



# E-Drive™

User Manual (with Pendant HMI)

version 3





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# Section 1 - Introduction

The purpose of this manual is to assist users in the integration, operation and maintenance of an E-Drive control cabinet and pendant HMI interface. Please also see the corresponding Mechanical User Manual for the actuator system. If you need additional information specific to your system, or information in another language, please contact your representative or a *Mold-Masters* office.

## 1.1 Intended Use

*Mold-Masters* E-Drive systems have been built to process thermoplastic material at the required temperature for injection molding and must not be used for any other purpose.

This manual is written for use by skilled persons who are familiar with injection molding machinery and their terminology. Operators should be familiar with plastic injection molding machines and the controls of such equipment. Maintenance persons should have sufficient understanding of electrical safety to appreciate the dangers of 3-phase supplies. They should know how to take appropriate measures to avoid any danger from electrical supplies.



### IMPORTANT

The E-Drive is designed to be operated by the E-Drive controller programmed for your order's specific system. Do not swap E-Drive controllers for different E-Drive systems without checking the manual as controller setup must match the mechanical system.

## 1.2 Documentation

This manual is part of the documentation package for your order and should be referenced along with other documents included in the package:

- HRUM-EN-XX (Mechanical User Manual - see E-Drive section)
- EC declaration of conformity
- The Bill of Materials (BOM). Together with the General Assembly drawing, the Bill of Materials should be referenced when ordering spare parts
- General Assembly drawing
- Electrical drawings

## 1.3 Release Details

When ordering this manual, please reference the document number below.

Table 1-1 Release Details		
Document Number	Release Date	Version
EDRP-UM-EN-00-03-3	March 2019	03-3

## **1.4 Warranty**

For current warranty information please refer to the documents available from our website: <https://www.milacron.com/mold-masters-warranty/> or contact your *Mold-Masters* representative.

## **1.5 Returned Goods Policy**

Please do not return any parts to *Mold-Masters* without pre-authorization and a return authorization number supplied by *Mold-Masters*.

Our policy is one of continuous improvement and we reserve the right to alter product specifications at any time without giving notice.

## **1.6 Movement or Resale of Mold-Masters Products or Systems**

This documentation is intended for use in the country of destination for which the product or system was purchased.

*Mold-Masters* takes no responsibility for documentation of products or systems if they are relocated or resold outside the intended country of destination, as stated on the accompanying invoice and/or waybill.

## **1.7 Copyright**

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## 1.8 Units of Measure and Conversion Factors



**NOTE**

The dimensions given in this manual are from original manufacturing drawings.

All values in this manual are in S.I. units or subdivisions of these units. Imperial units are given in parenthesis immediately after the S.I. units.

Table 1-2 Units of Measure and Conversion Factors		
Abbreviation	Unit	Conversion Value
bar	Bar	14.5 psi
in.	Inch	25.4 mm
kg	Kilogram	2.205 lb
kPa	Kilopascal	0.145 psi
gal	Gallon	3.785 l
lb	Pound	0.4536 kg
lbf	Pound force	4.448 N
lbf.in.	Pound force inch	0.113 Nm
l	Litre	0.264 gallon
min	Minute	
mm	Millimeter	0.03937 in.
mΩ	Milli Ohm	
N	Newton	0.2248 lbf
Nm	Newton Meter	8.851 lbf.in.
psi	Pound per square inch	0.069 bar
psi	Pound per square inch	6.895 kPa
rpm	Revolutions per minute	
s	Second	
°	Degree	
°C	Degree Celsius	0.556 (°F -32)
°F	Degree Fahrenheit	1.8 °C +32

## 1.9 Trademarks and Patents

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# Section 2 - Global Support

## 2.1 Manufacturing Facilities

### GLOBAL HEADQUARTERS

#### CANADA

Mold-Masters (2007) Limited  
233 Armstrong Avenue  
Georgetown, Ontario  
Canada L7G 4X5  
tel: +1 905 877 0185  
fax: +1 905 877 6979  
canada@moldmasters.com

### SOUTH AMERICAN HEADQUARTERS

#### BRAZIL

Mold-Masters do Brasil Ltda.  
R. James Clerk Maxwell,  
280 – Techno Park, Campinas  
São Paulo, Brazil, 13069-380  
tel: +55 19 3518 4040  
brazil@moldmasters.com

### UNITED KINGDOM & IRELAND

Mold-Masters (UK) Ltd  
Netherwood Road  
Rotherwas Ind. Est.  
Hereford, HR2 6JU  
United Kingdom  
tel: +44 1432 265768  
fax: +44 1432 263782  
uk@moldmasters.com

### EUROPEAN HEADQUARTERS

#### GERMANY / SWITZERLAND

Mold-Masters Europa GmbH  
Postfach/P.O. Box 19 01 45  
76503 Baden-Baden, Germany  
Neumattring 1  
76532 Baden-Baden, Germany  
tel: +49 7221 50990  
fax: +49 7221 53093  
germany@moldmasters.com

### INDIA

Mold-Masters Technologies  
Private Limited  
# 247, Alagesan Road,  
Shiv Building, Saibaba Colony.  
Coimbatore T. N.  
India 641 011  
tel: +91 422 423 4888  
fax: +91 422 423 4800  
india@moldmasters.com

### USA

Mold-Masters Injectioneering LLC  
29111 Stephenson Highway  
Madison Heights, MI 48071, USA  
tel: +1 800 450 2270 (USA only)  
tel: +1 (248) 544-5710  
fax: +1 (248) 544-5712  
usa@moldmasters.com

### ASIAN HEADQUARTERS

#### CHINA/HONG KONG/TAIWAN

Mold-Masters (KunShan) Co, Ltd  
Zhao Tian Rd  
Lu Jia Town, KunShan City  
Jiang Su Province  
People's Republic of China  
tel: +86 512 86162882  
fax: +86 512-86162883  
china@moldmasters.com

### JAPAN

Mold-Masters K.K.  
1-4-17 Kurikidai, Asaoku  
Kawasaki, Kanagawa  
Japan, 215-0032  
tel: +81 44 986 2101  
fax: +81 44 986 3145  
japan@moldmasters.com

## 2.2 Regional Offices

### AUSTRIA / East and South East Europe

Mold-Masters Handelsges.m.b.H.  
Pyhrnstrasse 16  
A-4553 Schlierbach  
Austria  
tel: +43 7582 51877  
fax: +43 7582 51877 18  
austria@moldmasters.com

### ITALY

Mold-Masters Italia  
Via Germania, 23  
35010 Vigonza (PD)  
Italy  
tel: +39 049/5019955  
fax: +39 049/5019951  
italy@moldmasters.com

### CZECH REPUBLIC

Mold-Masters Europa GmbH  
Hlavni 823  
75654 Zubri  
Czech Republic  
tel: +420 571 619 017  
fax: +420 571 619 018  
czech@moldmasters.com

### KOREA

Mold-Masters Korea Ltd.  
E dong, 2nd floor, 2625-6,  
Jeongwang-dong, Siheung  
City, Gyeonggi-do, 15117,  
South Korea  
Tel: +82-31-431-4756  
korea@moldmasters.com

### FRANCE

Mold-Masters France  
ZI la Marinière,  
2 Rue Bernard Palissy  
91070 Bondoufle, France  
tel: +33 (0) 1 78 05 40 20  
fax: +33 (0) 1 78 05 40 30  
france@moldmasters.com

### MEXICO

Milacron Mexico Plastics Services  
S.A. de C.V.  
Circuito El Marques norte #55  
Parque Industrial El Marques  
El Marques, Queretaro C.P. 76246  
Mexico  
tel: +52 442 713 5661 (sales)  
tel: +52 442 713 5664 (service)  
mexico@moldmasters.com

## Regional offices - continued

### POLAND

Mold-Masters Europa GmbH  
Skr. Pocztowa 59  
00-908 Warszawa  
Poland  
tel: +48 (0) 66 91 80 888  
fax: +48 (0) 66 91 80 208  
poland@moldmasters.com

### SINGAPORE\*

Mold-Masters Singapore PTE. Ltd.  
No 48 Toh Guan Road East  
#06-140 Enterprise Hub  
Singapore 608586  
Republic of Singapore  
tel: +65 6261 7793  
fax: +65 6261 8378  
singapore@moldmasters.com  
\*Coverage includes Southeast  
Asia, Australia, and New Zealand

### SPAIN

Ferromatik Milacron /  
Mold Masters Europa GmbH  
C/. Enric Morera, 7  
Polig. Ind. Foinvasa  
08110 Montcada i Reixac  
Barcelona, Spain  
tel: +34 93 575 41 29  
fax: +34 93 575 34 19  
spain@moldmasters.com

### TURKEY

Mold-Masters Europa GmbH  
Merkezi Almanya Türkiye  
İstanbul Şubesi  
Alanaldı Caddesi Bahçelerarası  
Sokak No: 31/1  
34736 İçerenköy-Ataşehir  
İstanbul, Turkey  
tel: +90 216 577 32 44  
fax: +90 216 577 32 45  
turkey@moldmasters.com

## 2.3 International Representatives

### ARGENTINA

Sollwert S.R.L.  
tel: +54 11 4786 5978  
e: sollwert@fibertel.com.ar

### DENMARK\*

Englmayer A/S  
tel: +45 46 733847  
e: support@englmayer.dk  
\*Coverage includes Norway and  
Sweden.

### BELARUS

HP Promcomplect  
tel: +375 29  
683-48-99 e:  
info@mold.by

### BULGARIA

Mold-Trade OOD  
tel: +359 82 821 054  
e: contact@mold-trade.com

### ISRAEL

ASAF Industries  
tel: +972 3 5581290  
e: sales@asaf.com

### FINLAND

Oy Scalar Ltd.  
tel: +358 10 387 2955  
e: info@scalar.fi

### GREECE

Ionian Chemicals S.A.  
tel: +30 210 6836918-9  
e: m.pavlou@ionianchemicals.com

### RUSSIA

System LLC  
tel: +7 (495) 199-14-51  
e: moldmasters@system.com.ru

### PORTUGAL

Gecim LDA  
tel: +351 244 575600  
e: gecim@gemic.pt

### ROMANIA

Tehnic Mold Trade SRL  
tel: +4 021 230 60 51  
e: contact@matritehightech.ro

### SLOVENIA

RD Picta Tehnologije d.o.o.  
tel: +386 59 969 117  
e: info@picta.si

# Section 3 - Safety

## 2.4 Introduction

Please be aware that the safety information provided by *Mold-Masters* does not absolve the integrator and employer from understanding and following international and local standards for safety of machinery. It is the responsibility of the end integrator to integrate the final system, provide necessary e-stop connections, safety interlocks and guarding, to select the appropriate electrical cable for the region of use and to ensure compliance with all relevant standards.

It is the responsibility of the employer to:

- Properly train and instruct its personnel in the safe operation of equipment, including the use of all the safety devices.
- Provide its personnel with all necessary protective clothing, including such items as a face shield and heat resistant gloves.
- Ensure the original and continuing competence of personnel caring for, setting up, inspecting and maintaining injection molding equipment.
- Establish and follow a program of periodic and regular inspections of injection molding equipment to ensure it is in safe operating condition and proper adjustment.
- Ensure that no modifications, repairs or rebuild of portions are made to the equipment that reduces the level of safety existing at time of manufacture or remanufacture.

### 3.1 Safety Hazards



**WARNING**

Also refer to all machine manuals and local regulations and codes for safety information.

The following safety hazards are most commonly associated with injection molding equipment. See European Standard EN201 or American Standard ANSI/SPI B151.1.

Refer to the illustration of hazard areas below when reading the Safety Hazards Figure 3-1 on page 3-2.

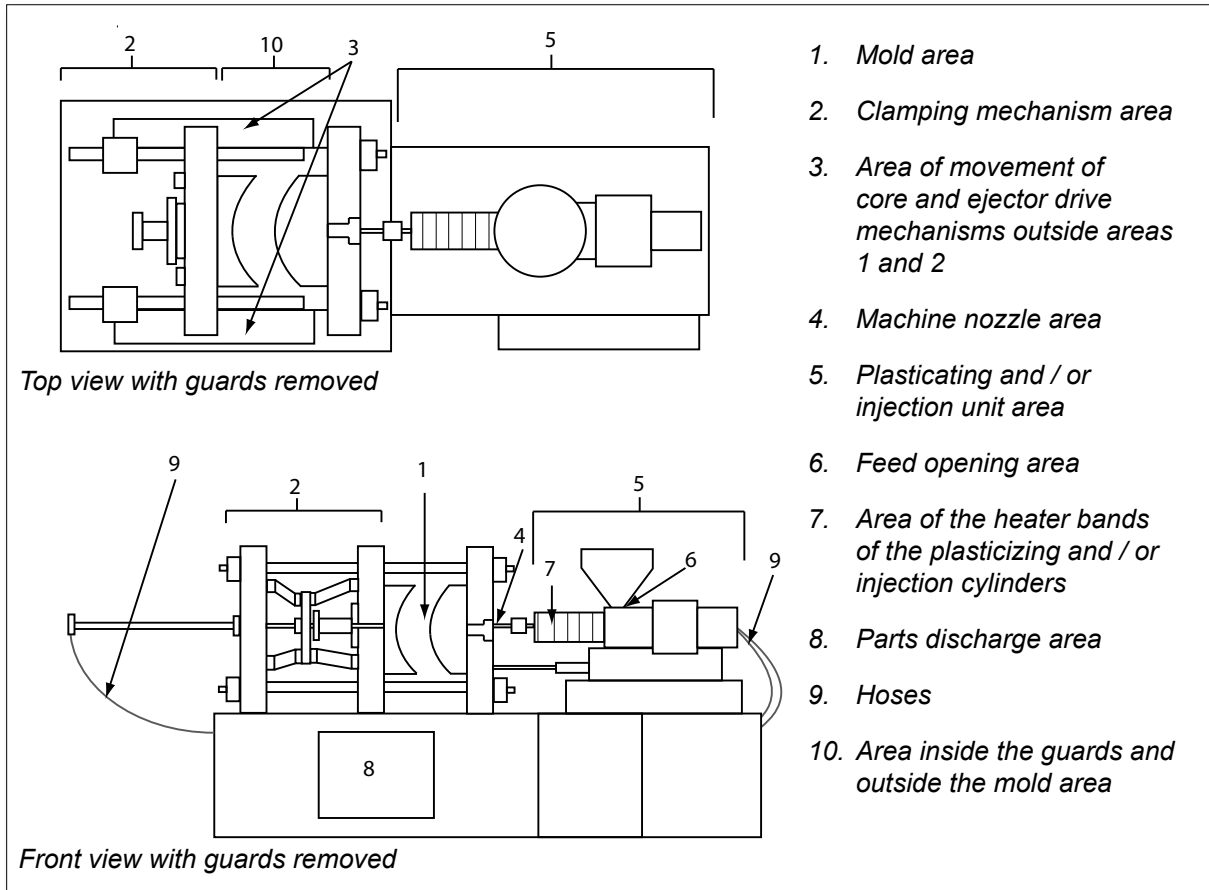


Figure 3-1 Injection molding machine hazard areas

**Safety Hazards - continued**

<b>Table 3-1 Safety Hazards</b>	
<b>Hazard Area</b>	<b>Potential Hazards</b>
<p><b>Mold Area</b> Area between the platens. See Figure 3-1 area 1</p>	<p><b>Mechanical Hazards</b> Crushing and / or shearing and / or impact hazards caused by:</p> <ul style="list-style-type: none"> <li>• Movement of the platen.</li> <li>• Movements of the injection barrel(s) into the mold area.</li> <li>• Movements of cores and ejectors and their drive mechanisms.</li> <li>• Tie bar motion.</li> </ul> <p><b>Thermal Hazards</b> Burns and / or scalds due to operating temperature of:</p> <ul style="list-style-type: none"> <li>• The mold heating elements.</li> <li>• Material released from/through the mold.</li> </ul>
<p><b>Clamping Mechanism Area</b> See Figure 3-1 area 2</p>	<p><b>Mechanical Hazards</b> Crushing and / or shearing and / or impact hazards caused by:</p> <ul style="list-style-type: none"> <li>• Movement of the platen.</li> <li>• Movement of the drive mechanism of the platen.</li> <li>• Movement of the core and ejector drive mechanism.</li> </ul>
<p><b>Movement of Drive Mechanisms Outside the Mold Area and Outside the Clamping Mechanism Area</b> See Figure 3-1 area 3</p>	<p><b>Mechanical Hazards</b> Mechanical hazards of crushing, shearing and / or impact caused by the movements of:</p> <ul style="list-style-type: none"> <li>• Core and ejector drive mechanisms.</li> </ul>
<p><b>Nozzle Area</b> The nozzle area is the area between the barrel and the sprue bushing. See Figure 3-1 area 4</p>	<p><b>Mechanical Hazards</b> Crushing, shearing hazards and / or impact hazards caused by:</p> <ul style="list-style-type: none"> <li>• Forward movement of the plasticizing and / or injection unit including nozzle.</li> <li>• Movements of parts of the power-operated nozzle shutoff and their drives.</li> <li>• Over pressurization in the nozzle.</li> </ul> <p><b>Thermal Hazards</b> Burns and or scalds due to operating temperature of:</p> <ul style="list-style-type: none"> <li>• The nozzle.</li> <li>• Material discharging from the nozzle.</li> </ul>
<p><b>Plasticizing and / or Injection Unit Area</b> Area from the adapter / barrel head / end cap to the extruder motor above the sled including the carriage cylinders. See Figure 3-1 area 5</p>	<p><b>Mechanical Hazards</b> Crushing, shearing and / or drawn-into hazards caused by:</p> <ul style="list-style-type: none"> <li>• Unintentional gravity movements e.g. for machines with plasticizing and / or injection unit positioned above the mold area.</li> <li>• The movements of the screw and / or the injection plunger in the cylinder accessible through the feed opening.</li> <li>• Movement of the carriage unit.</li> </ul> <p><b>Thermal Hazards</b> Burns and / or scalds due to operating temperature of:</p> <ul style="list-style-type: none"> <li>• The plasticizing and / or injection unit.</li> <li>• The heating elements e.g. heater bands.</li> <li>• The material and / or vapors discharging from the vent opening, feed throat or hopper.</li> </ul> <p><b>Mechanical and / or Thermal Hazard</b></p> <ul style="list-style-type: none"> <li>• Hazards due to reduction in mechanical strength of the plasticizing and / or injection cylinder due to overheating.</li> </ul>
<p><b>Feed Opening</b> See Figure 3-1 area 6</p>	<p>Pinching and crushing between injection screw movement and housing.</p>

