EDS One Dot Marking System
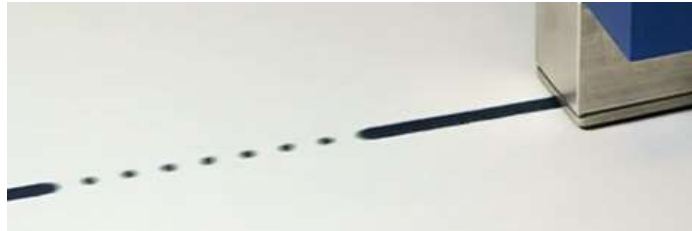
Dot and Line Marking with EDS + EDC Controller
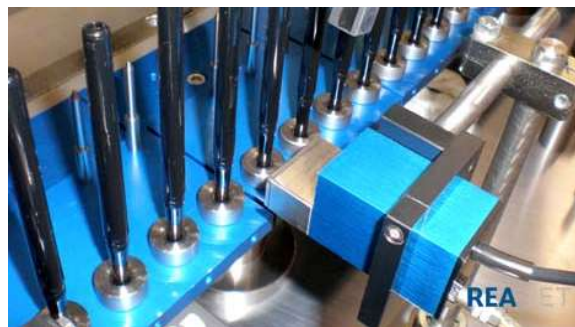
Dot Marking on Parts

Dot Marks With Dye Based Ink

Dot Marks With Pigmented Ink

EDC Controller

The EDC controller is used for printing single dots, dotted or solid lines, or programmed combinations of these printing modes. It can be used with:

- EDS One-Dot Printheads (dot size 0.5 to 3 mm)
- ST Spray Heads (dot size up to 30 mm)

EDC Front View   **EDC Back View**

Advantages of EDC

- Speed-independent printing by use of an encoder or signal from PLC
- Precise application — always the same amount of medium
- Programmable templates (Morse code)
- Simple control through the product sensor, interface or analog/digital inputs and outputs
- Use with EDS or ST Spray
- Print suppression for product moving backwards, pinpoint-precise restart upon forward movement
- Optional PLC control
- 6 configurable digital inputs (three of them also analog), 4 configurable digital outputs
- Dot size and cycle frequency adjustable with knob or through the interface
- Burst mode to clear nozzle: specially programmable opening sequences after long system downtime

Sample applications for the EDC marking system

- Marking products as good or bad for quality assurance
- Colored line marking for pipes, profiles, and endless products
- Multi-colored dot and line marking for product type differentiation (multiple units)
- Welded seam marking in the manufacture of metal profiles
- Detectable line markings for edge trimming
- Application of location and position markings, as well as "bend here" and "cut here" markings
- Product differentiation by using Morse code pattern (dot, line, combinations)

