



Voyantic

Videojet DataFlex 6420/6530 Thermal transfer printers

Hardware setup guide

Ensurance™

Version 11/2019

1 Important Information

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About Ensurance

Ensurance is a software used to manage tag personalization process activities in smart label production, including memory programming, data printing, quality testing, and data verification. The software provides a graphical user interface (GUI) for the machine operator, the necessary tools for production engineers to create and edit process definitions, and it manages processing equipment and in-process dataflow.

The Ensurance personalization system is intended to be used in production environment as a part of a machine, and operated by professional personnel. It should be noted that if antennas or other radiating elements are used with the system, local regulations may limit the frequency range and transmit power that can be used. Particularly, related to RAIN/UHF reader, regulations related to features, such as channel-hopping and dwell time are specific to country. If the device is transported to different region, please check that settings and reader type comply with the local regulations.

About this document

Ensurance system can be added with a printer for applying codes, text, and graphics on the label. For the purpose, two thermal transfer printer models are supported: Videojet DataFlex 6420 and Videojet DataFlex 6530. This document describes how to set up and use a Videojet thermal transfer printer, the key specifications related to personalization, and typical troubleshooting scenarios.

Related documentation

Manufacturer's technical documentation. This manual includes information on the process options and relevant performance data related to Reelsurance Pro platform. More technical information is available from device-specific documentation by manufacturer.

3rd party software manuals. Operation of Videojet printers requires application of software from Videojet. Printer settings are managed through CLARiTYConfig and the graphical design of printed labels is made with CLARiSOFT. The programs are referred to in this documentation, but their operation instructions are available through the manufacturers own documentation.

3 Technical information

3.1 Supported models

Ensurance supports two alternative models Videojet DataFlex 6420 and 6530. They come as left-handed (LH) and right-handed (RH) versions. The LH option indicates the liner moving from left to right whereas the RH option the movement on reverse direction.

3.2 Functions and performance

Both supported printer models are capable of printing graphics, 1D/2D codes with fixed or variable data, and text. The solution is capable of printing single or multiple graphical elements per label and data can be static or dynamically acquired in-process (e.g. from file, or tag memory).

Key differences between the models are related to print area and throughput capability. For DataFlex 6420 the maximum print area is 107mm wide and the maximal throughput 200 prints/min. For DataFlex 6530, the maximum print area is 53mm wide and the maximal throughput 700/500 prints/min, depending on the operating mode (iAssure-mode enabled, or not).

Prints produced with thermal transfer technology are monochromatic. Ribbons are available in multiple colors, but only one color can be applied per label. Color tone can be adjusted by applying rasterization enabling graphical items to be printed at different level of darkness. As an example, see Fig 1.

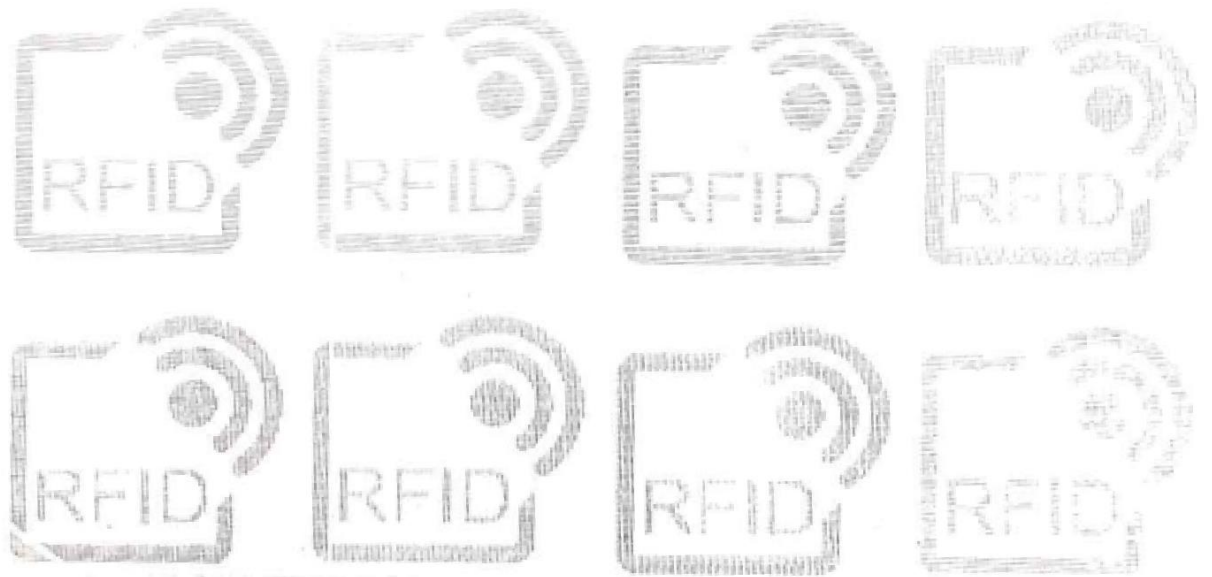


Fig 1. Examples of different color tones created by applying rasterization on the graphical element

The key specifications for the supported printer model are listed in table below. For further details, refer to product the manufacturer's datasheet and manuals.

