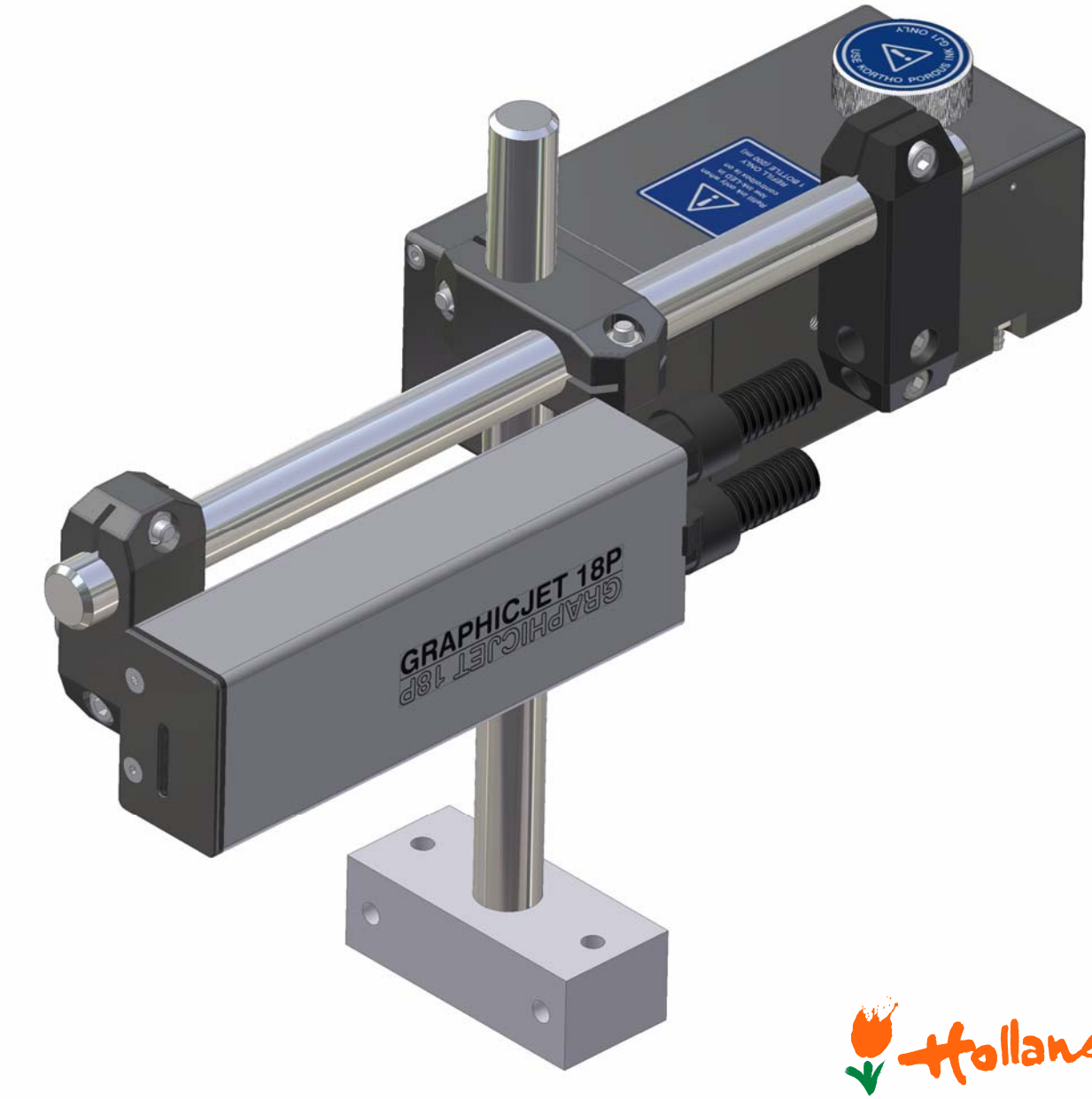
kortho

MANUAL

GraphicJet P-series



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Series: GraphicJet P-series
Production year: 2007

Standard models: 18P 18PT 35P
Firmware release: v5.3.002

Basic models: 18PB 18PTB 35PB
Firmware release: v1.1.001

Printed in the EC 2007

Preface

Welcome to the GraphicJet P-series manual.

Read the manual before you start and read it carefully. This will avoid unnecessary problems and loss of performance.

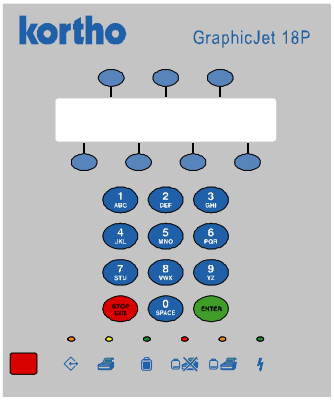
This manual is meant for all personnel who are involved with the GraphicJet P-series. The purpose of this manual is to get familiar with the GraphicJet printer either with standard (18P, 18PT, 35P) or limited, 'basic', (18PB, 18PTB, 35PB) functionality. This involves operational, safety, transport & storage, installation, commissioning, fault diagnosis and maintenance instructions.

All personnel must read the first four chapters named INTRODUCTION, TECHNICAL DESCRIPTION, PROCESS DESCRIPTION and SAFETY. The other chapters provide instructions or information for different aspects of the GraphicJet P-series printer.

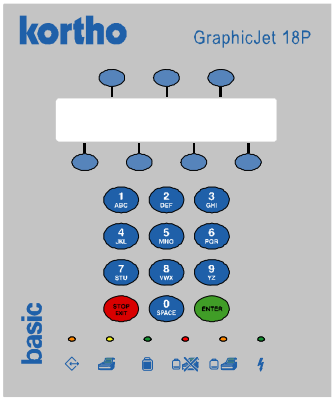
Keep this manual on a sensible and safe place for future use.

Contact Korthofah BV or your local distributor if you have any questions

Only the control box differs between the standard and basic printer. For easy recognition, both front panels of the control box are displayed below.



Standard model



Limited model ('Basic')

Conventions in this manual:

- The GraphicJet P-series system will be referred to as the printer.
- Any model specific feature is marked by the model name between brackets e.g. [35P] or [18P, 35P].
- If a feature is specific for the limited model it is marked by this symbol: basic
- If a standard feature is excluded for the limited model it is marked by this symbol: ~~basic~~
- Any material the printer is used to print on is called substrate.
- The customer is the person or company who is the owner of the printer.
- Follow the instruction order as indicated when you carry out any of the procedures described.

Instruction format:

1. Instruction. Comment(s).
   a. Sub-instruction. Comment(s).
   b. Sub-instruction. Comment(s).
2. Instruction. Comment(s).

▪ Symbols in this manual

In this manual, the following symbols are used:

WARNING:
This symbol indicates a potentially hazardous situation which, if instructions are not followed, could result in death or serious injury.

CAUTION:
This symbol indicates a potentially hazardous situation which, if instructions are not followed, may result in minor or moderate injury or damage to property.

The statements above are notes for your safety.

Beware:
A notice with useful information for the user in relation to the product. It attends the user to possible problems.

Note:
Gives the user suggestions and helps the work to be carried more rapidly.

The symbols below are related to the GraphicJet models with limited functionality:

This symbol indicates if a model feature is specific for basic functionality.

This symbol indicates if a model feature is excluded for basic functionality.

Glossary

Bitmap:	A data file or structure which corresponds pixel for pixel with a picture or print.
Datum:	Drawing term for a fixed reference point from which measurements are taken.
Encoder:	This is a shaft encoder. It converts shaft rotations to pulses for accurate and precise measurements. The encoder generates pulses from which the control box can extract the product speed information in order to match the print speed.
Flash memory:	This kind of memory does not need any electrical power to keep data stored.
Host:	A machine or production system that handles the product or substrate and can be connected by an interface to the printer, e.g. a printer alarm to stop the machine.
Image:	A design file from which the printer generates the bitmap to print. This design file can contain a unique combination of text, numeric, date, barcode and/or graphical items.
Infrared Transmitter:	Transfer device between a PC and the Kortho Remote Control.
KIGS:	Acronym for 'Kortho Image Generation Software'. A design tool on a PC to create and edit images.
Porous:	Refers to substrate materials that can be penetrated by ink, i.e. the ink is partial absorbed by the substrate surface.
Pixel:	A pixel is the smallest portion of a bitmap. For a printer one pixel represents one ink dot.
Print:	The result of printing an image on a substrate.
Print request:	A signal generated by a sensor or host machine. It is a trigger to start a print cycle.
Print cycle:	The moment from which the printer accepts a print request until the printer is ready to accept a new print request.
Product:	In this manual, the items the printer prints on, e.g. a box, package etc.
RAC:	Acronym for 'Remote Access Control'. A PC program to control one or more printers.
Remote Control:	A handset that acts as a data carrier for images between the infrared transmitter and the control box of the printer.
Sensor:	A product detection device connected to the control box, usually a photocell.
Substrate:	This is the material of a product to print on, e.g. cardboard, wood, paper, foil etc.
Template:	This is a predefined image and only available for printers with basic functionality.

Table of contents

4 SAFETY

5 TRANSPORT & STORAGE

6 INSTALLATION

7 COMMISSION

9 TROUBLESHOOTING

10 MAINTENANCE

11 DISMANTLING & DISPOSAL

Index

Appendices

1 INTRODUCTION

1.1 Qualified personnel

Operators are qualified when they have read and understand the chapters 1 to 6 of this manual. A specific preliminary training is not required.

Technicians that carry out repairs and technical maintenance on the printer equipment should have secondary technical education or comparable technical level of knowledge through practical experience.

Installation or servicing of the printer must only performed by qualified personnel of Korthofah BV. For customer installations authorisation must be obtained from Korthofah BV or a local distributor, which is designated by Korthofah BV.

1.2 Elementary personal protection

- Use the printer only in a well ventilated area.
- Do not eat or drink while working with the ink or solvent.

When at risk for contact with the ink or solvent:

- Wear chemical resistant gloves.
- Use safety goggles or face shield in case of splash risk.
- Wear suitable protective clothing as protection against splashing of or contamination with ink or solvent.

Please read the SAFETY chapter and the Material safety data sheets (MSDS) in Appendix E for more information

1.3 Intended Use

The GraphicJet P-series printers are industrial printers and are designed to print directly on porous substrates. The printer can print images with fixed and/or dynamic items. All printer models have items such as text, number, date and time. The standard printer models have extra items such as barcode, shift-code and picture.

Except for the basic printers, the images will be designed with a PC based design tool and downloaded by the user. The basic printers have a standard template set, which can be filled out with data and saved to an image by the user.

Normal use means use under normal conditions as described in this manual i.e. use the ink and the solvent that are supplied or approved by Korthofah BV.

The printer may not be used in areas, which have a fire or explosion hazard.

Korthofah BV accepts no liability for damage resulting from the improper or uninformed use of the equipment or caused by maintenance or other work being carried out improperly. They also accept no liability for the normal wear-and-tear of the printer.

1.4 Specifications

Only general specifications are described in this chapter. Refer to Appendix A for specifications that are more detailed.

1.4.1 Coding unit

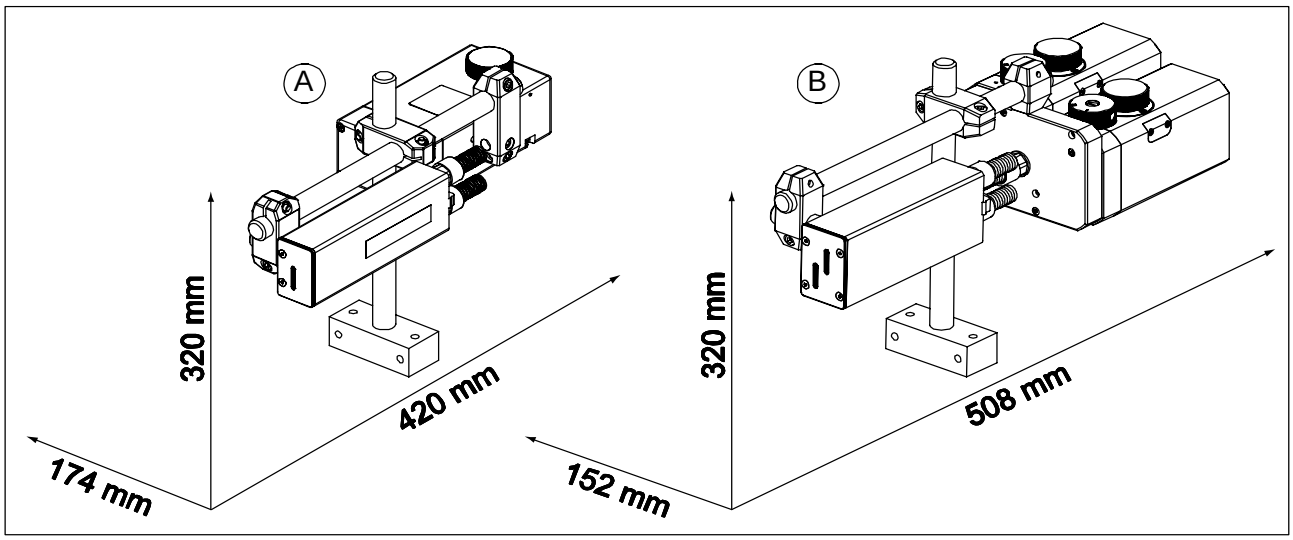


Fig. 1.1 Coding units, global dimensions

A general impression of the coding unit dimensions is given in Fig. 1.1 for the GraphicJet models 18P (A), 18PT (A) and 35P (B).

The dimensions (h x w x d) of the main parts are:

Printhead housing	[18P, 18PT]	60 x 40 x 215 mm
Ink reservoir	[18P, 18PT]	90 x 90 x 183 mm
Printhead housing	[35P]	70 x 50 x 215 mm
Ink reservoir	[35P]	100 x 152 x 190 mm

The printhead can print an area of 17.6 x 2200 mm [18P, 18PT] and 35.2 x 2200 mm [35P] in a speed range from 0.4 until 35 m/min.

The ambient temperature must be between 10 °C and 40 °C, with a relative humidity between 10% and 90% (non condensing).

Use only Kortho Ink-GJ1 or Solvent-GJ for this printer.

1.4.2 Control box

The dimensions (h x w x d) of the control box are 303 x 266 x 104.

The electrical requirements for the power supply are a voltage between 115 and 230VAC and a frequency between 50 and 60Hz. The power consumption of the control box is 40VA maximal. The control box is equipped with two fuses (5x20 mm) with a rating of F2A (fast acting).

All external equipment that is connected to the control box interface must be double insulated to qualify the whole installation as a separated extra-low voltage (SELV, Class II) system.

The control box has a bespoke hardware user interface, communication ports and host I/O-ports.

The ambient temperature must be between 5 °C and 45 °C, with a relative humidity between 10% and 90% (non condensing).

1.4.3 Ink

The Kortho ink GJ1 is a black oil based ink and has been developed for use in conjunction with the GraphicJet P-series printhead to print onto a range of porous substrates.

The ink is a low odour, low volatility pigmented ink. The use of a low volatility oil gives rapid dry times on appropriate substrates, such as paper and card, and gives reliable performance in the GraphicJet printheads

The ink is designed for outdoor use and with a suitable substrate; the ink should withstand 1-year exposure. All pigments are lightfast. The ink is resistant to water and common solvents when used on suitably resistant substrates.

The ink must be protected from light and stored or used between 10 °C and 40 °C.

The recommended ambient temperature while printing is between 20 °C and 30 °C.

1.4.4 Image features

For the basic printer models basic :

Templates 18P and 18 PT:

Template 1:	One line,	text height = 18 mm,	only capitals.
Template 2:	One line,	text height = 18 mm.	
Template 3:	One line,	text height = 16 mm.	
Template 4:	Two lines,	text height = 9 mm.	
Template 5:	Two lines,	text height = 6.5 mm.	
Template 6:	Three lines,	text height = 5.5 mm.	
Template 7:	Four lines,	text height = 4 mm.	
Template 8:	Four lines,	text height = 3 mm.	
Template 9:	Five lines,	text height = 3 mm.	
Template 10:	Five lines,	text height = 2.5 mm.	
Template 11:	Six lines,	text height = 2.5 mm.	
Template 12:	Six lines,	text height = 2 mm.	

The text height is calculated in mm from highest to lowest point of the font. As example: 

For the GraphicJet 35PB the number of lines is doubled compared to the templates mentioned above.
The length of a template line can be up to 50 characters.

Image:

Name:	User defined name (10 char. max.) and an optional description (26 char. max.).
Saved template:	A template, which is filled with data and saved.
Test image:	Default image, which is useful for checking the print quality and correct setting of several parameters.

Items:

Fixed:	Text.
Dynamic:	Counter, date and time.

Storage capacity: The control box memory size for storing images is 512 kB.

For the standard printer models ~~basic~~:

Image:

Name:	User defined name (10 char. max.) and an optional description (26 char. max.).
Test image:	Default image, which is useful for checking the print quality and correct setting of several parameters.
Items:	Text, multiple line text, number, date, time, shiftcode, barcode and graphic (maximal 99 items per image, except for graphic items since an image can contain up to 10 of these items). These items are placed in an image with the design tool KIGS.
Data:	Fixed and variable.
Size:	Maximal 64 kB, due to the buffer size of the control box.

Font:

Name:	Inkhr
Sizes:	6pt, 8pt, 10pt, 12pt, 16pt, 20 pt, 28 pt, 48pt, 54 pt, and 69pt. (extra for 35P: 104pt en 139pt).

Barcode formats: UPCA, UPCE, EAN 8, EAN 13, EAN 128, Code 39, Code 128, Code 2 of 5 Interleaved.

Items:

Graphic:	In bmp format (black/white) and at most 10 per image.
Dynamic:	Number, date, time and shiftcode.
Operator input:	Text, number, date.

Image download: From remote control unit to infrared communication port of the control box. With RAC and a cable between the serial ports of the PC and the control box.

Storage capacity: The remote control can store up to 100 images with a total size of 128 kB. The control box memory size for storing images is 512 kB.

1.4.5 Life span

The life span of the equipment is five years, except the printhead, under normal use and in compliance with the indicated maintenance periods.

The life span can be negatively influenced by improper/uninformed use of the equipment or improper maintenance, repair or modification by unqualified personnel, or repair with unoriginal parts. No claims for guarantee or compensation for damages will be accepted in such instances.

1.4.6 Electrostatic charge

Make sure that the substrate is not able to build up an electrostatic charge near the printhead, i.e. use conductive rolls and bearings for substrate guidance.

An electrostatic charge will disturb the print by electrostatic influence on the ink drops and may cause permanent printhead failure.

1.4.7 Shock & vibration

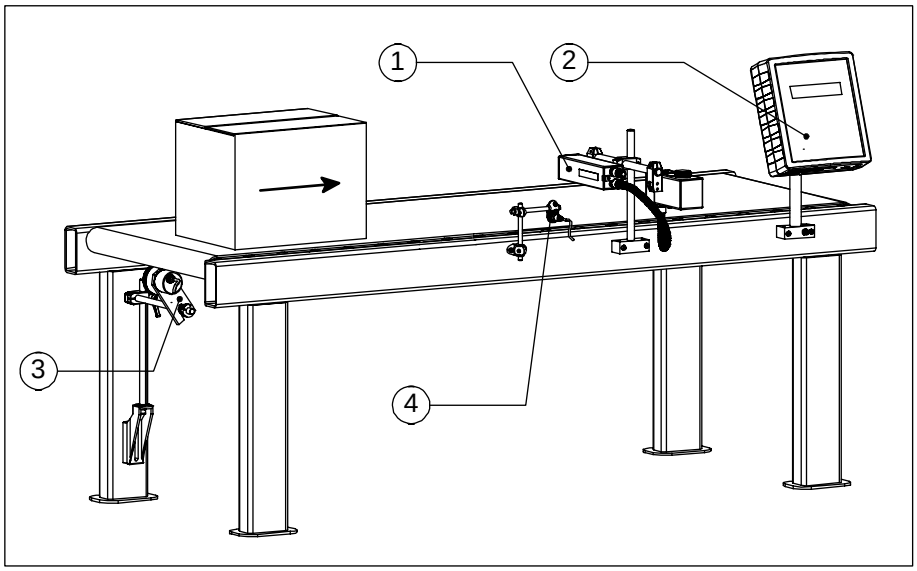
The printer should be installed in a low vibration location.

It is recommended that the coding unit be protected from shock and vibration, as this will have severe impact on the printed image quality and printhead life.

2 TECHNICAL DESCRIPTION

This chapter is meant for all users. It describes all the main parts of the printer system.

2.1 The printer system



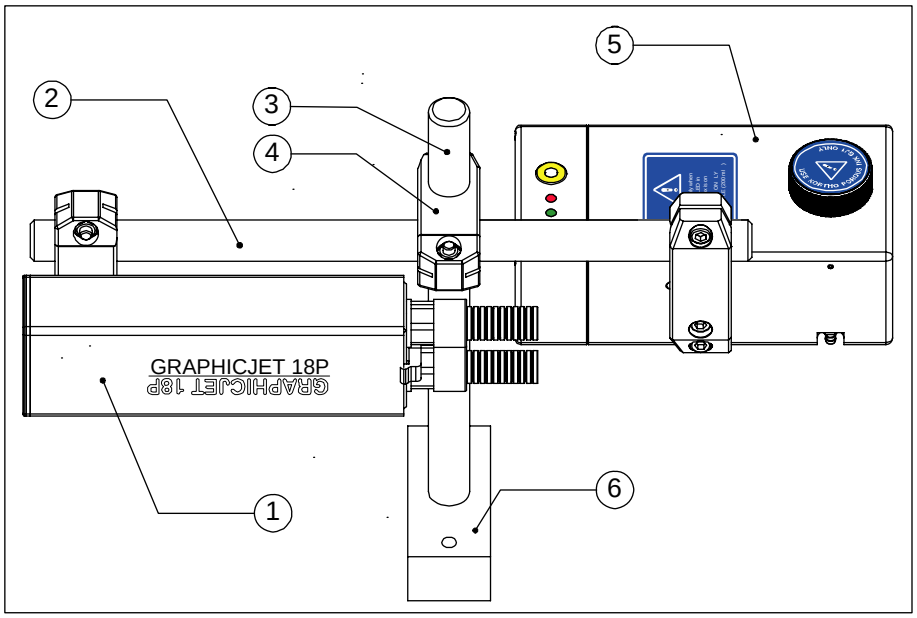
1. Coding unit
2. Control box
3. Encoder
4. Photocell

Fig. 2.1 The printer system

A typical GraphicJet system is shown in Fig. 2.1. The box/product is moved by a conveyer belt along the front of the photocell and the coding unit. The photocell is connected to the control box. An encoder can also be connected to the control box but this is optional. If the speed is not constant an encoder is needed, otherwise the print will be squeezed in or stretched out. The control box is connected to the coding unit [18P, 35P] or two coding units [18PT].

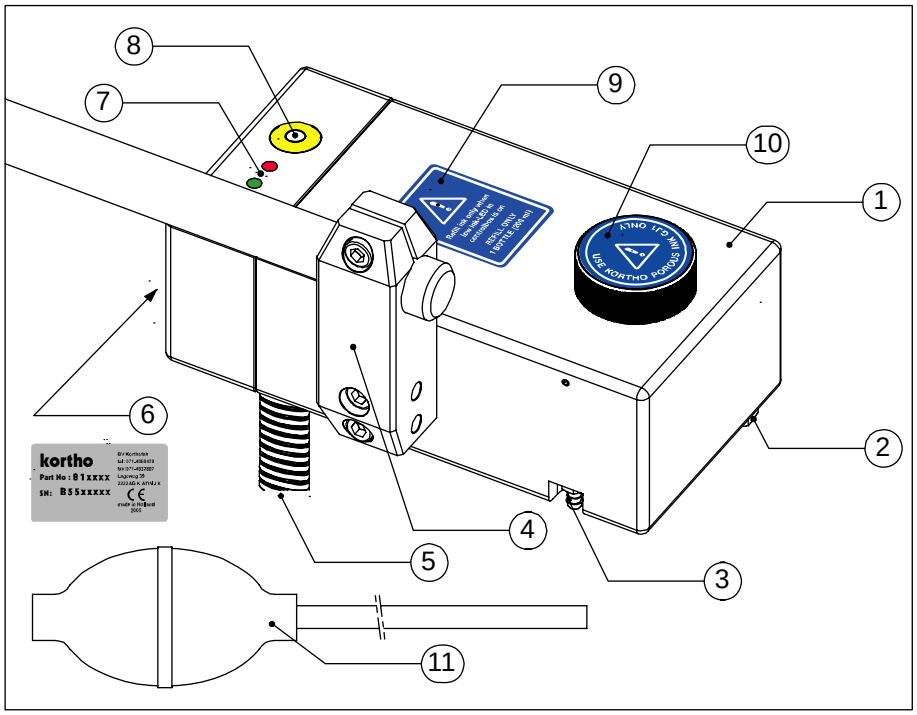
2.2 Coding unit

2.2.1 GraphicJet 18P and 18PT



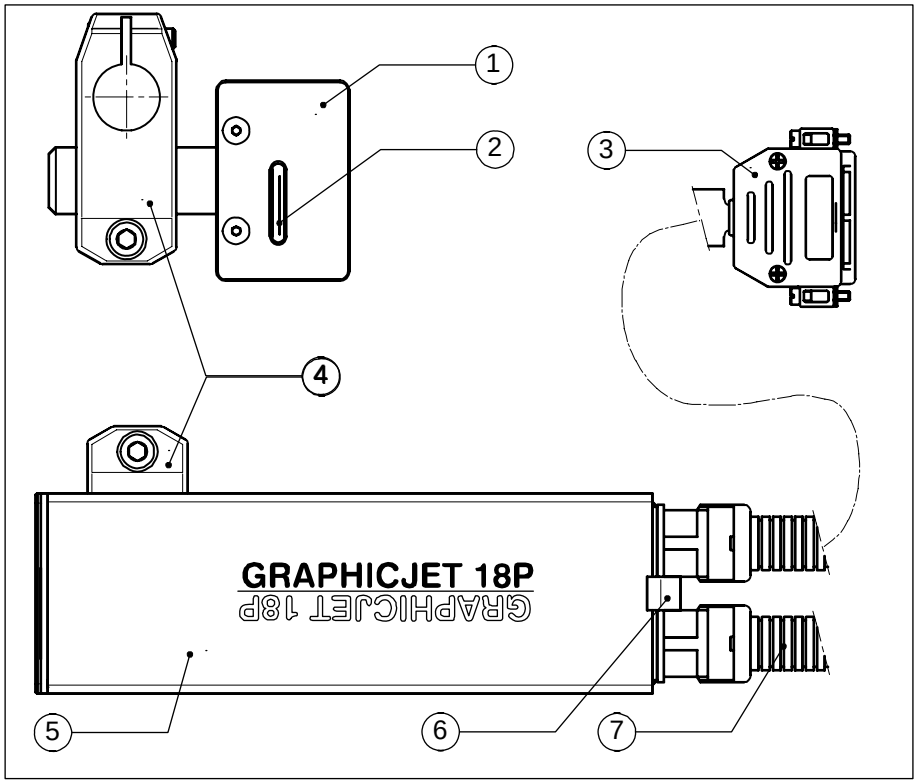
1. Printhead housing
2. Support shaft
3. Support pole
4. Support clamp
5. Ink reservoir
6. Support mounting block

Fig. 2.2 Coding unit parts of the GraphicJet [18P, 18PT]



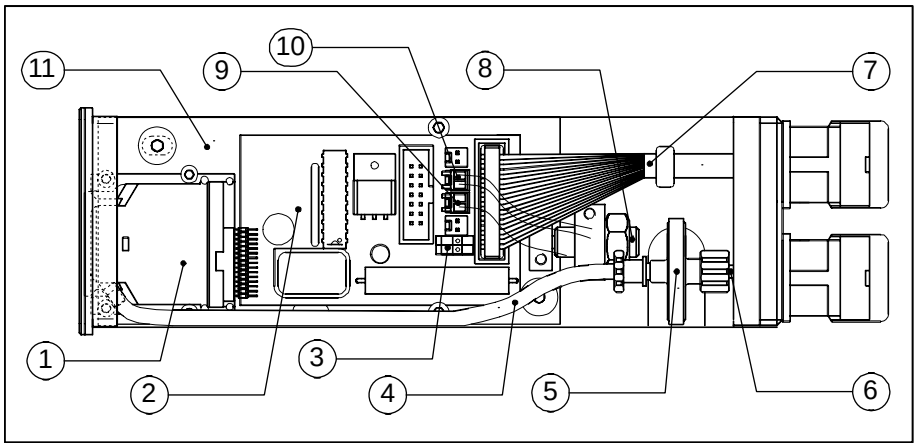
1. Ink reservoir
2. Drain plug
3. Fitting for prime bulb
4. Reservoir mounting clamp
5. Flexible conduit to printhead housing
6. Serial number label for Coding Unit (not visible)
7. Ink level indicator (green: ink level OK) (red: low level warning)
8. Built-in spirit leveller
9. Refill label
10. Screw cap with label
11. Prime bulb with tube

Fig. 2.3 Ink reservoir parts [18P, 18PT]



1. Front plate
2. Printhead nozzle plate
3. Printhead connector (X5)
4. Mounting clamp
5. Printhead housing
6. Lock strip
7. Flexible conduit to ink reservoir

Fig. 2.4 Printhead housing parts [18P, 18PT]



1. Printhead
2. Printhead interface board
3. Revision switch (rev1/rev2)
4. Filtered ink tube (black)
5. Ink filter (10 µm)
6. Unfiltered ink tube (yellow)
7. Printhead cable
8. Force adjustment screw
9. 5Vdc connector (CN 3, one wire)
10. Low ink connector (CN 1, two wires)
11. Printhead alignment frame

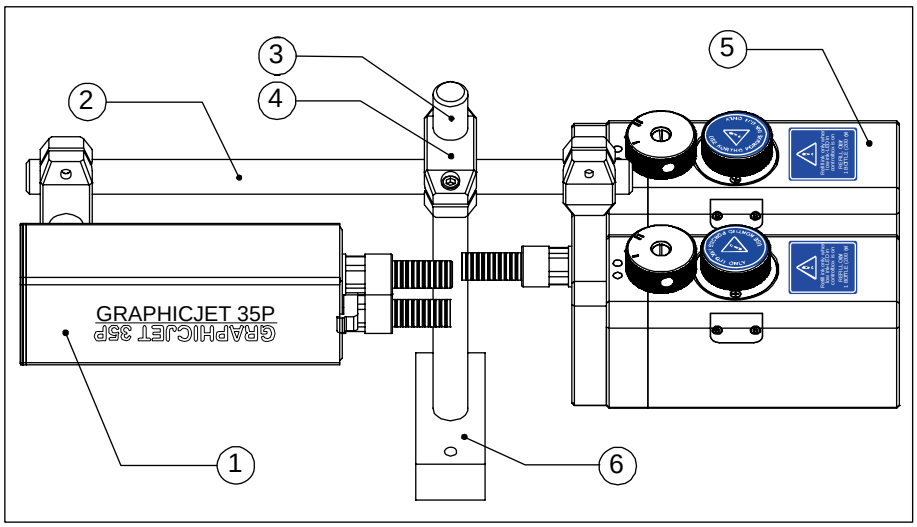
Fig. 2.5 Printhead interior parts [18P, 18PT]

The printhead has a small integral filter designed to stop particles entering the printhead and blocking the nozzles. If this filter starts to become excessively blocked, flow rate will decrease and the performance of the printhead will severely decrease. The integral filter cannot be replaced or cleaned.

A primary system filter is filtering the ink (Fig. 2.5. item 5), prior to the integral filter. This will ensure that the integral filter will last for the lifetime of the printhead. This filter can be replaced.

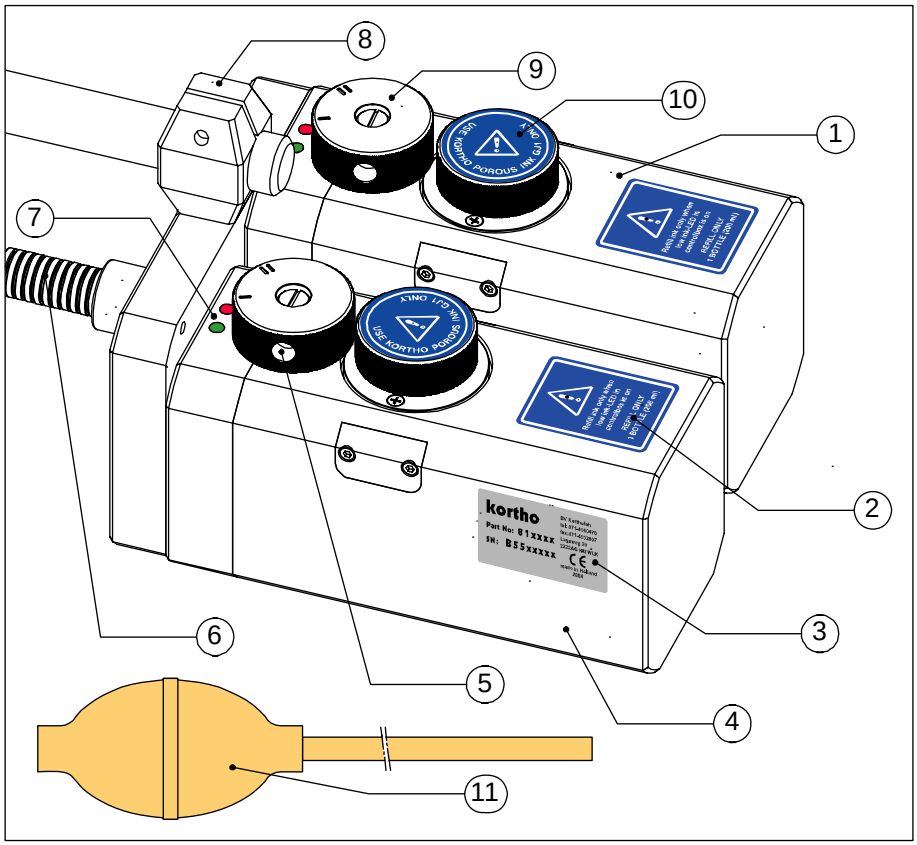
The printhead is aligned to the front plate with an alignment frame.

2.2.2 GraphicJet 35P



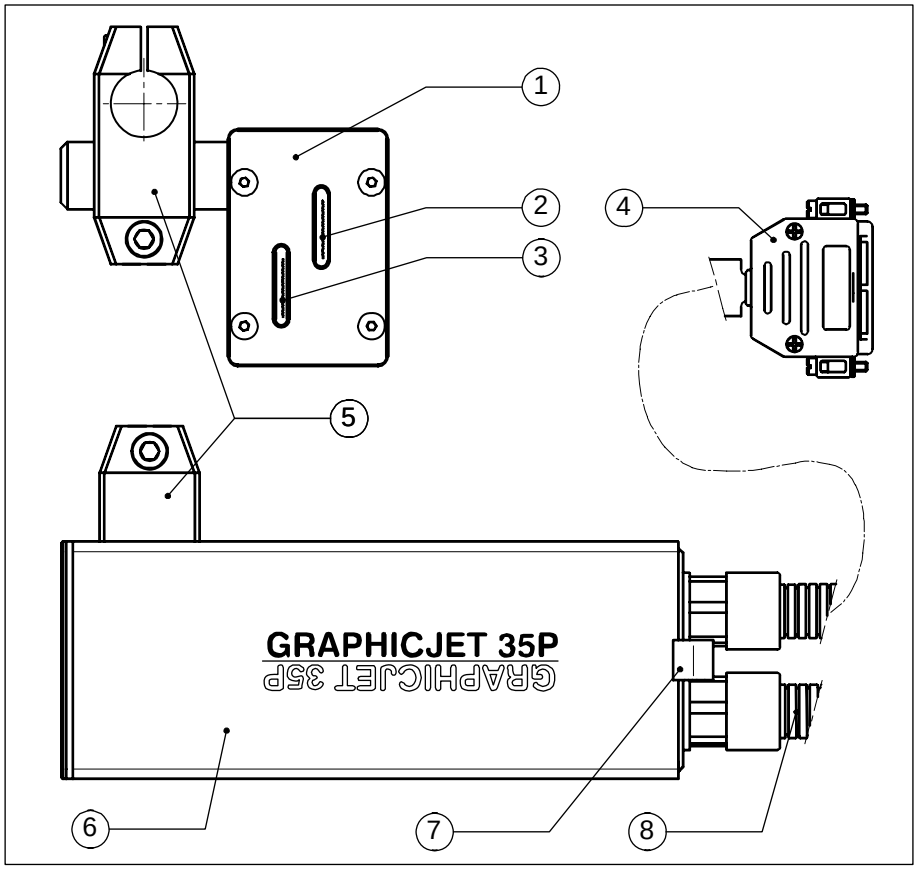
1. Printhead housing
2. Support shaft
3. Support pole
4. Support clamp
5. Dual ink reservoir
6. Support mounting block

Fig. 2.6 Coding Unit parts [35P]



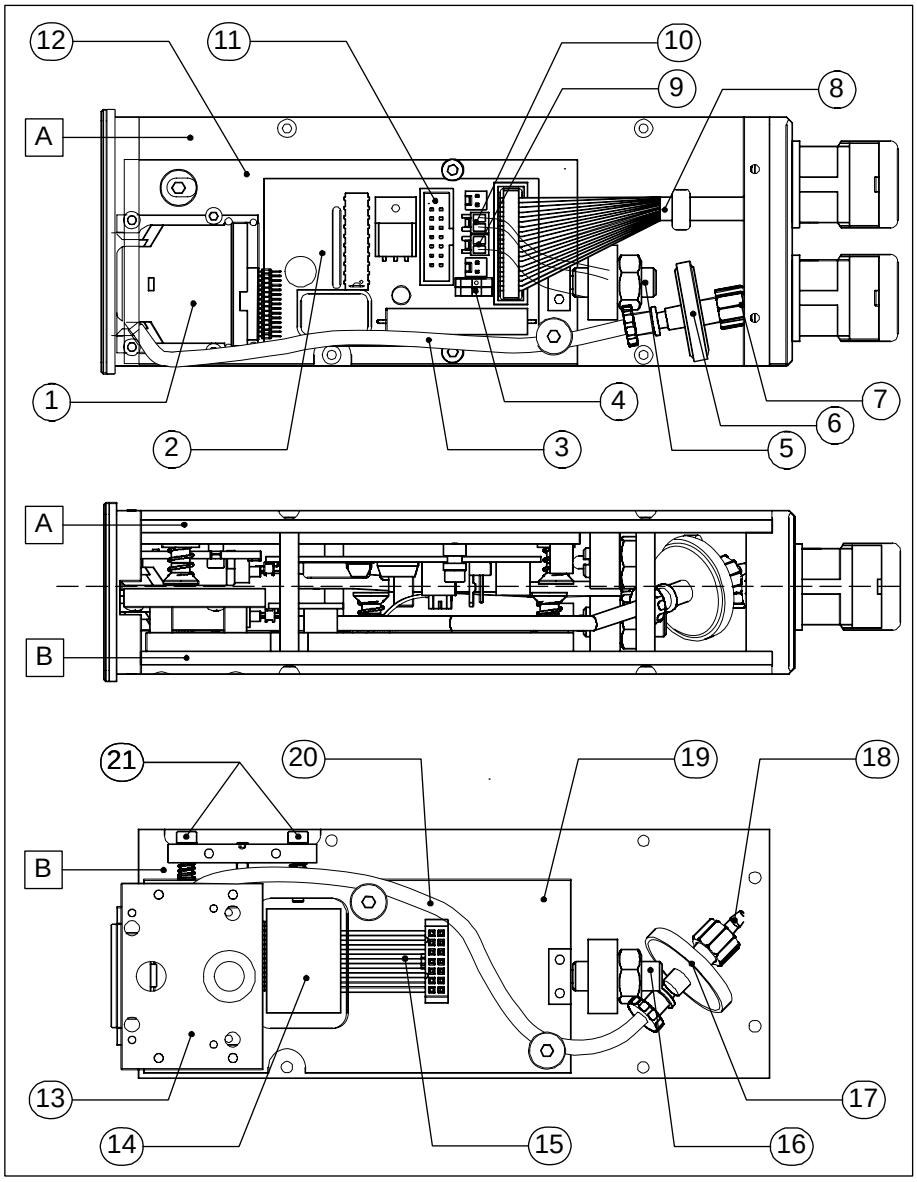
1. Ink reservoir 1, fixed (top printhead)
2. Refill label
3. Serial number label for Coding Unit
4. Ink reservoir 2, adjustable (bottom printhead)
5. Opening for prime bulb
6. Flexible conduit to printhead housing
7. Ink level indicator (green: ink above low level) (red: low level warning)
8. Reservoir mounting clamp
9. Vent knob (position I: vent closed) (position II: vent open)
10. Screw cap with label
11. Prime bulb with tube

Fig. 2.7 Ink reservoir parts [35P]



1. Front plate
2. Printhead nozzle plate (top)
3. Printhead nozzle plate (bottom)
4. Printhead connector (X5)
5. Mounting clamp
6. Printhead housing
7. Lock strip
8. Flexible conduit to ink reservoir

Fig. 2.8 Printhead housing parts [35P]



Bottom printhead assembly (A)

1. Printhead
2. Printhead interface board
3. Filtered ink tube (black)
4. Revision switch (rev1/rev2)
5. Force adjustment screw
6. Ink filter (10 μm)
7. Unfiltered ink tube (yellow)
8. Printhead cable
9. 5Vdc connector (CN 3, one wire)
10. Low ink connector (CN 1, two wires)
11. Extension connector
12. Printhead alignment frame

Top printhead assembly (B)

13. Printhead
14. Extension board
15. Extension ribbon cable
16. Force adjustment screw
17. Ink filter (10 μm)
18. Unfiltered ink tube (yellow)
19. Printhead alignment frame
20. Filtered ink tube (black)
21. Vertical adjustment screws

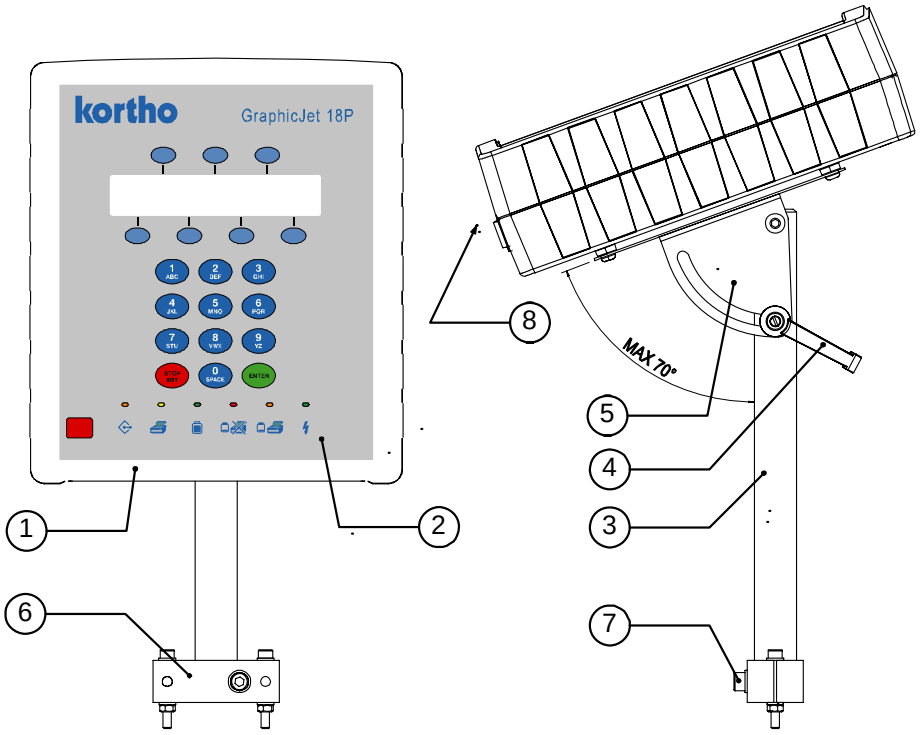
Fig. 2.9 Printhead interior parts [35P]

The printheads have a small integral filter designed to stop particles entering the printhead and blocking the nozzles. If this filter starts to become excessively blocked, flow rate will decrease and the performance of the printhead will severely decrease. The integral filter cannot be replaced or cleaned.

The primary system filters (Fig. 2.9, item 6 and 17) are filtering the ink, prior to the integral printhead filter. This will ensure that the integral filter will last for the lifetime of the printhead. These filters can be replaced.

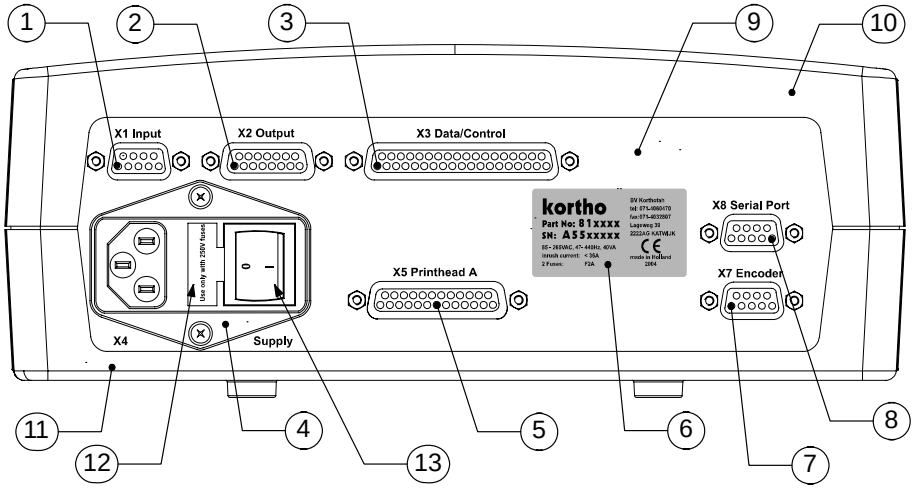
The printheads are aligned to the front plate and each other with their own alignment frames.

2.3 Control box



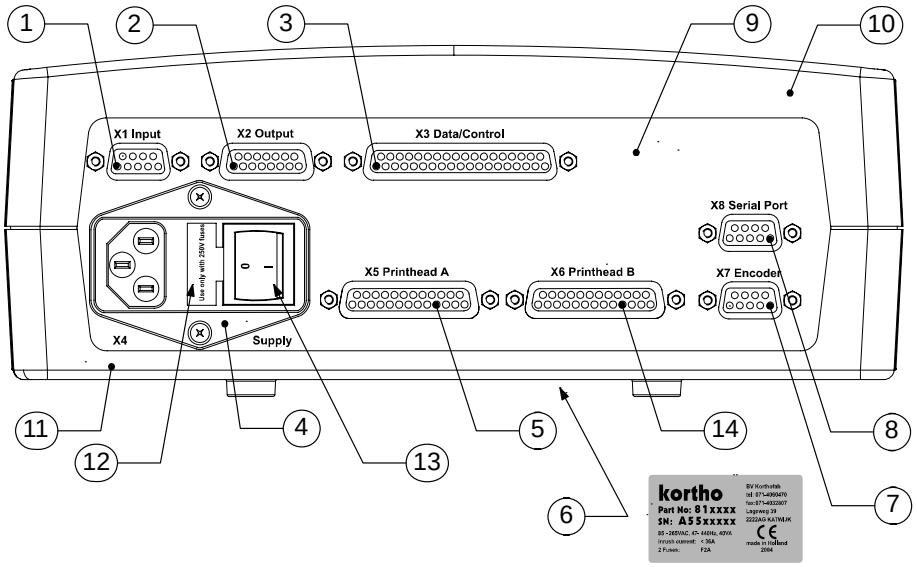
1. Control box
2. Control panel
3. Support
4. Lock handle vertical rotation
5. Hinge plate
6. Mounting block
7. Lock screw horizontal rotation
8. Connector plate

Fig. 2.10 Control box + adjustable support



1. X1 Input
2. X2 Output
3. X3 Data/Control (not used)
4. X4 Supply
5. X5 Printhead A
6. Serial no. label
7. X7 Encoder ~~basic~~
8. X8 Serial port ~~basic~~
9. Connector plate
10. Top cover
11. Bottom cover
12. Fuse holder (2x F2A)
13. Mains power switch

Fig. 2.11 Connector plate [18P, 35P]



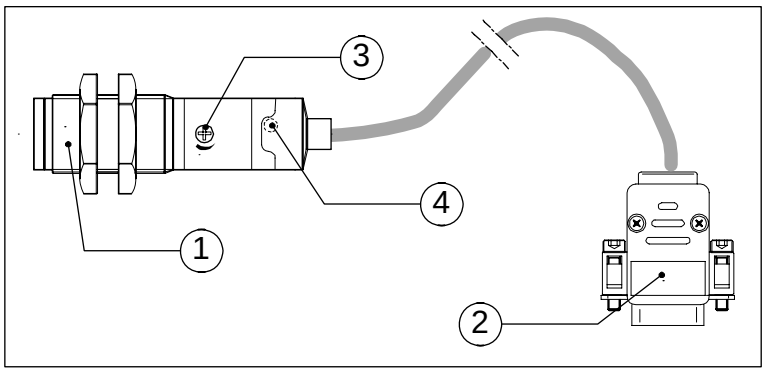
1. X1 Input
2. X2 Output
3. X3 Data/Control (not used)
4. X4 Supply
5. X5 Printhead A
6. Serial no. label (at back)
7. X7 Encoder basic
8. X8 Serial port basic
9. Connector plate
10. Top cover
11. Bottom cover
12. Fuse holder (2x F2A)
13. Mains power switch
14. X6 Printhead B [18PT]

Fig. 2.12 Connector plate [18PT]

2.4 Sensors

2.4.1 Photocell

The photocell is used to detect the product to be print.

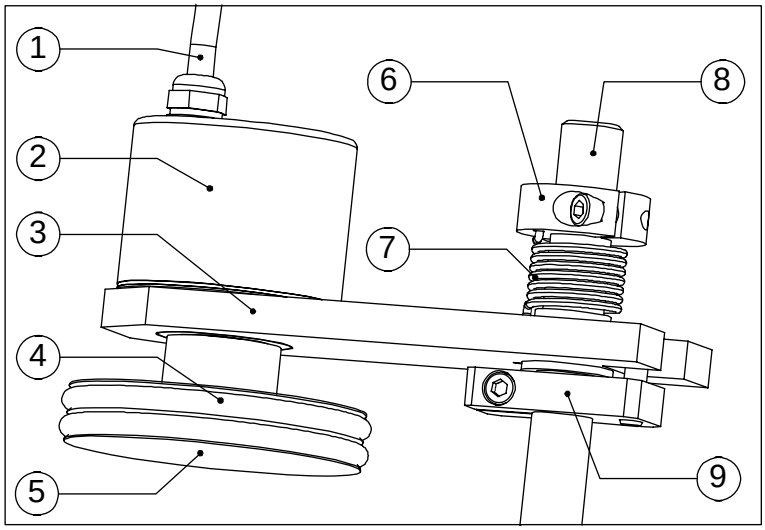


1. Photocell
2. Sensor connector (X1)
3. Sensitivity adjustment
4. Function indicator

Fig. 2.13 Photocell

2.4.2 Encoder basic

The encoder is used to measure the movement of the product to print on. This measurement is used to calculate the correct print speed at which the printer will print.



1. Encoder cable (X7)
2. Encoder
3. Encoder lever
4. Rubber O-ring (2x)
5. Encoder wheel
6. Spring tension adjustment clamp
7. Lever spring
8. Encoder shaft
9. Lever limiter

Fig. 2.14 Encoder with lever assembly

2.5 Image design basic

2.5.1 Design tool KIGS basic

The image design tool is called KIGS, which is an acronym for “Kortho Image Generating Software”.

