

#### COLORING THE WORLD



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**MOVACOLOR** LEADING INNOVATOR IN DOSING TECHNOLOGY

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#### **1** Introduction

Thank you for purchasing a Movacolor metering device. This manual is addressed to operators and **qualified technicians** taking care of the metering of dry additives to ensure correct use of the Movacolor dosing unit.

🛈 Important note: this manual must be read before installing the dosing unit. Keep this manual in a place accessible for all operators.

#### 1.1 Symbols

(j)

Important note

Attention; safety regulations for the operator

1.2 Terms

#### Operator: Qualified Technician:

A person charged to operate, adjust, maintain and clean the machine. A specialized, suitable trained person authorized to execute the installation, non-routine maintenance, or repairs requiring special knowledge of the machine and how it operates.

#### 1.3 Transport

To protect the Movacolor unit against damage during transport, the unit is packed in a cardboard box filled with polyurethane foam. Delivery terms are Ex-Works Sneek, The Netherlands. Buyer is responsible for the transport. Movacolor cannot be held liable for any damage during transport.

#### 1.4 Receipt

Check the unit thoroughly upon receipt. Pass any remarks to the local agent or Movacolor within 8 days upon receipt of goods.

#### 1.5 Disclaimer

Movacolor does not warrant that the hardware or software will work properly in all environments and applications, and makes no warranty and representation, either implied or expressed, with respect to the quality, performance, merchantability or fitness for a particular purpose.

Movacolor has made every effort to ensure that this user's manual is accurate; Movacolor disclaims liability for any inaccuracies or omissions that may have occurred.

Information in this user's manual is subject to change without notice and does not represent a commitment on the part of Movacolor. Movacolor assumes no responsibility for any inaccuracies that may be contained in this user's manual. Movacolor makes no commitment to update or keep the current information in this user's manual, and reserves the right to make improvements to this user's manual and/or to the products described in this user's manual, at any time without notice.

If you find information in this manual that is incorrect, misleading or incomplete, we would appreciate your comments and suggestions.

## **2** General information

#### 2.1 Safety



The equipment is only designed and may only be used for the dosing of dry additives. Any use that is not in conformity with the instructions is considered improper and as such frees the manufacturer from any liability regarding damage to things and/or persons.



Before switching on the unit for the first time, ensure that the mains power voltage applied is between 80 and 260VAC.



Always switch off the Movacolor control cabinet and disconnect the mains power plug from electrical power before performing maintenance.



Ensure that all parts are securely fixed to the extruder or injection molding machine.



Dangerous voltages are present inside the control cabinet for up to 2 minutes after it has been switched off.

#### 2.2 Certification

The Movacolor dosing unit is designed and produced in conformity with the following European regulations:

- **1.**  $C \in$  standards for machinery (health, safety, environment)
- 2. EMC (electromagnetic compatibility)
- 3. 2006/42/EG
- 4. RoHS

#### 2.3 Operating environmental conditions

- 1. The unit must be protected against weather conditions
- 2. Operating temperature -20 to +70 degrees Celsius
- 3. Protection class: IP-50

## **3 Overview Dosing unit**

## 3.1 MC12-Micro Components overview.



## **4** Installation

### **4.1 Mechanical Installation**

Most mechanical parts are pre-assembled, making installation quick and simple.

1. When installing a foreign main material hopper on top of a neckpiece, the top flange of the neckpiece needs to be adapted. The lid of the neckpiece can be dismounted for easy machining.

#### 2.

- Install the neckpiece directly on top of the • entrance of the production machine;
- Install the neckpiece in a 90-degree angle • to the machine barrel. This will optimize the dosing accuracy in relation to vibrations of the production machine;
- Make sure that the complete unit is mounted; •
- horizontally levelled and fixed securely;
- Assure proper grounding to control cabinet, • neckpiece and dosing unit.
- 3. Connect the unit to the neckpiece by closing curled knob clockwise.





Mount the unit in a 90-degree angle to the machine barrel, as shown in the picture.



with 500ml hopper).

#### **4.2 Electrical Connections**

The MC12-Micro controller is standard equipped with 3 connections:

- 1. Mains power cable,
- 2. Input cable
- 3. Motor cable

(1) Before switching on the unit for the first time, ensure the mains power voltage being applied is between 80 and 260Vac.

