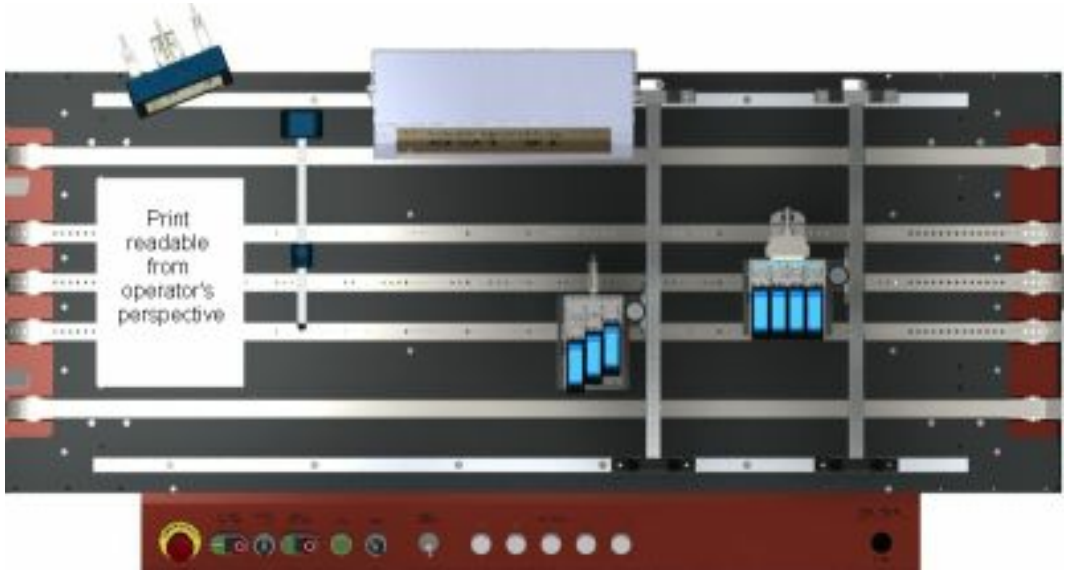


CB Quickstart Manual

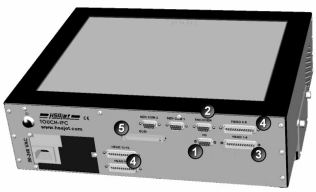
From installation to production ready with CB Board

0.5

Table of Contents

1 Your Print System

You print system consists of the following parts:

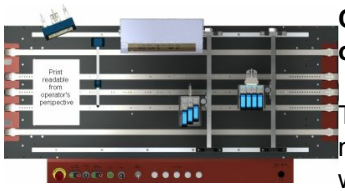


Print controller (PC)

Can be a complete Touch IPC as indicated here, or a PC with one or more controller boards installed.

1: I/O connects to the product sensor
2: ENC connects to encoder
3: HEAD1 connects to first pen. Do not use if SCSI connector is in use (5).
4: Additional output connectors is for remaining pens.
5: SCSI connector is for 3pen or 4pen heads.

The PC must be using INKdraw version 1.9.x or newer.



Conveyor with one or more print heads, photo sensor and optionally encoder

The conveyor may be for documents as here, with print heads mounted on a horizontal surface, or a conveyor for products / boxes with print heads mounted on a vertical /horizontal surface.

Assumptions

The following is assumed in this manual
- You have correctly connected your print heads to the controller
- You have verified that your product sensor and encoder (if connected) are working as expected
- You have purged print print heads to make sure communication works.

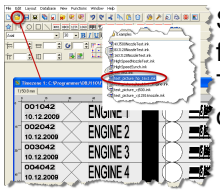
Goal of this manual

The goal of this manual is to prepare your system for production. This means that:
- You have selected a test job and printed it, to verify function of your print head(s)
- Distances between sensor, print head(s) and offsets have been correctly set
- Speed setting is correct

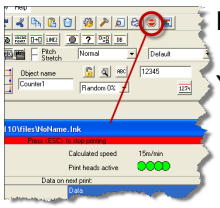
2 First print test

Create a test print with these simple steps.

> Do not worry about creating a correct print with rotation, size, offset etc. You will learn to do this in the following sections.



Start INKdraw and open the file **test_picture_hp_16x1.ink** from the Examples folder supplied with your INKdraw installation.
This test image is made with the maximum number of pens, and will create output on all pens no matter how many controller boards you have.



Press F10 or print icon to start print mode.

You should see the green circles become bright.

Start the conveyor and pass a paper slowly under the print head(s). At the same time, manually activate the product sensor.

> You should see something being printed. If you did not see anything, check again that your sensor is working (did you activate it correctly), and that you did not remove the paper too fast.

3 Step by Step

Follow these steps carefully to get a perfect print. Each of these steps are explained in details later.

Make sure heads are mounted accurately and as close to the media as possible

Explained in Installation Manual.

