HSAjet TCU MANUAL

A guide to operating and managing the HSAjet TCU series – with and without display.

HS AutoMatic

Definitions of warnings, notices and tips:

Warning

Your equipment might be damaged or not work, if you do this.

Notice

Additional information to or emphasizes a topic.

Tip

A different way of doing things or something that might be able to help you use the product.

Assistance

For assistance, please contact your local distributor where you purchased the product.

Version numbers and MD5 checksums:

Manual Version	25 March 2012 for TCU version 3.9	
FPGAFILE	69.900 bytes	MD5 = 1f556b37c99085dd7e0681153616cba5
Firmware	**No. 032,** 131.072 bytes	MD5 = fc7bb5f98e80558755f2f2905cb419d4
Language	1606 bytes	MD5 = 01AFF0BA8A8378BA1BBD5C3249FE6D06

Please see section on upgrading your TCU.

For your own security, you should verify checksums before upgrading your TCU. A software for checksum verification is available at http://www.fourmilab.ch/md5/

Third Party Companies and Trademark Information.

Mention of third party products, companies, and web sites in this documentation is for informational purposes only. HS Automatic ApS provides this information only as a convenience to users and makes no representation whatsoever regarding the content of any other web sites. When you access a third party site, please understand that it is independent from HS Automatic ApS and that HS Automatic ApS has no control over the contents on that web site.

Important - For your safety

Please follow these guidelines for safe operation.

Power Supply

❑ Only use the unit within the specified power range. Please check the label before connecting

Frequency: 50 Hz (220V-240V) or 50/60 Hz (110V-120V)

❑ Only use a good, undamaged cable

Environment

The TCU is electronic equipment and designed to be operated in a dry environment.

- Please do not expose printer or print heads to water or dirt.
- Do not subject the printer to strong shocks or vibrations
- Do not expose printer to open flames

 Before removing back panel, make sure the unit is turned off and the power cord is unplugged.

 The unit is is not serviceable by customers. Only the documented service jobs should be performed by the user, please see the end of this documentation.

 Take great care when you connect RS232 (serial cable) to the TCU. You **must make sure that computer and TCU are both grounded and turned off**.

Otherwise, you can burn the serial ports in either PC or TCU.

 This information is only valid in European Union

Information for Users on Disposal of Old Equipment

This symbol indicates that the product with this symbol should not be disposed as generalhousehold waste at its end-of-life. If you wish to dispose of this product, please do so in accordance with applicable national legislation or other rules in your country and municipality. By disposing of this product correctly, you will help to conserve natural resources and will help prevent potential negative effects on the environment and human health.

Concept of the the TCU

The HSAjet TCU (Tiny Controller Unit) is a very cost-effective printing solution designed for limited printing jobs still requiring a high-resolution and high quality print. It is the ideal solution for simple printing jobs, e.g. stamping of checks, paper documentation, pre-coding, internal logistics, date documentation e.g. integrated in letter openers, or in the pharmaceutical industry.

Ideal Solution

The HSAjet TCU is the ideal printing solution for small messages, i.e. text printing, barcode printing, counter printing, time- and date printing, expiry data printing and logo printing.

It is a very compact solution and calls for a minimum amount of maintenance. Consequently, no special training is required to operate and maintain the HSAjet TCU, and the cartridges are clean and easy to install. In addition, the HSAjet TCU has a design of stain-less steel and can easily be implemented in production areas.

Advanced Technology

The HSAjet TCU is based on standard HP cartridges and makes use of the thermal inkjet technology. Thermal inkjet technology places small ink drops extremely accurately and gives a very high image and text quality.

The ink is available either black or colored (red, blue, yellow, green), which enhances possible printing applications. The HSAjet TCU also enables printing on almost any surface such as cardboard, paper, wood, and plastic.

Different models of the TCU

The TCU is available in 2 different models:

Standard	Button for start / stop print. Most simple version. No direct editing of messages possible on the unit.
	It is possible to add switch or terminal to select messages. These options can always be added later. With terminal, the standard TCU has same function as Integrated model.
Integrated v/ display	Simple editing of start position and prompts possible. Indication of current message, number of prints etc. Same features in one unit as standard TCU with terminal.

Features of the TCU

Below the most important features of the TCU is explained.

Print using high-resolution HP cartridges. Because the TCU is based on the HP® technology, you get high resolution and little or no maintenance. If a cartridge is empty or damaged, simply replace it with a fresh one. You can also use different types of ink and different colors with the same printing system.

Messages stored on standard Compact Flash modules. All messages and setup information is stored on Compact Flash cards. They are standard and can be purchased anywhere. It is no problem to create more messages and have many different cards to choose from. Each card can store as many messages as the card size allows, in reality about 120 messages is the maximum due to card format limitations.

Compact Flash

Very simple to use. The TCU is designed to be a select-and-print solution. The operator can do little more than select the correct message, adjust the start delay and activate the print. No possibility to change any of the message content as the designer has control of which objects that prompts for value before print. This makes the TCU ideal for applications where security is an issue.

Messages are designed in graphic program on a PC. Use OBJ INKdraw to design all messages.

Both static and variable content. In the design process, all content in the message is based on objects. You can move objects around and use all objects available in OBJ INKdraw. You can use

your own logos and even create 2-D barcodes. When saved, this background formes a static picture, to which you can add a number of variable fields such as counters, dates, and times.

Prepare-as-you-print. It is possible to load a new message and prepare it's settings while another message is printing. When it is time to change message, simply press print, and confirm change to a new message.

Message resolution and speed

The maximum speed available for the printer depends on the resolution you have selected when you design your messsage. The table below gives an overview:

DPI	Using	Max speed m/minute
600 x 600	Two rows	38
300 x 300	Two rows	152
300 x 300	One row	76
300 x 150	Two rows	304

The resolution is stored inside the TCU message and can not be altered on the unit.

The TCU keyboard

The TCU keyboard is identical to the keyboard of the *HSAjet CU*. But not all keys are used in the TCU, as some functions are not available.

Used to start and stop print activity

Enter the setup menu

Enter the previous menu or go to main menu

Arrow keys, use with enter to select message.

Enter activates edit mode or accepts a choice

TCU connectors

Power connector

The TCU operates at 115V or 230V depending on which type you order. The mains plug connector is a standard type **IEC**.

Notice that the TCU is using 24 V in the I/O and encoder connector, where the other HSA equipment uses 12 V.

I/O connector

The main function for this connector is to provide the start signal to begin print. In the same connector is also an additional input as well as 2 output signals:

OUT-2 is used for low-ink warnings

OUT-1 is a print message signal

It is located in the back of the board, as a 9-pin female SUB-D.

The wiring of the I/O connector **is required** for proper function of the print – you will not get a printout without a start signal.

You can use either a simple mechanical switch or a 5/24V photo cell for the start signal, please see pinout and connection guide in the back of this manual.

Notice that the "Print mode" button (Red on front of TCU) is *not* the same as the "Start print" signal. It only tells the machine to prepare for the print process.

Encoder connector

This connector is where the signals from the encoder are coming in. You will notice that there is a "normal" encoder input and an inverse input. Which one you use depends on your encoder. Active high use normal, for active low use inverse.

Head connectors HP

Two connectors are available for the HP heads. Head1 and Head2 are both **female** 25-pin SUB-D, you need a **straight-through cable (1:1)** to connect to the heads.

COM 1

Use a crossed 9-pin **male** SUB-D cable to connect to a PC.

You need a **crossed** 9-pin serial cable to connect to a PC.

This type of cable is also called _Nullmodem (9-9)_

As you can see from connection table below, cross pin 2 and 3.

Signal	SUBD 1		SUBD 2	Signal
Receive Data	2		3	Transmit Data
Transmit Data	3		2	Receive Data
System Ground	5		5	System Ground

COM 2

Use this 9-pin SUB-D to connect the TERM3 terminal or the Print Selector box.

For both these you need a **straight- through (1:1) cable**.

Designing TCU layouts

The TCU pictures / files are designed using the OBJ INKdraw software.

In each picture you can have a fixed background and a number of variable fields. The background is a "photography" of the canvas in OBJ INKdraw, meaning that you in the design process can place any number of objects, and move them around as you please. When the file is saved, the canvas is converted to a fixed image. The variable fields such as counters and dates are then added to this image in the print job on the TCU.

An illustration of this process:

Design: everything is an object. Text, logos, barcodes etc can be moved around freely.
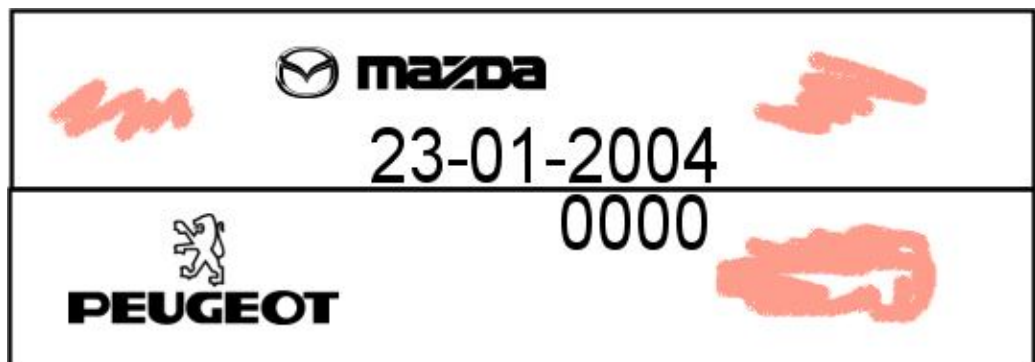
Print:

The grey area (text, logos and barcodes) are converted to one fixed image. Variables (Blue) are imposed on top.
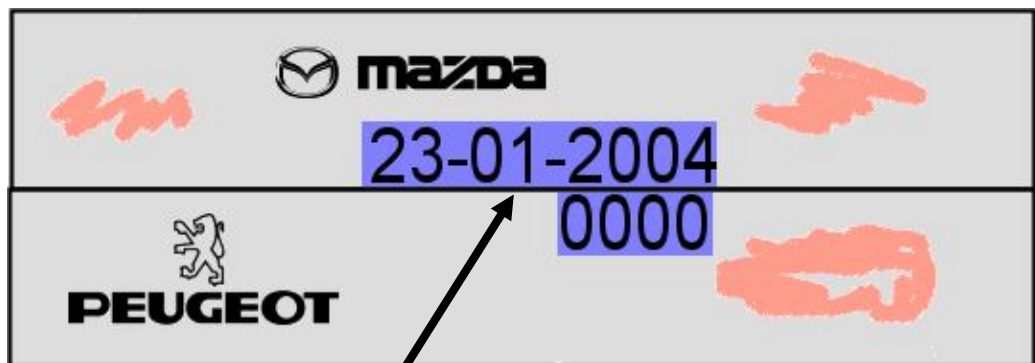
Variable content (TCU objects) will be on top

Design a picture using OBJ INKdraw

All pictures for the TCU are designed using OBJ Inkdraw. You do this in a special mode, selected when you start a new picture. You can also change to this mode later, and thereby turn your existing pictures into TCU pictures.
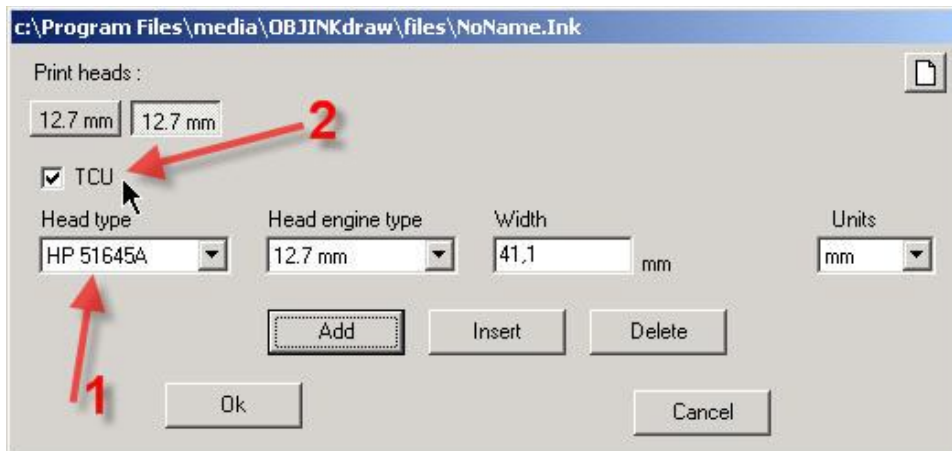
Features of the TCU

❑ 1 or 2 HP heads, up to 2 x 12,7mm print height (1 inch)
   (2 heads can be 2 x 1   or   1 x 2)
❑ Message length up to 2,7 meters, depending on resolution and font size.
❑ Memory is dynamically allocated between message length, font sizes and resolution.
❑ 4 special TCU objects: date, time, counter and text prompt.
❑ Available are 2 times, 2 counters, 4 dates and 10 text prompts. All other OBJ INKdraw objects available will become static background
❑ Adjustable voltage on heads for special inks
❑ Ability to use bulk systems

Starting a new picture

When you want to design pictures for the TCU, you must select "HP" as the head type, and make sure to check "TCU". You will be able to add 1 or 2 heads of 12,7mm.

Dialog box when making a new TCU picture

Notice

If you wish to change a "normal" HP message to TCU, and you have more than 2 heads, you will be asked to delete some of the heads before you can continue. The TCU will only work with max two heads.

After pressing OK to the new picture, you are now in TCU MODE. This is clearly indicated in the right-hand side of the screen (above object list)

When you are in TCU mode, the main tool bar changes to the TCU tool bar:
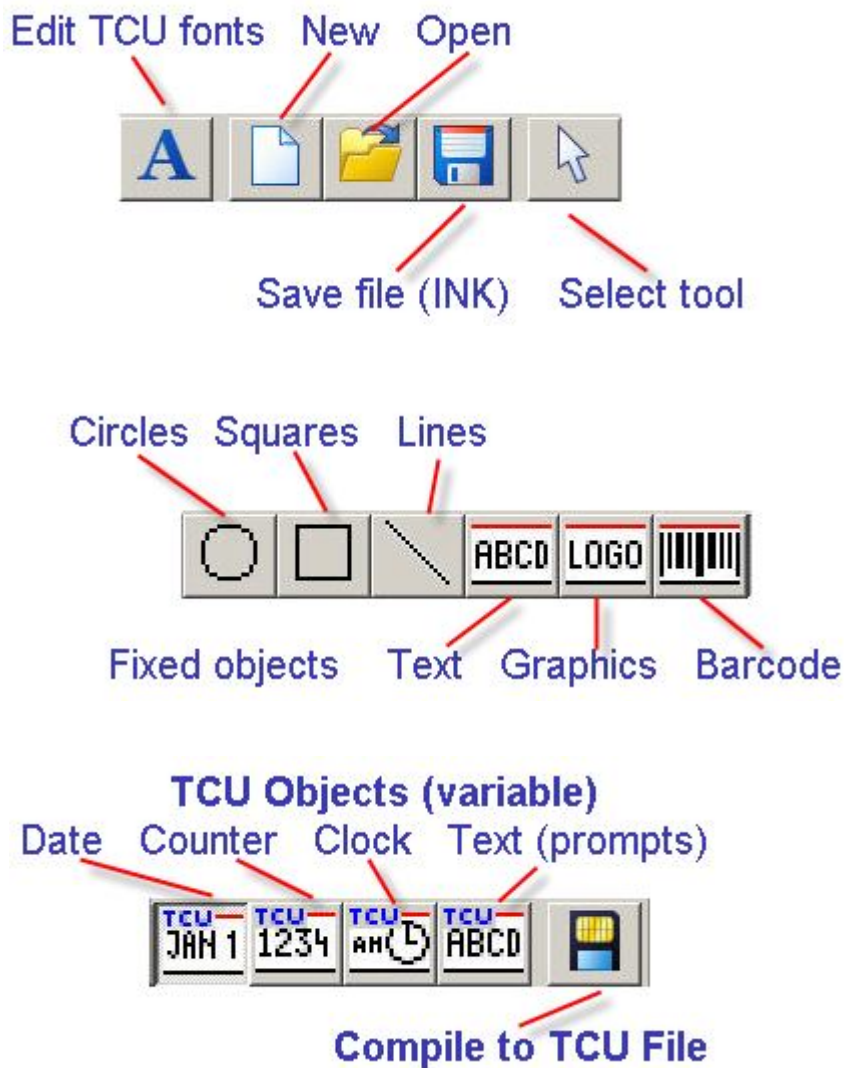
Fixed objects

The TCU can work with any fixed object that does not normally change automatically. This means that dates, counters, databases and shift objects are not available. But that any number of fixed text labels, graphics and barcodes can be used in your TCU layout. Normal properties are available for these objects.

Variable Message Objects

In addition to the normal (fixed objects), four new icons are added to the icon bar. Notice the writing in blue above the object image.

Date	Counter	Clock	Text (prompt)

TCU icons
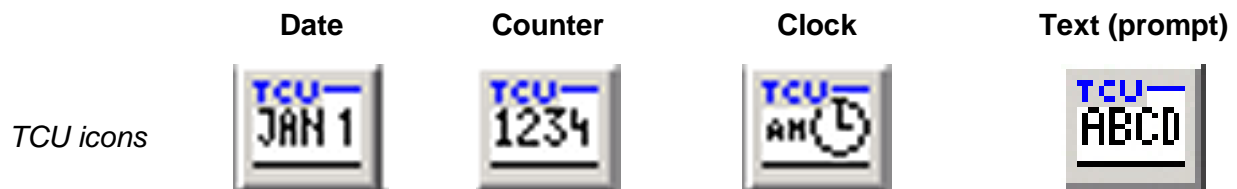
Differences compared to normal objects

The TCU objects are different compared to normal objects in several ways.

- You have 3 different fonts/ font sizes per message to choose from (see section on TCU fonts). These can be from any of the proportional Windows fonts installed in your system.

- You can drag the objects freely sideways, but vertically you are limited to the setup of the chosen font.

Date / Time

The date and time format is user-defineable, based on different format codes. When designing a message you can choose from a pre-defined format or type your own. You can choose between the following format codes, where the letters mean the following for the date
29 February 2004, 14:45 (2.45pm)

Code	Meaning	Values possible	In example above
dd	day, 2 digits	00 - 31	29
mm	Month, 2 digits	00 - 12	02
mmm	Month name in letters	jan.. dec	feb
yy	Year, 2 digits	00 - 99	04
yyyy	Year, 4 digits	2004 - 9999	2004

The month names in letters are equal to the Windows format currently used. In English, you get "jan, feb, mar, apr, jun, jul.."

Likewise, the capitalization follows the code. From above:
"mmm" => "feb" while "MMM" => "FEB".

"Mmm" will result in "Feb" although frequently displayed as a number. This is because "Mmm" is not a valid date format in Windows and can't be displayed by OBJ Inkdraw. It will, however, print correctly on the TCU.

In time object formatting, you can choose between hour and minute, or both. Separator freely chooseable.

Code	Meaning	Values possible	In example above
hh	Hour, 2 digits (24 hour clock).	00 - 23	14
nn	Minute, 2 digits	00 - 59	45

At the moment, dates are formatted on the canvas as Windows usually formats dates. For non-English settings this means that you might see the canvas display f.ex. "dd-mm-yyyy" but you have selected "dd/mm-yyyy". The TCU will print as the drop-down.

It is possible to enter your own format (separators), so you f.ex. could have dd:mm:yyyy   to print   29:04:2004

Counter

The TCU counter object can only display numbers, and only the decimal format.