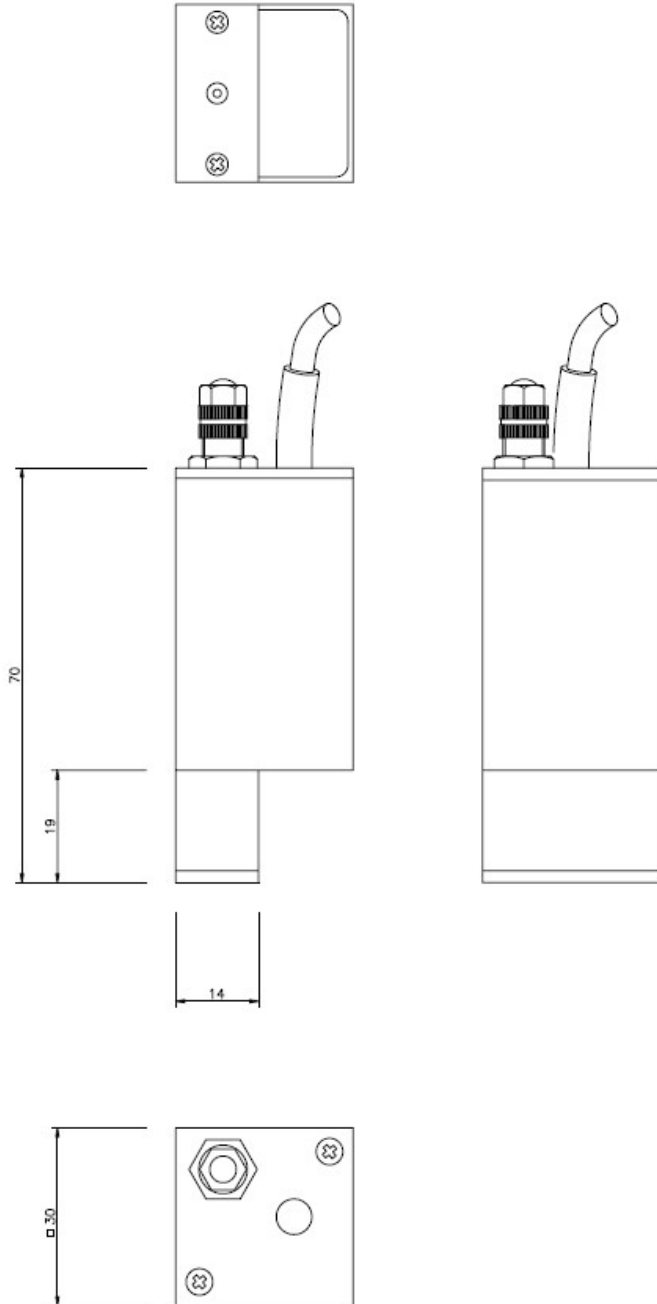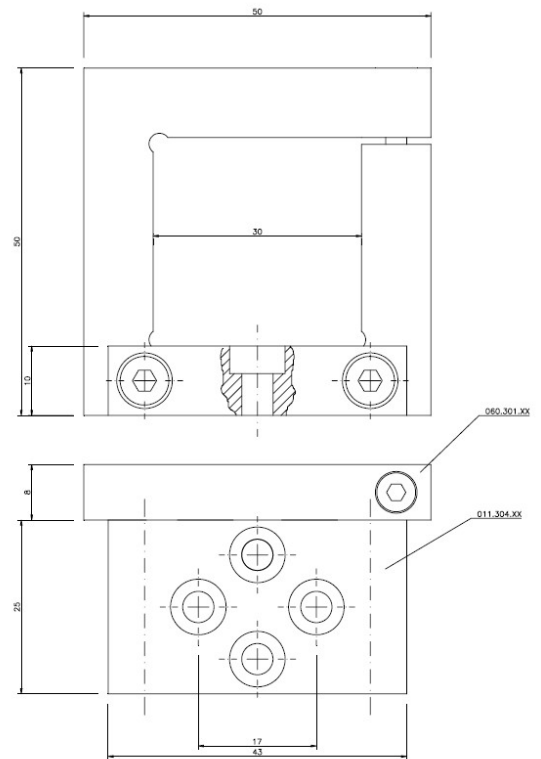# Dot Printer Technical Data Sheet

1-Dot Printhead Dimensions

1-Dot Printhead Bracket Dimensions

EDC Controller Dimensions

INK JET NOZZLE SIZES

TKDK-SW 010 Ink
Approx. 3 PSI
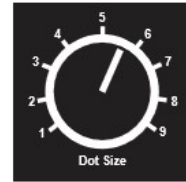
Dot Size 1
Dot Size 5
Dot Size 9

130μ Nozzle Size

Dot Size 1
Dot Size 5
Dot Size 9

180μ Nozzle Size

Dot Size 1
Dot Size 5
Dot Size 9

270μ Nozzle Size

Dot Size 1
Dot Size 5
Dot Size 9

350μ Nozzle Size

Ink Consumption Estimate

Ink type tested: TEP
Ink pressure: 0.25 bar / 3.6 PSI

Millions of Dots per Liter			
Nozzle size (μ)	Dot Size 1	Dot Size 5	Dot Size 9
130	54.3	18.0	12.1
180	21.0	11.5	7.0
270	16.2	5.2	3.3
350	4.9	3.5	1.8

Printing Considerations with One Dot

Splatter Shape

The 1-dot printhead creates a dot by releases ink through a tiny nozzle that is opened momentarily. The resulting mark is a "splatter" shape. The printhead is designed to work at close distance. At close distance (Distance 1 – not to scale) the splatter is densely packed in a small area.   At greater distances (Distance 2 & 3) the stream breaks up as it passes through the air and the splatter becomes larger and more random.   The overall placement of the splatter is less precise as this distance increases. This effect is exaggerated further as the printhead becomes dirty.