Check that your sensor activates on the media

Run past manually a few times and check indicator light. See sensor manual

Take notice on where heads are connected

If needed put numbers on the heads if you have many. You can identify the numbering of controller boards the head is connected to by doing a purge on each board. See installation manual.

Determine print direction

Print direction is as seem from where you normally operate the print line.

Notice head position

Normal is with connector going down or towards you

Upside down is normal rotated 180 degrees on the surface

Other side is on the opposite side of the media (typically a box).

See how

Create message according to your head setup

Message length should be identical to your actual media (paper, box, ..)

Heads in the message should correspond to your actual type, and in order they are connected (controller board 1, head 1 first etc).

Set sensor distance

Measured in mm to first pen in first head, in print direction from sensor.

Calculate and set encoder parameter

Optional.

A perfect print relies on an accurate encoder. Calculate the encoder values and enter into the parameters.

Set head offset

Measured in mm.

Notice that normal orientation heads are measured from the back, against the print direction. Heads placed upside down are measured in the print direction.

Set pen offset

On heads with multiple pens, set the pen offset.

Notice difference between heads placed upside down and heads placed in normal position.

Fine tune offsets

Create a test pattern and fine tune until it's perfect

Set resolution required

Higher resolution for darker, more dense, but also slower print.

Lower resolution for faster print, but less density.

4 Physical setup

4.1 Head type and canvas

Start a new message in INKdraw. (File->New or the New Icon)

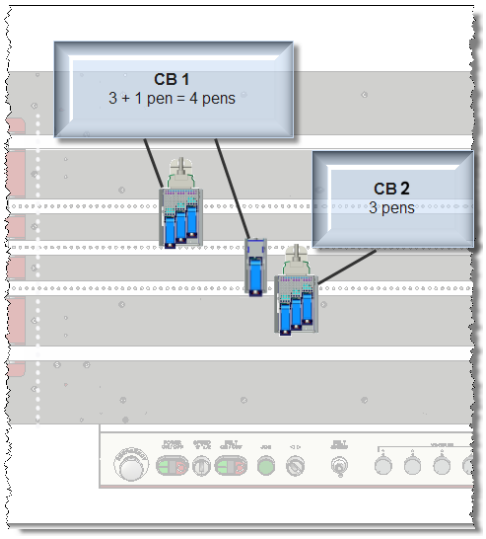
Add heads to your message **in the correct size (type)** and **in the same order** as they are physically connected. Do the boards in order if you have multiple boards.

The canvas length should be identical to the length of your media (paper, box, etc) - this will prevent you from getting unwanted print go signals from pre-printed text etc.

Then press OK.

You now have a canvas that exactly matches your physical setup.

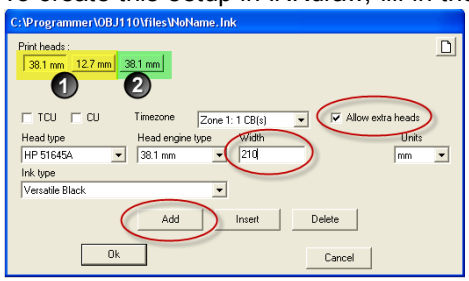
An example to illustrate:



On this conveyor, two CB boards are connected. CB 1 has a 3pen + 1pen connected, CB 2 has a 3 pen.

The media to print is standard A4 paper in portrait mode, giving a width of 210 mm.

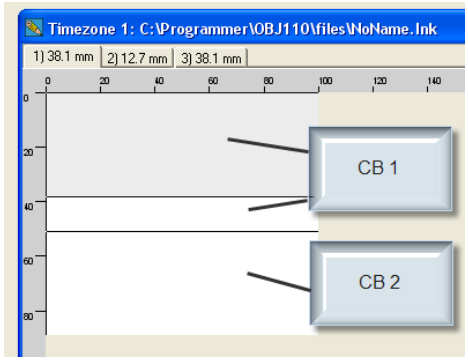
To create this setup in INKdraw, fill in the dialog for File->New as follows:



1) Width is the width of your media, and the resulting canvas. Entered in the units selected (default: mm)
2) Press Add until you have the same number of heads. You may have to select "Allow extra heads" if you design on a PC without controller boards installed.
3) Click on each head and select it's size using "Head engine type". 12,7mm is 1 pen etc.

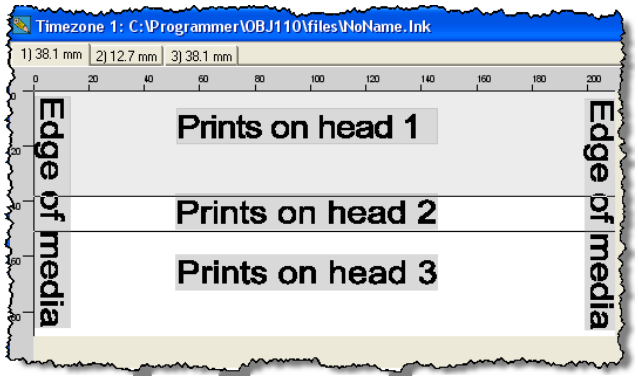
Inkdraw will try to fill as many heads as possible into each controller board, up to maximum 4. In the above example, the 3+1 pen heads marked in yellow will print on controller board 1. The last 3 pen head, marked in green, will print on controller board 2.

