Upgrade your blow molding machine with one of our two new state of the art machine control systems.

Uniloy is proud to introduce the Allen Bradley Compact Logix, and B&R Control Packages developed for our Reciprocating screw blow molding machines. These packages provide improved machine sequence control as well as Ethernet connectivity. Each package also includes a color touch screen operator interface with built in security access levels and alarms and diagnostics useful for trouble shooting machine operation and processing issues.

Control System Features

<table>
<thead>
<tr>
<th>Standard Features</th>
<th>Compact Logix</th>
<th>B&amp;R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine Sequence Control</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Ethernet Connectivity</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Alarms and Diagnostics</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Security Levels</td>
<td>4 Levels</td>
<td>4 Levels</td>
</tr>
<tr>
<td>Output Voltage for Solenoids</td>
<td>110 VAC Standard</td>
<td>24 VDC Standard</td>
</tr>
<tr>
<td>Color Touch Screens</td>
<td>7“, 10”, 12” and 15” Available</td>
<td>15”</td>
</tr>
</tbody>
</table>

**Machine Sequence Control** is the process of using input and output signals and an internal sequence control counter to maintain precise order and timing of all machine movements included in each machine cycle. Both control packages provide this function.

**Ethernet Connection** provides Local Area Networking which means you have the ability to link your machine controller to other computers for the purpose of production scheduling, material tracking, or supervisory control. Both Compact Logix and B&R control packages are equipped with this feature. The software required to perform scheduling, tracking, and supervisory tasks, is the customer’s responsibility.

**Alarms and Diagnostics** are an important feature in a machine control system. Alarms are used to alert machine operators that something within the machine or production process needs their attention. Diagnostics are provided in the form of messages which appear on the operator interface. These messages are intended to help the operator understand what needs attention or correction. A few examples of alarms and associated messages might be:

Alarm 008    “Process Low Temperature Alarm, Heat Zone Actual Temp Below Low Temp Set Point”

Alarm 011    “Swing Arm Shaft Not Clear Alarm”

There are over two hundred alarms and messages built into the Uniloy control systems and they are standard features on both Compact Logix and B&R.
Security Levels are a standard feature in a Uniloy machine control system. The Allen Bradley Compact Logix system provides four security levels. The four levels are Operator, Maintenance, Administration, and Service. All four levels require login passwords and each level is designed to provide the appropriate access and capabilities required for that job function.

The B&R Control System also provides four security levels. These levels are Processor, Maintenance, Administration, and Service. As with the Compact Logix System, login passwords are required, and each level's access is appropriately allocated.

Output Voltage for Solenoids on the existing machines is typically 110 VAC. They can either be left 110 VAC or they can be converted to 24 VDC. The Controller most suited for a machine with 110 VAC solenoids is Compact Logix. The standard Compact Logix system provides a 110 VAC output voltage. The standard B&R control system is setup to provide 24 VDC output voltages; therefore, it is most suited for machines where solenoids are 24 VDC. The B&R control system can be adapted to work with AC voltage solenoids but this requires the addition of relays to convert the controllers DC output to AC.

Color Touch Screens are standard equipment in Uniloy controls packages. The Compact Logix system is designed to include a Panel View Plus Monitor. The PVP is available in five sizes: the PVP 700, 1000, 1250 and 1500. All four monitors have screen backup and restore capabilities using flash cards, each has built in Ethernet capability thru RS232 ports, and all four are full 16 bit color touch screens. The PVP 700 is small enough to fit in the operator station above the clamp or it can be mounted in the electrical cabinet door. The PVP 1000, 1250 and 1500 can be mounted in the electrical cabinet door or mounted on a machine mounted arm or free standing pedestal.

The B&R control system includes a 15” monitor with 24 bit color. The monitor has two RS232 communication ports and one compact flash card slot. The monitor also has two 10/100Base-T Ethernet ports.
Control System Options

The next step in building your controls package is to select your control system options. The options listed in the table below may be used as a guide to determine the control system best suited for your needs.