**Safety Hazards - continued**

<b>Table 3-1 Safety Hazards</b>	
<b>Hazard Area</b>	<b>Potential Hazards</b>
<b>Area of the Heater Bands of the Plasticizing and / or Injection Cylinders</b> See Figure 3-1 area 7	Burns and / or scalds due to operating temperature of: <ul style="list-style-type: none"> <li>• The plasticizing and / or injection unit.</li> <li>• The heating elements e.g. heater bands.</li> <li>• The material and / or vapors discharging from the vent opening, feed throat or hopper.</li> </ul>
<b>Parts Discharge Area</b> See Figure 3-1 area 8	<b>Mechanical Hazards</b> Accessible Through the Discharge Area Crushing, shearing and / or impact hazards caused by: <ul style="list-style-type: none"> <li>• Closing movement of the platen.</li> <li>• Movements of cores and ejectors and their drive mechanisms.</li> </ul> <b>Thermal Hazards</b> Accessible through the discharge area Burns and or scalds due to operating temperature of: <ul style="list-style-type: none"> <li>• The mold.</li> <li>• Heating elements of the mold.</li> <li>• Material released from / through the mold.</li> </ul>
<b>Hoses</b> See Figure 3-1 area 9	<ul style="list-style-type: none"> <li>• Whipping action caused by hose assembly failure.</li> <li>• Possible release of fluid under pressure that can cause injury.</li> <li>• Thermal hazards associated with hot fluid.</li> </ul>
<b>Area Inside the Guards and Outside the Mold Area</b> See Figure 3-1 area 10	Crushing and / or shearing and / or impact hazards caused by: <ul style="list-style-type: none"> <li>• Movement of the platen.</li> <li>• Movement of the drive mechanism of the platen.</li> <li>• Movement of the core and ejector drive mechanism.</li> <li>• Clamp opening movement.</li> </ul>
<b>Electrical Hazards</b>	<ul style="list-style-type: none"> <li>• Electrical or electromagnetic disturbance generated by the motor control unit.</li> <li>• Electrical or electromagnetic disturbance that can cause failures in the machine control systems and adjacent machine controls.</li> <li>• Electrical or electromagnetic disturbance generated by the motor control unit.</li> </ul>
<b>Hydraulic Accumulators</b>	High pressure discharge.
<b>Power Operated Gate</b>	Crush or impact hazards caused by the movement of the power operated gates.
<b>Vapors and Gases</b>	Certain processing conditions and / or resins can cause hazardous fumes or vapors.





## 3.2 Operational Hazards

### WARNINGS

- Refer to all machine manuals and local regulations and codes for safety information.
- The equipment supplied is subjected to high injection pressures and high temperatures. Ensure that extreme caution is observed in the operation and maintenance of the injection molding machines.
- Only fully trained personnel should operate or maintain equipment.
- Do not operate the equipment with unconfined long hair, loose clothing or jewelry, including name badges, neckties, etc. These may get caught in the equipment and can cause death or serious injury.
- Never disable or bypass a safety device.
- Ensure that the protective guards are placed around the nozzle to prevent the material from splashing or drooling.
- A burn hazard exists from material during routine purging. Wear heat-resistant personal protective equipment (PPE) to prevent burns from contact with hot surfaces or splatter of hot material and gases.
- Material purged from machine may be extremely hot. Ensure protective guards are in place around the nozzle to prevent material from splashing. Use proper personal protective equipment.
- All operators should wear personal protective equipment, such as face shields and use heat resistant gloves when working around the feed inlet, purging the machine or cleaning the gates of the mold.
- Remove purged material from the machine immediately.
- Decomposing or burning material could result in noxious gases being emitted from the purged material, feed inlet or mold.
- Ensure proper ventilation and exhaust systems are in place to help prevent inhalation of harmful gases and vapors.
- Consult manufacturer's Material Safety Data Sheets (MSDS).
- Hoses fitted to the mold will contain high or low temperature fluids or air under high pressure. The operator must shut down and lockout these systems as well as relieving any pressure before performing any work with these hoses. Regularly inspect and replace all flexible hoses and restraints.
- Water and / or hydraulics on the mold may be in close proximity to electrical connections and equipment. Water leakage may cause an electrical short circuit. Hydraulic fluid leakage may cause a fire hazard. Always keep water and / or hydraulic hoses and fittings in good condition to avoid leaks.
- Never perform any work on the mold machine unless the hydraulic pump has been stopped.
- Check frequently for possible oil leaks / water leaks. Stop the machine and make repairs.



**Operational Hazards - continued****WARNING**

- Make sure that the cables are connected to the correct motors. Cables and motors are clearly labeled. Reversing the cables can result in unexpected and uncontrolled motion causing a safety risk or damage to the machine. A crushing hazard exists between the nozzle and mold melt inlet during carriage forward motion.
- A possible shearing hazard exists between the edge of the injection guard and the injection housing during injection.
- The open feed port could present a hazard to a finger or a hand inserted during operation of the machine.
- The electric servo motors could overheat presenting a hot surface which could cause burns to someone touching it.
- The barrel, barrel head, nozzle, heater bands and mold components are hot surfaces which could result in burns.
- Keep flammable liquids or dust away from the hot surfaces as they could ignite.
- Follow good housekeeping procedures and keep floors clean to prevent slips, trips and falls due to spilled material on the work floor.
- Apply engineering controls or hearing conservation programs as necessary to control noise.
- When doing any work on the machine that requires moving and lifting the machine, ensure that lifting equipment (eyebolts, fork lift truck, cranes, etc.) will have sufficient capacity to handle mold, auxiliary injection unit or Hot Runner weight.
- Connect all lifting devices and support the machine using a crane of adequate capacity before commencing work. Failure to support the machine can result in severe injury or death.
- Mold cable from the controller to the mold must be removed before servicing the mold.

### 3.3 General Safety Symbols

Table 3-2 Typical Safety Symbols	
Symbol	General Description
	<b>General – Warning</b> Indicates an immediate or potentially hazardous situation, which if not avoided, could result in a serious injury or death, and / or damage to equipment.
	<b>Warning – Barrel Cover Grounding Strap</b> Lockout / tagout procedures must be followed before removing the barrel cover. Barrel cover can become energized upon removal of grounding straps and contact can result in death or serious injury. Grounding straps must be reconnected before reconnecting power to machine.
	<b>Warning – Crushing and / or Impact Points</b> Contact with moving parts can cause serious crushing injury. Always keep guards in place.
	<b>Warning – Crush Hazard Closing Mold</b>
	<b>Warning – Hazardous Voltage</b> Contact with hazardous voltages will cause death or serious injury. Turn off power and review electrical schematics before servicing equipment. May contain more than one live circuit. Test all circuits before handling to make sure circuits have been de-energized.
	<b>Warning – High Pressure</b> Overheated fluids may cause severe burns. Discharge pressure before disconnecting water lines.
	<b>Warning – High Pressure Accumulator</b> Sudden release of high pressure gas or oil can cause death or serious injury. Discharge all gas and hydraulic pressure before disconnecting or disassembling accumulator.
	<b>Warning – Hot Surfaces</b> Contact with exposed hot surfaces will cause serious burn injury. Wear protective gloves when working near these areas.
	<b>Mandatory – Lockout / Tagout</b> Ensure that all energies are properly locked out, and remain locked out until the service work is completed. Servicing equipment without disabling all internal and external power sources can cause death or serious injury. De-energize all internal and external power sources (electrical, hydraulic, pneumatic, kinetic, potential, and thermal).
	<b>Warning – Molten Material Splashing Hazard</b> Molten material or high pressure gas can cause death or severe burns. Wear personal protective equipment while servicing the feed throat, nozzle, mold areas and when purging the injection unit.
	<b>Warning – Read Manual Before Operation</b> Personnel should read and understand all instructions in the manuals before working on equipment. Only properly trained personnel should operate the equipment.
	<b>Warning – Slip, Trip or Fall Hazard</b> Do not climb on equipment surfaces. Serious slip, trip, or fall injuries can result from personnel climbing on equipment surfaces.

## General Safety Symbols - continued

Table 3-2 Typical Safety Symbols	
Symbol	General Description
	<b>Caution</b> Failure to follow instructions may damage equipment.
	<b>Important</b> Indicates additional information or used as a reminder.

### 3.4 Wiring Check



#### CAUTION

System Mains Supply Wiring:

- Before connecting the system to a power supply, it is important to check that the wiring between the system and the power supply has been done correctly.
- Particular attention must be given to the current rating of the power supply. For example, if a controller is rated at 63A, then the power supply must also be rated at 63A.
- Check that the phases of power supply are wired correctly.

Controller to Mold Wiring:

- For separate power and thermocouple connections, ensure that the power cables are never connected to the thermocouple connectors and vice-versa.
- For mixed power and thermocouple connections, ensure that the power and thermocouple connections have not been wired incorrectly.

Communications Interface and Control Sequence:

- It is the customer's responsibility to verify functionality of any custom machine interface at safe speeds, prior to operating equipment in the production environment at full speed in automatic mode.
- It is the customer's responsibility to verify all required motion sequences are correct, prior to operating equipment in the production environment at full speed in automatic mode.
- Switching the machinery into Auto mode without having verified the control interlocks and motion sequence are correct, may cause damage to machinery and / or equipment.

Failure to do wiring or connections properly will result in equipment failure.

The use of *Mold-Masters* standard connections can help to eliminate the potential for wiring errors.

*Mold-Masters Ltd.* cannot be responsible for damage caused by customer wiring and / or connection errors.



## 3.5 Lockout Safety

### WARNING

DO NOT enter the cabinet without first ISOLATING the supplies.

High voltage and amperage cables are connected to the controller and the mold. Electrical power must be shut off and lockout / tagout procedures followed prior to installing or removing any cables.

Use lockout / tagout to prevent operation during maintenance.

All maintenance should be performed by properly trained personnel based on local laws and regulation. Electrical products may not be grounded when removed from the assembled or normal operating condition.

Ensure proper grounding of all electrical components before performing any maintenance to avoid potential risk of electrical shock.

Often power sources are inadvertently turned on or valves are opened mistakenly before maintenance work is completed, resulting in serious injuries and fatalities. Therefore, it is important to ensure that all energies are properly locked out and that they remain locked out until the work is completed.

If a lockout is not performed, uncontrolled energies could cause:

- Electrocutation from contact with live circuits
- Cuts, bruises, crushing, amputations or death, resulting from entanglement with belts, chains, conveyors, rollers, shafts, impellers
- Burns from contact with hot parts, materials or equipment such as furnaces
- Fires and explosions
- Chemical exposures from gases or liquids released from pipelines



## 3.6 Electrical Lockout

### WARNING - READ MANUAL

Refer to all machine manuals and local regulations and codes.

### NOTE

In some instances, there may be more than one power source feeding equipment and steps must be taken to ensure that all sources are effectively locked out.

Employers must provide an effective lockout / tagout program.

1. Shut down machine using normal operational shutdown procedure and controls. This should be done by, or in consultation with the machine operator.
2. After ensuring that the machinery has been completely shut down, and all controls in the “off” position, open the main disconnect switch located in the field.
3. Using your own personal padlock, or one assigned by your supervisor, lock the disconnect switch in the off position. Do not lock only the box. Remove the key and retain. Complete a lockout tag and affix to the disconnect switch. Each person working on the equipment must follow this step. The lock of the person doing the work or in charge must be installed first, remain throughout and be removed last. Test the main disconnect switch and make sure it cannot be moved to the “on” position.
4. Try to start the machine using the normal operation controls and point of operation switches to make sure that the power has been disconnected.
5. Other sources of energy that could create a hazard while working on the equipment must also be de-energized and appropriately “locked-out”. This can include gravity, compressed air, hydraulics, steam and other pressurized or hazardous liquids and gases. See Table 3-3.
6. When the work is completed, prior to removing the last lock, make sure the operational controls are in the “off” position so that the main disconnect switching is done under “no load”. Ensure all blocks, tools and other foreign materials are removed from machine. Also ensure that all personnel that may be affected are informed that the lock(s) will be removed.
7. Remove lock and tag, and close the main disconnect switch if permission has been given.
8. When the work has not been completed on the first shift, the next operator should install a personal lock and tag before the first operator removes the original lock and tag. If the next operator is delayed, a lock and tag could be installed by the next supervisor. Lockout procedures should indicate how the transfer is to be conducted.
9. It is important that, for their personal protection, each worker and/or foreperson working in or on a machine places his/her own safety lock on the disconnect switch. Use tags to spotlight work in progress and give details of work being done. Only when the work is completed and the work permit signed off, may each worker remove his/her lock. The last lock to be removed should be that of the person supervising the lockout and this responsibility should not be delegated.

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### 3.6.1 Energy Forms and Lockout Guidelines

Table 3-3 Energy Forms, Energy Sources and General Lockout Guidelines		
Energy Form	Energy Source	Lockout Guidelines
<b>Electrical Energy</b>	<ul style="list-style-type: none"> <li>Power transmission lines</li> <li>Machine power cords</li> <li>Motors</li> <li>Solenoids</li> <li>Capacitors (stored electrical energy)</li> </ul>	<ul style="list-style-type: none"> <li>Turn off power at machine first (i.e., at point of operation switch), and then at the main disconnect switch for the machine.</li> <li>Lock and tag the main disconnect switch.</li> <li>Fully discharge all capacitive systems (e.g., cycle machine to drain power from capacitors) according to the manufacturer's instructions.</li> </ul>
<b>Hydraulic Energy</b>	<ul style="list-style-type: none"> <li>Hydraulic systems (e.g., hydraulic presses, rams, cylinders, hammers)</li> </ul>	<ul style="list-style-type: none"> <li>Shut off, lock (with chains, built-in lockout devices, or lockout attachments) and tag valves.</li> <li>Bleed off and blank lines as necessary.</li> </ul>
<b>Pneumatic Energy</b>	<ul style="list-style-type: none"> <li>Pneumatic systems (e.g., lines, pressure reservoirs, accumulators, air surge tanks, rams, cylinders)</li> </ul>	<ul style="list-style-type: none"> <li>Shut off, lock (with chains, built-in lockout devices, or lockout attachments) and tag valves.</li> <li>Bleed off excess air.</li> <li>If pressure cannot be relieved, block any possible movement of machinery.</li> </ul>
<b>Kinetic Energy (Energy of a moving object or materials. Moving object may be powered or coasting)</b>	<ul style="list-style-type: none"> <li>Blades</li> <li>Flywheels</li> <li>Materials in supply lines</li> </ul>	<ul style="list-style-type: none"> <li>Stop and block machine parts (e.g. stop flywheels and ensure that they do not recycle).</li> <li>Review entire cycle of mechanical motion, ensure that all motions are stopped.</li> <li>Block material from moving into area of work.</li> <li>Blank as necessary.</li> </ul>
<b>Potential Energy (Stored energy that an object has the potential to release due to its position)</b>	<ul style="list-style-type: none"> <li>Springs (e.g., in air brake cylinders)</li> <li>Actuators</li> <li>Counterweights</li> <li>Raised loads</li> <li>Top or movable part of a press or lifting device</li> </ul>	<ul style="list-style-type: none"> <li>If possible, lower all suspended parts and loads to the lowest (rest) position.</li> <li>Block parts that might be moved by gravity.</li> <li>Release or block spring energy.</li> </ul>
<b>Thermal Energy</b>	<ul style="list-style-type: none"> <li>Supply lines</li> <li>Storage tanks and vessels</li> </ul>	<ul style="list-style-type: none"> <li>Shut off, lock (with chains, built-in lockout devices, or lockout attachments) and tag valves.</li> <li>Bleed off excess liquids or gases.</li> <li>Blank lines as necessary.</li> </ul>

## 3.7 Disposal



### WARNING

Milacron *Mold-Masters* declines any responsibility for personal injury or personal damage arising from reuse of the individual components, if these parts are used other than for the original and proper intended purpose.