Your resulting canvas will look as follows - a blank area with boundary lines between each head.



Once you have this completed, save your layout as a template. When you have fine-tuned your print parameters, it will be a good base for future layouts.

As you have created the canvas the same width as your media, you should end up with a result like this:

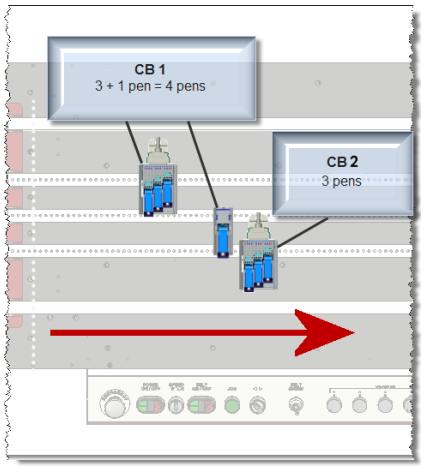


When designing your message, remember that INKdraw is not a line-based software. Objects can be placed anywhere in any rotation, and can freely cross head boundaries.

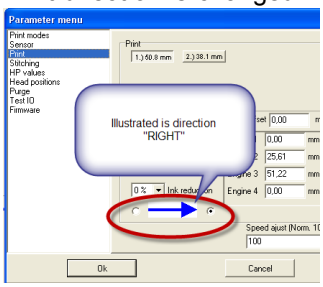
Once properly setup, all heads will start printing at the edge of the media, and finish at the other edge. It is possible, but not necessary to align heads vertically to form "one page". Alignment should be in the print direction only.

4.2 Print direction

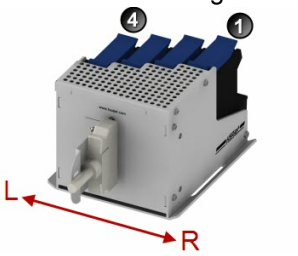
Print direction is the same as the travel direction of the medium. It is global for all heads in the message



Print direction is changed in the parameter settings.



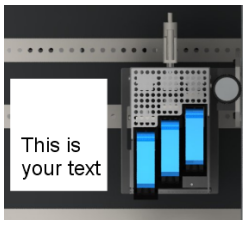
When no other settings are changed, the direction for the heads is as seen against the connector



4.3 Select head position

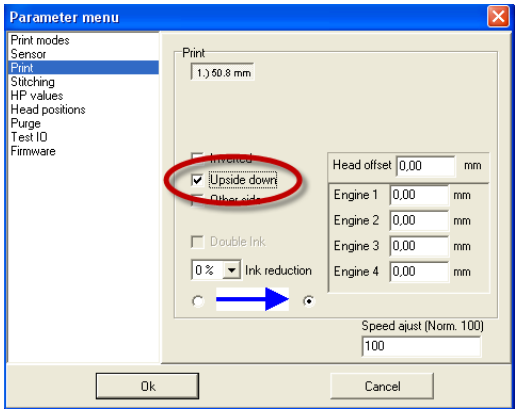
With the print direction RIGHT ==>, the following are the positions of the heads.

Normal head position.



If you want to position your head as shown below, "upside down" must be set to on.

This is typically used on horizontal surfaces, less often on vertical surfaces.

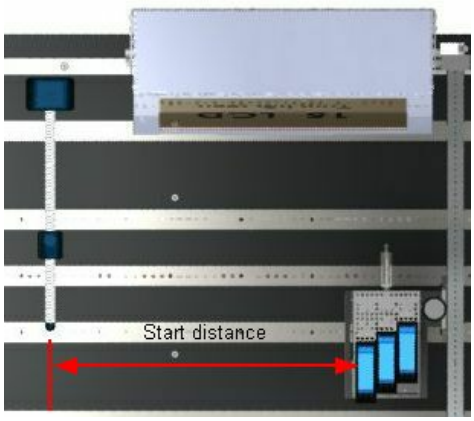


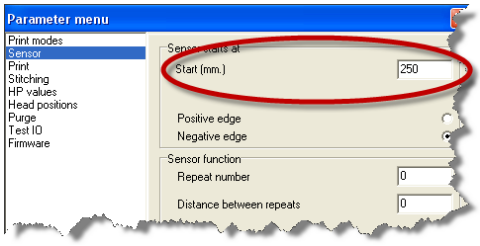
Be aware that head offset is measured from the opposite direction when a head is in "normal" position.

4.4 Start distance

Unless your sensor is vertically above the first pen in your print direction, you are required to enter a start distance.
The sensor start distance is the distance from the sensor to the first pen in the first head on first board.

