

# ADVANCED FLOW MONITORING 2018



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Flow Monitoring System

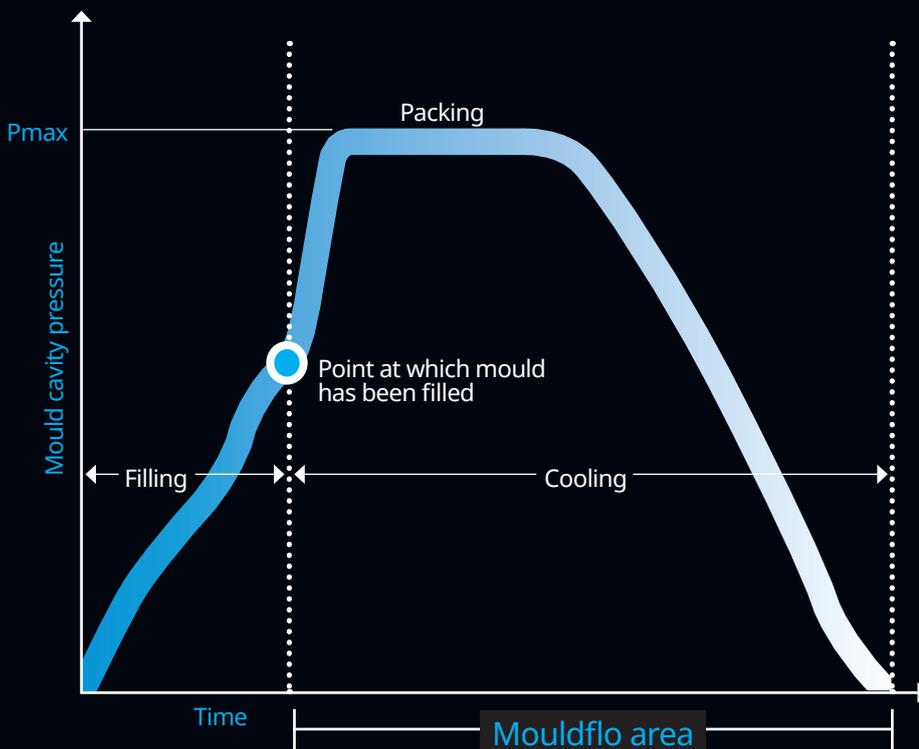
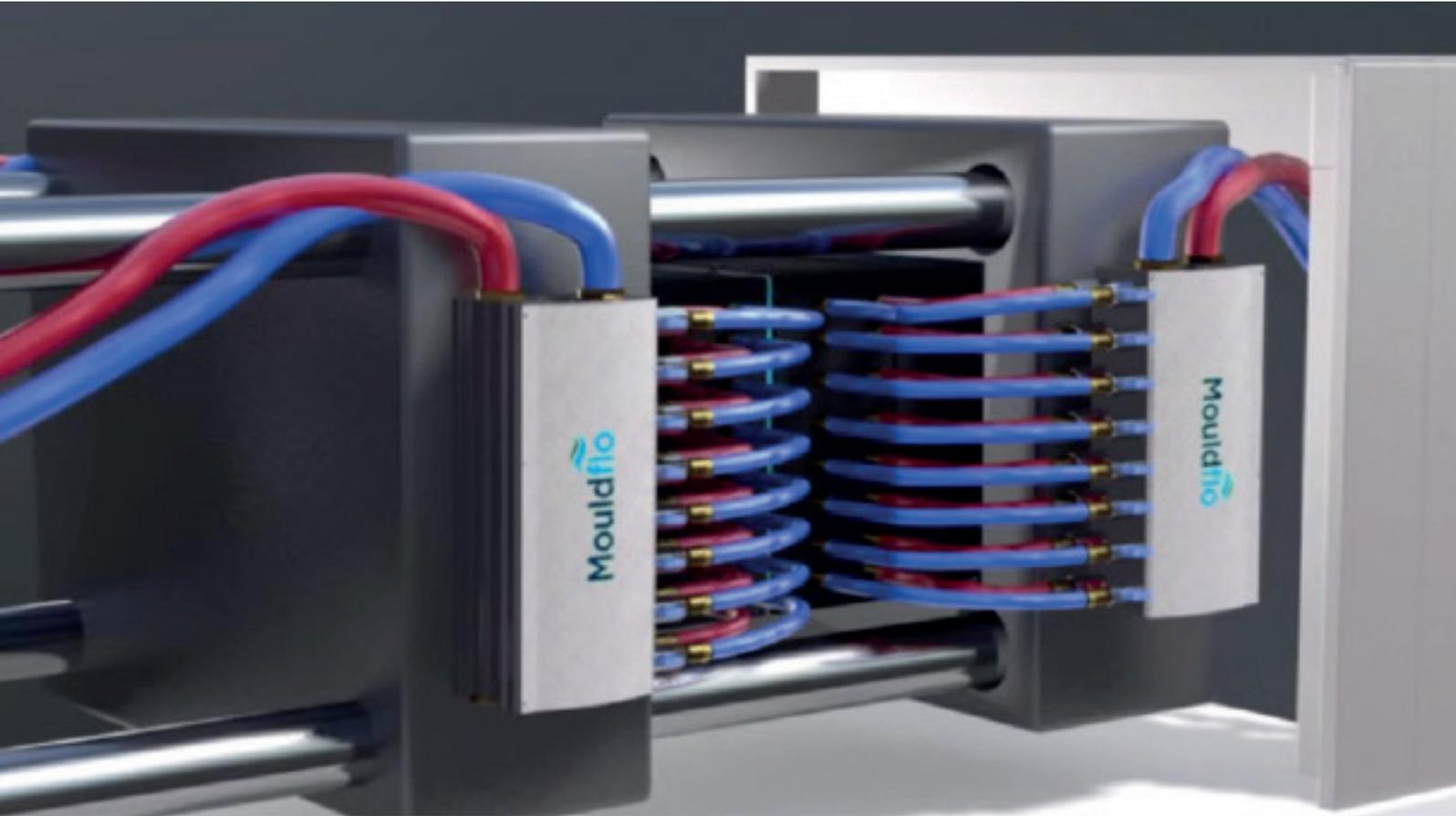


