

Smart injection moulding pressure sensor

Ultimate
technical guide





Smart injection moulding

Knowledge of what is happening inside the cavity makes all the difference

IMPS is an injection-moulding pressure sensor, which is installed directly in the tool **cavity**. With real-time pressure data, it can control the moulding process through various interconnected devices (IoT). Hidria's sensors will not only improve your moulding process, they will also save you money. There are many reasons for implementing Hidria's pressure sensors—the most important ones are described on the following page.

Why is Hidria IMPS the perfect choice



■ Industry 4.0 ready

IMPS can interact with other devices in the network. Together, they can create a smart industrial environment.



■ Automated control

Real-time cavity pressure data is monitored during every cycle. When the measured pressure is not in the desired tolerance, the IMPS will send a signal to the machine's control system. It will automatically adjust the holding pressure to bring the quality of the product to the desired point (under development).



■ 100 % quality control

There is a correlation between the pressure in the cavity and the quality of the product. By making sure the pressure in the cavity is right, you also know that the quality of the product is spot-on.



■ Cost savings

Hidria's sensor will pay for itself. Just by reducing scrap and setup times alone, the sensor will amortise itself in less than 18 months (*), not to mention the time and costs you will save avoiding quality complaints.

Affordable for all users

The investment is affordable for users all around the globe.



■ Simple & durable

Your satisfaction means everything. The goal was to provide a robust user-friendly tool and the goal has been accomplished. Both installation and use are very simple. You can find a step-by-step installation guide in this leaflet.