Table 1. Technical information of supported Videojet thermal transfer printers

Supported models	Videojet Dataflex 6420 Videojet DataFlex 6530
Functions	Graphics printing, text printing, 1D/2D code printing, variable data printing
Supported print element types	<p>1D/2D codes: EAN 8, EAN 13, UPC-A, UPC-E, Code 39, EAN 128, Code 128, ITF, RSS, DataMatrix, ITF D-M, QR, Micro PDF417, PDF417, GS1 databar expanded</p> <p>Text: Scalable text supporting Windows TrueType and Unicode, multilingual</p> <p>Graphics: Can be imported from common graphic file types incl. jpg, pdf, ai, png</p>
Print area	<p>Videojet DataFlex 6420:</p> <ul style="list-style-type: none"> - LH: 107 x 68 mm (intermittent), 107 x 200 mm (continuous) - RH: 107 x 75 mm (intermittent), 107 x 200 mm (continuous) <p>Videojet DataFlex 6530:</p> <ul style="list-style-type: none"> - LH: 53 x 68 mm (intermittent), 53 x 200 mm (continuous) - RH: 53 x 75 mm (intermittent), 53 x 200 mm (continuous)
Performance	<p>Print resolution: 300dpi</p> <p>Videojet DataFlex 6420:</p> <ul style="list-style-type: none"> - Max. 200 prints/minute (12'000 prints/hour), for bad tag marking - Max. 110 prints/minute (6'600 prints/hour), for code/graphics printing <p>Videojet DataFlex 6530:</p> <ul style="list-style-type: none"> - Max. 700 prints/minute (42'000 prints/hour), for bad tag marking - Max. 350 prints/minute (21'000 prints/hour), for code/graphics printing - Enabling iAssure reduces throughput by about 30% <p>Lane speed capacity is high, but print rate (prints/min) as well as minimum viable speed (about 3m/min) set restrictions to applying prints on products with small pitch. Throughput needs to be verified case-by-case and continuous mode printing may not be possible with all smart label materials.</p>

3.3 Licensing and options

The variable data printing option for Ensurance includes a printer unit with accessories. Regarding functionality, the delivery package includes Ensurance license for variable data printing and a license for Videojet label design software tools (CLARiSUITE). List of parts and introduction to supporting software is provided in Chapter 4. There are no license options directly linked to printing functionality, but additional Ensurance software license options may be required if specific in-process data processing functionality is required for printing application. Ensurance licensing is discussed in the Ensurance software manual.

<p>Standard options</p>	<p>Hardware:</p> <p>Videojet DataFlex 6420/6530 thermal transfer printer</p> <p>Videojet accessories: cables and connectors</p> <p>Supporting 3rd party software</p> <ul style="list-style-type: none"> - License for CLARiSOFT design software (included in delivery package) - CLARiTYConfig and CLARiSOFT provided with Videojet installation media <p>Code printing capability</p> <ul style="list-style-type: none"> - text printing - graphics printing - 1D/2D code printing <p>Data management:</p> <ul style="list-style-type: none"> - static data - data from file - basic in-process data conversions
<p>Optional features</p>	<p>Special in-process data conversions</p>

4 Setup instructions

4.1 Printer system parts

Videojet setup for Ensurance includes the thermal transfer print unit, HMI, accessories, and software needed for operating Videojet printer with the Ensurance system. Additionally, application may require installation-specific parts which should be included in the machine delivery. Main contents of the package are listed below. Check that everything is available before going on with the set-up process.

Hardware and accessories

- Videojet DataFlex printer unit with cabling and HMI
- Print roller for continuous mode operation (specific to Reelsurance Pro delivery)
- Print platen for intermittent mode operation (specific to Reelsurance Pro delivery)
- Installation frame (specific to Reelsurance Pro delivery)
- Encoder kit (Snap-roller, tension roller, and encoder; specific to Reelsurance Pro delivery)

Software and licenses

- Ensurance GUI is available in the Ensurance installation media (license for variable data printing included)
- CLARiTYConfig software is available in printer software installation media (does not require license)
- CLARiSOFT software available in printer software installation media (license dongle included in delivery)



Fig 2. Videojet system parts as provided with Reelsurance Pro.

4.2 Initial settings

Before starting to work, the correct settings need to be applied for the printer to match the specific installation. Although the printer typically comes in readily adjusted to work, it's still recommended to check and adjust the following settings before the first use. Please note that some of these settings are adjusted through CLARiTYConfig software. If the software has not been previously installed, run the installer from installation media provided with the printer before going forward with the setup.

- **Encoder operation mode** defines how the printer interprets the encoder signals and whether the direction of movement is taken into account or not. **Encoder wheel size, lines per rotation, and scaling percent** define how they're converted to distance/speed readings and affects the form of the print. These values are specific to the used hardware setup and can be applied through CLARiTYConfig from Inputs-menu.
- **Printer operation mode** defines the printhead operation. In intermittent mode, the material is expected to stay still and printhead sweeps over material. In continuous printing mode, the material moves and the printhead stays still during printing.
- **Printhead to platen distance** defines the time for the printer to adjust printhead from rest position to platen and thus affect how the printhead operates. This should be adjusted to match the actual distance between the smart label surface and the printhead thermal element in the resting state. In case the exact measurement proves challenging, the value should be set higher than the actual distance.
- **Printer alignment** defines alignment of the roller/platen and the printhead. The alignment can be checked by pushing the printhead down against the platen/roller surface. If the alignment is perfect, no light should come through from between the platen/roller and the printhead while watching from the other side. Alignment can be adjusted by either by adding shims below the platen or adjusting the printer positioning. The printer setup with a soft, 40Sh surface material accepts some small misalignment, but less than 0.5mm mismatch is recommended.