# 14

Test-rig



## Cooling is up to 70% of cycle time



The cooling time is up to 70% of the total cycle time.

By monitoring the flow, temperatures and pressure you can easily optimize the cooling circuit and improve productivity and reduce scrap.

## Flow Monitoring

# Measure

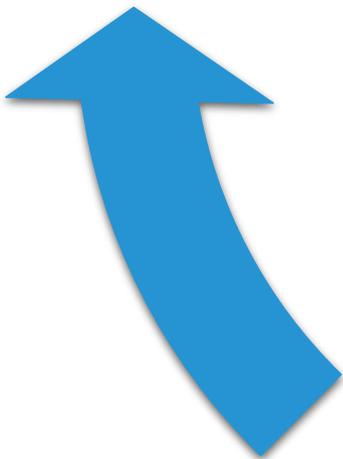
Flow  
Pressure  
Temperature

# Process

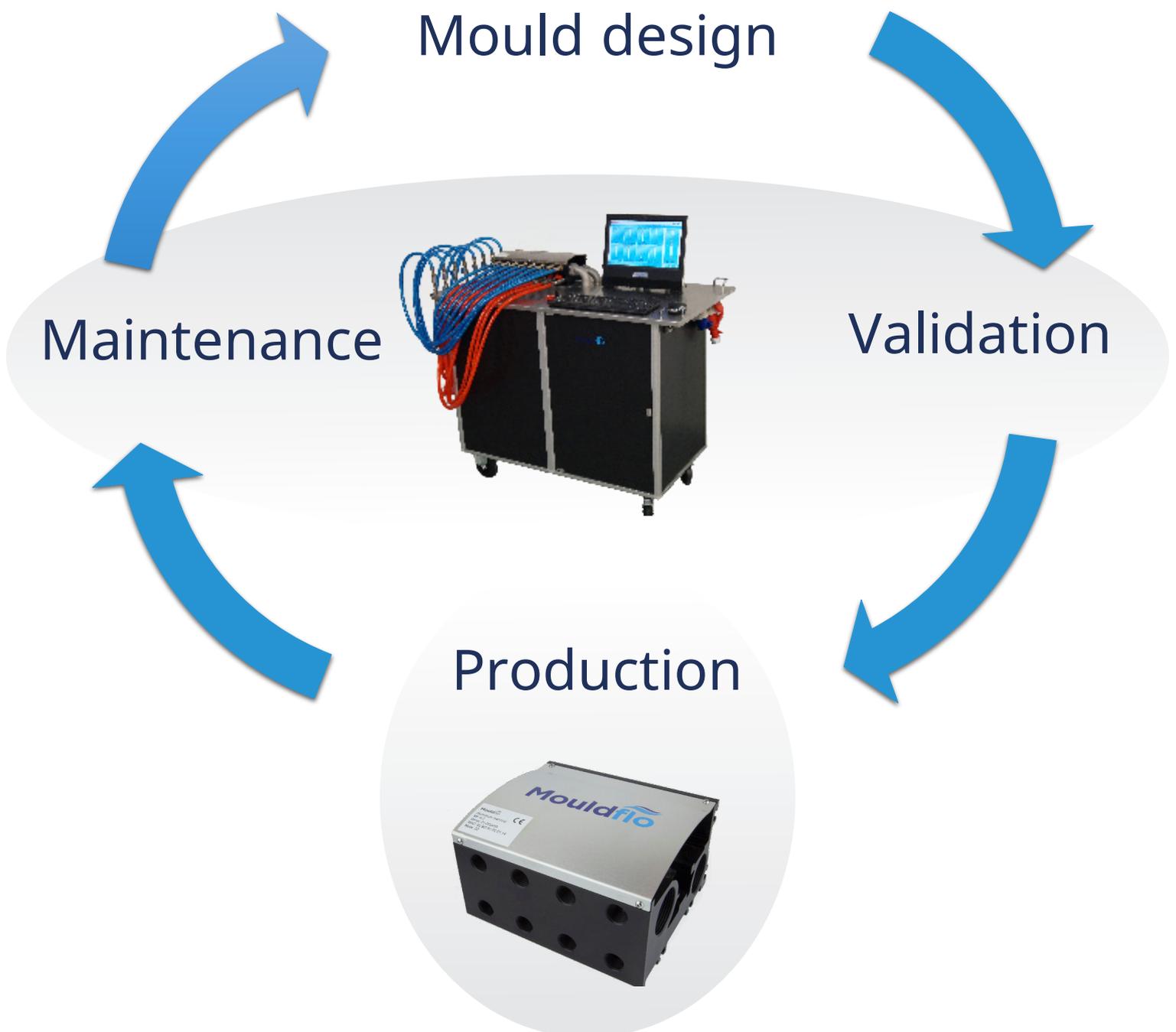
Alarm output  
Data logging  
History tracking

# Improve

Energy savings  
Reduce cycle time  
Reduce scrap  
Increase productivity  
Full documentation



Validate & maintain your mould



## Flow Monitoring System



Mouldflo offers an affordable manifold solution for monitoring flow and temperature of cooling circuits within a mould

### Problem

Often overlooked by many moulders, the efficiency of the mould cooling circuit(s) are critical to a stable process and the manufacturing of high quality parts.

Traditionally the most common method has been water flow regulators. Although cost effective flow regulators suffer from a number of inherent problems:

- Bulky / delicate – have to be mounted away from the mould

- Long pipe runs – reduced flow
- Flow restrictions
- Broken sight glasses
- Do not give a true reading of flow
- Sight glasses unreadable due to oxidation
- High levels of maintenance

### Solution

The Mouldflo system will digitally monitor all of the flow circuits within the mould recording both flow and temperature, for every circuit.

Mouldflo can protect your mould and

improve quality by quickly identifying cooling problems and alerting the user to various common cooling circuit problems, such as:

- No water flow from the mould heater
- Blocked waterways
- Scale / rust build up
- Incorrect piping

## System Overview



Touch Panel or VNC

### Touch Panel or VNC

The Touch panel is industrial style and is equipped with VESA standard mounts.

Connect the Mouldflo 15" Capacitive sensing touch panel and experience a quick response and trouble free user interface.