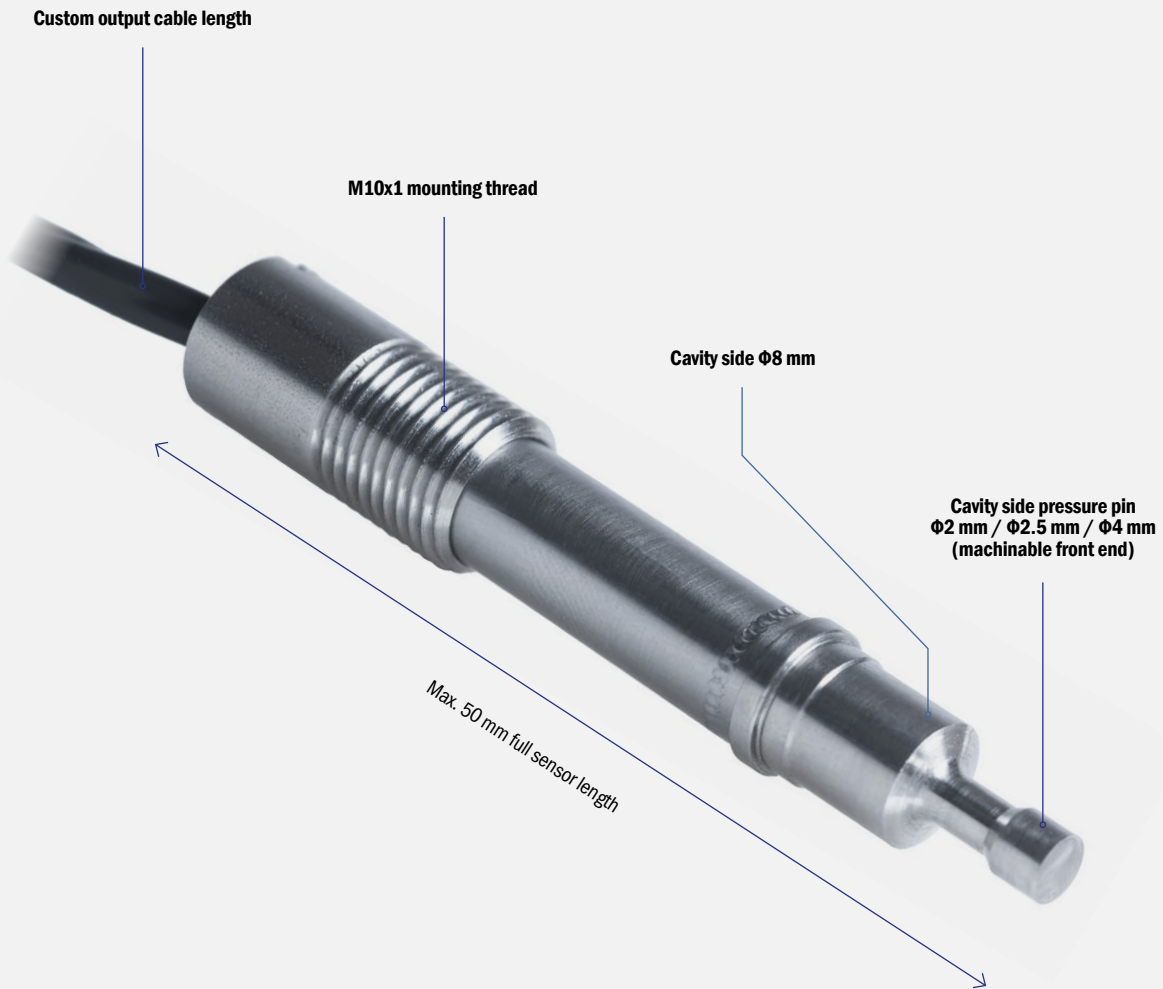


■ Tough voltage cable

The cable provides a robust solution, suitable for industrial environments. In the unlikely event that the cable is damaged, you should be able to solder the cable back together and continue with your work in no time at all.

Design & specifications

The sensing unit assembly contains a variety of elements. Here is the basic scheme of the IMPS.



■ Basic specifications of the sensing unit:

Feature	Value
Operating pressure range	0 bar ... 2000 bar
Over-pressure	2500 bar
Max. melt temperature	450 °C
Max. mould temperature	0 °C ... 150 °C
Storage temperature range	-40 °C ... 100 °C
Total accuracy	< ± 1 % Full Scale (FS) *

The signal accuracy tolerance is guaranteed for the following conditions:

Pressure pin diameter	Max. signal duration for error < ±1 % FS
Φ4.0 mm	50 s
Φ2.5 mm	20 s
Φ2.0 mm	10 s

Step-by-step guide for installation

Following the step-by-step instructions, you should have no trouble installing the sensor into the tool. However, basic workshop knowledge and experience are recommended. Let's take a look!

■ Step #1 – Tool preparation

First, you need to prepare the tool. The mounting dimensions are shown below. You can choose between three different tip sizes: $\varnothing 2$ mm, $\varnothing 2.5$ mm and $\varnothing 4$ mm. Making the tool with the right tolerances (shown on the drawings) is very important for the performance of the sensor. The most crucial dimensions are the following:

- Centering area – $\varnothing 7.8H6$: the most important dimension. Under no circumstances should you make centering elsewhere.
- $\varnothing X$: choose the right tip dimension and make sure to make the borehole with the right tolerance. There should be a minimal

gap between the sensor tip and the borehole. The gap should not be too small (no contact) or too large (the resin could leave the cavity and damage the sensor).

- The distance between the perpendicular sit and the cavity – 17.5 mm: if this dimension is not correct, the tip of sensor will either extend too far or not enough into the cavity. The tip should be flush with the cavity wall.
- Thread: the length of the thread is very important. If the thread is too short, it is possible that the nut will not push the sensor into its end position. On the other hand, if the thread is too long it could create problems with the perpendicular sit of the sensor.

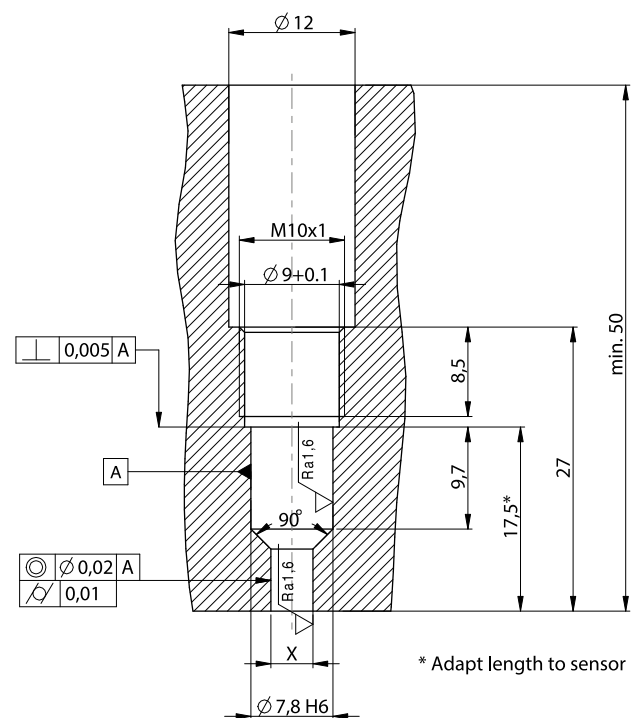
Tip dimension x [mm]	Tolerance
$\varnothing 2.0$	F7
$\varnothing 2.5$	F7
$\varnothing 4.0$	H7

We suggest the following step-by-step process when making the borehole.