This software package enables you to create the images for the Kortho GraphicJet and Thermoprinter series. It runs on an IBM-compatible PC featured with Microsoft Windows 9x, NT, 2000 and XP.

For full details on installing and using the package, see the separate Manual H560 AM "Kortho Image Generating Software".

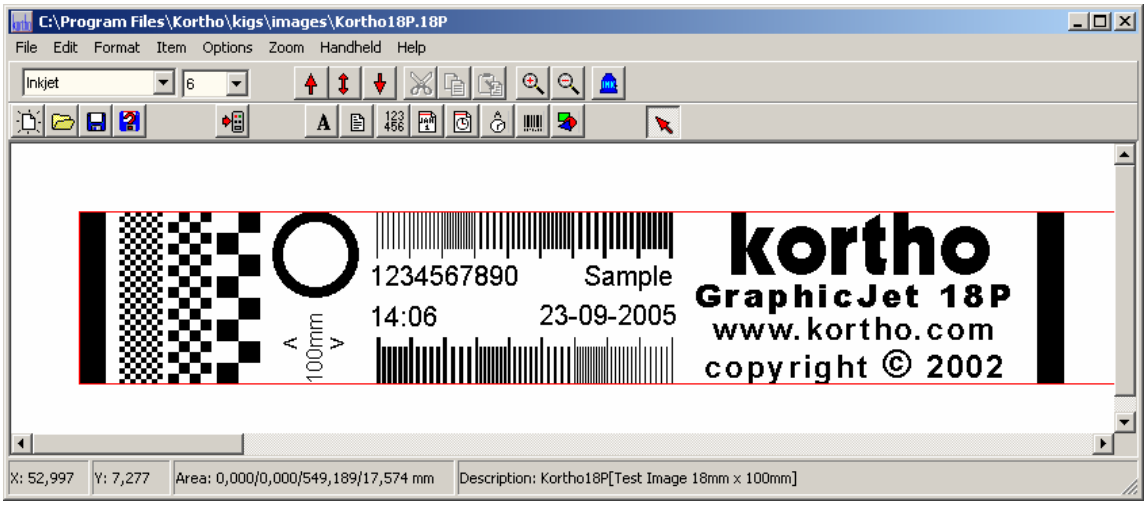


Fig. 2.15 KIGS main window

2.5.2 Image transmission ~~basic~~

Downloading of images to the control box can be done with either direct or indirect image transmission. A remote control and an infrared transmitter are used by KIGS for indirect image transmission. A RS232-cable is used for direct image transmission by RAC.

The remote control can store the data for a number of different images. These images are loaded into the remote control via the infrared transmitter. The infrared transmitter is always connected to the RS232 port of the PC.

1. Battery cover
2. Blue button (confirm)
3. Data transmission light
4. Battery low voltage indication
5. Infrared Transmitter LED
6. Infrared Transmitter
7. Cable to PC com-port
8. Infrared LED
9. Yellow button (select)
10. Remote Control

Fig. 2.16 Infrared transmission devices for images

2.6 Templates basic

Compared to the standard printer model, it is not possible to download images to the basic model. That's why the printer system contains 12 templates, which can be used to create images. When a template has been filled with data and saved for future use, it will be further referred as an image. If needed, an image can also be edited (only the data) at the start of a print session.

A template is a predefined image, which does not contain any printable data. Predefined are:

1. The number of lines, which can be printed.
2. The position of the lines.
3. The text height (font).
4. The maximal line length, which can be up to 50 characters.
5. The template name (the name reflects the number of lines it can print).
6. The template description (the description reveals the size of the characters used).

A template can contain text (including some special characters), date, time and counter items. Barcodes, shift codes and graphics are not available.

The date, time and counter items are limited in the way they can be formatted:

Date, can be added in 2 formats: DD-MM-YY or MM-DD-YY.
The system date will be placed in the line. The date item is editable, but will become a fixed date at that time. If the system date is accepted, the date will be updated automatically at 00:00 hour.

Time, can be added in 3 formats: 09:14 (12 hour), 21:14 (24 hour) or 09:14AM/PM.
The system time is place in the line. The time item cannot be edited.

Counter, can be added in one fixed format: 000000 (6 digits with leading zero's).
The counter can act as an up (increment = 1) or down (decrement = 1) counter. The number can be edited to start at the desired value.

Not all the available lines in a template do have to contain data. At least one line of the template should have at least one character placed.

Refer to Appendix H for an overview of the 12 templates.

3 PROCESS DESCRIPTION

3.1 Print cycle

The purpose of the printer is to print an image on a substrate. An image is digital data and is stored in the flash memory of the control box. The control box converts the image into a bitmap. The printhead receives this bitmap pixel-column by pixel-column and uses it to fire ink dots on the substrate. The ink drop fire rate is controlled by pulses, which are generated by either an internal clock or an external encoder. The vertical dot resolution is always 185 dpi; the horizontal dot resolution depends on the speed setting. At the correct speed, by parameter setting or use of an encoder, the print resolution is 185 x 185 dpi.

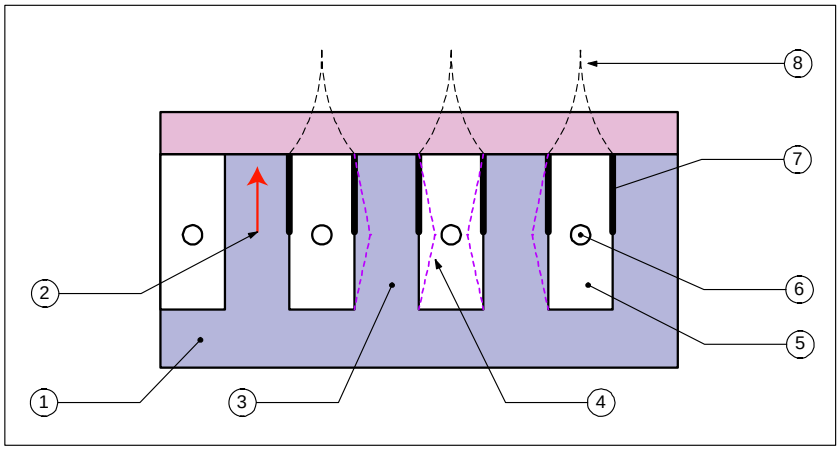
The print cycle is initiated with a trigger signal, called 'print request', and generated by a photocell, which detects the product or special mark on the substrate. When a print has been made, the bitmap will be updated, if necessary, for image items such as time, date and number. When this is done, the ready output is set and the printer is ready for the next trigger signal.

3.2 Piezo printhead

The heart of the GraphicJet printer is the printhead. The printhead uses patented digital drop on demand (DOD) piezo ink jet printing technology. It is seen in a range of industrial printing applications, including coding and marking, as it is a versatile technology able to print on a wide variety of surfaces.

This printing technology uses a ceramic material that deforms when an electric field is applied to it. This deformation is harnessed in order to eject ink from each of the printhead's ink channels in a highly controlled and repeatable manner. Each pixel on the substrate is either covered with ink or not - a binary choice.

In simplified overview, the technology consists of a series of ink chambers packed together into a printhead, divided by shared chamber walls with an electrode attached to each side (Fig. 3.1).



1. Piezo material (PZT)
2. PZT poling
3. Shared walls
4. Shear mode actuation
5. Ink chamber
6. Nozzle
7. Electrode
8. Signals

Fig. 3.1 Piezo printhead technology

The piezo material is made of lead zirconate titanate (PZT). This ferroelectric ceramics becomes piezo-electric when poled.

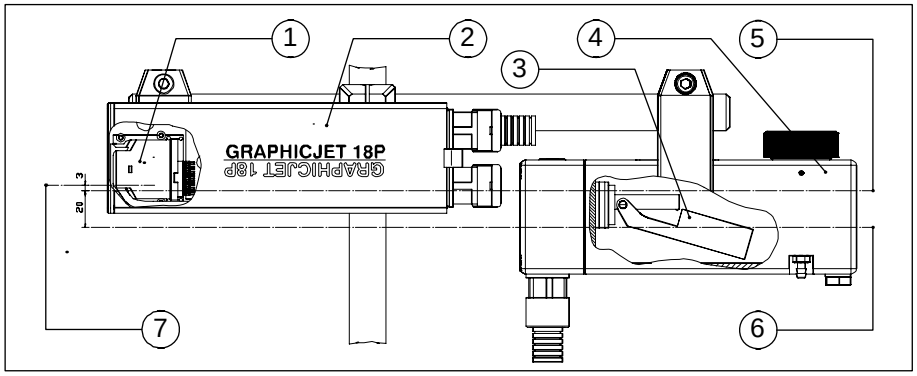
When a voltage is applied across this material the material distorts or bends. This phenomenon is implemented in the printhead by machining rows of parallel channels into a PZT block. An electrode is then placed onto the sides of the channel walls allowing a voltage to be applied across it. The way in which the

wall bends due to the applied voltage is known as 'shear mode'. Two channels share the wall, and hence the term shared wall.

The channels are filled with ink and a pressure wave inside the ink is generated due to the distortion of the PZT walls. The height and width of the chambers do not alter; they simply just shift to one side. This movement generates the pressure wave in the ink. This pressure wave forces ink out of the end of the channels via the printhead's nozzle.

Shear mode is more efficient than the direct mode of printing employed by other inkjet technologies as it effects a greater deformation in the piezoelectric material without using more energy.

3.3 Ink system



1. Printhead
2. Printhead housing
3. Level float switch
4. Ink reservoir
5. Top ink level
   (3mm below first (bottom) nozzle)
6. Low ink level
7. Level of first (bottom) nozzle

The ink volume between the top and low ink level is 200 ml

Fig. 3.2 Printhead and ink levels

The printhead acts like a pump and therefore is capable of pulling ink through it. A negative ink supply pressure must be used for the printhead to operate properly.

The most common and most simple way to supply a negative pressure ink supply is to position the ink reservoir below that of the printhead nozzles. The ink reservoir is open to atmospheric pressure.

The orientation of the printhead [18P, 18PT] is between horizontal, as in Fig. 3.2, and vertical position. The vertical orientation is only used for printing downwards. With the dual printhead [35P], the orientation can only be horizontal or vertical and at the vertical orientation must ink reservoir-2 adjusted to the same level as ink reservoir-1. Upwards printing is not possible due to the very high risk of clogging the nozzles.

It is important that for any orientation of the printhead the top ink level is at least 3mm below the level of the first (bottom) nozzle, otherwise the printhead starts ‘bleeding’ ink.

3.4 Printhead protection

In extreme cases, it is necessary to enable the spit timer. This timer triggers the printhead to spit ink through all the nozzles and in this way prevents clogging of the nozzles.

The disadvantage of using the spiting timer is waste of ink and probably the need of a device that collects the ink while spitting. Refer to chapter 7.5.1 Setting the spit parameters for further information.

3.5 User interface

The user interface consists of two parts, the control panel and the menu structure of operator menus.

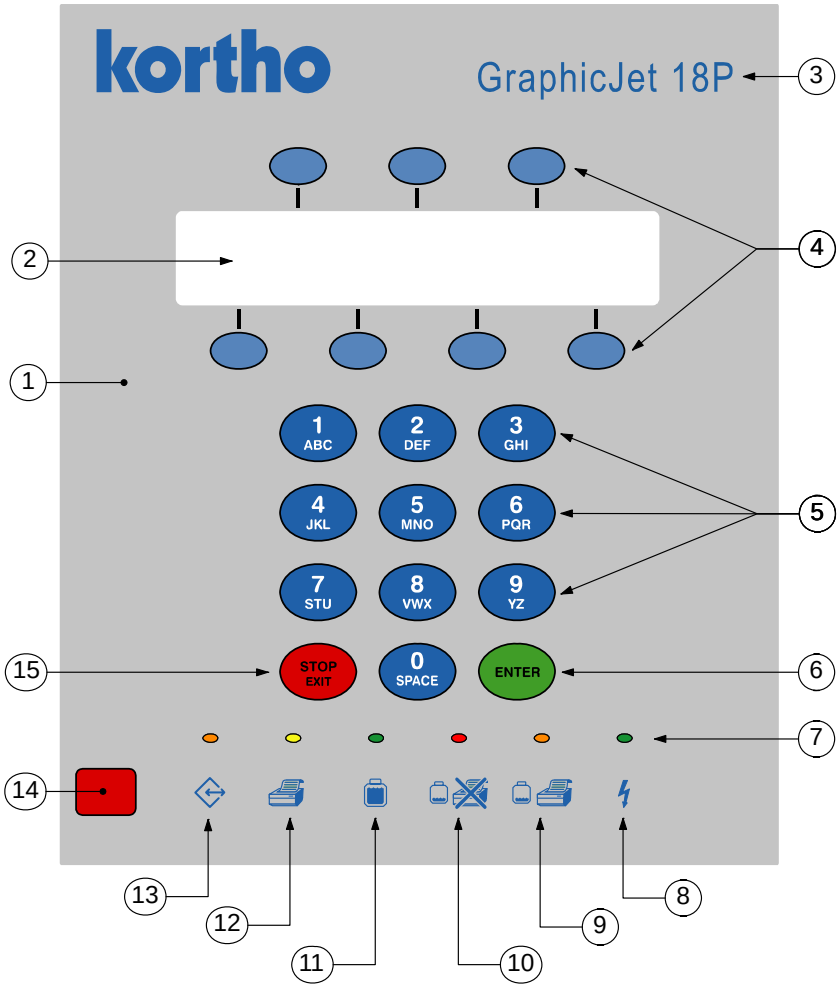
3.5.1 Control panel

The buttons positioned above and below the LCD screen on the control panel (Fig. 3.3) are used to navigate through the control box's screen menus to control or set up the printer. The functions assigned to the buttons change with each screen menu. To activate a function press the button adjacent to it (Fig. 3.4). If the selected function prompts you for data, enter it via the alphanumeric keypad.

Two special command keys, 'stop/exit' and 'enter' are provided.

The 'stop/exit' key will stop the printer, if it is printing, or return you to the previous screen menu when you are setting up the printer.

The 'stop/exit' key always returns the control box program towards the 'main menu' (top level).



1. Control panel
2. LCD screen
3. Printer series & model label
4. Function buttons
5. Alpha-numeric keys
6. Enter key
7. Indicator lights
8. Icon, Power
9. Icon, Ink low but continue
10. Icon, Ink low and stop
11. Icon, Ink OK
12. Icon, Printing
13. Icon, Data transmission ~~basic~~
14. Infrared com-port ~~basic~~
15. Stop/Exit key

Fig. 3.3 Control panel

3.5.2 Control panel indicator lights and icons

Indicator lights, items 8 to 13 in Fig. 3.3 , are provided to show the status:

Data transmission (orange):	Burns during image transmission by using the remote control basic .
Printing (yellow):	Burns while printing.
Ink OK (green):	Burns, when enough ink is in the ink reservoir.
Ink low and stop (red):	Burns when the ink level is low. The system stops printing and the alarm-outputs are set.
Ink low but cont. (orange):	Burns when the ink level is low, but the printer continues printing and the alarm-output is set.
Power (green):	Burns when the printer electronics is powered.

3.5.3 Function button names

Many menus have functions attached to the front panel buttons. They are named from A to G as shown in Fig. 3.4.

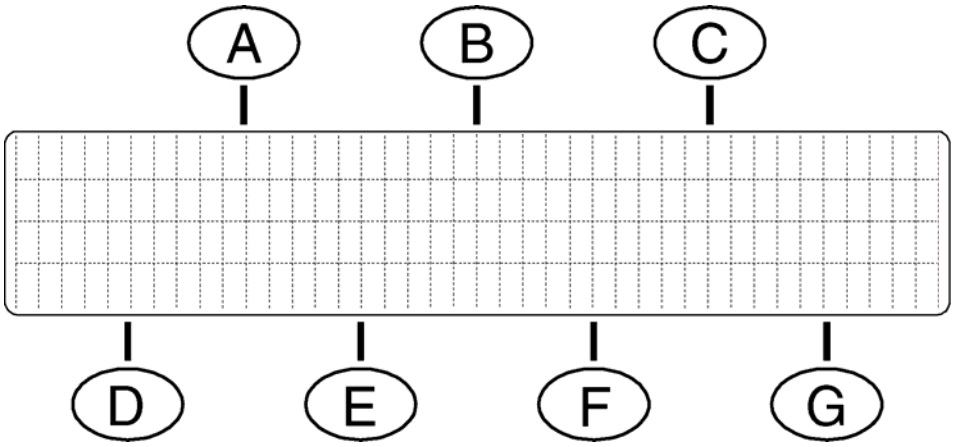
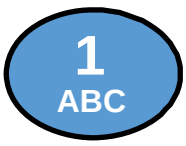


Fig. 3.4 Function button names

3.5.4 Keypad keys

The keys of the keypad are used to enter alphanumeric characters into a text field. Each key (Fig. 3.5) has its own character sequence. Pressing a key scrolls through the sequence related to that key.



The character sequence for this key is:
1 A B C a b c 1 A etc.

Fig. 3.5 Key '1 ABC'

3.5.5 Firmware & copyright message

On power-up the control box displays a message on the LCD screen indicating the GraphicJet type, firmware version, processor board (X100) release and copyright notice. The processor board release is indicated with "Rx", where "x" is the release version.

Fig. 3.6 Firmware & copyright message

The MAIN MENU follows**.** The menus are structured as shown in Fig. 3.7 or Fig. 3.8.

3.5.6 Menu structure basic

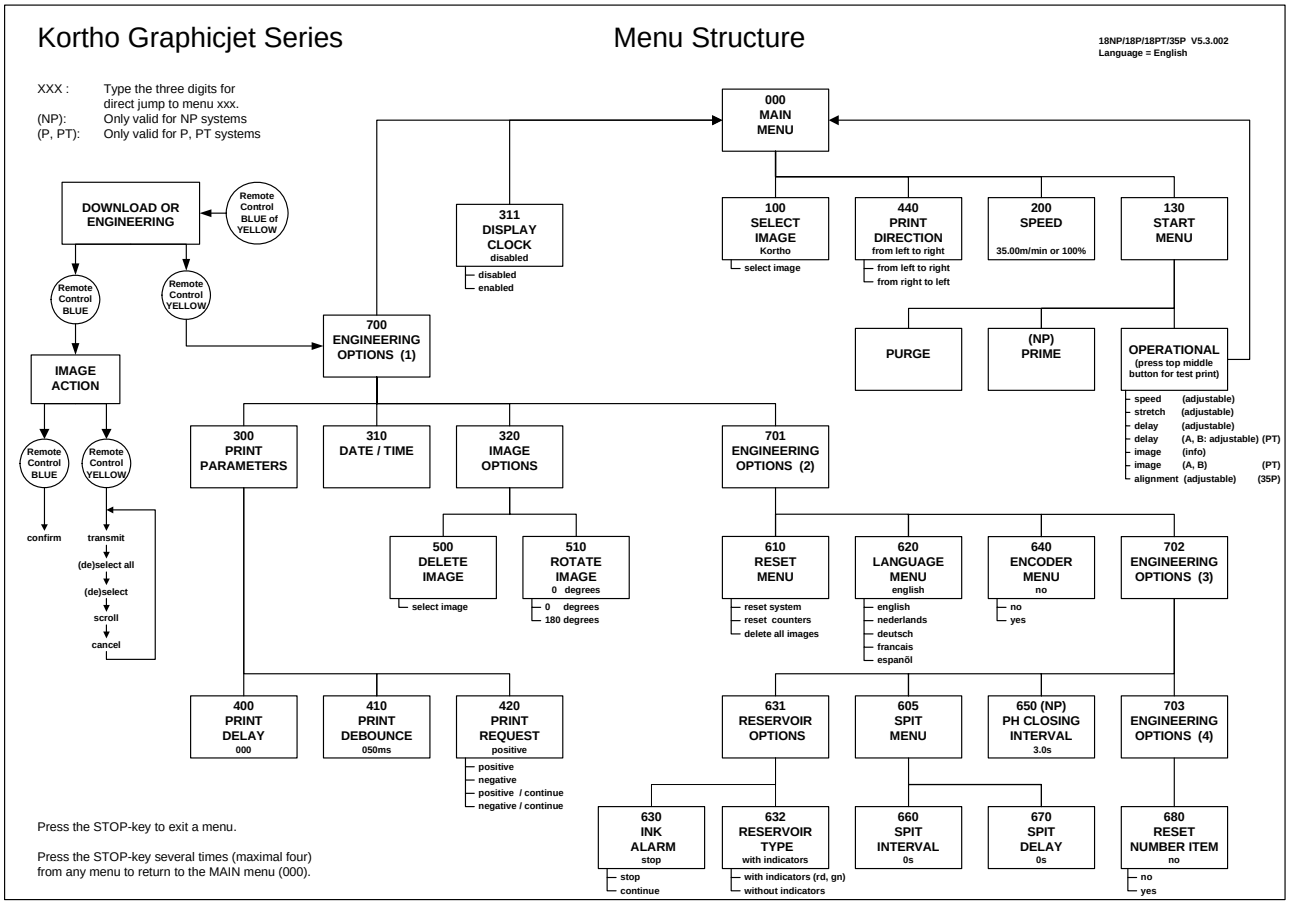


Fig. 3.7 Standard menu structure

Refer to Appendix G for a full-scale sheet of the menu structure.

Note:
To select a menu directly, without following the "tree", enter its quick reference number via the alphanumeric keypad. For example, to adjust the PRINT DELAY, enter 400.

3.5.7 Menu structure basic

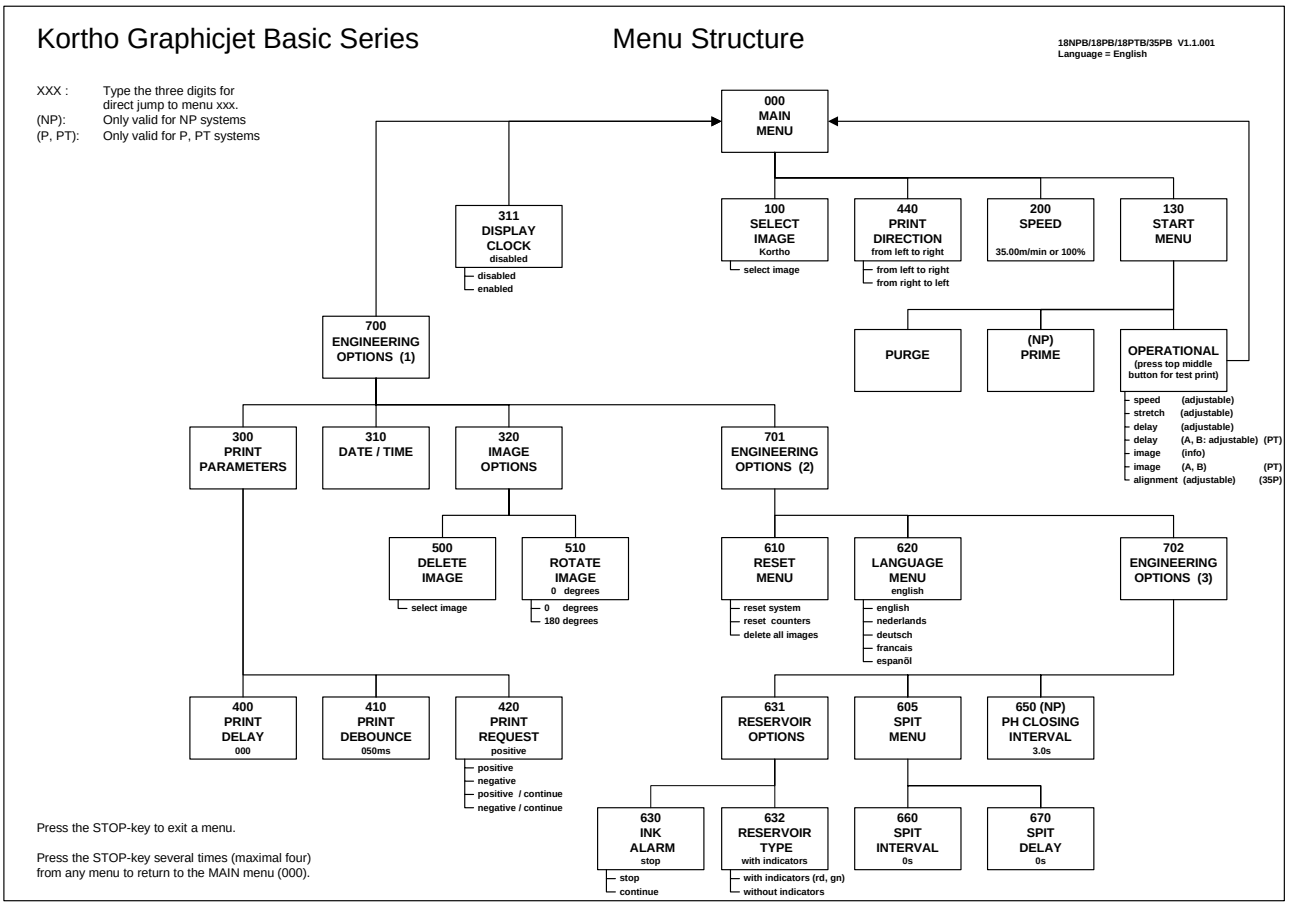


Fig. 3.8 Basic menu structure

Refer to Appendix H for a full-scale sheet of the basic menu structure.

Note:
To select a menu directly, without following the "tree", enter its quick reference number via the alphanumeric keypad. For example, to adjust the PRINT DELAY, enter 400.

4 SAFETY

This product is designed to conform to all current directives, and their relevant harmonized standards, of the European Council.

CE Machinery Directive (98/37/EC)

EN 292-1:1991	Safety of machinery - Basic concepts, general principles for design - Part 1 : Basic terminology, methodology.
EN 292-2:1991 EN 292-2/A1:1995	Safety of machinery - Basic concepts, general principles for design - Part 2 : Technical principles and specifications (with Amendment 1).

EMC Directive (89/336/EEC)

EN 55022 :1998 EN 55022/A1:2000 EN 55022/A2:2003	Information Technology Equipment - Radio disturbance characteristics Limits and methods of measurement (with Amendment 1).
EN 55024 :1998 EN 55024/A1:2001 EN 55024/A2:2003	Information Technology Equipment - Immunity characteristics Limits and methods of measurement (with Amendment 1).
EN 61000-3-2:2000	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase) (with Amendments 1 and 2).
EN 61000-3-3:1995 EN 61000-3-3/A1:2001	Electromagnetic compatibility (EMC) - Part 3-3: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems for equipment with rated current 16 A per phase and not subject to conditional connection

Low Voltage Directive (72/23/EEC)

EN 60950-1:2000	Safety of information technology equipment

4.1 Control box

4.1.1 Power supply

Fig. 4.1 Control box serial no. label

For safe operation, the power cable to the control box must be connected to a properly grounded single-phase supply of the appropriate voltage. The power supply must comply with the power supply information that is written on the serial-number label (Fig. 4.1) located on the connector plate of the control box.

Verify that no significant potential difference exists between the single-phase ground supply of the printer and the frame ground of the host machine.

The wire colour code for the supply cable is:
BROWN for Line (L)
BLUE for Neutral (N)
GREEN/YELLOW for Protective Earth (PE)

When installing or servicing the equipment ensure that the host machine is stopped.

Note:
All external equipment that is connected to the control box interface must be double insulated to qualify the whole installation as a separated extra-low voltage (SELV, Class II) system.

4.1.2 Precautions before power-up

Check at every printer power-up if all these connections are secured:

1. The cable/conduit (X5) between the control box and the coding unit.
2. The cable/conduit (X6) between the control box and the second coding unit [18PT].
3. The mains power plug. (X4).
4. The input cable. (X1). (Info: photocell or host-interface)
5. The output cable (X2). (Option)
6. The encoder cable (X7). (Option)
7. The communication cable (X8). (Option)

4.1.3 Precautions when opening the control box

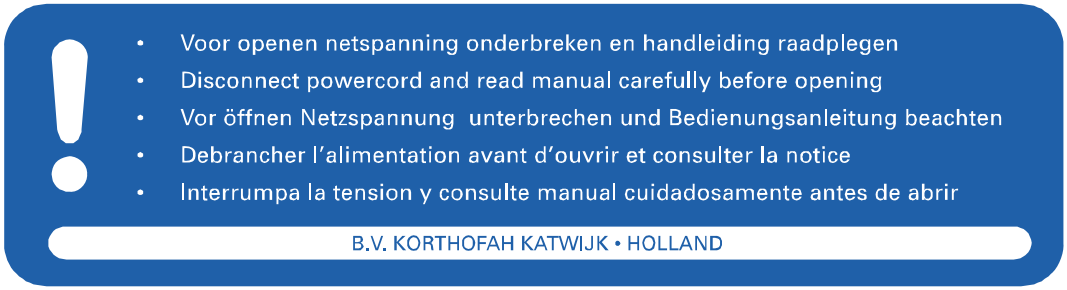


Fig. 4.2 Attention label for opening control box

The control box bottom cover has an attention label (Fig. 4.2) to alert the user to read the manual before opening the control box.

- ALWAYS disconnect the power to the printer before removing any connectors or covers:
  1. Switch the printer off.
  2. Remove the plug from the mains power supply.
- DO NOT operates the printer when any cover is removed.
- DO NOT LEAVE tools, screws or other parts inside the control box when re-assembling the equipment.
- USE all four screws to fasten the covers, the control box is ONLY then EMC sealed.

4.1.4 Anti-static precautions

The printhead is a static sensitive device, which can be damaged if it is touched without the necessary electrostatic discharge (ESD) precautions being taken. The ESD precautions involve the use of a grounded wrist strap and/or conductive work mat.

During installation, servicing and handling of the printhead, the printhead must be protected from electrostatic discharges on the connector. The printhead can be compared with a normal CMOS circuit and must be ESD protected accordingly to avoid later problems caused by discharges. The printhead internal protection level is 2kV.

4.2 Ink and solvent

4.2.1 General safety measures

Common:

- Use the printer only in a well ventilated area.
- Do not eat or drink while working with the ink or solvent.
- Do not smoke in the vicinity of ink, solvent or coding unit.

When at risk for contact with the ink or solvent:

- Wear chemical resistant gloves.
- Use safety goggles or face shield in case of splash risk.
- Wear suitable protective clothing as protection against splashing or contamination with ink or solvent.

4.2.2 First aid measures

For ink:

General advice: In case of doubt or with persisting symptoms obtain medical attention. Never pass anything through the mouth of an unconscious person. Keep the victim calm and warm.

Inhalation: Remove to fresh air. Provide rest, warmth and fresh air. Get medical attention.

Skin contact: Immediately remove contaminated clothing, and then wash the affected area with soap and water. Contaminated clothing should be laundered before reissue. If symptoms occur, obtain medical attention.

Eye contact: In case of contact, immediately rinse with water for at least 15 minutes. Obtain medical attention if irritation continues.

Ingestion: If swallowed, seek medical advice immediately.

For solvent:

General advice: In case of doubt or with persisting symptoms obtain medical attention. Never pass anything through the mouth of an unconscious person. Following severe exposure the patient should be kept under medical review for at least 48 hours as delayed pulmonary oedema may develop.

Inhalation: Remove patient from exposure, keep warm and at rest. If ill effects occur obtain medical attention and show the Material Safety Data Sheet, label or container.

Skin contact: Remove contaminated clothing, and then wash the affected area with soap and water. Contaminated clothing should be laundered before reissue. If symptoms occur, obtain medical attention.

Eye contact: Make sure to remove any contact lenses before rinsing. Rinse with water for at least 15 minutes and get medical attention if irritation persists.

Ingestion: Wash out mouth with water and give 200 – 300ml of water to drink. Do **not** induce vomiting. Obtain medical attention and show the Material Safety Data Sheet, label or container.

4.2.3 Regulatory information

For ink:

Danger symbol: Xi (Irritant)

Risk Phrases:	R36/38 -	Irritating to eyes and skin.
Safety Phrases:	S24 -	Avoid contact with skin).
	S26 -	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
	S37 -	Wear suitable gloves.

Refer to Appendix E, Kortho Ink GJ1 black (MSDS) for more information.

For solvent:

Danger symbol: Xn (Harmful)

Risk Phrases:	R65 -	Harmful: May cause lung damage if swallowed.
	R66 -	Repeated exposure may cause skin dryness or cracking.
Safety Phrases:	S24 -	Avoid contact with skin.
	S37 -	Wear suitable gloves.
	S51 -	Use only in well-ventilated areas.
	S62 -	If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

Refer to Appendix E, Kortho Solvent GJ (MSDS) for more information.

4.2.4 Warning labels

The labels of the inkbottle (Fig. 4.3) and the solvent bottle (Fig. 4.4) are warning labels.

'Warning' indicates that harm to the user or damage to the printer is possible when the user is neglecting the risk and safety phrases. The user can be exposed to (severe) injury.

Fig. 4.3 Ink Bottle label

Fig. 4.4 Solvent bottle label

4.2.5 Caution labels

The labels on the screw cap (Fig. 4.3 A) and the ink reservoir (Fig. 4.4 B) are caution labels.

'Caution' indicates that, when the user is neglecting the procedures, the coding unit is at risk of damage.

Use only Kortho porous ink GJ (Fig. 4.5 A), because other ink is probably not chemical compatible with the materials used in the GraphicJet 18P, 18PT or 35P. The coding-unit can develop leakage and/or the printhead nozzles can become clogged.

Refill the ink reservoir only with maximal 200 ml ink (Fig. 4.5 B), if a low ink indicator on the control panel and ink reservoir is lit. Otherwise, the ink reservoir will flow over into the air release channel.

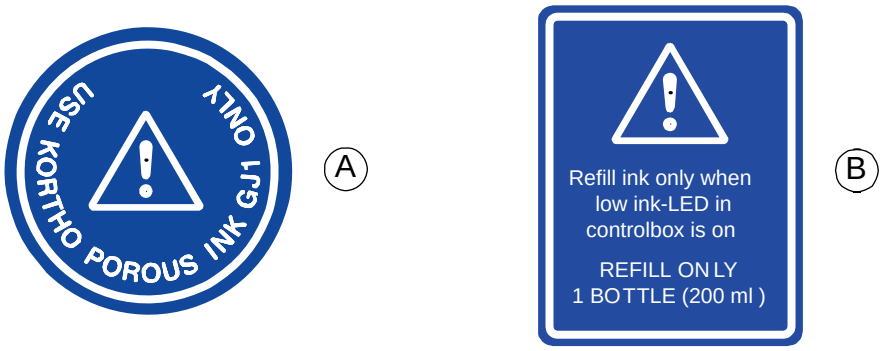
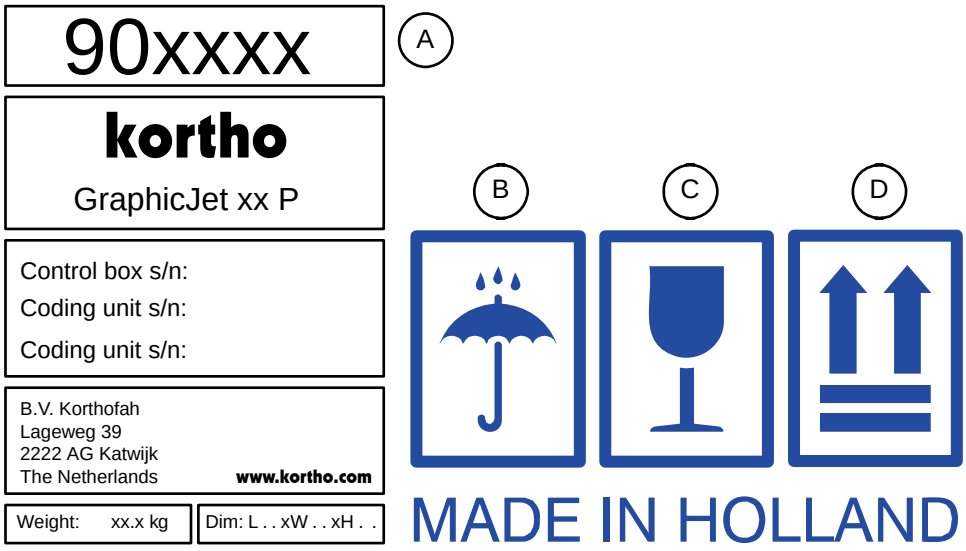


Fig. 4.5 Ink reservoir labels, screw cap and refill

5 TRANSPORT & STORAGE

5.1 Printer equipment

5.1.1 Shipping and handling



A. Shipping label GraphicJet
B. Handling label `KEEP DRY`
C. Handling label 'FRAGILE'
D. Handling label 'THIS SIDE UP'

Fig. 5.1 Shipping and handling labels

The original packaging for the GraphicJet printer set is labelled with similar shipping and handling labels as shown in Fig. 5.1. The handling labels must be visible from all sides.

- Refer to label (A) of Fig. 5.1 for shipping information.

Shipping information:				Serial numbers:	
Set (standard)	Part number	Weight	Dimensions (cm)	Control box	Coding unit
GraphicJet 18P	901807	13.25 kg	L50 x W42 x H42	1	1
GraphicJet 18PT	901835	18.50 kg	L70 x W40 x H40	1	2
GraphicJet 35P	901822	15.00 kg	L50 x W40 x H40	1	1
Set (basic)	Part number	Weight	Dimensions (cm)	Control box	Coding unit
GraphicJet 18PB	901864	13.25 kg	L50 x W42 x H42	1	1
GraphicJet 18PTB	901892	18.50 kg	L70 x W40 x H40	1	2
GraphicJet 35PB	901889	15.00 kg	L50 x W40 x H40	1	1

- Keep the package always dry, refer to label (B) of Fig. 5.1.
- Handle the package with care, because the printhead is fragile. Refer to label (C) of Fig. 5.1.
- Keep the package always upright, refer to label (D) of Fig. 5.1.

5.1.2 Pre-transport procedure

The transport distance and time is determinative for the pre-transport procedure:

For movement within a building:

1. Keep the coding unit upright to avoid ink leakage from the ink reservoir through the air release channel.
2. Avoid shocks and vibrations during the transport to reduce the risk of generating air bubbles in the printhead or in the ink tubing. In this case, you have to prime the printhead and ink tubes at the new location.

For short distance and at the most two day travel:

1. Unscrew the drain plug (Fig. 2.3 item 3) to drain the ink with a funnel from the ink reservoir into a clean inkbottle. For the older type ink reservoirs without a drain plug, suck the ink up from the ink reservoir with a clean syringe or prime all the ink through the printhead in a clean inkbottle (for later refill). Refer to subsection 8.5.3.
2. Keep the coding unit upright to avoid ink leakage of residue fluid from the ink reservoir through the air release channel.
3. Use original or equal packaging for the printer equipment.
   a. Label the box with 'keep dry' labels like label (B) of Fig. 5.1 (visible at all sides).
   b. Label the box with 'fragile' labels like label (C) of Fig. 5.1 (visible at all sides).
   c. Mark the top of the box with 'this side up' labels like label (D) of Fig. 5.1 (visible at all sides).

For long distance or at least two day travel:

1. Unscrew the drain plug (Fig. 2.3 item 3) to drain the ink with a funnel from the ink reservoir into a clean inkbottle. For the older type ink reservoirs without a drain plug, suck the ink up from the ink reservoir with a clean syringe or prime all the ink through the printhead in a clean inkbottle (for later refill). Refer to subsection 8.5.3.
2. Refill the ink reservoir with 50ml solvent.
3. Carry out the nozzle maintenance procedure. Refer to chapter 10.2.
4. Prime the ink system with the solvent through the printhead in a waste container.
5. Repeat from instruction 2 until all the printhead nozzles spout a clean jet.
6. Drain or prime the remaining solvent from the ink reservoir (same as instruction 1 but read solvent instead of ink).
7. Verify if the ink reservoir is empty.
8. Keep the coding unit upright to avoid leakage of residue fluid from the ink reservoir through the air release channel.
9. Use original or equal packaging for the printer equipment.
   d. Label the box with 'keep dry' labels like label (B) of Fig. 5.1 (visible at all sides).
   e. Label the box with 'fragile' labels like label (C) of Fig. 5.1 (visible at all sides).
   f. Mark the top of the box with 'this side up' labels like label (D) of Fig. 5.1 (visible at all sides).

5.1.3 Pre-storage procedure

The printer storage location and time is determinative for the pre-storage procedure:

When still mounted on the support but idle for at least one month:

1. Unscrew the drain plug (Fig. 2.3 item 3) to drain the ink with a funnel from the ink reservoir into a clean inkbottle. For the older type ink reservoirs without a drain plug, suck the ink up from the ink reservoir with a clean syringe or prime all the ink through the printhead in a clean inkbottle (for later refill). Refer to subsection 8.5.3.
2. Refill the ink reservoir with 50ml solvent.
3. Carry out the nozzle maintenance procedure. Refer to chapter 10.2.
4. Prime the ink system with the solvent through the printhead in a waste container.
5. Repeat from instruction 2 until all the printhead nozzles spout a clean jet.
6. Drain or prime the remaining solvent from the ink reservoir (same as instruction 1 but read solvent instead of ink).
7. Verify if the ink reservoir is empty.
8. Place a dust cover or bag over the coding unit.

For storage prior to distribution:

1. Unscrew the drain plug (Fig. 2.3 item 3) to drain the ink with a funnel from the ink reservoir into a clean inkbottle. For the older type ink reservoirs without a drain plug, suck the ink up from the ink reservoir with a clean syringe or prime all the ink through the printhead in a clean inkbottle (for later refill). Refer to subsection 8.5.3.
2. Refill the ink reservoir with 50ml solvent.
3. Carry out the nozzle maintenance procedure. Refer to chapter 10.2.
4. Prime the ink system with the solvent through the printhead in a waste container.
5. Repeat from instruction 2 until all the printhead nozzles spout with a clean jet
6. Drain or prime the remaining solvent from the ink reservoir (same as instruction 1 but read solvent instead of ink).
7. Verify if the ink reservoir is empty.
8. Place the coding unit in upright position in a packaging box to avoid leakage from the ink reservoir through the air release channel.
9. Use original or equal packaging for the printer equipment.
   a. Label the box with 'keep dry' labels like label (B) of Fig. 5.1 (visible at all sides).
   b. Label the box with 'fragile' labels like label (C) of Fig. 5.1 (visible at all sides).
   c. Mark the top of the box with 'this side up' labels like label (D) of Fig. 5.1 (visible at all sides).
10. Store the printer, in the original packaging with topside upwards, in a dry place at ambient temperature between 10 °C and 40 °C.

5.2 Ink and solvent

Refer to Appendix E, Material safety data sheets (MSDS) for more detailed information.

5.2.1 Handling

- Keep ink and solvent away from heat, sparks and open flame.
- Avoid spilling, skin and eye contact.
- Avoid inhalation of vapours.

5.2.2 Storage

- Store the inkbottle and solvent bottle tightly closed in a dry place and between 10 °C and 40 °C.
- Keep away from strong, oxidizing agents.
- Keep the ink and solvent in their original containers. The ink and/or solvent may react with some plastics, rubber and coatings

5.2.3 Transport information

The product is not subject to transport regulations (ADR/RID, IATA and IMO).

Keep the inkbottle and solvent bottle tightly closed in a dry place, between 10 °C and 40 °C, and away from strong, oxidizing agents. This is valid for all kind of transport.

6 INSTALLATION

6.1 Requirements

Provided by the customer:

- Power: 115-230VAC, 50-60Hz
- A stop-signal input of the host machine to connect to the printer alarm. A standard output cable (812668) of 4 meters is available at your distributor.
- Sufficient space for installation and operation.

For a printer installation is needed:

- The standard printer set, either 18P, 18PT or 35P.
- A two-pack ink set (083437).
- A 200 ml solvent bottle (083449).

Optional are:

- An encoder (813301) ~~basic~~.
- A standard output cable (812668).
- Extra support parts: shaft (319139), clamp (813187), pole (317517) and mounting block (317504).

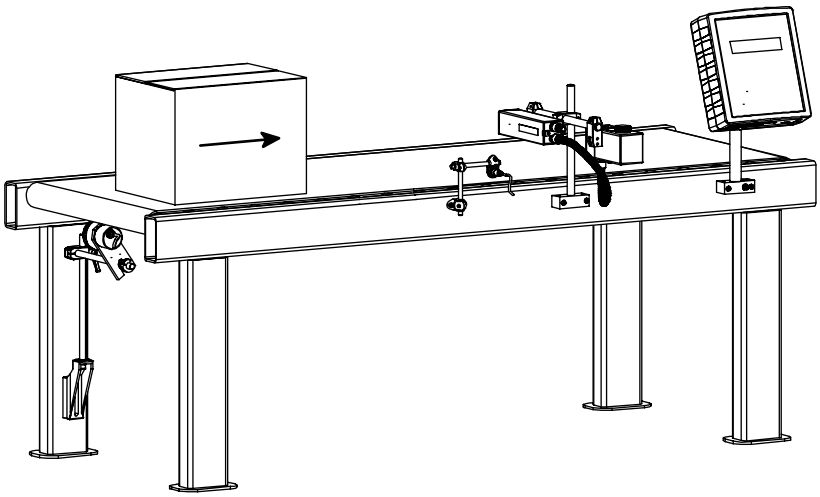
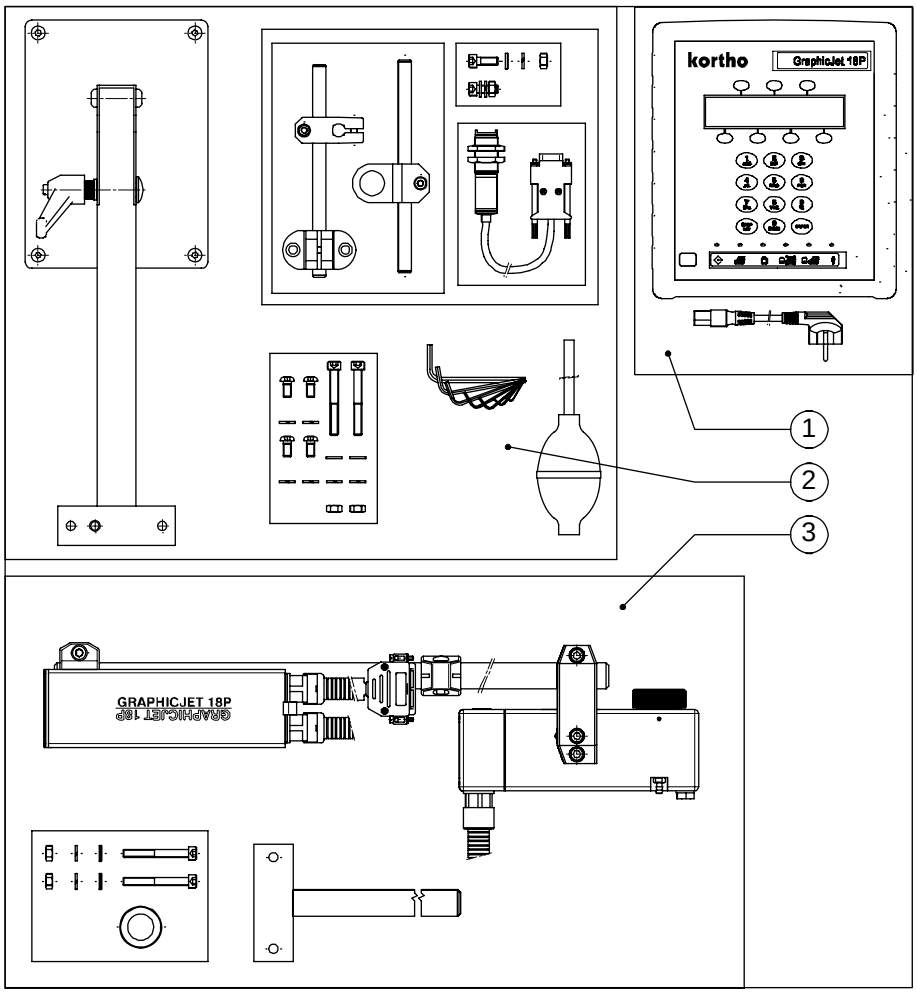


Fig. 6.1 Typical printer application

6.2 Unpacking

6.2.1 The printer set [18P, 18PT]

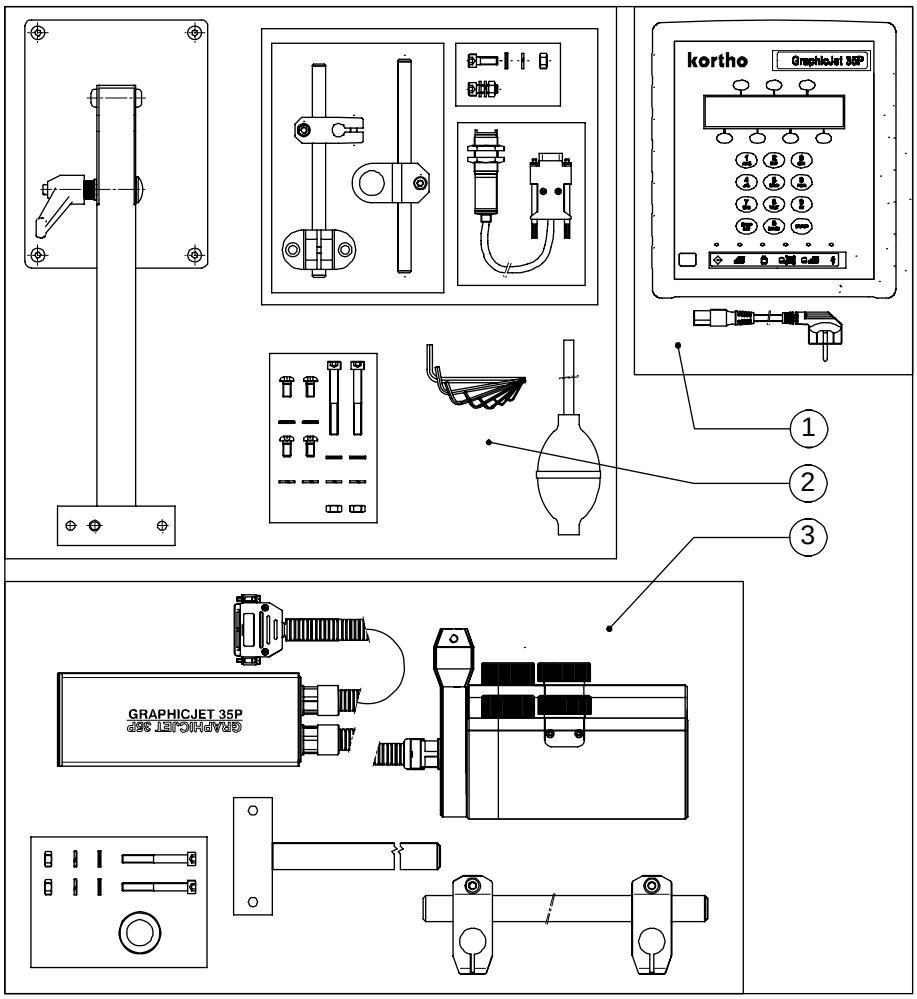
The original package for the printer set consists of three boxes with sub parts as shown in Fig. 6.2 and a manual.