MF-Server Network ready

### Server

The Server is a compact computer with Mouldflo software installed. The compact design makes the unit fit directly inside the electrical cabinet on the injection moulding machine.

The integrated VNC (virtual network computing) feature allows easy integration on the machine control, laptop or tablet via Ethernet cable or WiFi router.



MF10 interface (Connects up to 8 manifolds)

### Interface module

The Mouldflo system is equipped with a DIN-Rail mounted interface module – this is the hub of the system and allows the manifolds to be easily connected to external devices.



Alu manifold



Stainless steel manifold

### The Manifolds

Read about the manifolds on page 12

## Software Interface



### Touch screen

Using a remote mounted touch screen the system will monitor and display the flow and temperature for every circuit. The information can be displayed in either a graphical or text format. The data is stored in the internal memory, time and date stamped for ultimate traceability.

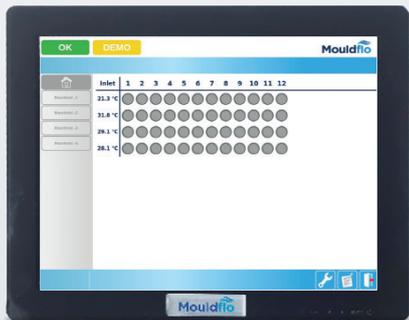
### Export of data

The data can also be displayed in a graphical format in order that the operator can spot any trend in deteriorating performance for any particular flow circuit. The data can be read over an ethernet connection or downloaded onto a USB stick.

### Warnings and alarms

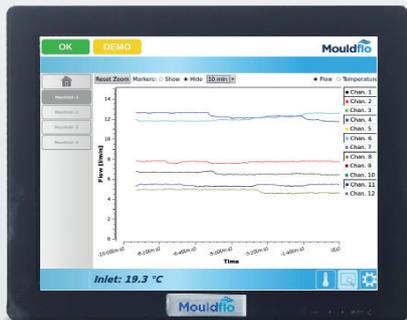
Warning and alarm limits can be set for flow and temperature to all monitored zones individually. Should a zone deviate from those settings, then both an onscreen warning and a potential free alarm signal can be fed directly to an ancillary device – such as an alarm tower, hot runner controller or the injection moulding machine to warn that the flow has deviated outside of tolerance.

The system is capable of storing multiple mould set-ups on the internal memory which can be quickly loaded when a mould is changed with all the correct set-points for any given mould.



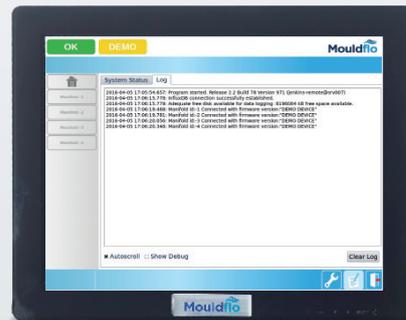
### Simple overview

Get an immediate overview of cooling circuit status 'at a glance' on a single screen with instant display status alarms should the flow / temperature go outside of tolerance



### Historical data

A performance log for each circuit and manifold is stored on the internal memory allowing the user to track the performance and easily identify problems



### Event log

Alarm errors, warnings and operator changes are all stored with a time and date stamp and can be reviewed at any time

