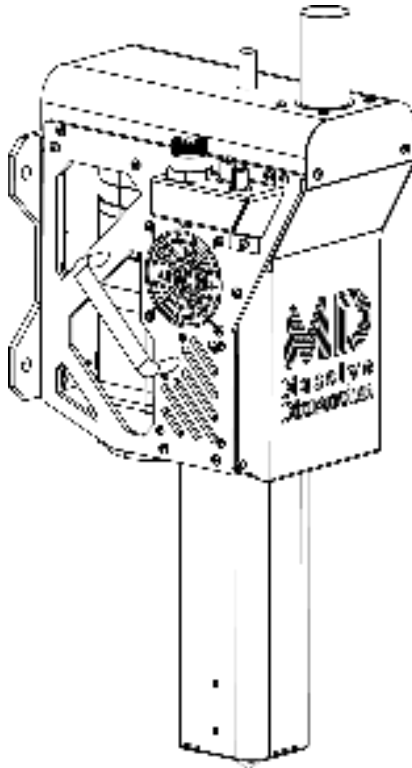

Massive Dimension MDPE10 Extruder

Operation Manual



This manual applies to the Massive Dimension MDPE10.

Triex LLC, Barre, VT 05641, USA

CAUTION! Read Carefully

- **RISK OF ELECTROCUTION** Customer is responsible for proper machine implementation, controls enclosure, grounding, safety fuses, and wiring. Improper wiring could cause injury or death. Consult a local electrician if unfamiliar with AC wiring.
- **HOT MATERIALS & SURFACES** Use gloves and eye protection while operating the MDPE10 Extruder. The barrel and nozzle are HOT and melted plastic can stick to the skin and cause serious burns and injury.
- **HIGH-PRESSURE EXPLOSION** Air trapped inside the barrel becomes highly pressurized during operation and can cause small explosions from the nozzle which eject molten plastic in all directions.
- **TOXIC FUMES** Some plastics such as PVC can produce dangerously toxic fumes when they are heated. Always carefully review the MSDS of any material before using it in the MDPE10 to avoid dangers to your health. Always use the MDPE10 in a well-ventilated area.
- **In Case of Emergency** ALWAYS include accessible emergency power shut-offs as part of implementing the MDPE10.
- Only use the MDPE10 to extrude thermoplastic polymers. No other use has been tested or approved by Massive Dimension.
- Always STOP the extruder before clearing the feed port or removing the screw. Never stick anything into the feed port while the screw is turning as this could damage your system.
- The MDPE10 is designed for indoor use only. Operate in a clean, dry area.
- Only use the specified input voltage to operate the MDPE10 or damage to the components could occur.

Contact Massive Dimension with any questions
1-802-505-6772
contact@massivedimension.com

General Specifications

Thermal Power Input:	208~240VAC-4.8A 50/60Hz 1-Phase 1000W MAX - varies with settings
Weight:	13.8kg (30.5 lbs) - With Servo & Gearbox 7.85kg (17.3 lbs) - Without Servo and Gearbox
Dimensions:	27.8cm D x 20.3cm W x 54.2cm H (10.9in L x 8.0in W x 21.3in H) Refer to "MDPE10_Public_Dimensions" for detailed dimensions. 3D files available on Massivedimension.com & Massivedimension.com
Temperature Control:	3 PID Controlled Barrel Heat Zones (aluminum blocks with dual 150W heaters) 1 PID Controlled Feed Throat Heat Zone 2 24VDC Feed Zone Fans Max Recommended Run Temp: 660°F (350°C)
Servo Drive:	SureServo servo drive 1 kW 230 VAC 1 and 3-phase, (1) RS-232/RS-485/RS-422 (IEEE1394) port Modbus. For use with 750W and 1 kW servos
Drive Motor:	SureServo low inertia AC brushless servo motor 750W, 3-phase input, 2500 lines/10000 ppr encoder
Gearbox:	SureGear high-precision planetary gearbox, 10:1 ratio, inline, 22mm diameter output shaft, nominal output torque 50 N-m (443 lb-in), 1- stage, 90mm frame
Final Drive:	8mm HTD pitch Timing Belt 20mm wide 22 tooth 22mm bore aluminum pulleys
Screw:	Part # EX6-625 16mm (5/8") Diameter 1/2" Pitch 24 L/D Ratio 17-4 PH Stainless Steel Con. H900 2:1 Compression
Nozzle:	1.5mm MD Nozzle (7/8"-14 Thread)

Parts Included



Parts Included cont.