1. Control box with mains power cord
2. Control box support set
   Photocell set
   Prime bulb
   Metric hexagon key ring set
3. Coding unit(s)
   (1x 18P or 2x 18PT)
4. Manual (not shown)

Fig. 6.2 Standard GraphicJet 18P or 18PT set

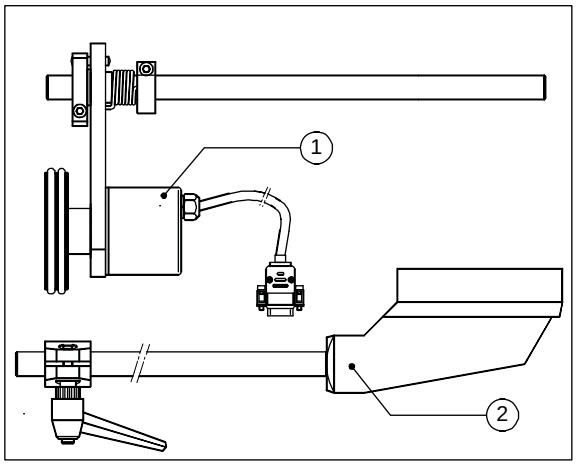
6.2.2 The printer set [35P]



1. Control box with mains power cord
2. Control box support set
   Photocell set
   Prime bulb
   Metric hexagon key ring set
3. Coding unit (1x 35P)
4. Manual (not shown)

Fig. 6.3 Standard GraphicJet 35P set

6.2.3 The optional encoder basic



1. Encoder with lever
2. Encoder support

Fig. 6.4 Encoder with support

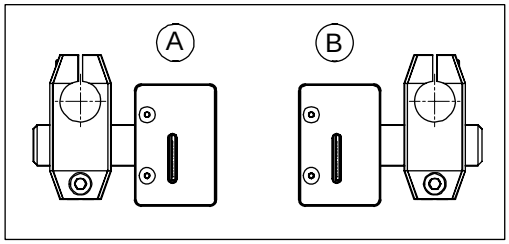
6.2.4 Two-pack ink set

The standard two-pack ink set consists of:

- Two (2) bottles with 200ml kortho ink GJ1 (083424)
- Five (5) pairs protection gloves (161222)
- Ten (10) foam swaps for cleaning (811968)

6.3 Coding unit mounting options

6.3.1 Printhead housing orientation



Printhead housing orientation:

A. Left-handed

B. Right-handed

Fig. 6.5 Printhead housing orientation [18P, 18PT]

The printhead housing standard orientation, for the GraphicJets 18P and 18PT, is 'left-handed' (Fig. 6.5). Sometimes a 'right-handed' orientation is required.

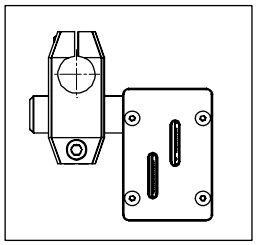
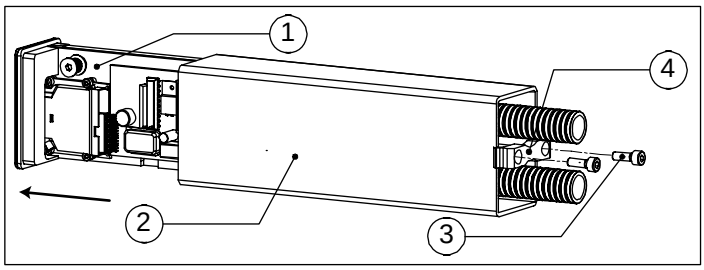


Fig. 6.6 Printhead housing orientation [35P]

The GraphicJet 35P provides only a 'left-handed' printhead housing orientation (Fig. 6.6).

6.3.2 Change printhead housing orientation [18P, 18PT]



1. Printhead frame
2. Printhead housing
3. Lock strip
4. Lock screws (2x)

Fig. 6.7 Open printhead housing [18P, 18PT]

To turn the printhead orientation, open the printhead housing as shown in Fig. 6.7:

1. Unscrew the two clamp screws.
2. Slide the printhead carriage assembly carefully out the printhead housing.
3. Rotate the printhead housing half a turn (180 degrees).
4. Slide the printhead carriage assembly carefully back into the printhead housing.

Beware:
The ink filter needs some guidance by hand.

5. Tighten the lock screws to secure the printhead carriage assembly with the lock strip to the housing.

6.3.3 Distance between front plate and product

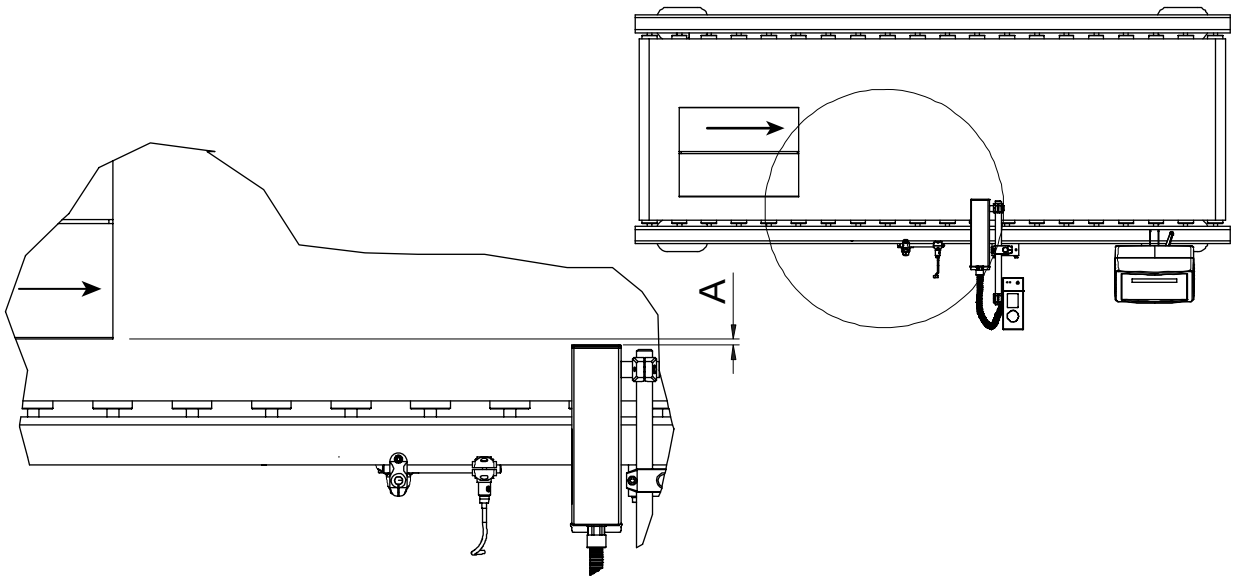


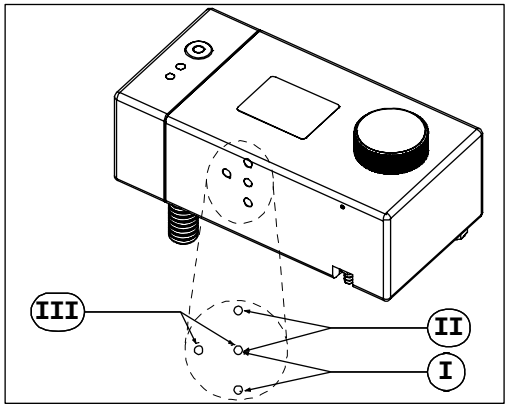
Fig. 6.8 Distance between front plate and product

The maximum print distance, distance A in Fig. 6.8, is 5 mm. If the situation permits, keep the print distance as small as possible for an optimal print quality.

Take precautions so that the product cannot damage the printhead housing or front plate.

6.3.4 Ink reservoir [18P, 18PT]

The ink reservoir must always be mounted in a levelled position. This is easy to check with the built-in spirit leveller.



I. Reservoir position I
(mounting-block screws fixed in the lower two holes)

II. Reservoir position II
(mounting-block screws fixed in the upper two holes)

III. Reservoir position III
(mounting-block screws fixed in the two horizontal holes)

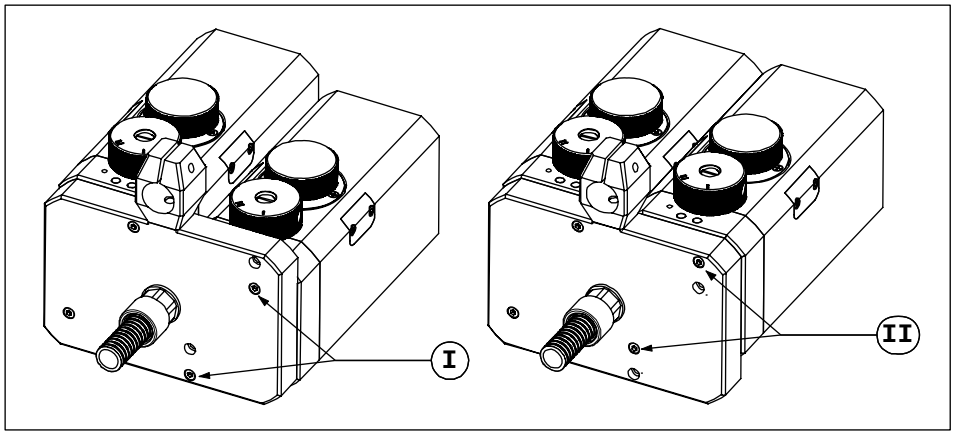
Fig. 6.9 Ink reservoir mounting clamp heights

The ink reservoir mounting-clamp is standard fixed in reservoir position I. The mounting height difference between reservoir position I and II is 14 mm. When the mounting-clamp is mounted upside down on the same reservoir position, I or II, the mounting height difference is then 76 mm.

When ink reservoir mounting-clamp is mounted in reservoir position III, the ink reservoir can be fixed at the desired height to the support pole.

6.3.5 Ink reservoir [35P]

The ink reservoir must always be mounted in a levelled position. This is easy to check with a spirit leveller.



I. Ink reservoir 2 at bottom position

II. Ink reservoir 2 at top position

Fig. 6.10 Ink reservoir-mounting heights [35P]

The ink reservoir 2 is standard fixed at the bottom position. At this mounting position, the ink reservoirs 1 and 2 have the correct level for the horizontal mounting position of the printhead housing.

When ink reservoir 2 is fixed at the top position, the printhead housing can be mounted at the vertical mounting position.

To rotate the reservoir mounting clamp:

1. Remove the four screws which positioning the reservoirs 1 and 2.
2. Loosen the screw of the reservoir mounting-clamp a bit. The screw is accessible from the inside.
3. Turn the reservoir mounting clamp 90°.
4. Tighten the screw of the reservoir mounting-clamp.

5. Replace both reservoirs with the four screws.

6.3.6 Ink reservoir orientation

The ink reservoir mounting-clamp can be fixed in two orientations, so that the ink reservoir is placed parallel (Fig. 6.11 and Fig. 6.12) or perpendicular (Fig. 6.13) to the support shaft. This is not possible for reservoir position III [18P, 18PT].

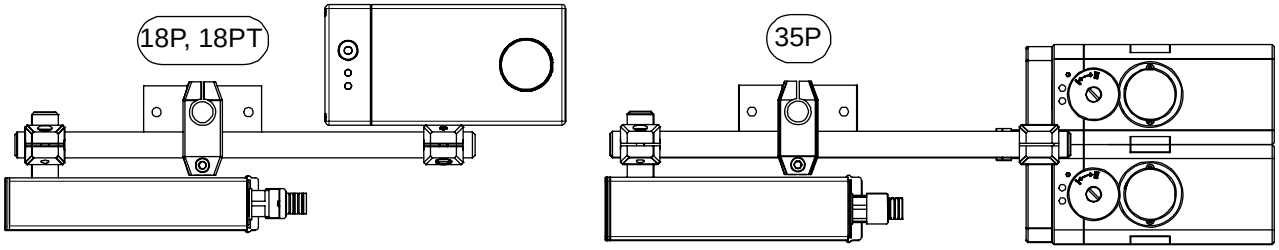


Fig. 6.11 Left-handed printhead housing and parallel reservoir (standard)

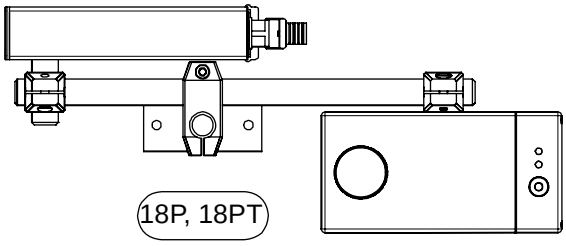


Fig. 6.12 Right-handed printhead housing and parallel reservoir

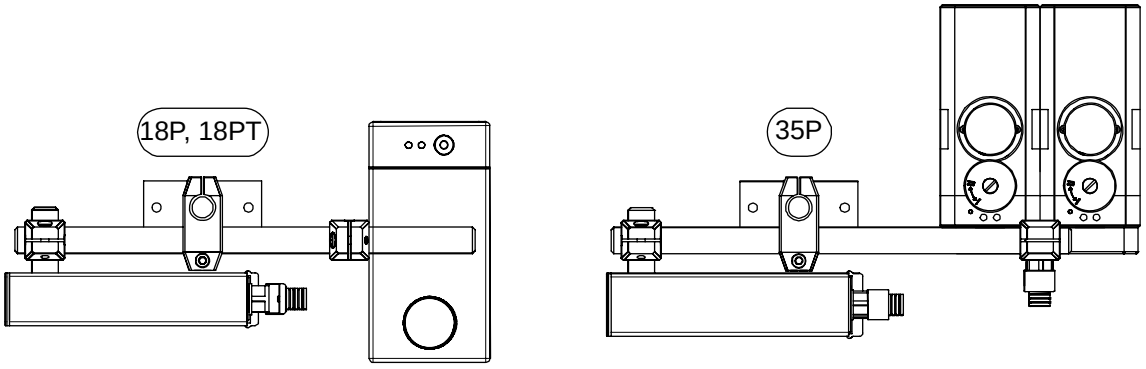


Fig. 6.13 Left-handed printhead housing and perpendicular reservoir

6.4 Printhead rotation [18P, 18PT]

A rotation of the printhead means that the ink level related to the printhead will change. For proper functioning of the printhead, the ink level must be kept between the specifications as explained in section 3.3. A quick and simple way to achieve this is the use of the graphs as described in this chapter.

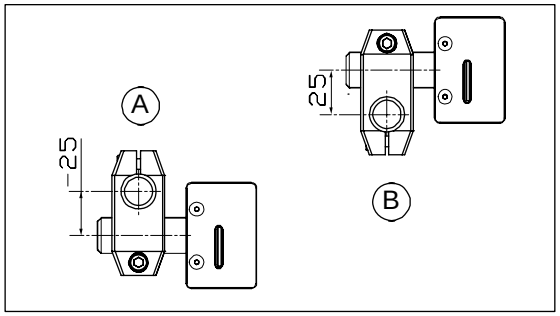
The dimensions and graphs are based on the type of clamps and shafts as used in the standard support set.

For every axial or radial rotation angle of the printhead, the ink reservoir must be set at a specific height. For easy measurement, the height between the top of the ink reservoir and top of the pole clamp is used. It is important that the support pole is levelled (use the built-in spirit leveller of the ink reservoir).

The top of the pole clamp is called datum-A and the top of the ink reservoir is called datum-B.
The height-AB dimension is negative if datum-A is above datum-B.

To set the proper ink level of the coding unit for a axial or radial printhead rotation:

1. Rotate the printhead housing so that the plane of the front-plate is positioned parallel to the substrate and perpendicular to the direction of the product.
2. Position the printhead housing at the desired print position. Datum-A is now fixed.
3. Determine with the figures in subsection 6.4.1 and 6.4.2 the type of printhead rotation, either radial or axial
4. Measure or set the rotation angle (β) with a protractor or a carpenter's square for right angles. The rotation angle (β) is 0° when the printhead housing is levelled.
5. Look in the rotation graph, Fig. 6.18 or Fig. 6.21, which height-AB (h_{AB}) corresponds to the measured angle (β) according to the graph-curves. Which graph-curve is chosen depends on the mounting of the printhead clamp (Fig. 6.14), either clamp down or clamp up (y_{clamp}).
6. Position the ink reservoir so that the distance between datum-A and datum-B is equal to the found height-AB. Use, if necessary, extra clamps, poles or shafts.
7. Level the ink reservoir.
8. Check the height-AB.



Printhead clamp mounting options:
A. Clamp down
B. Clamp up

Fig. 6.14 Printhead clamp mounting options

Printhead clamp down $\Rightarrow \quad y_{clamp} = -25\ mm$

Printhead clamp up $\Rightarrow \quad y_{clamp} = +25\ mm$

6.4.1 Radial [18P, 18PT]

The figures Fig. 6.15 to Fig. 6.17 shows some examples with a radial rotation of the printhead. To change the position of the ink reservoir, refer to subsection 6.3.4.

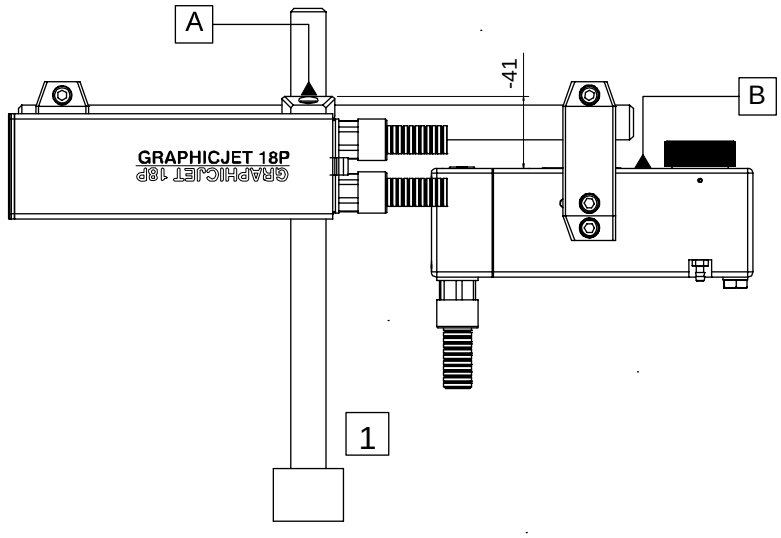


Fig. 6.15 Printhead radial rotation 0°, standard support, clamp down, reservoir position I

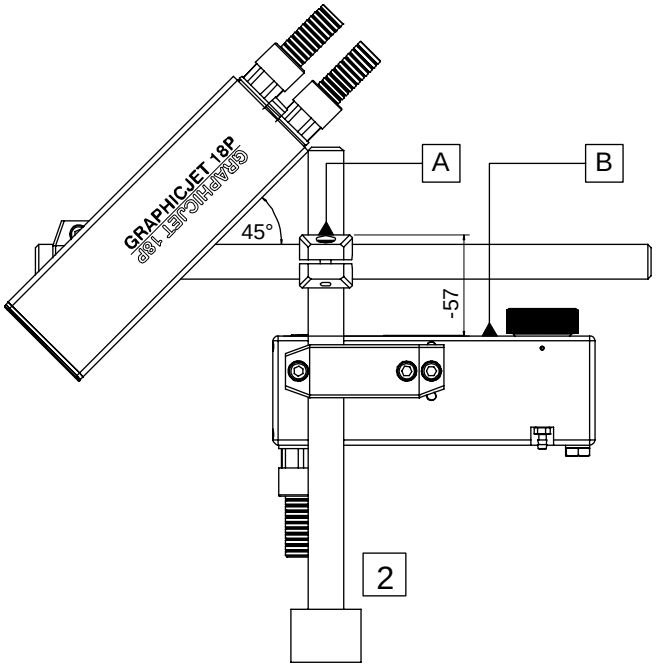


Fig. 6.16 Printhead radial rotation 45°, standard support, clamp down, reservoir position III

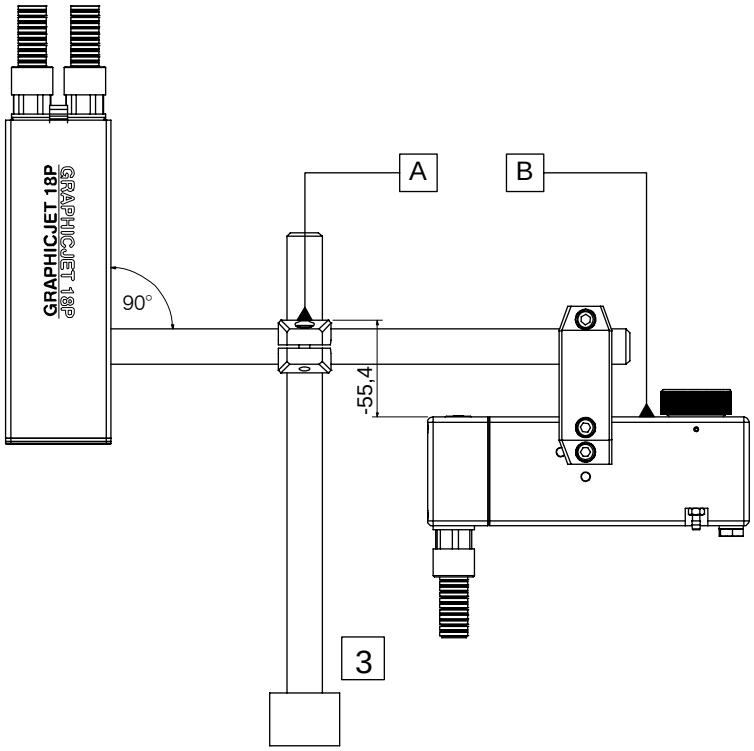


Fig. 6.17 Printhead radial rotation 90°, standard support, clamp down, reservoir position II

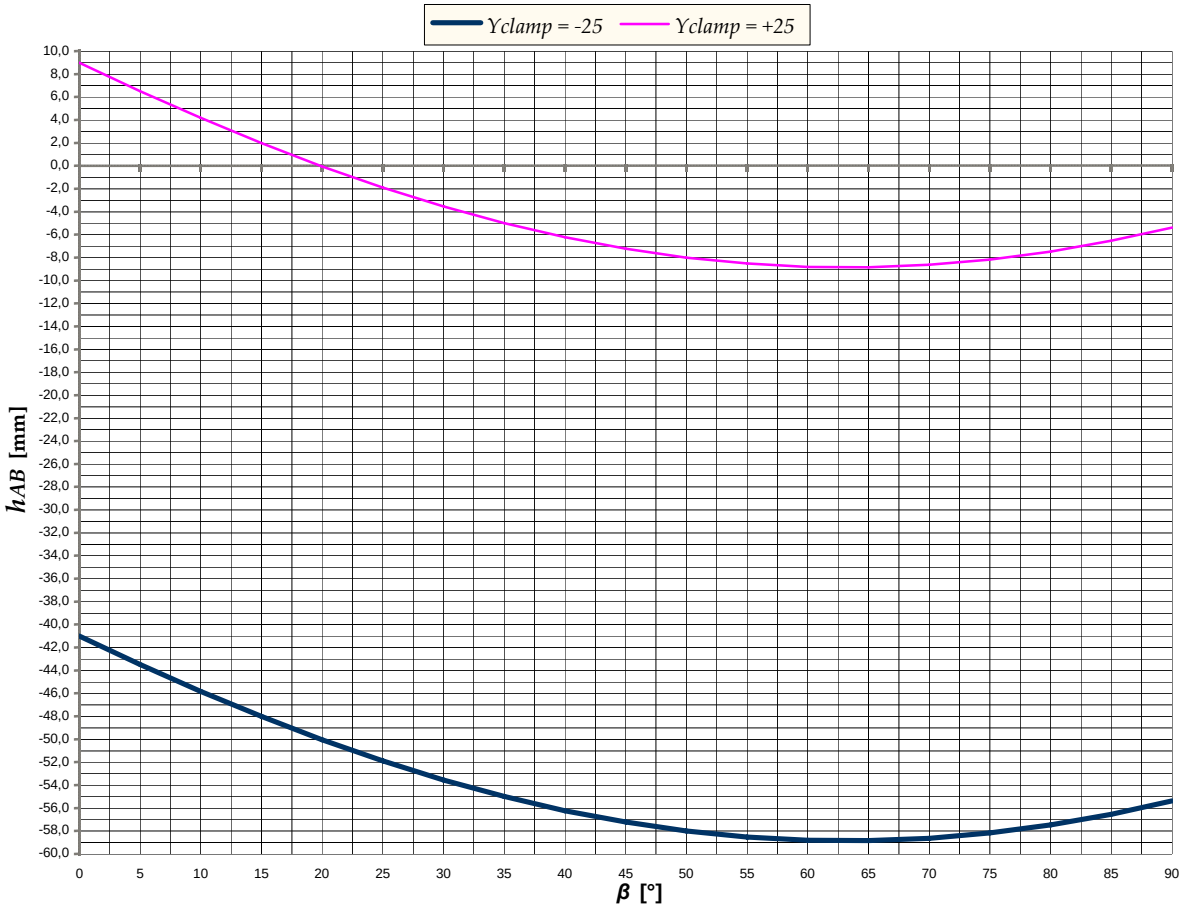


Fig. 6.18 Printhead radial rotation graph

Example [1]: Radial rotation of 0°, printhead clamp down, height-AB = -41.0 mm

Example [2]: Radial rotation of 45°, printhead clamp down, height-AB = -57.2 mm

Example [3]: Radial rotation of 90°, printhead clamp down, height-AB = -55.4 mm

To calculate height-AB at a given radial rotation angle ($h_{AB(\beta)}$ [mm]), use these equations:

$0° \leq \beta \leq 90°$; β is the radial rotation angle of the printhead housing.

$y_{clamp} = \pm 25\,mm$; y_{clamp} is the dimension between the centrelines of the printhead housing and the support shaft. With the printhead clamp down, $y_{clamp} = -25\,mm$.

$$h_{AB(\beta)} = \left(y_{clamp} + 1.37\right) - 32.48 * SIN\left(26.78 + \beta\right)$$

6.4.2 Axial [18P, 18PT]

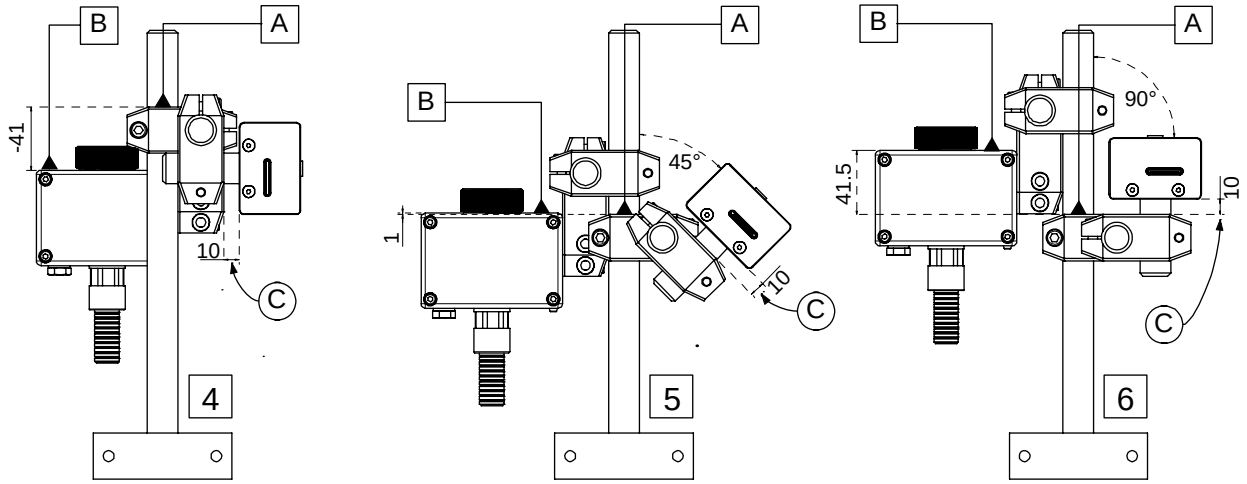


Fig. 6.19 Printhead axial rotation 0°, 45° and 90°, clamp down, reservoir position I, $x_{gap} = 10mm$

For some axial angles, the standard coding-unit support needs an extra shaft and pole clamp. Compare example [4] with [5] and [6]. At some angles, the reservoir mounting clamp must be fit to reservoir position II or III instead of the standard I position (refer to Fig. 6.9) because the two pole clamps can be in the way of each other.

First, set the x_{gap} (dimension C). Look at the curves in the graph Fig. 6.21 for a height-AB at a given axial rotation angle. Every curve in the graph Fig. 6.21 have their own x_{gap} and y_{clamp} values.

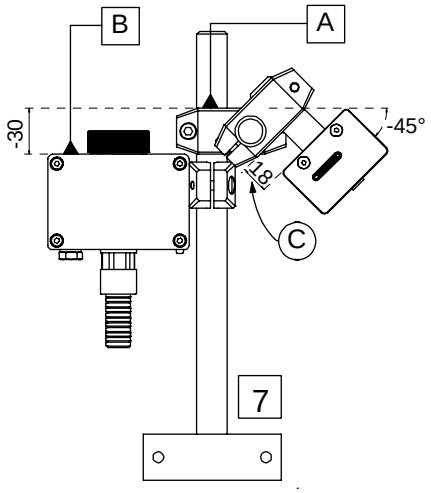


Fig. 6.20 Printhead axial rotation -45°, clamp up, reservoir position III, $x_{gap} = 18mm$

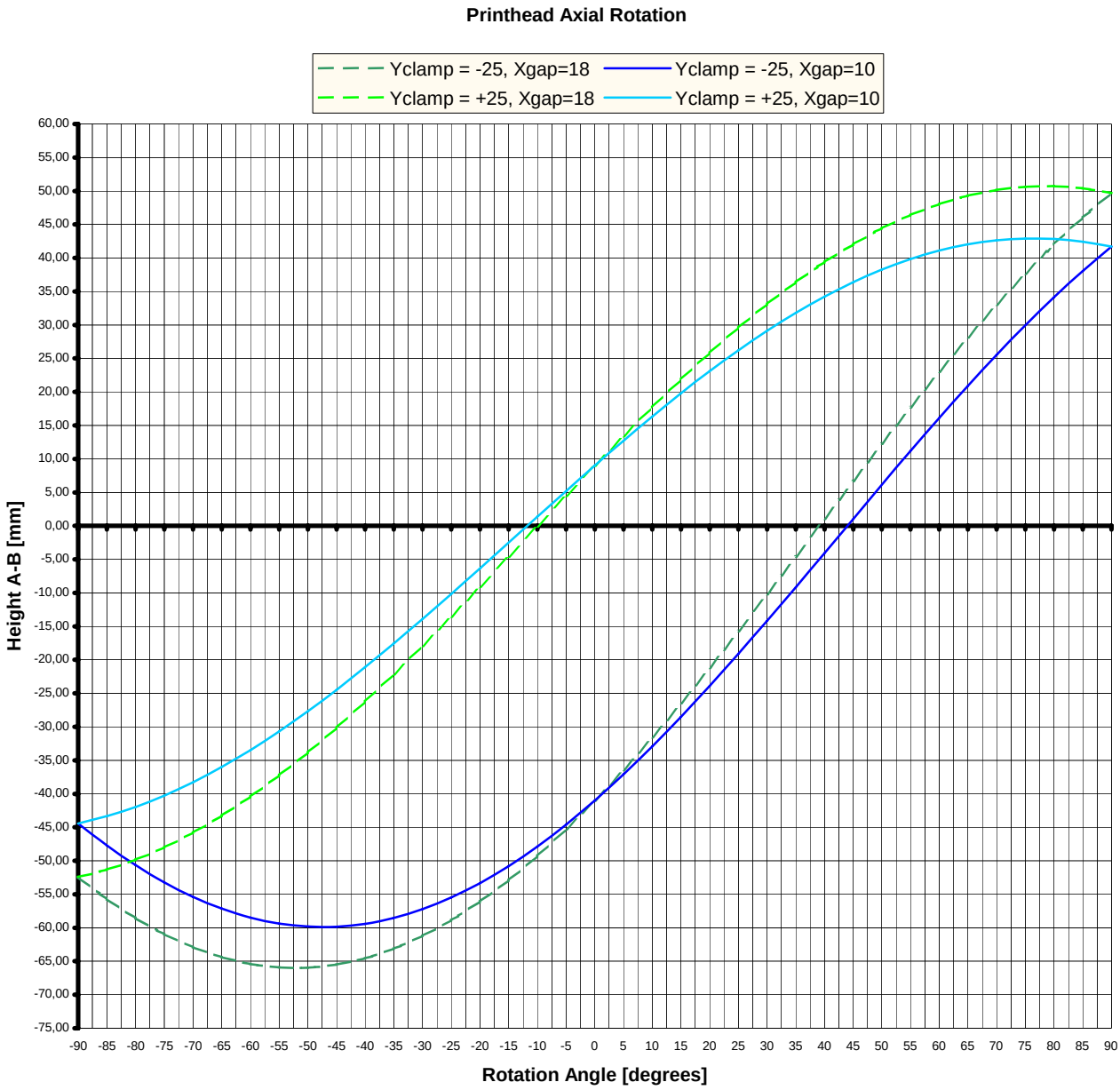


Fig. 6.21 Printhead axial rotation graph

Example [4]: Axial rotation of 0°, clamp down, x_{gap} = 10 mm, height-AB = -41.0 mm

Example [5]: Axial rotation of 45°, clamp down, x_{gap} = 10 mm, height-AB = 1.0 mm

Example [6]: Axial rotation of 90°, clamp down, x_{gap} = 10 mm, height-AB = 41.5 mm

Example [7]: Axial rotation of -45°, clamp up, x_{gap} = 18 mm, height-AB = –30.0 mm

When the $x_{gap} \neq 10 \; or \; 18mm$, calculate height-AB at a given rotation angle ($h_{AB(\beta)}$ [mm]) with these equations:

$-90° \leq \beta \leq 90°$; β is the axial rotation angle of the printhead housing.

$8.5mm \leq x_{gap} \leq 18mm$; x_{gap} is the dimension C in Fig. 6.19 and Fig. 6.20.

$y_{clamp} = \pm 25mm$; y_{clamp} is the dimension between the centrelines of the printhead housing and the support shaft. With the printhead clamp down, $y_{clamp} = -25mm$.

$x_0 = 33.05 + x_{gap}$; horizontal dimension, at $\beta = 0°$, between the first (bottom) nozzle and the printhead rotation point.

$y_0 = 14.635 - y_{clamp}$; vertical dimension, at $\beta = 0°$, between the first (bottom) nozzle and the printhead rotation point.

$\alpha_0 = ARCTAN\left(\frac{y_0}{x_0}\right)$; α is the axial rotation angle of the line, at $\beta = 0°$, between the first (bottom) nozzle and the printhead rotation point.

$$h_{AB(\beta)} = \left(y_0 + y_{clamp} - 1\right) - x_0 * \left(\frac{SIN\left(\alpha_0 - \beta\right)}{COS\left(\alpha_0\right)}\right)$$

6.4.3 Radial and axial [18P, 18PT]

An application with a combined axial and radial printhead rotation is more difficult, because both graphs, Fig. 6.18 and Fig. 6.21, cannot be combined. As described in section 3.3 Ink system, it is important that for any orientation of the printhead the top ink level in the reservoir is at least 3mm below the level of the first (bottom) nozzle, otherwise the printhead starts 'bleeding' ink.

The top ink level lies 16.8 mm below datum-B if the reservoir is levelled. This means that datum-B lies 13.8 mm above the first (bottom) nozzle of the printhead. The distance between first (bottom) nozzle and the bottom of the printhead housing is 15.4 mm.

To roughly set the ink level of the coding unit for a axial and radial printhead rotation:

1. Rotate the printhead housing so that the plane of the front-plate is positioned parallel to the substrate and perpendicular to the direction of the product.
2. Position the printhead housing at the desired location. Datum-A is now fixed
3. Clamp with a cramp an aid-strip, levelled at 13.8 mm below datum-B, to the ink reservoir. The topside of the aid-strip lies now 3 mm above the top ink level.
4. Position the aid-strip in the horizontal plane of the first nozzle while keeping the aid-strip and reservoir level with the build-in leveller.
5. Mark the position of the ink reservoir.
6. Mount the ink reservoir at the marked position. Use, if necessary, extra clamps, poles or shafts.
7. Check if the ink reservoir is levelled.
8. Check with the aid-strip if the horizontal plane of the first nozzle is 13.8 mm below datum-B.

Beware:
After the first refill of the ink reservoir the printhead may start 'bleeding' ink. Stop this 'bleeding' by lowering the ink reservoir for about 1 mm.

6.5 Printhead rotation [35P]

A rotation of the printhead means that the ink level related to the printhead will change. For proper functioning of the printhead, the ink level must be kept between the specifications as explained in section 3.3 Ink system .

Due to the dual printhead construction, the practical printhead radial rotation angles are 0° (horizontal) and 90° (vertical) with an axial rotation angle of 0°. Other radial and/or axial rotation angles are not advisable due to the risk of ink bleeding from one of the printheads.

To change the position of ink reservoir 2, refer to subsection 6.3.5.

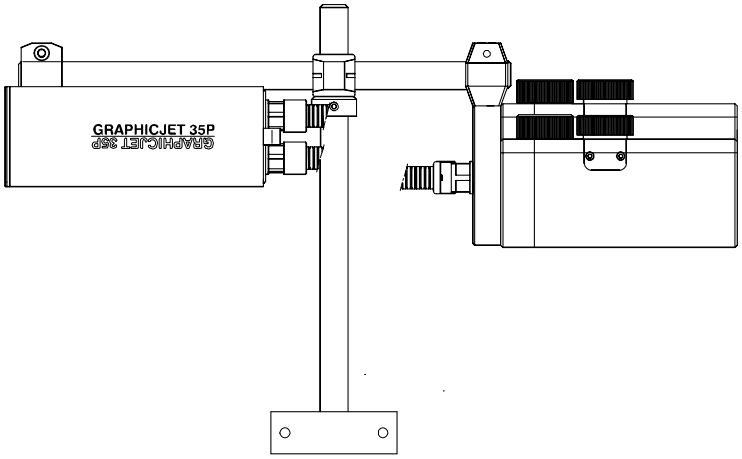


Fig. 6.22 Printhead radial rotation 0°, axial rotation 0°, reservoir 2 at position I

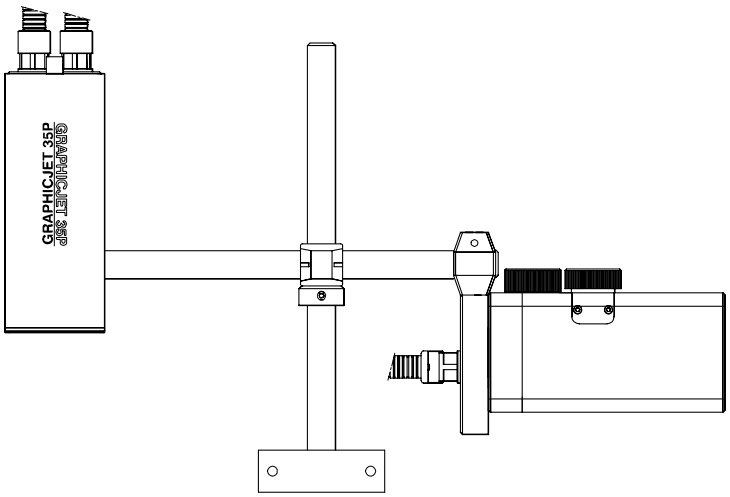


Fig. 6.23 Printhead radial rotation 90°, axial rotation 0°, reservoir 2 at position II

6.6 Positioning the sensors

6.6.1 Photocell

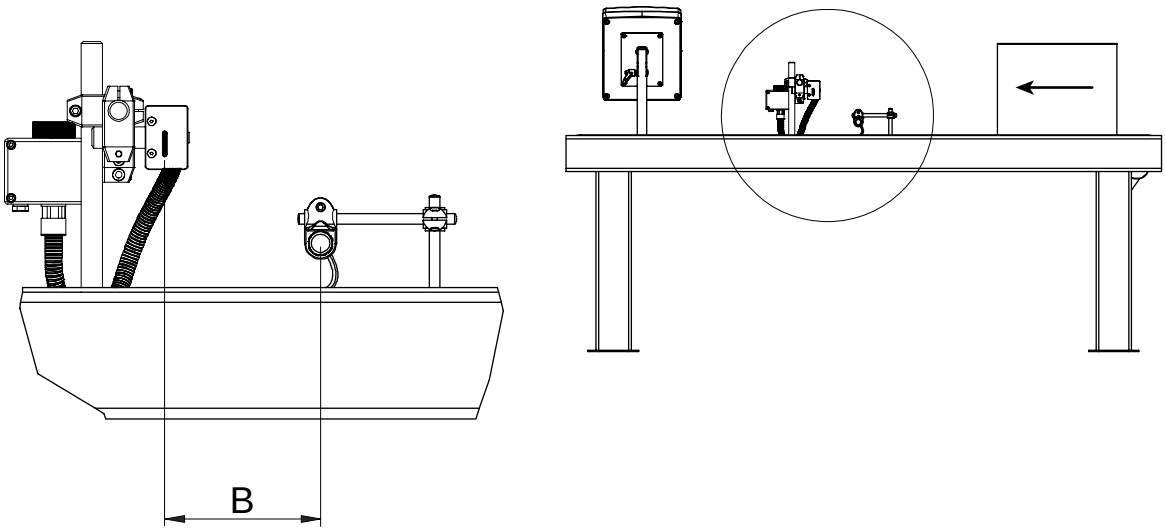


Fig. 6.24 Photocell positions

The photocell is placed at distance B ahead of the printhead (Fig. 6.24). The photocell will trigger the print request input of the printer to make a print. To print on the product, the print delay parameter (subsection 8.7.3) must be set to a value that is equal or greater than distance B.

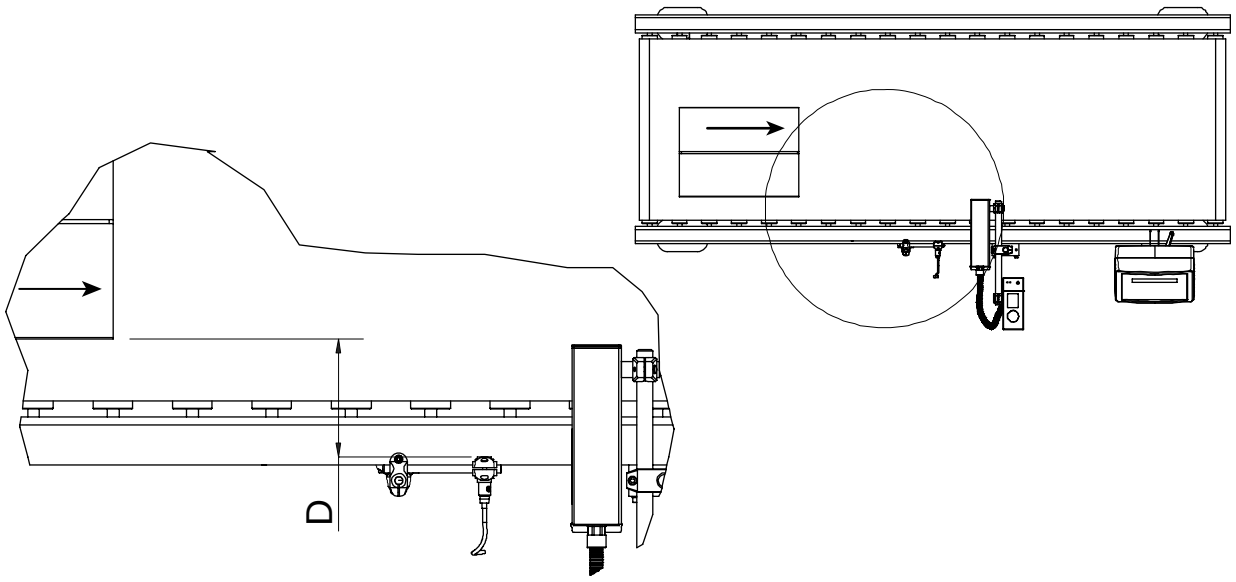


Fig. 6.25 Photocell distance to the product

Keep the photocell distance (D in Fig. 6.25) within the maximum operating range of the photocell, which is approximately 400 mm. The operating range also depends on product properties like colour, reflection etc.

Take precautions so that the product cannot damage the photocell.

6.6.2 Encoder (optional) ~~basic~~

1. Mount the encoder in such a position that it detects at least the movement of the product from the moment photocell detects the product until the print is made. Mount the encoder as close as possible to the location of the printhead.
2. Set the lever tension with the spring tension adjustment clamp and the lever limiter (Fig. 2.14) so that the encoder wheel will not slip and the product becomes neither damaged nor disturbed.
3. Take precautions that the product cannot damage the encoder.

Beware:
Mount the encoder as close as possible to the location of the printhead. This will give the best print results.

6.7 Mounting the control box

1. Find a secure location, which is easily accessible for operators, to mount the control box.
2. Fix it into position near the coding unit bracket and fix the cables so that the coding unit(s) can rotate and move within the dimensions of the bracket(s).
3. Check if all of these cables are long enough to be connected to the connector plate. If not, correct it by relocating either the coding unit, the control box or extend the cable(s).
    1. The cable/conduit (X5). (between the control box and the coding unit)
    2. The cable/conduit (X6) [18PT]. (between the control box and the coding unit)
    3. The mains power plug. (X4).
    4. The input cable. (X1). (info: photocell or host-interface)
    5. The output cable (X2). (option)
    6. The encoder cable (X7). (option) ~~basic~~
    7. The RS232 communication cable (X8). (option) ~~basic~~

If the host must stop when a printer alarm occurs or must know when the printer is ready to print, connect the interface output (X2) to the host. Refer to X2 Interface Output in Appendix D Connections.

The outputs ALARM 1 and ALARM 2 are logical but not physical the same output. They are activated when an ink low condition occurs. The READY output is activated when the printer is ready to accept the trigger signal (PRINT REQUEST) for making a print.

7 COMMISSION

This part describes the commissioning for a typical printer application (Fig. 6.1).

Beware:
Do NOT switch the control box off while writing to memory. Otherwise the risk of corrupting the memory is very high.

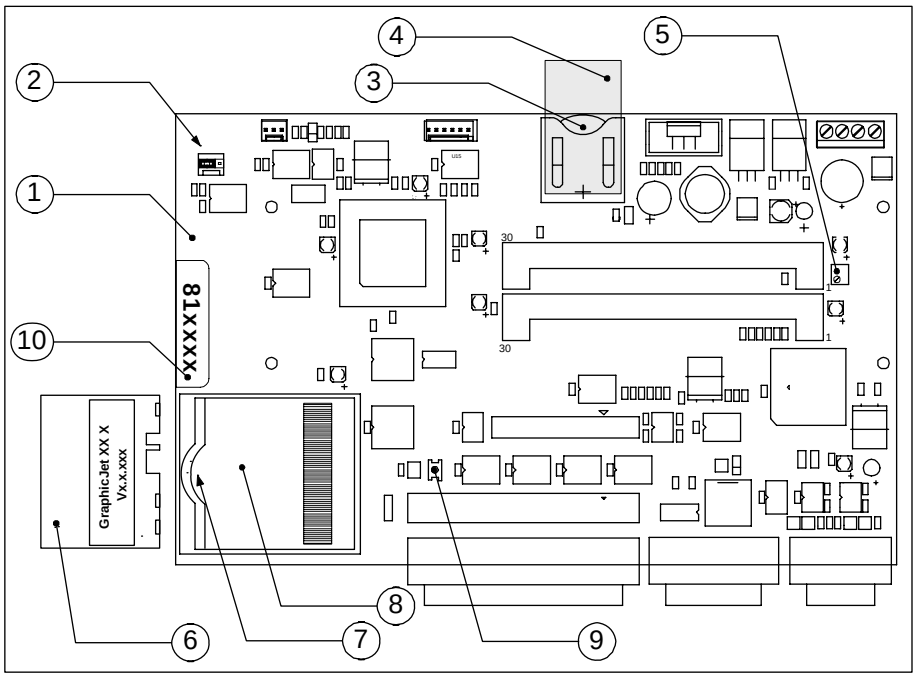
When at the next start-up of the control box the boot procedure detects a corrupted memory, the memory will be initialised i.e. resetted to the default parameters with a cleared image list.

The warning message 'writing to memory' (Fig. 7.1) appears when changed parameters or data will be written to flash memory. This warning message usually appears at re-entering to the main menu

Fig. 7.1 Writing to memory message

7.1 Preparing the control box

The control box is shipped with the flashcard in a protection box. This box is taped to the inside of the control box. The flashcard contains the program (firmware) of the GraphicJet.



1. X100 r2 Processor board
2. Encoder jumper (left position = GraphicJet)
3. Clock battery
4. Isolation strip
5. Contrast adjustment of LCD screen
6. Flashcard memory
7. Flashcard release lever
8. Flashcard memory slot
9. Reset button
10. Part number

Fig. 7.2 X100 R2 processor board

To setup the control box for the first time:

1. Verify if the mains power plug and the other cables are disconnected from the control box.
2. Open the control box by unscrewing the four screws on the back of the control box.
3. Locate the "X100" processor board (1), as shown in Fig. 7.2, mounted in the front cover
4. Check if the flashcard (6) is placed. If so, proceed with instruction 6.
5. Check whether the flashcard connector and the flexible connector are clean. If not, clean them. To prevent damage to the connectors do not touch them with your fingers!
6. Place the flashcard (6) with the connector side downwards into the slot.
7. Push the flashcard down until the lever (7) clicks to secure the flashcard.
8. Check jumper J10 (2) for the GraphicJet setting (left position = GraphicJet).
9. Remove the plastic strip (4) underneath the battery (3) to activate the battery.
10. Close the control box and secure the control box with the four screws at the back.
11. Connect the mains power plug.
12. Switch the control box on and wait until the MAIN MENU (000) appears.

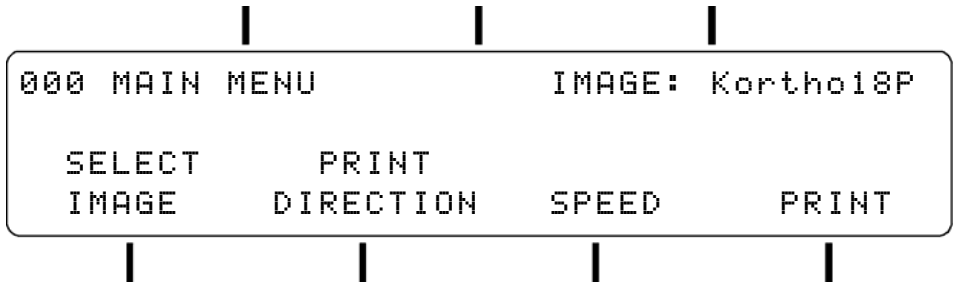


Fig. 7.3 000 Main menu

13. Go to the LANGUAGE MENU (type 620 with keypad keys) to select and set the language.

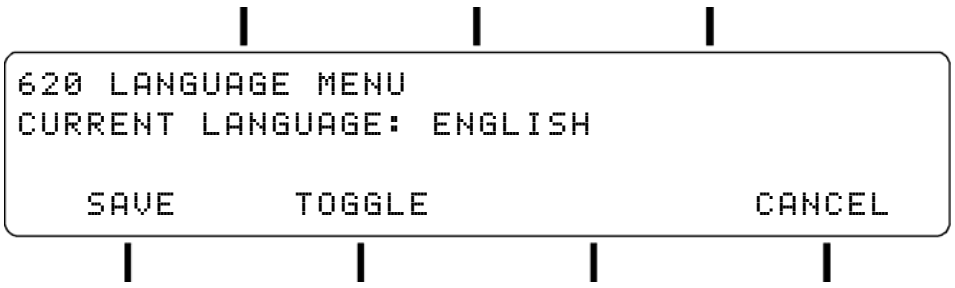


Fig. 7.4 620 Language menu

The language selected in this menu is the language setting for all the screen menus. Available languages are English, Nederlands, Deutsch, Français and Espanõl.

Press function button:

SAVE	to put the setting in memory and exit to the previous menu level.
TOGGLE	to scroll through the language list until the desired language is displayed.
CANCEL	to retain the previous setting and exit to the previous menu level.

14. Go to the RESET MENU (type 610 with keypad keys) to reset the system, counters and delete all images.

Fig. 7.5 610 Reset menu

The functions in the reset menu are for resetting printer parameters or counters and deleting all the stored images.

Press function button:

RESET SYSTEM	to restore the printer to the factory preset default values for all parameters except the one for language, date and time..
RESET COUNTERS	to reset the counters to zero.
DELETE ALL IMAGES	to delete all the stored images in the printer except the test image.
CANCEL	to exit to the previous menu level.