<table>
<thead>
<tr>
<th>Package Options</th>
<th>Compact Logix</th>
<th>B&amp;R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature control</td>
<td>OPTION</td>
<td>OPTION</td>
</tr>
<tr>
<td>Analog Inputs</td>
<td>OPTION</td>
<td>OPTION</td>
</tr>
<tr>
<td>New DC Pushbuttons</td>
<td>OPTION</td>
<td>STANDARD FEATURE</td>
</tr>
<tr>
<td>New Electrical Cabinet Doors</td>
<td>OPTION</td>
<td>STANDARD FEATURE</td>
</tr>
<tr>
<td>New Power Components</td>
<td>OPTION</td>
<td>OPTION</td>
</tr>
<tr>
<td>Parison Programming</td>
<td>OPTION</td>
<td>OPTION</td>
</tr>
<tr>
<td>Proportional Motion Control</td>
<td>OPTION</td>
<td>OPTION</td>
</tr>
<tr>
<td>Cooling Bed and Trimmer</td>
<td>OPTION</td>
<td>NOT AVAILABLE</td>
</tr>
</tbody>
</table>

**Temperature Controls** can be configured for up to 42 zones using Compact Logix or B&R. This is achieved using thermocouple control cards. These systems provide closed loop control with temperature set points and actual readings displayed on the graphical interface. Solid state heat contactors are provided to replace the old mercury contacts in the existing panel.

The standard Compact Logix package handles 18 heat zones. The table below illustrates some typical heat configurations available for Uniloy blow molding machines where three T/C cards are used along with one analog output card. This configuration provides the ability to monitor 3 thermocouples, and control 15 zones. The available zones are distributed according to the following rules:

- All 2.5” diameter extruders have three heat zones on the barrel.
- All 3.5” and 4” extruders have 4 zones on the barrel.
- The nozzle accounts for one zone.
- The die block can be wired as one or two zones.
- The feed throats are wired as individual zones when possible or ganged in pairs when necessary.
- The stock temperature, hydraulic tank temp, and reducer box temp, each use one monitor only zone.
- The die tips are either ganged or individual to use the remaining heat zones.
If closed loop heat control is not desired for die tips, an open loop percent on control can be selected. The percent on die tip control allows the operator to turn on die tip heaters and adjust them on the control screen. This type of control is called open loop because there is no feedback loop. The actual temperature is displayed on the screen only. The percent on control is used for machine start up only, once the machine goes into auto-cycle the die tips are turned off.

The B&R control system provides 42 controlled heat zones. These zones can be distributed to provide individual control for all heads and die tips. The Compact Logix package, with the use of networking and additional T/C cards, can also be expanded to 42 heat zones. The following table illustrates examples of the expanded heat configurations available from both packages.

<table>
<thead>
<tr>
<th>250R 4 head</th>
<th>Barrel</th>
<th>Nozzle</th>
<th>Die Block</th>
<th>Feed Throats</th>
<th>Hyd Temp</th>
<th>Reducer Temp</th>
<th>Stock Temp</th>
<th>Die Tips</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>350R 4 head</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>18</td>
</tr>
<tr>
<td>350R 6 head</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>350R 10 head</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>18</td>
</tr>
</tbody>
</table>

The picture below is an example of a temperature control screen. This screen is part of the B&R control package and as you can see it includes the temperature set points, the actual temperature, % on, and a + and – tolerance for the temperatures of the six zones controlled on the extruder. This screen also shows the mold water in and out temperatures as well as the setback temperature.
The following screen is a temperature control screen from the Compact Logix control package.