CONFIGURATION SETTING	Range	Reelsurance Pro
Inputs > EncoderMode	0: Quadrature 1: single phase	1: single phase
Inputs > EncoderNumberOfLines	200 – 5000	500
Inputs > EncoderWheelDiameterHMM	2500 – 25000	5300
PrintInformation > EncoderScalingPercent	20 – 500	100
PrintInformation > PrintheadToPlatenDistance (mm)	1.6 – 4.5	1.6 - 4.5 (1.6)
Printer alignment against platen/roller	-	< 0.5mm
PrintInformation > PinterType	0: intermittent 1: continuous	0: intermittent 1: continuous

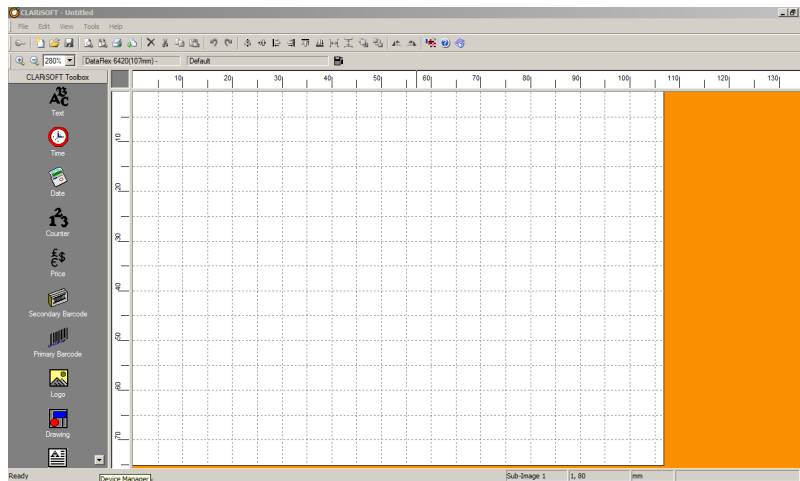
4.3 Preparation for job

To be able to perform a job, the operator needs to have a printable design, which is downloaded for the printer. Then user has to setup print parameters, adjust print positioning, and verify print quality by producing test prints.

4.3.1 Implementing a print design and downloading the file for the printer

Using the manufacturer's own toolchain, the print is designed using CLARiSUITE software(s) and the design file(s) can then be downloaded to the printer either directly from the design software or CLARiTYConfig. The design software provides a variety of tools for layout design. The designs can include e.g. graphical items, static and variable data, and text. Below is an example of how to design a simple print job and download it for the printer.

Browse and run Clarisoft.exe from If the software has not been previously installed, run the installer from installation media provided with the printer. Please note that this software requires a separate license and might require purchasing this separately.



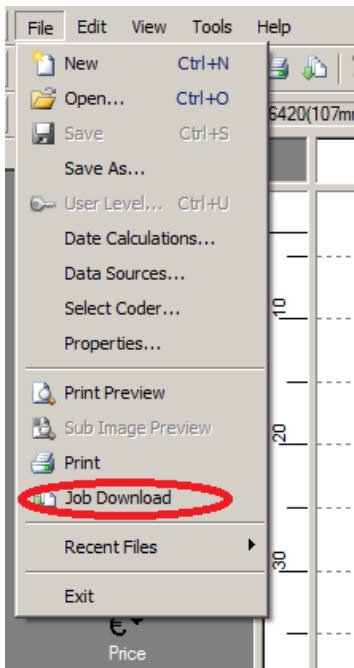
From here, you can either open an existing job file, stored on the local computer, or create a new job file.

For a more detailed example of creating a print job see, *Appendix A – Creating a QR code with variable data*.

Once you have the design you want to print, save it with a descriptive name so it can be easily referenced to later.

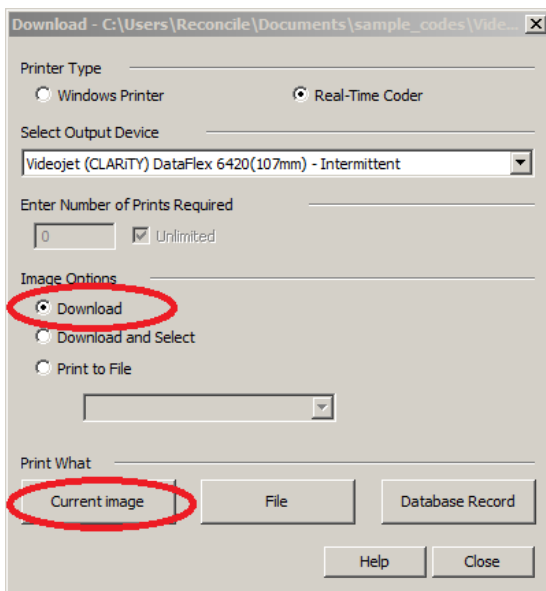
Note: The name of the print job is also used when configuring a VideoJet Ensurance case file, more information can be found in Ensurance Recipe builder manual.

The print job must be downloaded into the printer’s internal memory before it can be used in printing. To do so, navigate to the “File” toolbar menu in CLARiSOFT and select “Job Download” from the dropdown menu.



Upon selecting the “Job Download” you will be presented by the Download dialog.

Make sure to select “Download” from the Image Options, see image below.



Select “Current image” to continue using the current open job in CLARiSOFT.

After this, there will be a “Job Selection Confirmation” window, and the job will be downloaded to the printer memory once “Ok” is pressed.

4.3.2 Setting up and testing the print parameters

Having successfully implemented the print and downloaded that to the printer, the next step is to apply appropriate printer settings. Finding the best combination of settings typically requires experimentation with product samples, but following a standard procedure should help finding the correct settings. The values are specific to material processed and after setup it's recommended to make notes about the adjustments to be able to reproduce them in production phase. A list of adjustable parameters is described in the table below and user is advised to apply the following protocol for finding the optimal setup.

1. Select ribbon type

Selection of the ribbon has great effect on the printing quality. Different ribbon qualities are available from the manufacture, but also other vendors provide compatible options. Videojet DataFlex 6420 and 6530 are compatible with resin or wax-resin ribbons made for near-edge printers. All wax ribbons are not suitable for thermal transfer printing.

The biggest factor influencing the choice of the ribbon is the printing substrate – if it's plastic, film, or paper, and whether the surface is glossy or matte. Other factors are required blackness or contrast, sharpness, and resilience of the print. Print speed might also be important and the available selection of colors varies from product to product. More information is available from the manufacturers' website, e.g. *videojet.com* and *inkanto.com*.

After choosing the ribbon type, the choice must also be defined for the HMI either through printer HMI menus or through CLARITYConfig.