15. Go to SET DATE AND/OR TIME menu (type 310 with keypad keys) to set the date and time.

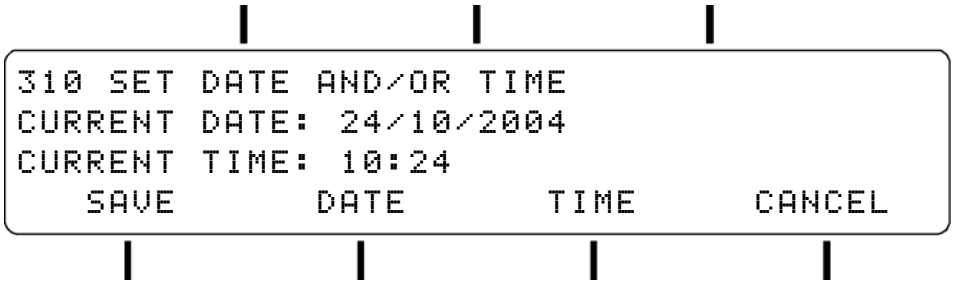


Fig. 7.6 310 Set date and/or time

Use this menu to set the date and/or time.

Press function button:

SAVE	to put the setting in memory and exit to the previous menu level.
DATE	an underlined cursor will appear under the first digit of the value. Enter the desired values using the alphanumeric keypad. As a digit is entered, the cursor will move to the next digit. The value can only be saved when all eight digits are entered. The date format is day/month/year.
TIME	an underlined cursor will appear under the first digit of the value. Enter the desired values using the alphanumeric keypad. As a digit is entered, the cursor will move to the next digit. The value can only be saved when all four digits are entered. The time is in 24-hour format (hour/minute)
CANCEL	to retain the previous setting and exit to the previous menu level

16. Switch the control box off.

17. Connect all the cables to the control box.

7.2 Filling the ink system

1. Check if all the instructions of section 7.1, Preparing the control box, are carried out.
2. Switch the control box on.
3. Go to RESERVOIR TYPE menu, type 632 with keypad keys (Fig. 7.7).

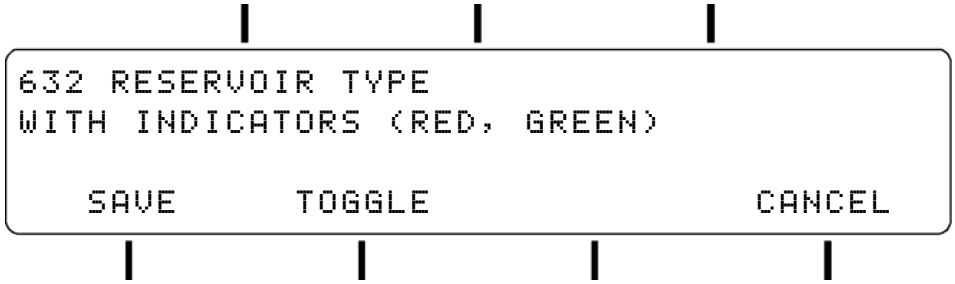


Fig. 7.7 632 Reservoir type menu

4. Check if the ink reservoir has indicators (red and green). Toggle to and save:
   a. The (default) value 'With indicators (red, green)' when indicators are present.
   b. The value 'Without indicators' when the ink reservoir is an older model without indicators.
5. Go to MAIN MENU, press the STOP/EXIT key several times or type 000 with keypad keys (Fig. 7.15) to save the 'reservoir type' parameter.
6. Rotate, if necessary, the printhead housing to the horizontal position (Fig. 7.8). The printhead radial and axial rotation is then 0°. The height-AB for the printhead housing and the ink reservoir is not important for this procedure.

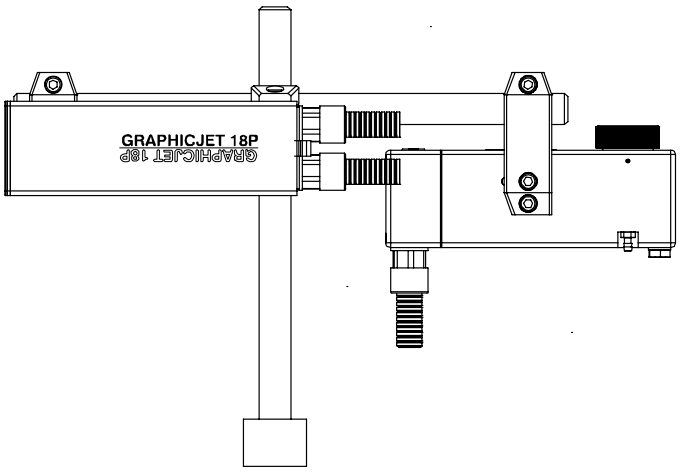


Fig. 7.8 Printhead housing at horizontal position

7. Put on protection gloves and use safety goggles for personal protection.

Note:
Perform instuctions 8 to 17 for both ink reservoirs of the GraphicJet 35P.

8. Clean and remove any dust from the top of the ink reservoir.
9. Take an inkbottle and cut off the end, which is indicated with a ring, of the spout top (Fig. 7.9).

CAUTION:
Use ONLY porous ink GJ1 in 200 ml bottles.

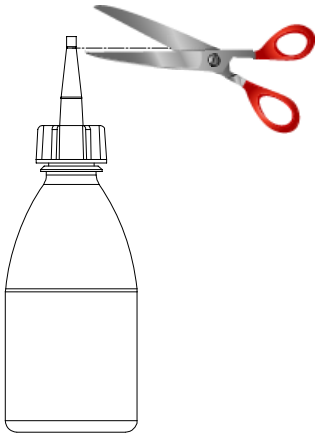


Fig. 7.9 Cut inkbottle open

10. Open the ink reservoir by unscrewing the screw cap (Fig. 7.10) counter clockwise. Lay the screw cap aside at a clean place.

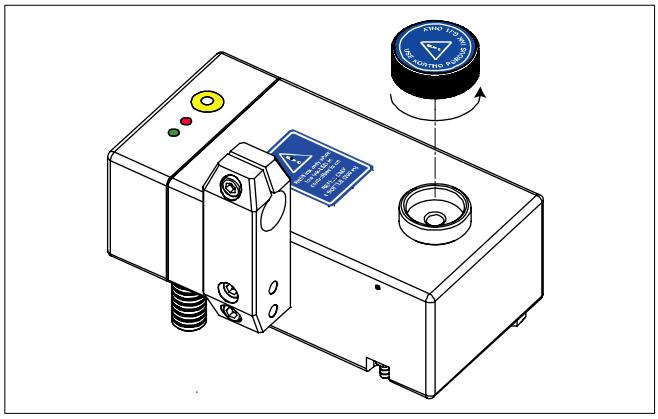


Fig. 7.10 Ink reservoir opened.

11. Place, without spilling ink, the inkbottle upside-down into the ink reservoir fill opening (Fig. 7.11).

12. Squeeze the inkbottle gently until it is empty. The status of the ink level indicators is now, red off and green on (Fig. 7.12 item 4 and 5).

CAUTION:
Fill the ink reservoir ONLY with ONE inkbottle (200 ml), filling with more than one inkbottle will cause ink leakage or overflow.

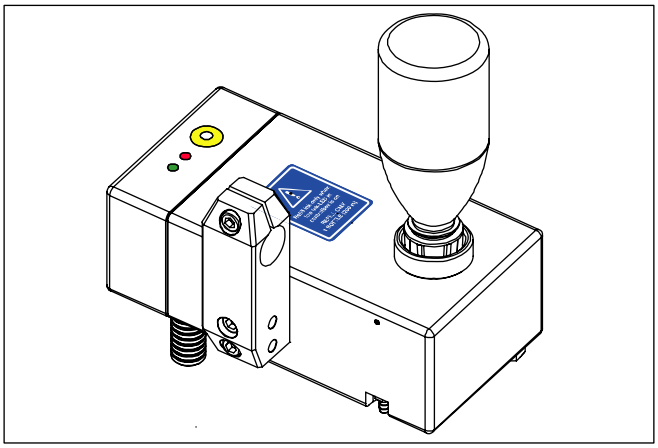
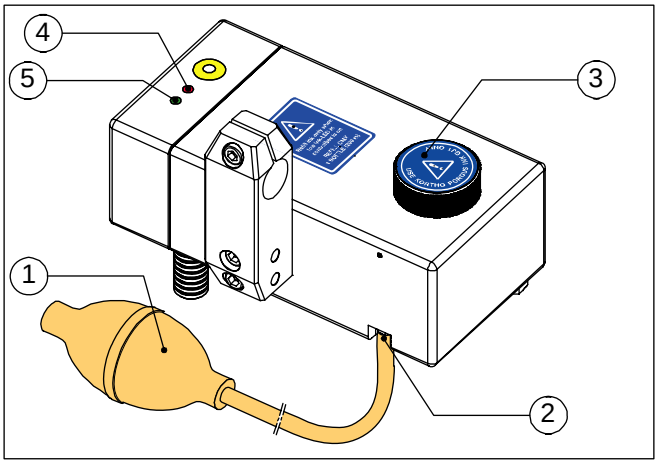


Fig. 7.11 Ink reservoir with inkbottle placed.

13. Remove the empty inkbottle and avoid spilling ink. Clean the reservoir opening with a clean paper tissue.

14. Close the ink reservoir by screwing the screw cap (Fig. 7.12 or Fig. 7.13) back on. Hand tight is sufficient.

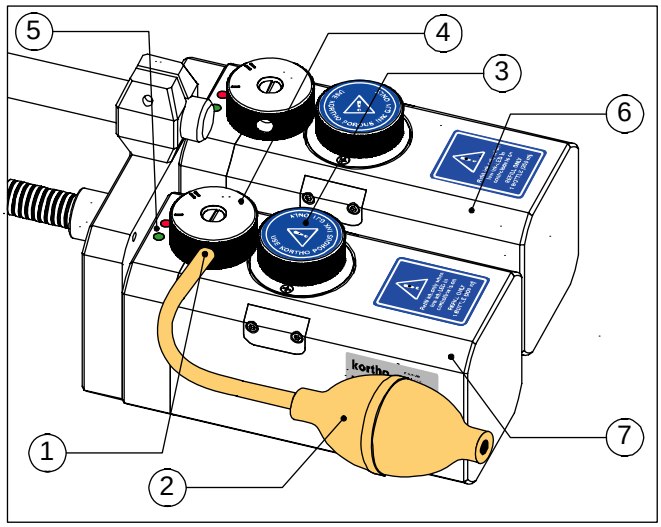


1. Prime bulb
2. Fitting for prime bulb
3. Screw cap with label

Ink level indicators

4. Low level warning (red)
5. Ink level OK (green)

Fig. 7.12 Ink reservoir with prime bulb [18P, 18PT].



1. Opening for tube of prime bulb
2. Prime bulb
3. Screw cap with label
4. Vent knob (pos. II)
5. Ink level indicators
   Low level warning (red)
   Ink level OK (green)
6. Ink reservoir 1
7. Ink reservoir 2

Fig. 7.13 Ink reservoir with prime bulb attached to vent knob [35P].

15. Fit the prime bulb to the fitting (Fig. 7.12) or to the opening of the vent knob (Fig. 7.13) of the ink reservoir. Check, only necessary for GraphicJet 35P, if:
    a. Vent knob is turned to position II [35P]
    b. Prime bulb is connected to the reservoir , which is connected to the printhead to be primed. The top and bottom printhead are respectively connected to reservoir 1 and 2 [35P].
16. Hold paper tissues in front of the printhead to collect ink.
17. Squeeze the prime bulb completely just one time to prime the printhead. Prime in bursts of about three to five seconds to remove any air bubbles out of the ink system.
18. Repeat priming until ink squirts from all the nozzles.
19. Remove the prime bulb (gently, to avoid a pressure wave within the ink tubes) from the fitting of the ink reservoir to stop priming the printhead.
20. Rotate the printhead housing back to the print position. This is only necessary if the printhead housing is rotated to the horizontal position at instruction 6.
21. The printer is now ready to print.

7.3 Tuning the speed related parameters

Proceed with this section only if the instructions of the sections 7.1 and 7.2 are successfully carried out.

7.3.1 Preparation for the first test print

1. Switch the control box on.
2. Go to ENCODER MENU, type 640 with keypad keys (Fig. 7.14) ~~basic~~.
3. Toggle to and save 'No', because the encoder will not be used in this procedure ~~basic~~.

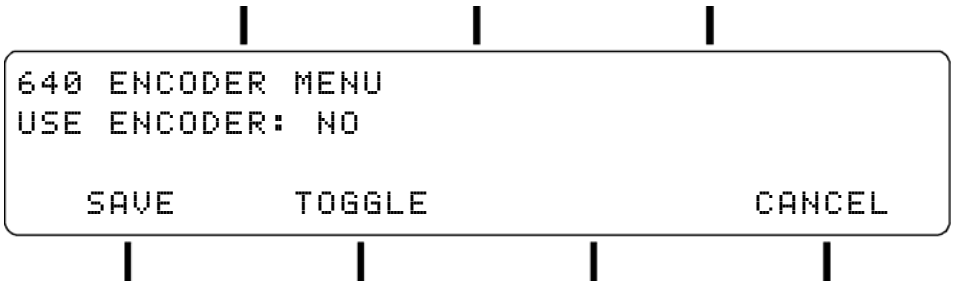


Fig. 7.14 640 Encoder menu

4. Go to MAIN MENU, press the STOP/EXIT key several times or type 000 with keypad keys (Fig. 7.15).

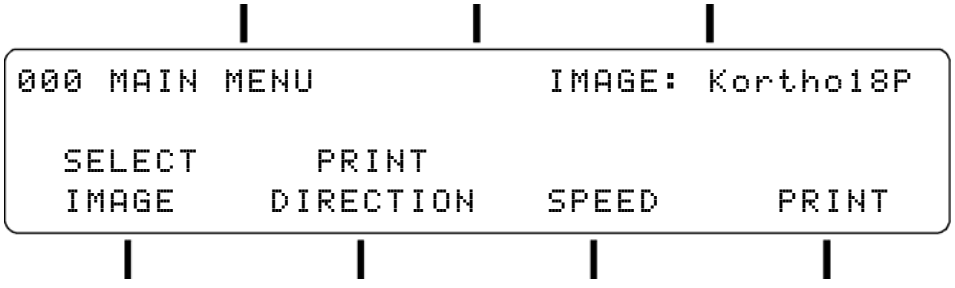


Fig. 7.15 000 Main menu [18P, 35P]

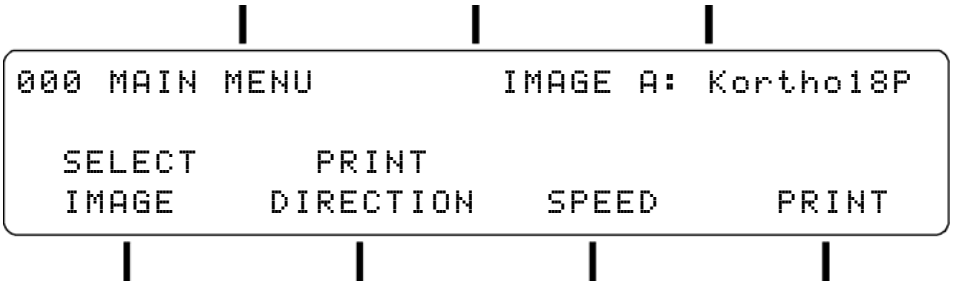


Fig. 7.16 000 Main menu [18PT]

Note:
Press button C (Fig. 3.4, Function button names), in the MAIN menu, to toggle between printhead A and B [18PT]. Only the SELECT IMAGE menu and the DELAY and PRINT DIRECTION parameters are dependent (local) to printhead A or B. All other menu's and parameters are the same (global) for printhead A and B.

5. If the selected image is 'Kortho18P', 'Kortho18PT' or 'Kortho35P' proceed with instruction 8.
6. Select the select image function.
7. Scroll the image pointer to the test image 'Kortho18P', 'Kortho18PT' or 'Kortho35P' and select this image (Fig. 7.17). This menu exits back to the main menu. Refer to subsection 8.4.1 for quick scrolling.

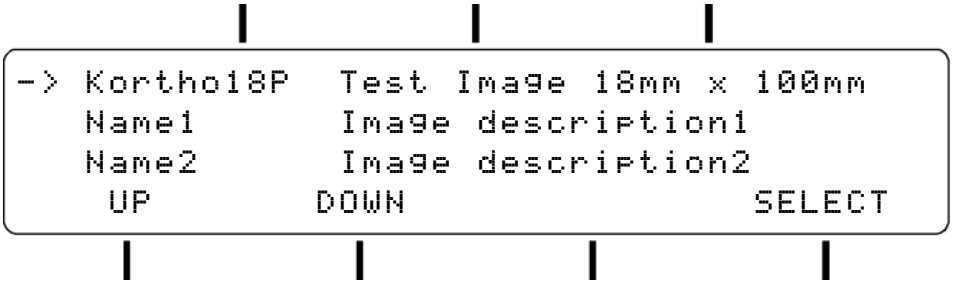


Fig. 7.17 (100) Select image

8. Press the print function button to enter the START MENU.

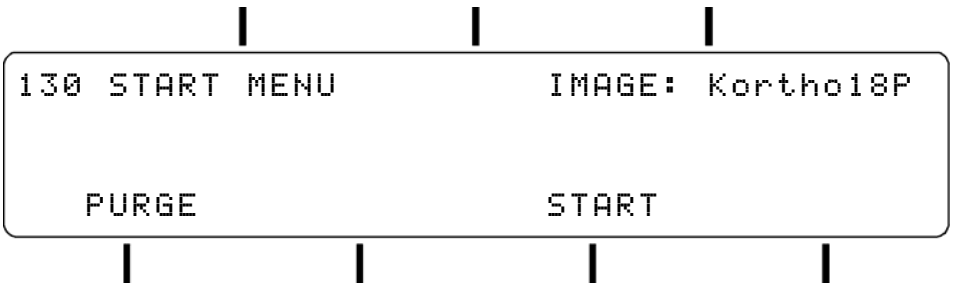


Fig. 7.18 130 Start menu

9. Press the start function button (Fig. 7.18). The prompt screen of the test image appears (Fig. 7.19)

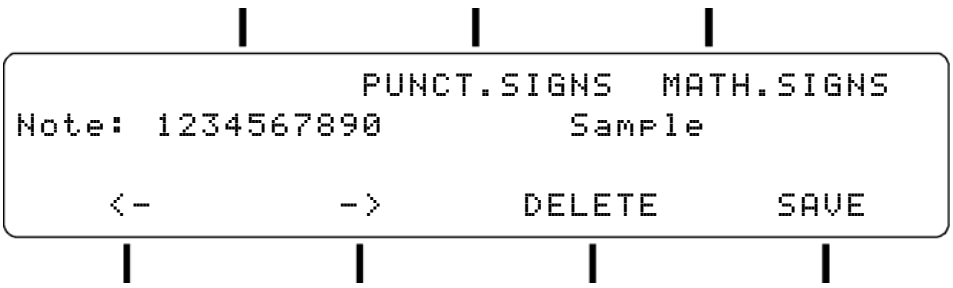


Fig. 7.19 Test image prompt screen

10. Edit the prompted data or leave as it and press the save function button to generate a printable bitmap from the image (This step twice for 18PT). The display shows the operational screen and the printer is now ready for printing.

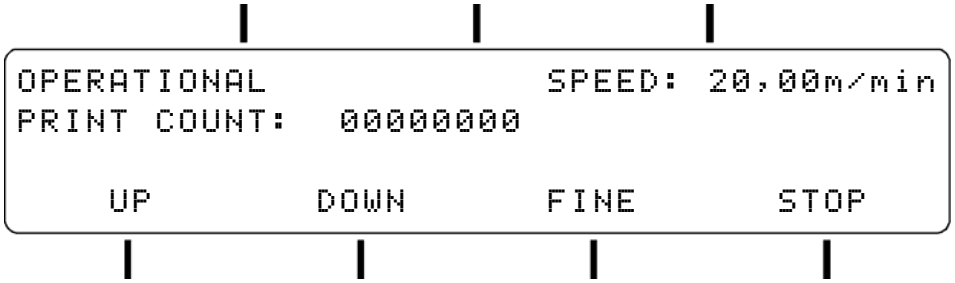


Fig. 7.20 Operational screen

11. Place a piece of paper or something similar in front of the printhead.

12. Press up and down (buttons D and E) to change the speed parameter (default = 20 m/min) to about 10 m/min. Toggle with button-F from fine to coarse for a larger step size

13. Press button-B to make a test print. Move the piece of paper along the printhead.

14. Check if a test print is made. The test print is probably not readable but this is not important yet, this test is only to check if the printhead prints. If the test failed, refer to chapter 9, TROUBLESHOOTING.

15. Check if the function indicator of the photocell will be lit when moving the product at operational distance along the front of the photocell.

16. Adjust the scanning sensitivity of the photocell if necessary.

17. Proceed, depending if an encoder is used, with either subsection 7.3.2 or 7.3.3.

7.3.2 Tuning the test print with the encoder disabled

1. Proceed with this subsection only if the instructions of the subsection 7.3.1 are successfully carried out.
2. Go to the ENCODER MENU, type 640 with keypad keys (Fig. 7.14) ~~basic~~.
3. Toggle the parameter value to and save 'No' ~~basic~~.
4. Repeat the steps 4 till 10 of subsection 7.3.1 to proceed to the OPERATIONAL MENU and make the printer ready for printing.

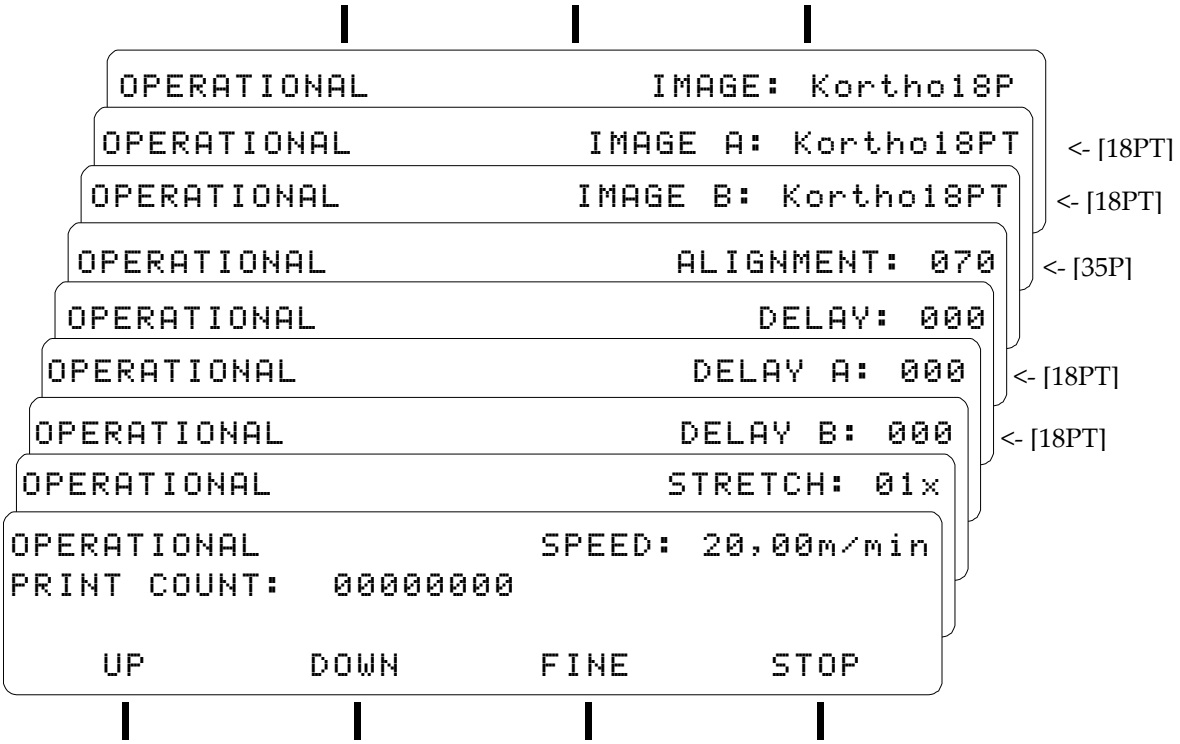


Fig. 7.21 Operational screens used without encoder, scrollable by button-C

5. Press up and down (buttons D and E) to change the speed parameter to the estimated speed of the product. Toggle the fine button to coarse for a larger step size.
6. Scroll by pressing button-C (the button above the parameter values) to the delay parameter.
7. Press up and down (buttons D and E) to change the delay parameter to the value of the distance between the photocell and the printhead, refer to Fig. 6.24 dimension B. The delay value is in millimetres at the correct speed setting.
8. Scroll (by pressing button-C) to the stretch parameter and check if the stretch value is set to 1x.
9. Remove all the tools and loose materials from the host machine and start the host machine.
10. Move a sample product along the photocell and the printhead. A test print (Fig. 7.22 or Fig. 7.23) should be made on the sample product.
11. Check if the complete test print is made on the sample product. The test print may be mirrored, or the top and bottom half may be misaligned [35P], but this is not relevant for this procedure. Measure for the GraphicJet 35P only the top or bottom half of the test print:
    a. If the begin of the test print is missing, increase the delay parameter or reposition the photocell closer to the printhead housing.
    b. If the overall length of the test print is shorter than 100 mm, decrease the speed parameter.
    c. If the overall length of the test print is longer than 100 mm, increase the speed parameter.
    d. If the end of the test print is missing, decrease the delay parameter or use a longer sample product.

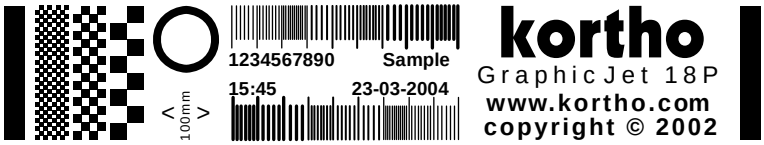


Fig. 7.22 Test image printed at correct speed setting {18P, 18PT]

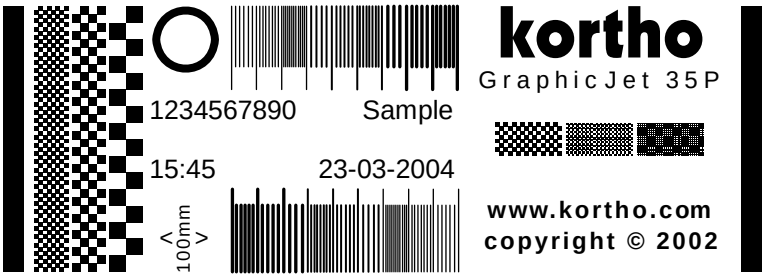


Fig. 7.23 Test image printed at correct speed [35P]

12. Repeat the instructions 10 and 11 until the test image is printed on the correct position of the product with a length of 100 mm.

7.3.3 Tuning the test print with the encoder enabled basic

1. Proceed with this subsection only if the instructions of the subsection 7.3.1 are successfully carried out.

2. Go to ENCODER MENU, type 640 with keypad keys (Fig. 7.14) basic.

3. Toggle to and save 'Yes' to enable the encoder basic.

4. Repeat the steps 4 till 10 of subsection 7.3.1 to proceed to the OPERATIONAL MENU and make the printer ready for printing.

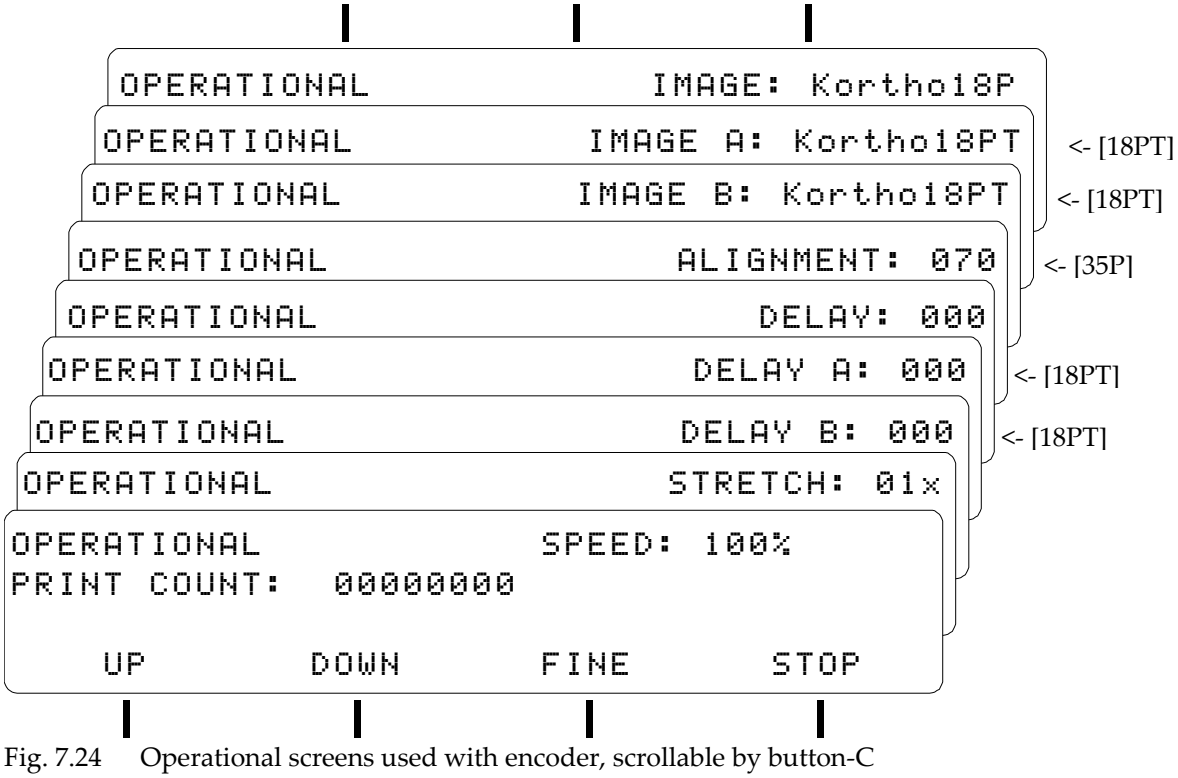


Fig. 7.24 Operational screens used with encoder, scrollable by button-C

5. Scroll by pressing button C (the button above the parameter values) to the delay parameter.
6. Press up and down (buttons D and E) to change the delay parameter to the value of the distance between the photocell and the printhead, refer to Fig. 6.24 dimension B. The delay value is in millimetres at the correct speed setting.
7. Scroll (by pressing button-C) to the stretch parameter and check if the stretch value is set to 1x.
8. Remove all the tools and loose materials from the host machine and start the host machine.
9. Check if the encoder wheel turns and does not slip
10. Move a sample product along the photocell and the printhead. A test print (Fig. 7.25 or Fig. 7.26) should be made on the sample product.

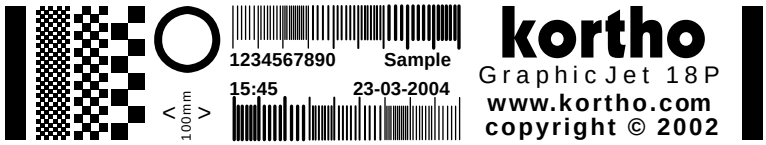


Fig. 7.25 Test image printed at correct speed [18P]

Fig. 7.26 Test image printed at correct speed [35P]

11. Check if the complete test print is made on the sample product. The test print may be mirrored, or the top and bottom half may be misaligned [35P], but this is not relevant for this procedure. Measure for the GraphicJet 35P only the top or bottom half of the test print.
    a. If the begin of the test print is missing, increase the delay parameter or reposition the photocell closer to the printhead housing.
    b. If the overall length of the test print is not equal to 100 mm, check if the encoder is slipping or bouncing over the product.
    c. If the overall length of the test print is shorter than 100 mm, increase the speed parameter.
    d. If the overall length of the test print is longer than 100 mm, decrease the speed parameter.
    e. If the end of the test print is missing, decrease the delay parameter or use a longer sample product.
12. Repeat the instructions 10 and 11 until the test image is printed on the correct position of the product.

7.4 General print parameter settings

Proceed with this section only if the instructions of section 7.3 are successfully carried out. The parameters in this section are not described in any particular order.

7.4.1 Changing the print direction

1. Make a test print with the test image.
2. Check if the test print is mirrored (Fig. 7.27). If not, no further action is required.

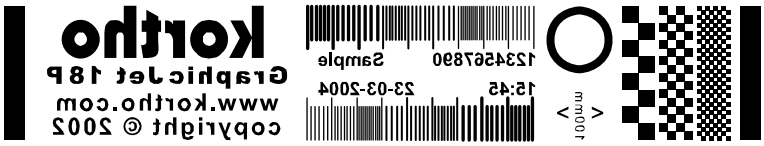


Fig. 7.27 Test image printed mirrored

3. Go to PRINT DIRECTION menu (type 440 with keypad keys).

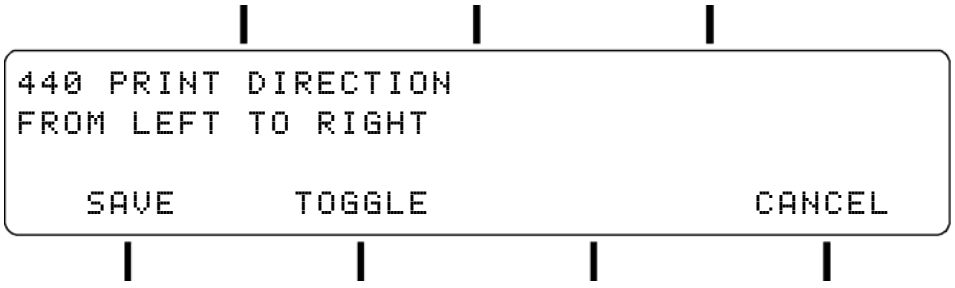


Fig. 7.28 440 Print direction

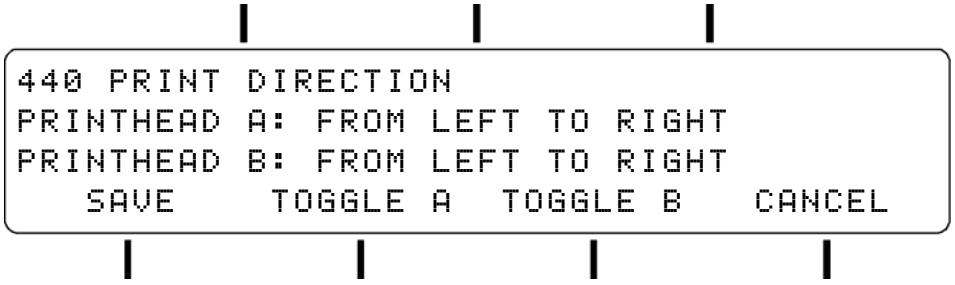


Fig. 7.29 440 Print direction [18PT]

4. Toggle the print direction from 'Left to right' into 'Right to left' or reverse (Fig. 7.28).
   Only 18PT, toggle the desired printhead (A, B) to the correct direction (Fig. 7.29).
5. Save this parameter.

7.4.2 Changing the print rotation angle

1. Make a test print with the test image.
2. Check if the test print should be printed upside-down (Fig. 7.30). If not, no further action is required.

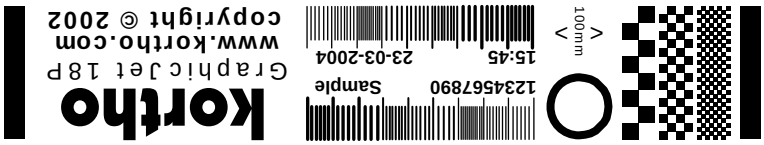


Fig. 7.30 Test image printed upside-down

3. Go to ROTATE PRINT menu (type 510 with keypad keys).

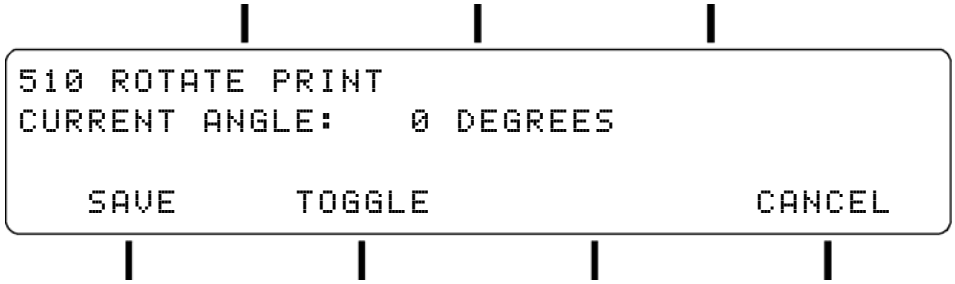


Fig. 7.31 510 Rotate print

4. Toggle the print rotation angle from 0 into 180 degrees.
5. Save this parameter.

7.4.3 Changing the alignment [35P]

1. Make a test print with the test image.
2. Check if the test image is printed with the correct speed setting. Refer to section 7.3.

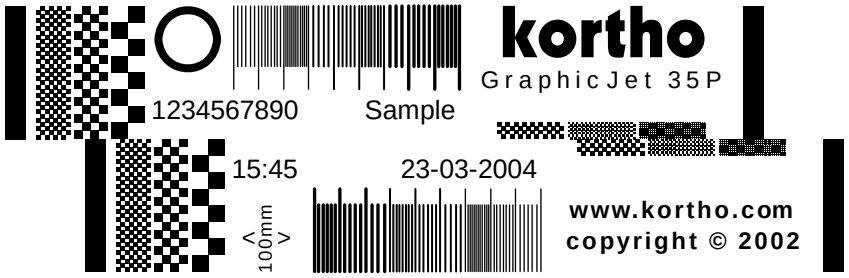


Fig. 7.32 Test image horizontal misaligned [35P]

3. Check if the top and bottom half of the test print are horizontal misaligned (Fig. 7.32). If not, proceed with instruction 8.
4. Scroll (by pressing button C) to the alignment parameter (Fig. 7.33).
5. Use the up and down (buttons D and E) to change the alignment parameter (default = 070). Toggle with button-F from fine to coarse for a larger step size.
6. Make a test print with the test image.
7. Repeat instructions 4 and 5 until the top and bottom half, of the test print, are properly aligned.

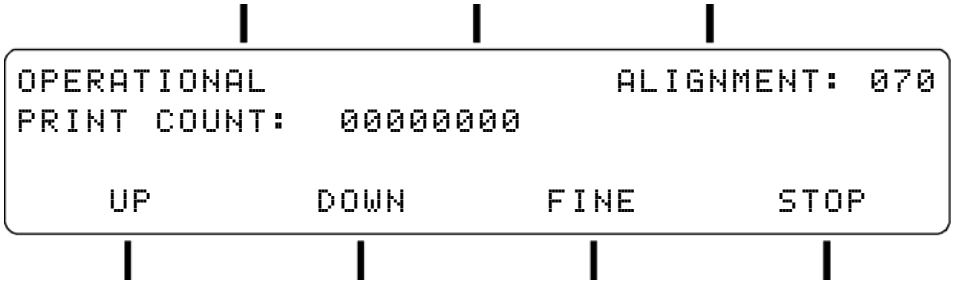


Fig. 7.33 Operational screen: Alignment [35P]

8. Check if between the top and bottom half of the test print is a gap or overlap. If so, vertical align the printhead housing to the print direction (refer to subsection 9.5.2, Vertical alignment), otherwise no further action is required.

7.4.4 Setting the trigger parameters

The PRINT REQUEST menu defines what kind of trigger signal, from the photocell or host control, is recognised by the printer. The options are positive, negative, positive-continuous or negative-continuous.

The polarities refer to the rising (positive) or falling (negative) edge of the trigger (print request) signal. Continuous means that after each print cycle, the next print cycle is started automatically as long as the trigger signal is activated.

Note:
At a continuous print request setting, the delay parameter can be used to define the distance between each print.

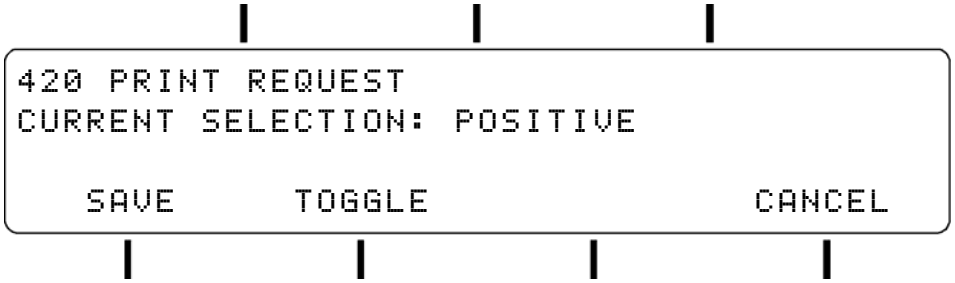


Fig. 7.34 420 Print request

Press:

SAVE	to put the new values in memory and exit to the previous menu level.
TOGGLE	successively until the desired selection is displayed.
CANCEL	retains the previous value and exit to the previous menu level.

Use PRINT DEBOUNCE menu to set a time-period between receiving one print request trigger and accepting another print request trigger. During this period, any other print request triggers are ignored. Use it to mask any switching transients on the print request signal. In most circumstances a setting at 050ms will do.

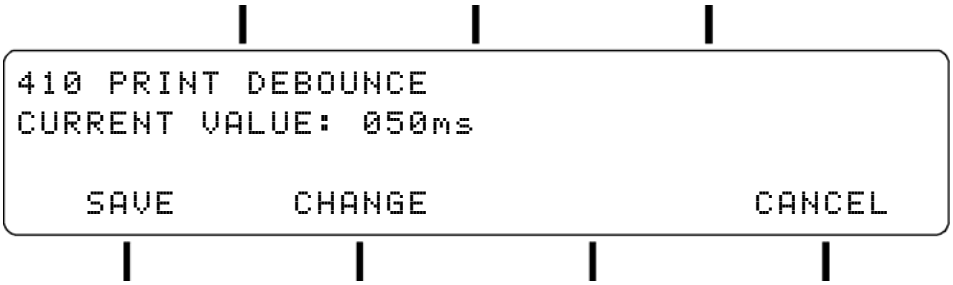


Fig. 7.35 410 Print debounce

Press:

SAVE	to put the new values in memory and exit to the previous menu level.
CHANGE	an underlined cursor will appear under the first digit of the value. Enter the desired value using the alphanumeric keypad. As a digit is entered, the cursor will move to the next digit. The value can only be saved when all three digits are entered.
CANCEL	retains the previous value and exit to the previous menu level.

7.5 Printhead protection parameter settings

7.5.1 Setting the spit parameters

Spitting means that the printhead will print pixel-columns at predefined intervals when the printer is ready to print. Spitting is suppressed while printing an image.

For the GraphicJet P-serie (utilising porous ink) is it for the majority installations not necessary to use spitting. Consult the distributor when the use of spitting is considered.

However, due to the properties of the ink and the fact that the nozzles of the piezo printhead are not sealed off from the open air, the ink can clog the nozzles under extreme conditions. To avoid this kind of clogging, it can help if the printhead is printing pixel-columns (spitting) at predefined intervals.

The disadvantages of using printhead spitting are:

- The pollution of the direct surroundings.
- The waste of ink and solvent.

Spit interval

The range off the spit interval can be set between 1 and 9 seconds. The spit interval is switched off when set to zero. The set interval time depends on the ambient circumstances, like temperature and humidity. Try several settings to minimise ink usage and pollution.

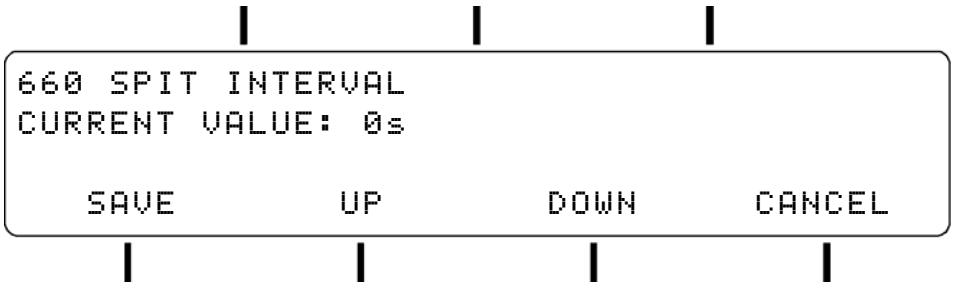


Fig. 7.36 660 Spit interval

Press:	
SAVE	to put the new value in memory and exit to the previous menu level.
UP	to increase the value.
DOWN	to decrease the value.
CANCEL	to retain the previous value and exit to the previous menu level.

When the value is set between 1 and 9 seconds, the printhead will 'spit' a pixel-column of 128 dots of ink every 'x' (x= set value) seconds.

The first pixel-column will be spitted directly after the print cycle has finished. To avoid these pixel-columns being printed on the product, use the option SPIT DELAY to set a time, which the printer will take into account before the pixel-column will be spit.

Spit delay

Set the spit delay, to prevent pixel-columns being spit on the product. This spit delay represents the time in seconds that the system will wait after an image has been printed, before starting to spit.

The spit delay can be set to a value between 0 and 9 seconds. When zero is selected, the first pixel-column will be spit directly after the printed image. Determine how long it will take the product to pass the printhead after it has printed the image. Select this value in the menu below and see whether this value is correct. If it does not mind that the pixel-column is spitted on the product, just leave the value at zero.

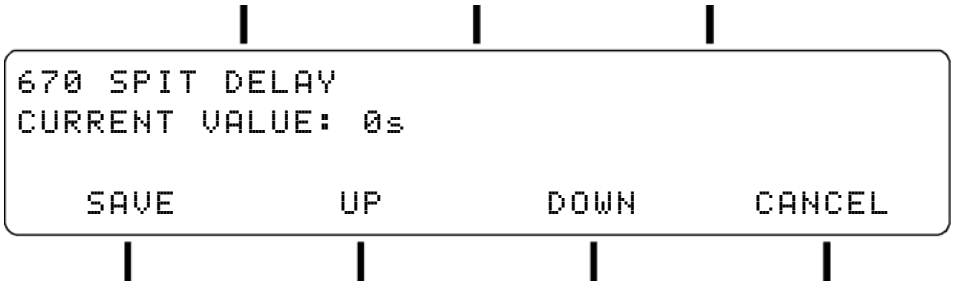


Fig. 7.37 670 Spit delay

Press:

SAVE	to put the new value in memory and exit to the previous menu level.
UP	to increase the value.
DOWN	to decrease the value.
CANCEL	to retain the previous value and exit to the previous menu level.

7.5.2 Setting the ink alarm

The WHEN INK LOW menu tells the printer what to do when the ink level in the ink reservoir is low. At ink low condition, the printer stops printing when this selection is set to 'stop' and continues printing when set to 'continue'. In either case, the alarm output is activated.

CAUTION:
If the 'when ink low' selection is set to continue, there is an apparent risk that air is able to enter the ink tubing and printhead. This will cause the ink-system to malfunction. The ink reservoir should be refilled within 15 minutes to prevent print failure.

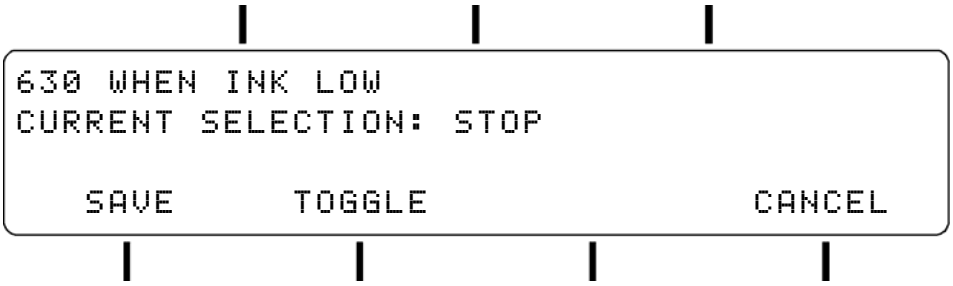


Fig. 7.38 630 When ink low

Press:

SAVE	to put the new values in memory and exit to the previous menu level.
TOGGLE	successively until the desired selection is displayed.
CANCEL	retains the previous value and exit to the previous menu level.

7.6 User settings

Fill in this table with the values found by setting the printer parameters.
Use the table, as a reference, to set the printer parameters when the memory is reset to the default values.
Keep the table nearby, when calling the helpdesk of your local distributor.

	Firmware version:		V . . R	
Menu	**Parameter**	**Default value**	**User value**	
Operational parameters	Speed without encoder	35,00m/min	(menu 200)	m/min
	Speed with encoder	100%	(menu 200)	%
	Stretch	01x		x
	Alignment [35P]	070		
	Print delay	000		See menu 400
311	Display clock	Disabled		Disabled / Enabled *
400	Print delay	000ms	Printhead A:	ms
			Printhead B [18PT]:	ms
410	Print debounce	050ms		ms
420	Print request	Positive		Positive / Negative / Positive-continuous / Negative-continuous *
440	Print direction	Left to right	Printhead A:	Left to right / Right to left *
			Printhead B [18PT]:	Left to right / Right to left *
510	Image rotation angle	0 degrees		0 / 180 degrees *
630	When ink low	Stop		Stop / Continue *
632	Reservoir type	With indicators		With indicators / Without indicators *
640	Encoder	No		No / Yes *
660	Spit interval (0 = disabled)	0s		s
670	Spit delay (0 = disabled)	0s		s
680	Reset number item during printing	No		No / Yes *

* Cross off the option that does not apply.

Fig. 7.39 Printer parameters, default and user values

Fill in this table and keep nearby, when calling the helpdesk of your local distributor.

Manufacterer host machine, type	
Control box, serial number	A
Coding unit 1, serial number	B
Coding unit 2, serial number [18PT]	B
Production plant	
Production line	
Type of substrate (product)	
Production / print rate	Cycles / min
Ambient temperature (min, max)	°C (min) / °C (max)

Fig. 7.40 Printer environment information

8 OPERATION

This part describes the functions and procedures for operating the printer. Keep in mind that standard printers only utilize images and basic printers utilize templates and images. For the basic printer an image is a saved template.

Beware:
Do NOT switch the control box off while writing to memory. Otherwise the risk of corrupting the memory is very high.
When at the next start-up of the control box the boot procedure detects a corrupted memory, the memory will be initialised i.e. resetted to the default parameters with a cleared image list.

The warning message WRITING TO MEMORY (Fig. 8.1) appears when changed parameters or data will be written to the flash memory. This warning message usually appears at re-entering to the main menu.

Fig. 8.1 Writing to memory message

8.1 Powering up

1. Check by visual inspection for damage of the printer.
2. Check if all of the relevant cables are connected.
3. Switch the control box on. The progression bar of the boot screen (Fig. 8.2) shows the program boot progress.

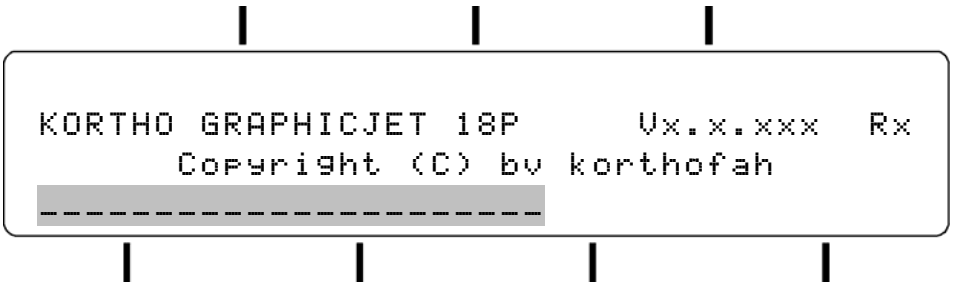


Fig. 8.2 Boot screen, with progression bar (marked grey)

4. Wait until the MAIN MENU is shown (Fig. 8.3).
5. Check if an ink low indicator is lit. When lit, refill the ink reservoir.
6. Access the desired menu function by pressing the appropriate function button.