You can choose, as with the normal counter, to count up/ down and how many decimal places you want.

Text (prompt)

TCU text is used if you wish to enter variable information before print. The user is asked before print starts about the content, and can enter all available characters on the TCU keyboard. If nothing is entered, the content put in the object in OBJ INKdraw will be used.

Also, in OBJ INKdraw you can set a max length, up to 16 characters.

How to activate prompts for TCU objects

TCU prompts are only available and useable on TCUs with display. Either compact with terminal added, or integrated.

Do not use prompts in layouts for non-display models, since you can't enter information, and thereby not start print function.

Prompts for TCU objects are used to allow the user to enter information into variable objects. Normally objects are not editable on the TCU units, but you can use prompts to allow editing.

Follow the procedure described below to activate prompts:

You must click on the object to activate it (border is RED).

Then click "TCU Prompt" on object properties

Prompt text is the object name, which you can freely modify.
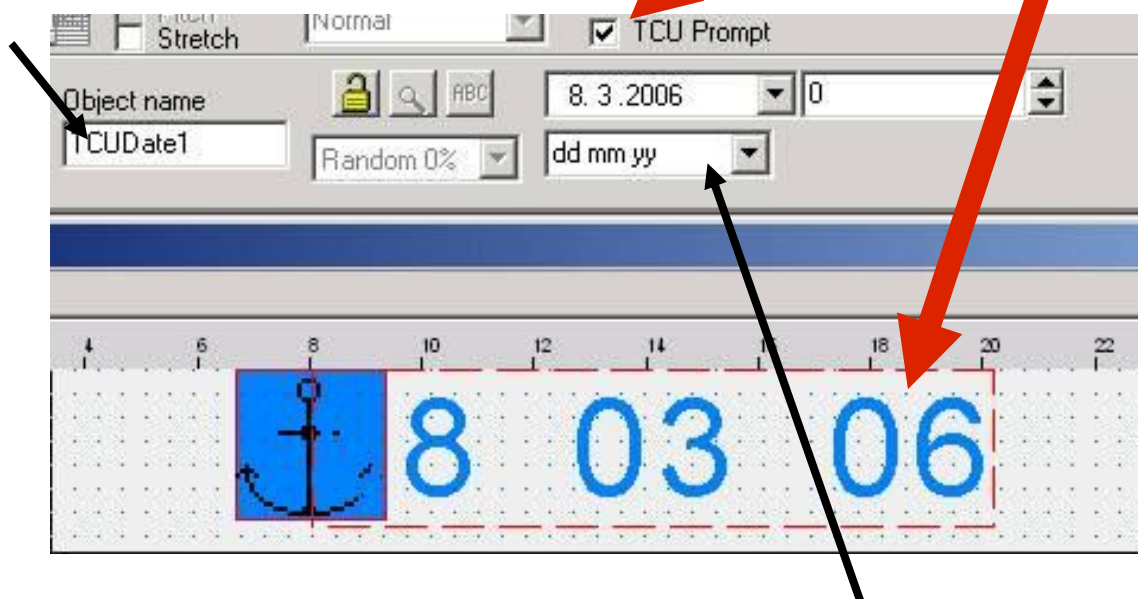
Prompt input format for date/ time is the same as output format. You don't have to, but can, enter separators like space or dash. The total format string must be 10 characters or less.

Text objects have prompts activated by definition. If you don't need prompt on a text line, simply make a static text.

Working with TCU font styles

The variable TCU objects display textual information. Because of it's resources, the TCU is not able to place and scale fonts freely. That is why the *font anchors* were made.

For every TCU message you can choose up to 3 different fonts, each linked to an anchor with a different color. Within each of the 3 fonts, you can choose between font type (Arial, Times Roman, and every other installed true type font), a font size, bold - you can even stretch the font freely.

Each of the 3 fonts can be freely placed relative to the anchor, which is fixed to the top of the head. You can always move the font left and right in single-pixel steps.

Some illustrations will show the point of anchors:
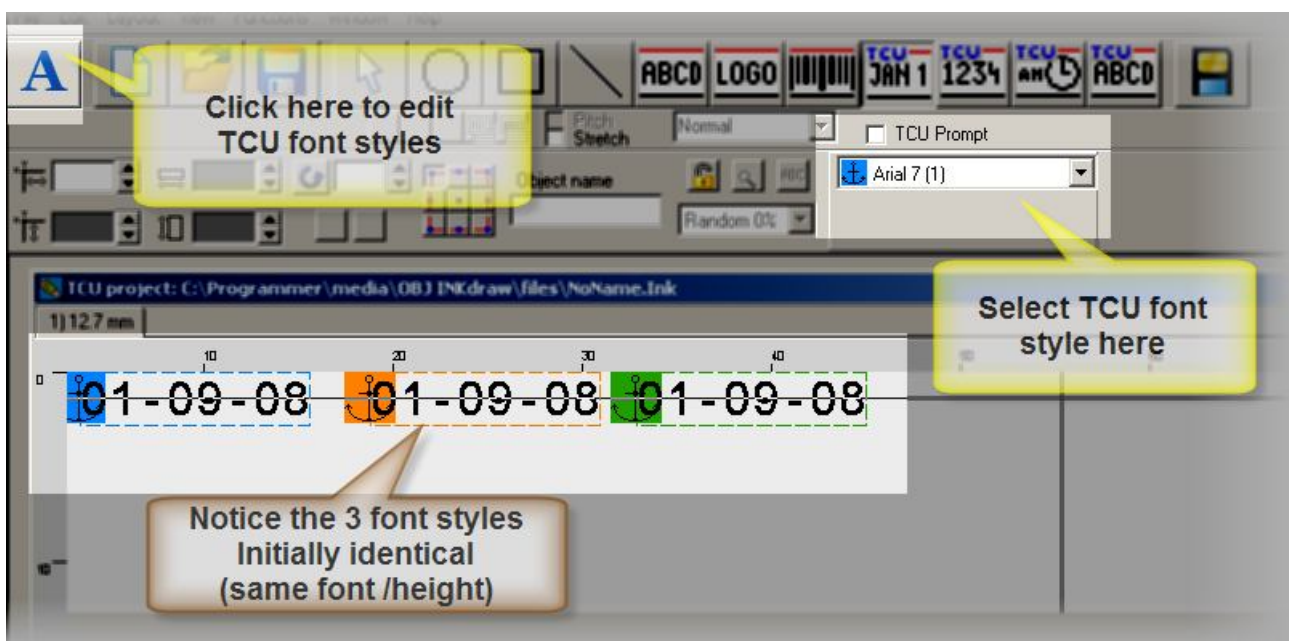
As you can see in the above picture, the 3 different font styles have been added to the TCU picture. So far, none of the font styles have been edited.
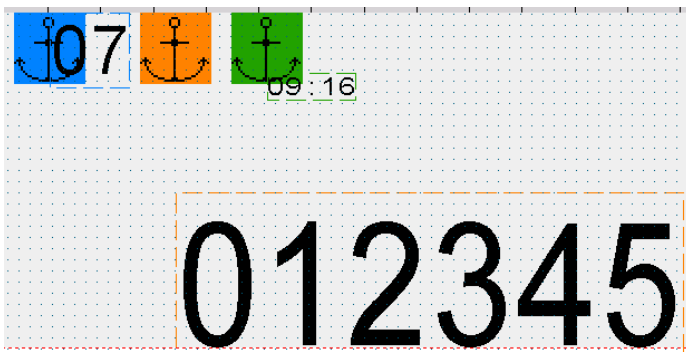
Here the fonts have been edited to 3 different sizes and positions. Notice how the anchors are kept in the same position and the text is relative to the anchor.

Editing TCU fonts

To edit the TCU fonts, click the icon next to the font style selector. This will bring up the font editor window.

To edit the font style, select it in the drop-down top left and alter the appearance.

You can either set a pre-defined size or drag freely.

Notice the head limits (dotted lines) - you can not exceed these.

When you are done editing the font style(s), press *Close*.
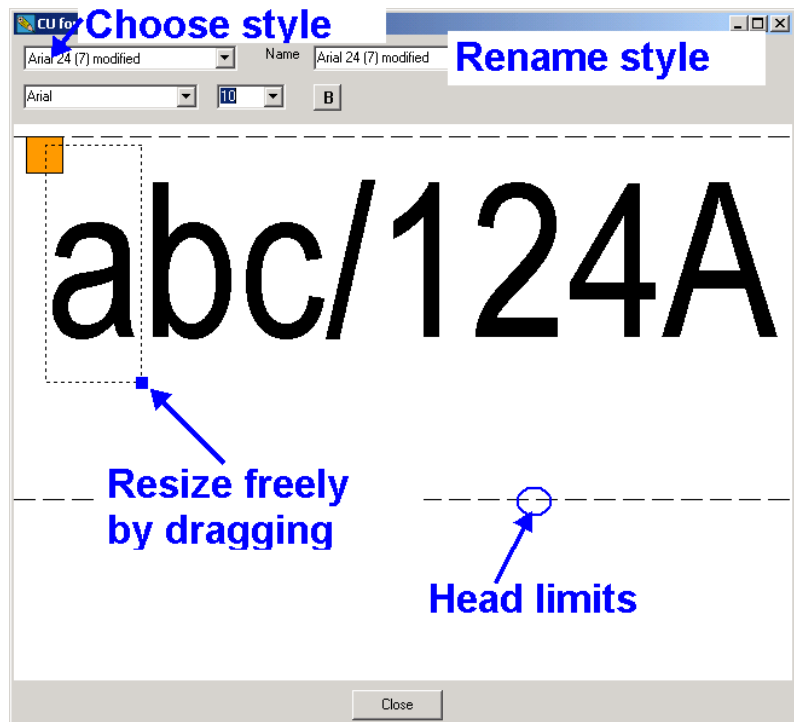
Limitations of the TCU fonts

Although the font specifications are quite flexible, there are a few limitations in the TCU:

You can not have more than two TCU objects printing at the same time in same printhead.
If you do, the last will not be printed. It will appear "masked" in the layout.
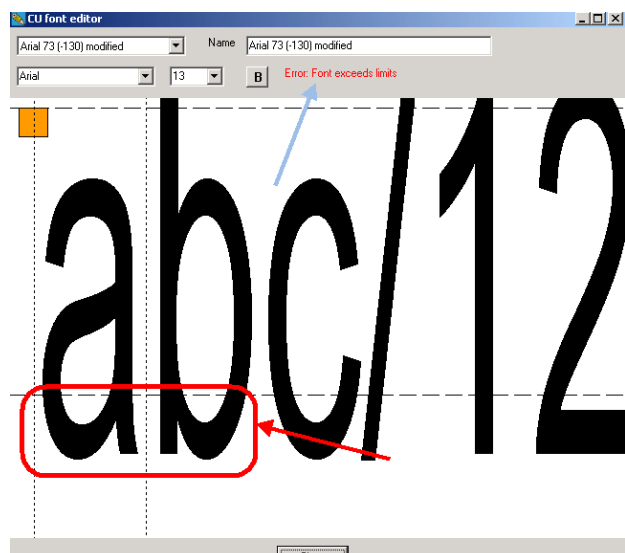
In this example, the blue and green objects both start within the horizontal position of the orange.