### Temperature Zones 1-8

<table>
<thead>
<tr>
<th>Description</th>
<th>Zone</th>
<th>Setpoint</th>
<th>Actual</th>
<th>Heat %</th>
<th>CV %</th>
<th>High Alarm</th>
<th>Low Alarm</th>
<th>Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed</td>
<td>1</td>
<td>202</td>
<td>200</td>
<td>100</td>
<td></td>
<td>300</td>
<td>190</td>
<td>50</td>
</tr>
<tr>
<td>Transition</td>
<td>2</td>
<td>303</td>
<td>300</td>
<td>100</td>
<td></td>
<td>400</td>
<td>350</td>
<td>5</td>
</tr>
<tr>
<td>Metering 1</td>
<td>3</td>
<td>233</td>
<td>230</td>
<td>100</td>
<td></td>
<td>100</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Metering 2</td>
<td>4</td>
<td>242</td>
<td>240</td>
<td>100</td>
<td></td>
<td>400</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>Nozzle</td>
<td>5</td>
<td>200</td>
<td>300</td>
<td>0</td>
<td></td>
<td>400</td>
<td>290</td>
<td>50</td>
</tr>
<tr>
<td>Melt Temp</td>
<td>6</td>
<td>300</td>
<td>400</td>
<td>200</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mold WTR In</td>
<td>7</td>
<td>10</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mold WTR Out</td>
<td>8</td>
<td>15</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Setback Disabled
- Setback Setpoint 100 °F

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Uniloy, a Milacron Brand
5550 Occidental Hwy ■ Tecumseh, MI 49286 ■ Tel. 517/424-8900 ■ Fax 517/423-6827
www.milacron.com
Analog Inputs are used to provide the controller with information about the machine. There are 7 analog inputs which are available with either Compact Logix or B&R.

- Screw Position
- Clamp Position
- Swing Arm Position
- Extruder Speed
- Extruder Load
- Melt Pressure
- Hydraulic Temperature

Position sensors are used to measure clamp position, screw position, and swing arm position. These sensors are calibrated for the full range of movement of each of these actuators and provide the controller with a signal telling it where each of these machine components is at any given time in the machine cycle. The controller will use these signals to trigger other machine functions such as preblow, blow, fingers open and close, and downstream. If your machine is currently a relay machine, the position sensors will replace existing limit switches which had to be manually adjusted to make a sequence change. With this option, machine sequence changes can be made from the operator interface.

Extruder Speed and Load are two additional inputs which are included with this option. These inputs would be present on any machine that has an AC/VF drive. The inputs are monitored and have high limit alarms which trip when the drive experiences an over current or over speed condition. Melt Pressure and Hydraulic Oil Temperature are also available. Melt pressure is measured by a pressure transducer located in the nozzle between the extruder barrel and die block and oil temperature is measured by a thermocouple located in the hydraulic tank. Both of these inputs are monitored with values displayed on the color screen. High limit alarms are assigned to protect the machine from damage caused by operating outside normal machine parameters.
The following two screens are the B&R and Compact Logix clamp and extruder position control screens. The B&R screen also includes controls for clamp speed which are used in correlation with a proportional hydraulic clamp valve.
The next two screens are the B&R and Compact Logix position control screens which include all of the set points required to control actuating swing arms. The B&R screen also includes settings for proportional hydraulic speed control.
The next two screens are the B&R and Compact Logix extruder control screens. The B&R screen includes set points for screw speed, shot speed, and backpressure. It also includes actual display values for screw position, melt pressure, melt temperature, and drive current. The Compact Logix screen is similar, displaying extruder speed set point and drive statistics such as motor rpm, screw rpm, drive current, melt pressure, and melt temperature.
**New DC Pushbuttons** are a 24 VDC option which replace existing 110 VAC buttons and switches in your operator stations. The new DC pushbuttons and switches are ANSI compliant. The switches and buttons included are:

**Pushbuttons included**
- Emergency Stop
- Cycle Start
- Mold Open
- Charge
- Cycle Stop
- Mold Close
- Shot Size

**Switches included**
- Blow Pins
- Stripper
- Swing Arms
- Shift Clamp
- Chute
- Shuttle

This feature is an option for the Compact Logix Control System and is standard equipment for the B&R. Also included with this option are new push button enclosures and faceplates. These push button stations are located on both sides of the clamp, next to the forward clamp door.