1. Hot runner and system components must be disconnected from the power supply fully and properly before disposal, including electricity, hydraulics, pneumatics and cooling.
2. Ensure that the system to be disposed of is free from fluids. In the case of hydraulic needle valve systems, drain the oil from the lines and cylinders and dispose it in an environmentally responsible manner.
3. The electrical components are to be dismantled, separating them accordingly as environmentally-friendly waste or disposed as hazardous waste if necessary.
4. Remove the wiring. The electronic components are to be disposed in accordance with the national electric scrap ordinance.
5. The metal parts are to be returned for metal recycling (waste metal and scrap trade). The instructions of the corresponding waste disposal company are to be observed in this case.

Recycling of the materials occupies a forefront position during the disposal process.



### 3.8 E-Drive Plus Safety Hazards



#### WARNING - ELECTRIC SHOCK HAZARD

Most controller warnings pertain to electrical hazards. It is crucial to comply with these warnings to minimize any personal danger.

- DO NOT enter the cabinet without first ISOLATING the supplies. As a three-phase supply is used, this potential may be 600 volts or higher.
- High voltage and amperage cables are connected to the controller and the mold. There is also a high voltage cable connection between the servo motor and the controller. Electrical power must be shut off and lockout / tagout procedures followed prior to installing or removing any cables.
- The main power disconnect is a 20A breaker located at the connector end of the cabinet. This main power switch is used to safely disconnect the total load current at the time of switch on and switch off.
- The main power switch can be locked using a padlock applied under the lockout / tagout procedure found in “3.6 Electrical Lockout” on page 3-10.
- Use lockout / tagout to prevent operation during maintenance.
- All maintenance should be performed by properly trained personnel based on local laws and regulation. Electrical products may not be grounded when removed from the assembled or normal operating condition.
- Ensure proper grounding of all electrical components before performing any maintenance to avoid potential risk of electrical shock.

#### 3.8.1 Operational Environment



#### WARNING

- The display console and controller cabinet together are designed for use in the plastic injection molding industry as with Milacron and third party servo gate control, commonly used in mold tools. They must not be used in residential, commercial or light industrial environments. They must not be used in an explosive atmosphere or where there is a possibility of such an atmosphere.
- The controller cabinet and its touchscreen console should be installed in a clean and dry environment where the ambient conditions do not exceed the limits that follow:
  - Temperature +5 to +45°C
  - Relative Humidity 90% (non-condensing)
- Do not make changes to the factory settings without the help of *Mold-Masters* service personnel. Changes to these settings can result in hazardous out-of-control or unexpected movement. It can also damage the machine, and it will void the warranty.



# Section 4 - Overview



## WARNING

Ensure that you have fully read “Section 3 - Safety” before setting up or operating the E-Drive controller.

## 4.1 Specification

The following are general specifications. The supplied E-Drive may have contractual variations and differ in some options.

### 4.1.1 Cabinet

Table 4-1 Cabinet Information	
<b>Supply Voltage and Current Rating</b>	380-480vac, 50/60 Hz, 3 phase delta (Neutral not required), Maximum of 20A per phase. Refer to the serial plate on the controller cabinet for confirmation of the supply requirements for your model. If the local supply is outside the specified range please contact <i>Mold-Masters</i> office for advice.
<b>Voltage Bandwidth</b>	Stable within $\pm 20\%$ supply voltage swing
<b>Over Current Unit Protection</b>	Rear-mounted Miniature Circuit Breaker gives over current protection and may also be used as a lockable main isolator
<b>Input from Associated Controller</b>	A HAN4A connector accepts an “Up to heat” signal which is required before the E-Drive is operable
<b>I/O Connection and Alarm Channel</b>	HAN10E has the following functions “E-Drive ready” output Accepts incoming trigger(s) to operate E-Drive from a dry contact or an external 24V source. Isolated closing contact to give a common alarm output signal
<b>Servo Output Cables</b>	Non-detachable cables provided as one pair per servo drive
<b>Cabinet Size (in mm)</b>	448 (D) x 350 (W) x 500 (H)

### 4.1.2 Pendant

Table 4-2 Pendant Information	
<b>Emergency Shutdown Button</b>	Latching push-to-operate and turn-to-release button.
<b>Hot Runner Controller Interface</b>	LCD Touch Screen for HMI

## 4.2 Future Expansion

The E-drive unit has been designed to give years of service and has the ability to receive firmware updates, to allow newly developed features to be easily added as they become available.

## 4.3 Switch On and Off

The main power switch is a 20A breaker located at the connector end of the cabinet. This switch is sufficiently rated to disconnect the total load current when switched off.



### CAUTION

Although the main switch has the capacity to switch the whole system off, we recommend that you only do this in an emergency situation. The console uses computer technology that should normally be switched off in stages (see below). A sequenced method for switching On and Off protects the console and extends the life of the main isolator.

### 4.3.1 Switch On

When the main power breaker is turned to on, the servo motors are not enabled.

Once the touchscreen completes its initial preamble and shows the Overview screen, the system is in Manual mode and, if the HEAT light LED is on (the remote enable signal typically connected to a Hot Runner Controller), then you are ready to enable the servo motors by pressing <Servo On> control button located on the pendant. The Motor LED will light up when the servo(s) is enabled. Now the E-Drive controller can be used in “Manual” and “Auto” mode.

See “5.1 Put the E-Drive in Manual Mode” on page 5-2 and “5.3 Put the E-Drive in Auto Mode” on page 5-6

### 4.3.2 Switch Off (or Shutdown)

*Mold-Masters* recommends that you use the pendant control buttons to turn off the servo motors, and only use the main isolator to switch off a dormant controller.

To switch off and shut down the system:

1. Switch the E-Drive to Manual mode.
2. Disable the servo(s).
3. Use the MCB at the rear of the cabinet to isolate all the power to the whole system.

### 4.4 Pendant Layout

The pendant is used to interface with the system. The pendant layout has the following main parts starting at the upper right and working clockwise.

- A stop button that releases the servos supply breaker to stop any plate movement; the main cabinet and controls are unaffected. The button shall be turned on to restart the plate movement.
- Control buttons that are located below the screen and to its left side.
- Four LEDs that display the system status.
- A central touchscreen with five main pages and on-screen navigation buttons to go to them.



Figure 4-1 Pendant layout



### 4.4.1 Status LEDs

1. **Motor:**  
This LED turns on (green) when the servo(s) are enabled.
2. **Alarm:**  
This LED will turn on (red) when an alarm is present. When it is off there are no alarms present.
3. **Heat:**  
This LED will turn on (green) when the 'heats ready' signal from the external heat controller indicates that all zones are up to temperature. The external heat controller may be integrated in the injections molding machine or it may be standalone.
4. **Auto:**  
This LED will turn on (green) when the system is in Auto mode. The "System Ready" interlock to the molding machine will be turned on when this led is on.

### 4.4.2 Control Buttons



**NOTE**

The control buttons are only active when on either tab of the Main Overview Screen.



1. **Jog/Tweak Open**  
In Manual mode pressing this button will move the pins toward the opened position using the velocity and accelerate / decelerate values set up using the "Section 6 - Plate Settings" on page 6-1. The pins will move as long as the button is pressed.  
In Auto mode pressing this button will incrementally move the pins by 0.01 mm in the open direction.



2. **Jog/Tweak Close**  
In Manual mode pressing this button will move the pins toward the close position using the velocity and accelerate / decelerate values set on "Section 6 - Plate Settings" on page 6-1. The pins will move as long as the button is pressed.  
In Auto mode pressing this button will incrementally move the pins by 0.01 mm in the close direction.



3. **Step Mode** *(Not in use - future functionality)*



4. **Manual Mode**  
Manual mode is the default mode.  
To switch from Auto mode to Manual mode press this button and acknowledge the confirmation message box that will appear on the touch screen. The message banner will indicate the system is in Manual mode.



5. **Auto Mode**  
Before the machine can be put into Auto mode, the servo(s) must be enabled and no alarms present.  
To switch from Manual mode to Auto mode press this button and acknowledge the confirmation message box that will appear on the touch screen. The message banner will indicate the system is in Auto mode.



6. **Torque Monitor**  
Pressing this button opens the "Torque Monitor" window.

## Control Buttons - continued

### 7. Homing



Pressing this button will cause the system to initialize Home Position. The servo(s) must be enabled, the system must be in Manual mode and there must be no alarms present. The message banner will indicate “Homing is in progress”. See “5.2 Home the E-Drive” on page 5-3.

### 8. Servo Enable



Before the system operates the servo(s) must be enabled. To enable servo(s), press this button and acknowledge the confirmation message box that will appear on the touchscreen. The Motor LED will light up (green) indicating the servo(s) are enabled.

## 4.5 Touchscreen Layout

At the right side of each screen, there is a group of tabs that allow the user to navigate through the various HMI screens. The dark highlighted button indicates which screen is currently active.

These buttons navigate you through the five main screens.



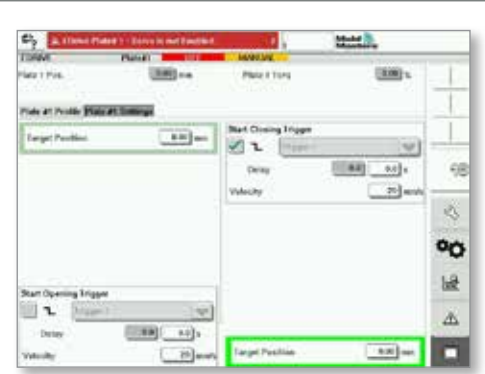
### Main Overview



This is the main operating screen. There are two tabs on this screen used for the operation of the system.

#### NOTE

The Control Buttons will only function when this screen is visible.

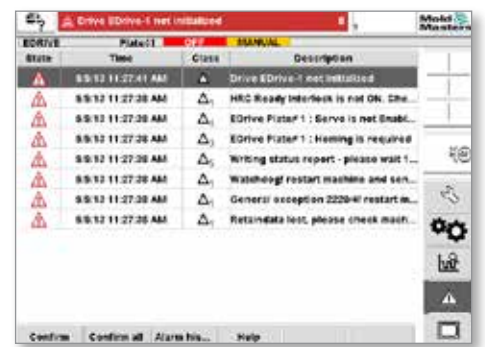


### Alarms

This is the alarm screen. The alarms screen shows all current alarms and warnings. Only alarms will cause the machine to stop and cause the Alarm button to turn to a red color.

#### NOTE

The alarm page can be accessed by choosing the [Status Display Banner].







### Scope



This is the Oscilloscope screen. This screen can be used to graph the live operation of the machine to help with fine tuning the operation.





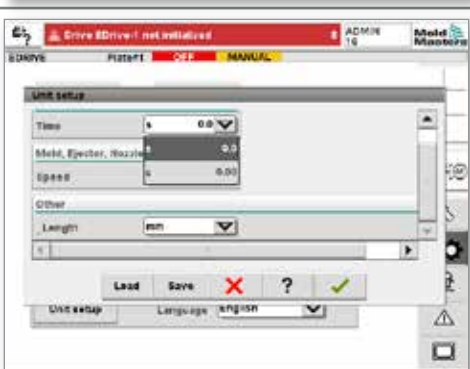
## Touchscreen Layout - continued

<p><b>Main Menu</b> </p> <p>This is the Main Menu screen that serves as central access point for configuration screens as well as diagnostic screens.</p>	
<p><b>Utilities</b> </p> <p>This is the Utilities screen. The user can login here as well as change language (Future), date/time, metric/imperial, and other functions.</p>	



## 4.6 User Unit Settings

Before you start to use or configure the E-Drive you should set up some basic user settings.

<p>1. Start at the Main Menu and tap the Language Option to select your preferred user language.</p>	
<p>2. Choose [Unit setup] to access sub menus that give further options for physical parameters like time, speed and distance</p>	
<p>3. Choose [Time] to set any displayed time to one tenth or one hundredth of a second.</p> <p>The [Speed] and [Length] options may be similarly configured on this screen.</p>	
<p>4. Choose [✓] to accept your options or choose [✗] to leave the screen without any of the above changes taking effect.</p>	

## 4.7 Status Display Banner

The Status display located at the top of the screen is common to all screens.



The Status display has three boxes of information:

1. Screen Capture Button. See “4.7.1 Print a Screen from the Status Display Banner” for more detail.



2. Warning / Error or Status message banner.



### NOTE

Warnings appear here as white text on a red background.

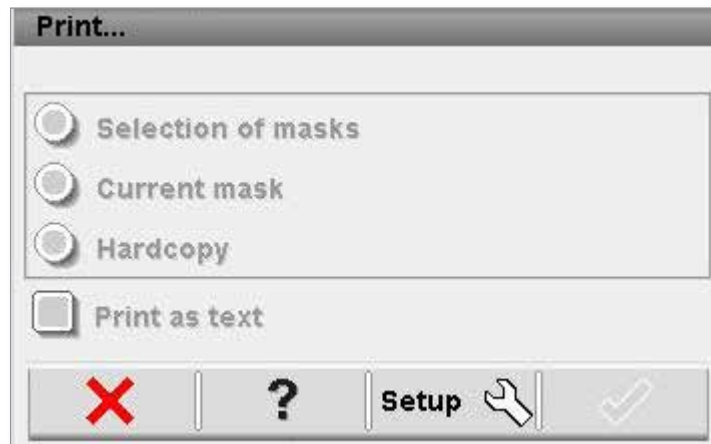
Status Messages appear as black text on white background.

3. Current user (above) and the User level (below).



### 4.7.1 Print a Screen from the Status Display Banner

Tap the Screen capture and any screen to open the print screen dialog.



If you are ready to print and have previously setup the screen print options then choose [✓] to print out the current screen.

If you need to setup or change the print options choose [**Setup**] to open the Printer Settings window and change print options which are described below.

To cancel the print option choose [✗] or, for online help, choose [?].

## 4.8 Printer Settings



### 4.8.1 Description of the Elements

Item	Description
<p><i>Use Printer</i></p>	Output to a printer that is connected by USB.
<p><i>Print to File</i></p>	Output to a file.
<p><i>MIME Type</i></p>	Selection of a MIME-type for the print file.
<p><i>Directory</i></p>	Choose the [...] button to find a directory/folder for the print file.
<p><i>Filename</i></p>	Type in a name for the Filename for the print file.



## Section 5 - Setup



### WARNING

Ensure that you have fully read “Section 3 - Safety” before setting up the E-Drive controller.

It is the responsibility of the integrator to understand and follow international and local standards for safety of machinery when integrating the E-Drive controller into the molding system. This responsibility includes providing necessary e-stop connections, safety interlocks and guarding to protect operators.

The E-Drive controller should be located in such a way that the main disconnect is easily accessible in case of emergency.

The E-Drive controller is shipped with a power cable which is a correct size to run the system. When you install a connector on the cable, ensure that the connector can safely withstand the full system load.

The E-Drive controller supply should have a fused disconnect or main circuit breaker according to local safety codes. Refer to the serial plate on the controller cabinet for confirmation of the supply requirements. If the local supply is outside the specified range, please contact *Mold-Masters* for advice.



### WARNING - ELECTRICAL SHOCK HAZARD

It is crucial to comply with these warnings to minimize any personal danger.

- Ensure that all energies are properly locked out in the controller and molding machine before installation of the controller into the system.
- DO NOT enter the cabinet without first ISOLATING the supplies. There are unguarded terminals inside the cabinet which may have a dangerous potential across them. Where a three-phase supply is used, this potential may be up to 600VAC.
- Voltage and amperage cables are connected to the controller and the mold. There is also a voltage cable connection between the servo motor and the controller. Electric power must be shut off and lockout / tagout procedures followed prior to installing or removing any cables.
- Integration should be done by properly trained personnel based on local codes and regulations. Electrical products may not be grounded when removed from the assembled or normal operating condition.
- Do not mix electrical power cables with thermocouple extension cables. They are not designed to carry the power load or list accurate temperature readings in each other's application.
- Integration should be done by properly trained personnel based on local law or regulation requirements. Electrical products may not be grounded when removed from the assembled or normal operating condition.
- Do not mix electrical power cables with thermocouple extension cables. They are not designed to carry the power load or list accurate temperature readings in each other's application.

## 5.1 Put the E-Drive in Manual Mode

1. Confirm settings on the Main Overview screens.



**NOTE**

Ensure you have set valid positions and servo settings. See “Section 6 - Plate Settings” on page 6-1.

