.



Setting: Allows to choose the parameters to plan (see Figure 17).
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:

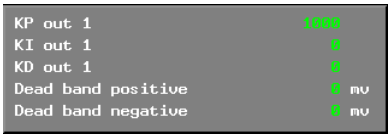
1. Free entry of end of filling point, batch quantity, end of extrusion point.
2. Entry of end of extrusion point and batch quantity.
3. Entry end of filling point and end of extrusion point.
4. Entry end of filling point and batch quantity.

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 17).

Filling voltage: Output voltage to avoid the filling (to help the valve during the filling). During the filling it is possible to define fixed output voltage.

4.8.3 Regulator parameters.



KP out 1: Proportional gain. Range: 0 to10000.

If for example write a KP = 1000 the gain of the regulator = (KP / 256) * (Vmax – Vmin / 10000 if KI and KD are void.

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

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

Dead band positive: Voltage added to the output already calculated by the PID controller to eliminate the dead band. Range: 0...+5000 mV.

Dead band negative: Voltage subtracted from the output already calculated by the PID controller to eliminate the dead band. Range: 0...+5000 mV.

4.8.4 Function Keys.

ACCUM.: Enter the Accumulator page.

NEXT: Enter the next Setup page.

MENU 1: Go to main menu 1.

4.9 Work Extruder.

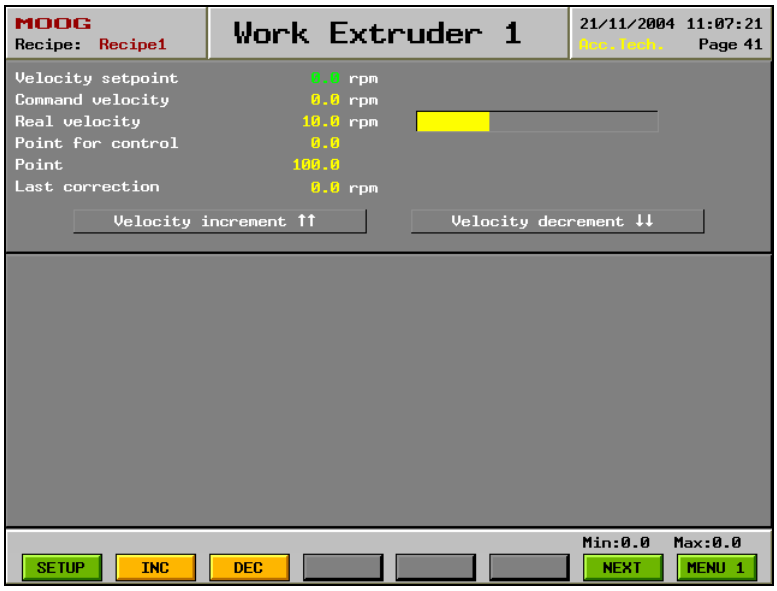


Figure 19

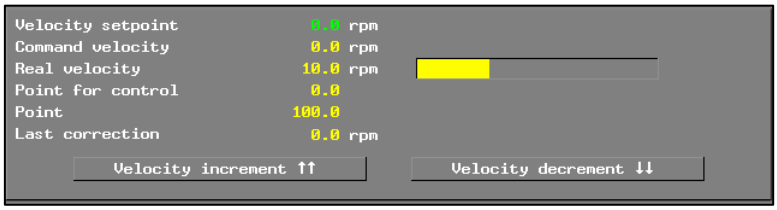
Work Extruder n.: Work Extruder page n° (n° = 1 to 2)..
Access: From Main Menu 1 key **F5** (Extruder 1) or **F6** (Extruder 2).
Use: It is possible to decide whether to use the extruder or not and which channel it should be associated to. It can be associated to:

- 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 set points 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 ON time for digital output depending on a manual command.
  - It is possible to setup the maximum ON time for digital output depending on a manual command.

4.9.1 Extruder command.



Velocity setpoint: Insert the velocity setpoint. (visible with “Analog extruder”).

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

Real velocity: Show by number and by bar graph the real velocity in rpm. (visible with “Analogical extruder”).

Point for control: (if enabled “Control length profile”) Show the set point for control.

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

Last correction: (if enabled “Control length profile” and with Analogical extruder) increment or decrement value.

4.9.2 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.

4.9.3 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.

MENU 1: Go to main menu 1.