Measure the distance from your sensor to the head and enter it in the parameter section under "Sensor". This distance is always entered in mm.



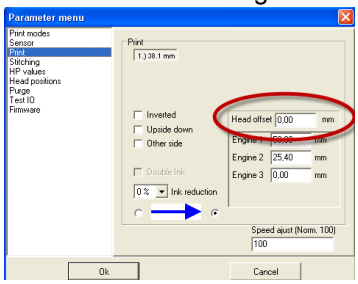


Also make sure to set the edge correctly. Set the sensor settings to positive or negative, depending on the type of sensor you are using.If printing starts when the sensor's signal goes active, the sensor edge should be set to positive. If printing starts when the sensor's signal goes inactive, the edge should be negative. If you use the standard sensor supplied with the print equipment, the sensor settings must be set to negative.

4.5 Head offset

If you have multiple heads installed on your system, you are required to adjust the offset between them if you wish to print the image as it is seen in INKdraw. In other words, when you create a vertical line in the software, it will actually print as a vertical line.

Head offsets are changed in the parameters, for each head.

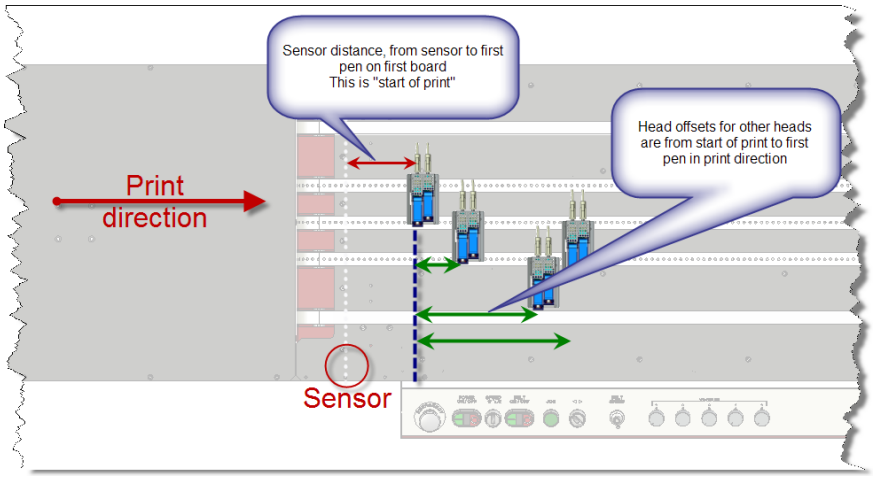


Please pay close attention to the position of the heads (upside/down or normal). The head position will change the way offsets are measured.

4.5.1 Upside Down

Heads that are upside down are measured from the first nozzle row in the first pen, in the print direction.

This is the typical situation in a conveyor operated from one side.



Start (mm) is from the sensor until the first pen in the first head.

Offsets on each head following is measured from the first pen in the first head, indicated by green

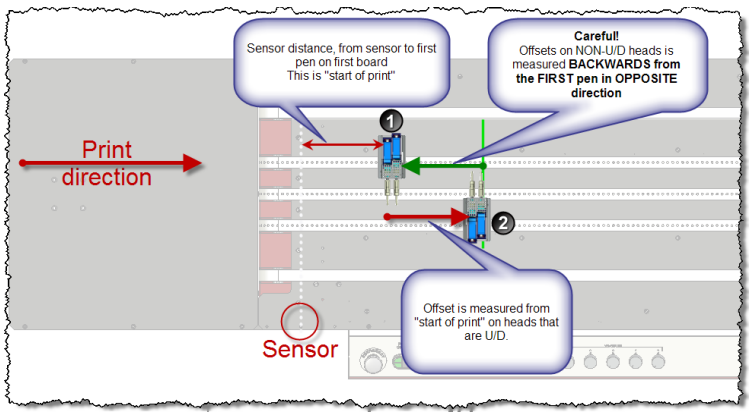
arrows.

4.5.2 Normal position

If you have heads that are placed in the "NORMAL" print direction, you need to measure BACKWARDS from the last head in your setup.

This installation is typical in installations printing on side faces of a box.

Example:



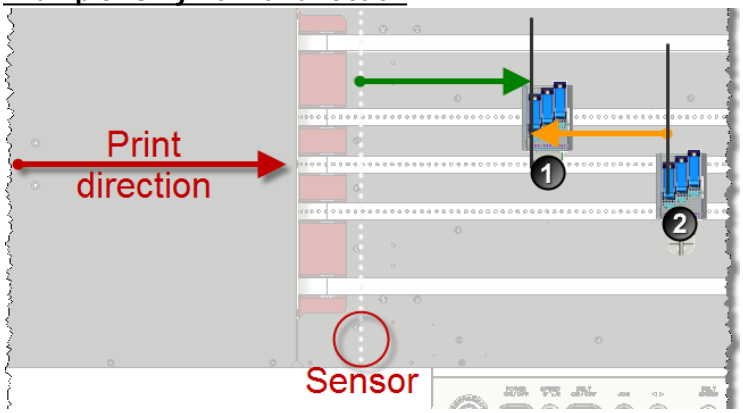
In this example, head [1] is NOT upside down, head [2] IS upside down.