Note:
To select a menu directly, without following the "tree" (Fig. 3.7), enter its quick reference number via the alphanumeric keypad. For example, to adjust the PRINT DELAY, enter 400. Refer also to Fig. 3.4 for the function button names.

8.2 Operational

8.2.1 Start printing

1. Check if the desired image 'IMAGE: ********' (Fig. 8.3) or template 'TEMPLATE: * LINE* ' is selected (Fig. 8.4). If not, press the select image function button and refer to subsection 8.4.1 or 8.4.2to select another image or template.
2. Only for GraphicJet 18PT, toggle by pressing button C (the button above the image name) between printhead A and B (Fig. 8.5).

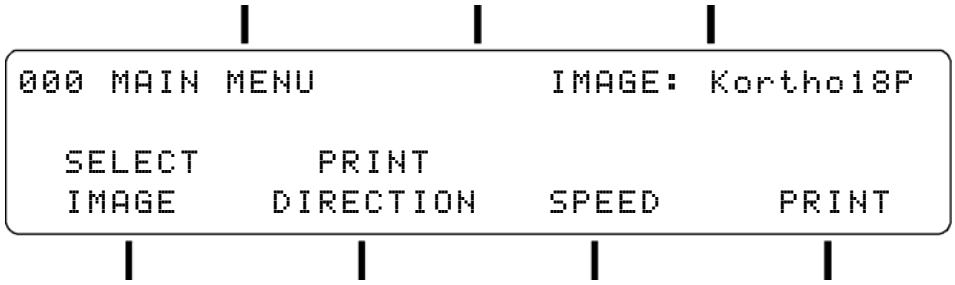


Fig. 8.3 000 Main menu with image 'Kortho18P' or 'Kortho35P' selected [18P, 35P]

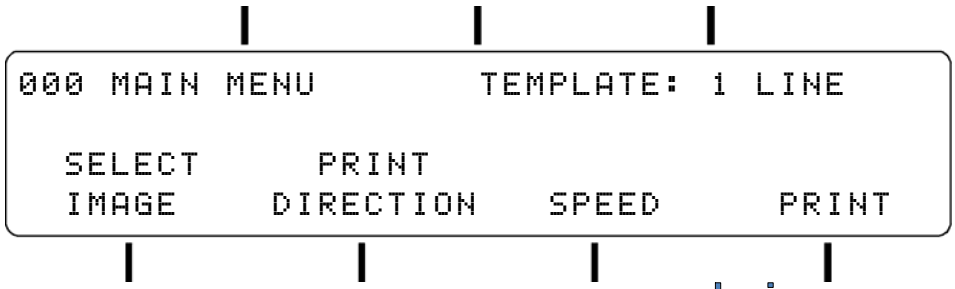


Fig. 8.4 000 Main menu with template '1 LINE' selected basic

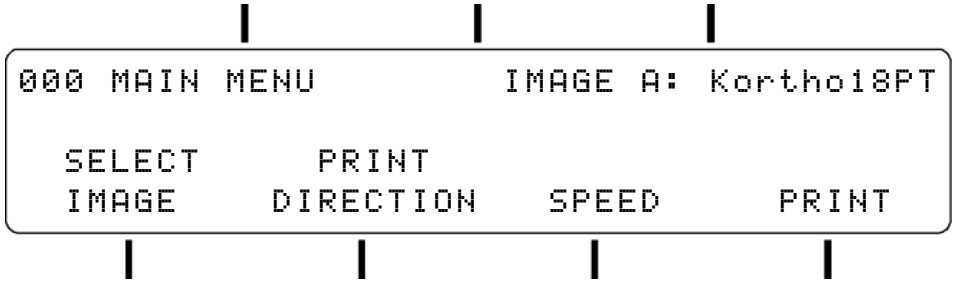


Fig. 8.5 000 Main menu with image 'Kortho18PT' selected [18PT]

3. Press function button PRINT (button G). The start menu appears.

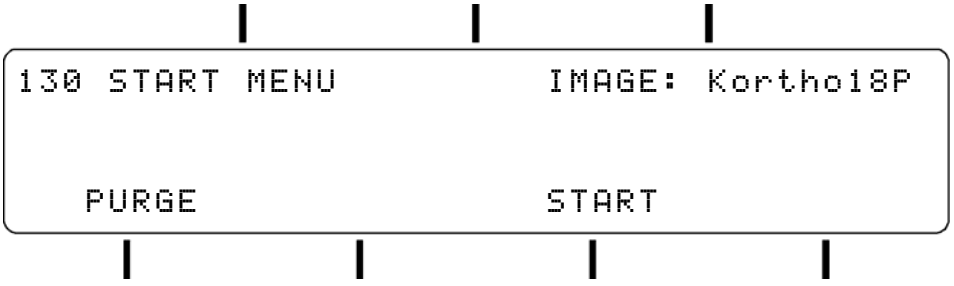


Fig. 8.6 130 Start menu

4. Press function START (button F). Dependent on the printer model:
   a. ~~basic~~ If the image has items that require input from an operator, input menus for those items will appear on screen. Refer to the subsections 3.5.4 and 8.3.1 till 8.3.3.
   b. **basic** If the image or template requires input for the line(s) from an operator, input menu's for those items will appear on screen. Refer to the subsections 3.5.4 and 8.3.4 till 8.3.7.
5. Wait until the image is generated and the OPERATIONAL menu appears. The GENERATING IMAGE message shows a progression bar from 0% to 100% (Fig. 8.7).

Fig. 8.7 'Generating image' message

6. The printer is now ready to print. A product pass, along the photocell and the printhead housing, makes a print.

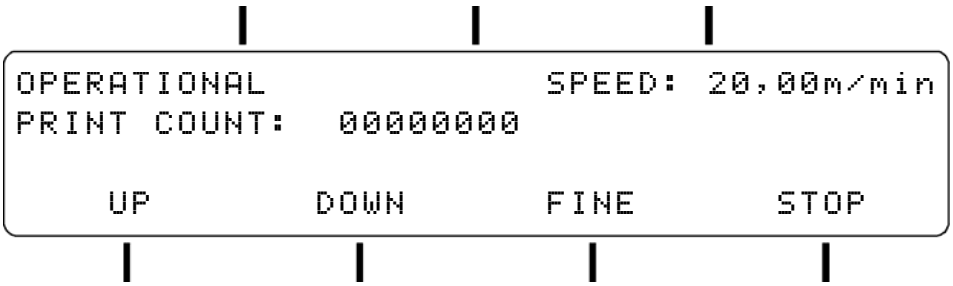


Fig. 8.8 Operational menu

This is the OPERATIONAL menu screen, which is displayed when the printer is ready to print or printing. The menu displays the print count of the prints made since the current print session is started.

8.2.2 Dynamic parameter adjustment

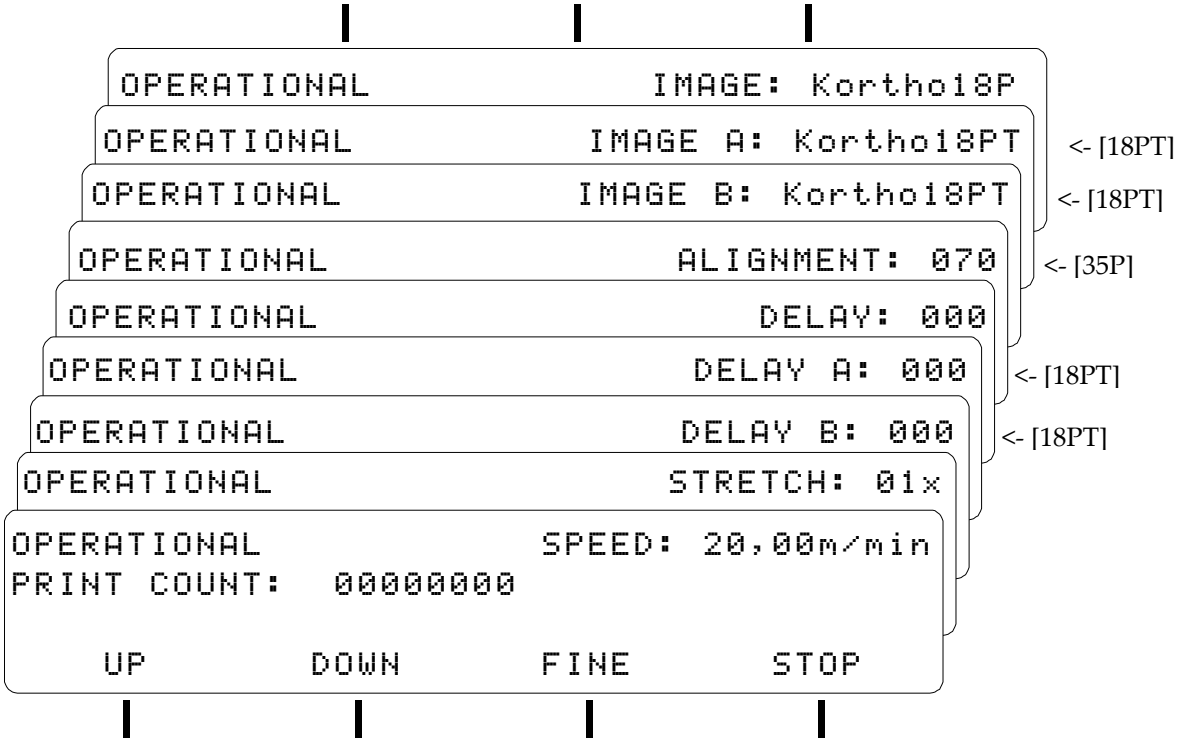


Fig. 8.9 Operational screens, scrollable by button-C

The OPERATIONAL menu also provides dynamic adjustment of some parameters while the printer is operational. Refer to subsections 8.7.1 till 8.7.4 for explanation of the parameters SPEED, PRINT DELAY, STRETCH and ALIGNMENT [35P].

Both printheads (A and B) of the GraphicJet 18PT have their own image and delay parameter.

If an encoder is used, SPEED is shown as a percentage, otherwise in m/min.

Press:

UP	to increase the shown parameter value with one step.
DOWN	to decrease the shown parameter value with one step.
FINE / COARSE	to toggle the step size at which the dynamic value will be adjusted. FINE sets the step size at 1, COARSE sets the step size at 10.
STOP	to stop the printer and exit to the MAIN MENU.
Button C	to scroll through a list of parameters and the selected image name.
Button B	to make a sample print.

Note:
To make a test print, press 'test' button B (the middle button, upper button row). A sample print will not alter the counters of an image, i.e. number items set as counters will repeat the number as printed with the previous regular print.
The 'test' button B will ignore the input from the photocell or the host machine and make the sample print. Avoid making a sample print while the host machine is running.

8.3 Operator data input

Refer to subsections 3.5.3 and 3.5.4 for the function button names and the character sequences of the keypad keys.

basic Images for the standard printers are designed with the PC based design tool KIGS, these images can contain item input fields, which should be filled by the operator at the start the print session

basic Images for the basic printers are created from predefined templates by the operator. The operator must fill the template with data and can then decide if the filled template must be saved for future use as an image or use it only for the current print session.

8.3.1 Text item input menu basic

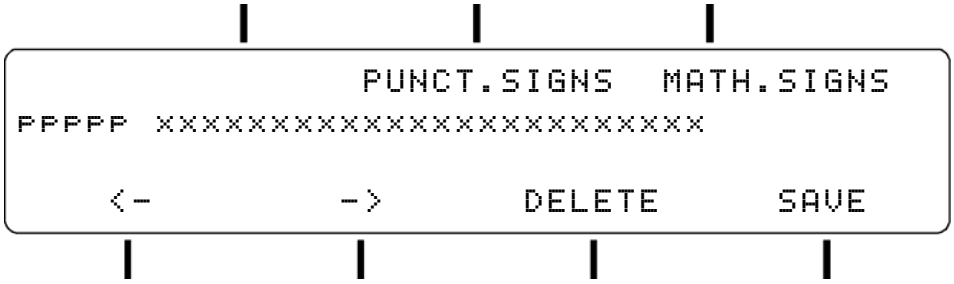


Fig. 8.10 Text item input menu

This screen shows the prompt and text field of a text item.

The text item prompt, here represented as 'ppppp', can be up to ten characters and is defined in the image with the design tool KIGS. The use of a text item prompt is useful, if an image has more than one text item that requires an operator input.

The text field, here represented as 'xxxx…xxxx', shows the input string, which is used at the previous print run with this image or the initial string defined by KIGS. In addition, the length of this string is defined by KIGS. The string, which can contain any mix of characters, can be edited by the operator. The character that can be edited is marked with a cursor beneath it.

Use the keys of the keypad to enter alphanumeric characters. Refer to subsection 3.5.4.

Use the function, PUNCT.SIGN or MATH.SIGN (buttons B and C) to change a string character to a special character from these sequences:

Punctuation sign sequence ! & ( ) : ; @ ? . ,

Mathematical sign sequence ↵ $ % + − * / = < > ^ #

(↵ represents the £ sign of the printer font)

To edit a string:

1. Use the right and left arrow function buttons to move the cursor to the character to be edited.
2. Scroll with a keypad key or the functions PUNCT.SIGN and MATH.SIGN (buttons B and C) the desired character is inserted at the cursor position. Alternatively, press the DELETE function button to remove an unwanted character.
3. Repeat the previous instructions until all the characters have been edited or entered.
4. Press SAVE (button G) or the ENTER key to save the string and continue the image initialisation procedure.

8.3.2 Date item input menu basic

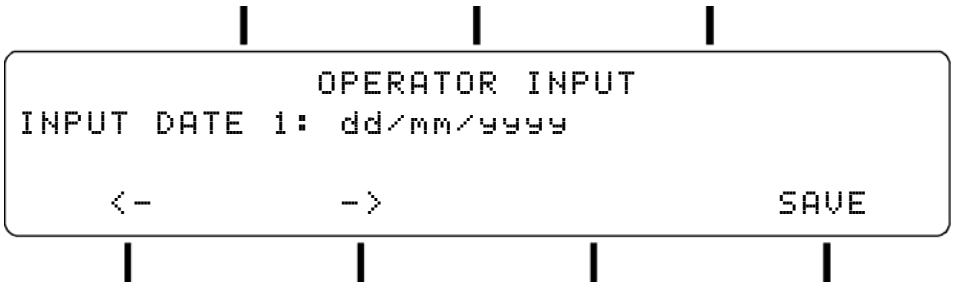


Fig. 8.11 Date item input menu

This screen shows the identification number and date field of a date item.

The date field, here represented as 'dd/mm/yyyy' which stand for day/month/year, shows always the current date as default.

The date field, which can be edited by the operator, accepts only valid dates. The digit that can be edited is marked with a cursor beneath it.

To edit a date field:

1. Use the right and left arrow function buttons to move the cursor to the digit to be edited.
2. Enter the desired number with the keypad. The cursor moves to the next digit.
3. Repeat the previous instructions until all the digits have been edited.
4. Press SAVE (button G) or the ENTER key to save the date and continue the image initialisation procedure.

8.3.3 Number item input menu basic

Depending on the object setting by KIGS, the number object is displayed with or without a repeat value (the so-called pallet count). The repeat value indicates the actual value of the repeat cycle. During the repeat cycle the printer prints the same (current) value, at the next repeat cycle the (current) value is changed according to the object setting made by KIGS.

The screens shows the identification number and number field(s) of a number item (#x).

Fig. 8.12 Number item input menu without repeat value

The number fields, here represented as '#########', shows the according value which is used at the previous print run with this image or the initial value defined by KIGS.

The number fields, which can be edited by the operator, accepts only valid numbers as defined by KIGS. The digit that can be edited is marked with a cursor beneath it.

To edit a value of a number item without a repeat value:

1. Use the right and left arrow function buttons to move the cursor to the digit of the current value to be edited.
2. Enter the desired number with the keypad. The cursor moves to the next digit.
3. Repeat the previous instructions until all the digits have been edited.
4. Press SAVE (button G) or the ENTER key to save the value and continue the image initialisation procedure.

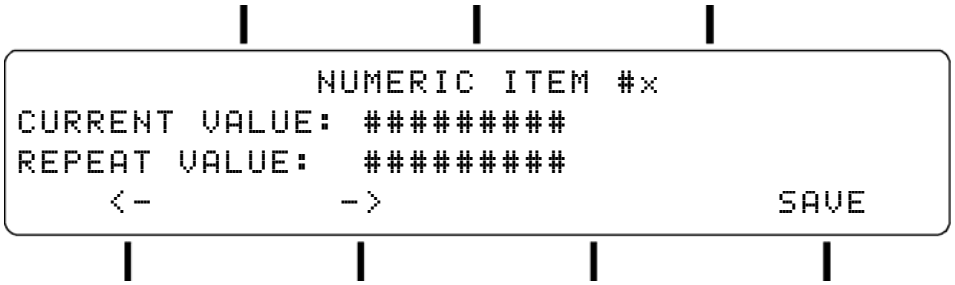


Fig. 8.13 Number item input menu with repeat value

To edit a value of a number item without a repeat value:

1. Use the right and left arrow function buttons to move the cursor to the digit of the current value to be edited.
2. Enter the desired number with the keypad. The cursor moves to the next digit.
3. Repeat the previous instructions until all the digits have been edited.
4. Press SAVE (button G) or the ENTER key to edit the repeat value.
5. Repeat steps 1 till 3 to edit the repeat value.
6. Press SAVE (button G) or the ENTER key to save the values and continue the image initialisation procedure.

8.3.4 Template/Image input procedure basic

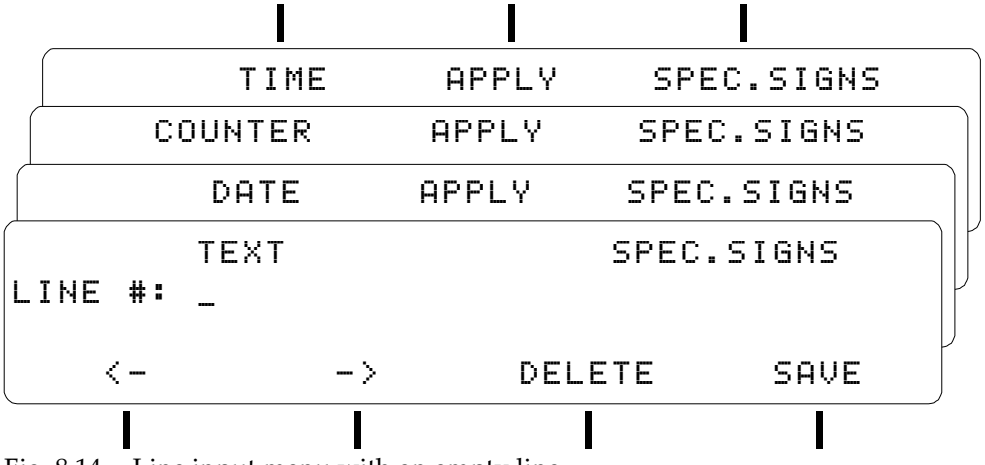


Fig. 8.14 Line input menu with an empty line

This screen shows the line prompt and the line string. The line prompt, represented as 'Line #: ', shows the line number '#' of the current line. The number of lines is defined by the selected template. To make the template/image printable, at least one line string should contain at least one character or item.

The line string is an empty string when initiating a template or contains data, which is used at the last print with this image. The operator can edit the line string which may contain any combination of the items text, date, counter or time. The position in the string that can be edited is marked with a cursor beneath it.

Press function button:

Button A	to scroll through item (text, date, counter or time) related functions. The function of buttons A, B and C is dependent on the properties of the string position marked with a cursor beneath. Refer to subsections 8.3.5 till 8.3.7 for date, counter or time item related functions.
Button B	to apply the function selected with button A or confirm edited items.
<-	to move the cursor to the left.
->	to move the cursor to the right.
DELETE	to delete the character or item at the cursor position.
SAVE	to save the string and continue the template/image input procedure.

For text items the keypad keys and the function SPEC.SIGNS (button C) can be used to enter (special) characters into the line string.

The special character sequence is: . : ; - / , + ! % & ( ) ä ü ö ß

To edit a template/image:

1. Use the right and left arrow function buttons to move the cursor to the line string position to be edited.
2. Enter or edit items of the line string:

   Text item: Insert a character by scrolling with a keypad key or the function SPEC.SIGNS (button C) until the desired character is showed at the cursor position. Alternatively, press DELETE (button C) to remove a character.

   Other items: Refer to subsections 8.3.5 till 8.3.7 for inserting or editing a date, counter or time item. Alternatively, press DELETE (button C) to remove an item.
3. Repeat the previous instructions until all the characters and/or items for the line have been edited or entered.
4. Press SAVE (button G) to save the string and continue the template/image input procedure.
5. Repeat the previous instructions until all the lines are entered and the 'SAVE IMAGE?' menu (Fig. 8.15) appears.
6. Choose YES, to save the edited template/image to an image and proceed with step 7.

   Choose No, to proceed with step 9 (the entered data will be lost when the print session stops).

Fig. 8.15 'Save image?' menu

Press function button:

YES	to enter the SAVE IMAGE menu (Fig. 8.16) to specify the image name and description.
NO	to generate a printable image and to proceed to the operational menu (the entered data will be lost when the print session stops).

7. Enter the desired or edit the existing image name and description in the SAVE IMAGE menu (Fig. 8.16).

Fig. 8.16 'Save image' menu

If the template/image input procedure is started with a template, both the name (10 char. max.) and the description (26 char. max.) strings are empty. Otherwise, the name and description of the edited image are displayed.

Press function button:

<-	to move the cursor to the left .
->	to move the cursor to the right side.
DELETE	to delete the character or item at the cursor position.
SAVE (first press)	to accept the image name and jump to the description.
SAVE (second press)	to accept the image description, save the image, generate a printable image and proceed to the operational menu.

8. Choose the desired option in the IMAGENAME EXISTS menu (Fig. 8.17Fig. 8.16) if an image name exists.

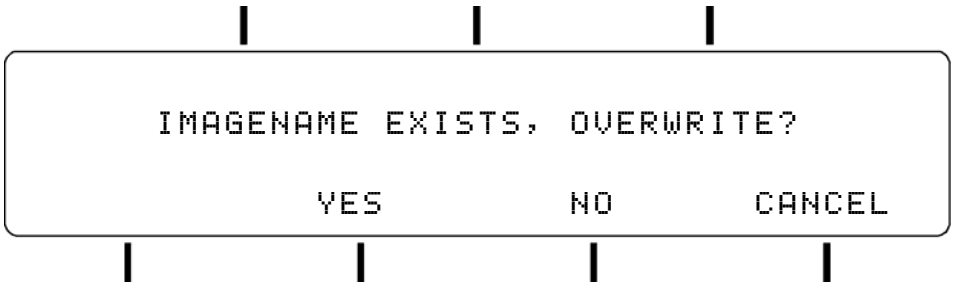


Fig. 8.17 'Image name exists' menu

Press function button:

YES	to replace the old image with the edited image.
NO	to return to the SAVE IMAGE menu (Fig. 8.16).
CANCEL	to generate a printable image and proceed to the operational menu (the image is not saved and the entered data will be lost when the print session is stopped).

9. A printable image will now be generated and the printer is ready to print.

8.3.5 Date item functions basic

The date item is normally used to print the system date which will be updated each time the system clock passes 00:00 hour. To set the system date and/or clock, refer to subsection 8.6.1. The date item will become a fixed date when it is changed with the edit function (refer toFig. 8.19). The normal or fixed date item can only contain real dates. The date item is printed in one of these two formats, DD-MM-YY or MM-DD-YY.

To insert a date item:

1. Scroll with button A until DATE is displayed, refer to Fig. 8.18.
2. Press APPLY (button B) to confirm the date item.

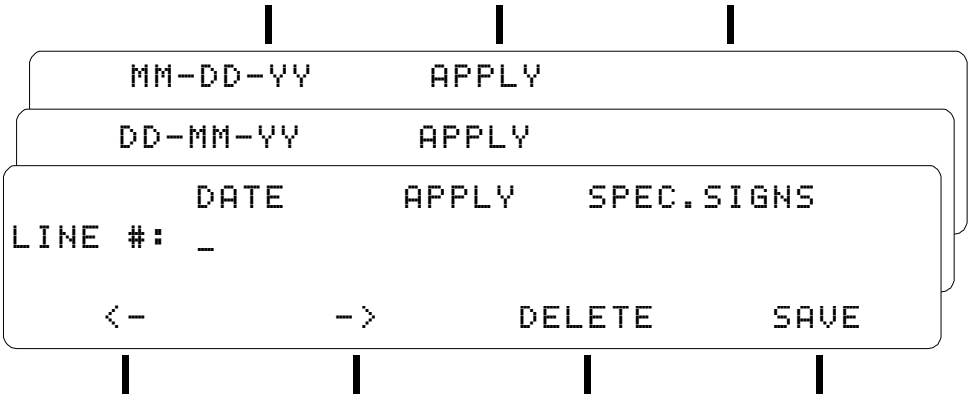


Fig. 8.18 Insert date item

3. Press button A to toggle between the date formats DD-MM-YY or MM-DD-YY.
4. Press APPLY (button B) to confirm the selected format. The date item will be inserted at the cursor position
5. Continue with the input procedure.

Note:
Place a space character before and after the date item to separate it from the other data.

To edit a date item:

1. Press the left or right arrow (button D or E) to move the cursor to the date item to be edited (Fig. 8.19). The data around the date item is represented by 'xxxxx'.

Fig. 8.19 Edit date item

2. Press EDIT (button B) to enter the edit mode (Fig. 8.20).
3. Use the keypad keys to change the digits of the date item. Only digits that are valid (for real dates according to the current format) will be accepted. . The arrows can only move the cursor within the date item.

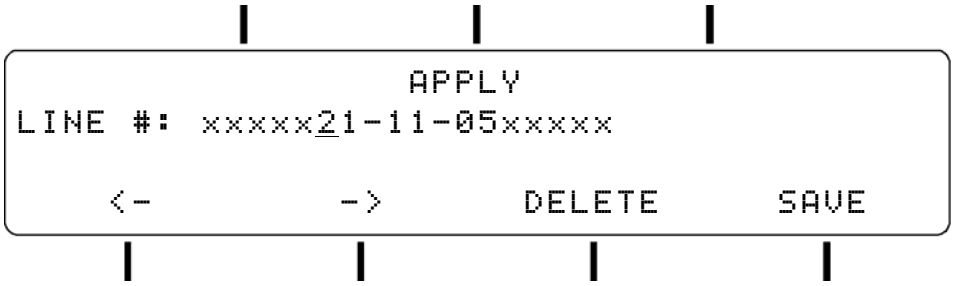


Fig. 8.20 Date item in edit mode

4. Press APPLY (button B) to confirm the date and exit the edit mode.
5. Continue with the input procedure.

Note:
Only when the digits of the date item are changed with the edit function, the date will become a fixed date.

8.3.6 Counter item functions basic

The counter item is used to print a counter, which will be incremented (up) or decremented (down) after each print. The number at which the counter item starts at the start of a print session can be changed with de edit function (refer to Fig. 8.22). When not edited, the counter items of a saved image will continue with the number count of the last print session with that image. The counter item contains six digits and will be printed with leading zeros.

To insert a counter item:

1. Scroll with button A until COUNTER is displayed, refer to Fig. 8.21.
2. Press APPLY (button B) to confirm the counter item.

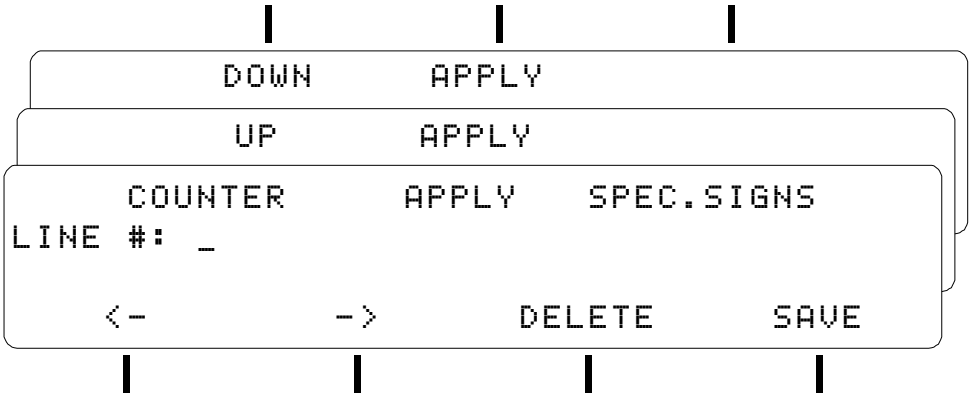


Fig. 8.21 Insert counter item

3. Press button A to toggle between up or down counting.
4. Press APPLY (button B) to confirm the selected count direction. The counter item will be inserted at the cursor position
5. Continue with the input procedure.

Note:
Place a space character before and after the counter item to separate it from the other data.

To edit a counter item:

1. Press the left or right arrow (button D or E) to move the cursor to the counter item to be edited (Fig. 8.22). The data around the counter item is represented by 'xxxxx'.

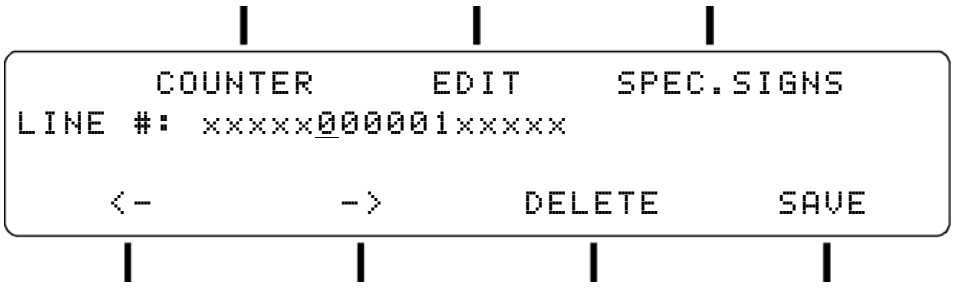


Fig. 8.22 Edit counter item

2. Press EDIT (button B) to enter the edit mode (Fig. 8.23).
3. Use the keypad keys to change the number of the counter item. The arrows can only move the cursor within the counter item.

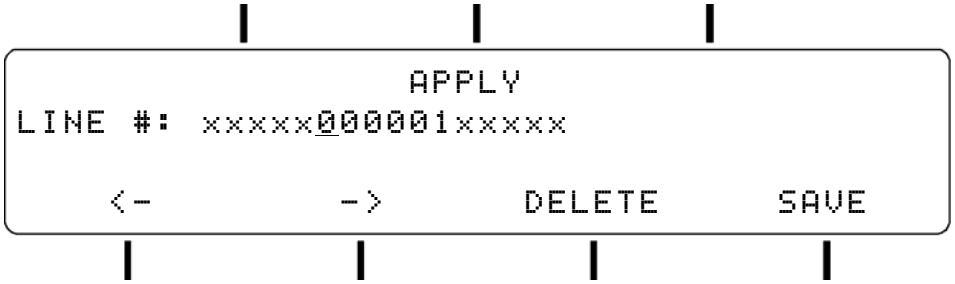


Fig. 8.23 Counter item in edit mode

4. Press APPLY (button B) to confirm the changed number and exit the edit mode.
5. Continue with the input procedure.

8.3.7 Time item functions basic

The time item is used to print the current time of the system clock. To set the system clock refer to subsection 8.6.1. The time value cannot be edited. The time item is printed in one of these three formats, 24 hour, 12 hour or 12 AM/PM.

Example: The time will be printed as 22:00, 10:00 or 10:00PM for 10 o'clock in the evening.

To insert a time item:

1. Scroll with button A until TIME is displayed, refer to Fig. 8.24.
2. Press APPLY (button B) to confirm the time item.
3. Scroll with button A to select one of the three time formats; 24 hour, 12 hour or 12 AM/PM.
4. Press APPLY (button B) to confirm the selected time format. The time item will be inserted at the cursor position.

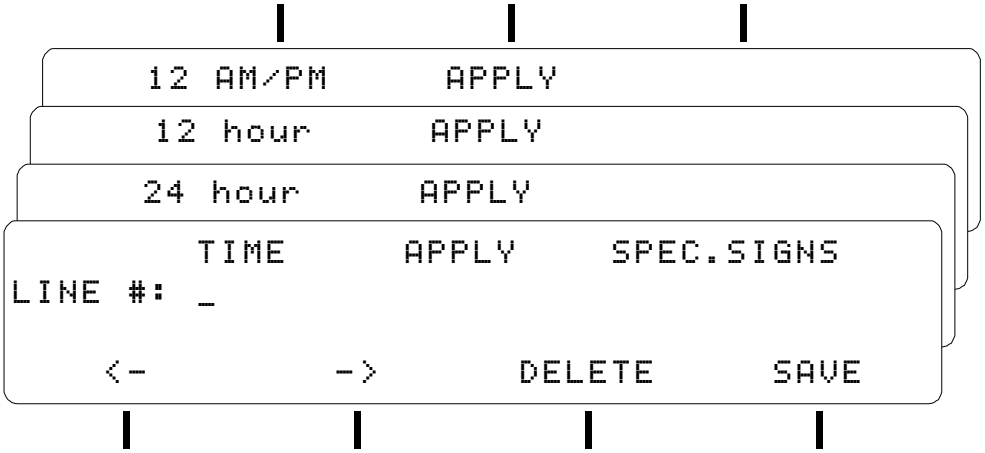


Fig. 8.24 Insert time item

5. Continue with the input procedure.

Note:
Place a space character before and after the time item to separate it from the other data.

Fig. 8.25 Recognized time item

When the cursor is placed on a time item it will be recognized by showing TIME (Fig. 8.25) at button A.

8.4 Image management

8.4.1 Selecting an image ~~basic~~

Use the IMAGE SELECT menu (type 100 with keypad keys) to select the image for printing.

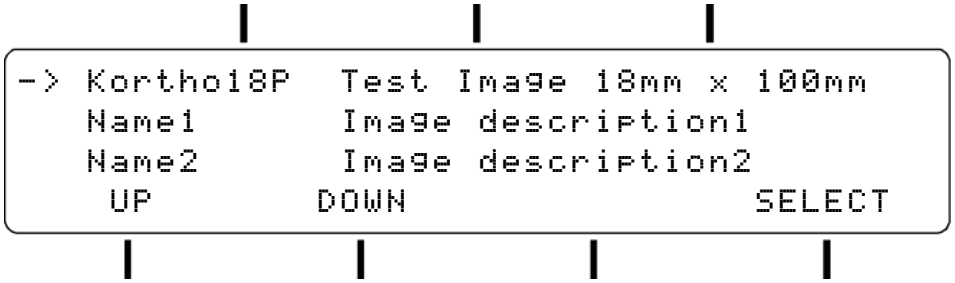


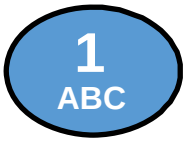
Fig. 8.26 (100) Image select menu

This menu points to the name and description of the currently selected image. Due to limited screen lines, only three image titles from the image list can be displayed together. The image list contains at least one image, which is the test image 'Kortho18P'. The test image is the default image and cannot be erased.

The image list is sorted ascending in this order; numeric, alphabetic uppercase and alphabetic lowercase.

Press function button:	
UP	to scroll up through the image list until the pointer (arrow) points to the desired image.
DOWN	to scroll down through the image list until the pointer (arrow) points to the desired image.
SELECT	to select the image and exit to the previous menu level.
Press key:	
STOP/EXIT	to use the retained selection and exit to the previous menu level

Instead of searching with the UP/DOWN function buttons, a quick search is possible with the keypad keys. Each keypad key (Fig. 8.27) has its own alphanumeric character sequence.



The character sequence for this key is:
1 A B C a b c 1 A etc.

Fig. 8.27 Key '1 ABC'

Pressing a key scrolls the image pointer to or near the image that begins with the character that is related to the pressed key. Pressing the same key again scrolls the image pointer further down the image list in accordance with the character sequence for that key.

8.4.2 Selecting a template/image basic

Use the IMAGE SELECT menu (type 100 with keypad keys) to select the template/image for printing. Toggle with button F for the desired template or image list.

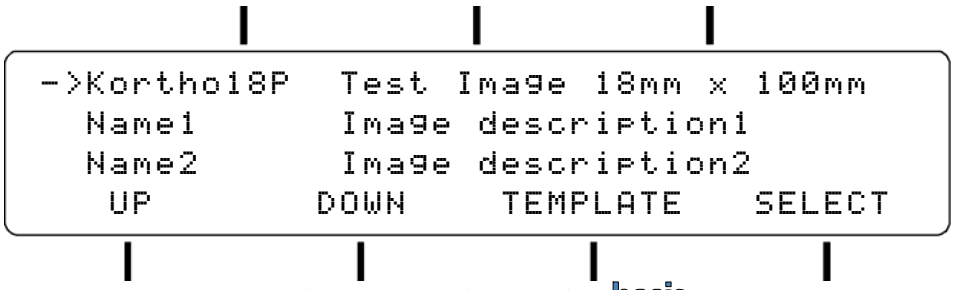


Fig. 8.28 (100) Image select menu with image list basic

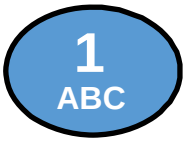
Fig. 8.29 (100) Template select menu with template list basic

This menu points to the name and description of the currently selected template/image. Due to limited screen lines, only three titles from the template/image list can be displayed together. The template list contains all the twelve predefined templates. The template '1 line 18mm Capitals' is the default template. The image list contains at least one image, which is the test image 'Kortho18P' or 'Kortho35P' (not erasable) .

The template/image list is sorted ascending in this order; numeric, alphabetic uppercase and alphabetic lowercase.

Press function button:	
UP	to scroll up through the template/image list until the pointer (arrow) points to the desired template/image.
DOWN	to scroll down through the template/image list until the pointer (arrow) points to the desired template/image.
IMAGE	to swap to the image list.
TEMPLATE	to swap to the template list.
SELECT	to select the template/image and exit to the previous menu level.
Press key:	
STOP/EXIT	to use the retained selection and exit to the previous menu level

Instead of searching in the images list with the UP/DOWN function buttons, a quick search is possible with the alphanumeric keys. A quick search in the template list is not possible. Each alphanumeric key (Fig. 8.30) has its own character sequence.



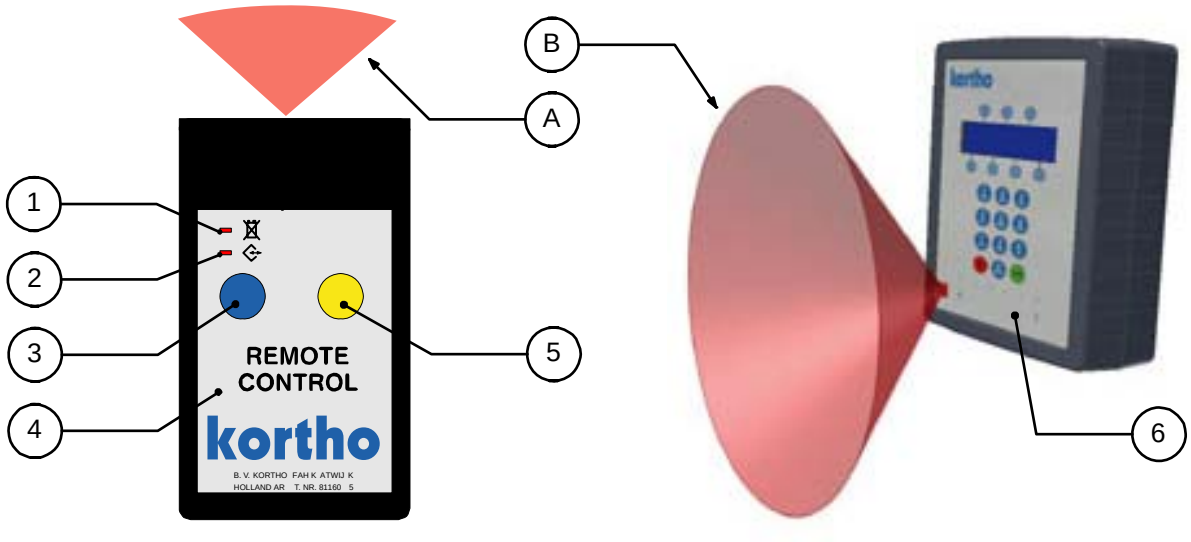
The character sequence for this key is:
1 A B C a b c 1 A etc.

Fig. 8.30 Key '1 ABC'

Pressing a key scrolls the image pointer to or near the image that begins with the character that is related to the pressed key. Pressing the same key again scrolls the image pointer further down the image list in accordance with the character sequence for that key.

8.4.3 Loading image(s) ~~basic~~

For loading images into the control box, a remote control filled with images is needed. Refer to the KIGS manual for loading images into the remote control.



1. Low battery warning indicator
2. Data transmission indicator
3. Blue button (confirm)
4. Remote control
5. Yellow button (select)
6. Control box
A. Infrared sector of remote control
B. Infrared sector of control box

Fig. 8.31 Infrared sectors of remote control and control box

To load images into the control box:

1. Check if the printer is operational. If so, press stop/exit key to exit the operational menu.
2. Press the blue or yellow button on the remote control. The remote control beeps and wakeup from sleep to active mode. When idle for a while, the remote control returns with a beep to sleep mode to save battery power.

> **Beware:**
> If the remote control does not beep upon wakeup or the low battery warning indicator is lit, replace the battery (9V PP3 alkaline cell) before continuing. None of the images will be lost when replacing the battery.

3. Point the remote control towards the infrared port of the control box, positioned at a distance between 50 until 500 mm and within the infrared sector of each other.
4. Press the blue or yellow button again. The control box responds by showing the DOWNLOADING OR ENGINEERING menu (Fig. 8.32).

```
DOWNLOAD OR ENGINEERING
BLUE   - DOWNLOAD IMAGE(S)
YELLOW - ENGINEERING OPTIONS
PRESS 'STOP' KEY TO EXIT
```

Fig. 8.32 Downloading or engineering menu

5. Press the blue button to access the image action menu (Fig. 8.33). If the remote control does not contain any images, the 'remote control is empty' message appears (Fig. 8.34).

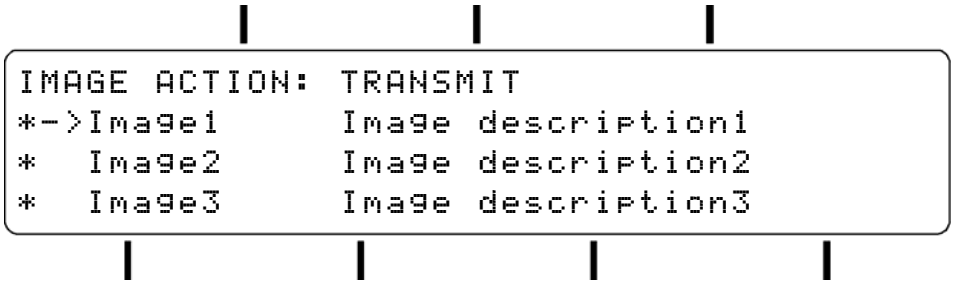


Fig. 8.33 'Image action' menu

It takes a moment, depending on the amount and size of the images for downloading, before the image action menu appears. The image list contains the names of all images currently stored in the remote control. Initially all the images are selected (marked with asterisks '*') and the action is 'transmit'

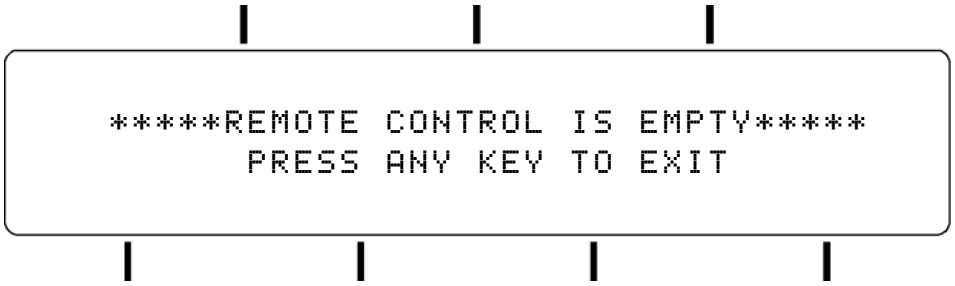


Fig. 8.34 'Remote control is empty' message

Execute these instructions when REMOTE CONTROL IS EMPTY message is shown:

a. Press any key to exit this message.

b. Use the design tool KIGS to fill the remote control with images.

c. Start again with instruction 1 of this subsection.

6. If all images must be downloaded to the control box, proceed then with instruction 15.

7. Press the yellow button successively to scroll until the action (DE)SELECT ALL appears.
The scroll sequence of the actions is TRANSMIT, (DE)SELECT ALL, (DE)SELECT, SCROLL and CANCEL (Fig. 8.35).

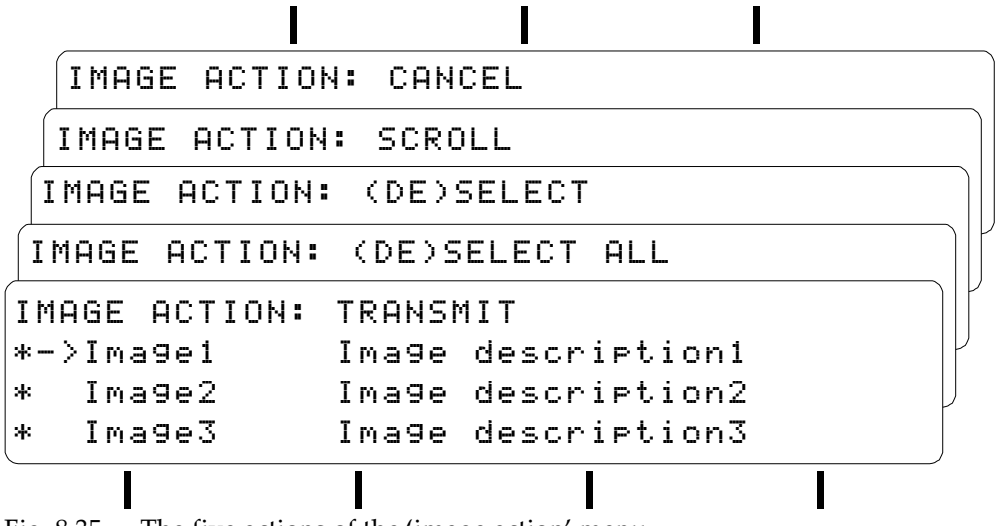


Fig. 8.35 The five actions of the 'image action' menu

Select the action with the yellow button and press then the blue button to execute the action:

TRANSMIT -	to transmit all selected images to the control box.
(DE)SELECT ALL -	to deselect or select all images in the list ('*' = selected).
(DE)SELECT -	to deselect or select the image to which the pointer (arrow) points. More than one image can be selected.
SCROLL -	to move the pointer (arrow) down one image in the <Image name> list.
CANCEL -	to exit the remote control into sleep-mode.

8. Press the blue button to execute the action (DE)SELECT ALL. The whole image list is now deselected.
9. Press the yellow button repeatedly to obtain the SCROLL action.
10. Press the blue button repeatedly until the pointer (arrow) points to the desired image name.
11. Press the yellow button repeatedly to obtain the (DE)SELECT action.
12. Press the blue button to select the image.
13. Repeat instructions 9 through 12 to select any other image names that are required.
14. Press the yellow button to obtain the TRANSMIT action.
15. Press the blue button to transmit the selected image(s) to the control box. Provided enough memory is available in the control box, the selected images are downloaded and the following messages can appear on the control box screen (Fig. 8.36 till Fig. 8.39).

Fig. 8.36 Downloading images message

The download of the image(s) is in progress. If necessary, press the STOP/EXIT key twice to cancel and exit the image loading process and return to the main menu.

Fig. 8.37 Overwriting image message

The overwriting image message only appears when an image with the same name already exists in control box memory.

Fig. 8.38 Image(s) download failed message

The image(s) download failed message only appears when the download process is interrupted. Press any key to exit to the main menu.

e.g. When the remote control is pointed outside the infrared sector of the control box this download-failed message appears after about 25 seconds.

Fig. 8.39 Image(s) successfully downloaded message

16. Press the STOP/EXIT key to exit. A warning message WRITING TO MEMORY (Fig. 8.1) appears and the downloaded images will now be written from the input buffer to the flash memory.

Beware:
Do NOT switch the control box off while writing to memory. Otherwise the risk of corrupting the memory is very high.
When at the next start-up of the control box the boot procedure detects a corrupted memory, the memory will be initialised i.e. resetted to the default parameters with a cleared image list.

When not enough memory is available for the downloaded images an insufficient memory message appears (Fig. 8.40). Storing 'new' images is only possible when some 'old' images are deleted or the memory is cleared. Refer to the next subsections 8.4.4, 8.4.5 or 8.6.7.

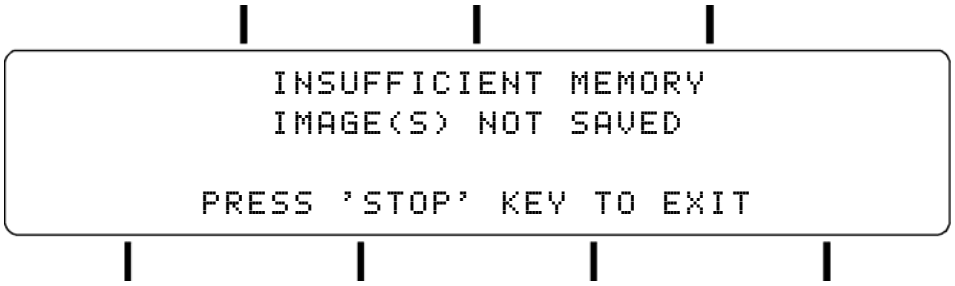


Fig. 8.40 Insufficient memory message

17. The download procedure is now finished.

8.4.4 Deleting an image

Use the DELETE IMAGE menu (type 500 with keypad keys) to delete specific images from the image list.

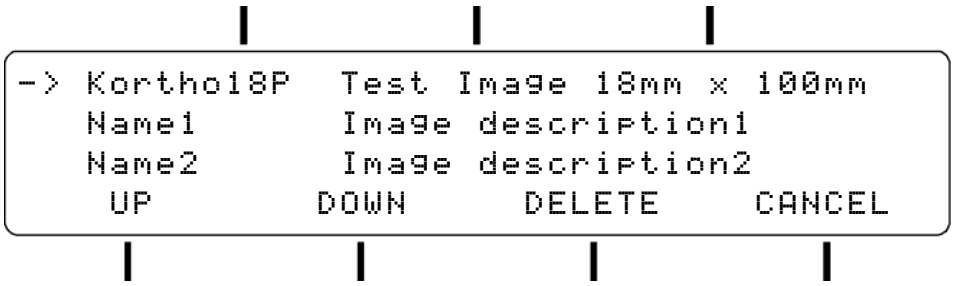


Fig. 8.41 (500) Delete image menu

Refer to subsection 8.4.1 for the description of searching in the image list

Press function button:

UP	to scroll up through the image list until the pointer (arrow) points to the desired image.
DOWN	to scroll down through the image list until the pointer (arrow) points to the desired image.
DELETE	to delete the pointed the image.
CANCEL	to exit to the previous menu level.

8.4.5 Delete all images

Beware:
All user defined images will be deleted and this is irreversible. Make sure that all the images are backed-up on a PC.