4.10 Analog Extruder Setup.

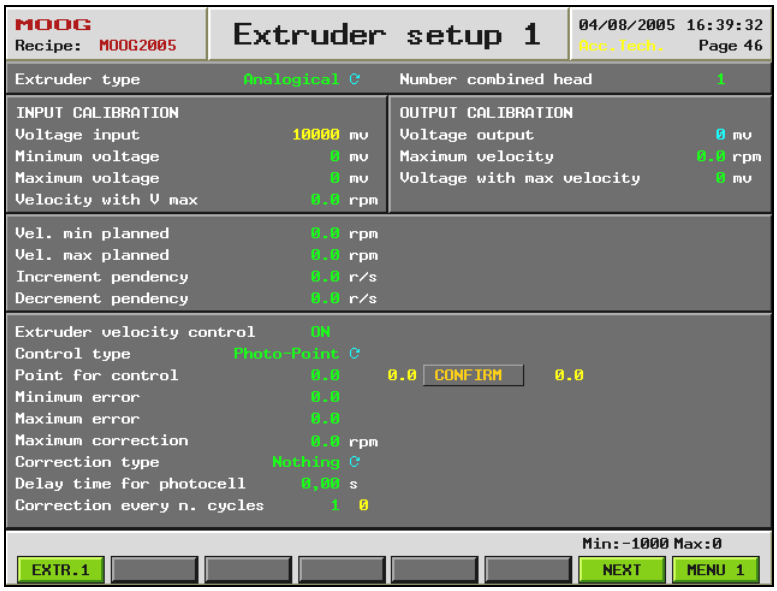
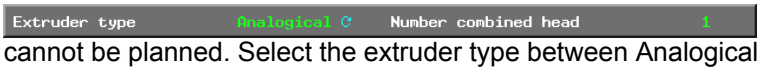


Figure 20

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.

4.10.1 Extruder Type.



Extruder type: If channel is not available it cannot be planned. Select the extruder type between Analogical and Digital.

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).

4.10.2 Input Calibration.

INPUT CALIBRATION

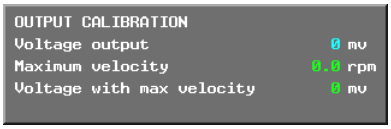
Voltage input: Analog input (input N° 3 for extruder 1, N° 4 for extruder 2).

Minimum voltage: Minimum voltage input calibration.

Maximum voltage: Maximum voltage input calibration.

Velocity with V max: Corresponding velocity with Maximum voltage.

4.10.3 Output Calibration.

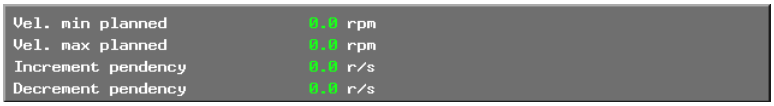


OUTPUT CALIBRATION
Voltage output: Analog voltage output. (output N° 3 for extruder 1, N° 4 for extruder 2).

Maximum velocity: Maximum velocity in rpm.

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

4.10.4 Velocity planned.



Vel. min planned: Minimum value for the velocity setpoint.

Vel. max planned: Maximum value for the velocity setpoint.

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

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

Duration digital Inc/dec: Duration of the digital command for the increase or the decrease of the extruder speed.

4.10.5 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 die ready signal**. The error is expressed in points.

Speed correction is made in accordance with the following algorithm. Errors lower than dead band values (in point percentage) are not considered. An error greater or lower than a programmed dead band window (in points) is scaled on a maximum correction value (in percentage). The correction is applied to extruder speed through the ramp.
An error greater than the window can be ignored or cause the maximum correction. It is possible to indicate a delay time from start signal, before ignoring the photocell signal. It is possible to indicate the minimum time correction in case of digital command. It is possible to indicate the number of times an error should be ignored before making the correction.

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.

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.

Maximum error: Maximum allowed error. Calculated between the programmed point and the point noticed by the photocell.

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.

4.10.6 Function Keys.

EXTR.1: Enter the Extruder page.

NEXT: Enter the next Setup page.

MENU 1: Go to main menu 1.