TCU texts do not have this limitation.
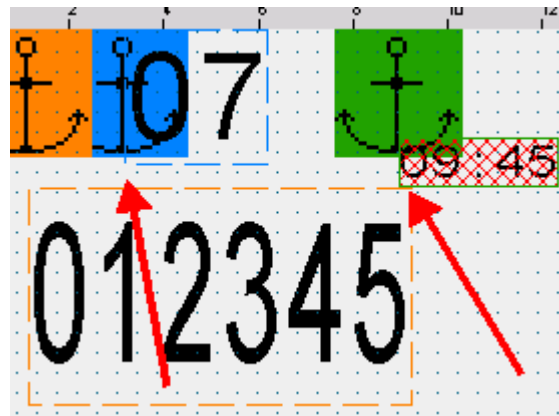
Fonts can not exceed limits of the head.

They will automatically be moved into the limits of the head.

The TCU has limited memory resources. A combination of the following: 600 dpi, large fonts and long message length, can cause the memory to be used 100%. Reduce one or more of these factors to go below 100%.

The bar at the bottom of the picture will flash red if all memory is used.
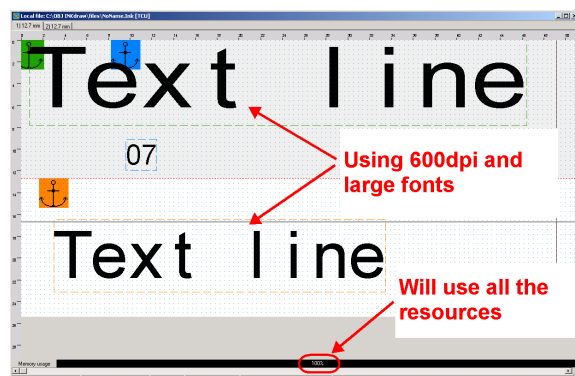
Saving the TCU message

Working with TCU files is just like working with INK files. In fact, the TCU file *is* an INK file until you transform it (compile it) into TCU files.

When you save the TCU message, it will be saved to the files directory, where your normal OBJ files are placed – as an INK file.

To transform the file into TCU format, press "Compile to CF"or press "F10"

This will open the "Save" dialog box. You can select your CF card drive here, if a formatted card is inserted, and set options.

TCU save dialog

Enter a file name into the filename box. You may choose any location, but **it is recommended to choose your CF drive directly.**

You can choose to save the .INK file along with the TCU file, so you always have them together.

Notice:

Only English characters are permitted in the file name (a-z and 0-9).

It is strongly recommended that you remember to eject the CF card, either by using the checkbox in Inkdraw, or by ejecting it in Windows later. This is to ensure that files are not corrupted by Windows.
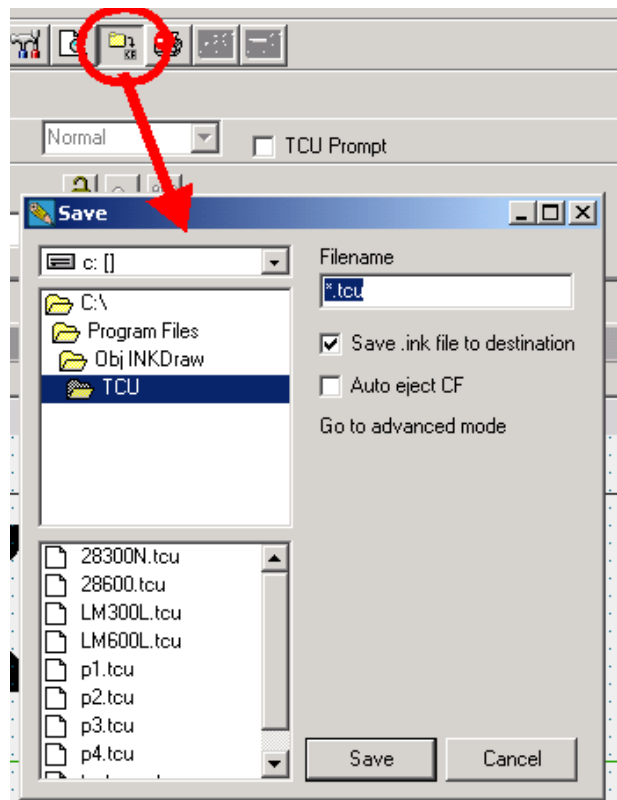
When you have saved, you will notice that not only 1 but minimum **4** files have been created, all with the same name. **They are _all_ needed for the TCU to load the file correctly.** You must make sure all these files are on the flash card.

filename.**fnt**	Font data for the TCU objects
filename.**pic**	Background (non TCU objects)
filename.**tab**	Tables for the printout
filename.**tcu**	TCU Object data
filename.**p??**	Text prompt data.Only if there are text prompts in the message
filename.**d??**	Date file, if you use "mmm" codes. Contains the data of the month names.

It is strongly recommended to use _short filenames_, meaning no more than 8 characters, and no spaces. Otherwise, the files will be shown as

filena→1   _(ex: "filename 1")_

Special ink – voltage settings

For some inks it may be required to change the TCU voltage supplied to the pens. Either for optimal performance of the ink, or because the ink simply requires a different voltage.

The TCU supports this change, on a per-message setting.

In order to adjust pen voltage, press F9 from message design. In the parameter menu, change HP head settings:
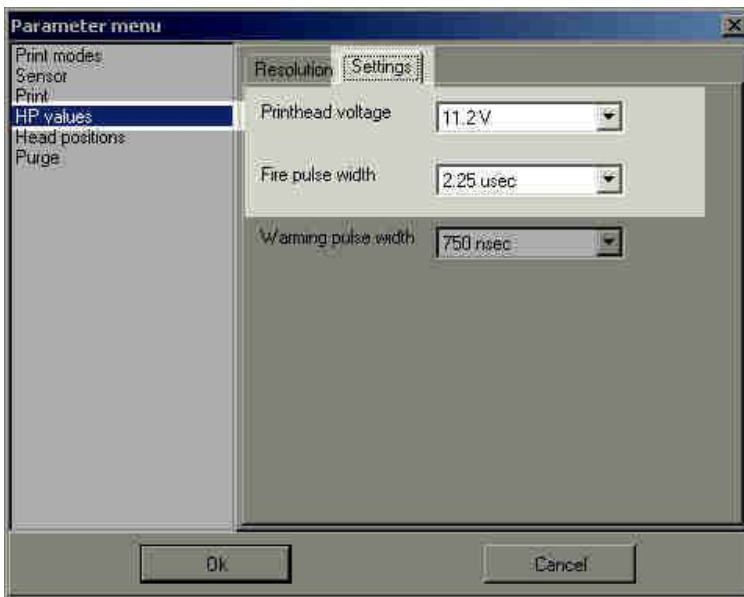
The ability to change voltage requires the following minimum:

- TCU Firmware 029 (TCU 3.6)
- INKdraw 1.9.80 or later

Using the TCU

The TCU can be controlled in 3 different ways: stand-alone, with print selector and with terminal.

In either case, the Compact Flash card must be inserted into the TCU before turning on the power.

When you start up the TCU, and turn on the power, the *FPGA* file will be loaded. You can compare this to the startup of a PC – it needs an operating system to work.

The FPGA file is located on the compact flash card, and must always be present. If you delete it, you can not use your TCU.
You should always have the following files on your flash card:

        FPGAFILE.EPR   (TCU operating system)
        LANGUAGE   (laguage file)

Also, you must have at least ONE layout on the CF card. If no layout is present, you will receive a warning "No files found"

Do not remove the compact flash card when the TCU is turned on. This may damage the card and/ or the internal memory of your unit.

After loading the FPGA file – which will take less than 2 seconds – your unit will load the last file used, or the first file found on the compact flash card if the last-used file is not present.

Start-stop print

Press the red button or terminal start button to start / stop print. The print will start from last counter value if it is restarted.

Purge heads

Press the black button or enter on purge menu to purge all heads. This is useful for cleaning the heads and detecting problems with missing nozzles

Stand-alone

If you wish to use the unit without any message selector (print selector or terminal), you can use only one file per flash card. This file will automatically be loaded when you turn on the power.

Such setup is ideal for simple jobs where the layout does not change, example: date stamping, numbering or indicia printing.

Simply press START/STOP button on the front to start print process.

Push START/STOP button (RED) to activate and stop print mode

Blinking = loading message

Constant light = ready to print

If more than 1 TCU layout is present on the flash card, the first layout found will be loaded. This is the file first written to the card, and is not necessarily the first file alphabetically.