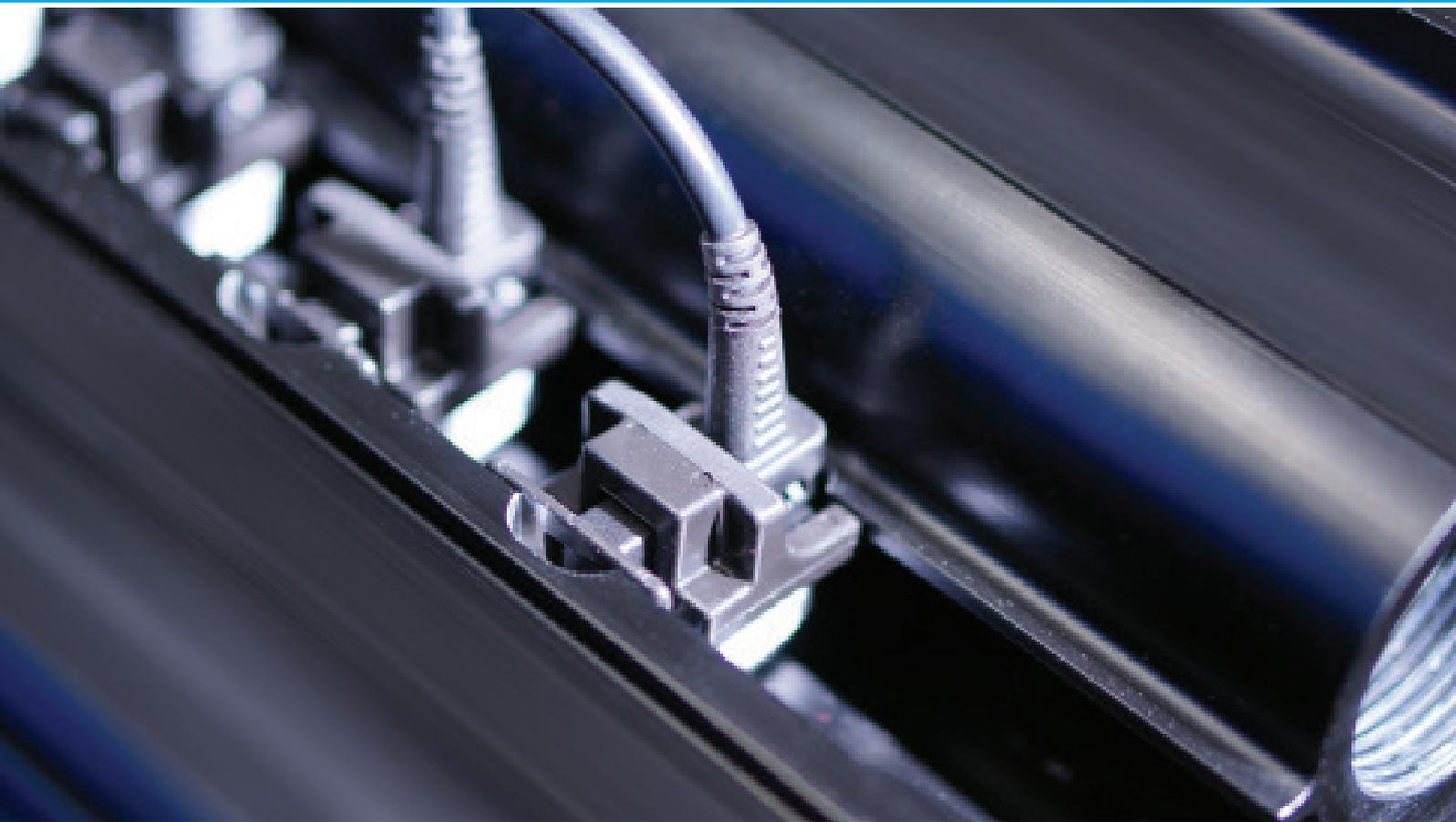


### VNC Ready

The Flow Monitoring System can be connected to a smartphone or laptop using a VNC protocol.

This will allow you to monitor the flow/temperature from any location directly from your device.

## Hardware



### Sensors

Each manifold is equipped with compact sensors that are capable of reading both flow and temperature. The sensor is based upon the vortex flow measurement principle which uses a bluff body in the middle of the flow path to create small eddy currents (vortices). The pressure of this current is measured to determine the flow through a given cross sectional area.

The sensors have no moving parts; this, combined with a large flow path, makes it ideally suited to mould cooling - even when using heavily contaminated water. The sensors are integrated directly into the manifold keeping size to an absolute minimum.

### Interface module

The interface module facilitates true 'plug and play', allowing multiple manifolds to be monitored and also enables convenient and simple connection to the touch screen, power supply, alarm signals in/out and machine communications. The module is equipped with USB and ethernet.

The data generated by the system can be fed into production monitoring systems or other ancillary devices such as hot runner controllers or the moulding machine control system using the onboard communication ports.