4.11 Digital Extruder Setup.

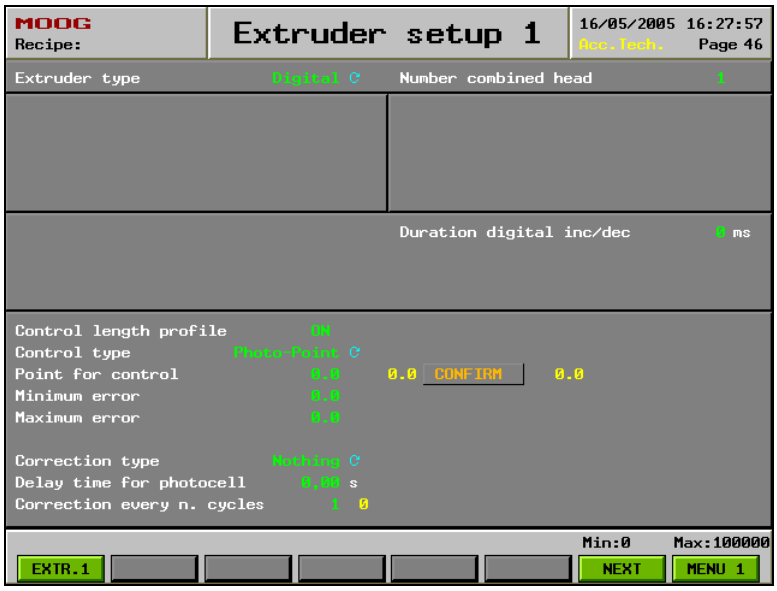
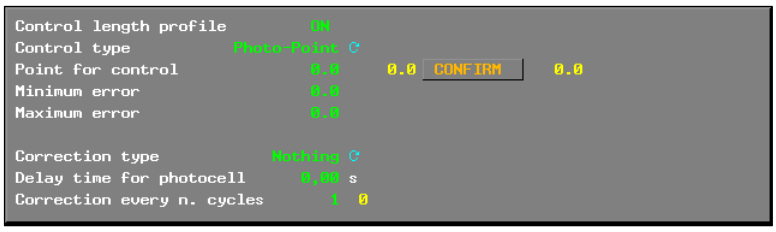


Figure 21

Extruder type: Select from Digital extruder or Analog 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).

Duration digital inc/dec: duration in millisecond of the increment or decrement.



See Analog extruder setup.

4.11.1 Function Keys.

EXTR.1 **EXTR.1:** Enter the Extruder page.

NEXT **NEXT:** Enter the next Setup page.

MENU 1: Go to main menu 1.

4.12 Timer Switch.

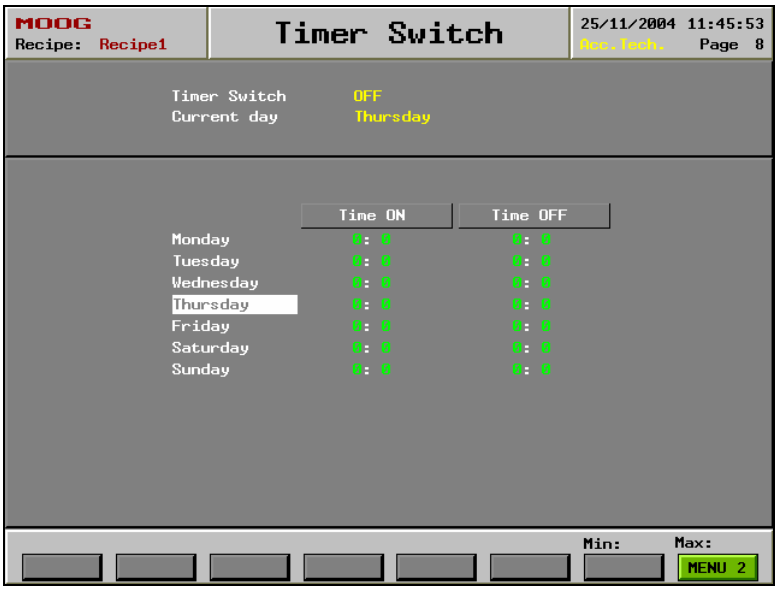


Figure 22

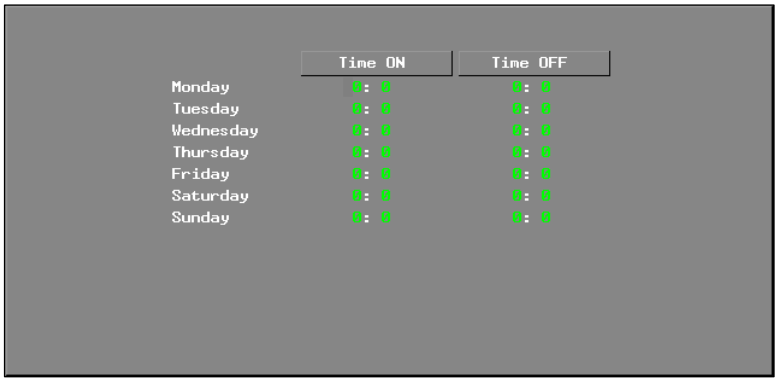
Timer switch: Timer switch page.
Access: From Main Menu 2 with key **F2** (when the page is enabled in the setup machine).
Use: This page is visualized only if in the Setup Machine Page the field Management timer switch is ON.
Manage Timer Switch for temperature control. The time switch allows defining, 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.