Start (mm) is again as before from sensor in print direction until the first pen in the first head.

On head [2] which is upside down, the distance is as expected from first pen in head 1.

But care has to be taken with offset in Head [1]. **Offset for this, NON-upside down, head is measured from the opposite direction (backwards). From first pen backwards until the first pen in the non-u/d head. Indicated by the green arrow.**

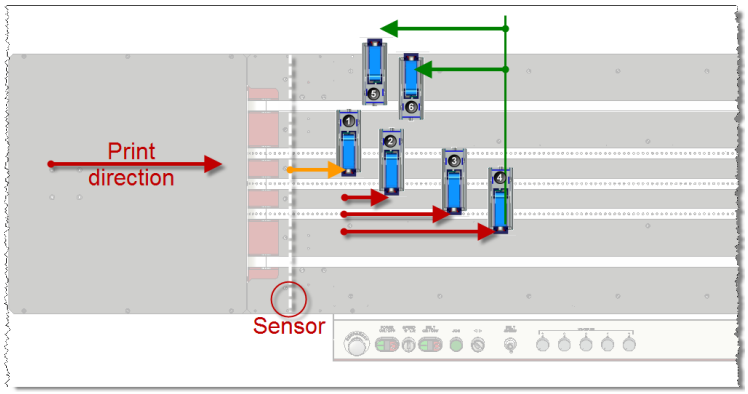
Example: Only normal direction



In this example, both 3pen heads are in "Normal" position.

The start (mm) is from sensor line to first head [1], indicated by the green arrow.
Offsets are:
Head 1: Distance from Head 2 to Head 1, indicated by the orange arrow.
Head 2: 0 offset, since this is the first head from the back.

A more complex example

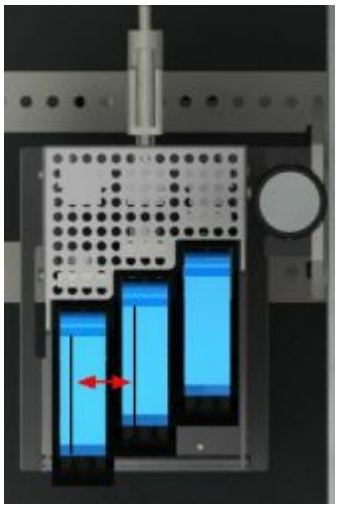


This is again a mixed situaton, only with multiple boards. Head 1..4 belong to CB1, head 5 and 6 belong to CB 2.

The heads that are upside down have head offset from head 1, pen 1, indicated by red arrows. Heads 5 and 6 are NOT upside down, and should have an offset measured from the LAST pen, indicated by green arrows.

4.6 Pen Offset

If there is more than one pen in the head, you are required to adjust the pen offset. The pen offset is the distance from the first nozzle row in the print direction to the first nozzle row on the second pen.

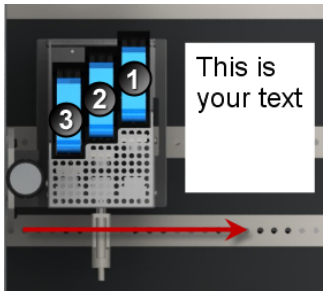


The offset distance of a pen is the distance from the first nozzle row of the first pen to the first nozzle row of the other pen.

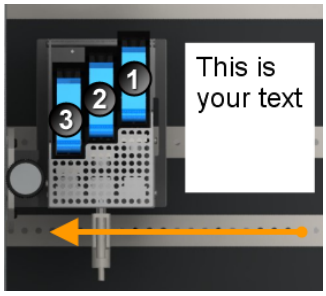
The first pen to print has a 0,00mm offset.

However the first pen to print is not always pen 1 in the parameter menu.

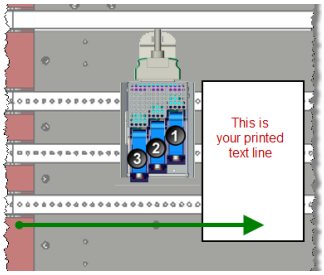
Please notice how pens are numbered in the head - where the pen furthest away from the cable is no. 1.