Concept only – not to scale

Distance 1	Distance 2	Distance 3
More precise		Sloppy, less precise
		More "satellite" dots
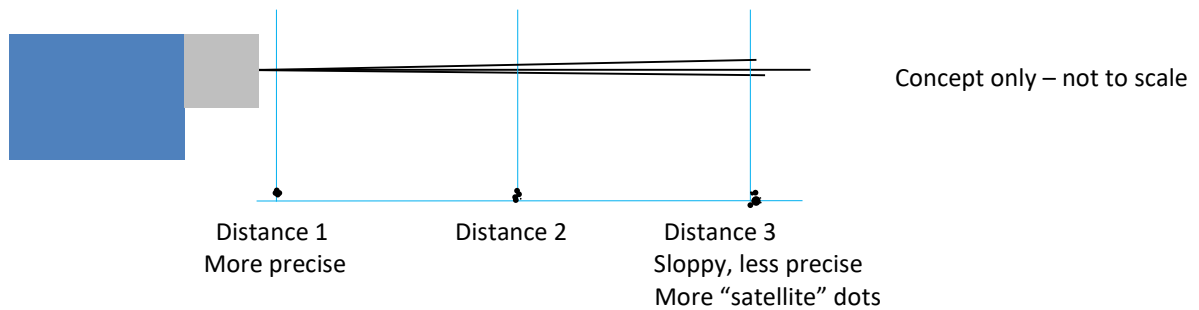
Close-up view of three excellent quality marks from our lab. Note that the mark is a splatter shape.

Printhead Maintenance Expectations

Cleaning requirements vary greatly by application. For example, dye based systems generally require less maintenance than pigmented systems. Using non-expired ink and maintaining the ink supply unit are important for good performance.

Face plate

Nozzle
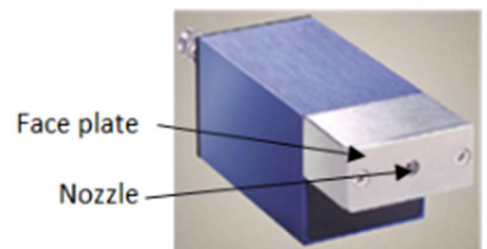
Cleaning the Face Plate

Printheads pointing down require far less maintenance than printheads pointing up.
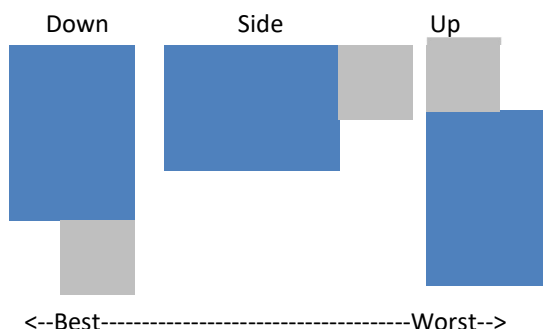
Down   Side   Up

<--Best----------------------------------Worst-->

ISO 9001:2000 CERTIFIED

Q1

- Cleaning the <u>face plate</u> takes 30 seconds. You MUST have access to the printheads.   If the printheads are buried deep in a machine, you will not be able to clean them sufficiently.

- If your application is mission critical (missed code shuts down the line) or requires high level of accuracy you will want to clean the face plate once per shift. Other applications with less strict requirements can go for longer periods of time without cleaning.
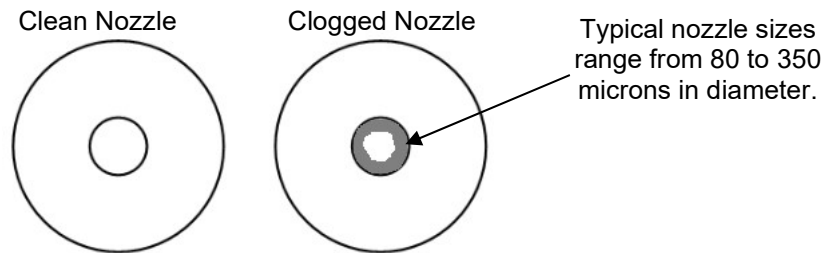
Cleaning the Nozzle
The tiny print nozzle may become clogged over time.

Clean Nozzle   Clogged Nozzle   Typical nozzle sizes range from 80 to 350 microns in diameter.