Step	Process	Technology
Step 1	$\varnothing 2$ from the bottom side (at least 8 mm)	Drilling
Step 2	$\varnothing 9+0,1$ from the top side (until 17,5 mm from the bottom end)	Milling
Step 3	$\varnothing 6,8$ from the top side (until 7,8 mm from the bottom end)	Drilling
Step 4	$\varnothing 12$ from the top side (until 27 mm from the bottom end)	Milling
Step 5	Thread M10x1	
Step 6	$\varnothing 7,8H6$	Sink eroding
Step 7	$\varnothing XF7/H7$	Wire cutting

Any other steps and technologies may be used, as long as the required dimensions are met.

Mounting with a nut



Pay attention:

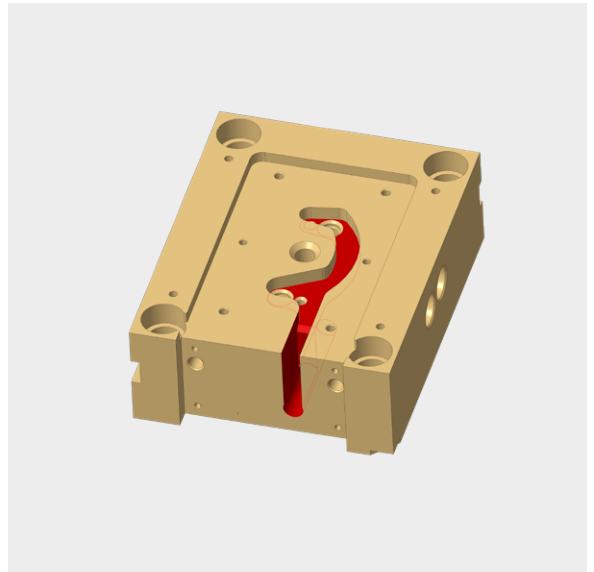
please follow the suggested tolerances. Any deviations may cause problems when installing the sensors in the tool.

■ Step #2 – Make space for cables

Now, you need to think about the cables and connector. Cables need to go out from the tool on the same side as the connector will be installed.

The diameter of the cable is 3.3 mm. Consider additional space for multi-cavity tools, hence more cables. Suggestions for groove dimensions are described in the table below.

Number of sensors	Groove depth [mm]	Groove width [mm]
1	5	5
2	5	10
4	10	10
8	15	15

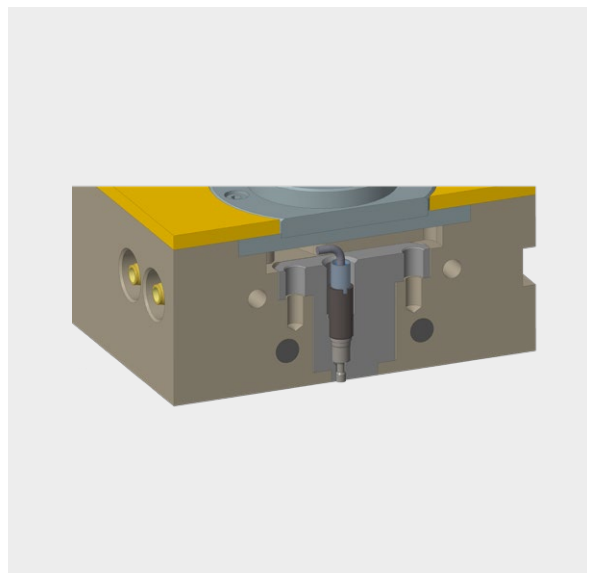


■ Step #3 – Sensor installation

Insert the sensor into the borehole.

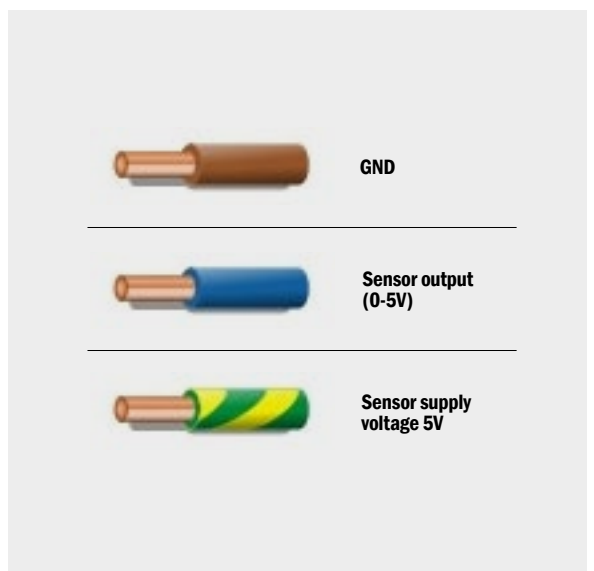
Tighten the nut with torque 3 Nm.