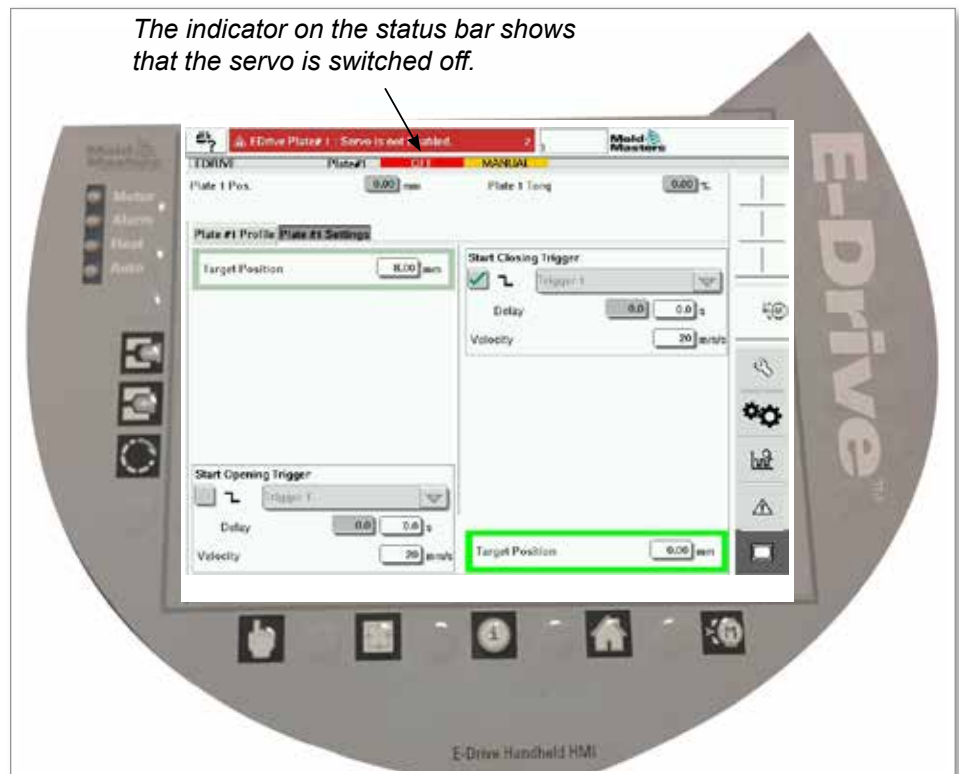
2. Press the Servo Enable button [ ] to enable the servo(s).
3. Acknowledge the pop up message that appears on the touchscreen.



**NOTE**

The motor LED will light up green in color if the servo(s) is successfully enabled.

The E-Drive is ready to use the Jog Open / Close controls.



## 5.2 Home the E-Drive

1. The E-Drive must be ready as follows:
  - a) It is in Manual mode
  - b) The servo(s) must be turned on
  - c) The heat light must be on
2. Choose the **[Plate #1 Settings]** tab on the Main screen.
3. Choose the **[Gear Ratio]** tab on this screen.
4. Set Degrees per Millimetre In the Gear Ratio Settings box.

This value is the number of motor rotational degrees of travel for each millimeter of plate travel and is calculated from the Ball screw pitch, the Gear Ratio and the Pulley Diameter Ratio in the following formula.

$$\text{Deg/mm} = (360^\circ \times \text{gear box ratio} / \text{Pulley diameter ratio} / \text{ball screw pitch}) * 10$$

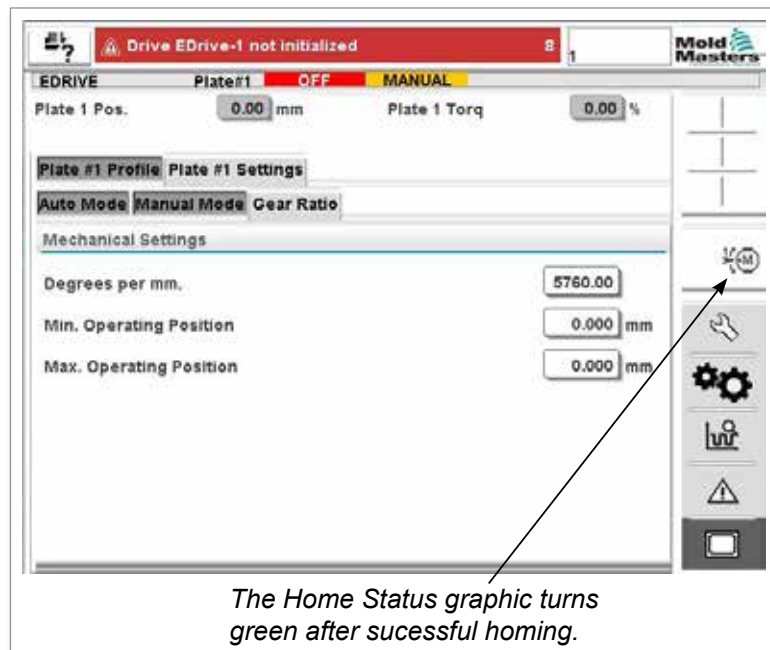
**Min. Operating Position** - the minimum position the operator can enter on the movement profile.

**Max. Operating Position** - the maximum position the operator can enter on the movement profile.



### NOTE

Reboot the controller if this value has been changed.



5. Configure the remaining parameters on this tab but remember that homing also uses the Jog Settings on the “Manual Mode” tab.
6. Press the Homing button [ ] and wait for the procedure to complete.
7. A message will appear in the status message display that states “Homing is in progress”. You will also see an icon appear on the right side of the

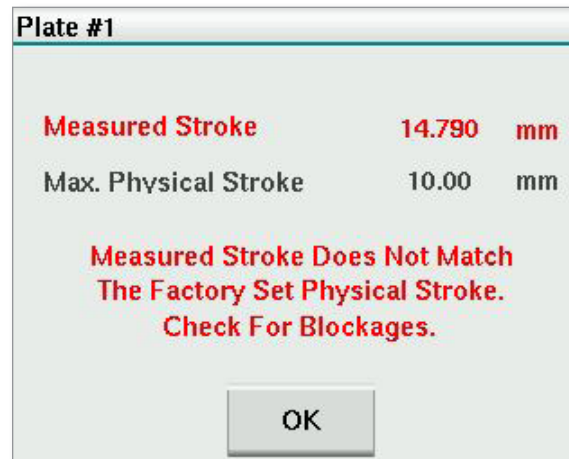
touchscreen. This indicates a movement is active.

8. If homing is successful the homed status graphic at the right side of the screen will turn green.
9. If homing is not successful, a dialog box appears showing the measured stroke and the factory set Max. Physical stroke. If the factory set stroke is correct, check for blockages. If the measured stroke is correct, change the factory set stroke in the factory settings.



**NOTE**

*Mold-Masters* tester or higher user needs to log in to change the factory settings.



- a) Measured Stroke – the stroke that was automatically calculated by the E-Drive during the homing procedure.
  - b) Max Stroke – from the last time the homing was done successfully.
  - c) Max. Physical Stroke - the stroke that is entered in factory settings which is used to compare with the Measured Stroke.
10. If the homing operation is successful the Homing required message will disappear from the alarm status display and the homed graphic will turn green in color.



### 5.2.1 More about the Steps followed during the Normal Homing Sequence

The following is a brief sequence of how the Stroke value is observed, calculated and displayed.

1. The plate moves to the fully-closed hard stop.
2. The rotational motor encoder count is captured into memory.
3. The plate moves to the fully-opened hard stop.
4. The rotational motor encoder count is captured into memory.
5. Finally, the plate moves to the fully closed hard stop.
6. The difference of the two hard stop positions is calculated.
7. The difference is divided by the entered Degrees per Millimetre value.
8. The result is the calculated plate travel.
9. If the calculated plate travel is different from the current Maximum Stroke value then the confirmation dialog is displayed. If it is within 1/10 of a millimetre then the dialog is not shown. Homing is successful.

**NOTE**

If you want the dialog to show change the Degrees per Millimetre value and re-home.


### 5.2.2 Home Sequence for Homing to Closed-Position Only

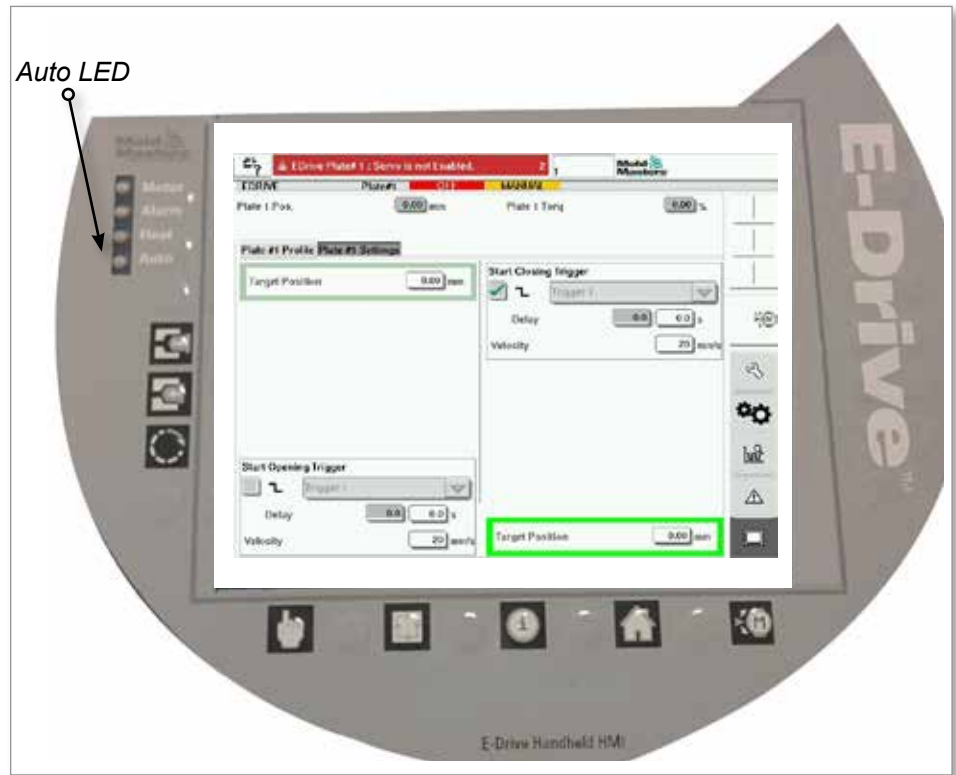
1. Plate moves to fully closed hard stop.
2. No stroke check is performed

**NOTE**


When using this option for homing it is important to input an accurate Gear Ratio.

### 5.3 Put the E-Drive in Auto Mode

1. If you have achieved the previous steps, Servo(s) are enabled and E-Drive is in Manual mode, then you can proceed to Auto mode.
2. Press the Auto button [  ].
3. Acknowledge the pop-up message that appears on the touchscreen.
4. If you are successful, the Auto LED will light up green.
5. You can now apply the triggers you have selected to make the servo plate move to the desired positions.

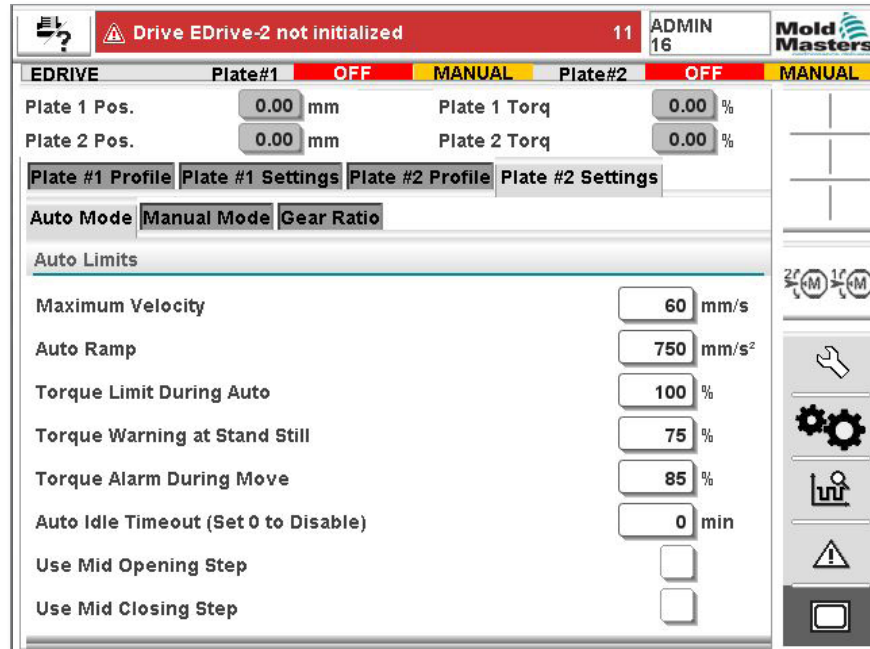


#### 5.3.1 Return to Manual Mode

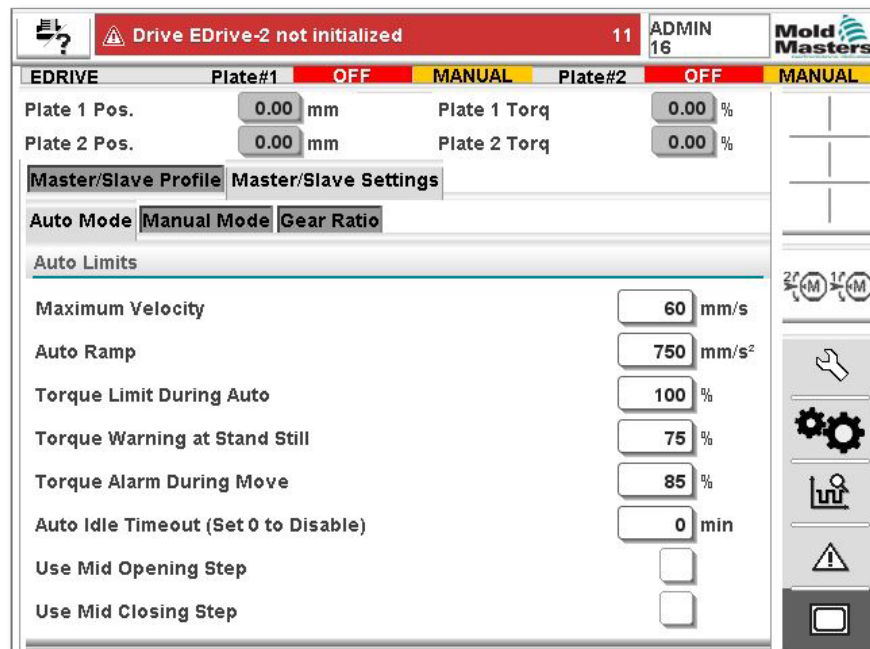
To return to manual mode, press [  ] (the Manual button) and acknowledge the pop-up message that appears on the touchscreen.

### 5.4 Other Plate Setting Tabs

If one plate or two plates are configured then a Plate Settings tab is added to the HMI for each plate.



If Master/Slave configuration is selected then one Master/Slave Settings tab is added. Settings are applied to both the Master (Plate #1) and Slave (Plate #2).



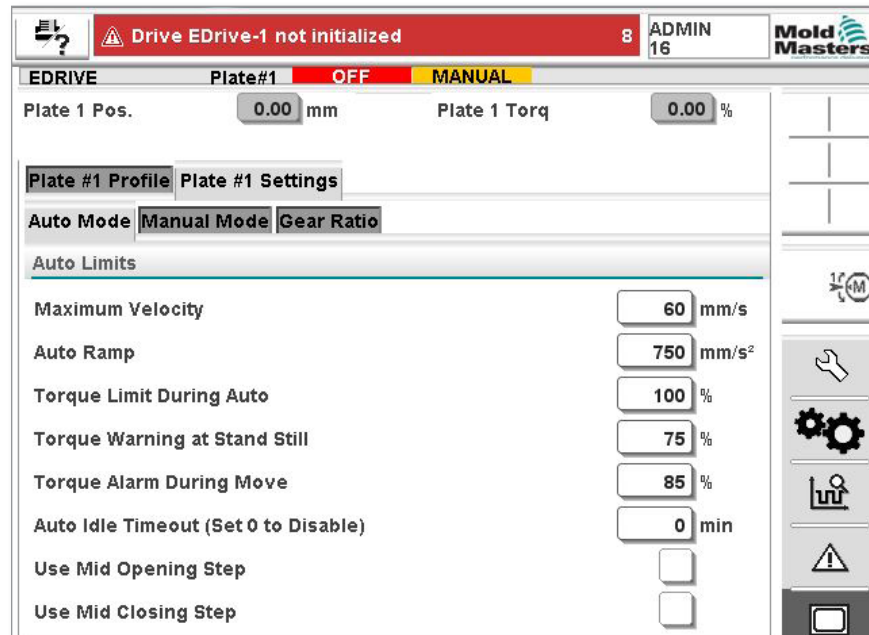
## 5.5 Plate Settings Parameters



### NOTE

Only a Supervisor (user level 12), or higher, may change these parameters.