1. EX6-625 Extrusion Screw 5/8" OD 2:1 Comp
2. Brass Bristle Tube Cleaner
3. Tube Cleaner Extension Rod
4. High-Temperature Resistant Terry Cloth Gloves
5. Copper Gauze
6. Brass Bristle Wheel
7. (4x) MD Nozzle 1.5mm
8. Magnetic Screw Retainer Rod
9. 1-1/8" Mini-change 9-pole cord set 12' long (AMX10E0010)
10. M12 Female 8-pole shielded thermocouple signal cable 16' (AMX10E0009)
11. M12 Female 4-pole shielded auxiliary signal cable 16'
12. ZL-SVC-CBL50 ZIPLink servo cable 50-pin connector to 50-pin connector
13. SVC-PFL-020 SureServo power cable 20'
14. SVC-EFL-020 SureServo encoder feedback cable 20'
15. ZL-RTB50 ZIPLink feedthrough module, 50-pole, DIN rail mount
16. SVC-PCCFG-CBL SureServo programming cable 9-pin D-sub 6'
17. SVA-2100 SureServo servo drive, 1 kW, 230 VAC, 1 and 3-phase
18. (4x) SLB4848-V0 SOLO single-loop temperature controller, 1/16 DIN
19. (4x) AD-SSR810-DC-28R Solid state relay 35mm DIN rail mount
20. 2x 1lb Bags of Extruder Purge Compound

Tools Required:

Non-marring bench vice (with V-block) for holding screw while cleaning

Powered Drill with a chuck that can receive a 5/16" or larger shank

3/4" Wrench (for nozzles)

Automotive grade wheel bearing grease (small amount)

Never-Seize/Anti-Seize thread lubricant (450°C rated or higher)

Recommended:

Compressed air & air blower/duster gun

Heat gun or propane torch

Shop Vacuum Cleaner

Call 1-802-505-6772 or visit massivedimension.com for additional or replacement parts

Thermal Control Components

Refer to “MDPE10 Wiring Diagram” for thermal control wiring

Temperature Control PIDs

Automation Direct Part # SLB4848-V0

Mount these PIDs in a controls enclosure with 1/16 DIN panel cutouts.

Run the auto-tuning function (page 5-2 of the PID manual) at the set temperature you plan to operate the machine at.

To ensure the PID controllers perform at their highest accuracy, we recommend re-tuning whenever operating at a temperature more than 30°C higher or lower than the temperature the previous tune was set at.

PID Manual Link:

<https://cdn.automationdirect.com/static/manuals/solobasic/solobasicmanual.pdf>

Temperature Control Relays

Automation Direct Part # AD-SSR810-DC-28R

Mount these relays on a 35mm DIN rail in an enclosure.

Relay Specifications Link:

<https://cdn.automationdirect.com/static/specs/ssclass8relays.pdf>

Servo Motor & Servo Drive Components

Servo Drive

Automation Direct Part # SVA-2100

Refer to the SureServo manual to set up the drive parameters for your implementation:

<https://cdn.automationdirect.com/static/manuals/sureservomanual/sureservomanual.html>

A serial programming cable is provided (AD Part # SVC-PCCFG-CBL). Connect the drive to a PC's 9-pin D-sub serial port to set and load drive parameters using the SureServo PRO Software which can be downloaded here:

<https://support.automationdirect.com/products/sureservo.html>

The servo drive I/O is broken out by the ZIPLink feedthrough module (AD Part # ZL-RTB50). Refer to the ZIPLink manual for pinout details:

<https://cdn.automationdirect.com/static/manuals/ziplinks/specsheets/ZL-RTB50.pdf>

Servo Motor

Automation Direct Part # SVL-207

Servo motor manual:

<https://cdn.automationdirect.com/static/manuals/sureservomanual/sureservomanual.html>

Servo Gearbox

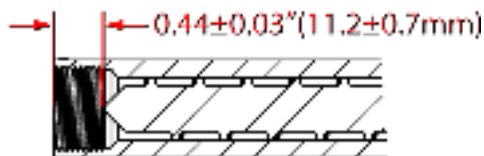
Automation Direct Part # PGA090-10A3

Servo gearbox specifications:

<https://cdn.automationdirect.com/static/specs/suregearservogb-il.pdf>

Installing the Screw

1. Apply a very thin layer of grease to all 5 flat surfaces of the square tang on the back of the screw. Be careful not to leave excess grease on the edges of the tang to minimize grease getting on the barrel walls while inserting the screw. Check that there is a thin layer of grease on the square tang at every screw change.
2. Insert the magnetic screw retainer rod into the small hole near the feed port on the top of the machine.
3. Insert the screw, square end first, into the end of the barrel. Push the screw into the barrel until it stops and is retained by the magnet on the end of the retainer rod. The tip of the screw should be recessed about 0.44" from the end of the barrel when the screw is fully inserted. If the screw does not easily insert to the full depth DO NOT install the nozzle or try to force the screw in. Pull the screw back out partially, turn it slightly and try again until it seats in the square coupler.



It should take minimal force to insert the screw fully. DO NOT tap the screw in as this could jam the screw in the barrel. There could be debris in the barrel or in the square socket that is stopping the screw. See "Cleaning" for more information.