A clean nozzle produces more predictable results. A clogged nozzle is less accurate and produces more splatter. As the printhead becomes dirtier, the possibility of a missed dot increases.

Cleaning the nozzle can be performed preventatively (e.g. once per month) or reactively (when print quality degrades). Cleaning the nozzle must be performed offline at a work bench. Pannier provides cleaning accessories including nozzle cleaning pins.

Missed First Dot
After a period of inactivity, it is possible that the printer will miss the first dot. Factors include the length of inactivity, the environment, the ink used, the maintenance state of the printhead, etc.

Techniques that can be used to avoid a missed first dot:
- Prior to marking, fire a sacrificial dot
- Fire a sacrificial dot on a set schedule (e.g. one every five minutes)
- Fire two dots

You may use a PLC to fire sacrificial dots. The EDC controller offers some on-board features as well.

Photo Eye & Encoder

Photo-Eye or Dry Contact

You may use a photo-eye to trigger the EDC. This can be used in conveyer or other applications where the part is moving. The photo-eye can be used to detect the part to be marked or it can be used to detect something else corresponding to marking like a tab on an indexing table. You may use the photo-eye port to trigger the EDC via dry contact. Pannier can supply cable that you can re-wire as needed.

Photo eye and bracket
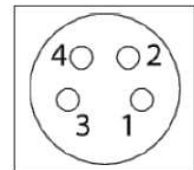
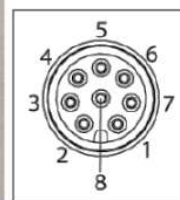| Pin	Designation	Value
1	VCC_SENSOR	+24V
2	nc	
3	GND	
4	SENSOR_PRODUKT	PNP

Pinout

Encoder

In variable speed applications, usually a conveyer belt or web, optional encoder can be used. For fixed speed applications, the speed may be defined in the controller. Encoding enables the EDC to print dots at consistent spacing regardless of the belt speed. This also enables setting a print delay after triggering in millimeters.

Encoder with wheel and spring-loaded bracket

Pin	Designation	Value
1	Ground	
2	+24V	24V@100mA
3	DG_A	in
4	DG_B	in
5	nc	
6	nc	
7	nc	
8	nc	

Pinout

I/O

You may trigger the EDC via PLC using the configurable I/O function. Six (6) inputs and four (4) outputs are available.

Inputs
- <u>Pattern Select</u> – Up to four inputs can be used for combinations of 2, 4, 8, or 16 customer-defined Morse code patterns.
- <u>Gate In</u> – print trigger via I/O
- <u>Gate In Debounced 8 ms</u> – print trigger via I/O, debounced
- <u>Purge</u> – purge the printhead (fire dots to keep nozzle clear)
- <u>Enable Head 1</u> – enables independent printhead control
- <u>Enable Head 2</u> – enables independent printhead control

Outputs
- <u>Busy</u>
- <u>Ready</u> – ready to print
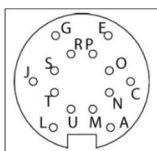- <u>Gate</u> (product sensor triggered)
- <u>Jet</u> (nozzles open)

Connecting to a PLC
- Pannier can supply EDC I/O cable with flying leads
- Pannier can supply connecting terminal shown below for easier wiring

I/O cable with flying leads

I/O Pinout

Pin	Designation	Value
A	SPS 3 – OUT	24V
C	SPS 4 – OUT	24V
E	SPS 2 – OUT	24V
G	SPS 1 – OUT	24V
J	SPS A/D 3 – IN	0-10V
L	SPS D 4 – IN	10-30V
M	SPS D 5 – IN	10-30V
N	+24V – OUT	
O	+24V – IN	
P	SPS A/D 2 – IN	0-10V
R	SPS A/D 1 – IN	0-10V
S	GND – IN	0V
T	GND – OUT	
U	SPS D 6 – IN	10-30V

Optional connecting element with LEDs

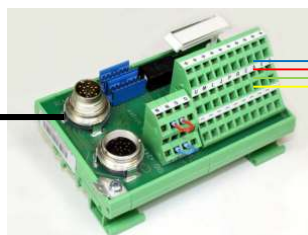**Connecting element in enclosure (J3400-059) plus 3 Meter cable (J2405-5865-030)**

EDC   Connecting Element   PLC