### Auto Mode Settings



Maximum Velocity - the maximum velocity the operator can enter in the movement profile

Auto Ramp - The acceleration and deceleration rate used on every step

Torque Limit During Auto - The torque limit during all auto movements

Torque Warning at Stand Still - The torque warning threshold when the plates are not in motion



### NOTE

This is a warning message only. The E-Drive will not stop operating.

Torque Alarm During Move - The torque alarm threshold during any movement



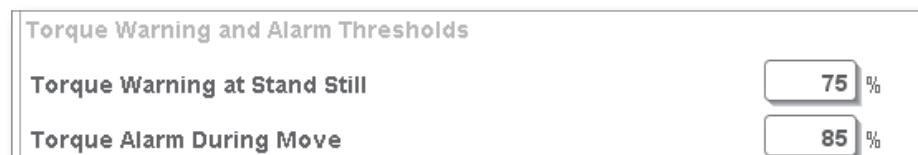
### NOTE

This is an alarm situation. The E-Drive will drop out of Auto then disable the servo motor. Use the Torque Monitor to help you find the proper setting for this alarm.

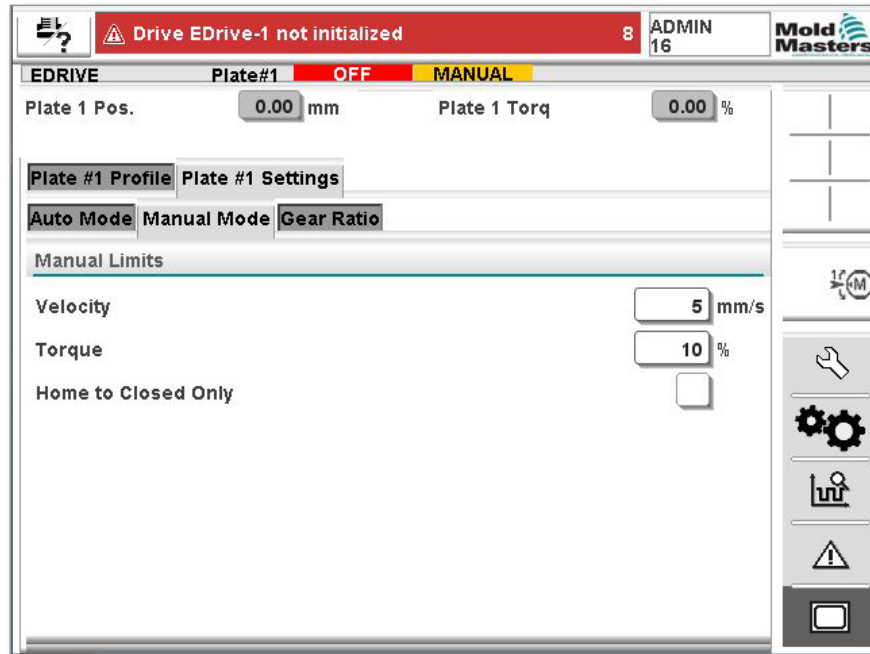
Auto Idle Timeout - The controller will be moved out of auto if no trigger is received for this amount of time. To disable this option, set the timer to 0 min.

Use Mid Opening Step - Select this option to use a mid opening step

Use Mid Closing Step - Select this option to use a mid closing step



## 5.6 Manual Mode Settings



### Home to Closed Pos Only

Checking this box will change the homing procedure.

See “Home to Closed Position Only Homing Sequence”.

### Manual and Homing Settings

Manual Jogging and the Homing operation both use these settings.

These values can only be set by the Supervisor level and higher (Level 12).



#### NOTE

These values are factory set and should be fine as set. If you feel it necessary to adjust these values, be careful because values set too high will cause accuracy problems during homing procedure.

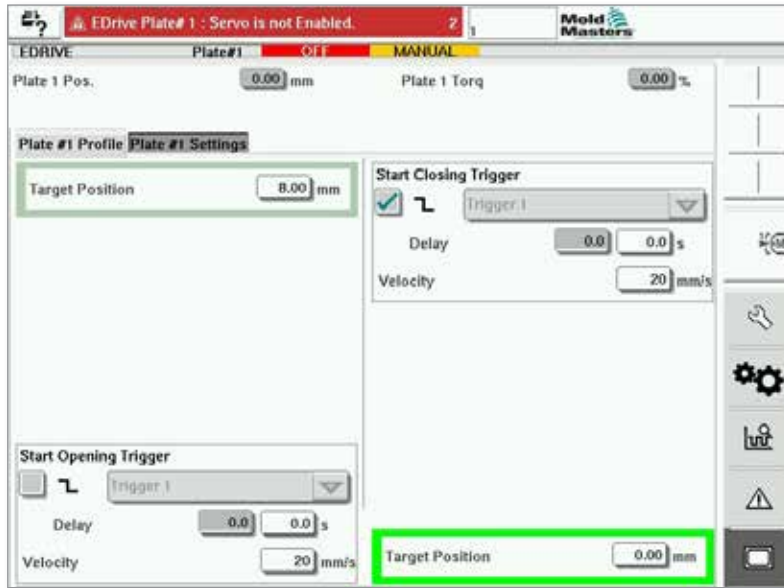
# Section 6 - Plate Settings



## WARNING

Ensure that you have fully read “Section 3 - Safety” before setting up or operating the E-Drive controller.

## 6.1 Main Overview Screen



### Purpose

This screen is the main screen for the system. It contains two tabs.

- The Plate #1 or Main Tab is where the sequence of the E-Drive is set.
- The “Settings Plate#1 Tab is where the servo velocity, torque etc. is set.



### NOTE

If two plates are used there will be a pair of tabs for each plate.

If plates are slaved together the name of the tabs will change and the Master Main tab will be used to setup both plates.



### NOTE

The Control Buttons will only work when this screen is showing. This is to help prevent unintended button presses.

### 6.1.1 Description of the Elements

Field	Description
	These fields show the actual plate position relative to the forward “hardstop” position when the plate was last referenced.
	These fields show the instantaneous or actual torque for each plate.

### 6.1.2 Description of the Sequencing Elements

Field	Description
	<p>The step “Start Opening Trigger” initiates the E-Drive opening sequence.</p> <p>The input trigger is selected from the drop down list. Rising/falling edge can be selected and a time delay can also be added.</p>
	When the trigger conditions in the first step are met, the E-Drive controller will move the plate to the Opened Position.
	<p>The step “Start Closing Trigger” initiates the E-Drive closing sequence.</p> <p>The input trigger is selected from the drop down list. Rising/falling edge can be selected and a time delay can also be added.</p>
	When the trigger conditions in the step above are met, the E-Drive controller will move the plate to the Closed Position. This also represents the starting position for the next cycle.
	<p>Rising edge triggering – triggers on the transition from low to high.</p> <p>Falling edge triggering – triggers on the transition of the trigger signal from high to low.</p>
	If the Delay timer checkbox is selected, then the trigger condition will be delayed by the time value entered.

## 6.2 Multi Stage Mode

Multi Stage Mode allows for more control of your process. It offers options for both an intermediate opening step and an intermediate closing step.

Tap the 'Other' tab of the 'Plate Settings' Tab to see the "Mid-opening" and "Mid-Closing" options.

The screenshot shows the 'Plate #1 Settings' screen. At the top, there is a red warning bar that says 'Drive EDrive-1 not initialized'. Below that, the status is 'EDRIVE Plate#1 OFF MANUAL'. The 'Plate 1 Pos.' is 0.00 mm and 'Plate 1 Torq' is 0.00 %. Under the 'Auto Limits' section, there are several settings with input fields: Maximum Velocity (60 mm/s), Auto Ramp (750 mm/s<sup>2</sup>), Torque Limit During Auto (100 %), Torque Warning at Stand Still (75 %), Torque Alarm During Move (85 %), and Auto Idle Timeout (Set 0 to Disable) (0 min). At the bottom of this section, there are two checkboxes: 'Use Mid Opening Step' and 'Use Mid Closing Step', both of which are currently unchecked. An arrow points to these checkboxes with the text: 'Check these boxes to add the desired mid steps'.

### 6.2.1 Mid-Opening Step Added

The screenshot shows the 'Plate #1 Settings' screen with the 'Mid-Opening Step Added' configuration. The 'Auto Limits' section is now expanded to show three trigger sections. The first is 'Mid to Opened Trigger', which has a 'Target Position' of 0.00 mm, a 'Start Closing Trigger' dropdown set to 'Trigger 3', a 'Delay' of 0.0 s, and a 'Velocity' of 0 mm/s. The second is 'Start Opening Trigger', which has a 'Target Position' of 0.00 mm, a 'Start Closing Trigger' dropdown set to 'Trigger 1', a 'Delay' of 0.0 s, and a 'Velocity' of 0 mm/s. The third is another 'Target Position' of 0.00 mm. The 'Start Closing Trigger' section is also visible, with a 'Delay' of 0.0 s and a 'Velocity' of 0 mm/s. The 'Target Position' field in the third section is highlighted with a green box.



### 6.2.2 Mid-Closing Step Added

⚙️ ⚠️ Drive EDrive-1 not initialized 8 ADMIN 16 Mold Masters

**EDRIVE** Plate#1 **OFF** **MANUAL**

Plate 1 Pos.  mm Plate 1 Torq  %

Plate #1 Profile **Plate #1 Settings**

**Start Closing Trigger**  
  **Trigger 2** ▼  
 Delay   s  
 Velocity  mm/s

**Target Position**  mm

**Mid to Closed Trigger**  
  **Trigger 3** ▼  
 Delay   s  
 Velocity  mm/s

**Start Opening Trigger**  
  **Trigger 1** ▼  
 Delay   s  
 Velocity  mm/s

**Target Position**  mm

### 6.2.3 Both Mid-Opening and Mid-Closing Step Added

⚙️ ⚠️ Drive EDrive-1 not initialized 8 ADMIN 16 Mold Masters

**EDRIVE** Plate#1 **OFF** **MANUAL**

Plate 1 Pos.  mm Plate 1 Torq  %

Plate #1 Profile **Plate #1 Settings**

**Mid to Opened Trigger**  
  **Trigger 2** ▼  
 Delay   s  
 Velocity  mm/s

**Target Position**  mm

**Start Closing Trigger**  
  **Trigger 2** ▼  
 Delay   s  
 Velocity  mm/s

**Target Position**  mm

**Mid to Closed Trigger**  
  **Trigger 3** ▼  
 Delay   s  
 Velocity  mm/s

**Start Opening Trigger**  
  **Trigger 1** ▼  
 Delay   s  
 Velocity  mm/s

**Target Position**  mm

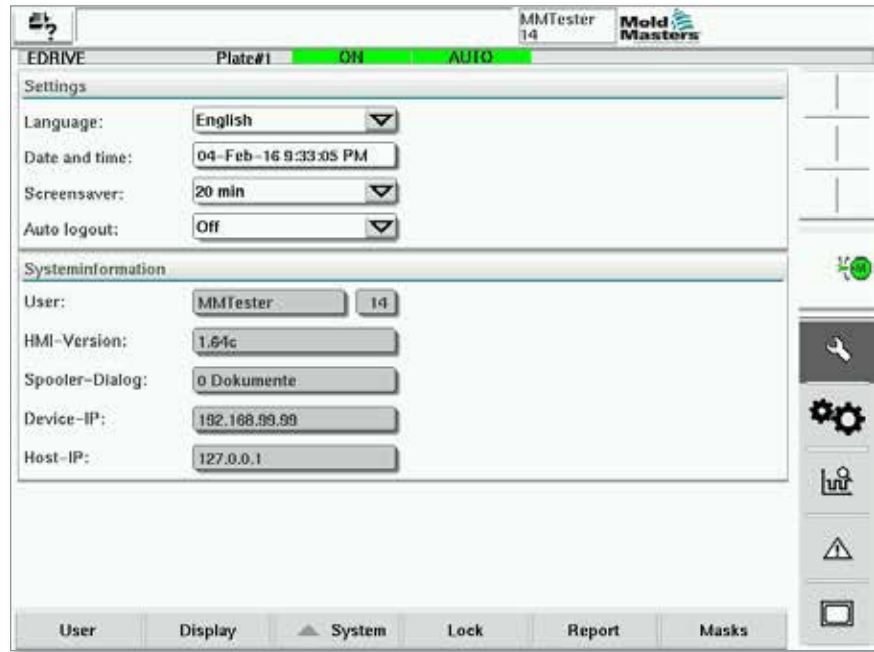
# Section 7 - Screen Functionality



## WARNING

Ensure that you have fully read “Section 3 - Safety” before setting up or operating the E-Drive controller.

## 7.1 Utilities Screen









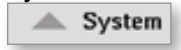


### 7.1.1 Purpose

The Utilities screen can be used to check system information and to adjust system display settings. The language of the display text, the date / time and the unit system can be set in the Settings section. System information shows specifics on the system but these cannot be changed here. Further setup functions can be accessed using the button bar at the bottom of the screen.

### 7.1.2 Description of the Elements

Settings Elements	Description
<p><i>Language</i></p> <p>Language: English</p>	Selects a system language from the languages available in this field.
<p><i>Date and time</i></p> <p>Date and Time: 15-Jun-12 10:32:06 AM</p>	The current date and time can be set here. These are centrally managed and saved in the control.
<p><i>Unit</i></p> <p>Unit:</p> <p><input checked="" type="checkbox"/> Metric <input type="checkbox"/> Imperial</p>	Unit display settings are selected via checkboxes. These settings are applied system-wide.

System information Elements	Description
<i>User</i> 	Shows the name of the user logged in. Access level (1-16) of the user is displayed to the right of the name.
<i>HMI Version</i> 	Shows the current version of the Kemro view standard runtime system (format: Vxx.yy).
<i>Device IP</i> 	This field displays the IP address of the visualization computer.
<i>Host IP</i> 	This field displays the IP address of the control computer.

Utilities Screen	Description
<i>User</i> 	Opens the login dialog and / or the user administration (see further description within Utilities Screen).
<i>Display</i> 	Sets the brightness and contrast of the KeTop display (only on KeTop and OP xxx).
<i>System</i> 	Displays further settings and system information (see section "Utilities Screen").
<i>Lock</i> 	Locks and releases the touchscreen operation (only for KeTop and OP xxx).
<i>Report</i> 	<p>Pressing this button on a local station opens a file selection dialog and the status report can be saved on a named drive. The E-Drives and directories which are available can be specified in the HMI configuration.</p> <p>Pressing the status report button on a remote station will store the status report permanently on the system drive (Root-directory) of the control.</p> <p>The status report contains the following information:</p> <ul style="list-style-type: none"> <li>- PMA stack (up to 4 files)</li> <li>- HMI event trace (key presses)</li> <li>- Boot log (optional)</li> <li>- System catalog</li> <li>- Info log</li> <li>- Current PCB configuration</li> <li>- Task analysis (WVR file)</li> <li>- Status report info file</li> <li>- Network status</li> <li>- KNet status</li> <li>- KNet error</li> <li>- Performance log</li> </ul>

<p><i>Screens</i></p> <p><b>Masks</b></p>	<p>Opens a dialog with a list of application screens. The screens listed are specified in the HMI configuration. Switch to viewing another screen by selecting the screen name and pressing the confirmation button.</p>
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## 7.2 Utilities Screen - User Button (Login Dialog)




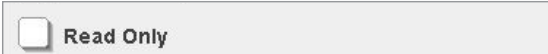
The Utilities Screen - User Button opens the login dialog. If one user is already logged in, the user administration can be directly accessed. However, only the administrator has access to the full range of functions.