2. Setup printhead force, print darkness, and print speed.

Start by setting low printhead force, low darkness, and high speed. Then increase force and darkness, and decrease speed until good quality is achieved. Please note that too high a printhead force will decrease print quality and potentially causing unnecessary stress for the chip. Recommended value is 4.5bar and it's recommended to first try finding the good setup by adjusting darkness and print speed only.

The correct setting for most designs should be found by adjusting these parameters. If not, more information on troubleshooting printing issues is provided in the troubleshooting section of this manual and in the manufacturer's documentation.

3. Make a note of the applied settings and utilize the same values in the production.

The values are specific to material processed and need to be verified and possibly updated if some part of the setup is changed.

PARAMETER	VALUE RANGE	WHERE TO SET?
Ribbon is available in multiple types. Key differences are compatibility with substrate material, required contrast and sharpness, speed tolerance, resilience, available colors, and pricing. Ribbons are available from several vendors. Type required is near-edge and either resin, or wax resin combo. All wax ribbons are not suitable for thermal transfer printers.	Standard Super standard Ultra	Printer HMI or ClarityConfig ¹
Printhead force defines how hard the printhead is pushed against print material. With DataFlex 6420, this setting is set by adjusting air pressure, while the DataFlex 6530 has this setting as a digital parameter. Typically more force equals better print quality, but at growing risk of damaging chip. Although TTO technology is considered to be safe to use, it is recommended to run a pilot prior to starting production to address this risk, especially if there are concerns about the durability of the labels.	4.5 – 5 bar	DataFlex 6420: Air pressure regulator behind the printer unit DataFlex 6530: Printer HMI
Print darkness defines the darkness of the print by adjusting the temperature of the print head during printing. The darker the tone, the higher the temperature. Typically darker is better, but if there are large dark areas in the print, too much heat might cause issues in printing quality.	75 – 90%	Printer HMI or ClarityConfig ¹
Print speed defines the sweeping speed of the print head in intermittent operation mode. The slower the movement, the longer the heating time, and typically the better the quality of the print. If there are large dark areas in the print, too much heat might cause issues in printing quality, and higher speed setting may help improving quality	50 - 630	Printer HMI or ClarityConfig ¹
Trailing edge darkness defines the darkness setting for the trailing edge of the print. Typically, the user does not have to adjust this setting. Try increasing the value if the trailing edge of the print appears to be too light, and decreasing if the print does seem smudgy on the edge.	25 – 125 default: 100	ClarityConfig ¹

¹ When using CLARiTYConfig to setup parameters, remember to first upload settings to the PC before making changes to the settings to avoid unintentionally overriding any of the concurrent print settings.

4.3.3 Print positioning

Having verified the settings, the last step is to adjust print position correctly. The point of reference for the print, i.e. the origin, is the upper-right corner of the print and the user is expected to adjust the position of that with the above-mentioned settings.

Position can be adjusted with respect to vertical and horizontal position through the printer HMI screen.

- The “Vertical” setting moves the print perpendicular to the tag movement through the printer. Incrementing the vertical value will move the print closer to the back of the printer (i.e. closer to the Reelsurance if mounted in it)
- The “Horizontal” setting moves the print along the direction of tag movement through the printer. Incrementing the horizontal value will move the print left when looking at the printer while standing in front of the HMI screen.
- The adjustments made through the printer HMI are automatically saved and associated with the print job. If the job is changed, the horizontal and vertical setting will be saved with the print job to the printer HMI and loaded while activating the job.

Word of warning! If there are multiple print jobs used in a production run, the print position settings have to be the same for all the print jobs. Having these settings configured differently, can make the application unstable. This would be the case e.g. when the printer is used to apply different prints for bad and good labels, or if batch mode is applied through Ensurance GUI.

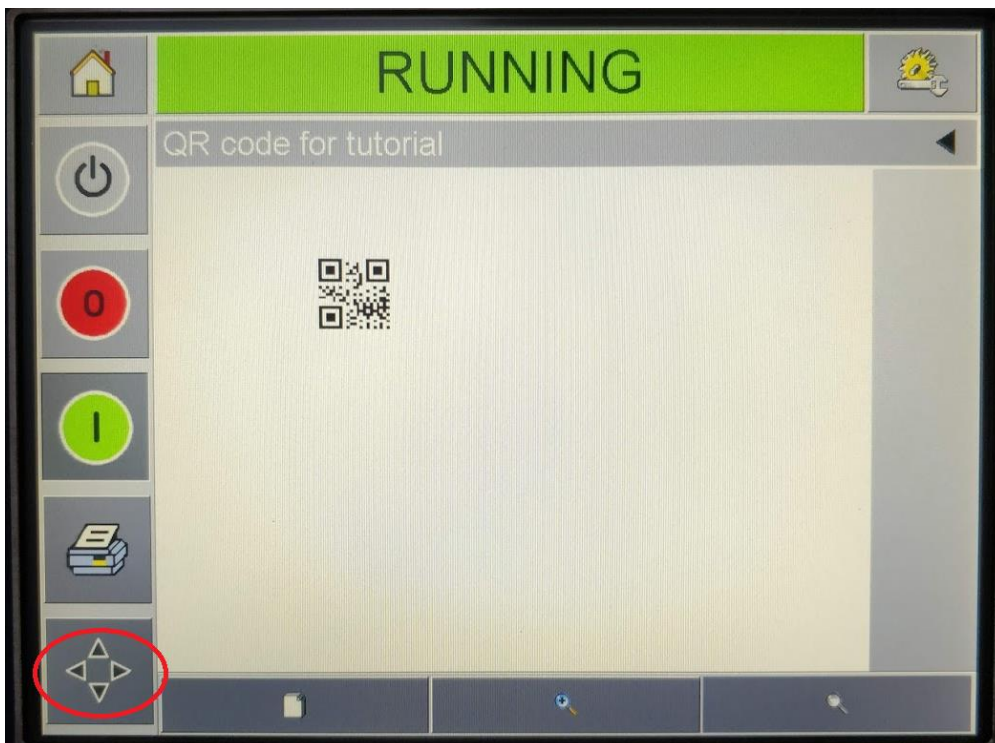


Fig 3. Fine tuning of the print position can be adjusted through the printer HMI.