The TCU has a built-in clock. If you wish to adjust the date / time without a terminal, you must connect a PC to the COM 1 connector on the TCU using an RS232 cable.

Please see later chapter discussing this.

Print Selector

To add more flexibility, you can connect a print selector box. This is a separate item available for purchase, and is not included with the TCU.

When changing between each of the 10 positions and 2 test pictures, you select a file and load it. Press the start button on the TCU, as above, to activate print.

With the print selector you also have access to 2 test pictures on the flash card. Test-1 and Test-2, which are pre-defined from HSA and write-protected to prevent deletion. You can of course use these names as well to get 12 files totally.

File names for use with the print selector must have names from

TCU-1 to **TCU-10**

(including the dash)

Terminal / Integrated

When you turn on the TCU, it will show the main menu.
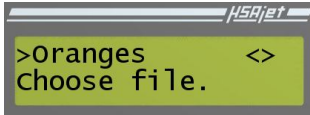
The main menu simply is a list of files available on the installed compact flash memory card. The last used file will always be loaded into memory when you turn on the machine.

You will see a ">" in front of the file currently selected.

If more than 2 files are available there will be arrows indicating that you can scroll up / down the list to select a file.

When the unit is not in print mode, "Choose file." is displayed.

When a message is printing you will see "printing" displayed. This indicates that the current message is in print function.

If a *different* message is printing, you will see it's name displayed. Here, *apples* is printing while *oranges 1* is loaded.

Notice the ">" to the right indicating that there are more files available.

From the main menu you have these options

- Load the selected file by pressing the enter key, or use arrow keys to locate a different file name
- Press the setup button to enter the configuration menu
- Press the print button to start print

It is easy to find the file name if you know the start letter(s). The TCU has built-in *find-as-you-type function.*

If you start typing on the keypad, the display will jump to the filename that best matches they characters typed in. Press **Enter** to load the file, or **ESC to cancel**.

Setup

If you have a Terminal with your TCU, you can change various settings in the setup menu. Press the button next to print start (indicated with hammer/screwdriver), and you will see the setup menu.

The configuration of the TCU is done through several screens. Navigate between the individual screens with arrow up / down. Go back to the main menu with ESC.

To select an option within a screen, navigate with arrows left / right and press ENTER.

Screen 1 is for the basic setup.

<u>P</u>urge	Pressing enter on this will purge all connected heads to clean them.
<u>S</u>pit	Pressing enter on this will allow you to set up the automatic spit function
<u>C</u>art	Press enter to change cartridges. Use this to turn off power on the heads when changing. You will see a separate screen indicating that you can change the cartridges.
S<u>0</u>00	Start delay. Press enter to edit, then enter a number.
Edg<u>+</u>	Press enter to toggle negative / positive edge
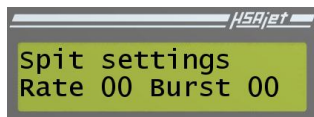
Settings for spit.

Rate 00	How often the printer is spitting. Input a value in seconds
Burst 00	How many rows the printer is spitting each time.

Recommended spit settings

Based on our experience and the dry time of standard HP cartridges, a recommended spit setting is **20** seconds and **10** burst.


Confirmation for cartridge change. Press enter when done.

Screen 2 is to test encoder / start sensor and to show the resolution.

Enc /	When there is encoder activity, the / will change between / - \ |
St	When the start sensor is activated, the "+" will change to "-"
1:+ 2:-	Shows if the message is configured for head 1 / 2.
600 x 600	Indicates the current print resolution. The print resolution is set in OBJ INKdraw when you create the message. You can not change it using the TCU.
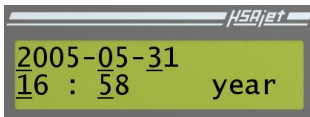
Screen 3 is for the date / time setup

You move between the individual parts of the date / time with arrows left / right, press enter to edit / accept changes.

Dates / times should be entered in YYYY-MM-DD HH:MM format, in a 24-hour clock. The text will show you what part you are editing (year, mon, day, hour, min)

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Ink lvl 1: 110 ml
Ink lvl 2: 110 ml
```

Screen 4 shows the current ink level (calculated)

Using the setting of cartridge size from the next screen, this screen shows the calculated remaining ink in each cartridge.

You can reset each cartridge to "full" by pressing Enter on the value.

```
Ink warning usr
Cart.size 953 mL
```

Screen 5 for setup of ink warning and cartridge size

There is a built-in ink warning function based on the remaining ink (calculated). In this screen you set up how much ink you have available in total for full cartridges.

You can set ink warning for

	ctr = 42 mL cartridge,
	blk = bulk ink tank 350 mL,
	usr = user defined level
and	**off** = do not warn.

You can only change cartridge size value for **usr**.

Low ink warning is a signal on OUT 2, please see section on connectors. The warning level is approx 20 % of full level.

Screen 6 is the version information

You can not edit anything here, but the screen shows what version of the TCU software you are using.

This is very helpful if you need to report any issues with your unit.

Printing

The TCU allows you to print with one file and at the same time prepare another message for quick change of print jobs.

When you press the print button the print mode will be activated.

If you have defined the message to have one or more prompts, the prompt screen will ask you to enter the values of the object.

You can only enter **english characters** into the TCU.

The date input will be in the same format defined in OBJ INKdraw, you will not have to enter for example ":" or "/" characters.

You can *not* print different directions on the two heads connected to a TCU.

Prompts

A prompt is set on the objects if you want the user to enter a value before the print starts. For example, you can use prompts for best-before dates or start values of counters.
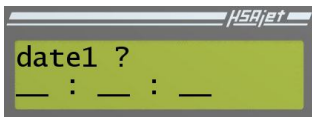
Enter the desired date and press enter to accept the value.

The input format is that of the date object itself.

Prompt for date1 object.

If you press enter and wish to change the value of the prompt you just entered, you can press ESC to go back. This is only possible if your prompt is not the last to be entered.

To start over, stop print and from the main menu press print again without loading a different file.

After entering prompts you will see to the print screen.

Print screen

000000	The numbers indicate the number of prints that were done since last print start.
<->	You can adjust the start delay during print with the arrow keys left/right.
ESC:main	Informs that ESC will go to main menu
0000<->	Start delay setting. Change with arrows left/ right. Arrows up/down changes 100s. This value is stored in the message for next use

During print mode, if you press **print** button, you will stop the print activity.

Pressing **ESC** will take you to the main menu. From there you can load a new file, and press print to go to the print menu. All the time the file that was printing before will still remain in memory.

Restarting print

If you press print and you have loaded a different file, you will be prompted if you want to restart the old print job, or start the new.

Acceptable values are

Y: start over with the same print job
N: start with the new file
ESC: do nothing - do not start print.
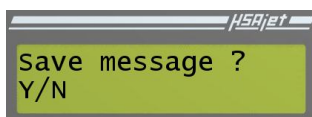
Pressing (N)o to restart the print (so, to start with a new message) will prompt you to save the settings of the current message.

Start position and prompts will be saved.

After selecting you return to the main menu.

Connecting to the TCU by RS/232

Typically the RS/232 connection is used if you have a unit without display and wish to adjust date/time. You need a PC with a terminal software and a crossed cable.
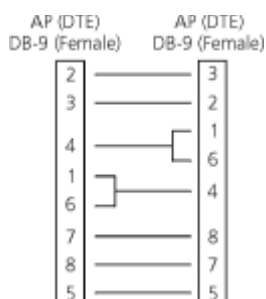
Connect a *crossed over* 9-pin serial cable from your PC to the TCU (**COM1**).
This cable is often referred to as a **Null-Modem cable**, which has pins 2 and 3 crossed.

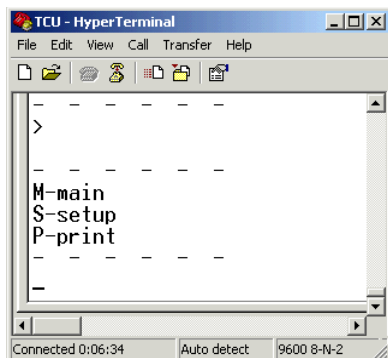It is only necessary to connect pins 2, 3 and 5.

Install a terminal program.

HSA has tested this with Hilgraeve's HyperTerminal, which is free for personal use. Please see http://www.hilgraeve.com/htpe/index.html

9600 bps,

8 data bits,

1 stop bit

no parity, no flow control

Connect using the parameters listed to the left.

TIP!

Resize the window so that you see 2 menu lines (screen) plus navigation menu

Once you turn on the TCU, you should see the main menu. The terminal simulates the TCU TERM3 screen, so that you see the TERM3 screen in the top section, and the navigation menu in the bottom section. Use **ESC**, **S**, and **P** to navigate.
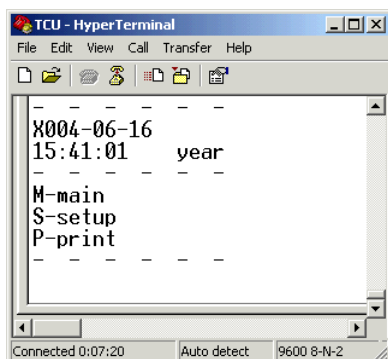
Press **S** to go to setup menu and use 8, 4, 6, 2 to navigate the menu. "X" is the cursor.

When the "X" is above what you wish to change, press *enter* and type the new value. Then press *enter* again to accept.

Controlling the TCU from a PLC

The control of TCUs via a PLC is **NOT** supported by HS Automatic. We only give you the instructions here for information purposes, but we do not offer support for this solution.

Technically it is possible to control the TCU only by using a PLC. Using the menu and the proper keys, you can select messages, start and stop print etc.

But beware that **the TCU does not have a protocol, or a buffer.** You can send only 1 character at a time, and you do not have a feedback about the result of a command.

If you program the PLC appropriately however it should be possible. Notice that HS Automatic can't support RS232 remote control on the TCU.

For sending keys, you need the following information:

#0D (ASCII value 13)	Enter key (start / stop editing of fields)
#1B (ASCII value 27)	ESC key
2, 4, 6, 8	Act as arrow keys. 2 = down, 8 = up, etc.
S (capital)	Setup screen
M (capital)	Main screen, same function as ESC
P (capital)	Print start / stop

What you send should **not** be followed by any characters (like CR, LF, etc)

Every time you send a character, the 9 lines of the menu (split by #0A) are returned by the TCU, as this example illustrates (#0A removed for illustration purposes)