4.12.1 Enable Timer Switch.

Timer switch: Status for the timer switch.

Current day: Show the current day.

4.12.2 Weekly start and stop time.



The input is enabled from Responsible level.

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

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

4.12.3 Function Keys

MENU 2: Go to main menu 2.

4.13 Input / Output.

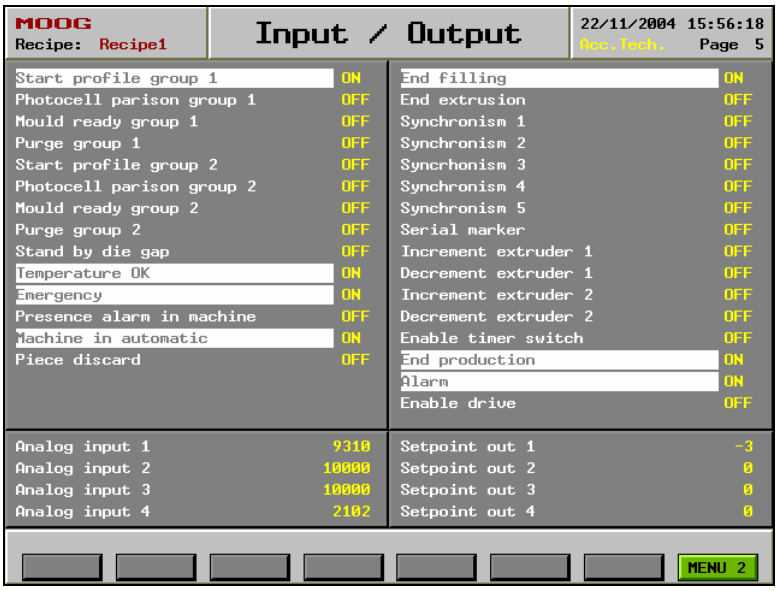
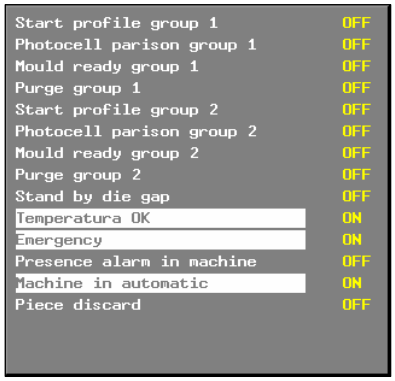


Figure 23

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.

4.13.1 Digital Input.



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.

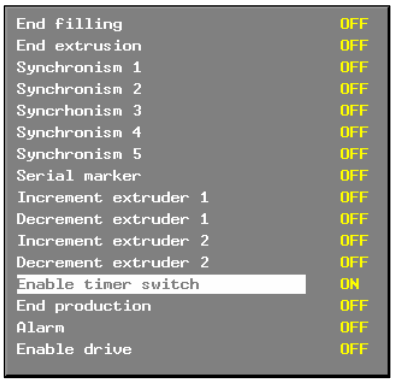
Emergency: Digital Input number 11.

Presence alarm in machine: Digital Input number 12.

Machine in automatic: Digital Input number 13.

Piece discard: Digital Input number 14.

4.13.2 Digital Output.



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.

Increment extruder 1: Digital Output number 10.

Increment extruder 2: Digital Output number 11.

Increment extruder 3: Digital Output number 12.

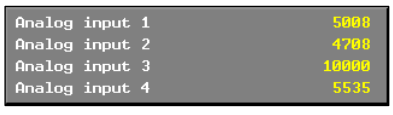
Enable timer switch: Digital Output number 13.

End production: Digital Output number 14.

Alarm: Digital Output number 15.

Enable drive: Digital Output number 16.

4.13.3 Analog Input.



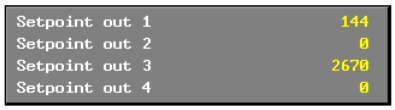
Analog Input 1: Analog Input number 1.