### 7.2.1 Login Tab

(Displays for all users)



### 7.2.2 Description of the Elements

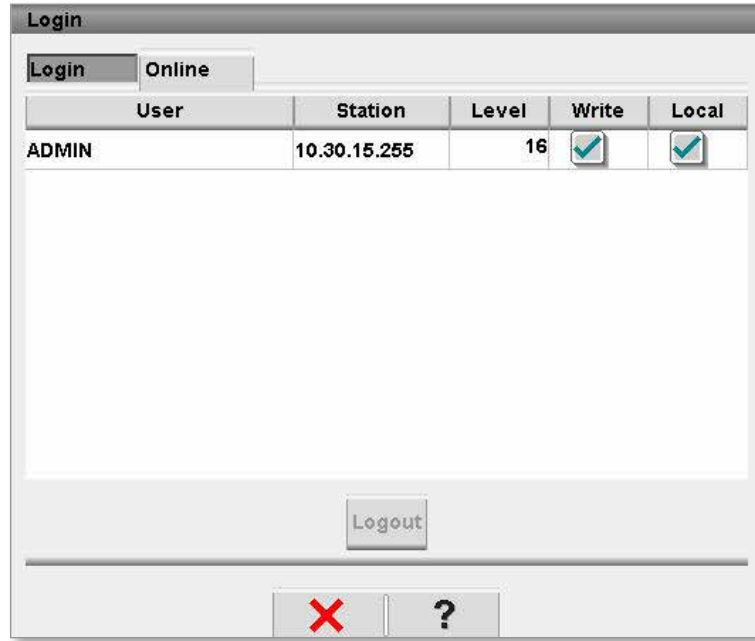
Input field / Check box	Description
<p><i>User</i></p> 	<p>Users that are registered by the Administrator can be selected from a drop down list.</p> <p>After entering the correct password and pressing Login, the user is logged in. A language or unit change-over may occur.</p> <p>By pressing the Logout button the current user is logged out and the user level automatically returns to 1.</p>
<p><i>Password</i></p> 	<p>This field is used to enter the user password (the type of input panel can be selected in the HMI configuration).</p>
<p><i>Force Write Permission</i></p> 	<p>By selecting this check box, the write permission can be forced if the maximum number of sessions with write permission on the system has been reached.</p>
<p><i>Read only</i></p> 	<p>If this check box is selected, the login is made without write permission.</p>



**NOTE**


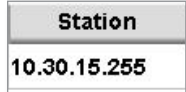
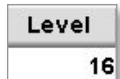


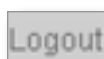
When logging in via chip card (RFID) the login dialog is not displayed, as the necessary data, including the password, are read directly from the chip card.

### 7.3 Online Tab



This screen shows all users that are logged in. If a user is authorized with the appropriate user rights, he can select another user and log that user out via the Logout button.

#### 7.3.1 Description of the Elements

Column / Button	Description
<i>User</i> 	This field shows the name of the user currently logged in.
<i>Station</i> 	This field displays the name (IP address) of the station on which the user is logged in.
<i>Level</i> 	Displays the access level of the user currently logged in.
<i>Write</i> 	Activating this check box gives the user write permission.
<i>Local</i> 	This checkbox displays whether the user has logged in from a local or remote station.
<i>Logout</i> 	This button enables a selected user to log out.

## 7.4 Administration Tab

(Administrator Rights Only)

The screenshot shows a software interface titled "Login" with four tabs: "Login", "Online", "Administration" (which is selected), and "Configuration". Below the tabs is a table with the following data:

User	Local	Remote	Language
ADMIN	16	16	English
Administrator	16	16	English
MML tech	14	14	English
operator	1	1	English
supervisor	12	12	English
tech	5	5	English
User admin	12	12	English

Below the table are three buttons: "New user", "Delete user", and "Modify profile". At the bottom of the interface are two icons: a red "X" and a question mark.

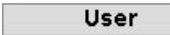








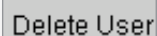



**NOTE**

Levels 13 -16 are reserved for *Mold-Masters* factory settings.

New users can be created and existing users modified or deleted from this screen.

### 7.4.1 Description of the Elements

Column / Button	Description
<i>User Column</i>  	Displays the user name defined on the control.
<i>Local</i>  	User access level on local stations (or on remote stations if the level has been confirmed on a local station).
<i>Remote</i>  	If the user on a remote station logs into the system, this user access level is assigned. No local confirmation is made. This user access level must be equal to, or less than, the local user level.
<i>Language</i>  	Standard language of user.
<i>New User</i> 	Opens a dialog to define a new user with all necessary settings.
<i>Delete User</i> 	Deletes the user selected in the list.
<i>Modify Profile</i> 	Opens a dialog in which the user profile of the selected user can be modified.



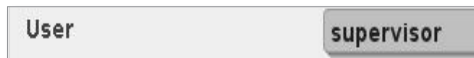
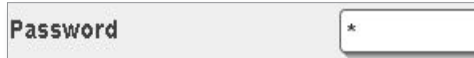
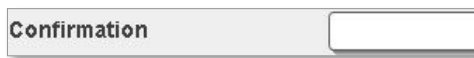
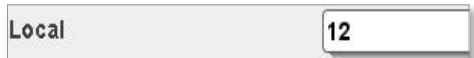

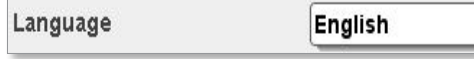

## 7.5 Modify Profile

(Administrator Rights Only)



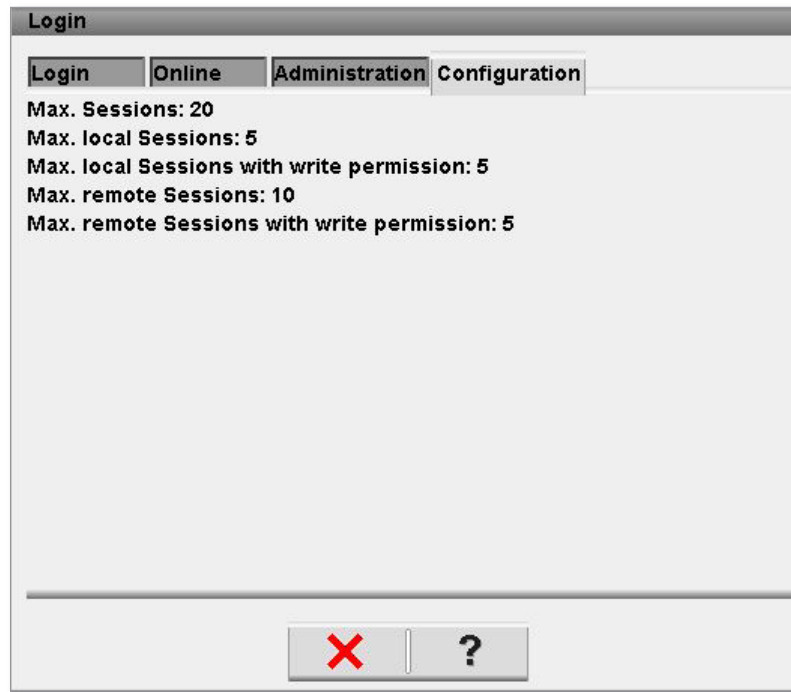
User settings can be changed by selecting a user from the table, and taping the Modify Profile button. The following fields are available to change the user settings.

### 7.5.1 Description of the elements

Input field	Description
<p><i>User</i></p> 	Displays the name of the user defined on the control.
<p><i>Password</i></p> 	Entry of the user password (the type of input panel can be selected in the HMI configuration).
<p><i>Confirmation</i></p> 	Repeated entry of a new password as confirmation.
<p><i>Local</i></p> 	User access level on local stations (or on remote stations if the access level request has been confirmed on a local station).
<p><i>Remote</i></p> 	User access level on a remote station. This user access level must be equal to, or less than, the local user level.
<p><i>Language</i></p> 	Choice of standard language for the user.
<p><i>Administrator</i></p> 	Selecting this checkbox will assign this user administrator rights.

## 7.6 Configuration Tab

(Administrator Rights Only)



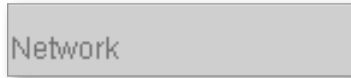
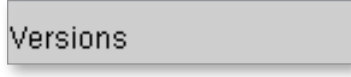
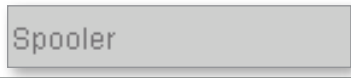
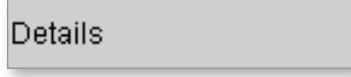
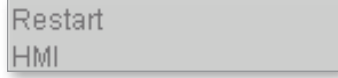
This screen displays an overview of all settings made in the user administration. Parameters cannot be entered or modified here.

## 7.7 Utilities Screen- System Buttons



This menu group can be used to modify the following settings.

### 7.7.1 Description of the Elements

Menu item	Description
<i>Network</i> 	Opens the dialog for setting and displaying the network configuration. This option is only available on the OF45x and at the KeTop under VxWorks.
<i>Versions</i> 	This dialog shows the system and application versions for the control and the visualization.
<i>Spooler</i> 	Opens the spooler dialog and shows all pending print jobs (only under VxWorks).
<i>Details</i> 	<p>This menu entry can be used to display a dialog box for further system information.</p> <p>OK: Confirms closing the dialog.</p> <p>System: Shows an overview of the configuration settings of the visualization and the start-up times of the loaded screens.</p> <p>SysVars: Shows an overview of the system variables the system is communicating with.</p> <p>Update: Updates the display.</p> <p>Logfile: Saves the overview of the communicating system variables in the file hmi.log (normally in the root directory of the system drive).</p>
<i>Restart HMI</i> 	Restarts the visualization settings.

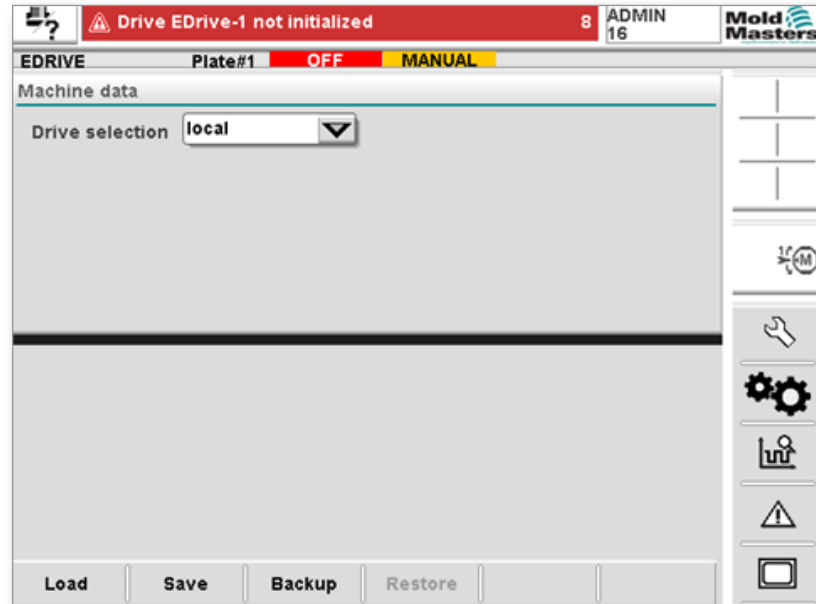
## 7.8 Store / Retrieve Settings Screen

### 7.8.1 Machine Settings (Machine Data)



**NOTE**

This screen and settings can only be accessed by a *Mold-Masters* service rep.



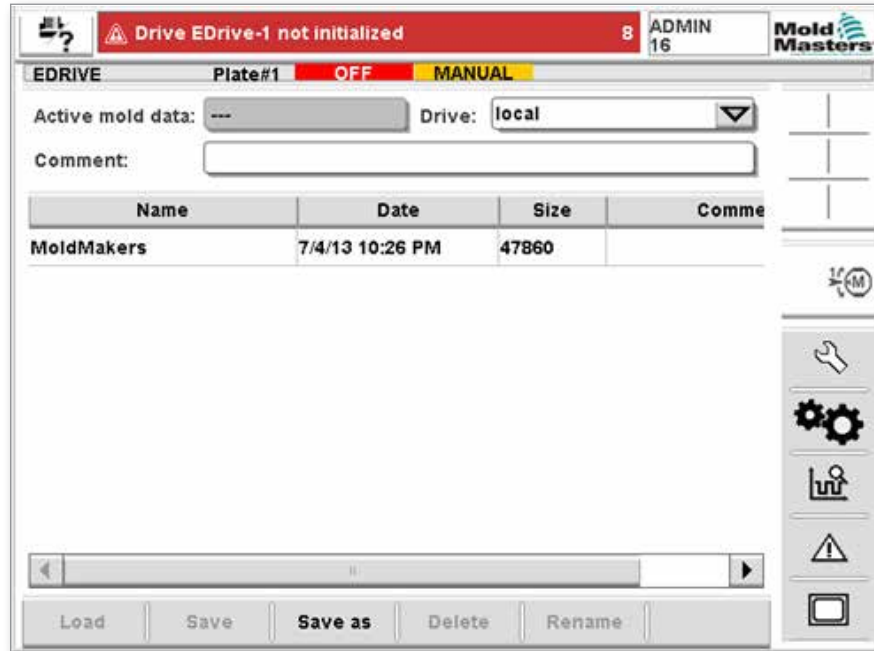
### 7.8.2 Purpose

Machine-specific settings, such as the number of heating zones, drive type, mold height adjustment; maximum injection velocity etc. can be loaded and saved in the Machine data screen.

### 7.8.3 Description of the Elements

Designation	Description
<i>Load machine data</i> 	Loads all values of the iec system variables from the group 'vg_machinedata' (e.g.: calibration data, number of heating zones,...) (see Kemro.iecedit documentation)
<i>Save machine data</i> 	Loads all values of the iec system variables from the group 'vg_machinedata' (e.g.: calibration data, number of heating zones,...) (see Kemro.iecedit documentation)
<i>Drop Down menu</i> 	Path of machine data for loading and saving (e.g.: local or USB stick)
<i>Backup machine data</i> 	Backs up the saved machine file as backup. This button is only available if machine data has already been saved.
<i>Restore backup</i> 	Restores the saved machine file. This button is only available if a backup is available.

## 7.9 User Settings Storage (Mold Data)






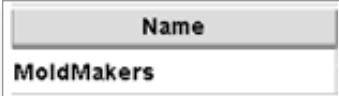
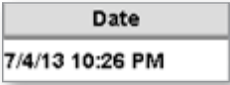
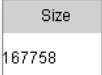





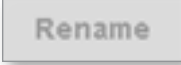
### 7.9.1 Purpose

Mold-specific settings (e.g. all process data such as movement settings, profiles, etc.) can be stored and uploaded again.

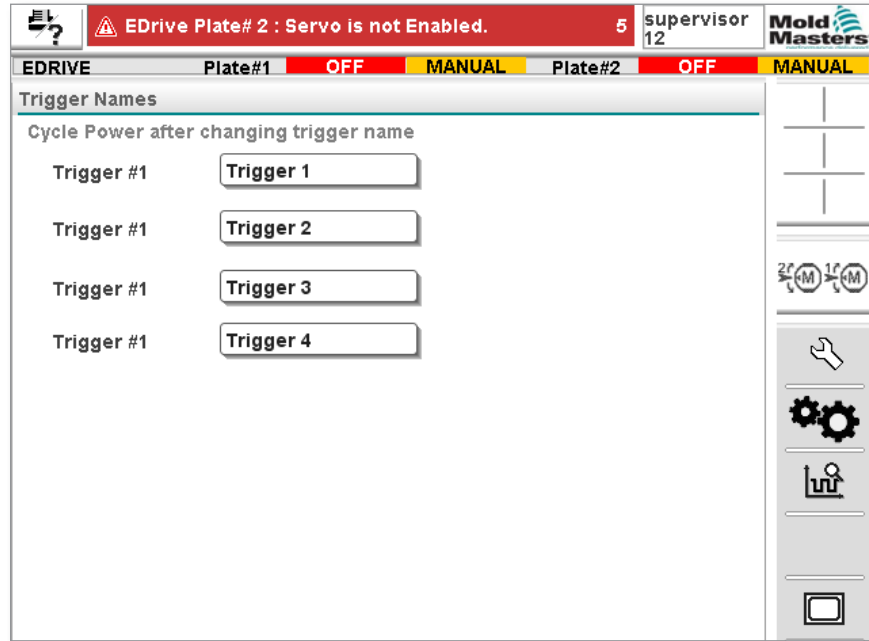
The upper section contains a table used to show and / or select all previously created mold data records.

New mold data records can be changed via the menu bar, while existing records can be edited or deleted.

### 7.9.2 Description of the Elements

Designation	Description
<p><i>Active mold data</i></p> 	Currently loaded component data record.
<p><i>Drive</i></p> 	Selection of a drive (local compact flash or USB stick) for saving and loading.
<p><i>Comment</i></p> 	Here a comment about the current mold data set can be entered.
<p><i>Name</i></p> 	Designation of the component data record.
<p><i>Date</i></p> 	Date Component data record created.
<p><i>Size</i></p> 	File size of the component data record.
<p><i>Comment</i></p> 	Display of comments on the mold data set.
<p><i>Load</i></p> 	Loads the selected component data record settings.
<p><i>Save</i></p> 	Saves the component data record settings currently loaded.
<p><i>Save as</i></p> 	Saves the settings of the component data record that was newly created and / or which is currently loaded under the name specified.
<p><i>Delete</i></p> 	Deletes the selected component data record.
<p><i>Rename</i></p> 	Renames the selected component data record.

## 7.10 Trigger Settings



### 7.10.1 Purpose

This screen allows the user to select the triggers which will appear on the Main Overview Screen on page 6-1.