In this example, pen 3 is the first pen to print and consequently has an offset of 0,00 mm

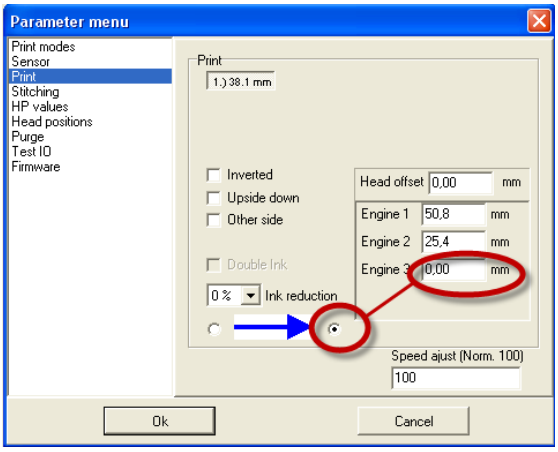


But if you change the print direction the first pen to print will be pen 1.



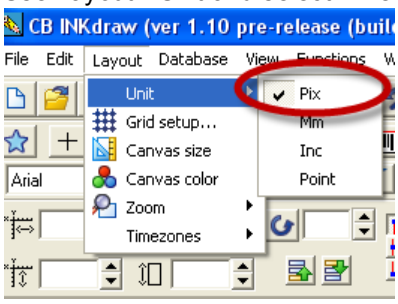
Notice - if you have your head in Upside/Down position, the numbering will change!

To change pen offset for each head use the parameter menu. The example below illustrates print direction RIGHT (red arrow above), where pen 3 has an offset of 0.

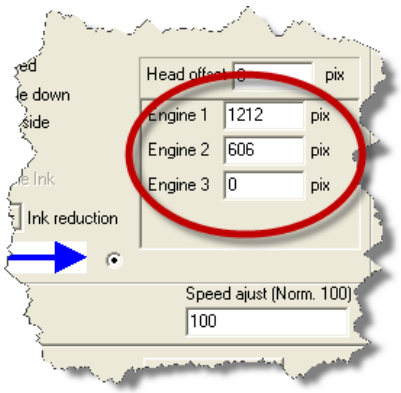


When you enter the pen offset, it is important to be very accurate. Even the slightest difference can have major impact on the print quality. **It is recommended to enter the pen offset in px (Pixel) to avoid rounding errors.**

Use Layout->Unit and select Pixel.



When you now use the parameter menu, offsets are in Pixel.



Change back to mm when you enter head offset.

The default settings are:

1st pen	0 px	0 mm
2nd pen	606 px	25,4 mm
3rd pen	1212 px	50,8 mm
4th pen	1818 px	76,2 mm

Do this for all heads with multiple pens in your installation.

5 Other settings

5.1 Speed measurement

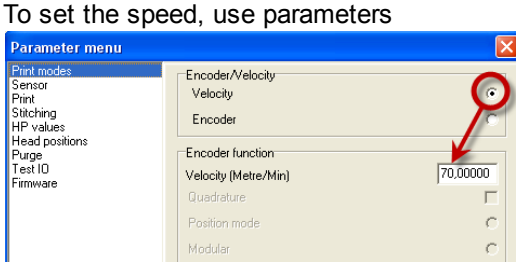
Fixed speed

Fixed speed, also known as **velocity mode** is the simplest way to measure the product movement speed.

It relies on an internal clock from the software, on which the dots are placed.

It is vital that your real (physical) speed corresponds to the internally set speed. If not, you will either get a compressed or a stretched printout, and your offsets will not be correct.

To set the speed, use parameters



Velocity is always set in metre / minute.

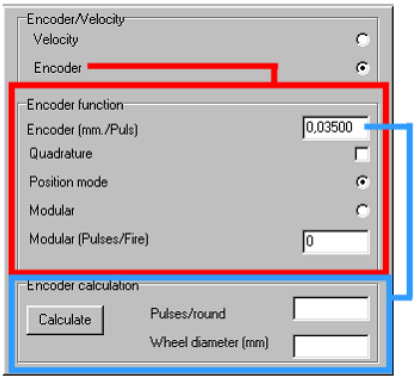
To convert, please use:

From feet/minute:	1 foot/minute = 0,3048 m/minute
From feet/second:	1 foot/second = 18,28800 m/minute
From inch/second:	1 inch/second = 1,52400 m/minute
From cm/second:	1 cm/second = 0,6 m/minute
From mm/second:	1 mm/second = 0,06 m/minute

The maximum allowed velocity depends on your selected resolution. You can't set the velocity higher than the resolution allows.

Encoder

Encoders are used to accurately measure the speed in real time. It is strongly recommended to use an encoder if you wish to have an accurate printout.



Enter the encoder value.

To calculate the encoder value, enter pulses/round, enter diameter and click "calculate"

There are two encoder modes:

Position mode
A pulse will be transmitted every time the wheel has traveled a certain distance. This is the typical mode.
Notice that the distance entered should be 0,01 or less for best results.

Modular mode
The calculation of the drop placement is based on the number of signals from the encoder. Requires a distance between signals that is modular to the dot distance in the print head.

Quadrature
Select quadrature, if your encoder transmits 2 pulses spaced 90 degrees apart. If you select this, divide the distance / pulse by 4.