**New Electrical Cabinet Doors** are an option which can be selected to replace doors that are in poor condition, to replace doors with large cutouts which are no longer necessary, or to facilitate a controls retrofit that will not fit on a small subpanel. The following conditions will require new electrical cabinet doors:

- B&R Controls System
- Compact Logix System with Networking
- A Maco Control System is being replaced
- Existing Doors are in unacceptable condition

The B&R Control System and the Compact Logix with networking will be sub assembled on the inside surface of the new doors. This configuration saves time compared to other more intrusive methods of installation.

**New Power Components** is an option which is available for either the Allen Bradley or B&R controls retrofit. The state of the art power components included are:

- Master Control Relay
- AC/VF Drive Relay (if required)
- Circuit Breakers
- Main Breaker
• Motor Contactors (Mercury free)
• Motor Overloads
• Power Supply
• Distribution Block

The circuit breakers provided replace your existing fuses.

**Parison Programming** is an option which is available using the B&R or the Compact Logix controller. Parison programming provides the capability to change the thickness of the parison while it is being extruded. The parison thickness is determined by a profile, programmed into the machine controller. The machine controller uses the profile to drive proportional, or servo, hydraulic valves and cylinders which open and close the gap between the die and mandrel.

Common uses for parison programming include:

• Light-weighting products while maintaining strength
• Profiling to achieve uniform wall thickness in containers with extreme changes in width
• Quick and easy container weight changes

Light-weighting a container can be accomplished by building a profile which places enough material and wall thickness in the top and bottom of the container for strength, while thinning the wall thickness in the body of the container to minimize the overall weight of the container.

Profiling to achieve uniform wall thickness would be useful in containers like a bleach bottle. A bleach bottle has a small neck and diameter at the top of the container which gradually increases in size as you follow the contour downward toward the body. The diameter remains constant from the top of the label panel downward to the bottom of the container. Less material is required in the neck of this container and more material would be required in the larger diameter body. Without a programmable profile this container would have an unnecessarily thick neck which is a waste of material.

Weight changes are made quickly and easily using parison profiling. A straight line profile can be simply shifted by moving two points on the graph. Profiles can be edited on the screen on a single head and tested to verify desired results, then copied to the remaining heads for production.

The following screens are used to create, edit, and run profiles which fulfill the weight, strength, and dimensional requirements of a container.

Building a profile using the B&R Position Control screen is accomplished by entering up to 20 master points and selecting math functions to connect the points. The B&R CPU always divides the resultant profile curve into 200 shot position points regardless of the shot time for the purpose of commanding the hydraulic proportional valve and programming cylinder.
Generating a profile by using the Tooling Profile Edit screen in the Compact Logix system is also done by entering up to 20 master points and selecting mathematical functions to connect the points. This profile line is scanned by the CPU at a rate of once every 5 milliseconds. The number of resultant command signals can be calculated by dividing the shot time by the scan rate of 5 milliseconds.
Compact Logix and B&R controls can both be used with either proportional hydraulic valves or servo valves. If parison programming is already on your machine, the hydraulic valves are most likely servo valves. If reusing your existing valves is what you want, the make and model of the existing valves will be needed to verify compatibility with the new control system. If you are adding parison control to your machine for the first time you have the option of either valve type. A system tailored for your machine and your preferences can be quoted upon request.

**Proportional Motion Control** is an option which is also available to control proportional hydraulic valves on the clamp and swing arms. This control option is available with both the Compact Logix and the B&R control systems.

Proportional motion control on your clamp and swing arms provides speed control, speed ramping, and more accurate positioning for smoother operation.

**Cooling Bed and Trimmer Control** is an option which is available using Compact Logix. This downstream control is accomplished through the use of networking with a flexible I/O wiring system. The downstream control feature moves the cooling bed and impact trimmer controls to the main machine by placing control nodes in the trimmer and cooling bed and linking them back to the machine controller with simple cables.