## Pressure Sensors



### Optional Pressure Sensors

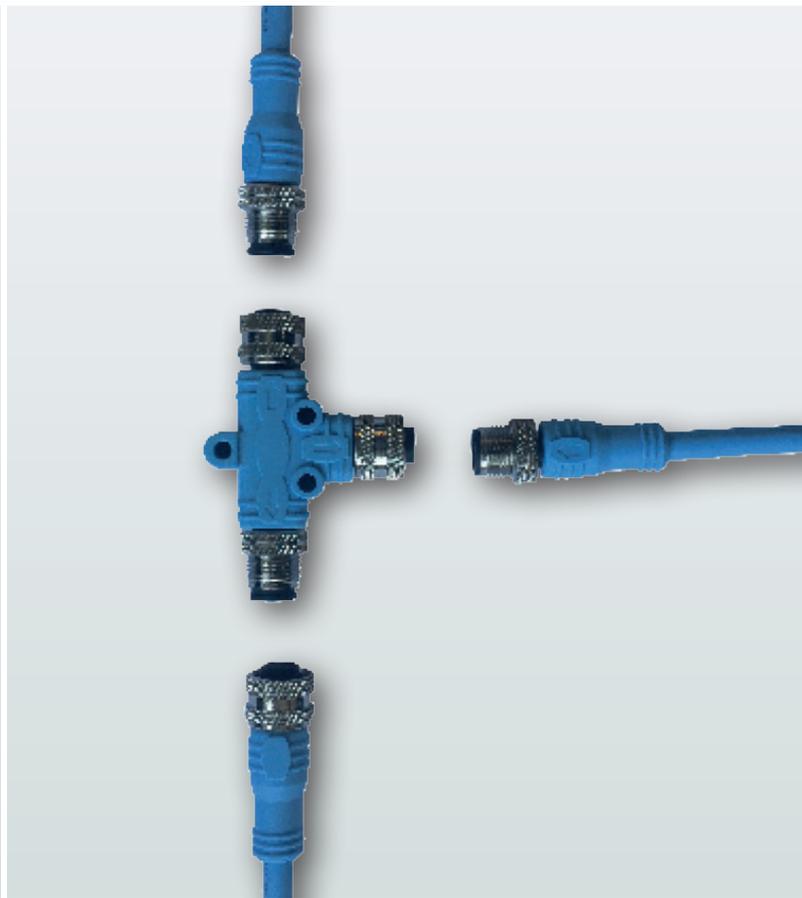
The correct pressure is critical in all flow circuits and with pressure sensors installed in the Manifolds you will monitor both the inlet and outlet pressure.

This feature allows the user to ensure that there is sufficient flow capacity and also identifies and deviation in the water supply.

The difference between inlet and outlet pressure illustrates the total pressure loss through the mould which is often caused by incorrect dimensioning of fittings and hoses.

The pressure sensors completes the installation and will ensure full knowledge of your flow circuit and guarantee trouble free function and high productivity.

## Cables and Connectors



### M12 connectors and cables

Mouldflo manifolds and the interfaces are equipped with M12 connectors.

Multiple manifolds can easily be daisy chained and connected to the interface. This will ensure perfect connections and trouble free operation.

## Manifolds

Aluminium manifold



Stainless steel manifold



### Smart design

The slimline and compact design is developed to enable the manifold to be mounted into the smallest space possible.

The manifold has flow and return ports on both the top and bottom of the manifold. This allows maximum flexibility when connecting to the water supply and means that the same manifold can be used on both the fixed and moving half of the moulding machine. The manifold is available with 4, 8 or 12 ports as standard.

Multiple manifolds can be electronically 'daisy chained' together to accommodate the necessary number of flow channels. The system will automatically identify 'new' manifolds and display them on the screen meaning that the system can be expanded in the future.

### Aluminium

Constructed from custom extruded aluminium, the manifold is black anodised to resist corrosion. The extrusion has been designed to accommodate a linear flow path for each of the flow sensors, which is very important for accurate measurement.

The manifold is also available in short pitch version, where the distance between channels is shortened to 35mm (default is 50mm). Both regular and short pitch are available in High Temperature (up to 120° C).

### Stainless Steel

The Stainless steel manifolds are the preferred choice for cleanroom or medical applications.