## 4.3 Input (start) signal

The MC12-Micro needs an input signal from the production machine in order to operate. Two different input signals can be used to control the dosing unit.

- 1. A potential free relay contact: Use the white and brown wire for the potential free contact.
- 2. A relay signal up to 24 Volt DC: Relay signals can be used for an extruder that has not a tacho signal. In case of a powered relay signal connect the white wire to +24 VDC and the yellow wire to side.

Also please have a look at <u>APPENDIX B: MC12-Micro Wiring Diagram</u>.

#### **5 Metering principle**

The Dosing Cylinder<sup>®</sup> of Movacolor combined with a very precise adjustable stepping motor ensures that the additive output is accurate and regular. For every particular application Movacolor provides different neckpieces but the most common mounting of the neckpiece is between the production machine and the hopper. In the figure below a cut through of the NST40 neckpiece can be seen.

During operation, the virgin material runs from the machine hopper through the neckpiece (1) into the machine. Inside the neckpiece the virgin material flow (4) is divided into two streams by the cover plate(3). In the space below the cover plate, the rotating cylinder (2) is dosing additive.

Additive is added directly into the center of the virgin material flow, just before it enters the production machine (5). This is a great advantage over metering devices that use batch pre-mixing because pre-mixing can actually cause material separation. Separation of materials results in an irregular additive flow into the production machine.





- Neckpiece
  Movacolor dosing tool
- 3. Cover plate
- 4. Virgin material
- 5. To production machine

## 6 Operation

## 6.1 The Interface



#### 6.2 General

- Connect motor before switching on the controller
- ALL changes has to be entered to acknowledge.
- A blinking value means the changed data is not acknowledged.
- To cancel a changed value, press the specific function button ( 🖾 or 🖾 ) again.
- Most functions have a designated key and LED on the interface. When a function is activated the LED of that key/function will light up.
- All functions except the test if function can be activated if the unit is started, (dependent on the chosen configuration.)
- Only one of the following functions *()*, can be active at the same time. This means no other function can be activated before the active function is deactivated

① The unit can be set to different configurations, see paragraph 7.3.

#### 6.3 Start up

The MC12 software version is displayed shortly when the unit is switched on followed by the configuration mode (con).

Configuration	Type of Production	Input signal
1	Injection Molding	Timer
2	Extrusion	Relay

When the MC12 is set to configuration 2, the time function key is deactivated. When a deactivated keys is pushed the unit will give a beeping signal. For changing the unit configuration see paragraph 7.4.

## 6.4 Configuration

To make the configuration available,
keep speed and enter 🕑 pressed while switching on the main power.
$\square$
The configuration number will be displayed, press to switch between the possible configuration
and press et acknowledge. The software version will be displayed.

# Timer

Timer mode is used for injection molding with a relay input signal. When the relay contact is made, the unit will start dosing according the number of seconds that has been set with the time function.

## Relay

A relay signal can be used in case working in extruder mode. With the relay input the unit will start dosing when the relay contact is made and will stop when the relay is interrupted.



Speed and dosing time can be altered (time only in case of injection molding)





## Production (Motor On/Off)



Press with to start production. The function active LED will start blinking when the unit is waiting for an input signal. The unit is dosing if the Start LED is lighted continuously.



Test procedure to determine output of dosing system:

- Place dosing unit horizontally leveled (water level surface).
- Set the speed (and or) time (see settings)
- Press I for Test
- Weigh the material dosed during test
- Adjust speed or time and repeat I Test if necessary.

(Configuration 1): The unit will dose with the set speed and time. (Configuration 2): The unit will dose for 30 seconds at the set speed

Emergency stop.

If the test is activated press stop with to cancel a test.

#### 6.5 Alarms / Warnings

Err0:

Motor connection failure. Make sure the motor is connected

Check cable and connectors

Press et a acknowledge the alarm.

6.6 Keyboard lock



Display shows : L.ON / L.OFF

## 7 Maintenance

To keep the MC12-Micro functioning correctly, it is advised to perform regular maintenance.



Always switch off the control cabinet and disconnect the mains power plug from electrical power before performing maintenance.

#### Weekly

- Clean the dosing tool (cylinder or auger) for proper operation; •
- Check dosing tool (cylinder or auger) for wear out. The rubber coupling of a dosing cylinder is a typical wear out part;
- Check the dosing cylinder bearing for smooth rotating.