```
M
-  -  -  -  -  -
>TCU-1          <
Choose file
-  -  -  -  -  -
M-main
S-setup
P-print
-  -  -  -  -  -
```

The character you sent last

TCU display shown here. Same as output on Terminal

Menu to remind you about the keys.
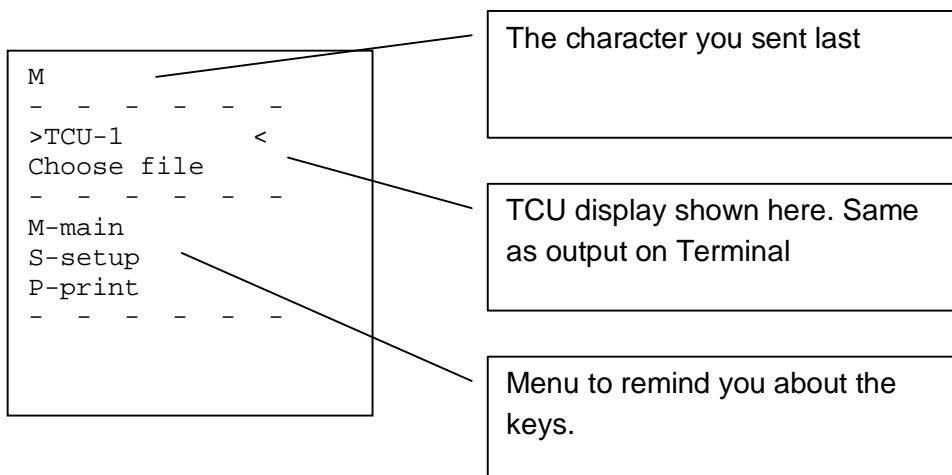
Upgrading your TCU

Sometimes it is necessary to upgrade your TCU. This could be because new features are added or the unit is improved in other ways. It is possible to do this directly from the TCU itself, the process requires a compact flash card and takes about 30 seconds.

Getting the upgrade firmware

The firmware is distributed from HSA. Over time, it will be available from our web page for download. It will be distributed in one file called **firmware.000** where *000* is a number. An internal check is done to make sure that it is a valid firmware file and that you don't downgrade.

Simply place the firmware file on a compact flash card. You may use the same card that you stored messages on. Once the upgrade is done, you can safely delete the firmware file from the compact flash card.

Doing the upgrade

When you turn on the TCU with the compact flash card containing the firmware file, it will automatically detect the upgrade. You will see the following on the screen:
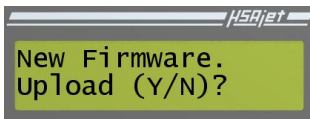
New firmware has been found. You can choose if you wish to upgrade or not. Press **Y** to upload the upgrade, or **N** to skip upload.
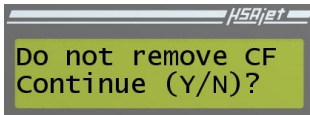
It is important that you leave the Compact Flash card in the TCU when you upgrade. You are asked again to confirm that you understand this. Press **Y** to start the actual upgrade.
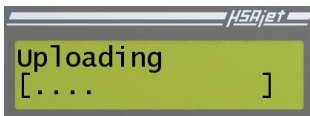
During upgrade you will see this message and the dots will indicate the progress.

The upgrade will take about 10-15 seconds.

When the progress bar (dots) is not longer counting, you can switch off your unit. It is common that the screen becomes blank after an upgrade. It will work when you turn power off / on.

Error situations

Should an error situation occur, the TCU display will show you what the error could be. The following will describe the error situations.

If you have the Print Selector, the error LED will either flash (✺) or be lit continously (◎)

Display on TCU	Meaning of error	Shown on Print Selector
Error FPGAFILE missing	The file with the FPGA is not on the CF card. *Place this file on the card and try again.* You can download a copy from HS Automatic's web page	◎
Error Language missing	There is no language file on the CF card. *Place this file on the card and try again.* You can download a copy from HS Automatic's web page	◎
Error Write Protected	The file you were trying to load is write protected.	✺
Error Fonts missing	File missing. This applies to the special file names on the Print Selector, you can't select a non-existing file on the terminal. *Turn dial to an existing file.*	✺
Error Fonts missing	The .fnt file of the layout is missing	
Error Bckgrnds missing	The .pic file of the layout is missing	
Error Tables missing	The .tab file of the layout is missing	

Terminal Language

The language of the TCU is by default English. The setup of the language is done via a language file on the compact flash card, called LANGUAGE (notice no extension). As it is just a simple text file, you can create your own language strings for the TCU interface.

Simply create a backup of the file and replace the original with your translated version

The lines **must** be in the same order as the original file. If you add/ remove lines, the display will not be correct.

String lengths are fixed, any additional characters are chopped off

Even if you redefine prompt letters, you must still use Y and N to answer.

Format of the language file

The language file consists of different lines, with a description and the actual value, separated by an '=' (equal sign). For your help, the length of the text is inserted in [ ]. This is only for information, since the line will automatically be chopped or spaces will be added.

The order of the lines *is* important. Do not delete or add lines, and do not remove any '='.

Below a few lines from the file

```
Print mode active (active file), main menu [16] = Printing
Print mode active (other file), main menu [4] = prt:
Choose message, main menu [16] = Choose file
Purge menu [5] = Purge
Edge toggle [3] = Edg
```

Translating the language file

When you translate the file, you can add your own description to the left side of the '='. You do not have to keep the numbers or brackets [ ]. Below an example of a Danish translation