Analog Input 2: Analog Input number 2.

Analog Input 3: Analog Input number 3.

Analog Input 4: Analog Input number 4.

4.13.4 Analog Output.



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.

4.13.5 Function Keys.

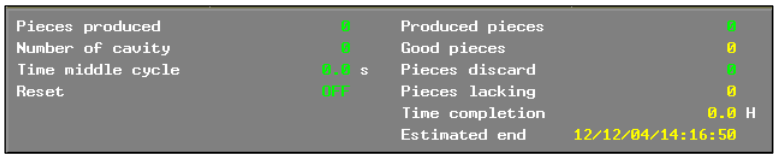
MENU 2: Go to main menu 2.

4.14 Production.

Figure 24

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.

4.14.1 Pruction Parameters.



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.

4.14.2 Function Keys.

MENU 2: Go to main menu 2.

4.15 Edit Profile.

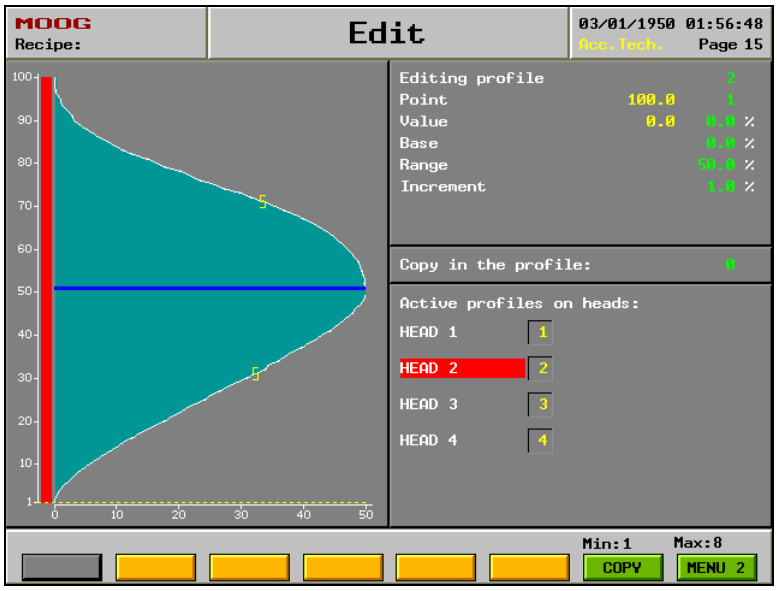


Figure 25

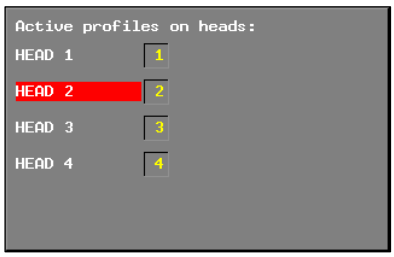
Edit: Edit page.
Access: From Main Menu 2 with key **F1** (Edit) with **Continuous extrusion to independent profiles** and the field **Free profiles assignment ON** (in the setup machine page).
Use: In this page it is possible to create a new profile and copy the one visualized in another if it is not already active on a head.

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

4.15.1 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).

4.15.2 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 the active profile.

4.15.3 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.