5 Maintenance and troubleshooting

5.1 Maintenance

Thermal-transfer printers are relatively low-maintenance, but some maintenance routines are recommended.

1. **Ribbon sufficiency** should be checked prior to starting production. Single roll of ribbon is adequate for a great number of labels, but consumption depends on printing mode (ribbons-saving function) and possible waste due to ribbon breakages, for example. Ribbons can be supplied from local Videojet supplier and there are suitable alternatives available from other vendors, too.
2. **Print head cleaning** should be done as a standard service routine or when issues are faced. To do this, remove printer front plate and clean the thermal element with soft brush and cotton swabs. Printhead is sensitive, so please avoid causing mechanical stress for the element. There's also a cleaning kit available for Videojet thermal-transfer printers which can be supplied from local Videojet supplier.

5.2 Troubleshooting

Once adjusted correctly, thermal-transfer printer typically allows good, stable printing quality. This chapter first lists generic preventive actions for avoiding printing issues and then covers typical troubleshooting scenarios and lists the in Table 2.

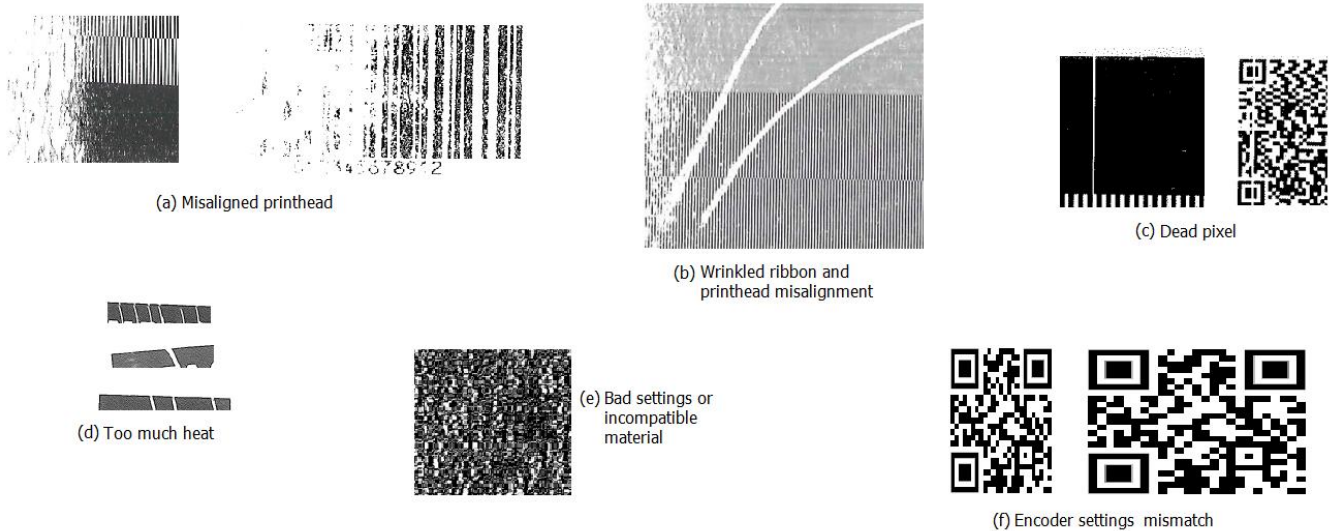


Fig 4. Examples of printing issues

Important things to take care of in order to avoid complications:

1. **Initial setup of the printer** is very important. It's critical to get printhead aligned with the roller/platen surface and printer-to-platen distance set correctly. Fig 4a shows examples of prints distorted due to bad printhead alignment, and imprecise printing quality in Fig 4e could be caused by too log gap between printhead and print platen. Adjustment of printer alignment and print head height position is specific to machine and instructions for doing this should be provide in the respective manual. Appropriate printhead-to-platen distance is 1.6 – 4.5mm and recommended gap is 1.6mm. This value also has to be defined for the printer through CLARiTYConfig. Alignment is the better, the smaller the gap is and it's recommended to get this value below 0.5mm.
2. **Print settings** are specific to the smart label material being processed. The critical parameters are print darkness, print speed, printhead force and ribbon selection which should be tested empirically before starting production.
3. **Maintenance** of the printer. Keeping printhead and platen clean influence the quality of printing and life expectancy for the print head thermal element. A dirty printhead can cause distortion and stains in the label, dead pixels show up as unprinted straight lines in the printout, like e.g. in Fig 4c and Fig 4e

Table 2. Examples of possible troubleshooting scenarios with thermal transfer printers