1. Go to the RESET MENU (type 610 with keypad keys) to delete all images.

Fig. 8.42 610 Reset menu

2. Press the DELETE ALL IMAGES function button to delete all the images except the test image.

Fig. 8.43 Confirmation message

3. Press YES key to confirm the deletion of all images.

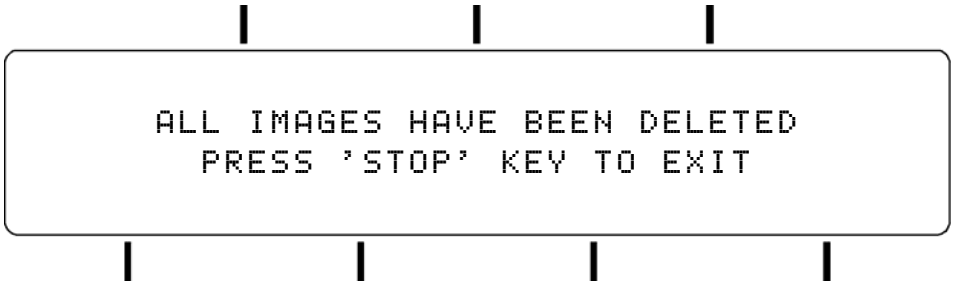


Fig. 8.44 All images have been deleted message

4. Press STOP/EXIT key to exit to the RESET menu.
5. Go to the MAIN MENU by pressing the STOP/EXIT key several times or type 000 with the keypad keys. The 'writing to memory' message appears (Fig. 8.1) and the updated image list will be written to the flash memory.

8.5 Ink system operating procedures

8.5.1 Refilling the ink reservoir

1. Put on protection gloves and use safety goggles for personal protection.
2. Clean and remove any dust from the top of the ink reservoir.
3. Take an inkbottle and cut off the end, which is indicated with a ring, of the spout top (Fig. 8.45).

CAUTION:
Use ONLY porous ink GJ1 in 200 ml bottles.

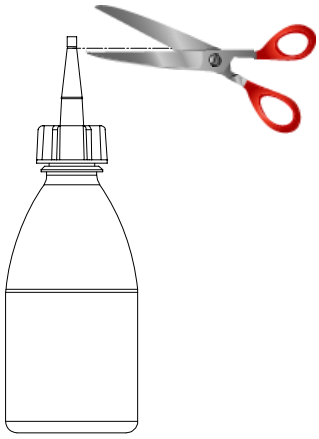


Fig. 8.45 Cut inkbottle open

4. Open the ink reservoir by unscrewing the screw cap (Fig. 8.46) counter clockwise. Lay the screw cap aside at a clean place.

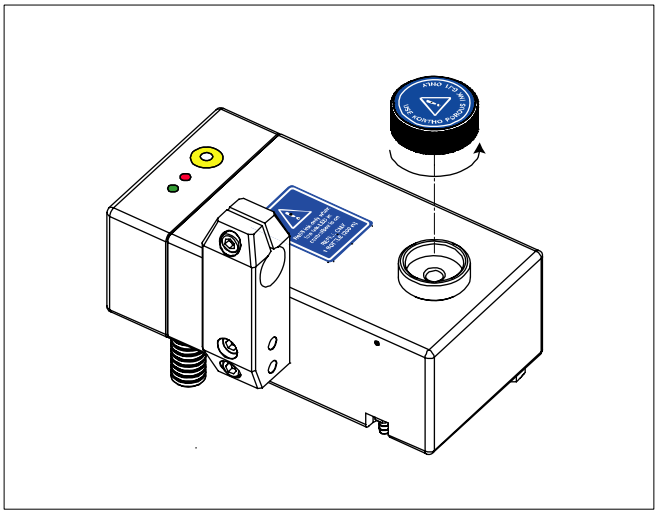


Fig. 8.46 Ink reservoir opened.

5. Place, without spilling ink, the inkbottle upside-down into the ink reservoir fill opening (Fig. 8.47).

6. Squeeze the inkbottle gently until it is empty. The status of the ink level indicators is now, green on and red off.

CAUTION:
Fill the ink reservoir ONLY with ONE inkbottle (200 ml), filling with more than one inkbottle will cause ink leakage or overflow.

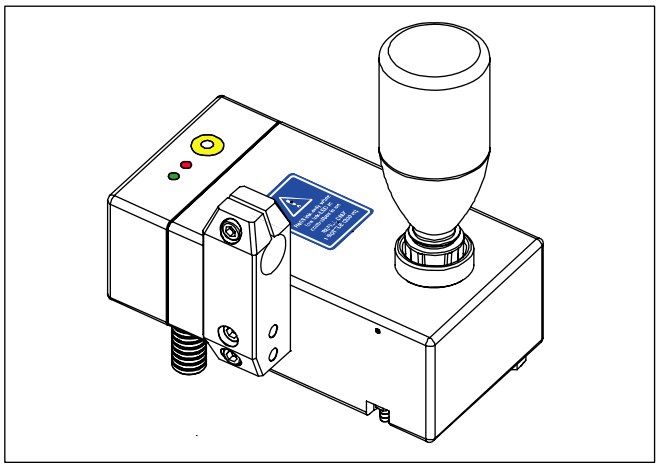


Fig. 8.47 Ink reservoir with inkbottle placed.

7. Remove the empty inkbottle and avoid spilling ink. Clean the reservoir opening with a clean paper tissue.
8. Close the ink reservoir by screwing the screw cap back on. Hand tight is sufficient.

8.5.2 Purging the printhead

This procedure is meant to test the piezo elements of the printhead or to clear the nozzles when the prints contain minor flaws.

1. Stop with printing on the product(s).
2. Put on protection gloves and use safety goggles for personal protection.
3. Go to the START MENU (type 130 with keypad keys).

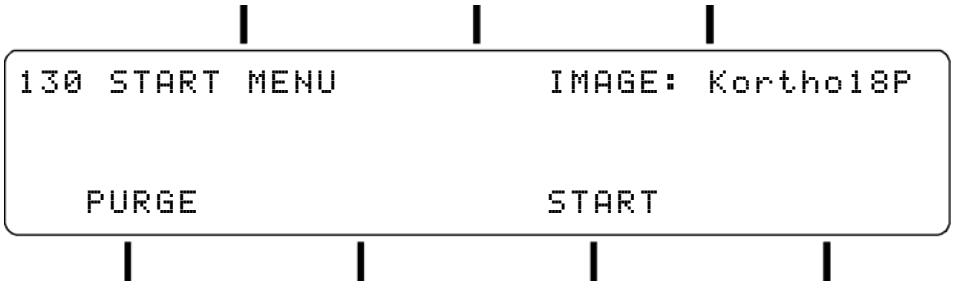


Fig. 8.48 130 Start menu

4. Hold paper tissues in front of the printhead to collect ink.
5. Press the PURGE function button. While purging, the PURGING message is shown.

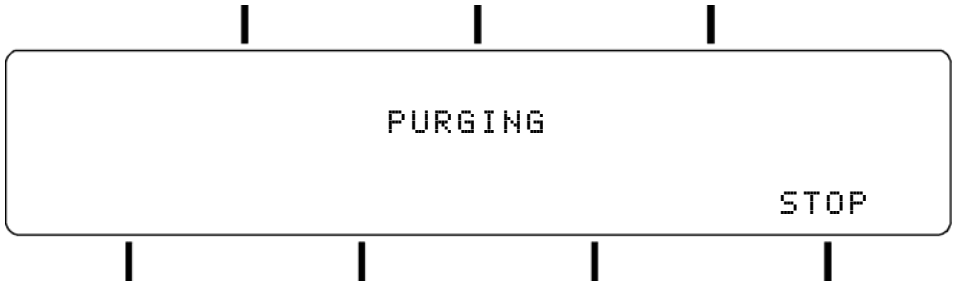


Fig. 8.49 Purging message

6. Make a sample print.
7. Repeat the purge procedure if the print is improved but still poor. As purging is not sufficient, refer then the prime procedure in subsection 8.5.3.

8.5.3 Priming the printhead

When the ink system contains air bubbles or the printhead nozzles are clogged, the printhead needs to be primed.

1. Stop with printing on the product(s).
2. Put on protection gloves and use safety goggles for personal protection.
3. Rotate, if necessary, the printhead housing to the horizontal position (Fig. 8.50). The printhead radial and axial rotation is then zero°. The height-AB for the printhead housing and the ink reservoir is not important for this procedure.

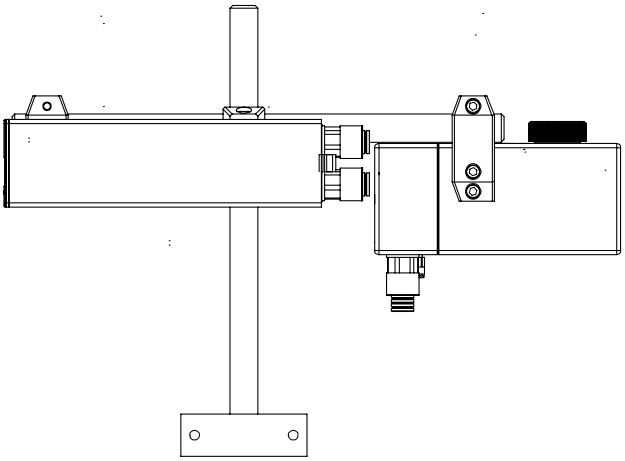
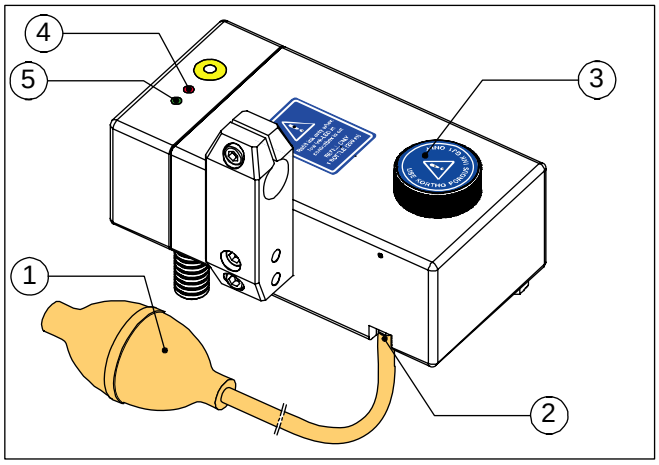


Fig. 8.50 Printhead housing at horizontal position

4. Fit the prime bulb to the fitting (Fig. 8.51) or to the opening of the vent knob (Fig. 8.52) of the ink reservoir. Check, only necessary for GraphicJet 35P, if:
   a. The vent knob is turned to position II [35P]
   b. The prime bulb is connected to the reservoir , which is connected to the printhead to be primed. The top and bottom printhead are respectively connected to reservoir 1 and 2 [35P].

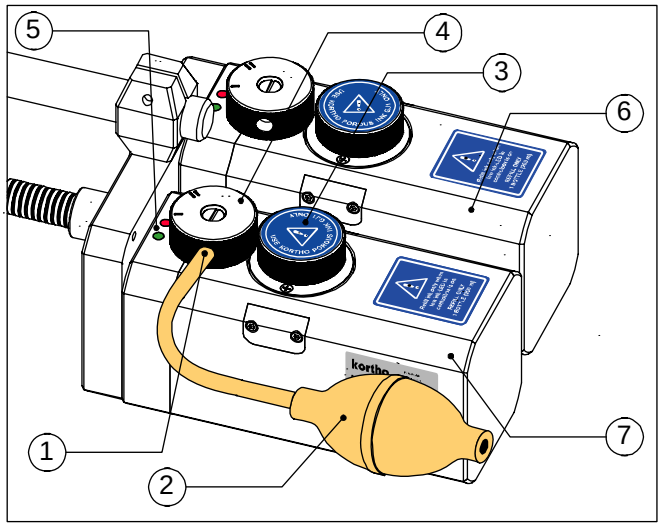


1. Prime bulb
2. Fitting for prime bulb
3. Screw cap with label

Ink level indicators

4. Low level warning (red)
5. Ink level OK (green)

Fig. 8.51 Ink reservoir with prime bulb [18P, 18PT].



1. Opening for tube of prime bulb
2. Prime bulb
3. Screw cap with label
4. Vent knob (pos. II)
5. Ink level indicators
   Low level warning (red)
   Ink above low level (green)
6. Ink reservoir 1
7. Ink reservoir 2

Fig. 8.52 Ink reservoir with prime bulb attached to vent knob [35P].

5. Hold clean paper tissues or a waste container in front of the printhead to collect ink.

6. Squeeze the prime bulb completely just one time to prime the printhead. Prime in bursts of about three to five seconds to remove any air bubbles out of the ink system.

7. Repeat priming until ink squirts from all the nozzles.

8. Remove the prime bulb from the fitting of the ink reservoir to stop priming the printhead.

9. Repeat the instructions 4 until 8 also for the other printhead [35P].

10. Rotate the printhead housing back to the print position. This is only necessary if the printhead housing is rotated to the horizontal position at instruction 3.

11. The printer is now ready to print.

8.6 Adjusting general system settings

8.6.1 Date and time

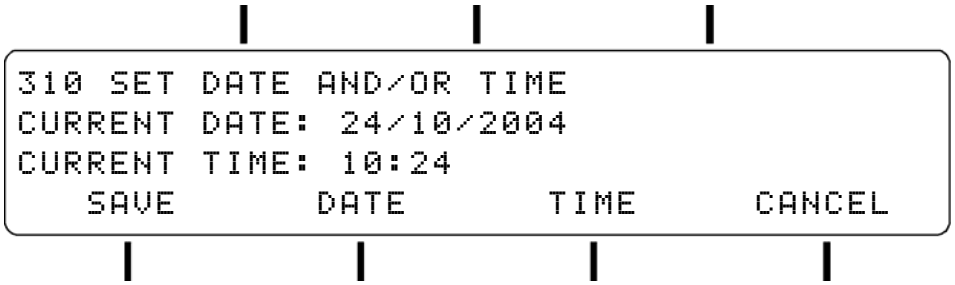


Fig. 8.53 310 Set date and/or time

Use this menu to set the date and/or time.

Press function button:

SAVE	to put the setting in memory and exit to the previous menu level.
DATE	an underlined cursor will appear under the first digit of the value. Enter the desired values using the alphanumeric keypad. As a digit is entered, the cursor will move to the next digit. The value can only be saved when all eight digits are entered. The date format is day/month/year.
TIME	an underlined cursor will appear under the first digit of the value. Enter the desired values using the alphanumeric keypad. As a digit is entered, the cursor will move to the next digit. The value can only be saved when all four digits are entered. The time is in 24-hour format (hour/minute)
CANCEL	to retain the previous setting and exit to the previous menu level.

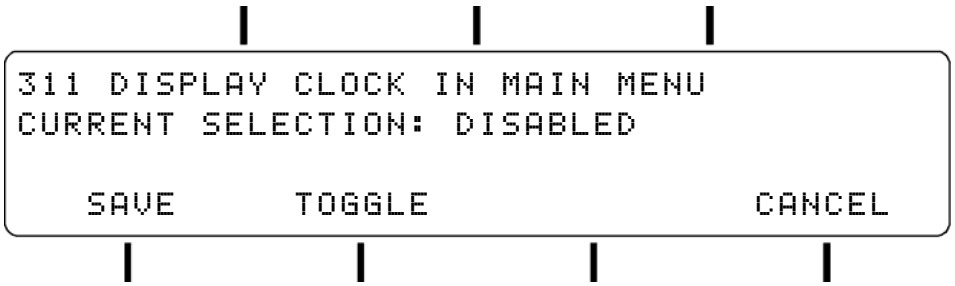


Fig. 8.54 311 Display clock in main menu

Use this menu to enable or disable the clock display in the main menu.

Press function button:

SAVE	to put the setting in memory and exit to the previous menu level.
TOGGLE	to enable or disable the clock display in the main menu (Fig. 8.55)
CANCEL	to retain the previous setting and exit to the previous menu level.

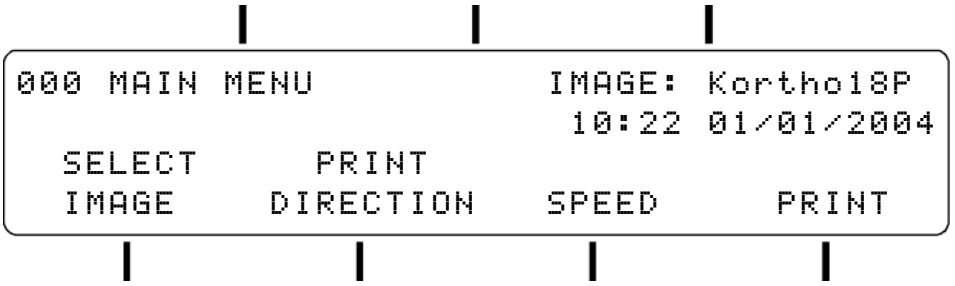


Fig. 8.55 000 Main menu with enabled clock display

8.6.2 Language

Fig. 8.56 620 Language menu

The language selected in this menu is the language setting for all the screen menus. Available languages are English, Nederlands, Deutsch, Français and Espanõl.

Press function button:

SAVE	to put the setting in memory and exit to the previous menu level.
TOGGLE	to scroll through the language list until the desired language is displayed.
CANCEL	to retain the previous setting and exit to the previous menu level.

8.6.3 Reservoir type

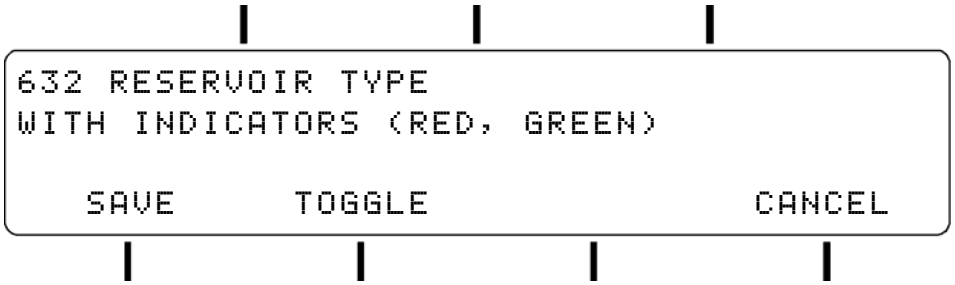


Fig. 8.57 632 Reservoir type menu

The control box handles the low ink signal different for ink reservoirs with or without indicators. The ink reservoir type selected by this menu is correspondent with the used ink reservoir. Some of the old ink reservoir types do not have ink level indicators.

Press function button:

SAVE	to put the setting in memory and exit to the previous menu level.
TOGGLE	to toggle between the reservoir type with or without indicators.
CANCEL	to retain the previous setting and exit to the previous menu level.

8.6.4 Encoder menu ~~basic~~

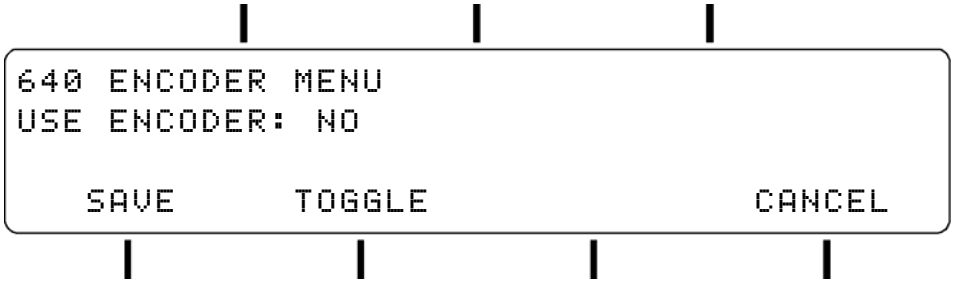


Fig. 8.58 640 Encoder menu

With this menu, the use of an encoder can be enabled or disabled. When enabled, the printer uses the pulses from the encoder to fire the printhead nozzles to adapt the print speed to the product speed.

When the encoder is disabled, the fire rate of the printhead nozzle is then generated by the control box according to the 'speed' parameter. Refer to subsection 8.7.1.

Press function button:

SAVE	to put the setting in memory and exit to the previous menu level.
TOGGLE	to enable or disable the use of an encoder.
CANCEL	to retain the previous setting and exit to the previous menu level.

8.6.5 Printhead protection parameters

Ink spitting

Spitting means that the printhead will print pixel-columns at predefined intervals when the printer is ready to print. Spitting is suppressed while printing an image.

For the majority of the installations, which use porous inks, it is not necessary to use spitting. Consult the distributor when the use of spitting is considered.

The printhead protection parameters 660 SPIT INTERVAL and 670 SPIT TIME are mainly set when commissioning the printer system. Refer to subsection 7.5.1.

Setting the ink alarm

The 'WHEN INK LOW' menu tells the printer what to do when the ink level in the ink reservoir is low. At ink low condition, the printer stops printing when this selection is set to 'stop' and continues printing when set to 'continue'. In either case, the alarm output is activated.

CAUTION:
If the 'WHEN INK LOW' selection is set to continue, there is an apparent risk that air is able to enter the ink tubing and printhead. This will cause the ink-system to malfunction. The ink reservoir should be refilled within 15 minutes to prevent print failure.

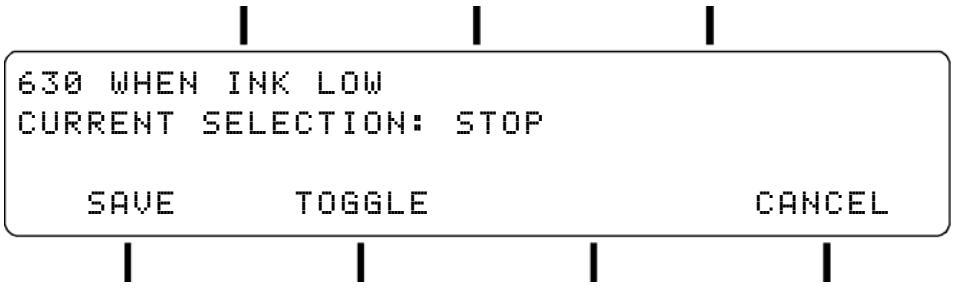


Fig. 8.59 630 When ink low

Press:

SAVE	to put the new values in memory and exit to the previous menu level.
TOGGLE	successively until the desired selection is displayed.
CANCEL	retains the previous value and exit to the previous menu level.

8.6.6 Reset number item during printing

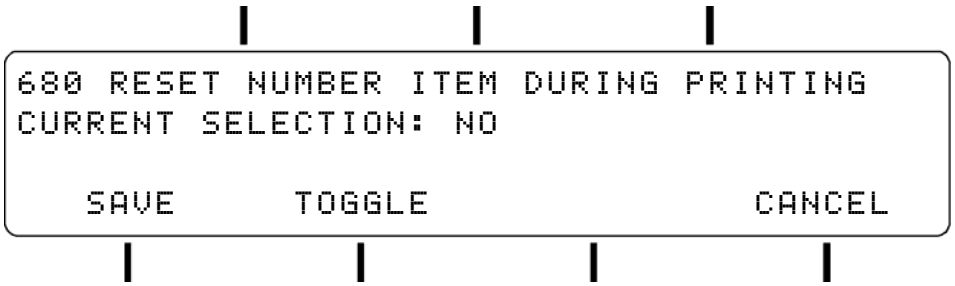


Fig. 8.60 680 Reset number item during printer menu

This function enables the possibility to reset the current value of the numeric item #1 while OPERATIONAL When enabled, the counter of numeric item #1 resets by pressing function button-A (top left button). The next print will begin with the start value as defined in the image by KIGS.

Press function button:

SAVE	to put the setting in memory and exit to the previous menu level.
TOGGLE	to toggle between YES or NO to enable or disable this function.
CANCEL	to retain the previous setting and exit to the previous menu level.

8.6.7 Reset parameters or counters

Use the RESET MENU (type 610 with keypad keys) to reset the system or counters.

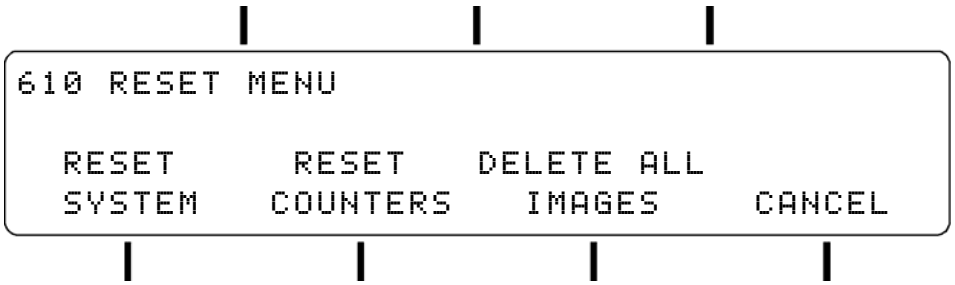


Fig. 8.61 610 Reset menu

Reset system

Use the RESET SYSTEM function (Fig. 8.61) when experiencing parameter related problems.

1. Press the RESET SYSTEM function button to reset all the parameters. This function restores the printer parameters to, factory preset, default values for all parameters. Only language, date and time are unaffected by the system reset.

Beware:
All the parameters will be reset to default values and this is irreversible. Make sure that all current parameter values are written down. Refer to 7.6 User settings.

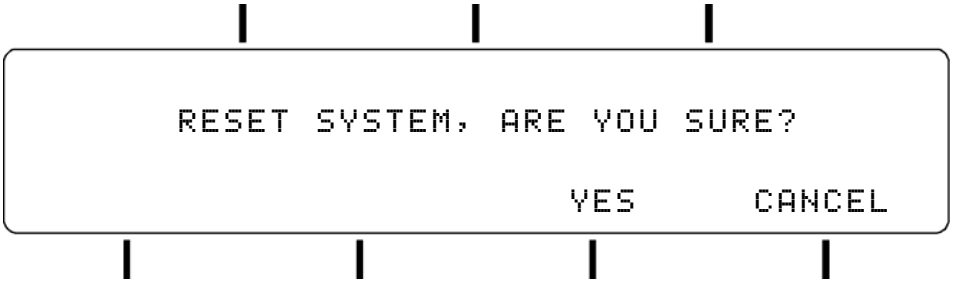


Fig. 8.62 Confirm system reset

2. Press YES to confirm the system rest.

Fig. 8.63 System has been reset message

3. Press STOP/EXIT key to exit to the reset menu.

4. Go to the MAIN MENU by pressing the STOP/EXIT key several times or type 000 with the keypad keys. The 'writing to memory' message appears (Fig. 8.1) and the changed parameter values will be written to the flash memory.

Reset counters

Use the RESET COUNTERS function (Fig. 8.61) to reset all the counters which are used in the current selected image.

1. Press the RESET COUNTERS function.

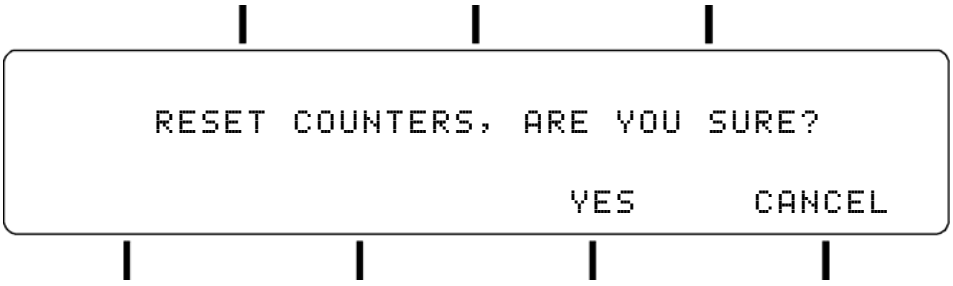


Fig. 8.64 Confirm counters reset

2. Press YES to confirm the system rest.

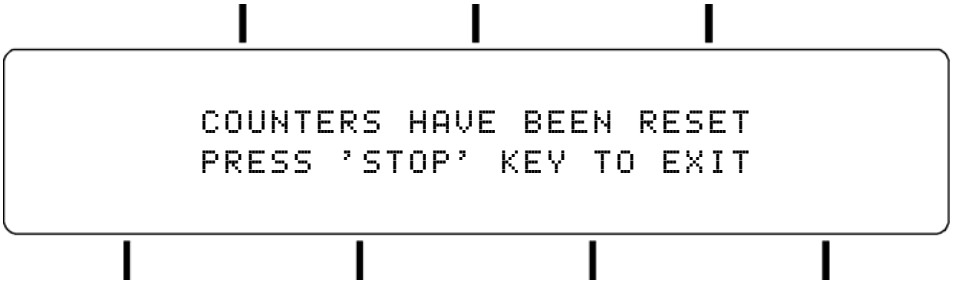


Fig. 8.65 Counters have been reset

3. Press STOP/EXIT key to exit to the reset menu.

4. Go to the MAIN MENU by pressing the STOP/EXIT key several times or type 000 with the keypad keys. The 'writing to memory' message appears (Fig. 8.1) and the changed parameter values will be written to the flash memory.

8.7 Adjusting print parameters

8.7.1 Speed

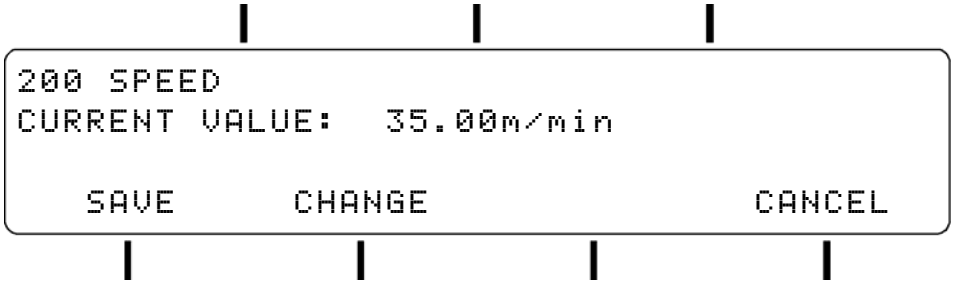


Fig. 8.66 Speed menu

The SPEED parameter controls the fire rate of the piezo printhead nozzles. A good, horizontal, print resolution will be obtained by proper adjustment of this parameter value.

The speed value can also be adjusted while operational as a dynamic parameter, refer subsection 8.2.1.

The used format, in which the SPEED value is shown, is related to the ENCODER menu (subsection 8.6.4).

The speed value format with encoder,

Enabled:	a percentage of the real product speed. The selectable range is from 85% to 115%.
Disabled:	a four digit value in meters per minute. The selectable range is from 00.40 to 35.00 m/min.

Press function button:

SAVE	to put the setting in memory and exit to the previous menu level.
CHANGE	an underlined cursor will appear under the first digit of the value. Enter the desired value using the keypad. As a digit is entered, the cursor will move to the next digit. The value can only be saved when all digits are entered and the cursor is disappeared.
CANCEL	to retain the previous setting and exit to the previous menu level.

8.7.2 Stretch

The STRETCH parameter is only adjustable while operational, refer to section 8.2. This parameter multiplies each pixel-column of an image 'x' times, where 'x' is a value from 01x to 10x. E.G., a STRETCH value of 02x doubles the printed image length, because each pixel-column of the image is printed twice. The result is a print that shows bolder.

Fig. 8.67 Test image with stretch = 2x

While operational scroll to the screen "stretch" (Fig. 8.68) with button C, and adjust the parameter value if desired.

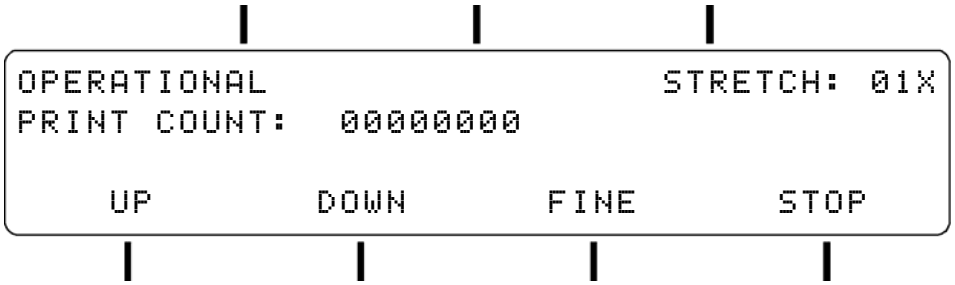


Fig. 8.68 Operational screen "stretch"

Press:	
UP	to increase the shown parameter value with one step.
DOWN	to decrease the shown parameter value with one step.
FINE / COARSE	to toggle the step size at which the dynamic value will be adjusted. FINE sets the step size at 1, COARSE sets the step size at 10.
STOP	to stop the printer and exit to the MAIN MENU.
Button C	to scroll through a list of parameters and the selected image name.
Button B	to make a sample print.

8.7.3 Print delay

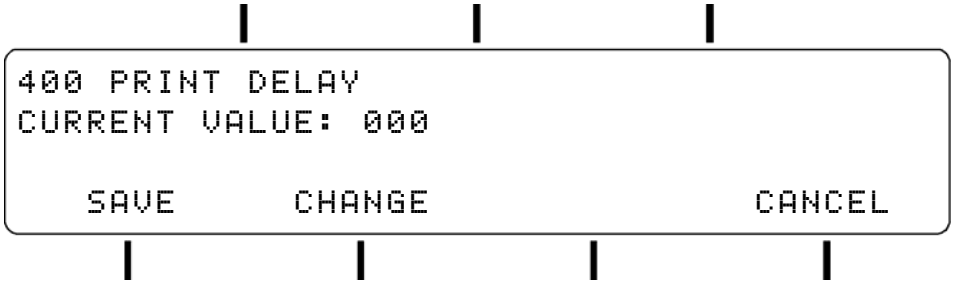


Fig. 8.69 Print delay

The parameter PRINT DELAY sets a displacement of xxx mm from the photocell position to the start position of the print on the product. The print delay is related to the speed parameter, i.e. the result of an incorrect speed is an incorrect displacement.

The delay value can also be adjusted while operational as a dynamic parameter, refer to subsection 8.2.2.

Press function button:	
SAVE	to put the setting in memory and exit to the previous menu level.
CHANGE	an underlined cursor will appear under the first digit of the value. Enter the desired value using the keypad. As a digit is entered, the cursor will move to the next digit. The value can only be saved when all digits are entered and the cursor is disappeared.
(Only for 18PT)	Use CHANGE A or CHANGE B to change the delay of the desired printhead (Fig. 8.70).
CANCEL	to retain the previous setting and exit to the previous menu level.

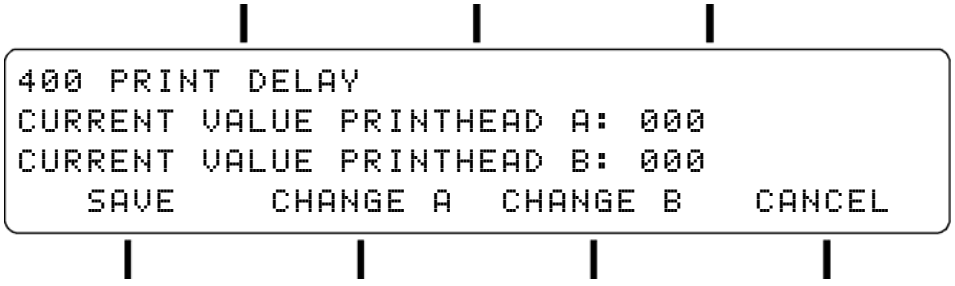


Fig. 8.70 Print delay [18PT]

8.7.4 Alignment [35P]

The ALIGNMENT parameter is only adjustable while operational. This parameter sets the alignment of xxx pixels between the two printheads in de printhead housing to horizontal align the top and bottom half of the print to each other. Adjust this parameter when the speed parameter is correctly set and the printed image is misaligned (Fig. 8.71).

The horizontal alignment is related to the speed parameter, i.e. the result of an incorrect speed is an incorrect alignment. Refer to subsection 9.5.1 for more examples of horizontal misalignment.

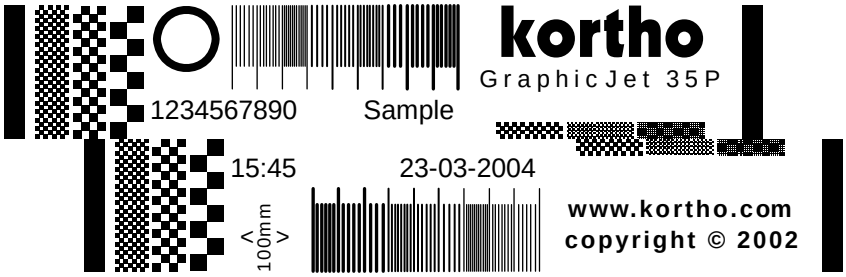


Fig. 8.71 Test image horizontal misaligned [35P]

While operational scroll to the screen “alignment” (Fig. 8.72) with button C, and adjust the parameter value if desired.

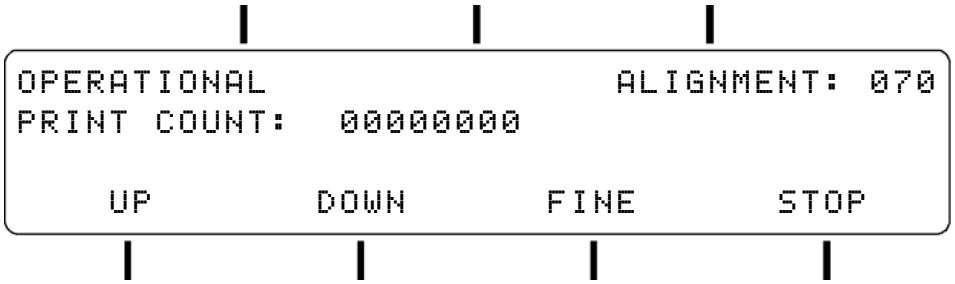


Fig. 8.72 Operational screen “alignment” [35P]

Press:	
UP	to increase the shown parameter value with one step.
DOWN	to decrease the shown parameter value with one step.
FINE / COARSE	to toggle the step size at which the dynamic value will be adjusted. FINE sets the step size at 1, COARSE sets the step size at 10.
STOP	to stop the printer and exit to the MAIN MENU.
Button C	to scroll through a list of parameters and the selected image name.
Button B	to make a sample print.

Note:
Besides a proper horizontal alignment the two printheads also require a proper vertical alignment. This vertical alignment is not controlled by the firmware of the printer. Refer to subsection 9.5.2 for adjusting the vertical alignment.

8.7.5 Trigger parameters

The PRINT REQUEST and PRINT DEBOUNCE parameters are mainly set when commissioning the printer system. Refer to subsection 7.4.4, Setting the trigger parameters.

8.7.6 Print direction

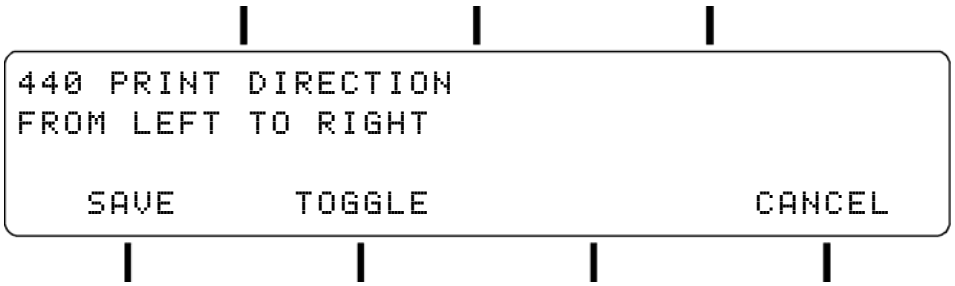


Fig. 8.73 Print direction

Use this menu, if the print is mirrored, to change the print direction. Refer to subsection 7.4.1 .

Press:	
SAVE	to put the new values in memory and exit to the previous menu level.
TOGGLE	successively until the desired selection is displayed, either 'from left to right' or 'from right to left'.
(Only for 18PT)	Use TOGGLE A or TOGGLE B to change the print direction of the desired printhead (Fig. 8.74).
CANCEL	retains the previous value and exit to the previous menu level.

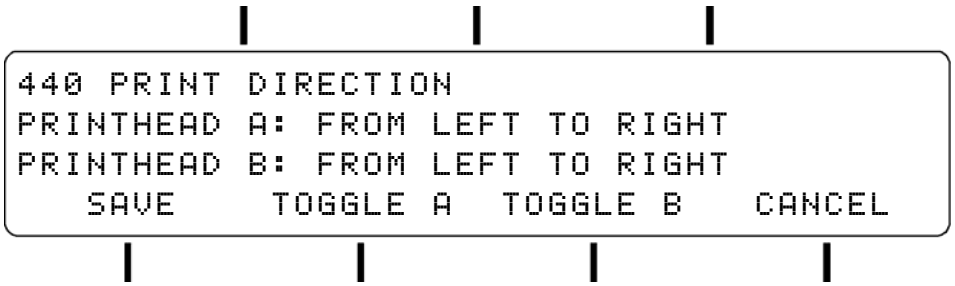


Fig. 8.74 Print direction [18PT]

8.7.7 Rotate print

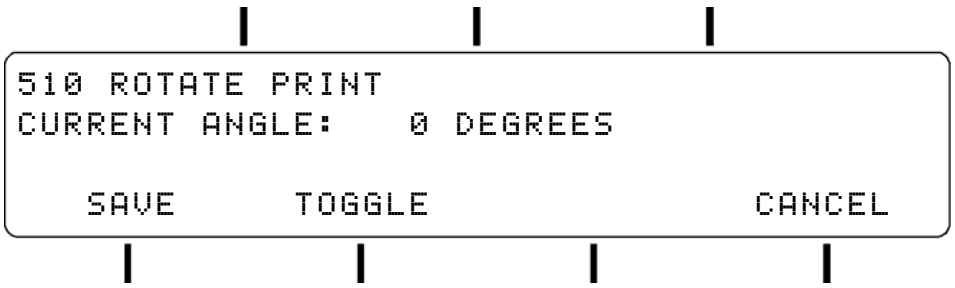


Fig. 8.75 Rotate print

Use this menu to turn the print upside-down. Refer to subsection 7.4.2.

Press:	
SAVE	to put the new values in memory and exit to the previous menu level.
TOGGLE	successively until the desired selection is displayed, either 0 or 180 degrees.
CANCEL	retains the previous value and exit to the previous menu level.

9 TROUBLESHOOTING

9.1 Fault diagnosis

9.1.1 Control box

Fault indication	Symptom(s)	Action(s)
Control box does not power up.	Power LED is not lit LCD remains dark	Check whether supply voltage is present. Check whether power cable connector is properly connected to control box and mains power supply. Check whether the power cable is not damaged. Check whether ON-OFF switch is in the position I.
		Only perform these actions by qualified personnel. **Disconnect power cable (X4) from mains power supply first!**
		Check the fuses in the power entry module (X4). Check whether internal mains wiring is connected properly. Check whether 35VDC is present and the processor board wiring is connected properly.. Check fuse on the 35VDC power supply..
Control box does not power up.	Power LED is lit LCD remains dark	**Only perform these actions by qualified personnel.** **Disconnect power cable (X4) from mains power supply first!**
		Check whether LCD connector to processor board is properly connected. Check whether LCD-cable is not damaged. Check whether LCD contrast is too dark Refer to subsection9.6.1. Check whether a "burning smell" is present in control box. If so, contact your local dealer.
Control box does not boot up.	Power LED is lit LCD is backlit	**Only perform these actions by qualified personnel.** **Disconnect power cable (X4) from mains power supply first!**
		Remove the flashcard and check whether the flashcard connector and the flexible connector are clean. Do not touch the flexible connector with your fingers! After check, place flashcard back and make sure it is secure in the flashcard holder. Refer to sections 7.1 and 10.4. Remove the two memory modules and place these back again to ensure good contact is made. Check whether a "burning smell" is present in control box. If so, contact your local dealer.
LCD contrast.	To bright or to dark	Adjust the LCD screen contrast. Refer to subsection 9.6.1.
'Memory write error' message shows up.		Unlock the flashcard by switching the write protection switch on the flashcard off. Refer to sections 7.1 and 10.4 to take out and replace the flashcard.
Date and time are stopped.	Wrong date and time is printed	Check whether the battery is not empty. Refer to subsection 9.6.2.

9.1.2 Coding unit

Fault indication	Action(s)
Ink slowly (bleeding) comes out of the nozzles of the printhead.	Check whether the ink reservoir is not mounted too high. Refer to section 6.5. Check whether the reservoir has not been "overfilled". This happens when ink is added to the reservoir before the ink low LED has lit up. Drain ink into an empty inkbottle until the ink bleeding stops.
Poor print quality.	Refer to section 9.3 to optimize print quality.
	Check whether the nozzle plate is clean and no debris is present in the front plate opening, which could block the ink droplets. Refer to section 10.2.
	Check whether the ink low indicator on the control box is lit. Refer to section 8.5.1, if the ink is low. Also, refer to section 8.5.3, to prime the printhead.
No print is obtained.	Check whether an image is selected and started.
	Check whether the photocell detects the product.
	Check whether the "printing" indicator (Fig. 3.3) is lit when an image should be printed.
	Check the height of the ink reservoir. Refer to section 6.5.
	Check whether a low ink situation is present. Refer to subsections 8.5.1 and 8.5.3.
	Check whether the control box indicates error messages on the LCD
	Check whether all cables are connected properly.
	Check whether the nozzle plate is clean, Refer to section 10.2 for cleaning the printhead.

9.1.3 Remote control basic

Fault indication	Action(s)
Remote control does not power up, beeps, when one of the keys is pressed.	Check whether the 9 VDC battery is not empty. Check whether battery clip is connected properly.
Remote control shuts down during image transfer.	Check whether the 9 VDC battery is not empty. Check whether battery clip is connected properly.

9.1.4 Photocell

Fault indication	Action(s)
Photocell does not detect passing product.	Check whether the lens (front side) of the photocell is clean.
	Check whether the photocell is positioned correctly to detect the substrate.
	Check whether the sensitivity of the photocell is properly set.
	Check whether the photocell connector (X1) is properly connected to the control box.
	Check whether the photocell does not detect anything in the background. Normally, the led indicator on the photocell is off if no substrate is present.

9.1.5 Encoder basic

Fault indication	Action(s)
Encoder wheel does not turn. Encoder wheel slips.	Check whether the lever spring is set to provide enough tension Check whether the encoder mounting bracket is securely mounted

9.2 Error message

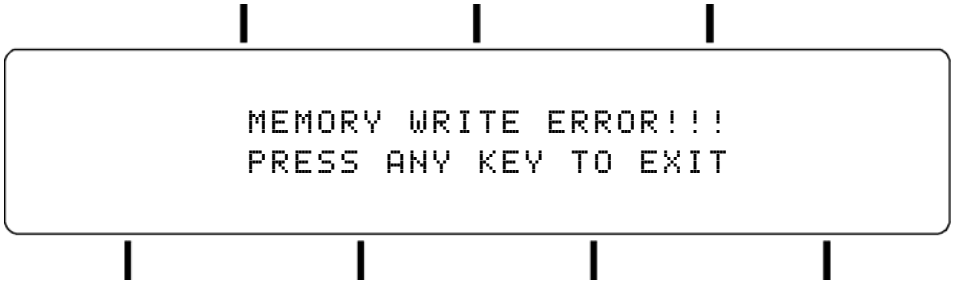
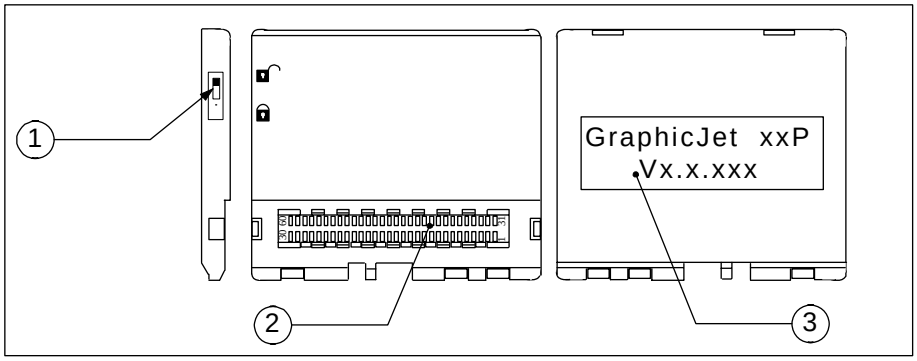


Fig. 9.1 Memory write error

Remedy, unlock the flashcard (Fig. 9.2). If this does not solve the problem replace the flashcard, contact your local distributor.



1. Write lock
2. Flashcard connector
3. Label with firmware name and version

Fig. 9.2 Flashcard

9.3 Poor print quality

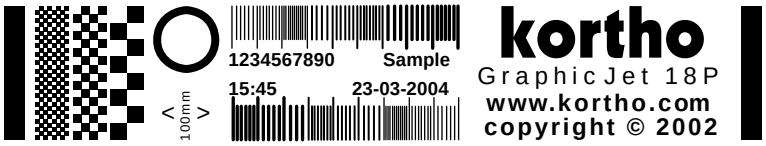


Fig. 9.3 Print result is correct

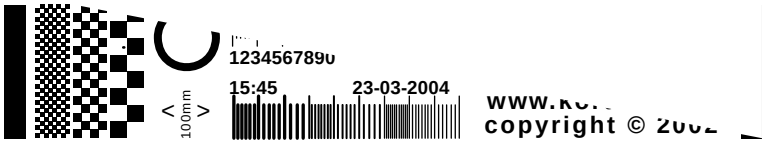


Fig. 9.4 Print result of air bubbles or reduced ink flow in ink system

Remedy, check for low ink level (LED indicators on control box and/or ink reservoir are on) and prime the printhead. Refer to subsection 8.5.3.

When several times priming does not improve the print quality, also check if the ink filter is clogged. Replace the ink filter when clogged. Refer to subsection 10.5.5.

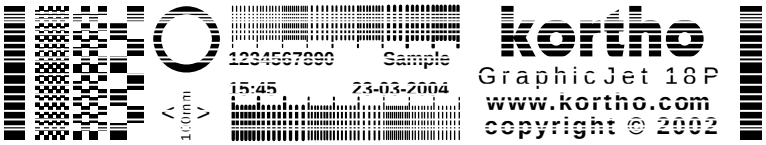


Fig. 9.5 Print result when nozzles are clogged with ink/dirt or blocked by air bubbles.

Remedy, purge or/and prime the printhead. Refer to subsection 10.2.

9.4 Incorrect print length due to speed

In this section, the stretch parameter is 1x and the correct print speed is defined as the speed at which the horizontal print resolution is equal to the printhead resolution. The printhead resolution is 185 dpi (dots per inch). The product speed must be in range of the print speed, which is between 0.4 m/min and 35 m/min.

Fig. 9.6 Test image printed too fast, length < 100 mm

Remedy, decrease the speed parameter or use an encoder.

Fig. 9.7 Test image printed too slow, length > 100 mm

Remedy, increase the speed parameter or use an encoder.

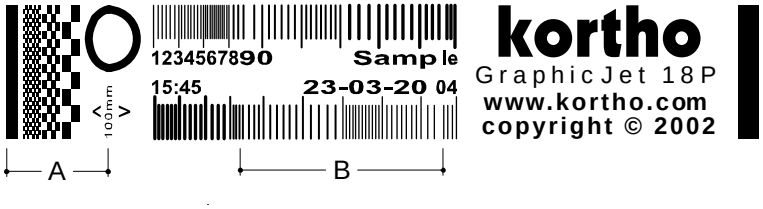


Fig. 9.8 Test image printed with variable product speed

The product speed was at period A too fast and at period B too slow. Remedy, avoid product speed variations or use an encoder.

9.5 Printhead misalignment [35P]

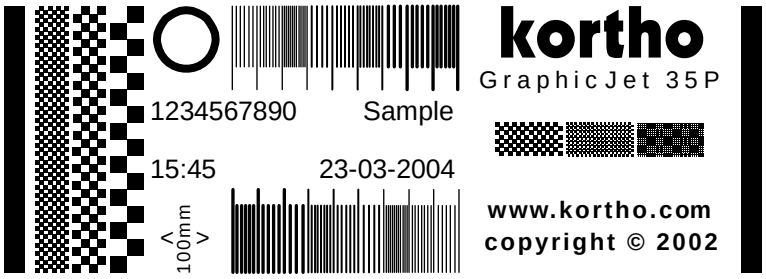


Fig. 9.9 Test image 'Kortho35P' at correct print speed and alignment, length = 100 mm

9.5.1 Horizontal alignment

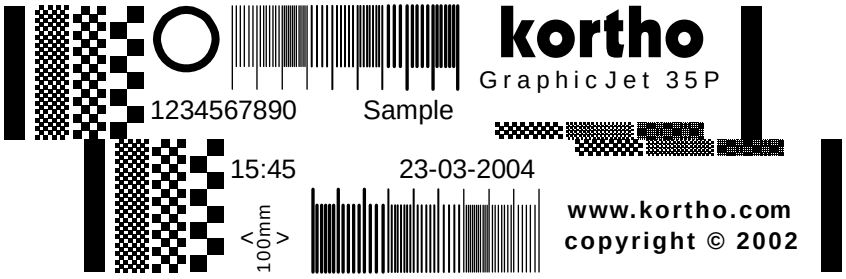


Fig. 9.10 Test image 'Kortho35P' without proper horizontal alignment

Remedy, adjust the alignment parameter. Refer to subsection 8.7.4.