4.16 Recipe.

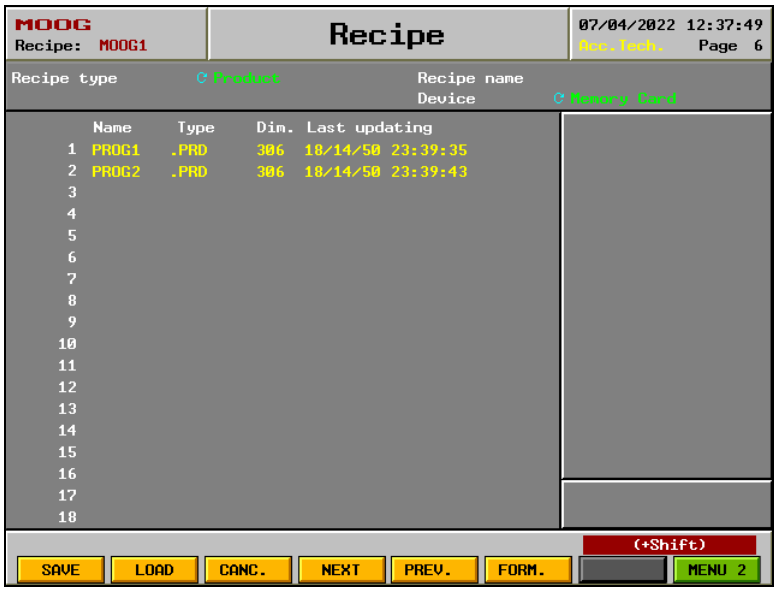


Figure 26

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 or cancel a recipe both on internal **Ram Disk** and on external **Memory Card** by selecting the correct device.
It's possible to format the device.
The recipe is given a name.
Only a few recipes can be saved on Ram Disk (Max 6) while on Memory Card it's possible to save a lot of recipes (i.e. 64 MB Memory Card around 4000 recipes).

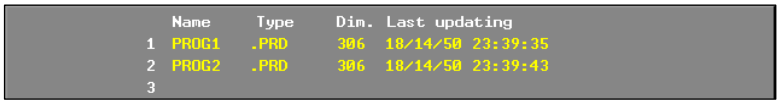
4.16.1 Recipe Type.

Recipe Type: With Technical level it is possible to select the recipe type choosing between **Product** and **Configuration**. With Responsible level it is possible to use only **Product** recipe. The .PRD file contains data relating to the mould. (Work Head data, Extrusor 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, Extrusor setup data, Accumulator setup data).

Recipe Name: Write the name of the recipe. The maximum number of characters is 8. Insert the desired alphanumeric with the rotation of the **Entry Knob,** move the cursor with the right arrow and insert the following alphanumeric. When the name is complete press **Set-key**.
When a field is in variation with the insertion of a new data the led near **Set Key** is lit and the field changes color.

Device: Select the device where to save the recipe (Ram Disk or Memory Card).

4.16.2 Index of the recipes.



Name: Name of the file.

Type: Type of the file: **.PRD** (product) or **.CFG** (configuration).

Dimension: File dimension in bytes.

Last updating: Last date and time of saving file.

To safely execute the commands in this page (SAVE – LOAD – CANCEL – FORMAT) it is necessary to press **Shift** key together with any functional key.

4.16.3 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).

CANCEL: Cancel 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.

FORMAT: Format all the Ram Disk or Memory Card (appear only at Technical level).

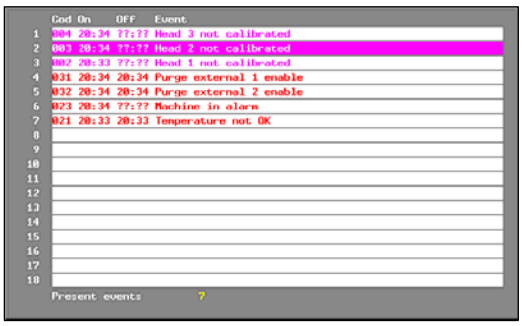
MENU 2: Go to main menu 2.

4.17 Alarms.

Figure 27

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

4.17.1 Definitions alarms parameters.



Colors: There are two types of colors that differentiate the importance of the alarms. (red used for important errors and pink 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.

4.17.2 List of the alarms.

- [001] PARISON CONTROLLER not Configurated.

  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 (**Vmin** and **Vmax** at Setup 1 Head 1 Page).

- [003] Head 2 not calibrated.

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

- [004] Head 3 not calibrated.

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

- [005] Head 4 not calibrated.

  Active if without feedback actuator the limits of calibration are equal (**Vmin** and **Vmax** 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 (**Vmin** and **Vmax** 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 Extrusor Type:
  the limits of 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 **Increment Pendency** and **Decrement Pendency** are 0 r/s;
  the **Maximum Velocity** is 0 mV;
  the **Voltage with max Velocity** is 0 mV.
  With Digital Extrusor Type:
  the **Duration Digital 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 Extrusor Type:
  the limits of 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 **Increment Pendency** and **Decrement Pendency** are 0 r/s;
  the **Maximum Velocity** is 0 mV;
  the **Voltage with max Velocity** is 0 mV.
  With Digital Extrusor Type:
  the **Duration Digital Inc/Dec** is 0 ms.

- [021] Temperature not OK.

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

- [022] Emergency not OK.

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

- [023] Machine in alarm.

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

- [032] Purge external 2 enable.

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

4.17.3 Function Keys.

DEL: Delete all the alarms.

MENU 1: Go to main menu 1.

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