#	DESCRIPTION	TROUBLESHOOTING
1	Print quality is distorted towards the other edge (Fig 4a)	Probable cause is printhead misalignment with bottom platen or roller. See machine manual for instructions on how to adjust these parameters.
2	Printer has inconsistent, possibly arch-formed pattern(s) (Fig 4b)	Wrinkled print ribbon typically causes this kind of issues. If problem does not vanish in the next few prints, stop machine, take out ribbon, straighten any wrinkles, and wind in some more ribbon to see that problem is not repeated.
3	Straight, unprinted lines in the print (Fig 4c)	This is a typical symptom of a dead pixel in the thermal element of the printhead. Try cleaning printhead and replace thermal element with new one if problem does not disappear. Moreover, if there's unused area in the print area, issue may be temporarily fixed by adjusting offset of the printer.
4	Arched patterns that look like the color does not hold on the material (Fig 4d)	Too much heat while printing large uniform areas can cause melting effect. Adjusting print darkness and print speed settings may solve the issue. Also it might be related to print platen introducing too much friction and the ribbon dragging against it. Reducing print force or adding gliding solvent, such as Dry PTFE spray lubricant may help. Alternatively, if issue is related to label surface material, another ribbon type may be needed.
5	Unprecise printing quality (Fig 4e)	This issue may be caused by several issues. First check printhead to platen distance settings, and then try adjusting print darkness, speed, and force. If issue is related to label surface material, another ribbon type may be needed.
6	Stretched or squeezed prints (Fig 4f)	This issue is specific to continuous mode operation and indicates a difference in speed of the liner and that censored by the printer. Check encoder settings and that encoder wheel is rotating correctly with the material. If encoder wheel is damaged or does not rotate normally, check machine manual for instructions on how to adjust or replace the component.
7	No prints	Printer turned off or not enabled from the machine interface, or liner movement is too slow. Minimum speed limit is 2.3mpm.
8	Printer skipping labels	Trigger interval is too small, i.e. printer throughput limit has been met. Maximum capacity of the printer is 200 prints/min for DataFlex 6420, and 700/500 prints/min for DataFlex 6530, and normally reduced by about 40-50% of this rate is achieved, if design includes anything more than just a dot. For small pitch material like smart labels, this value increases fast with the faster liner speed.

9	Printer acting non- logically in low speed	Minimum liner speed is 2.3m/min and may start causing issues when printer is set to work in continuous mode and speed is below 3mpm. Increasing speed may solve issue unless the limit of throughput (prints/min) is exceeded.
10	Print is mispositioned	It's possible to adjust the position of the print by changing print delay and prin offset settings from the printer MHI. Also chine attachments may feature adjustment possibilities.

6 Appendix A – Creating a QR code with variable data

Following appendix is a guide that explains how to setup a print job file in a way that enables the Ensurance software to send/stream data to the print job in order to modify the content.

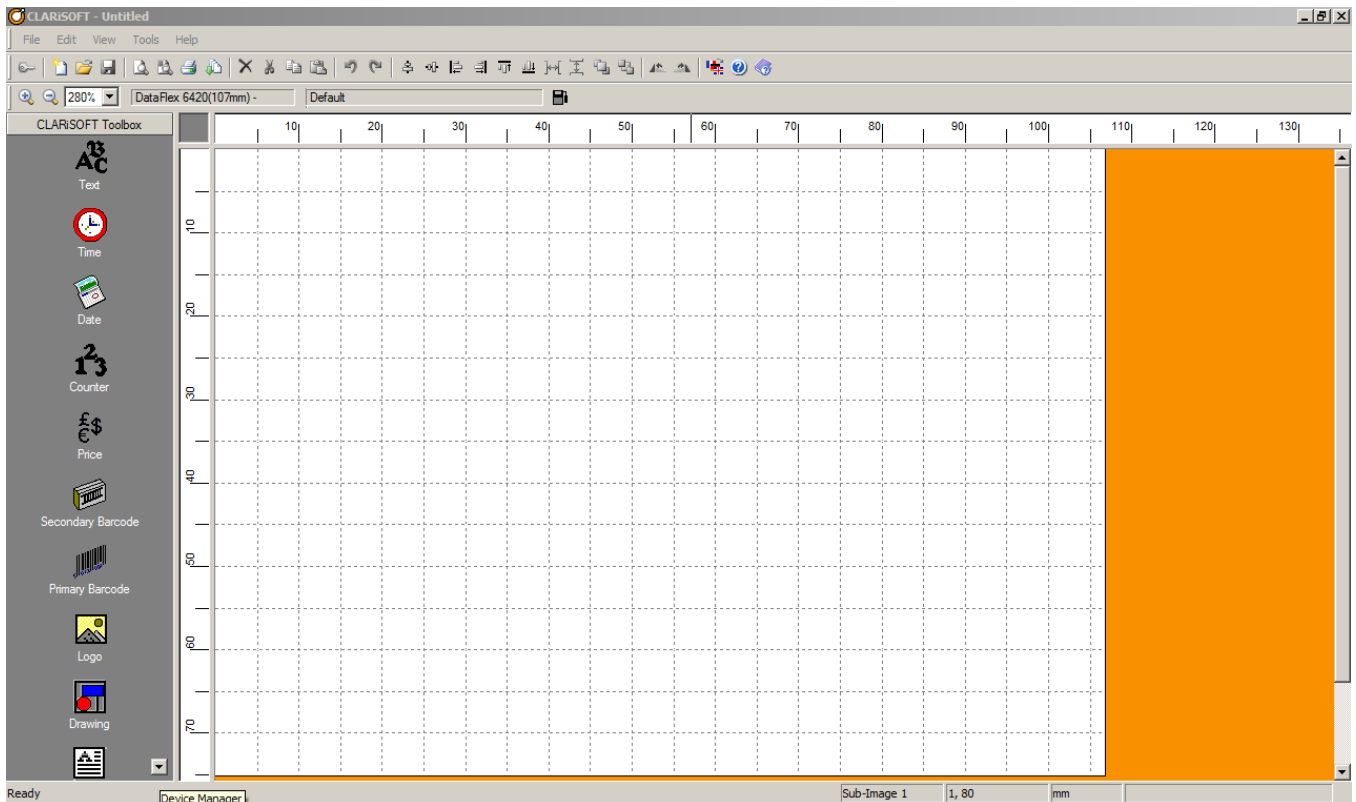
We will use a QR code as an example, but the following principles can be applied to many different code types, text fields, numbers, etc. The reason for choosing a QR code is because it requires a slightly different approach than a text field would have, due to how the variable data is implemented.

First, we open a new empty print job file in the CLARiSOFT application.

From the top toolbar, we select “File”→“New”.