To calculate the encoder value for a hollow shaft encoder, you need to know the circumference of the wheel and the number of pulses transmitted in on revolution.
Please refer to the documentation from your encoder supplier. If you use a shaft encoder, you need to know the belt pulley diameter.

Example, hollow shaft encoder

In the following example the encoder transmits 5000 pulses in one revolution. The wheel has a diameter of 64mm.

Circumference = Pi * Diameter=64mm*3,14 = 200,96mm

The encoder value is 200,96 / 5000= 0,04192.

If quadrature is set to on, the encoder value must be divided by 4, so the encoder value will be 0,01

Example, shaft encoder

In the following example the encoder transmit 5000 pulses in one revolution. The belt pulley has a diameter of 300mm.To this, add the thickness of the belt (assumed 2 mm here)

Circumference = Pi * Diameter=3,14 * 302 = 948,28 mm

The encoder value is 942 / 5000= 0,1896.

If quadrature is set to on, the encoder value must be divided by 4, so the encoder value will be 0,0474

Tip:
In either mode, velocity or encoder, you can test your speed setting by making a layout with 2 vertical lines at a known distance, example: 10 cm apart.
If your speed setting is correct, the distance between the lines will be the same during print.

Is the distance longer in the printout then your actual speed is faster.
Is the distance shorter then your actual speed is slower.

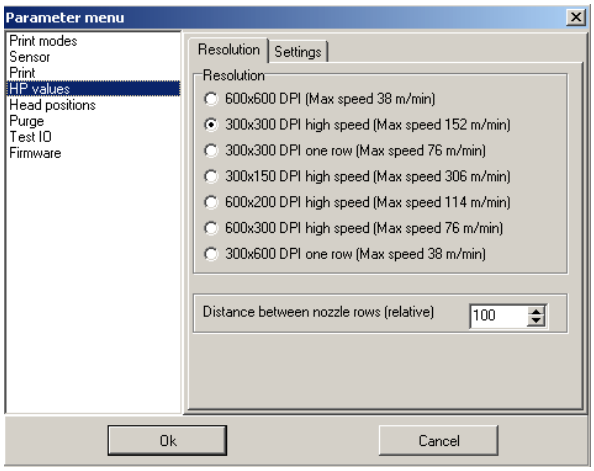
Divide the known distance by the measured distance (from the printout), and change the speed setting (or encoder setting) by this factor.

5.2 Select resolution

The resolution is the number of dots placed per distance. The more dots, the better ("sharper") the printout will appear - but as the print head has a maximum frequency, more dots per distance means slower maximum speed.

HP pens each have two rows of dots. You can use one or both when you print. If you use two rows (600 DPI or high speed), it is required to use an encoder to get a perfect print.

Resolution is changed in Parameters under "HP Values". The maximum speed is indicated next to the resolution.



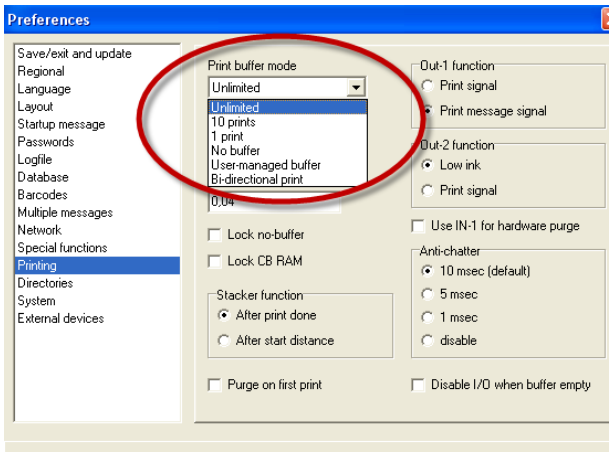
5.3 Select buffer mode

The buffer is a location in the controller memory that holds data waiting to be printed when printing of other data is in progress.

The more print data (number of prints) you allow in the buffer, the better will your performance be. However, as INKdraw fills the memory as much as it's allowed to do, you may risk that especially clock variables are out of date on very slow printing systems (example: when you return from lunch, the clock will still be as before lunch).

Turn buffer mode off if instant printing is required. Typically this is (only) needed if you want to print the exact time.