Controlling downstream equipment from the blow molder’s main control system has its benefits including:
- Ergonomic advantages of one control point
- Lower cost of overall control system and components
- One software for the entire system
- Simplified wire connection between equipment

The main disadvantage associated with having the cooling bed and trimmer controlled by the main machine controller is that this limits future flexibility with the equipment. The cooling bed and trimmer are now dependent on the machine controller and cannot be moved and operated in front of a machine without downstream control capability.

The B&R Control system does not support downstream control. If a B&R control system is desired for your blow molder, and you also wish to have new, updated controls for your downstream equipment, the following list includes current independent control systems available:

- **Impact Trimmer**  Allen Bradley Compact Logix
- **Cooling Bed**  Siemens Logo
- **Rotary Trimmer**  Siemens Logo
- **VIT**  B&R (Independent of machine)

For more information about the downstream control systems or for a formal quote, contact your Uniloy Sales Representative.
Choose Your New Controls System

Now that you have all of the details, use the following survey to choose the control system that’s right for you.

<table>
<thead>
<tr>
<th>Controls Package Features and Options</th>
<th>Compact Logix Package</th>
<th>B&amp;R Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine Sequence Control</td>
<td>Standard Package</td>
<td>Standard Package</td>
</tr>
<tr>
<td>Ethernet Connectivity</td>
<td>Standard Package</td>
<td>Standard Package</td>
</tr>
<tr>
<td>Alarms and Diagnostics</td>
<td>Standard Package</td>
<td>Standard Package</td>
</tr>
<tr>
<td>Security Levels</td>
<td>4 Levels Standard Package</td>
<td>4 Levels Standard Package</td>
</tr>
<tr>
<td>Modem Connectivity</td>
<td>Standard Package</td>
<td>Standard Package</td>
</tr>
<tr>
<td>Output Voltage for Solenoids</td>
<td>110 VAC Standard Package, 24 VDC Optional</td>
<td>24 VDC Standard Package, 110 VAC with Relays Optional</td>
</tr>
<tr>
<td>Color Touch Screen</td>
<td>7&quot;, 10&quot;, 12&quot;, OR 15&quot; Optional</td>
<td>15&quot; Standard Package</td>
</tr>
<tr>
<td>Temperature Control</td>
<td>Optional 18 Zones, further expandable to 42 Zones</td>
<td>42 Zones Optional</td>
</tr>
<tr>
<td>Analog Inputs</td>
<td>7 Inputs Optional</td>
<td>7 Inputs Optional</td>
</tr>
<tr>
<td>New DC Pushbuttons</td>
<td>Optional</td>
<td>Standard Package</td>
</tr>
<tr>
<td>New Electrical Cabinet Doors</td>
<td>Optional</td>
<td>Standard Package</td>
</tr>
<tr>
<td>New Power Components</td>
<td>Optional</td>
<td>Optional</td>
</tr>
<tr>
<td>Parison Programming</td>
<td>Optional up to 8 individually controlled heads</td>
<td>Optional up to 16 individually controlled heads</td>
</tr>
<tr>
<td>Proportional Motion Control</td>
<td>Optional Clamp and Swing Arm</td>
<td>Optional Clamp and Swing Arm</td>
</tr>
<tr>
<td>Cooling Bed and Trimmer</td>
<td>Optional</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

If you have any questions about this product offering or if you would like assistance specifying your new controls system, please feel free to contact your Uniloy Sales Representative.
See below for before and after pictures of controls retrofits installed by Uniloy

TYPICAL ENCLOSURE BEFORE RETROFIT
B&R CONTROLS RETROFIT

B&R MONITOR

NEW ELECTRICAL CABINET DOORS
B&R MOUNTED ON INSIDE OF DOOR

B&R COMPONENTS MOUNTED ON INSIDE OF DOOR
ALLEN BRADLEY CONTROLS RETROFIT

AB Controls with New Cabinet Doors

New Power Components
PVP 600 5” Color Screen

Temperature Control Screen
AB Controls Mounted on a Sub Panel
Sub Panel Mounted on Existing Doors

Job Complete