This presents us with a selection of different printer models. We use the DataFlex 6420 with a 107 mm wide ribbon, so select that and then select either continuous or intermittent mode, whichever is planned to be used when running the printer with this print job.

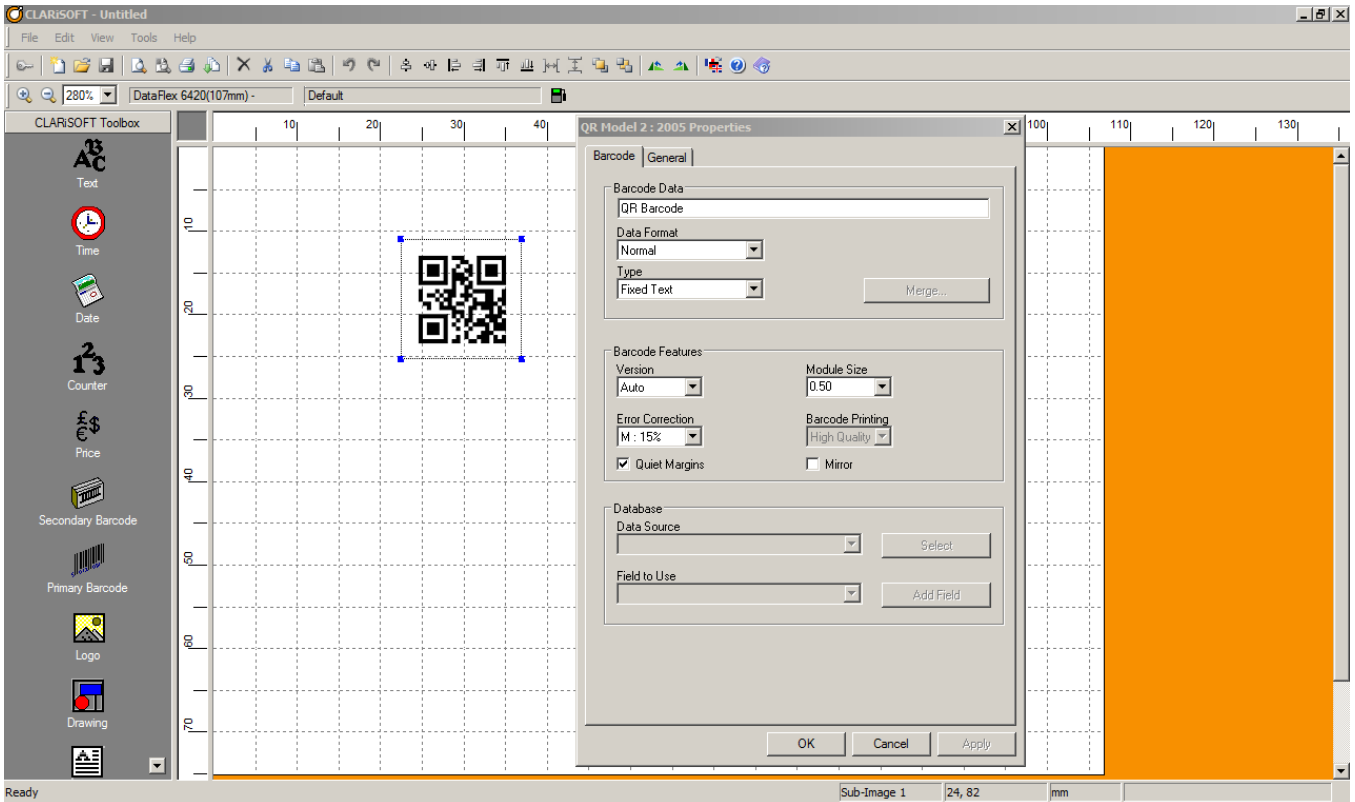
We are now presented with an empty workspace, see below



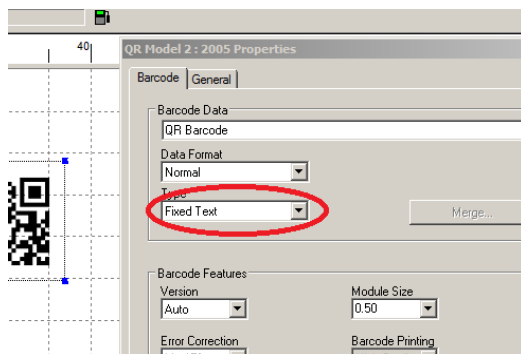
Select the “Primary Barcode” from the CLARiSOFT Toolbox and click somewhere in the empty space to be able to select the QR code we want.

The QR code should now appear on the workspace.

Briefly open the properties for the QR code (either double click on the QR code on the workspace OR right click and the select “Properties) and the following menu is shown.



Here we have the possibility to set a fixed text as the QR code data, but if we want to be able to send the data content from the Ensurance software we need to select the Type “User Entered Text” *instead of* “Fixed Text”.



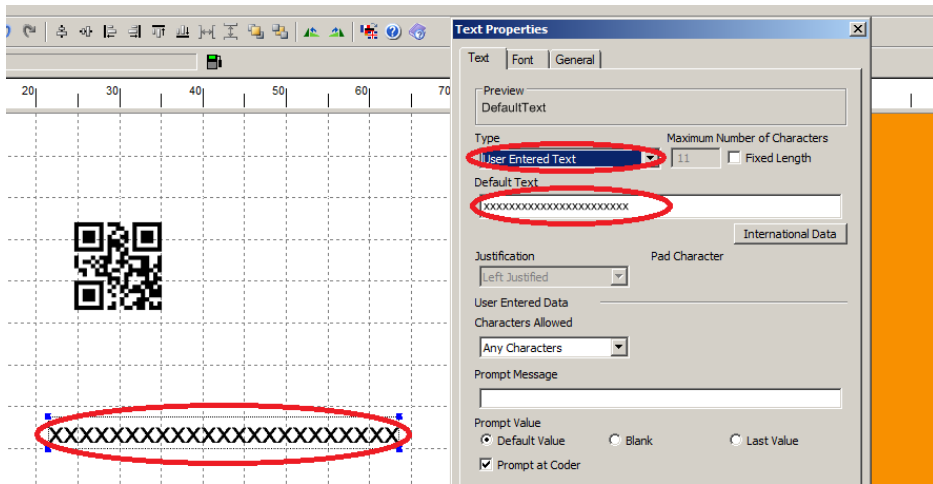
However, this is not possible (notice there’s no option available for selecting “User Entered Text” if the “Type” dropdown options are expanded) for the barcode objects in a print job.