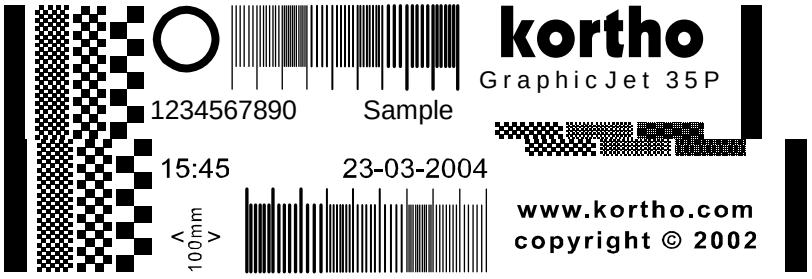


Fig. 9.11 Test image 'Kortho35P' with product speed variations

The top and the bottom half of the print (Fig. 9.11) will have not the same length if the product has no constant speed during printing.

Remedy, avoid these product speed variations while printing, use an encoder or redesign the image. Design an image this way, do not place image items partial on the bottom or upper half of the print area).

9.5.2 Vertical alignment

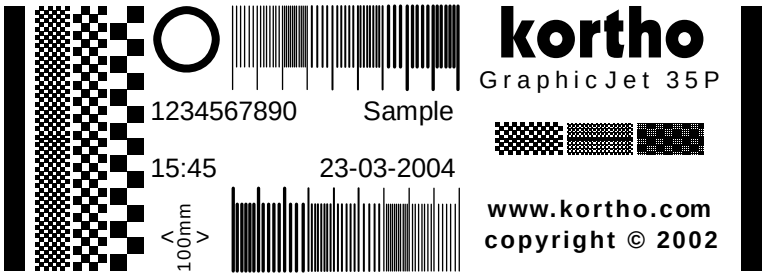


Fig. 9.12 Test image 'Kortho35P' with overlapping printheads

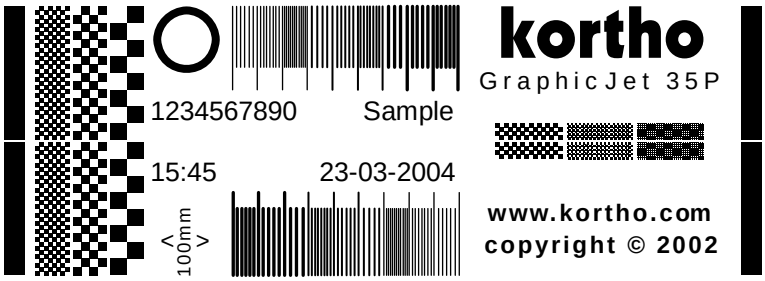


Fig. 9.13 Test image 'Kortho35P' with a gap between the printheads

The printheads of the GraphicJet 35P can be misaligned, Fig. 9.12 or Fig. 9.13, due to:

1. The printhead housing is not properly aligned with the print direction. This is the most common cause for misalignment. To solve this:
    a. Rotate the printhead housing a bit axial and make a print with the 'Kortho35P' test image.
    b. If the overlap or gap has become bigger, rotate the printhead housing in the other direction and make a print.
    c. Repeat instructions a and b if necessary until the overlap or gap has disappeared.
2. One of the printheads is replaced or the factory setting of the vertical alignment inside the printhead housing has changed. Refer to Fig. 2.9, to solve this:
    a. Make a print with the 'Kortho35P' test image.
    b. If the print is tilted, align the printhead housing to the print direction.
    c. If the problem is not solved, open then the printhead housing and slide the interior halfway out.
    d. Align the printhead alignment frame with the vertical adjustment screws.
    e. Slide the interior back and make a print.
    f. Repeat the steps from instruction c until the vertical alignment is correct.

9.6 Control box problems

Only qualified personnel may perform the instructions as described in this section

9.6.1 Adjusting LCD screen contrast

The contrast of the LCD screen can be adjusted with the contrast potentiometer.

WARNING:
There is danger of electrical shocks from some parts of the control box when the control is box open and switched on. Only qualified personnel may perform the instructions as described in this subsection. Use only isolated tools.

1. Switch control box off.
2. Open the control box by unscrewing the four screws accessible from the back cover of the control box.
3. Place the front cover on its side.
4. Switch control box on.
5. Use an isolated screwdriver to turn contrast potentiometer (see item 5 in Fig. 7.2).
6. Turn clockwise to increase the contrast. Turn counter clockwise to decrease the contrast.
7. Switch control box off.
8. Close and screw the control box with the four screws.

9.6.2 The date and time are stopped

The date and time are stopped and locked on the value 01/01/2001 and 00:00. The date and time items in an image are related to these values, so the print will be wrong. It means that the battery on the processor board is empty and has to be replaced.

Replacing the battery has not any consequences for settings and images stored on the flashcard.

1. Switch control box off.
2. Open the control box by unscrewing the four screws on the back of the control box.
3. Replace the battery (see item 3 in Fig. 7.2).
4. Switch control box on.
5. Set the time and date in SET DATE AND/OR TIME (310).
6. Switch the control box off for a minimum of 20 seconds.
7. Switch on again and check if the time and date are still correct. If not, jump to instruction 1.
8. Switch control box off
9. Close and screw the control box with the four screws.

10 MAINTENANCE

10.1 Quick and regular checks

Inspect the printer visually and check the print quality both on a regular basis.

Daily or weekly maintenance is only necessary when, due to the printing environment, the same problems occur regularly. Do NOT clean the nozzle plate of the printhead if the prints are just fine. Refer to chapter 9 TROUBLESHOOTING for setting up a custom maintenance plan, to minimize problems.

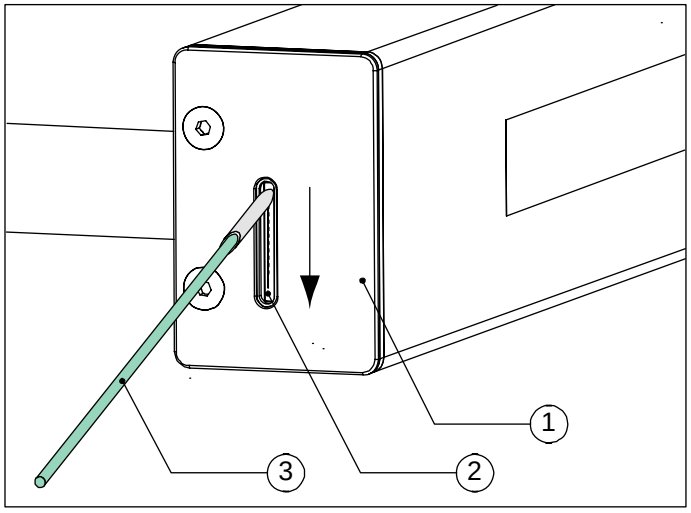
10.2 Nozzle maintenance

1. Put on protection gloves and use safety goggles for personal protection.
2. Purge the printhead. Refer to subsection 8.5.2. The nozzle will be cleaned of small particles.
3. Spray with the spout of the solvent bottle some solvent on the front and nozzle plates. Let the solvent flow off of the front and nozzle plates, taking with it most of the ink and particles.

CAUTION:
Use ONLY special foam swaps and GJ solvent (for part numbers refer to 6.2.4).
Do NOT use cotton buds, the micro fibres will obstruct or damage the nozzles of the printhead.

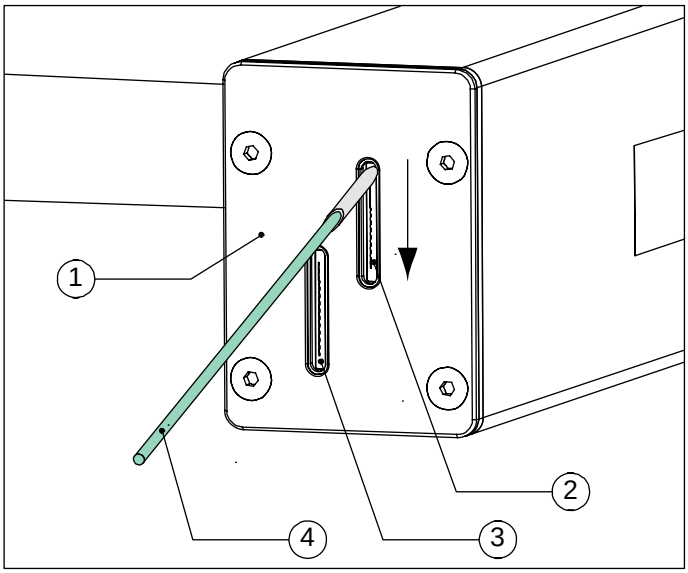
4. Use a foam swab to clean the nozzles (Fig. 10.1 or Fig. 10.2) for excessive particles and ink. Wipe the nozzles gently, only ONCE, from top to bottom. Avoid that ink or debris particles are wiped into the nozzles.

CAUTION:
Perform the actions near and on the printhead nozzle plate with special care to prevent damage to the printhead nozzle plate.



1. Front plate
2. Nozzle plate
3. Foam swap

Fig. 10.1 Cleaning the nozzle plate [18P]



1. Frontplate
2. Nozzle plate of top printhead
3. Nozzle plate of bottom printhead
4. Foam swap

Fig. 10.2 Cleaning the nozzle plates [35P]

5. Take a clean cloth, if necessary with some solvent, and gently wipe off all excessive ink and particles from the printhead housing. Take care that the excessive ink and particles are NOT wiped in the grooves of the nozzle plates.

10.3 Yearly maintenance

To prevent loss of production it is advisable to service the printer once in a year. Only service engineers, qualified by Korthofah BV are allowed to service the printer.

10.4 Updating firmware

In case of firmware updates, exchange the flashcard for the flashcard with the new firmware.

Follow the instructions as described in section 7.1 Preparing the control box , but replace the instructions 4 and 6 with these instructions:

4. Push the lever (7) backward and take the flashcard, with the old firmware, out the slot (8), first upwards and then backwards.

6. Place the flashcard (6), with the new firmware, with the connector side downwards into the slot. Do not touch the flexible connector of the slot!

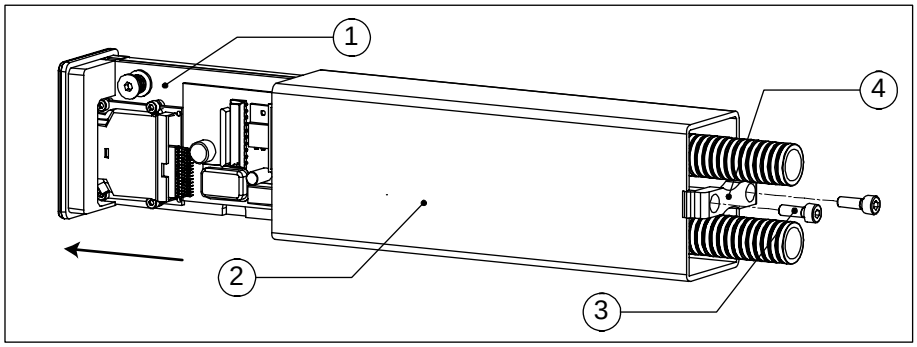
10.5 Replacing parts of the printhead housing

Only service engineers, qualified by Korthofah BV, are allowed to replacing parts of the printer.

CAUTION:
Always take anti-static precautions when changing a parts of the coding unit.

10.5.1 Open the printhead housing

1. Switch control box off and disconnect the mains power cable.
2. Put on protection gloves and use safety goggles for personal protection.
3. Remove any obstacles in front of the printhead housing to enable the printhead frame (Fig. 10.3) to slide freely out the printhead housing.
4. Protect the host machine surface underneath the printhead housing against contamination with ink
5. Unscrew the lock screws to release the lock strip (Fig. 10.3).



1. Printhead frame
2. Printhead housing
3. Lock strip
4. Lock screws (2x)

Fig. 10.3 Sliding the printhead frame out

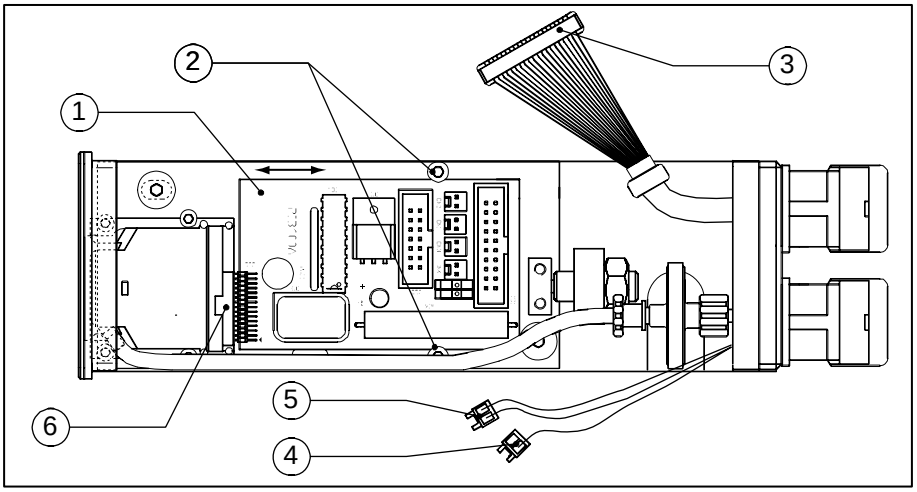
6. Slide the printhead frame gently halfway out the printhead housing as shown in Fig. 10.3. Guide the two flexible conduits.

10.5.2 Close the printhead housing

1. Clean, if necessary, the printhead frame and housing.
2. Clean the gasket of the printhead housing.
3. Slide the printhead frame gently back into the printhead housing. Guide the ink filter if necessary (reverse action of Fig. 10.3).
4. Place the lock strip and screw the lock screws to fasten the lock strip (reverse action of Fig. 10.3).
5. Connect the mains power cable and switch control box on.

10.5.3 Replacing the Printhead Interface Board (PIB)

1. Open the printhead housing. Refer to subsection 10.5.1.



1. PIB
2. Standoff + 2x screw
3. Data cable
4. 5Vdc connector
5. Low ink connector
6. Printhead connector

Fig. 10.4 Replace Printhead Interface Board (PIB) [18P]

2. Disconnect the data cable, 5Vdc and low ink connector from the PIB (Fig. 10.4: 3, 4 and 5)

3. Loosen the two PIB standoff screws (2).

4. Pull the PIB (1) gently but firmly off the printhead connector (6).

5. Take the new PIB out of the anti-static bag and slide it between the two standoffs.

6. Push the PIB gently but firmly in the printhead connector. Make sure the PIB is exactly in line with the printhead and aligned with the printhead connector.

7. Fasten the two PIB standoff screws.

8. Connect the data cable, 5Vdc (CN3 of J3) and low ink (CN1 of J1) connector again to the PIB.

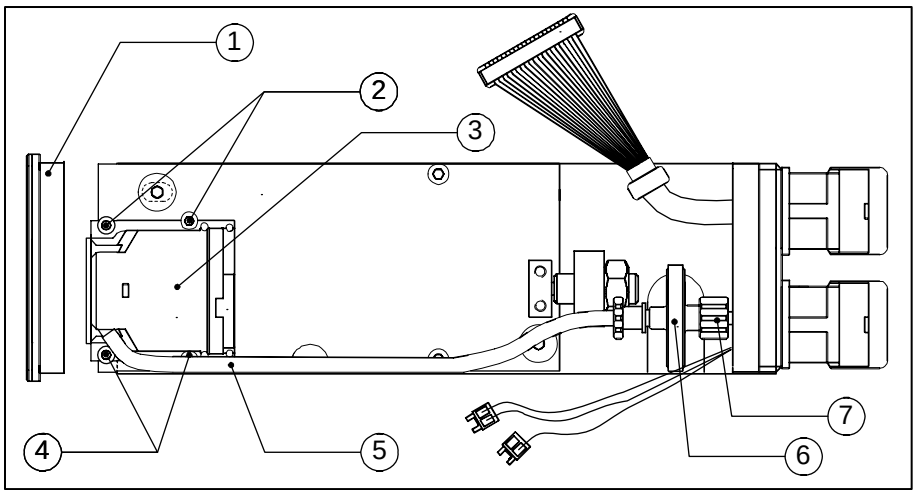
9. Put the switch(es) to the REV2 mode. The current PIB version contains only one switch. (The REV1 mode is meant for first generation X100 mainboards of the control unit)

10. Close the printhead housing. Refer to subsection 10.5.2.

10.5.4 Replacing the piezo printhead

Replacing the printhead means that also the ink tube connected to the printhead and the filter must be replaced. The ink tube can is deformed when it is connected to the printhead fitting. Re-use of the ink tube increase the risk of ink leakage. It is recommended to replace the filter together with the printhead.

1. Open the printhead housing. Refer to subsection 10.5.1.
2. Remove the Printhead Interface Board (PIB). Refer to subsection 10.5.3 instructions 2 until 4.



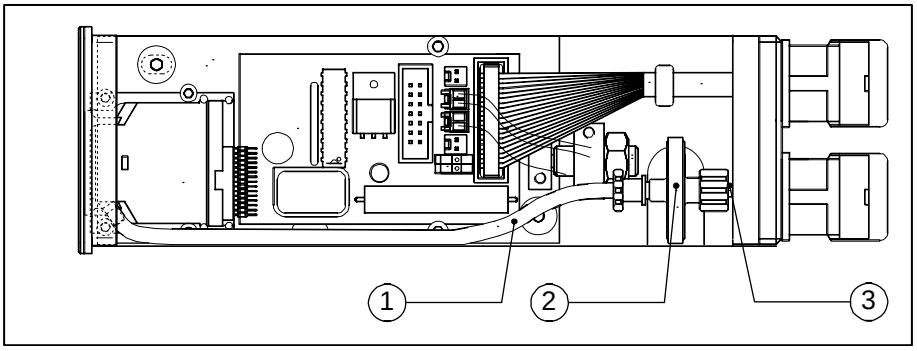
1. Front plate
2. Standoff + screw (2x)
3. Printhead
4. Standoff + screw (2x)
5. Ink tube (black)
6. Filter
7. Ink tube (yellow)

Fig. 10.5 Replace printhead [18P]

3. Remove the front plate (fastened with two screws) Fig. 10.5.
4. Loosen the bottom two standoff screws (4).
5. Unscrew the top two standoff screws (2).
6. Disconnect the ink filter (6) from the yellow ink tube (7) by turning the coupling anti-clockwise. Beware of ink leakage.
7. Remove the printhead, ink tube and filter.
8. Carefully take the new piezo printhead out its anti-static packaging.
9. Remove the nozzle protection cover. Do not touch the nozzle plate!
10. Place the new printhead and secure it with the four standoff screws (2 and 4).
11. Cut down the new ink tube (black) to the proper length, use the old ink tube as a reference.
12. Connect the the ink filter(6) to the yellow ink tube(7).
13. Connect the new ink tube to the the ink filter(6).
14. Connect the new ink tube to the printhead. Take care that the tube is NOT bended or twisted when fitted to the printhead.
15. Clean the gasket inside the front plate with solvent.
16. Mount the frontplate again in front of the printhead.
17. Replace the printhead interface board (PIB). Refer to subsection 10.5.3 instructions 6 until 8.
18. Close the printhead housing. Refer to subsection 10.5.2.
19. Prime the excessive air from the system, refer to subsection 10.5.3.
20. The printer is now ready to print

10.5.5 Replacing the ink filter

1. Open the printhead housing. Refer to subsection 10.5.1.



1. Ink tube (black)
2. Filter
3. Ink tube (yellow)

Fig. 10.6 Replace ink filter [18P]

2. Disconnect the ink filter (2) from the yellow ink tube (3) by turning the coupling anti-clockwise (Fig. 10.6).

3. Disconnect the black ink tube (1) from the ink filter by turning the filter anti-clockwise.

4. Place the new filter by performing instructions 3 and 2 in reverse direction.

5. Wipe the printhead frame clean in case of spilled ink.

6. Close the printhead housing. Refer to subsection 10.5.2.

7. Prime the excessive air from the system, refer to subsection 10.5.3.

8. The printer is now ready to print

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11 DISMANTLING & DISPOSAL

11.1 Dismantling

Dismantle the printer only in a well-ventilated area.

Wear safety goggles, suitable protective clothing, face shield and chemical resistant gloves made of polyvinyl alcohol (PVA), PTFE (Teflon) or the ones supplied by korthofah.

Separate the printer parts in this order:

11.1.1 Printer

1. Switch off the printer.
2. Unplug the mains power cable.
3. Disconnect all remaining connections of the control box.
4. Dismount the supports.
5. Separate the supports from the coding unit and the control box.

11.1.2 Ink reservoir(s)

1. Open the reservoir(s) screw cap.
2. Pour the remaining ink in a waste container.
3. Let the ink reservoir(s) drain dry.
4. Treat the waste container and its contents as special waste.

11.1.3 Printhead housing

1. Open the printhead housing
2. Remove the two printed circuit boards.
3. Treat the two printed circuit boards as electronic waste.

11.1.4 Control box

1. Open the control box.
2. Remove the battery (coin cell) from the main printed circuit board.
3. Treat the battery as special waste.
4. Treat the control box as electronic waste.

11.1.5 Remote control ~~basic~~

1. Open the battery cover
2. Remove the 9V battery.
3. Treat the battery as special waste.
4. Treat the remote control as electronic waste.

11.1.6 Sensor devices

1. Treat the photocell as electronic waste.
2. Treat the encoder as electronic waste. ~~basic~~

11.2 Disposal

11.2.1 Disposal method

The disposal method must be in accordance with national and local regulations at the time of the disposal.

The user is responsible for the disposal of:

1. The printer at the end of its operational life.
2. Packaging
3. Containers, clothing, cleaning foam swaps and paper wipers contaminated with ink and solvent.
4. Wasted ink and solvent. Refer to Appendix E, Material safety data sheets (MSDS).

11.2.2 Waste separation

Please deliver the packaging materials to waste recycling companies.

The batteries, ink and solvent are generally being count as special waste.

Empty ink or solvent containers, paper wipers, cleaning foam swaps and clothing contaminated with ink or solvent can count as special waste.

Printed circuit boards and the plastic control box are count as electronic waste. Because poisons found in electronic waste include lead, mercury, cadmium, and brominated flame-retardants commonly added to plastics used in electronics.

The remaining waste of the printer contains mainly anodized aluminium and stainless steel

Please deliver the remaining waste materials also to waste recycling companies.

Index

▪ Keywords

▪ Figures

Appendix A Specifications

Coding Unit

		18P, 18PT		35P	
Printhead housing	Height	60 mm	(2.36")	71 mm	(2.80")
	Width	40 mm	(1.57")	48 mm	(1.89")
	Depth	185 mm	(7.28")	184,5 mm	(7.26")
	Weight	1.20 kg	(2.65 lb)	1.25 kg	(2.76 lb)
Inksystem	Height	62 mm	(2.44")	102 mm	(4.02")
	Width	92 mm	(3.62")	152 mm	(5.98")
	Depth	183 mm	(7.20")	188,5 mm	(7.42")
	Weight	1.65 kg	(3.64 lb)	2,48 kg	(5.47 lb)
Print area	Height	17.6 mm	(0.69")	35.2 mm	(1.39")
	Depth	2000 mm	(78.74")	2000 mm	(78.74")
Prind speed without encoder	Minimal	0.4 m/min	(1.4 ft/min)	0.4 m/min	(1.4 ft/min)
	Maximal	35 m/min	(114 ft/min)	33 m/min	(108 ft/min)
Prind speed with encoder	Minimal	1.5 m/min	(5 ft/min)	1.5 m/min	(5 ft/min)
	Maximal	35 m/min	(114 ft/min)	28 m/min	(91.8 ft/min)

Printhead	Dots	128	
	Drop mass	approx. 80ng	
	Resolution	7.28 dots/mm	(185 dpi)
Print	Speed range	0.4 - 35 m/min	(1.32 - 114 ft/min)
	Substrate distance	5 mm	(0,20")
Substrate	Porous		
Ink & Solvent	Kortho Ink GJ1 black, Kortho Solvent GJ		
Environment	Temperature	10 °C - 40 °C	(50 °F - 104 °F)
	Relative humidity	10% - 90%	non condensing

Ink

Operational	Temperature (recommended)	20 °C - 35 °C	(68 °F - 95 °F)
Transport & Storage	Temperature	10 °C - 40 °C	(50 °F - 104 °F)
	Precautions	use original packaging	
	Shelf life	12 month	

Control Box

Control box	Height	303 mm	(11.93")
	Width	266 mm	(10.47")
	Depth	104 mm	(4.10")
	Weight	3.9 kg	(8.6 lb)
Power supply	Input Voltage	115 - 230VAC	
	Frequence	50 - 60 Hz	
	Power	max. 40VA	
	Current	230mA at 115VAC	153mA at 230VAC
	Inrush current	<18A at 115VAC	<36A at 230VAC
Environment	Temperature	5 °C - 45 °C	(41 °F - 113 °F)
	Relative humidity	10% - 90%	non condensing
Interface	Bespoke hardware user interface Infra-red communication port (not present at basic printer) RS 232 port (not present at basic printer) Host input and output port		

Image features

For the basic printer models basic :

Templates:

Template 1:	1 line,	text height = 18 mm,	only capitals (default).
Template 2:	1 line,	text height = 18 mm.	
Template 3:	1 line,	text height = 16 mm.	
Template 4:	2 lines,	text height = 9 mm.	
Template 5:	2 lines,	text height = 6.5 mm.	
Template 6:	3 lines,	text height = 5.5 mm.	
Template 7:	4 lines,	text height = 4 mm.	
Template 8:	4 lines,	text height = 3 mm.	
Template 9:	5 lines,	text height = 3 mm.	
Template 10:	5 lines,	text height = 2.5 mm.	
Template 11:	6 lines,	text height = 2.5 mm.	
Template 12:	6 lines,	text height = 2 mm.	

The text height is calculated in mm from highest to lowest point of the font. As example: 

For the GraphicJet 35PB the number of lines is doubled compared to the templates mentioned above.
The length of a template line can be up to 50 characters.
The templates cannot be deleted.

Image:

Name:	User defined name (10 char. max.) and an optional description (26 char. max.).
Saved template:	A template, which is filled with data and saved.
Test image:	System image, which cannot be deleted and which is useful for checking the print quality and correct printer adjustment and setting of several parameters.

Items:

Fixed:	Text.
Dynamic:	Counter, date and time.

Storage capacity: The control box memory size for storing images is 512 kB.

For the standard printer models ~~basic~~ :

Image:

Name:	User defined name (10 char. max.) and an optional description (26 char. max.).
Test image:	System image, which cannot be deleted and which is useful for checking the print quality and correct printer adjustment and setting of several parameters.
Items:	Text, multiple line text, number, date, time, shiftcode, barcode and graphic (maximal 99 items per image, except for graphic items since an image contains up to 10 items of these items). These items are placed in an image with the design tool KIGS.
Data:	Fixed and variable.
Size:	maximal 64 Kb. Due to the buffer size of the control box.

Font:

Name:	Inkhr
Sizes:	6pt, 8pt, 10pt, 12pt, 16pt, 20 pt, 28 pt, 48pt, 54 pt, and 69pt.

Barcode formats: UPCA, UPCE, EAN 8, EAN 13, EAN 128, Code 39, Code 128, Code 2 of 5 Interleaved.

Items:

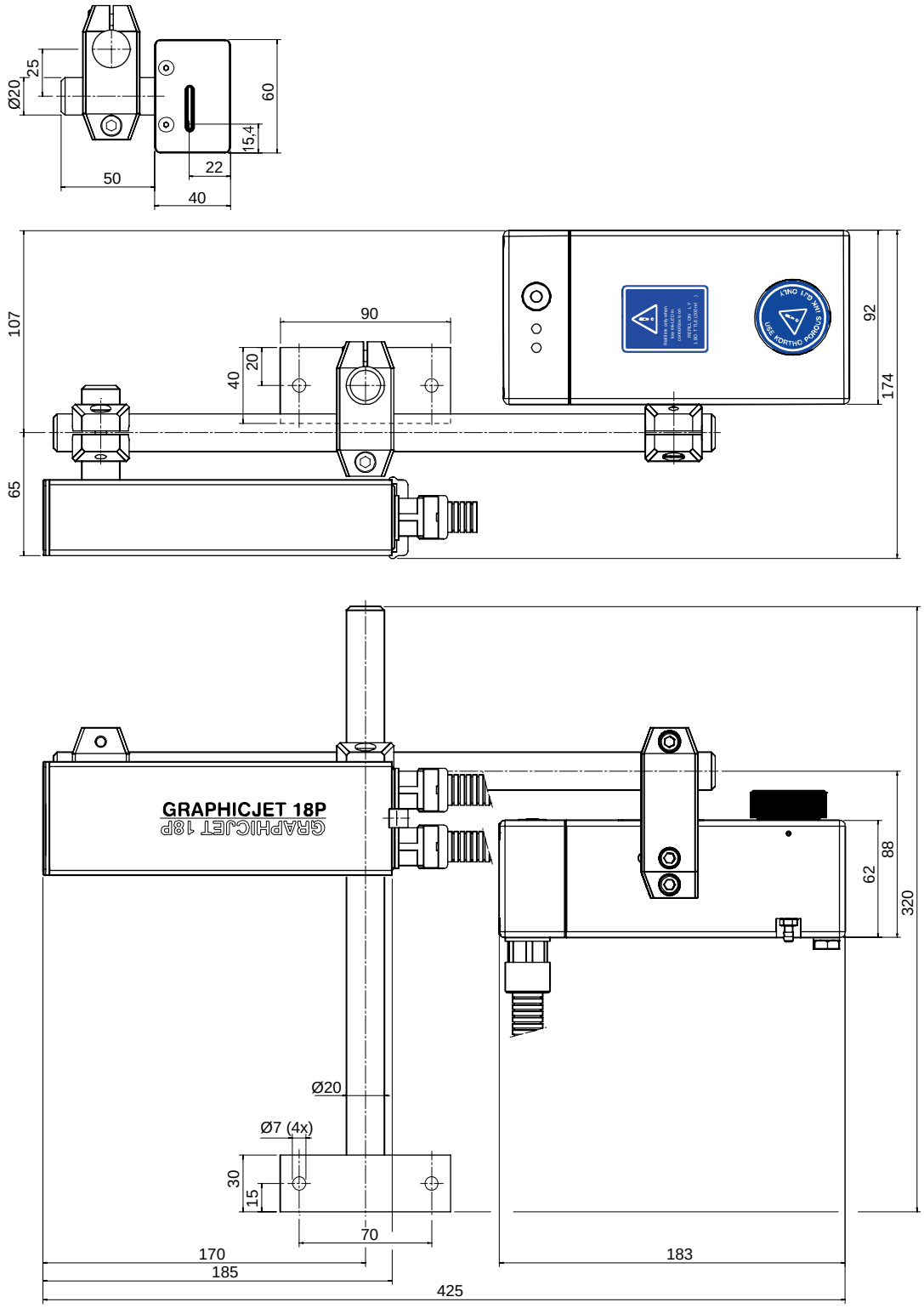
Graphic:	In bmp format (black/white) and at most 10 per image.
Dynamic:	Number, date, time and shiftcode.
Operator input:	Text, number, date.

Image download: From remote control unit to the infrared communication port of the control box. With RAC and a cable between RS232-port interface and the serial port of the control box.

Storage capacity: The remote control can store up to 100 images with a total size of 128 kB. The control box memory size for storing images is 512 kB.

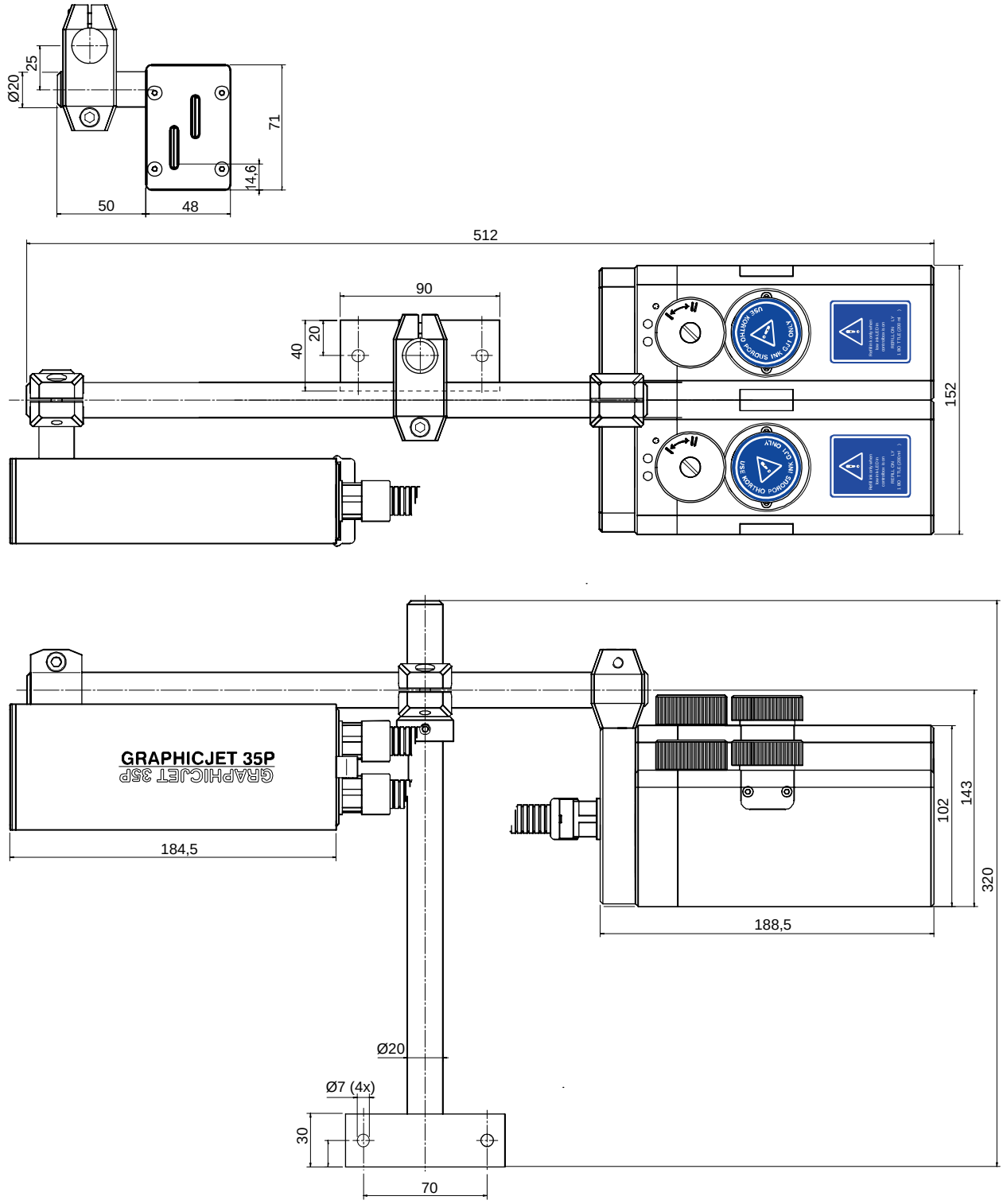
Appendix B Dimensions

Coding Unit [18P, 18PT]



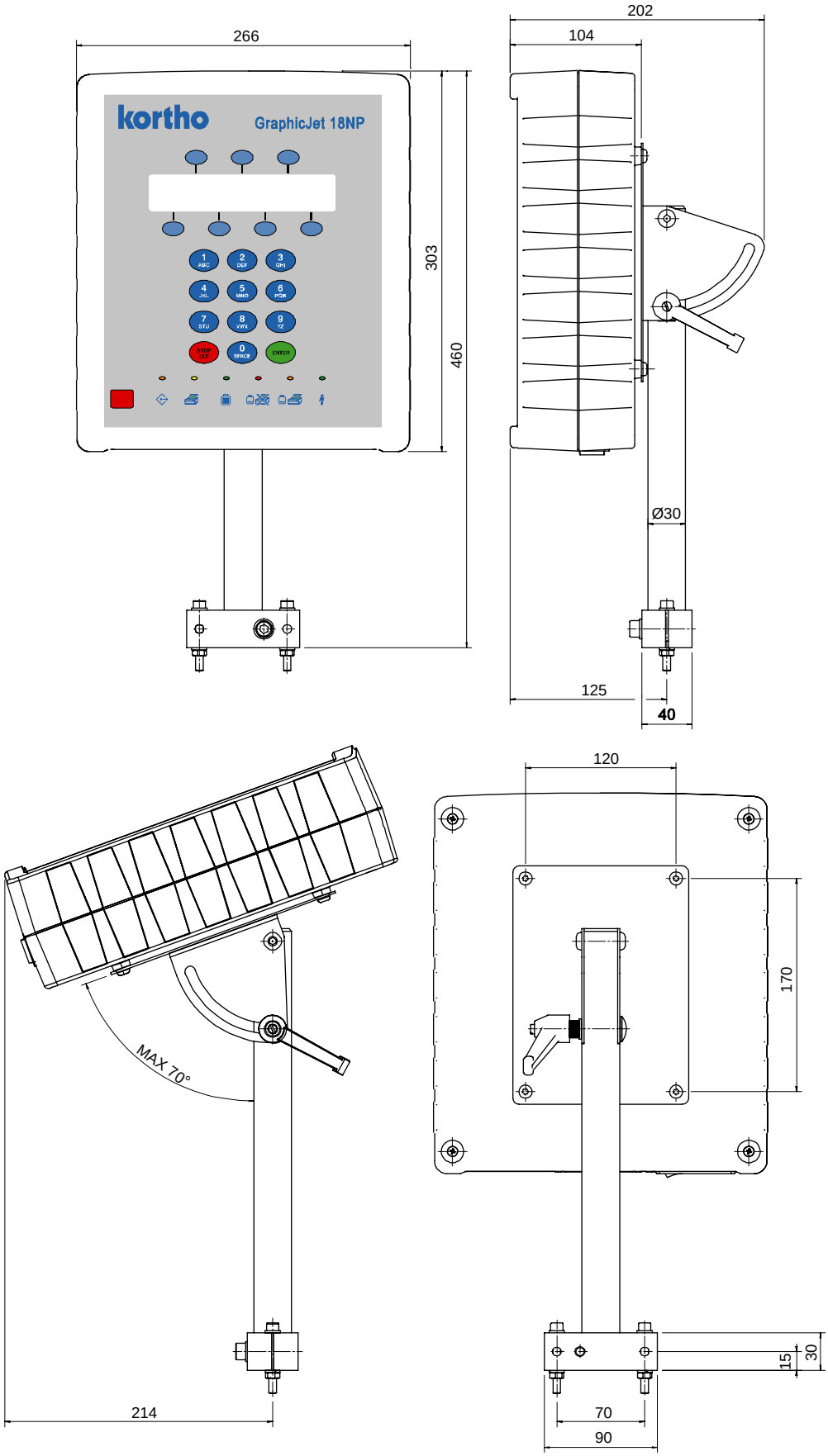
Dimensions are metric [mm]

Coding Unit [35P]



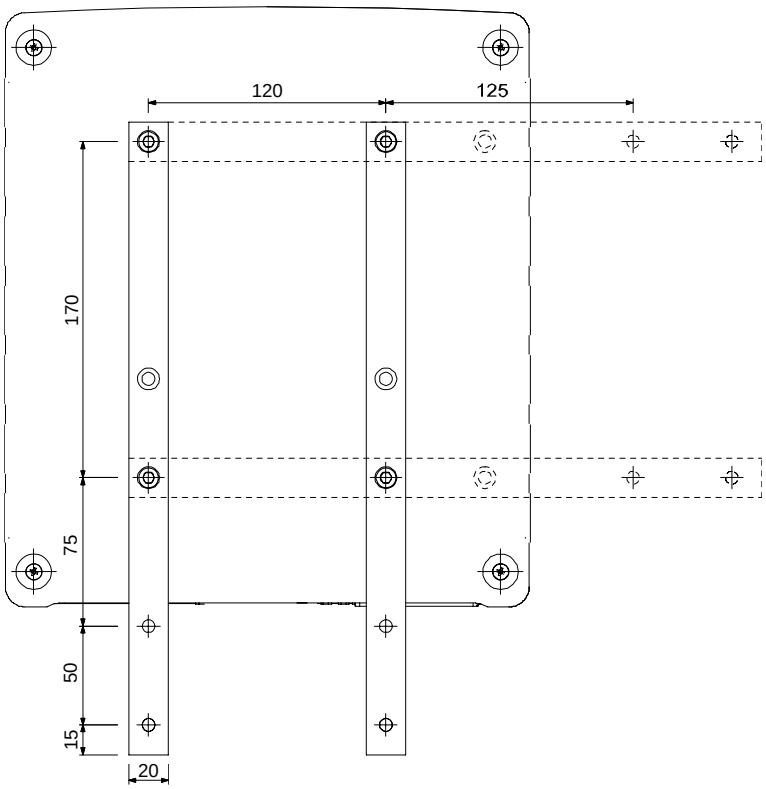
Dimensions are metric [mm]

Control Box
Adjustable support



Dimensions are metric [mm]

Fixed support



Dimensions are metric [mm]

Appendix C Part lists & illustrations

Coding Unit [18P]

Coding unit [18P], drawing A

814138 CODING UNIT 18P

Drawing A

Line	Part no.	Description	Qty
1	B	Refer to drawing B	1
2	317504	BASE SUPPORT	1
3	317517	BRACKET SHAFT	1
4	319139	SHAFT 18P	1
5	813187	CROSSING CLAMP D=20	2
6	814179	INKSYSTEM 18P	1

Not shown in drawing A & B

Line	Part no.	Description	Qty
1	813021	POWER & DATA CABLE KGJ	1
2	813648	SET MOUNT.PARTS CTRL BOX KGJ	1
3			
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Drawing B

Line	Part no.	Description	Qty
1	150007	STICKER DIM:44X25MM	1
2	151699	CYL.HEAD SCREW MBZ M4X12 ST.ST.	2
3	151731	COUNTERSUNK SCREW MBZ M4X16 ST.ST	2
4	154149	COUNTER SUNK SCREW MBZ M5X16 ST.ST	2
5	155199	HEXAGONAL BOLT M8 ST.ST.	2
6	156937	SOCKET HEAD SCREW M3X12 ST.ST.	2
7	157512	WASHER D=5,3 ST.ST.	1
8	157834	SOCKET HEAD SCREW M3X8 ST.ST.	2
9	160802	FILTER 14 MICRON	2
10	160844	M. AIRTUBE 4X2,5 BLACK	2
11	160898	COUPLING NUT PG11, BLACK	2
12	161165	HOSE SOCKET, BUS, FILTER	2
13	162018	SOCKET HEAD SCREW MBZ M3X10 ST.ST.	1
14	162327	CYL.HEAD SCREW MBZ M2,5X6 ST.ST.	0,5
15	162677	COMPR.SPRING, LO=11,5; DM=6,3; D=0,63	1
16	162689	BALL SCREW M8 ST.ST.	1
17	162721	SCREW M3X8 MBZ ST.ST.	2
18	164048	HOSE SOCKET, SCREW BUS, FILTER	4
19	317895	PLATE 35P	2
20	317949	STRIP SCREW 35P	1
21	317981	BUSH PH 35P	2
22	317994	PRESURE PIN 35P	1
23	318007	STRIP CLAMP PH 35P	4
24	320052	SEALING PH-FRONTPLATE 18P	1
25	320065	SEALING HOUSE-FRONTPLATE 18P	1
26	320078	FRONTPLATE 18P	1
27	320081	COUPLING UNIT HOLDER 18P	1
28	320094	MOUNTINGPLATE 18P	1
29	320107	CLAMPINGSTRIP 18P	1
30	810864	PRINTHEAD KGJ	1
31	811589	PRINTER INTERFACE PCB KGJ	1
32	814195	HOUSING PRINTHEAD 18P	1
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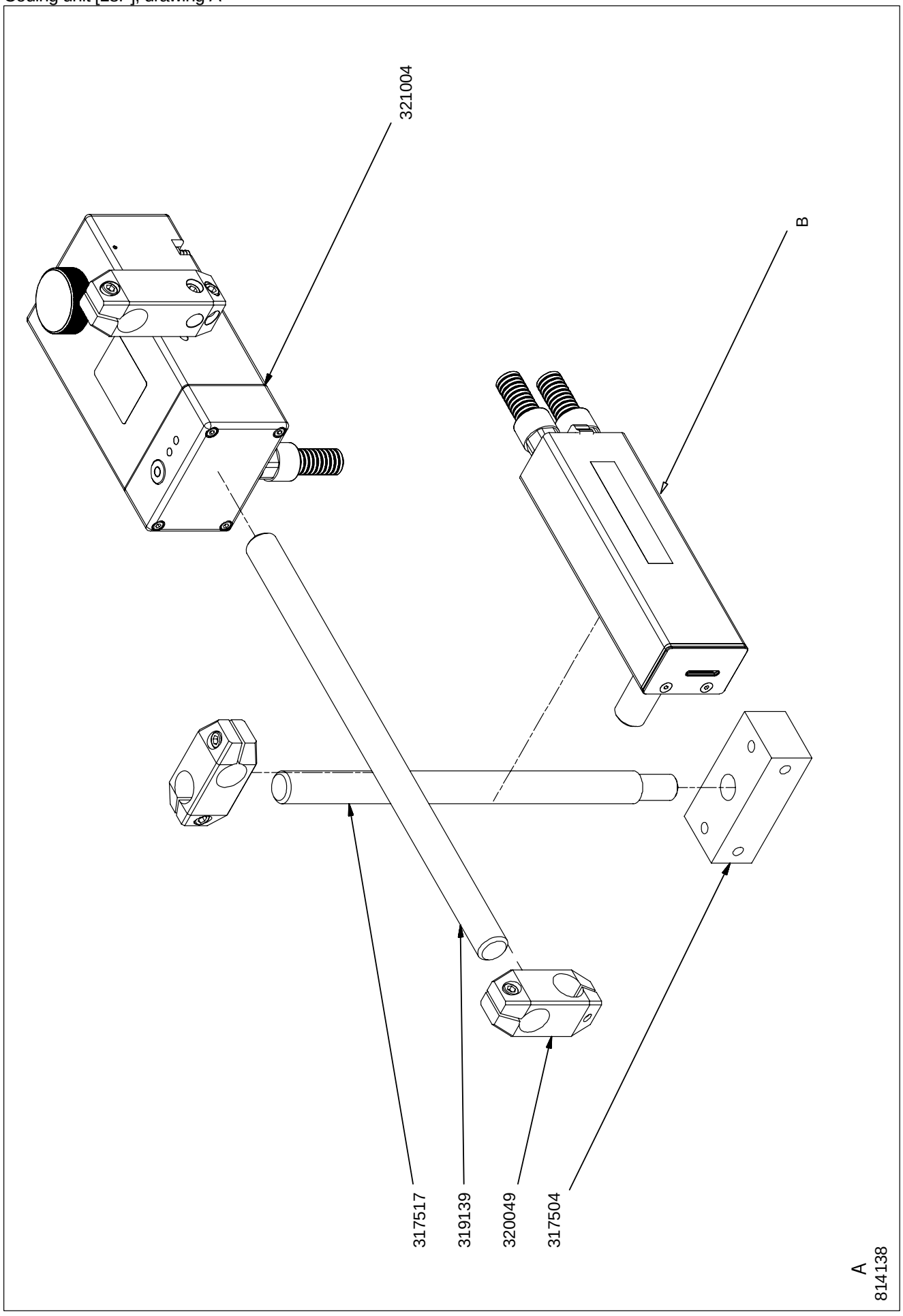
Coding unit [18P], drawing A



Coding unit [18P], drawing B

814138 CODING UNIT 18P

Drawing A

Line	Part no.	Description	Qty
1	B	Refer to drawing B	1
2	317504	BASE SUPPORT	1
3	317517	BRACKET SHAFT	1
4	319139	SHAFT 18P	1
5	813187	CROSSING CLAMP D=20	2
6	814179	INKSYSTEM 18P	1

Not shown in drawing A & B

Line	Part no.	Description	Qty
1	813021	POWER & DATA CABLE KGJ	1
2	813648	SET MOUNT.PARTS CTRL BOX KGJ	1
3			
4			
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Drawing B