```
Udskriver aktiv fil, hovedmenu = Udskrives
Udskriver anden fil, hovedmenu = Uds:
```
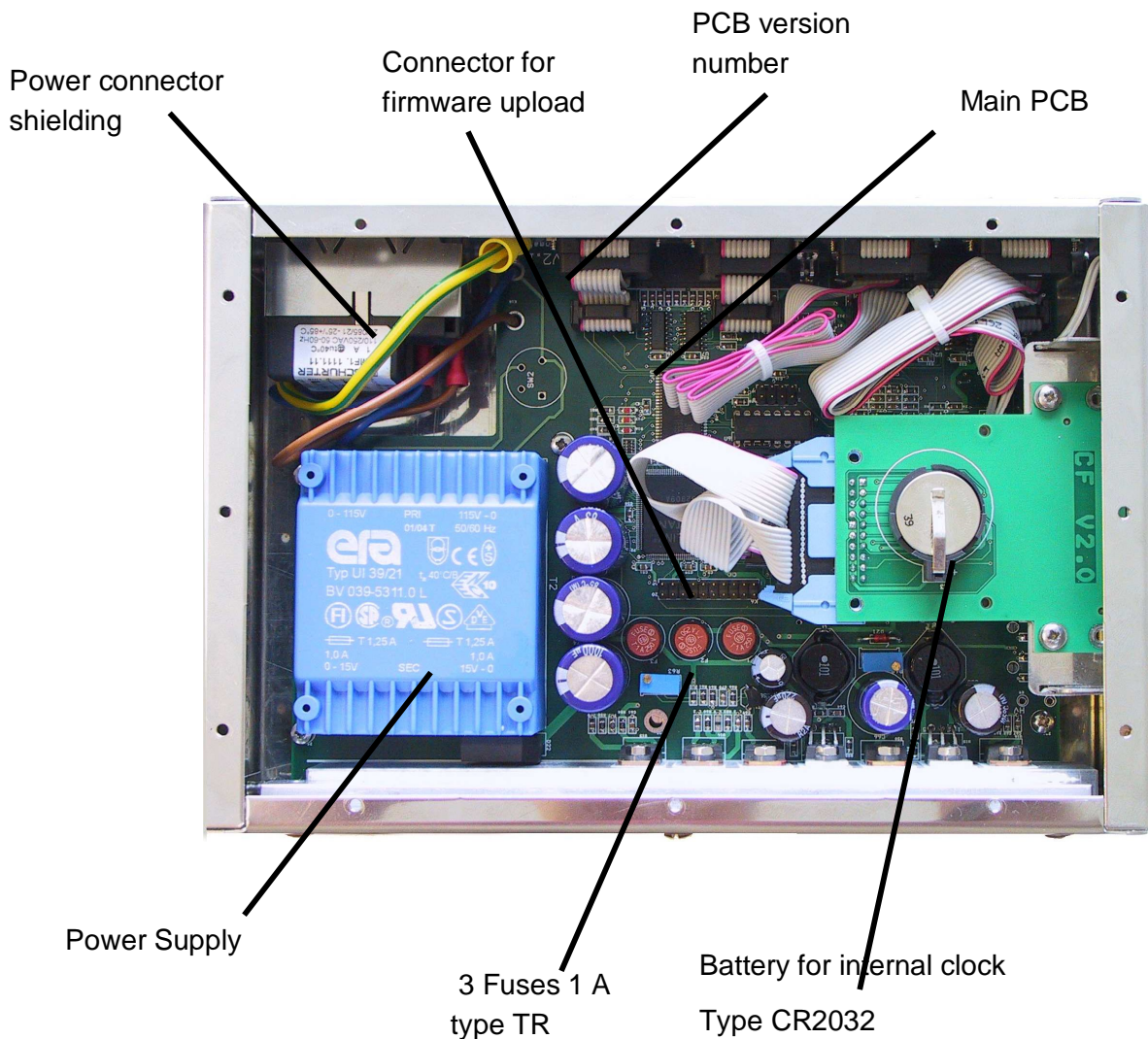
The TCU inside

This section will describe the insides of the TCU. This is mostly for your information, but also to inform about simple service jobs you can do.

Before removing back panel, make sure the unit is turned off and the power cord is unplugged.

Do not try to modify anything in the TCU - it may void your warranty. Only do simple operations such as changing fuses and battery.

Power connector shielding

Connector for firmware upload

PCB version number

Main PCB

Power Supply

3 Fuses 1 A type TR

Battery for internal clock
Type CR2032

Appendix

Technical overview

HSAjet TCU

Print Head Technology	HP TIJ 2.5 (12.7 mm).
Max no of heads	2 (Total height 25.4 mm / 1 inch). Same direction print only.
Distance to surface	0.5 mm – 2 mm
Speed / resolution (Horizontal x Vertical)	
600 x 600 dpi => max resolution	38 m/min
300 x 300 dpi	76 / 152 m/min
150 x 300 dpi => max speed	304 m/min
Max message length:	Depends on resolution and font sizes. Max available 2,7 m.
Ink	All HP inks.
	Bulk ink useage possible (HP Centaur)

Print Capacity

Design software	OBJ INKdraw (Free)
Font support	Full support for Windows Truetype®
Text / graphics (fixed)	Scale, Rotate, different fonts on each object
Static Objects	Unlimited per message
Variable Objects	
date	Maximum 4 per message.
	Date, month, year, month name
time	Maximum 2 per message. 24 hour clock only (hh / mm)
counter	Maximum 2 per message. Decimal only.
text prompt	Maximum 10 per message
Special Functions	Change of date, time, counter, text by use of prompts.
	Numbers / English letters input only.
Barcode Printing	Yes (not variable). All symbologies, incl 2-D.
Graphics / Logos	Scaleable to max height

Inputs / Outputs

Print sensor	Negative / positive flank
Encoder	Encoder input (24 V and 5 V), Quadrature / Position mode
Message Selector	HSAjet print selector, HSAjet Terminal, RS232

System

|	
Operator interface language	English, user-defineable (Only latin-1 character set)
Internal Memory	0.5 mb
External Memory	CF card (32 to 512 Mb),
	FAT-16 format only.
	Max number of layouts 120 / card.
Voltage	115 V / 230 V

Using external outputs

There are 2 different outputs that can be used for detection of when a message has been printed, and to give an alarm for low ink.

Notice that Iout $_{max}$ = 400mA

OUTPUT1:

This is always print message signal. The LED or relay will be active every time the start sensor is activated, until the message has been printed.
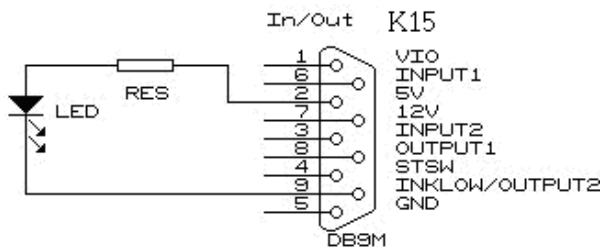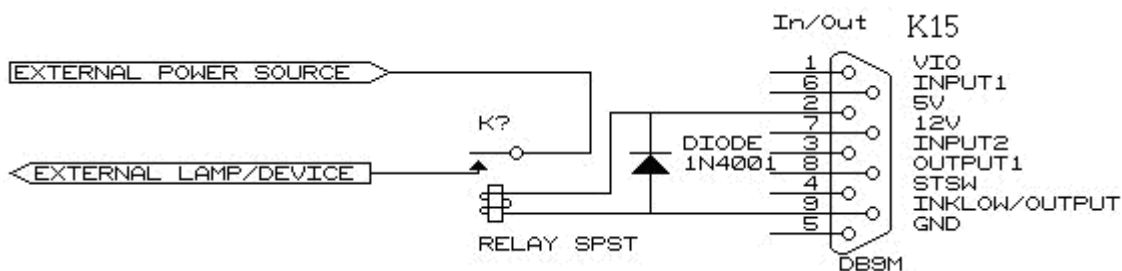

Connecting an LED

$$Led = \frac{5V - LEDvoltage}{LEDcurrent}$$
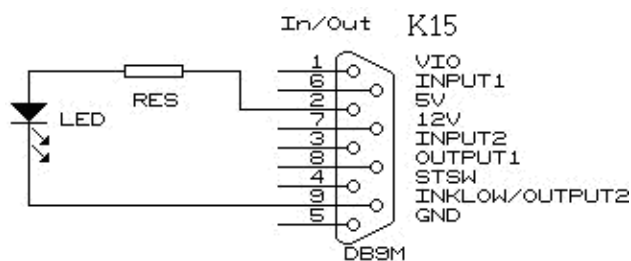
Connecting a RELAY

Schematic (for 5V relay), for Signal lamp/sound device:

OUTPUT2 :

This is used to get the low ink warning. When the specified amount of ink is close to being used, the alarm will go off.

Notice that you need to reset the ink level to "full" when you have replaced the cartridge. The amount of ink is calculated, not measured.

Notice: Iout max = 400mA

Connecting an LED

$$Led = \frac{5V - LEDvoltage}{LEDcurrent}$$

Depending on the LED used the LEDcurrent usually is:
For small surface mount LEDs: 5-10mA.
For most Leaded LEDs: 10-25mA.

Connecting a RELAY

Schematic (for 5V relay), for Signal lamp/sound device.
For 5V relays: Between pin 2 and pin 9.
For 12V relays: Between pin 7 and pin 9.
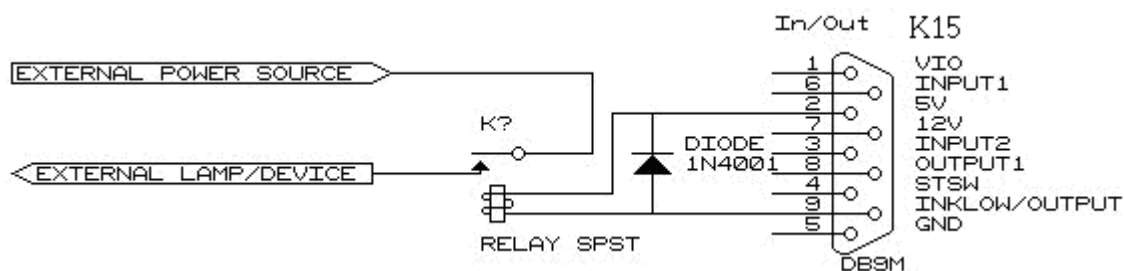
Start sensor connections

As a start sensor, you can use a simple switch, or a photo cell. The output is 24V, but typically photo cells are 10-30V.
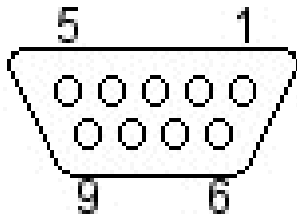
PIN	DESCRIPTION
1	V I/O
2	5 V
3	IN 2
4	START
5	GND
6	IN 1
7	**24 V**
8	OUT 1
9	OUT 2
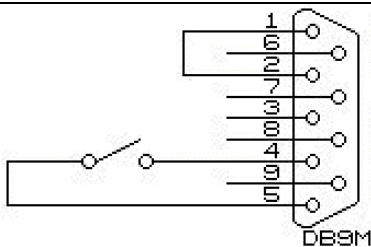
Using a **simple mechanical switch.**
Loop pins 1-2 and connect the switch between pins 4 and 5.
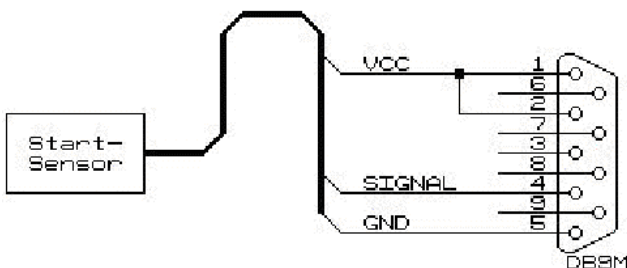
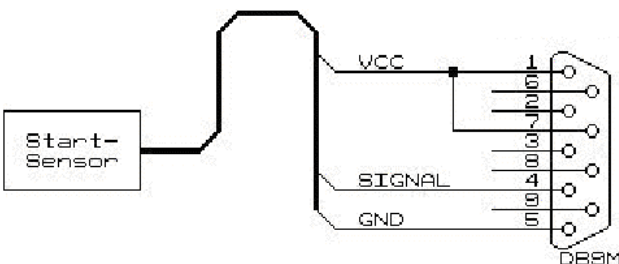**5 Volt NPN / PUSH/PULL sensor.**
VCC to pins 1,2
Signal to pin 4
GND to pin 5
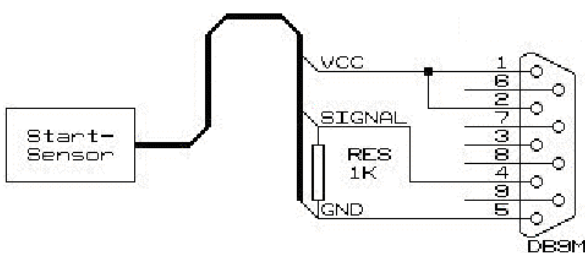
5 Volt PNP sensor.
VCC to pins 1,2
Signal to pin 4
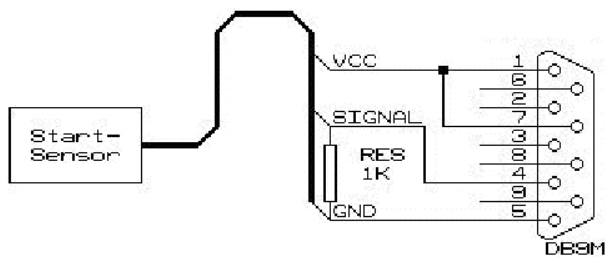GND to pin 5
1 K resistor between
pin 4 and 5

24 Volt NPN / PUSH/PULL
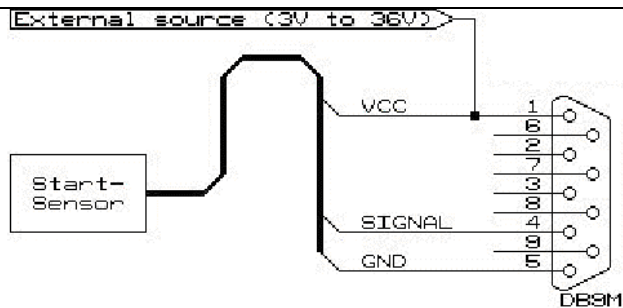VCC to pins 1,7
Signal to pin 4
GND to pin 5

24 Volt PNP sensor.
VCC to pins 1,7
Signal to pin 4
GND to pin 5
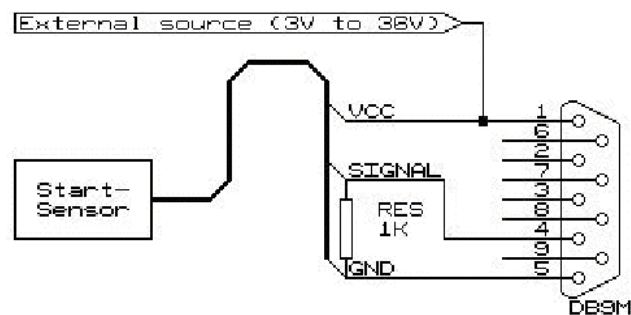1 K resistor between pin 4 and 5

External power source, +3-36V, using NPN / PUSH/PULL sensor
VCC to pin 1
Signal to pin 4
GND to pin 5

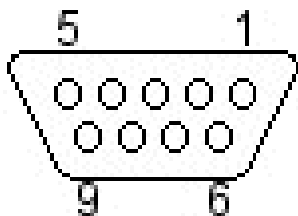**External power source, +3-36V, using PNP sensor**
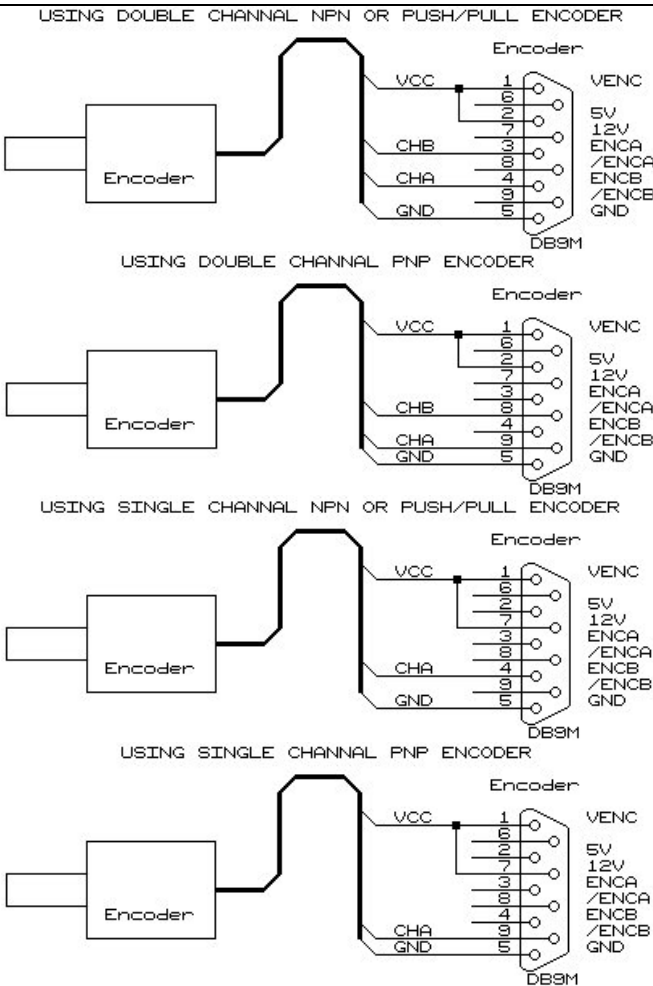VCC to pin 1
Signal to pin 4
GND to pin 5
1K resistor between 4 and 5.

connections

For the encoder, you can use either a single or double channel. If you have both channels connected, you need to activate "Quadrature" in the software, and divide distance / pulses by 4.