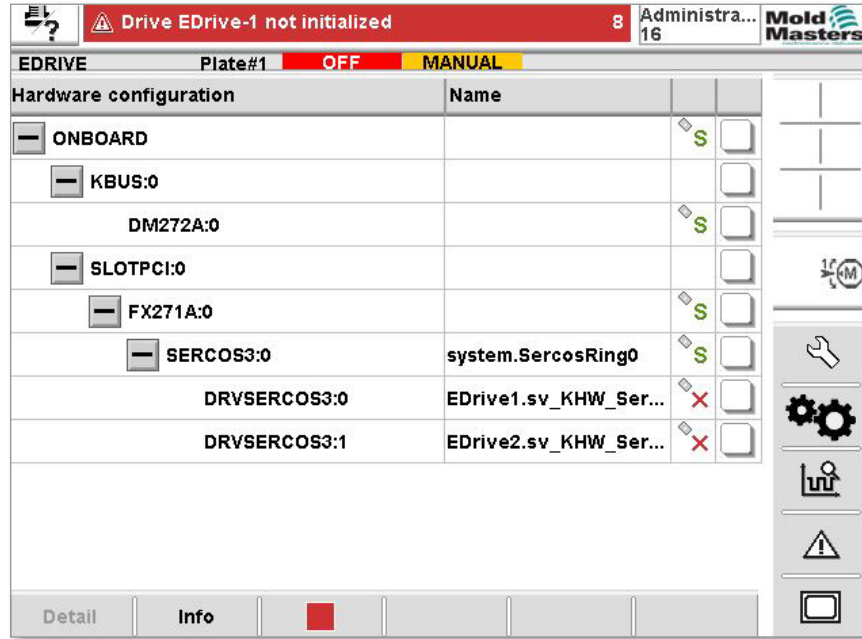
The screen lists each of the four input triggers, which could be added to the open and / or closed trigger list. Additionally, each trigger can be renamed by the user.



#### **NOTE**

Power must be cycled to the controller for the new name to take effect.

## 7.11 IO Monitor Overview Screen



### 7.11.1 Purpose

The IO monitor screen displays the status of the inputs and outputs of the hardware modules.

The IO monitor screen is divided into two areas:

- Overview
- Detail (see “7.12 IO Monitor Detail Screen” on page 7-17)

### 7.11.2 Selection






The overview screen is used for the selection of one or more hardware modules. The modules are represented hierarchically in a tree structure, as they are integrated in the system (connections of CPU module via bus coupler, K-Net, K-CAN, SIO, to the hardware modules).

The hardware modules can be selected by clicking on the checkbox in the right column. Selecting one structure element will mark all elements located below it.

To deselect a module, tap it again.



### 7.11.3 IO Monitor Overview Buttons

Menu button	Description
<p><i>Detail</i></p> 	Switches to the detail view of the selected module (see chapter. IO monitor - detail).
<p><i>Info</i></p> 	Taping will take user to Info Screen which displays information about the selected module (e.g.: BIOS version, Operation hours counter, etc.).
<p><i>Select Statistics</i></p> 	<p>Displays all available CPUs. The state of the CPU is displayed as follows:</p> <ul style="list-style-type: none"> <li> CPU is started.</li> <li> CPU is stopped.</li> </ul>

### 7.11.4 Description of the Buttons

Button	Description
<i>Start / Stop</i>	The CPU is started or stopped according to its state.
<i>Reset</i>	The selected CPU is restarted.

## 7.12 IO Monitor Detail Screen

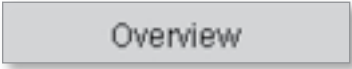
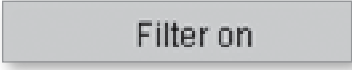



### 7.12.1 Purpose


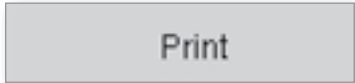

The input / output values can be forced in this screen in order to debug error analysis.

For each selected hardware module, the current values of the inputs and outputs are displayed.




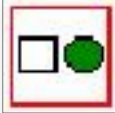

### 7.12.2 Description of the Elements

Menu button	Description
<p><i>Overview</i></p> 	Shows the selection of modules.
<p><i>Filter on / off</i></p> 	The filter for the display can be switched on or off with this button.
<p><i>Setup</i></p> 	<p>Opens the dialog for the filter settings -selection of the modules to be displayed (DI, DO, etc.).</p> <p>NOTE: Temperature inputs and / or outputs are taken account of with the filters AI and / or AO.</p>

**Description of the Elements - continued**

<p><i>View</i></p> 	<p>Opens a sub-menu for the selection of the following views:</p> <p>Compact: Only the connection designations and the status icons are displayed.</p> <p>Normal: The assigned system variable is displayed beside the connection designations and the status icons.</p> <p>List: Shows the connections in tabular form.</p>
<p><i>Print</i></p> 	<p>Prints the current view.</p>
<p><i>Unforce all</i></p> 	<p>This button can be used to cancel all forced IO states.</p>

The states of the inputs or outputs are displayed with the following icons:

Icon	Description
	<p>Digital input/output (DI/DO) state off.</p>
	<p>Digital input/output (DI/DO) state on.</p>
	<p>Analog output (AI/AO) with example value 2.5 V. Temperature inputs (TI) are displayed the same as analog inputs.</p>
	<p>Input or output forced</p>
	<p>Error</p>

By selecting an input or output, a corresponding input dialog appears for modifying the respective values or states.

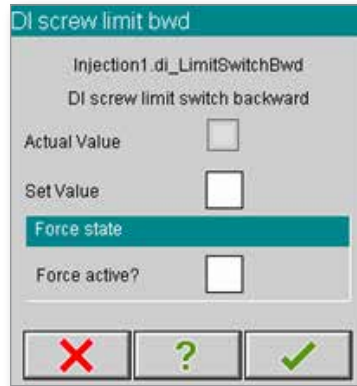
**Description of the Elements - continued**



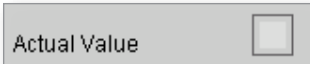
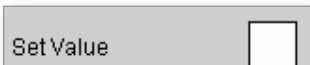
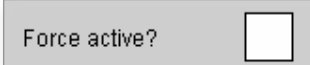
**NOTE**

By opening the input dialog, the long name of the related system variable is stored in the clipboard. This can be inserted into the text field of the parameter selection in the settings dialog of the software oscilloscope and the screens of the process data package (via the insert-key of the virtual keyboard).

The header of the dialog box shows the short name of the variable. Underneath it the variable name and the long text for the variable are displayed.



**7.12.3 Description of the Elements**

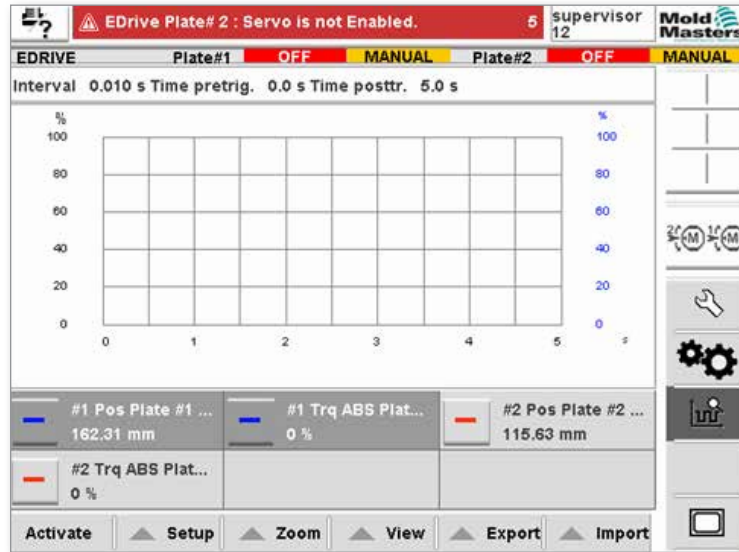
Field	Description
<p><i>Actual value</i></p> 	Current value of the input/output.
<p><b>NOTE</b> In case of a sensor failure, this field will show "-----". A forced value, however, will still be shown with a red border.</p>	
<p><i>Set Value</i></p> 	Value to which the input/output is forced.
<p><i>Force active</i></p> 	Activates the forced setting of the value.



## 7.13 Oscilloscope Screen

### 7.13.1 Purpose

The software oscilloscope is used for recording and displaying process variables for diagnostic purposes. The measured values are represented in an yt-chart.



Measurements can be stored and displayed again at a later time or on another system. A measurement can also be saved in a text format and then displayed in another application (e.g. MS Excel).

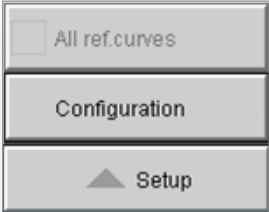
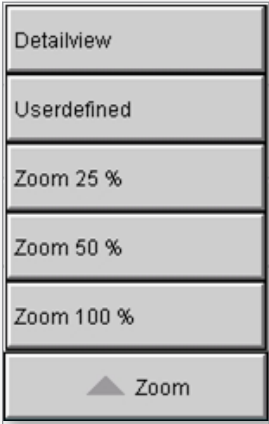
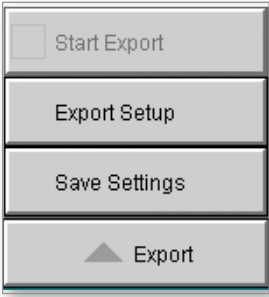
Measurements can be started either manually or trigger-driven. System variables, system events and system alarms can be used as trigger events. The visibility of the curves depicted can be changed by the user even during a current measurement. The same applies when labelling the right y-axis, which represents the scale for a curve. If the scale for a curve is displayed, the 0-line is depicted separately (in form of a thick horizontal scaling line).

The legend is located underneath the diagram. It contains the variable short and long text as well as the current actual value. The current actual value corresponds with the factual value of the variable and is updated with the update cycle of the variables service. Instead of the current actual value, the display of actual value shows the value measure at the cursor position.



By pressing an element on the legend area, the respective curve can be hidden or displayed. The legend dialog can be accessed via the legend element button. This dialog can be used to adjust the line color, the upper and lower limit of the scaling and the visibility of the scaling.

The Status line is located above the diagram. It can be used to display the duration of the measurement (not for continuous recordings), the interval of the recording and the pre/post-trigger (for triggered measurements). In the display of the actual value the x-position of the actual value cursor is displayed here.

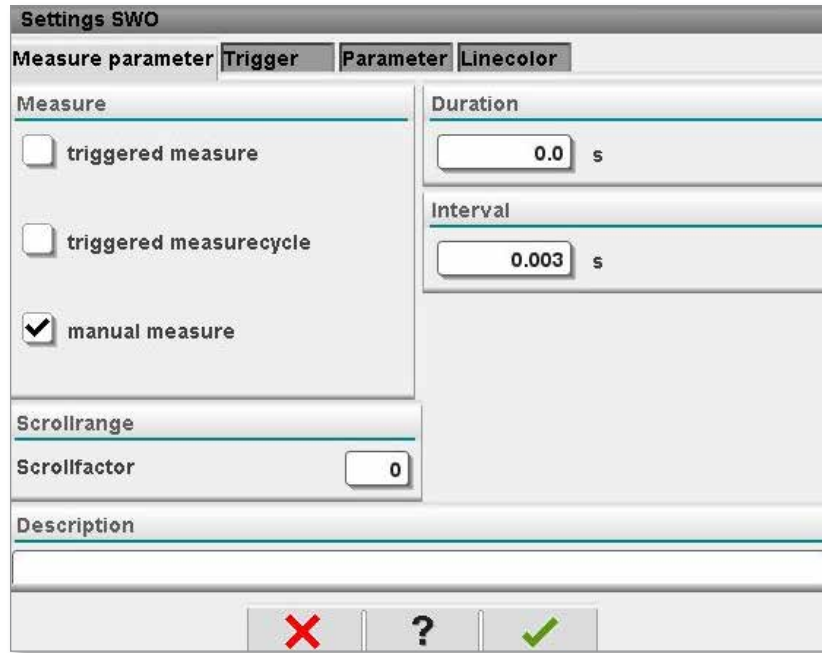
### 7.13.2 Description of the Elements

Designation	Description
<p>Start / Stop Activate / De-activate</p>	<p>Start/stop the measurement. The button is depicted alternating, depending on the current status of the measurement (Start/stop during manual measurement; Activate/Deactivate during trigger-driven measurement).</p>
<p>Setup</p> 	<p>All Ref. curves: Updates the reference curves of all parameters. The single numbers update of a reference curve is made in the properties dialog (legend) of the respective parameter.</p> <p>Setup: Opens the settings dialog.</p>
<p>Zoom</p> 	<p>Zoom: Enlarges the displayed area by the corresponding factor (100%, 50% or 25%).</p> <p>User-defined: Allows the user to select an area (red bordered) and magnify it.</p> <p>Detail view: Stretches the chart in x-direction, enabling all measurement values in the buffer to be depicted (Note: the 100% view will allow only every 4th measurement point to be depicted).</p>
<p>Export</p> 	<p>Start export: Starts the export acc. to the export settings.</p> <p>Export Setup: Opens the export settings dialog.</p> <p>Save Settings: Saves the current configuration (measurement settings, curves selected, export settings, trigger settings)</p>

**Description of the Elements - continued**

<p><b>View</b></p> 	<p><b>IEC Name / Var Name:</b>          Display of long text (IEC name) or short text (Var name) of process parameters.</p> <p><b>Details off:</b>          Shows/hides the detail display in the upper part of the graphic</p> <p><b>Maximized:</b>          Increases or decreases the displayed graph (show/hide legend).</p> <p><b>Delete:</b>          Deletes the display of the curve.</p> <p><b>Act. Value:</b>          Displays the actual value cursor which can be pushed to any position of the displayed curve using the position buttons (left, right). The measured values at this position are shown in the legend.</p> <p><b>Print:</b>          Gives a printout of the current view (header, chart, short or long text of the variables, scale of each variable). A printer-dialog appears.</p>
<p><b>Import</b></p> 	<p><b>Load Measurement:</b>          Opens a saved recording and shows the variable values in a chart.</p> <p><b>Load settings:</b>          Loads the stored configuration.</p> <p><b>Restore Config (only active with loaded recording):</b>          Loads the settings in the data recorder. The measurement can be started with these settings.</p>

## 7.14 Settings



All parameters required for a measurement are configured in the settings dialog. These include the setting of the measurement type (manual and / or trigger-driven measurement) and their characteristic values (trigger event, pre/post trigger, interval, measurement duration, threshold value, etc.) In addition, measurement variables and visual attributes are selected here.

### 7.14.1 Measure Parameter Tab

This tab defines the measurement type, duration and interval of the measurement.

During manual measure, both the scan interval (every x-measurement is saved) as well as the duration can be set. If the value 0 has been specified as measurement duration, the measurement will be continuous. This measurement can only be terminated by pressing the Stop button.

If a measurement duration greater than 0 is entered, the scan interval will be automatically corrected if necessary, to ensure that the measurement duration corresponds with the buffer size x of the (corrected) scan interval. An automatic correction of the measurement duration is implemented if the scan interval is changed so that the measurement duration (once more corrected) corresponds with the buffer size x of the scan interval. If a continuous measurement is set (measurement duration = 0) the scan interval is not corrected.

*Example:*

Buffer size: 2,000 measurement values, scan interval: 0.01 s, then measurement duration = 20 s.

During the triggered measure it is possible to specify a time pre-trigger as well as time post-trigger along with the scan interval and the duration. The configuration of a continuous measurement is not possible. The pre-trigger and the post-trigger are specified as a time period and the measurement duration is the cumulative sum of pre-trigger and post-trigger. If the scan interval is changed, the time values for both, pre-trigger as well as post-trigger, are adjusted proportionally.



## Measure Parameter Tab - continued

*Example:*

Original: Scan interval: 0.1s

Measurement duration: pre-trigger 4 s; post-trigger 6s (measurement buffer full)

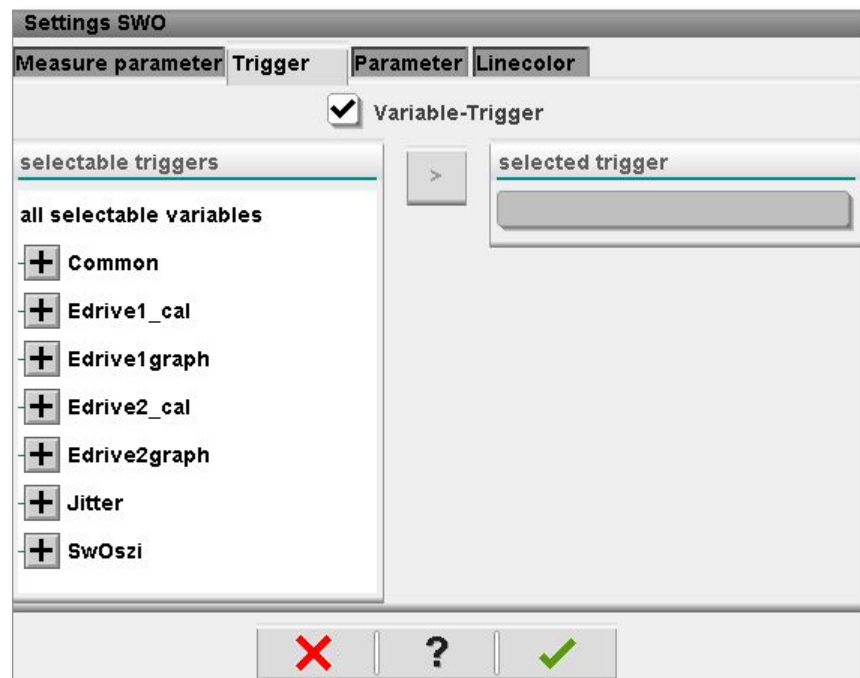
New scan interval: 0.05s

Makes: pre-trigger 2s; post-trigger 3s (measurement buffer full)

The triggered measure cycle is functionally identical with the triggered measurements, but the trigger is re-activated after successful measurement so as to start a new measurement once the trigger conditions occur again.