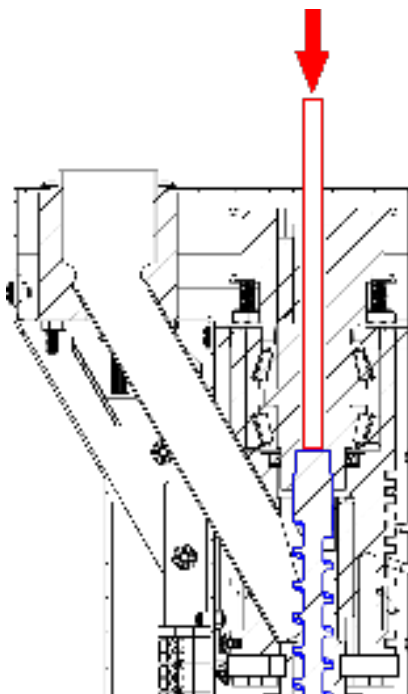
CAUTION! The barrel gets **HOT!** To prevent burns, always use gloves when working with the screw and nozzles.

4. Apply a thin layer of anti-seize lubricant to the nozzle threads and screw the nozzle into the end of the barrel. The nozzle should be snug but not tight, approximately 200 in-lbs (230 kg-cm).

Cleaning

Caution! Parts of the extruder get **hot!** Wear gloves and eye protection! It is recommended to thoroughly clean the extruder after use, or right before the next use, for the most consistent extrusion. Polymer melt on the screw due to heat creep after shutdown can cause issues when restarting the extruder. Leave the extruder temperature zones on during cleaning.

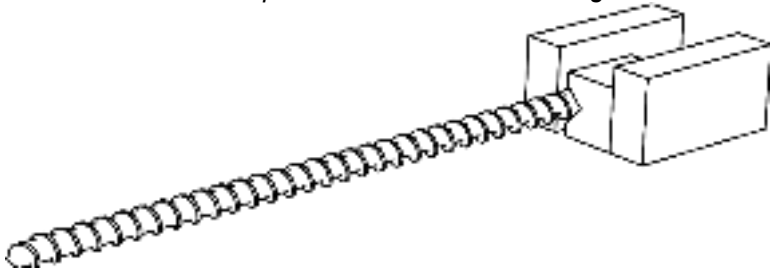
1. Either run the extruder until the feed port is empty or use a vacuum cleaner to remove the remaining pellets. Continue running the extruder until polymer stops extruding from the nozzle.
2. If you are using a filter nozzle, stop the extruder, remove it, and replace it with a standard nozzle with a minimum hole size of 1.5mm. Purge damages the filter. Fill the steel angled feed tube approximately halfway with extruder purge compound while running the extruder at approximately 20RPM. Do not change the temperatures from the polymer that was run to run purge. **NOTE:** *Use high temp purge for temps over 300°C. It is possible to remove and clean the screw without using purge material, but the process can be significantly more difficult and is not recommended.*
3. Continue running the extruder until purge stops extruding from the nozzle, or add more if the residual polymer is still visible in the purge. **NOTE:** *Running the extruder "dry" with no polymer in the feed will cause excess wear on the screw over time. Avoid running the extruder while empty for more than a few minutes at a time.*
4. After all the purge has been extruded, stop the extruder and remove the nozzle.
5. Remove the magnetic screw retainer rod and insert the tube cleaner extension rod to push the screw forward and out from the end of the barrel.



Cleaning - Continued

6. Pull the screw the rest of the way out of the barrel using gloves, then clamp the back of the screw in a non-marring vice with a v-block for cleaning. **NOTE:** *Clean the screw while it is still hot.*

Always use a smooth, non-marring vice and v-block to secure the screw. Damage to the screw from the use of an improper vice could cause wear issues or prevent the screw from fitting in the barrel.



7. Clean the remaining material from the screw using a power drill with the brass bristle wheel. If present, large pieces of material may need to be scraped off first. **NOTE:** *Always use soft metal tools (brass, aluminum, etc.) to remove material from the screw to prevent marring of the surface which can decrease the life of the screw and cause extrusion issues. Use a heat gun or propane torch if the screw cools and cleaning becomes difficult.*
8. Screw the brass bristle tube cleaner onto the tube cleaner extension rod and wrap two layers of copper gauze around the brass bristle tube cleaner. Wrap the gauze counter-clockwise with the extension rod pointing toward you.
9. Secure the end of the extension rod in the power drill chuck and make sure the drill is turning clockwise.
10. Insert the brass bristle tube cleaner into the end of the barrel, while spinning, and continue until it reaches the feed port. While still spinning, remove the tube cleaner, and repeat 2~3 times.
11. Use compressed air in the feed tube to blow any remaining debris out the end of the barrel. Check if the barrel is clean by shining a light in the feed port and looking into the end of the barrel.

Refer to our online resources at massivedimension.com for cleaning demos.

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