Instead we must create an additional (non-printed) object on the workspace, that will later be used for modifying this QR code.

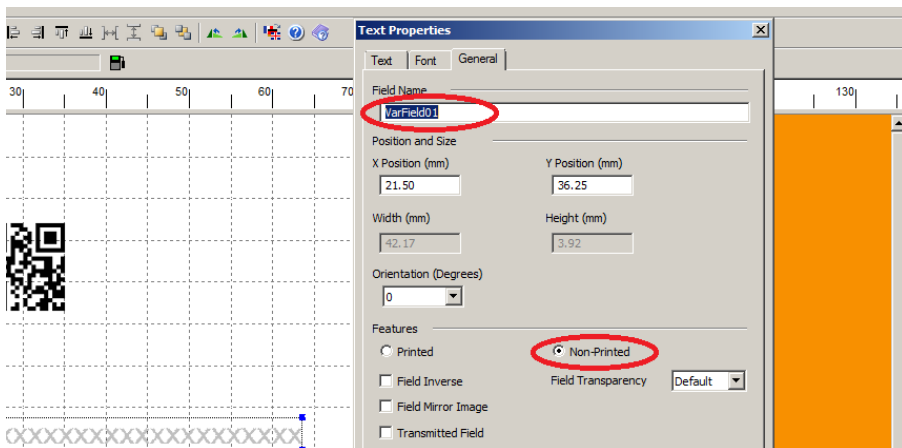
What we need to do now is to create this additional object. This is done by adding a Text-object to the workspace and changing its Type to “User Entered Text”.

IMPORTANT: Set the Default Text to the maximum expected length of the data that is to be sent from the Ensurance software to this print job.

For example, if we are supposed to print the web address “voyantic.fi” in the QR code and we know that different variations of the web address will have a maximum length of 20 characters, we have to make sure that the “Default Text” we set is at least 20 characters long. If the Default Text is set to something shorter, the variable data sent from Ensurance will be truncated automatically by the printer, leaving us with an truncated and incomplete QR code data.



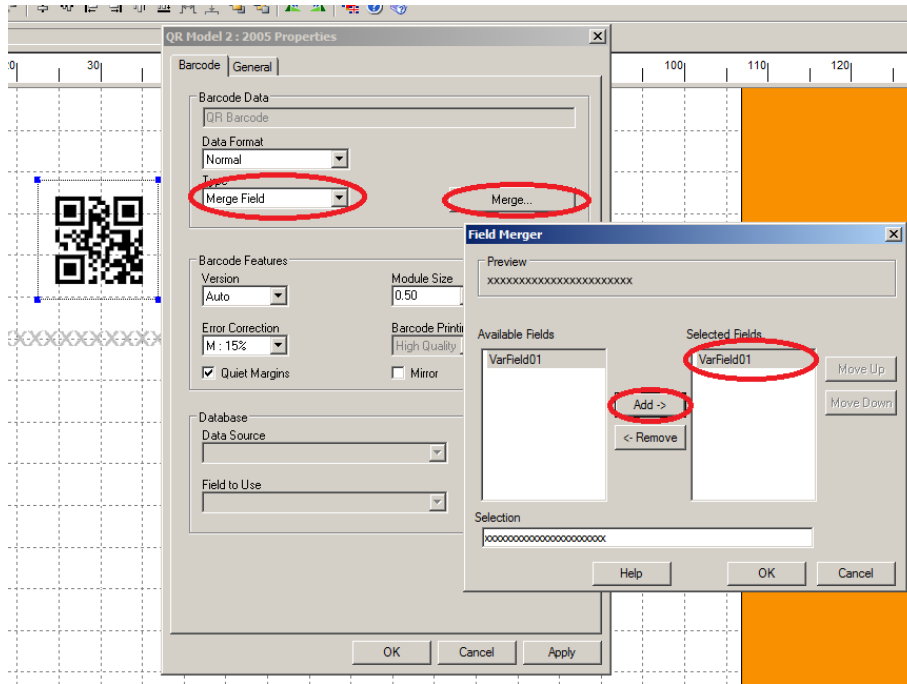
Now, since the Text object we added is only here to assist us to change the QR code based on variable input data from Ensurance, we need to make sure that the text object itself isn't visible in the print. We do this by, in the Text properties, selecting the General tab and then enable the “Non-Printed” feature.



Here, it's also important to note that the “Field Name” is what will be used in the VideoJet Ensurance case file in order to select this specific field to send variable input data to. **We make a note of this Field Name “VarField01” for later use when we create the VideoJet case file for Ensurance.**

Now we can go back to the QR code and set it up so that it makes use of the newly added text object.

Double click the QR code to open its properties and select “Merge Field” from the Type-options. After that, click the “Merge” button in order to set-up source fields for the merge operation. We select our previously created text field named “VarField01” as a source and add it to the Selected Fields list, see screenshot below.



Now we are done with our QR code print job, and all that remains is saving it and then downloading it to the printer, as described in 4.3 Preparation for job.

To summarize what we just did, we..

1. created the QR code that we want to print
2. created a non-printed text that we use to receive the variable input data from Ensurance software
3. set our QR code to use the non-printed text object for its barcode data