### 7.14.2 Trigger Tab

System variables, system events and system alarms can be used as trigger events.



### Variable-Trigger

System variables that can be configured as triggers are created in the variables monitor. These variable groups are available in the software oscilloscope in the same grouping as configured in the variables monitor. All types of system variables that can be recorded can also be used as trigger variables.

If a numerical system variable has been selected as trigger, a trigger threshold must be entered and an excess / undershoot must be specified at which the measurement shall be started. For a Boolean variable the Edge must be selected.

### 7.14.3 Event-Trigger

In the case where a system event is used as a trigger event, the user has to enter the full qualified name of the event or select it from a list of defined system events.

### 7.14.4 Alarm-Trigger

System alarm triggers can be selected from a list of all defined alarms. An alarm is only fully identified through the additional specification of four values for the Alarm-Sub-Ids. If the value -1 is specified for a Sub-Id every occurring alarm, irrespective of its Sub-Id, will act as a trigger at this point (Sub-Id-"Wildcard").

### 7.14.5 Settings - Parameter

The parameter selection enables selection of system variables to be recorded. A maximum of 12 variables can be selected. The following types of system variables can be logged:

- all INT-types (SINT, INT, DINT, LINT, USINT, UINT, UDINT, ULINT)
- all REAL-types (REAL, LREAL)
- all Bit-types (BOOL, BYTE, WORD, DWORD, LWORD)
- TIME and TIME\_OF\_DAY

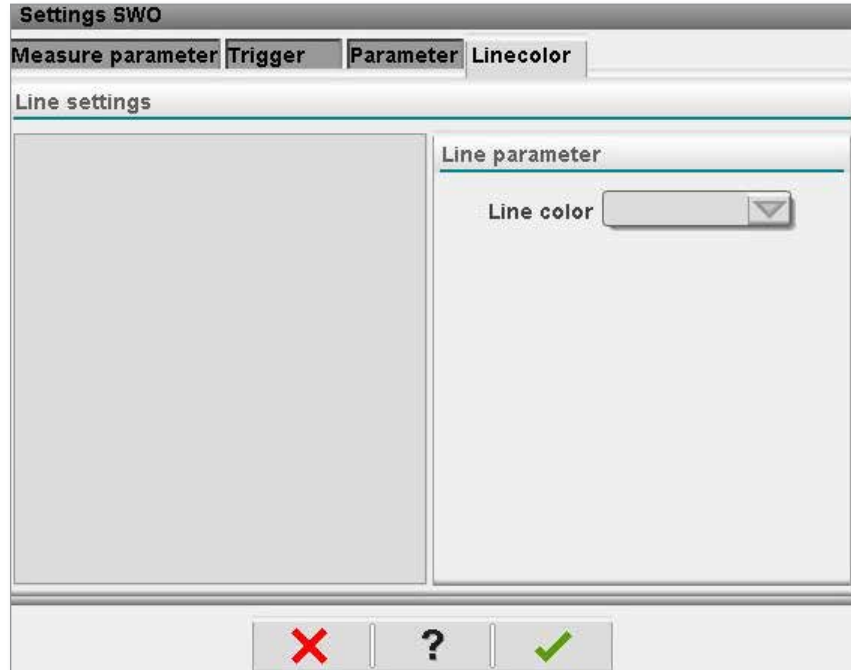
The variables that can be selected for a measurement are configured via the variable's monitor. If no groupings were created in the variable's monitor, no variables are available. Parameters can be manually added by entering them into the field parameter and subsequent confirmation of the addition.



#### **NOTE**

Variable names can also be directly inserted into the Parameter field by taking them from the IO-monitor via the clipboard (Insert key of the virtual keyboard).

## 7.15 Settings – Line color



Every system variable can be assigned a specific line color using this window.

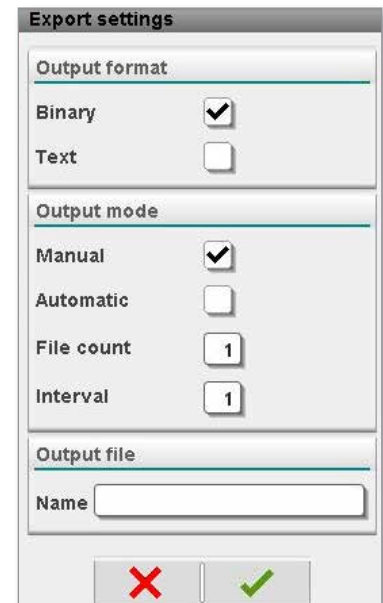
### 7.15.2 Export Settings

The Output format allows selection between:

- Binary Format (for later import for viewing), or
- Text (for import into Excel).

The Output mode is used to select between:

- Manual Mode - The current and complete measurement is output once into the specified file on activation of “Start Export”. Any file with the same name if overwritten.
- Automatic Mode – At the start of the next measurement, the data are written into the specified file in the format selected. The export can either be explicitly terminated by the user or when the specified file count is reached.



The specification of an Interval > 1 enables the selective omission of measurement.

With binary measurements exactly one file will be created in the automatic mode for an order (Output under Name). These are then automatically given continuous numbers by the system (e.g.: MyExportFile000.bin, MyExportFile001.bin, ...). After notification to the user, any given measurement sequence with the same name is completely deleted, prior to the start of the new measurement. During text export the data are always attached to the existing file, which was newly created at the start of the measurement.

### 7.15.1 Torque Monitor

The Torque monitor collects torque values during the machine operation. If two plates are used in the hot half then the Plate #2 tab is used.

You can choose [**Base Line**] at any time to zero the monitor and start new torque data collection.

In typical operation, the E-Drive will only use open and close positions.

#### Two-Stage Mode (Typical operation)

If the user is using any other combination of steps each step will be shown.

- Choose [**Base Line**] to clear the data.
- When the next E-Drive cycle occurs, the Base Line torque value is captured and displayed in the Base Line column.
- After each new cycle the torque is averaged and displayed in the Cycle Avg. Column.
- If the torque captured is the peak value, since the [**Base Line**] was pressed then the peak value is displayed in the Cycle Peak column.
- If Four-Stage Mode is used the Opening and Closing rows will be enabled and torque data will be collected and displayed for these positions.

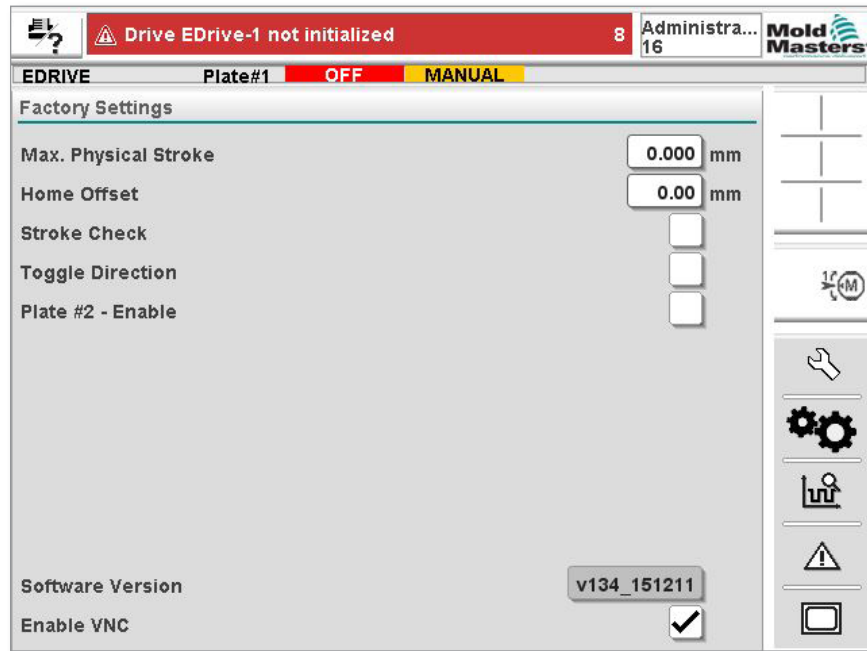
Torque Monitor Plate#1			
Step	Base Line	Average	Peak
Opened	0.00%	24.77%	51.818%
Closed	0.00%	24.047%	48.365%
Plate#1 Batch Count:		18	
Plate#2 Batch Count:		17	
Action			
Reset		Plate #2	Close



#### NOTE

The Torque monitor will not interfere with the E-Drive operation. It is only meant for monitoring the torque.

## 7.16 Factory Settings Screen



The factory setting page shows:

1. The software version
2. Max. physical stroke
3. Home offset
4. Stoke check (check box)
5. Toggle direction (check box)
6. Plate #2 & Master / Slave mode - Enable (check box)

# Section 8 - Maintenance



## WARNING

Ensure that you have fully read “Section 3 - Safety” before performing maintenance or repair procedures on the E-Drive controller.

Always isolate your controller at source before you open the unit to inspect it or replace fuses.

## 8.1 Cleaning and Inspection

Inspect the fan filters at regular intervals according to your own environment. The filters are removable and a light tapping action removes loose dirt and dust. Failure to do this reduces the flow of cooling air and may incur more expensive repairs if internal components subsequently overheat. If filters do become clogged, they need to be replaced and these can be obtained from *Mold-Masters* quoting model type and year of manufacture.

Any excess dust that has entered into the cabinet may be removed with a light brush and vacuum cleaner.

If the equipment is subject to vibration, we recommend you use an insulated screwdriver to check that no terminals have become loose.

External cable-looms should be checked to see that there has been no damage to the flexible conduit, plugs or sockets. If the flex has been squashed, if there is visible damage, or if there are any exposed conductors, then, for your own safety, it must be replaced.

## 8.2 Replacement Parts

*Mold-Masters* does not expect that you will need to repair any controller parts at board level other than fuses. In the unlikely event of any board failure then we provide an excellent repair and exchange facility for all our customers.

## 8.3 Change Fuses

There are two fuses in the 24V supply that are located inside the cabinet. They are found to the lower rear area on the right side of the cabinet (when viewed from the front).

## Change Fuses - continued



### NOTE

Always investigate the cause of blown fuse before replacing with new. Always replace fuses for new fuses of the same type and size (as shown in the table below).

Function	Type	Rating
24V Supply	32 x 6mm slo-blo	2A at 250vAC



## 8.4 Upgrade Software

### 8.4.1 The Benefits of Upgrading

In order to maintain our high quality, our development engineers at *Mold-Masters* are making continual improvements to our control systems. We also listen to customers who will sometime suggest useful system changes. Improvements are offered to our customers and should you decide that they would be beneficial to your own control system, it is quite straightforward to implement an upgrade yourself.

Upgrades can usually be provided on a single compact flash card that can be read by your controller. The following instructions will guide you through the upgrade procedure.

### 8.4.2 Implement an Upgrade

*Mold-Masters* recommends that you always wait until your controller is free before implementing any upgrade. This ensures that, in the event of an error, or a power interruption at a crucial point, normal production will not be adversely affected.

1. Turn off power to the E-Drive.
2. Check that you have the upgrade compact flash card.
3. Open the front door of the E-Drive cabinet.
4. Using a pen, press the Compact Flash eject button.
5. Remove the existing compact flash card.
6. Insert the compact flash card with the label to the front.
7. Power up the E-Drive.
8. Confirm version number displayed on the Overview Screen matches the document provided with the upgraded compact flash.

# Section 9 - Wiring Details



## WARNING

Ensure that you have fully read “Section 3 - Safety” before connecting the E-Drive controller.

## 9.1 Three Phase Supply Cable and Miniature Circuit Breaker

Please take extreme care when connecting the controller to the three-phase supply. Incorrect connection may result in damage to the controller.

Cable Marking	Supply Description
L1	Phase 1
L2	Phase 2
L3	Phase 3
Earth Symbol	Earth

\*N.B. Cable colors may vary therefore wire up according to the cable markings.

A suitably rated three-phase miniature circuit breaker (MCB) is located on the rear of the cabinet just above the supply cable inlet. This is the safety overload trip for the cabinet as well as the main user-switch for isolation. It can be locked off by using a proprietary shield locking device.

## 9.2 Auxilliary Input

A HAN4A cabinet connector provides a simple IO function.

The input (Pins 1 &2) looks for a closing signal from the associated hot runner controller. This indicates that the mold is up to temperature and must be present before the E-Drive can be used.

Pin	Connection	Input / Output
1	Auxiliary Input signal	Input from associated hot runner controller
2	Auxiliary Input Ground	
3	Not Used	spare function
4	Not Used	





### 9.3 Machine Interface (HAN10E)

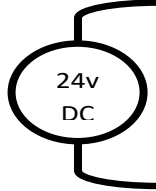

This connector is associated with a jumper which determines what type of trigger signal is needed.

If you link 50 with 52 then the single trigger requires an external 2VDC source.

If you link 50 with 51 then you can provide external dry contacts that use an internal 24VDC source. This allows you to use up to four trigger inputs.

There are also two common outputs across HAN10 pins 1/6 and 2/7 as detailed below.

	Option 1	Option 2	
			
1/6	Dry pair output to show E-Drive controller is on		1/6
2/7		Dry-pair output to show no Alarms present	2/7
4	Trigger 1	Trigger 1	4
5	Not Used	Trigger 2	5
8	Not Used	Trigger 3	8
9	Not Used	Trigger 4	9
3	Trigger 1 (0v)	Not Used	3
10	Not Used	24V dc out	10

### 9.4 50-51-52 Jumper Location

The 50-51-52 jumper-block is located inside the cabinet. It is found to the lower rear area on the right side of the cabinet (when viewed from the front).



### 9.5 Servo Connectors

Beside the HAN10E connector are dedicated servo connections which are fixed at the cabinet end and terminate in servo connectors at the E-Drive end.

These are not normally detachable at the cabinet end.

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## **NORTH AMERICA**

### **CANADA (Global HQ)**

tel: +1 905 877 0185

e: [canada@moldmasters.com](mailto:canada@moldmasters.com)

## **SOUTH AMERICA**

### **BRAZIL (Regional HQ)**

tel: +55 19 3518 4040

e: [brazil@moldmasters.com](mailto:brazil@moldmasters.com)

## **EUROPE**

### **GERMANY (Regional HQ)**

tel: +49 7221 50990

e: [germany@moldmasters.com](mailto:germany@moldmasters.com)

### **SPAIN**

tel: +34 93 575 41 29

e: [spain@moldmasters.com](mailto:spain@moldmasters.com)

### **FRANCE**

tel: +33 (0)1 78 05 40 20

e: [france@moldmasters.com](mailto:france@moldmasters.com)

## **ASIA / INDIA**

### **CHINA (Regional HQ)**

tel: +86 512 86162882

e: [china@moldmasters.com](mailto:china@moldmasters.com)

### **JAPAN**

tel: +81 44 986 2101

e: [japan@moldmasters.com](mailto:japan@moldmasters.com)

### **U.S.A.**

tel: +1 248 544 5710

e: [usa@moldmasters.com](mailto:usa@moldmasters.com)

### **MEXICO**

tel: +52 442 713 5661 (sales)

e: [mexico@moldmasters.com](mailto:mexico@moldmasters.com)

### **UNITED KINGDOM**

tel: +44 1432 265768

e: [uk@moldmasters.com](mailto:uk@moldmasters.com)

### **POLAND**

tel: +48 669 180 888 (sales)

e: [poland@moldmasters.com](mailto:poland@moldmasters.com)

### **TURKEY**

Tel: +90 216 577 32 44

e: [turkey@moldmasters.com](mailto:turkey@moldmasters.com)

### **KOREA**

tel: +82 31 278 4757

e: [korea@moldmasters.com](mailto:korea@moldmasters.com)

### **INDIA**

tel: +91 422 423 4888

e: [india@moldmasters.com](mailto:india@moldmasters.com)

### **AUSTRIA**

tel: +43 7582 51877

e: [austria@moldmasters.com](mailto:austria@moldmasters.com)

### **CZECH REPUBLIC**

tel: +420 571 619 017

e: [czech@moldmasters.com](mailto:czech@moldmasters.com)

### **ITALY**

tel: +39 049 501 99 55

e: [italy@moldmasters.com](mailto:italy@moldmasters.com)

### **SINGAPORE**

tel: +65 6261 7793

e: [singapore@moldmasters.com](mailto:singapore@moldmasters.com)