```
PIN ........................................................DESCRIPTION

1 .........................................................V ENC
2 .........................................................5 V
3 .........................................................ENC A
4 .........................................................ENC B
5 .........................................................GND
6 .........................................................INK LEVEL (not used)
7 .........................................................24 V
8 .........................................................ENC A (inv.)
9 .........................................................ENC B (inv.)
```
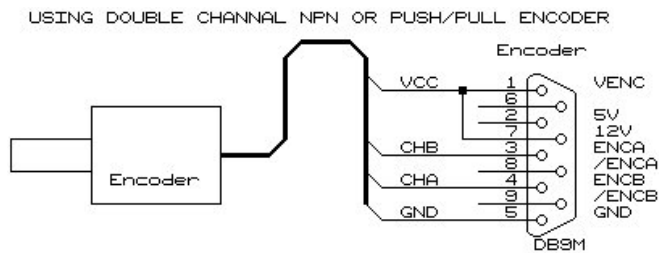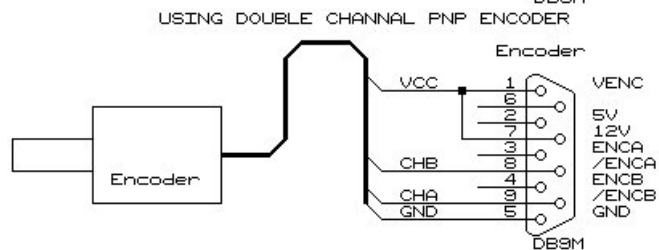

5 VOLT encoder double channel
NPN / PUSH/PULL encoder

5 VOLT encoder double channel
PNP encoder

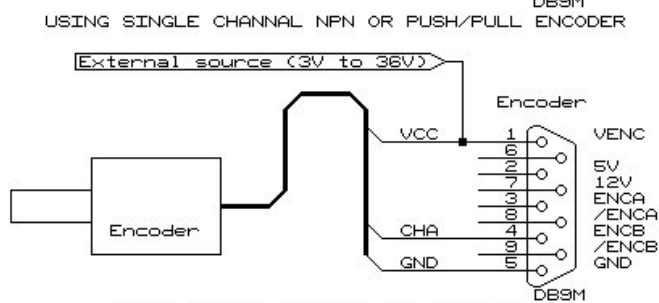24 VOLT encoder single channel
NPN/ PUSH/PULL encoder
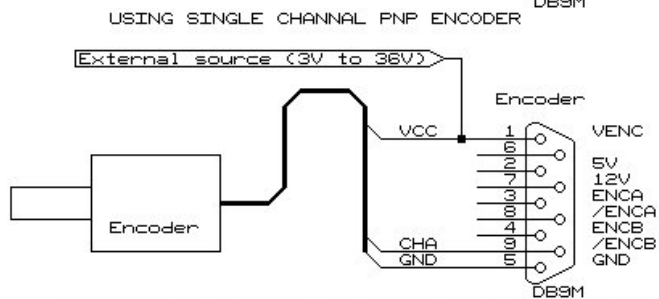
24 VOLT encoder single channel
PNP encoder

USING DOUBLE CHANNAL NPN OR PUSH/PULL ENCODER

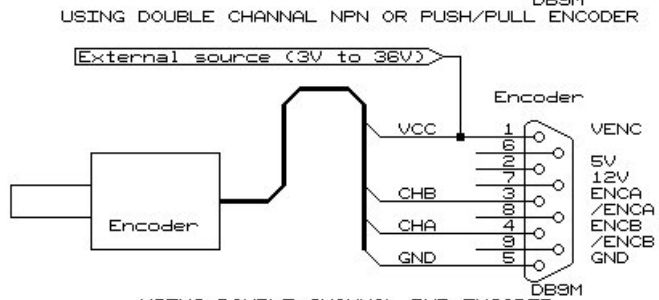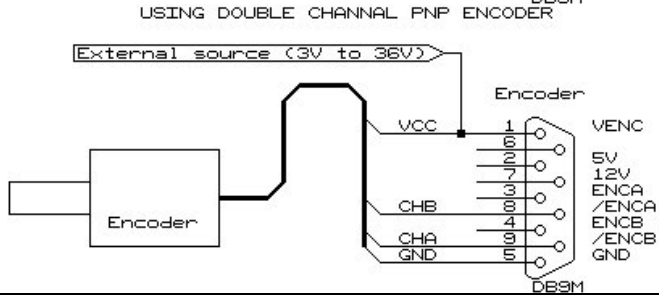24 VOLT encoder double channel
NPN / PUSH/PULL encoder

USING DOUBLE CHANNAL PNP ENCODER

24 VOLT encoder double channel
PNP encoder

USING SINGLE CHANNAL NPN OR PUSH/PULL ENCODER

External power source, 3-36V, encoder
single channel
NPN/ PUSH/PULL encoder

USING SINGLE CHANNAL PNP ENCODER

External power source, 3-36V, encoder
single channel
PNP encoder

USING DOUBLE CHANNAL NPN OR PUSH/PULL ENCODER

External power source, 3-36V, encoder
double channel
NPN / PUSH/PULL encoder

USING DOUBLE CHANNAL PNP ENCODER

External power source, 3-36V, encoder
double channel
PNP encoder

Drawings of the TCU

Below follows drawings of the TCU, with the main dimensions highlighted. High-res drawings available on request.

All dimensions are in mm.

65,70

65

Front

194

56

46,82

22,51

14,70

20

50,30

HEAD 1

HEAD 2

I/O

ENCODER

COM 1

COM 2

34

34

25,71

44