The Stainless steel manifold is equipped with 1" feed ports and 3/8" circuit ports. It is available in High Temperature (up to 120° C).



### Manifold Aluminium

Manifold feed	1-1/2" BSP
Manifold ports	1/2" BSP
Number of ports	4/8/12 Standard
Sensor type	Vortex
Range (Flow)	1-15 litres/min or 2-40 litres/min
Power supply	12 VDC
Manifold connection	Hasco / DME / Staubli® (optional)
Operating temperature (max)	Standard: 0 - 100°C / High Temp: 0-120 °C
Operating pressure (max)	10 bar
Temperature sensing	Per circuit (return)
Flow sensing	Per circuit (return)
Temperature sensor - main inlet	Yes
Accuracy (Flow)	1.5% fs
Accuracy (Temperature)	+/- 1.5% fs
Resolution (Temperature)	0.5°C

### Manifold Stainless Steel

Manifold feed	1" BSP / NPT
Manifold ports	3/8" BSP or 1/2" BSPT / NPT
Number of ports	4/8/12 Standard (other sizes on request)
Sensor type	Vortex
Range (Flow)	1-20 litres/min or 2-40 litres/min
Power supply	12 VDC
Manifold connection	Hasco / DME / Staubli® (optional)
Operating temperature (max)	Standard: 0 - 95°C. / HiTemp: 0-120 °C
Operating pressure (max)	10 bar
Temperature sensing	Per circuit (return)
Flow sensing	Per circuit (return)
Temperature sensor - main inlet	Yes
Accuracy (Flow)	1.5% fs
Accuracy (Temperature)	+/- 1.5% fs
Resolution (Temperature)	0.5°C

### Dimensions

Depth	Height
180 mm	124 mm

### Dimensions

Depth	Height
160 mm	115 mm

### No. of ports Total length (A) Ports

4	225 mm	1/2" BSPP female
8	425 mm	1/2" BSPP female
12	625 mm	1/2" BSPP female
4 (Short pitch)	195 mm	1/2" BSPP female
8 (Short pitch)	320 mm	1/2" BSPP female
12 (Short pitch)	460 mm	1/2" BSPP female

### No. of ports Total length (A) Port size 1-20 l/m Port size 2-40 l/m

4	220 mm	3/8" BSPP female	1/2" BSPT male
8	420 mm	3/8" BSPP female	1/2" BSPT male
12	620 mm	3/8" BSPP female	1/2" BSPT male

## Mould Maintenance - the Test-rig

Moulds must be maintained regularly to remove scale and rust and ensure maximum productivity



### Scale build-up

Mould cooling circuits are exposed to scale build up, which will reduce flow capacity dramatically and also act as an insulator causing moulding problems due to increasing temperatures.

Eventually the cooling channels will block and stop production.

### Flow, temperature and pressure test

With the Test-rig, the cooling channels can be analysed and tested.

The flow and pressure can be controlled exactly to simulate the production setup.

All details displayed on the screen:

- Flow
- Pressure Inlet
- Pressure Outlet

### Integrated Pump

The internal dynamic pump will give a calibrated flow and pressure, fully defined and controlled on the touch screen.

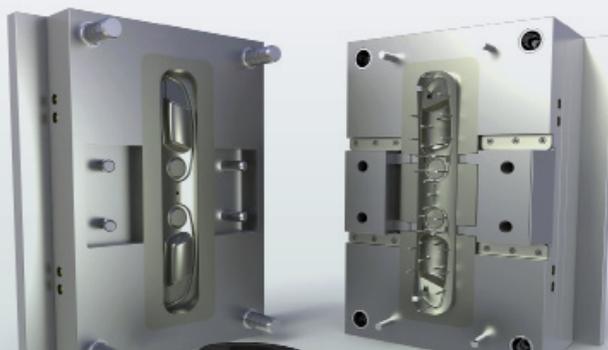
Dynamic testing of:

- Flow volume
- Back pressure/ pump pressure
- Leaks



## Cooling Channel Optimization

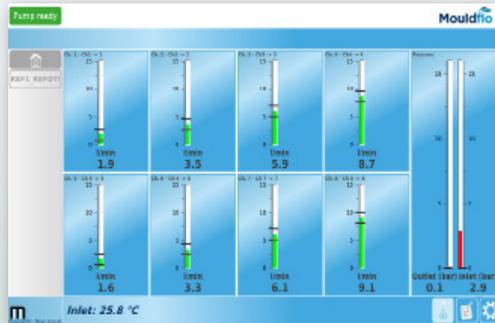
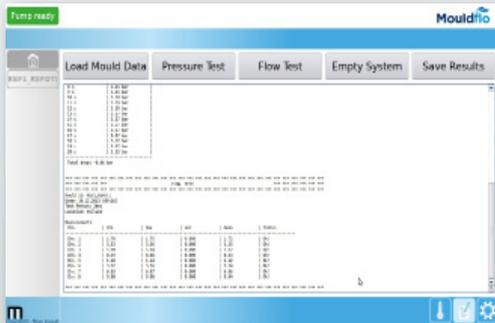
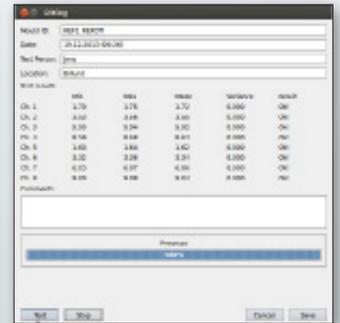
Mouldflo offers you a unique way to configure and benchmark cooling circuits within the mould



Mouldmakers must often supply new moulds to the customer complete with a report of operating parameters, which should include data relating to the cooling circuits in the mould. Now you can easily connect the Test-rig to the mould as part of the benchmarking process



## Validate your mould

Zone	Flow	Pressure	Temperature	Status
Ch. 1	2.70	2.78	3.70	OK
Ch. 2	3.30	3.38	3.30	OK
Ch. 3	3.30	3.34	3.30	OK
Ch. 4	3.30	3.38	3.30	OK
Ch. 5	3.30	3.38	3.30	OK
Ch. 6	3.30	3.38	3.30	OK
Ch. 7	3.30	3.38	3.30	OK
Ch. 8	3.30	3.38	3.30	OK

By using the Test-rig you are able to generate a full report with printed documentation validating all of the flow and pressure characteristics within the mould.

Following data can be recorded:

- Flow volume/capacity
- Pressure loss through the Mould
- Pressure Leak Test

### Drain the mould in seconds

After testing and validating the mould, a convenient feature allows you to air purge the water out of all channels, simply by pushing the "empty system" function.

The unit is equipped with the high quality controllable pump. All parts are carefully selected to meet the highest standards of quality and performance.

The unit can be equipped with water change function, to ensure clean water at all times.

## Technical specifications

### Control

Display	15" touch screen
Control	Microprocessor based / computer based
Communication ports	Ethernet / USB
Storage (log and settings)	Internal (optional) / USB (optional)
Number of zones (flow and temperature)	8 Zones
Display units (flow)	Litres / gallons switchable
Display units (temperature)	°C / °F switchable
Warning limits	10% of alarm limits (optional)

### Pump and Tank

Pump Capacity	Up to 160 l/m
Pump Pressure	0-4 Bar
Power supply	380V., 50Hz, 2500W
Tank Capacity	60 l.

### Flow sensor

Sensor type	Vortex
Range (Flow)	1-15 litres/min or 2-40 litres/min
Accuracy (Flow)	1.5% fs
Accuracy (Temperature)	+/- 1.5% fs
Response time	< 1 s
Resolution (Temperature)	0.5°C



## Headquarters

Mouldflo A/S

Dynamovej 11, 2. tv.

DK-2860 Søborg

Denmark

e-mail: [sales@mouldflo.com](mailto:sales@mouldflo.com)

tel.: (+45) 40 20 77 22

CVR: 36459344

[www.mouldflo.com](http://www.mouldflo.com)



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# Mouldflo

Dynamovej 11, 2. tv. · DK-2860 Søborg · Denmark  
Phone: +45 4020 7722 · E-mail: [sales@mouldflo.com](mailto:sales@mouldflo.com)

[www.mouldflo.com](http://www.mouldflo.com)