#### Monthly

• Check the motor seal for abnormal wear out.

#### 8 System performance

The following variables may influence the accuracy and repeatability of the system:

- 1. Material properties. Easy flowing, non-sticky and non-static material that comes in the form of small regular shaped granules or powder can be dosed very accurate and regular.
- 2. Periodical cleaning of the dosing cylinder and seals is necessary for proper operation.
- 3. Extreme vibrations and shocks can have negative influence on system performance.
- 4. An unstable relay signal has a negative influence on the repeatability.
- 5. With injection molding the shot to shot accuracy depends, besides the variables mentioned so far, on the shot time in combination with granule size and weight. If relatively big and heavy granules have to be dosed in a very short time, it will influence the shot accuracy and repeatability, because if only a few granules are dosed during the shot, one granule more or less makes a big difference on the total shot weight.
- 6. Vacuum or overpressure in the neckpiece caused by driers or hopper loaders.
- 7. Bridging or rat holing of the material inside the hopper can happen if the material is not free flowing.
- 8. Bridging or rat holing of the material inside the hopper can happen if the material is extremely static.
- 9. Extremely static material can contaminate the dosing cylinder.
- 10. In case of water cooled neckpiece, check if there is material build up around the dosing cylinder and the water cooled pipe. Check also the water supply to the neckpiece.

#### APPENDIX A: MC12-Micro Technical Specifications

#### **Controls:** Speed: Manual setting from 0,1 to 200 RPM max, in increments of 0.1 RPM. Time: Manual settings from 0,1 to 999,9 sec in increments of 0,1 sec. Monitoring/System Information/External communication Man/Machine interface: 4-piece 7 segments LED at front display. **External Communication:** None. Alarm: LED Indication + Internal beeper. Specifications/Standards & Directives/ Technical data: Power supply: Operating power from 80 VAC to 260 VAC, 50 and 60 Hz. by integrated automatic voltage selector. 80 Watt maximum. Power consumption: (1,8degr/step) max 2 Amp at 40 Volt. Stepper motor: -20 to +70 degrees Celsius. Operating Temperature: Input signal(s): Injection molding: Start/Stop trigger input, potential free or 18-24VDC\*. Extrusion: Start/Stop trigger input, potential free or 18-24VDC\*. \* Note potential contact Guaranteed OFF: 0-8VDC. Guaranteed ON: 18-30VDC. Output(s): Stepper motor max. output 2A (40VDC). **Standard Directives:** Protection class: IP-50. Safety In case of overload due to short-circuit or in correct connection, the power supply automatically shuts down:

• Opto-insulated start input for connection to production machine.

#### Machine connection flange:

Standard flange NST40 neckpiece with cleaning opening (steel epoxy coated); Inlet: ø50mm; Outlet: ø45mm.

Standard flange NST90 neckpiece with cleaning opening (steel epoxy coated);Inlet:Ø50mm;OutletØ90mm.

#### **Optional parts**

- 12 liter hopper stainless steel;
- Water-cooled flange BH(A) inlet/outlet 50mm/50mm stainless steel ANSI 304;
- Water-cooled flange PHA inlet/outlet 100mm/100mm.



## **APPENDIX C: MC12-Micro Dimensional Drawings**







#### DECLARATION OF CONFORMITY

(According to 2006/42/EC)

Manufacturer's name	:	MOVACOLOR BV
Address	:	P.O. Box 3016 8600 DA Sneek The Netherlands
		www.movacolor.com

## Declare under our sole responsibility that the products:

Product description	:	Dosing equipment
Product designation	:	MCBasic, MC12, MC18, MC30, MC12 Micro, MC18 Micro, MCLiquidV, MCLiquidG, MCHighOutputV, MCBalance.
Identification	:	From serial number 27500 onwards.
Year	:	2019

- The object of the declaration described above is in conformity with the relevant Union harmonization legislation;

-	-0,		
	Machine Directive	2006/42/EC	
	EMC Directive	2014/30/EU	
	RoHS	2011/65/EU	

### - The following harmonized standards and technical specifications have been applied:

	EN 60204-1	Safety of machine Part 1: G	f machinery - Electrical equipment of s. Feneral requirements
	EN 61010-1:2010	Safety re measure Part 1: G	equirements for electrical equipment for energy of the second sec
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