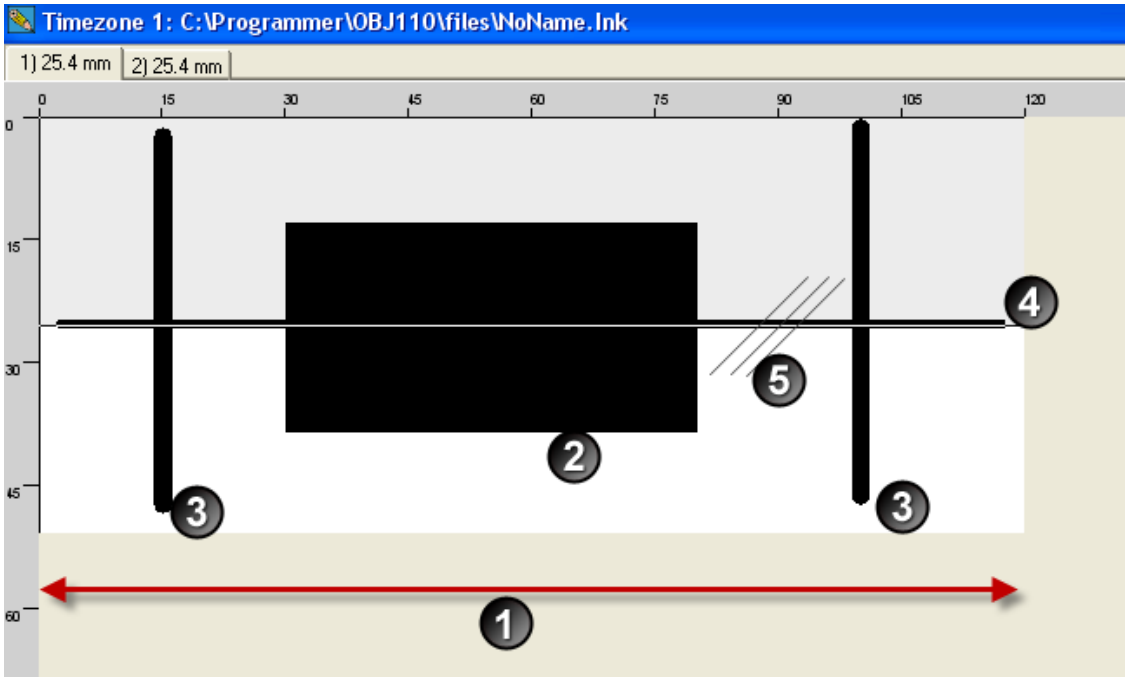
Buffer mode is selected in preferences.



Notice: you should not use user-managed buffer or bi-directional print unless you need to, and know how to operate these modes.

6 Test Pattern

To fine tune your installation, create a test pattern



1) Make the canvas exactly the length of your media. Here, the test paper is 120mm in the print direction

2) Make a box of known length (here, 50mm), and with a known start point (here, at 30mm in print direction). The box should be extended over all heads in your message

3) Make a few vertical lines that span all your heads, at known position. Here, they are placed at 15 and 100mm in the print direction.

4) Make a horizontal line on top of each of the boundaries between heads. This will allow you to see if the head is perpendicular to the print direction

5) Make some lines at 45 degrees to print direction, which cross head boundaries.

When you print this pattern, check that

- The box is exactly as long as the one you made (if not, check speed setting)
- The 45 degree lines meet across heads
- The vertical lines are placed exactly where you put them, when measured from back end of the media (if not, check sensor distance and head offset)

7 Trouble Shooting

There is no printout at all.

Please make sure your hardware has been properly connected. Please refer to the installation manual. If your hardware is working, the most likely explanation is that either the start distance or the sensor settings are wrong. If the start distance is to short, printing will start before the media has reached the head. If the sensor settings are wrong, printing will start after the media has passed the head. Please refer to the chapters "start distance" and "sensor settings".

Only a part of the print has been printed.

Check your start distance. If the start distance you have entered is shorter than the distance between the sensor and the head, printing will start before the media has reached the head and consequently only a part of the printout will be printed on the paper.

The print is blurred.

Check the distance between the head and the media. The optimal distance is 0.5mm. Please refer to the installation manual.

There are white lines in the print.

Typically, one or more clogged nozzles in the pen(s). Take out the pen and wipe against a lint-free cloth.

Check your head. The head must be placed in an angle of 90 degrees in relation to the print direction. Please refer to the installation manual.

The print has been mirrored

Please make sure the selected print direction is correct. Please refer to the chapter on the subject.

Shadow print

Your encoder value could be wrong. Please refer to the chapter "Setting up encoder". You will also see a "shadow image" in your print out if your are printing faster than the speed limits shown above. Check the resolution settings. If your are printing in velocity mode, resolution must be set to one row.

The print length is incorrect

Your printout should be approx. 84 mm long. If the printout is much longer or much shorter, several things could be wrong. If you are printing in velocity mode, your speed may be incorrect. Please refer to the chapter "Speed measurement".If you are using an encoder, your encoder value could be wrong. Please refer to the chapter "Setting up encoder".Your encoder may not be properly installed. Please refer to the installation

manual.

Date and /or time incorrect

If neither the date or the time on your print is incorrect, please check your system clock settings. If the date is correct, but the clock is minutes off, make sure buffer mode is set to off. It could be possible that your print is buffered several minutes ago. Check this by exiting / entering print mode, which will reset the buffer.

8 Support

For product support, please contact HSA SYSTEMS Customer Service department

HSA SYSTEMS CUSTOMER SERVICE DEPARTMENT

Phone: +45 66103401
Email: techsupport@hsasystems.com