Congratulations, you're almost done! Just a little more effort to put in – connect everything in one system.



■ Step #4 – Connecting sensors with DAQ

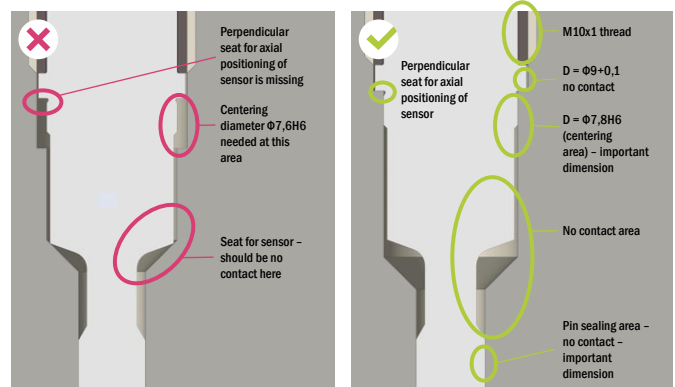
Each IMPS needs to be connected at the right place. Please follow the scheme below and connect the cables to the DAQ. It does not matter where you start, as long as you make sure all the wires are in the right place.



Troubleshooting

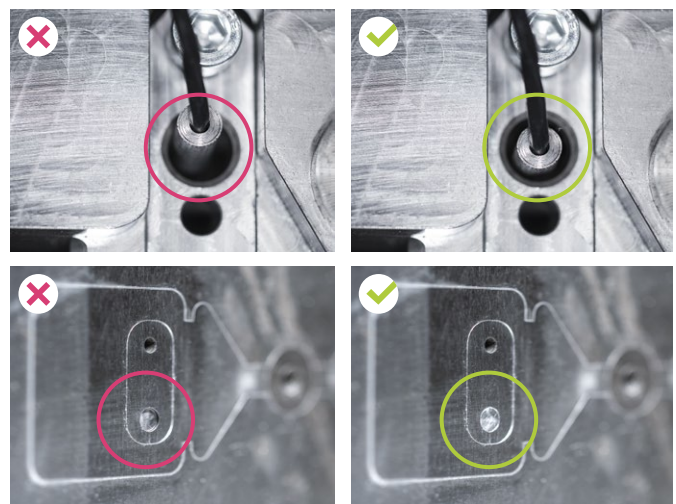
#1 Borehole not as per drawing

The step of preparing the borehole is probably the most important one. Some dimensions are crucial for correct installation of the sensor, which is the first condition that should be met for the sensor to perform in the best possible way. Please note the differences between the left and right picture.



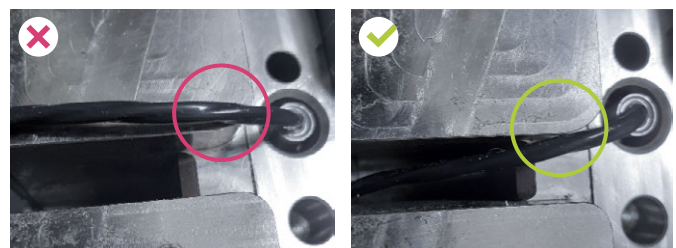
#2 Handling with the sensor

The sensor needs to be correctly fitted into the borehole. It should be concentric with the borehole axis and pushed all the way down so that the sensor tip is flush with the plate.



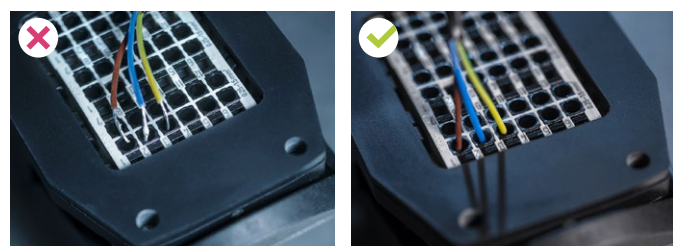
#3 Wire damage

Pay attention when fitting the top plate onto the tool. The plate could damage the cable if not fitted correctly into the groove. You can help yourself by using self-adhesive tape to fix the cable while the plate is being installed. Do not forget to remove the tape once the tool is ready.



#4 Wire issue

Take your time when inserting the wires into the DAQ. Make sure all the wires are fitted tightly. Please check that the complete stripped part of the wire is placed into the connector.





Hidria

Hidria, d. o. o.
BU Hidria Advancetec
Poljubinj 89a
5220 Tolmin
Slovenia
T: +386 5 382 10 00
E: sales.aet@hidria.com
www.hidria.com