Line	Part no.	Description	Qty
1	150007	STICKER DIM:44X25MM	1
2	151699	CYL.HEAD SCREW MBZ M4X12 ST.ST.	2
3	151731	COUNTERSUNK SCREW MBZ M4X16 ST.ST	2
4	154149	COUNTER SUNK SCREW MBZ M5X16 ST.ST	2
5	155199	HEXAGONAL BOLT M8 ST.ST.	2
6	156937	SOCKET HEAD SCREW M3X12 ST.ST.	2
7	157512	WASHER D=5,3 ST.ST.	1
8	157834	SOCKET HEAD SCREW M3X8 ST.ST.	2
9	160802	FILTER 14 MICRON	2
10	160844	M. AIRTUBE 4X2,5 BLACK	2
11	160898	COUPLING NUT PG11, BLACK	2
12	161165	HOSE SOCKET, BUS, FILTER	2
13	162018	SOCKET HEAD SCREW MBZ M3X10 ST.ST.	1
14	162327	CYL.HEAD SCREW MBZ M2,5X6 ST.ST.	0,5
15	162677	COMPR.SPRING, LO=11,5; DM=6,3; D=0,63	1
16	162689	BALL SCREW M8 ST.ST.	1
17	162721	SCREW M3X8 MBZ ST.ST.	2
18	164048	HOSE SOCKET, SCREW BUS, FILTER	4
19	317895	PLATE 35P	2
20	317949	STRIP SCREW 35P	1
21	317981	BUSH PH 35P	2
22	317994	PRESURE PIN 35P	1
23	318007	STRIP CLAMP PH 35P	4
24	320052	SEALING PH-FRONTPLATE 18P	1
25	320065	SEALING HOUSE-FRONTPLATE 18P	1
26	320078	FRONTPLATE 18P	1
27	320081	COUPLING UNIT HOLDER 18P	1
28	320094	MOUNTINGPLATE 18P	1
29	320107	CLAMPINGSTRIP 18P	1
30	810864	PRINTHEAD KGJ	1
31	811589	PRINTER INTERFACE PCB KGJ	1
32	814195	HOUSING PRINTHEAD 18P	1
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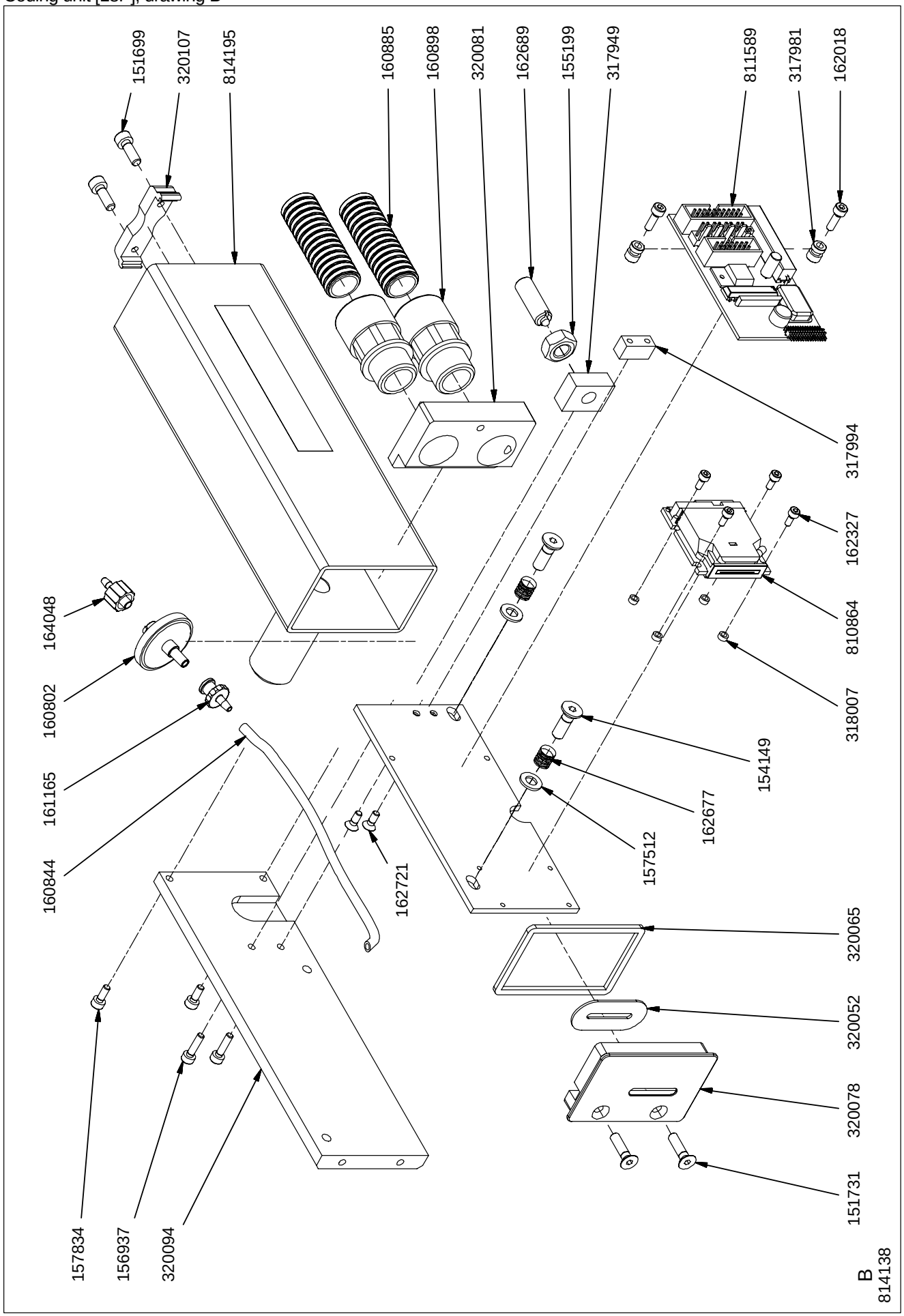
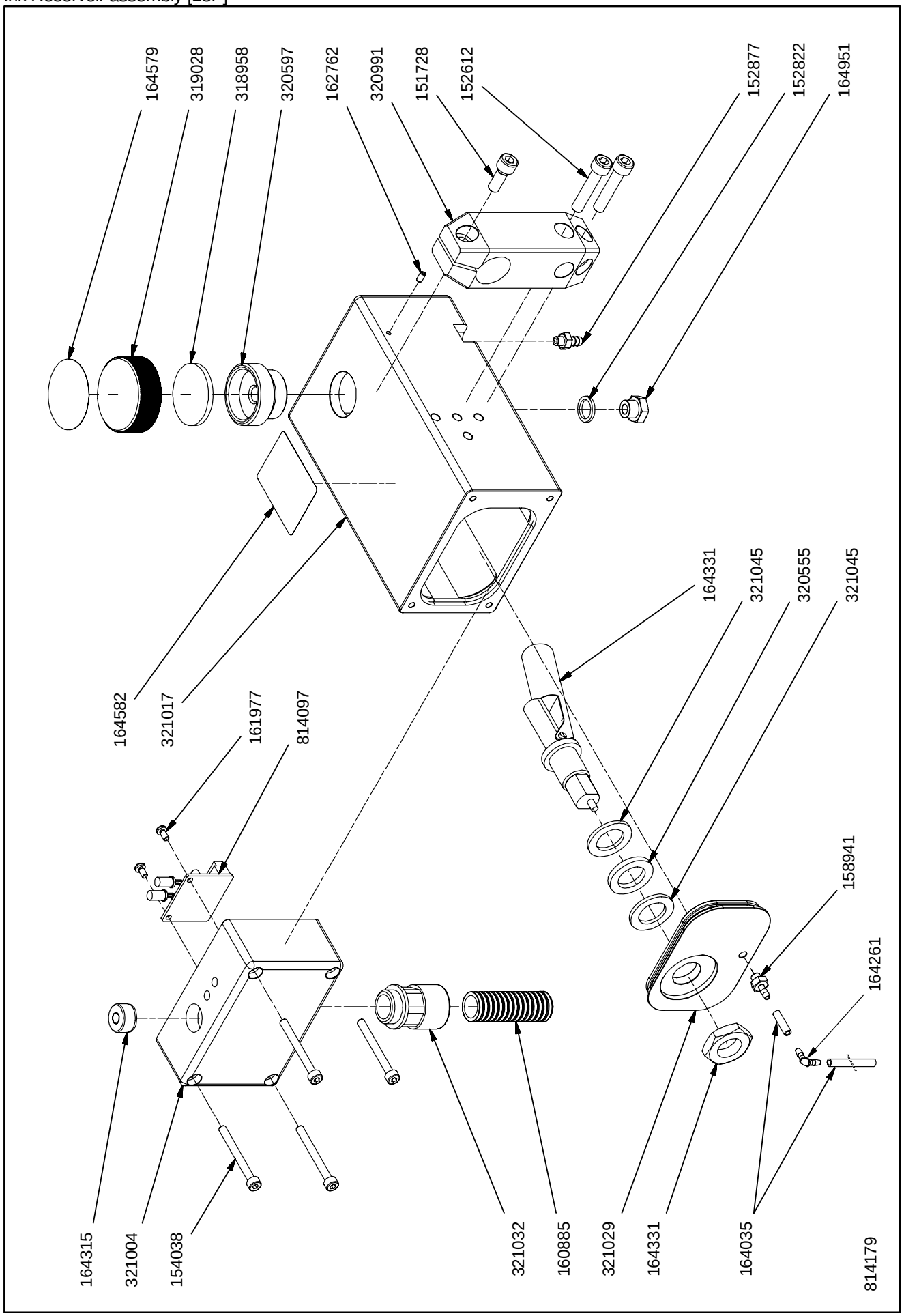
Coding unit [18P], drawing B



Ink Reservoir assembly [18P]

814179		INK RESERVOIR ASSEMBLY 18P	
Line	Part no.	description	Qty
1	151728	SOCKET HEAD SCREW M6X16	1
2	152612	CYL.HEAD SCREW MBZ M6X30 ST.ST.	2
3	152822	GASKETRING 1/8 INCH	1
4	152877	HOSE NIPPLE M5X4MM	1
5	154038	SOCKET HEAD SCREW MBZ M4X40 ST.ST.	4
6	158941	HOSE NIPPLE M5X3 MM	1
7	160885	M. PROTECTION HOSE D=16	1
8	161137	CONNECTOR HOUSE 24-22 AWG	2
9	161149	PIN CONNECTOR 24-22 AWG	3
10	161178	M.MOUTING CABLE 0,2 MM2 BLACK	1
11	161808	M.CABLE 24 AWG RED	1
12	161811	M.CABLE 24 AWG BLUE	1
13	161922	CONDUCTOR 0,5 MM2 ISOLATED	5
14	161977	CONVEX CIL HEADSCREW M3X6 ST.ST.	2
15	162762	HEX.SOCK.SET SCREW M3X6 ST.ST.	1
16	164035	MTR. AIR TUBE 5/3-BLACK	1
17	164261	HOSE SOCKET 4/2,5	1
18	164315	LIBEL LEVEL 18NP	1
19	164331	LEVEL SWITCH 18NP	1
20	164579	STICKER FILLING BUSH 18P	1
21	164582	STICKER INKSYSTEM 18P	1
22	164748	O-RING 60,05,0X1,78 NBR	1
23	164751	PLUG 18P	1
24	318958	SILICONE RUBBER DISC INKSYSTEM KGJ	1
25	319028	COVER FILLING SYSTEM KGJ	1
26	320555	DISTANCE WASHER 18NP	1
27	320597	FILLINGBUSH INKSYSTEM 18NP	1
28	320991	CLAMP BLOCK INKSYSTEM 18P	1
29	321004	COVER INKSYSTEM 18P	1
30	321017	INKRESERVOIR INKSYSTEM 18P	1
31	321029	COVERDISC INKSYSTEM 18P	1
32	321032	COUPLING NUT PG11	1
33	321045	SEALING LEVEL SWITCH 18P	2
34	814097	POWER PCB LOW-INK 18P/18PT	1

Ink Reservoir assembly [18P]



Coding Unit [35P]

Coding Unit [35P], drawing A

813091 CODING UNIT 35P

Drawing A

Line	Part no.	Description	Qty
1	B	Refer to drawing B	1
2	317504	BASE SUPPORT	1
3	317517	BRACKET SHAFT	1
4	319139	SHAFT 18P	1
5	813187	CROSSING CLAMP D=20	2
6	812499	INKSYSTEM 35P	1

Not shown in drawing A & B

Line	Part no.	Description	Qty
1	813021	POWER & DATA CABLE KGJ	1
2	813648	SET MOUNT.PARTS CTRL BOX KGJ	1
3			
4			
5			
6			

Drawing B

Line	Part no.	Description	Qty
1	150007	STICKER DIM:44X25MM	2
2	151687	CYL.HEAD SCREW MBZ M3X16 ST.ST.	2
3	151702	SOCKET HEAD SCREW M4X16 ST.ST.	2
4	151731	COUNTERSUNK SCREW MBZ M4X16 ST.ST.	4
5	154149	COUNTER SUNK SCREW MBZ M5X16 ST.ST	2
6	154782	SOCKET HEAD SCREW MBZ M8X35 ST.ST.	1
7	155199	HEXAGONAL BOLT M8 STAINL.ST.	2
8	156937	SOCKET HEAD SCREW M3X12 ST.ST.	8
9	157512	WASHER D=5,3 STAINL.ST.	4
10	157805	COUNTER SUNK SCREW MBZ M5X20 ST.ST	2
11	157834	SOCKET HEAD SCREW M3X8 ST.ST.	4
12	160802	FILTER 14 MICRON	2
13	160844	M. AIRTUBE 4X2,5 BLACK	0,31
14	160898	COUPLING NUT PG11, BLACK	1
15	161165	HOSE SOCKET, BUS, FILTER	2
16	162018	SOCKET HEAD SCREW MBZ M3X10 ST.ST.	6
17	162327	CYL.HEAD SCREW MBZ M2,5X6 ST.ST.	4
18	162622	CONVEX CIL HEADSCREW M2,5X4 ST.ST.	4
19	162664	COMPR.SPRING, LO=7,0; DM=4,0; D=0,5	2
20	162677	COMPR.SPRING, LO=11,5; DM=6,3; D=0,63	4
21	162689	BALL SCREW M8 ST.ST.	2
22	162718	SOCKET HEAD SCREW M3X6 ST.ST.	8
23	162721	SCREW M3X8 MBZ STAINL.ST.	2
24	164048	HOSE SOCKET, SCREW BUS, FILTER	2
25	164369	HEX.SOCK.SET SCREW M3X10 ST.ST.	1
26	317895	PLATE 35P	1
27	317908	MOUNTINGPLATE 35P	1
28	317911	FRONTPLATE 35P	1
29	317924	MOUNTING PLATE PH 35P	1
30	317937	COUPLING UNIT HOLDER 35P	1
31	317949	STRIP SCREW 35P	2
32	317952	DISTANCE BUSH 35P	4
33	317965	PLATE ADJUST. 35P	1
34	317978	MOUNTINGPLATE ADJUST. 35P	1
35	317981	BUSH PH 35P	2
36	317994	PRESURE PIN 35P	2
37	318007	STRIP CLAMP PH 35P	4
38	318019	DISTANCE SHAFT PH 35P	4
39	318022	ADJUSTING STRIP PH 35P	1
40	318035	SEALING PH-FRONTPLATE 35P	1
41	318051	SEALING HOUSE-FRONTPLATE 35P	1
42	320444	CLAMPINGSTRIP 35P	1
43	810864	PRINTHEAD KGJ	2
44	811564	PRINTER INTERFACE PCB 35P	1
45	811589	PRINTER INTERFACE PCB KGJ	1
46	812569	FLATCABLE PH-35P	1
47	813549	HOUSING PRINTHEAD 35P	1
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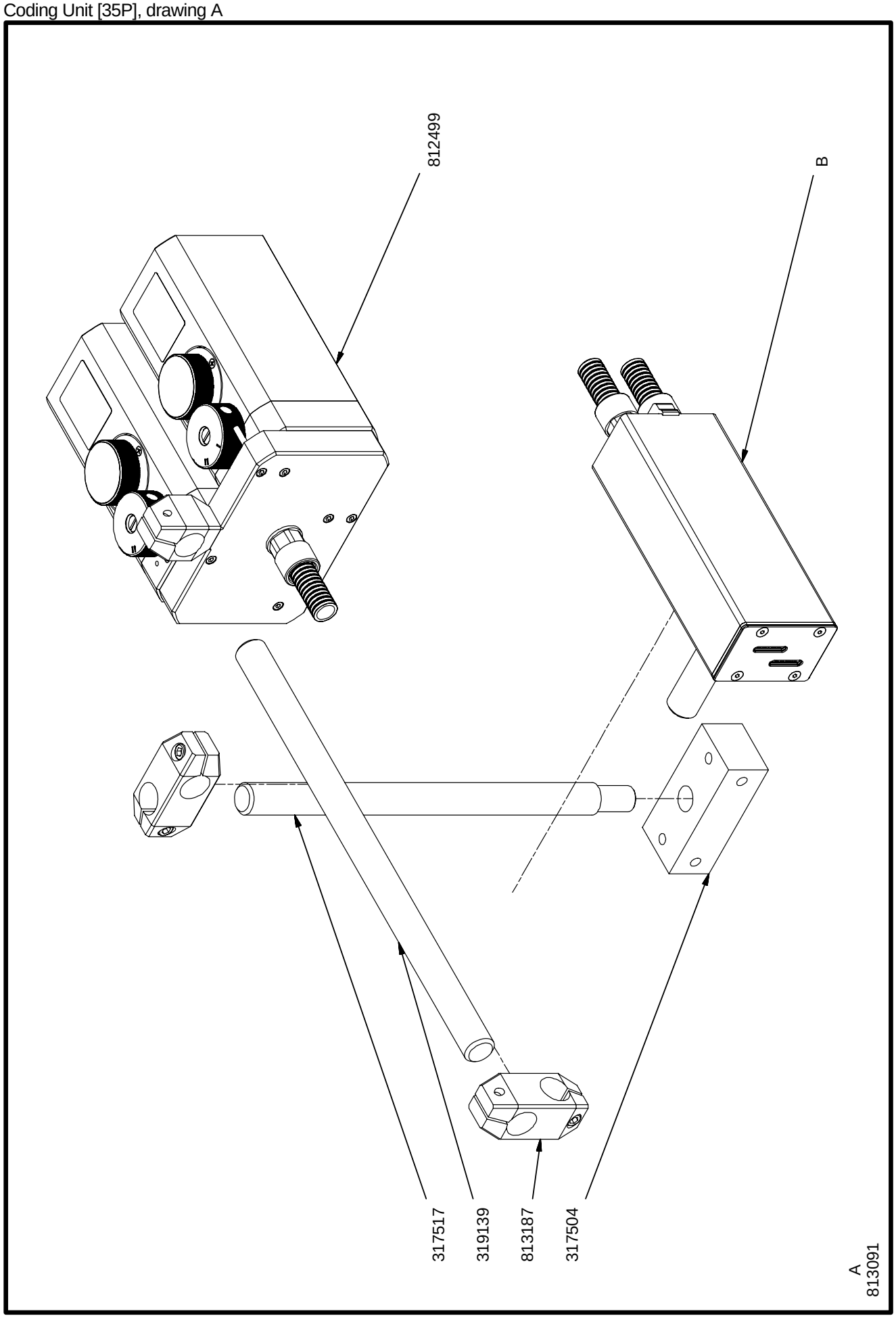
Coding Unit [35P], drawing A



Coding Unit [35P], drawing B

813091 CODING UNIT 35P

Drawing A

Line	Part no.	Description	Qty
1	B	Refer to drawing B	1
2	317504	BASE SUPPORT	1
3	317517	BRACKET SHAFT	1
4	319139	SHAFT 18P	1
5	813187	CROSSING CLAMP D=20	2
6	812499	INKSYSTEM 35P	1

Not shown in drawing A & B

Line	Part no.	Description	Qty
1	813021	POWER & DATA CABLE KGJ	1
2	813648	SET MOUNT.PARTS CTRL BOX KGJ	1
3			
4			
5			
6			

Drawing B

Line	Part no.	Description	Qty
1	150007	STICKER DIM:44X25MM	2
2	151687	CYL.HEAD SCREW MBZ M3X16 ST.ST.	2
3	151702	SOCKET HEAD SCREW M4X16 ST.ST.	2
4	151731	COUNTERSUNK SCREW MBZ M4X16 ST.ST.	4
5	154149	COUNTER SUNK SCREW MBZ M5X16 ST.ST	2
6	154782	SOCKET HEAD SCREW MBZ M8X35 ST.ST.	1
7	155199	HEXAGONAL BOLT M8 STAINL.ST.	2
8	156937	SOCKET HEAD SCREW M3X12 ST.ST.	8
9	157512	WASHER D=5,3 STAINL.ST.	4
10	157805	COUNTER SUNK SCREW MBZ M5X20 ST.ST	2
11	157834	SOCKET HEAD SCREW M3X8 ST.ST.	4
12	160802	FILTER 14 MICRON	2
13	160844	M. AIRTUBE 4X2,5 BLACK	0,31
14	160898	COUPLING NUT PG11, BLACK	1
15	161165	HOSE SOCKET, BUS, FILTER	2
16	162018	SOCKET HEAD SCREW MBZ M3X10 ST.ST.	6
17	162327	CYL.HEAD SCREW MBZ M2,5X6 ST.ST.	4
18	162622	CONVEX CIL HEADSCREW M2,5X4 ST.ST.	4
19	162664	COMPR.SPRING, LO=7,0; DM=4,0; D=0,5	2
20	162677	COMPR.SPRING, LO=11,5; DM=6,3; D=0,63	4
21	162689	BALL SCREW M8 ST.ST.	2
22	162718	SOCKET HEAD SCREW M3X6 ST.ST.	8
23	162721	SCREW M3X8 MBZ STAINL.ST.	2
24	164048	HOSE SOCKET, SCREW BUS, FILTER	2
25	164369	HEX.SOCK.SET SCREW M3X10 ST.ST.	1
26	317895	PLATE 35P	1
27	317908	MOUNTINGPLATE 35P	1
28	317911	FRONTPLATE 35P	1
29	317924	MOUNTING PLATE PH 35P	1
30	317937	COUPLING UNIT HOLDER 35P	1
31	317949	STRIP SCREW 35P	2
32	317952	DISTANCE BUSH 35P	4
33	317965	PLATE ADJUST. 35P	1
34	317978	MOUNTINGPLATE ADJUST. 35P	1
35	317981	BUSH PH 35P	2
36	317994	PRESURE PIN 35P	2
37	318007	STRIP CLAMP PH 35P	4
38	318019	DISTANCE SHAFT PH 35P	4
39	318022	ADJUSTING STRIP PH 35P	1
40	318035	SEALING PH-FRONTPLATE 35P	1
41	318051	SEALING HOUSE-FRONTPLATE 35P	1
42	320444	CLAMPINGSTRIP 35P	1
43	810864	PRINTHEAD KGJ	2
44	811564	PRINTER INTERFACE PCB 35P	1
45	811589	PRINTER INTERFACE PCB KGJ	1
46	812569	FLATCABLE PH-35P	1
47	813549	HOUSING PRINTHEAD 35P	1
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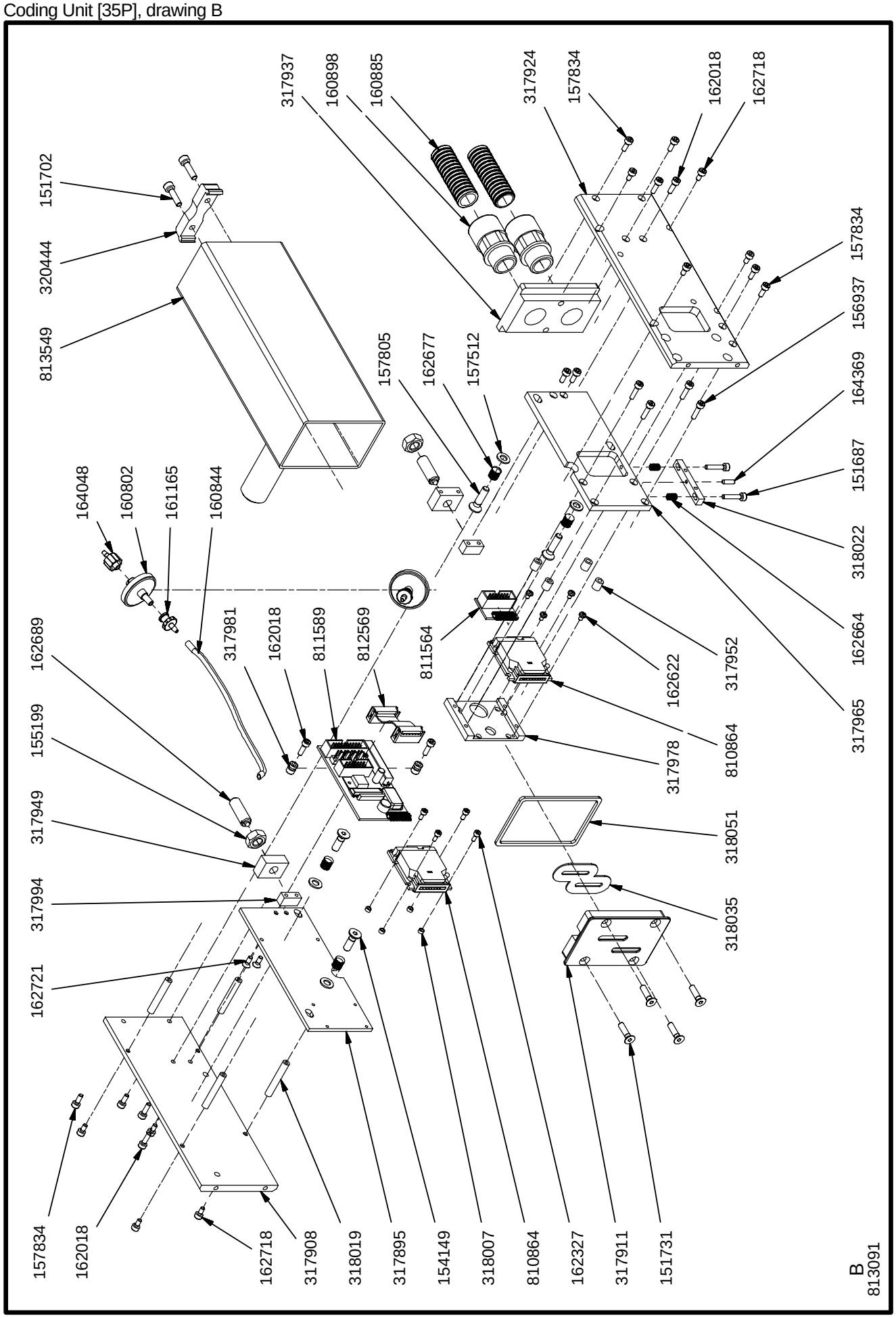
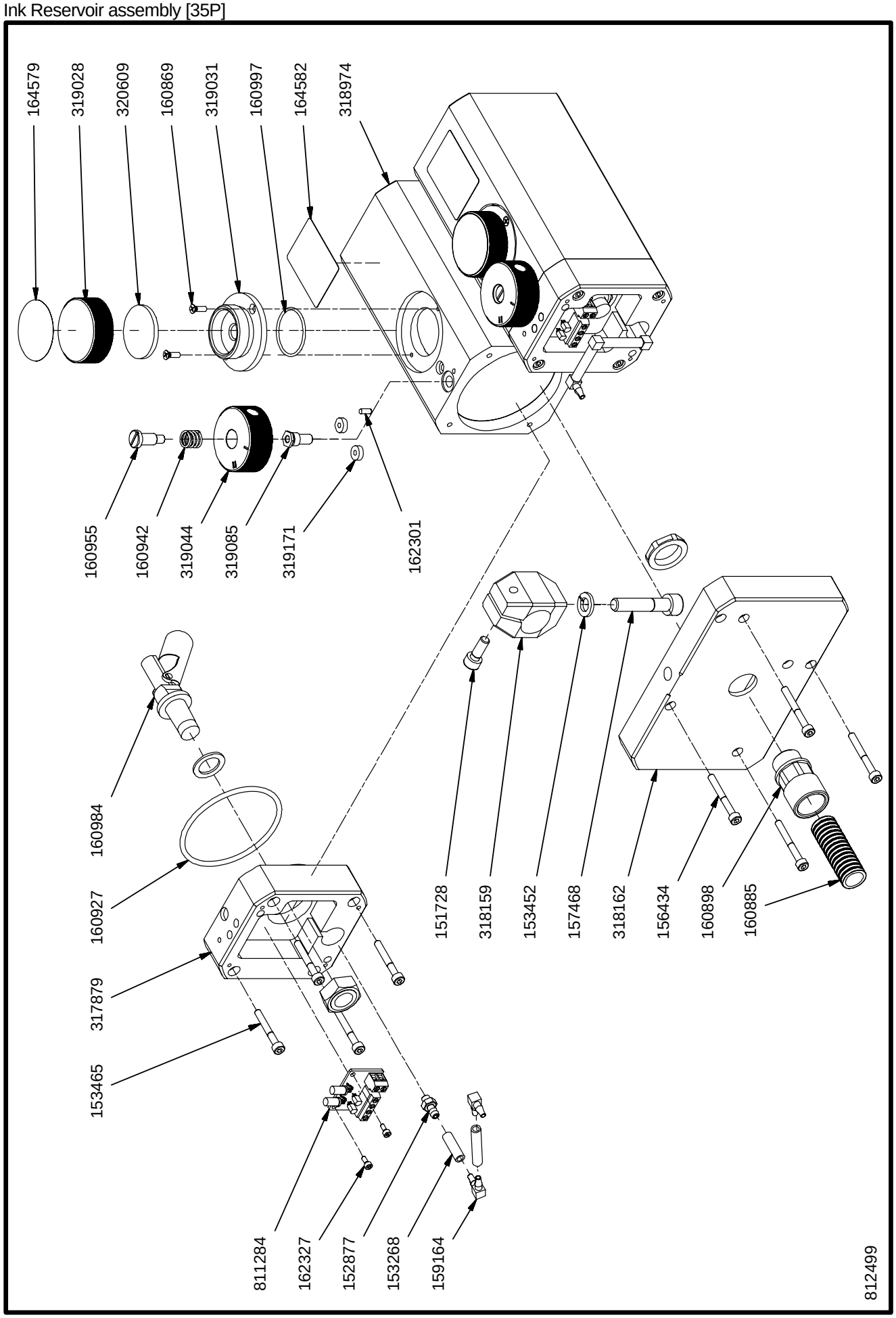
Coding Unit [35P], drawing B



Ink Reservoir assembly [35P]

812499		INK RESERVOIR ASSEMBLY 35P	
Line	Part no.	description	Qty
1	151728	SOCKET HEAD SCREW M6X16	1
2	152877	HOSE NIPPLE M5X4MM	2
3	153268	MTR. AIR TUBE 6/4-BLACK	0,13
4	153452	SPRING RING STAINL.ST. D=8,1	1
5	153465	SOCKET HEAD SCREW M4X30 ST.ST.	8
6	156434	SOCKET HEAD SCREW M4X35 ST.ST.	4
7	157468	SOCKET HEAD SCREW M8X40 ST.ST.	1
8	159164	PLASTIC SQUARED HOSE SOCKET	5
9	160169	COUPLING NUT PG11 BLACK	1
10	160309	CORD BUSH 1,0 MM2, RED	4
11	160869	ROUNDHEAD COUNTERSUNK SCREW 3X10 ST.ST.	4
12	160885	M. PROTECTION HOSE D=16	0,6
13	160898	COUPLING NUT PG11, BLACK	1
14	160927	O-RING 62,00 X 3,00	2
15	160942	COMPR.SPRING, LO=20,0; DM=10,0; D=1,25	2
16	160955	SHOULDER BOLT M5X12	2
17	160984	LEVEL SWITCH KGJ	2
18	160997	O-RING 27,1X1,6 NBR	2
19	161137	CONNECTOR HOUSE 24-22 AWG	2
20	161149	PIN CONNECTOR 24-22 AWG	3
21	161178	M.MOUTING CABLE 0,2 MM2 BLACK	0,9
22	161808	M.CABLE 24 AWG RED	1,03
23	161811	M.CABLE 24 AWG BLUE	1,03
24	161922	CONDUCTOR 0,5 MM2 ISOLATED	7
25	162301	CYLINDRICAL PIN 3M6X6 STAINLST.	4
26	162327	CYL.HEAD SCREW MBZ M2,5X6 ST.ST.	4
27	162998	M. MOUNTING CABLE 24 AWG YELLOW	0,13
28	164035	MTR. AIR TUBE 5/3-BLACK	1,42
29	164579	STICKER FILLING BUSH 18P	2
30	164582	STICKER INKSYSTEM 18P	1
31	317879	COVER INKRESERVOIR INKSYSTEM 18PT/35P	2
32	318159	COUPLING 35P	1
33	318162	COVER INKSYSTEM 35P	1
34	318958	SILICONE RUBBER DISC INKSYSTEM KGJ	2
35	318974	INKRESERVOIR INKSYSTEM 18P	2
36	319028	COVER FILLING SYSTEM KGJ	2
37	319031	HOLDER FILLING SYSTEM 18P	2
38	319044	CLOSING CAP INKSYSTEM 18P	2
39	319085	INSERT INKSYSTEM 18P	2
40	319171	SILICONE RUBBER DISC 9X3X3, KGJ	4
41	319489	STRIP 18P	4
42	811284	POWER PCB LOW-INK 18PT/35P	2

Ink Reservoir assembly [35P]



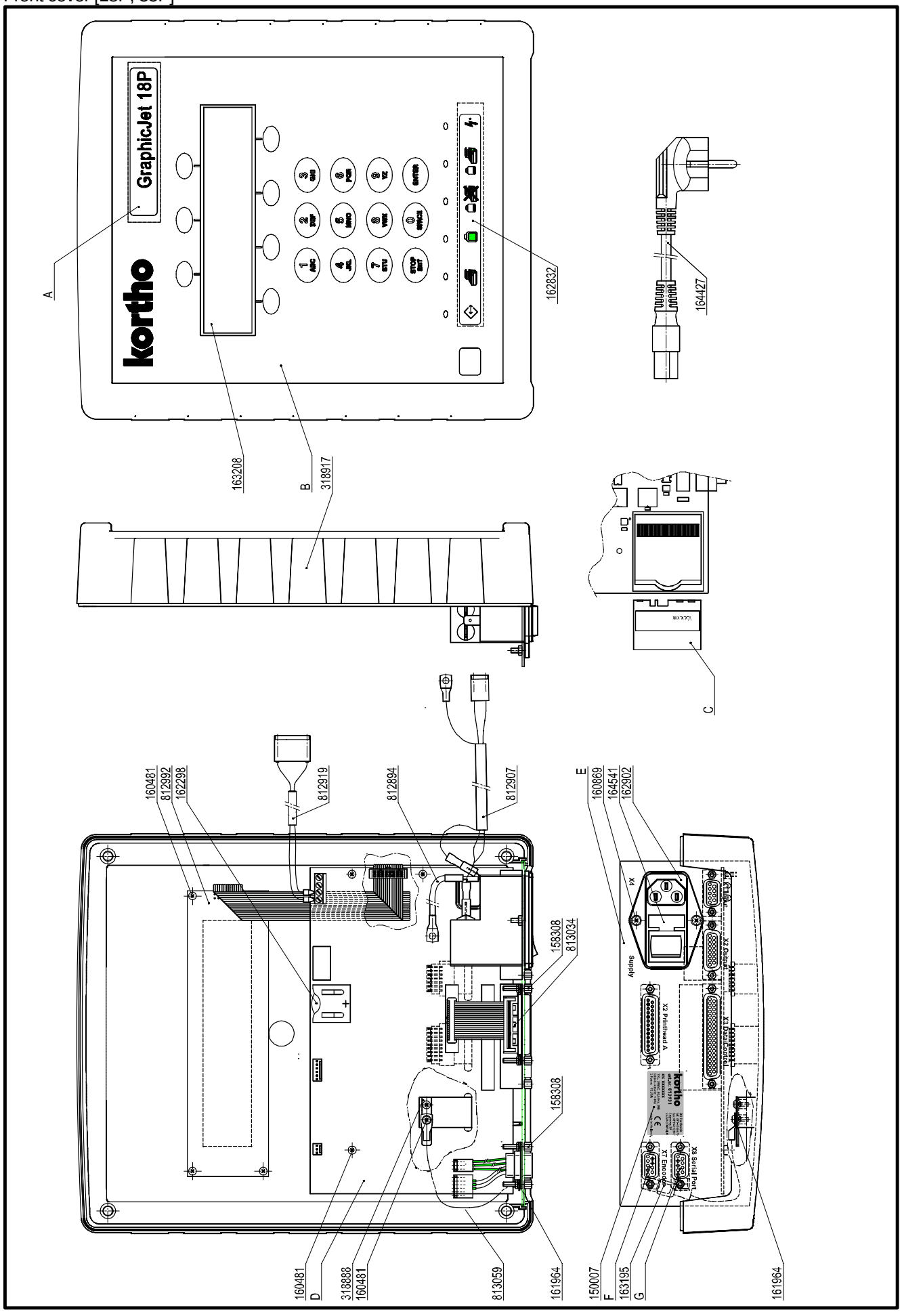
Control Box [18P, 35P]

Front cover [18P, 35P]

CONTROL BOX, model independent parts			
Models:	18P, 35P, 18PB, 35PB		
Part no.:	812948, 812964, 814237, 814252		
Line	Part no.	description	Qty
1	150007	STICKER DIM:44X25MM	1
2	158308	FEMALE SCREWLOCKS HD20, L=13	6
3	160481	ROUND HEAD COUNTERSUNK SCREW 3X8 ST.	18
4	160869	ROUNDHEAD COUNTERSUNK SCREW 3X10 ST.ST.	2
5	161964	LOCKWASHER DIA 3,2 ST.	7
6	162298	BATTERY X100-D2	1
7	162734	POWER SUPPLY, CONTROLBOX KGJ	1
8	162832	NAME PLATE CONTROLBOX GRAPHIC	1
9	162874	BOX POWER SUPPLY, CONTROLBOX 18P	1
10	162902	FILTER CONTROLBOX KGJ	1
11	163042	STICKER DANGER CONTROLBOX	1
12	163167	CONVEX CIL HEADSCREW M4X25 ST.ST.	4
13	163195	FASTON 45GR., 6,3X0,8	1
14	163208	PLASTIC PLATE CONTROL BOX 18P/48I	1
15	163392	CONVEX CIL HEADSCREW M3X5 ST.ST.	4
16	164427	POWER CORD EURO-CONNECTOR	1
17	164541	FUSE 2A, 5X20 (F)	2
18	318121	MOUNTINGPLATE CONTROLBOX	1
19	318888	EARTHING STRIP CONTROLBOX	2
20	318917	TOP CONTROLBOX 18P/48I	1
21	318929	BOTTOM CONTROLBOX 18P/48I	1
22	812894	EARTH CABLE 18P CONTROLBOX	1
23	812907	INT. POWERCABLE 220/110V, 18P	1
24	812919	INT. POWERCABLE 35V, 18P	1
25	812992	LCD SCREEN, CONTROLBOX	1
26	813034	INT. POWER- SIGNALCABLE, 18P	1
27	813059	EARTH WIRE CONTROLBOX	1

CONTROL BOX, model dependent parts				18P	35P	18PB	35PB
				Model, part no.			
Pos.	Part no.	description	Qty	812948	812964	814237	814252
A	162817	NAME PLATE CONTROLBOX 18P	1	X		X	
A	162887	NAME PLATE CONTROLBOX 35P	1		X		X
B	162804	PANEL CONTROL BOX 18P/48I	1	X	X		
B	164792	PANEL CONTROL BOX 18P/48I BASIC	1			X	X
C	812012	FLASH MEMORY 2MB 18P	1	X			
C	814281	FLASH MEMORY 2MB 18P BASIC	1			X	
C	811242	FLASH MEMORY 4MB 35P	1		X		
C	814307	FLASH MEMORY 4MB 35P BASIC	1				X
D	813371	CONTROL BOARD PCB X100-2 KGJ, 18P/35P	1	X	X		
D	814335	CONTROL BOARD PCB X100-2 KGJ, 18P/35P BASIC	1			X	X
E	813467	CONNECTIONPLATE CONTROLBOX 18P/35P	1	X	X		
E	814351	CONNECTIONPLATE CONTROLBOX 18P/35P BASIC	1			X	X
F	812922	INT. ENCODER CABLE 18P	1	X	X		
G	813829	COMM.CABLE CONTROLBOX	1	X	X		

Front cover [18P, 35P]

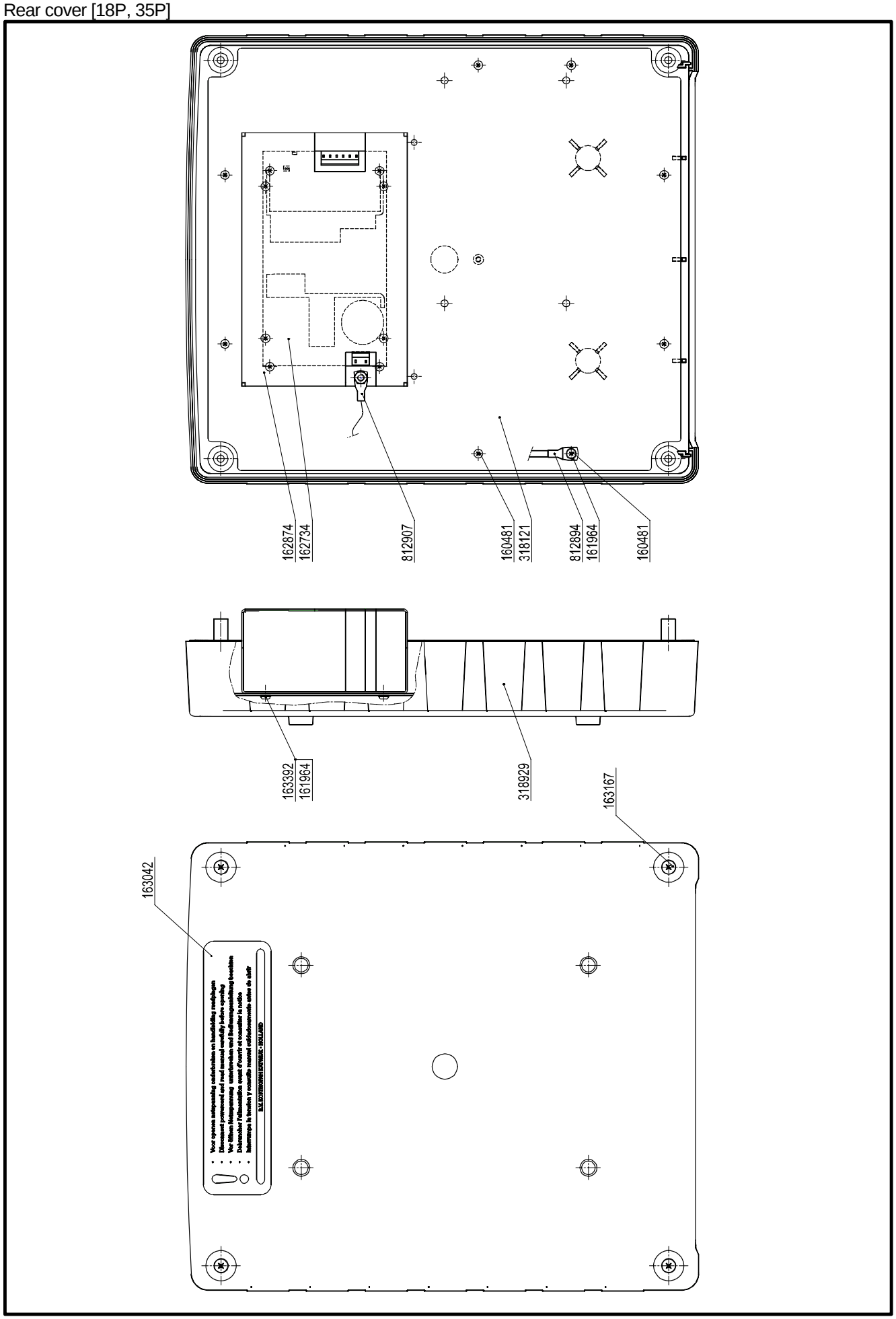


Rear cover [18P, 35P]

CONTROL BOX, model independent parts			
Models:	18P, 35P, 18PB, 35PB		
Part no.:	812948, 812964, 814237, 814252		
Line	Part no.	description	Qty
1	150007	STICKER DIM:44X25MM	1
2	158308	FEMALE SCREWLOCKS HD20, L=13	6
3	160481	ROUND HEAD COUNTERSUNK SCREW 3X8 ST.	18
4	160869	ROUNDHEAD COUNTERSUNK SCREW 3X10 ST.ST.	2
5	161964	LOCKWASHER DIA 3,2 ST.	7
6	162298	BATTERY X100-D2	1
7	162734	POWER SUPPLY, CONTROLBOX KGJ	1
8	162832	NAME PLATE CONTROLBOX GRAPHIC	1
9	162874	BOX POWER SUPPLY, CONTROLBOX 18P	1
10	162902	FILTER CONTROLBOX KGJ	1
11	163042	STICKER DANGER CONTROLBOX	1
12	163167	CONVEX CIL HEADSCREW M4X25 ST.ST.	4
13	163195	FASTON 45GR., 6,3X0,8	1
14	163208	PLASTIC PLATE CONTROL BOX 18P/48I	1
15	163392	CONVEX CIL HEADSCREW M3X5 ST.ST.	4
16	164427	POWER CORD EURO-CONNECTOR	1
17	164541	FUSE 2A, 5X20 (F)	2
18	318121	MOUNTINGPLATE CONTROLBOX	1
19	318888	EARTHING STRIP CONTROLBOX	2
20	318917	TOP CONTROLBOX 18P/48I	1
21	318929	BOTTOM CONTROLBOX 18P/48I	1
22	812894	EARTH CABLE 18P CONTROLBOX	1
23	812907	INT. POWERCABLE 220/110V, 18P	1
24	812919	INT. POWERCABLE 35V, 18P	1
25	812992	LCD SCREEN, CONTROLBOX	1
26	813034	INT. POWER- SIGNALCABLE, 18P	1
27	813059	EARTH WIRE CONTROLBOX	1

CONTROL BOX, model dependent parts				18P	35P	18PB	35PB
				Model, part no.			
Pos.	Part no.	description	Qty	812948	812964	814237	814252
A	162817	NAME PLATE CONTROLBOX 18P	1	X		X	
A	162887	NAME PLATE CONTROLBOX 35P	1		X		X
B	162804	PANEL CONTROL BOX 18P/48I	1	X	X		
B	164792	PANEL CONTROL BOX 18P/48I BASIC	1			X	X
C	812012	FLASH MEMORY 2MB 18P	1	X			
C	814281	FLASH MEMORY 2MB 18P BASIC	1			X	
C	811242	FLASH MEMORY 4MB 35P	1		X		
C	814307	FLASH MEMORY 4MB 35P BASIC	1				X
D	813371	CONTROL BOARD PCB X100-2 KGJ, 18P/35P	1	X	X		
D	814335	CONTROL BOARD PCB X100-2 KGJ, 18P/35P BASIC	1			X	X
E	813467	CONNECTIONPLATE CONTROLBOX 18P/35P	1	X	X		
E	814351	CONNECTIONPLATE CONTROLBOX 18P/35P BASIC	1			X	X
F	812922	INT. ENCODER CABLE 18P	1	X	X		
G	813829	COMM.CABLE CONTROLBOX	1	X	X		

Rear cover [18P, 35P]



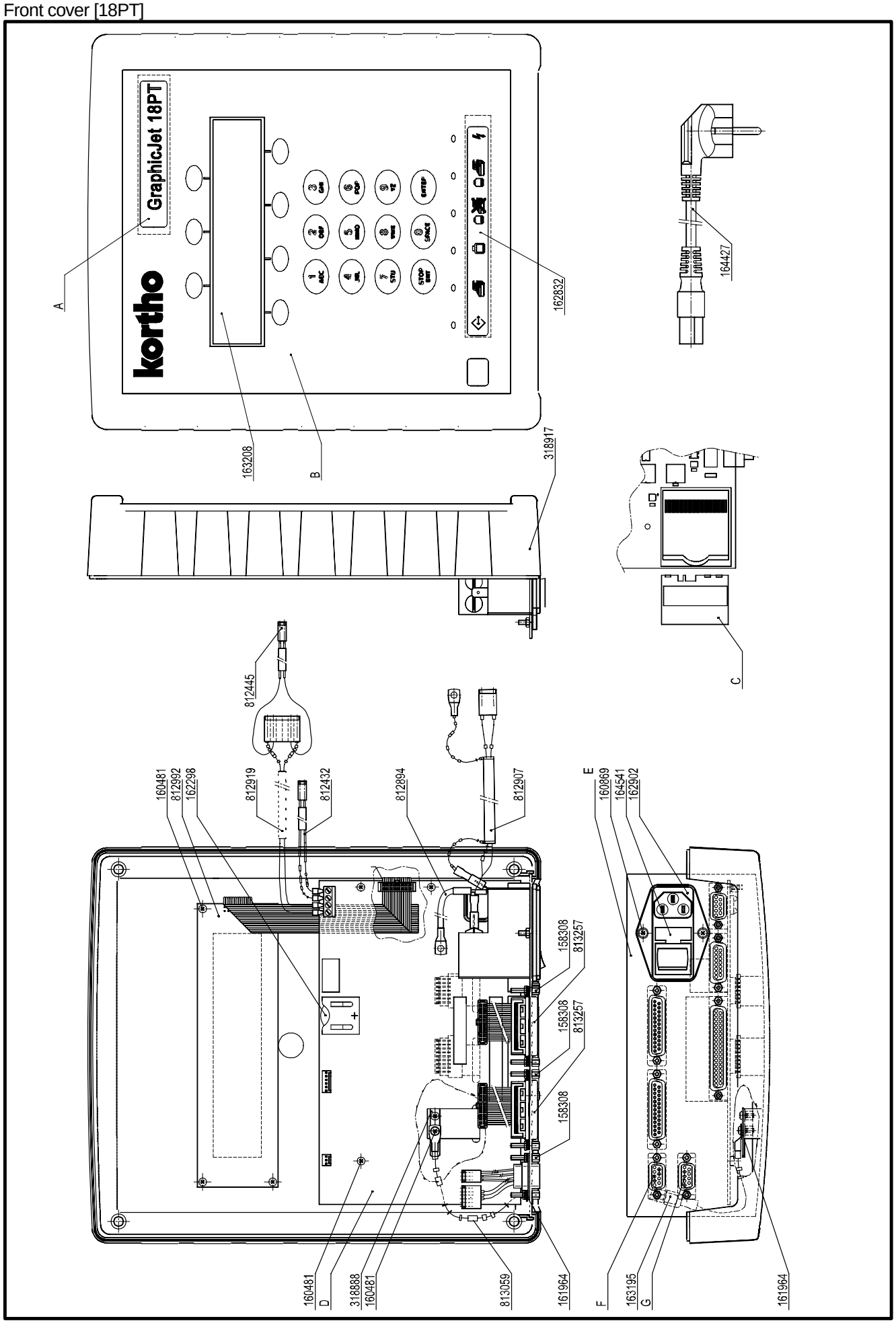
Control Box [18PT]

Front cover [18PT]

CONTROL BOX, model independent parts							
Models:	**18PT, 18PTB**						
Part no.:	**812951, 814265**						
Line	**Partno.**	**description**	**Qty**	**Line**	**Partno.**	**description**	**Qty**
1	150007	STICKER DIM:44X25MM	1	21	318888	EARTHING STRIP CONTROLBOX	2
2	158308	FEMALE SCREWLOCKS HD20, L=13	8	22	318917	TOP CONTROLBOX 18P/48I	1
3	160481	ROUNDHEAD COUNTERSUNK SCREW 3X8 ST.	18	23	318929	BOTTOM CONTROLBOX 18P/48I	1
4	160675	HEXAGON NUT M4, SYNTHETIC	4	24	812404	CONTROL BOARD 18PT	1
5	160869	RNDHEAD COUNTERSUNK SCREW 3X10 ST.ST.	2	25	812432	CABLE 5 VDC, 18PT	1
6	161964	LOCKWASHER DIA 3,2 ST.	7	26	812445	CABLE 35 VDC, 18PT	1
7	162298	BATTERY X100-D2	1	27	812894	EARTH CABLE 18P CONTROLBOX	1
8	162734	POWER SUPPLY, CONTROLBOX KGJ	1	28	812907	INT. POWERCABLE 220/110V, 18P	1
9	162832	NAME PLATE CONTROLBOX GRAPHIC	1	29	812919	INT. POWERCABLE 35V, 18P	1
10	162874	BOX POWER SUPPLY, CONTROLBOX 18P	1	30	812992	LCD SCREEN, CONTROLBOX	1
11	162902	FILTER CONTROLBOX KGJ	1	31	813059	EARTH WIRE CONTROLBOX	1
12	163042	STICKER DANGER CONTROLBOX	1	32	813244	INT. DATACABLE, 18P	1
13	163167	CONVEX CIL HEADSCREW M4X25 ST.ST.	4	33	813257	INT. POWER- SIGNALCABLE, 18PT	2
14	163195	FASTON 45GR., 6,3X0,8	1				
15	163208	PLASTIC PLATE CONTROL BOX 18P/48I	1				
16	163392	CONVEX CIL HEADSCREW M3X5 ST.ST.	4				
17	163405	DISTANCE BUSH L=6,4	4				
18	164427	POWER CORD EURO-CONNECTOR	1				
19	164541	FUSE 2A, 5X20 (F)	2				
20	318121	MOUNTINGPLATE CONTROLBOX	1				

CONTROL BOX, model dependent parts				18PT	18PTB
				Model, part no.	
Pos.	**Part no.**	**description**	**Qty**	**812951**	**814265**
A	162829	NAME PLATE CONTROLBOX 18PT	1	X	X
B	162804	PANEL CONTROL BOX 18P/48I	1	X	
B	164792	PANEL CONTROL BOX 18P/48I BASIC	1		X
C	811268	FLASH MEMORY 2MB 18PT	1	X	
C	814319	FLASH MEMORY 2MB 18PT BASIC	1		X
D	813384	CONTROL BOARD PCB X100-2 KGJ, 48I/18PT	1	X	
D	814348	CONTROL BOARD PCB X100-2 KGJ, 48I/18PT BASIC	1		X
E	813482	CONNECTIONPLATE CONTROLBOX 18PT	1	X	
E	321131	CONNECTIONPLATE CONTROLBOX 18PT BASIC	1		X
F	812922	INT. ENCODER CABLE 18P	1	X	
G	813829	COMM.CABLE CONTROLBOX	1	X	

Front cover [18PT]

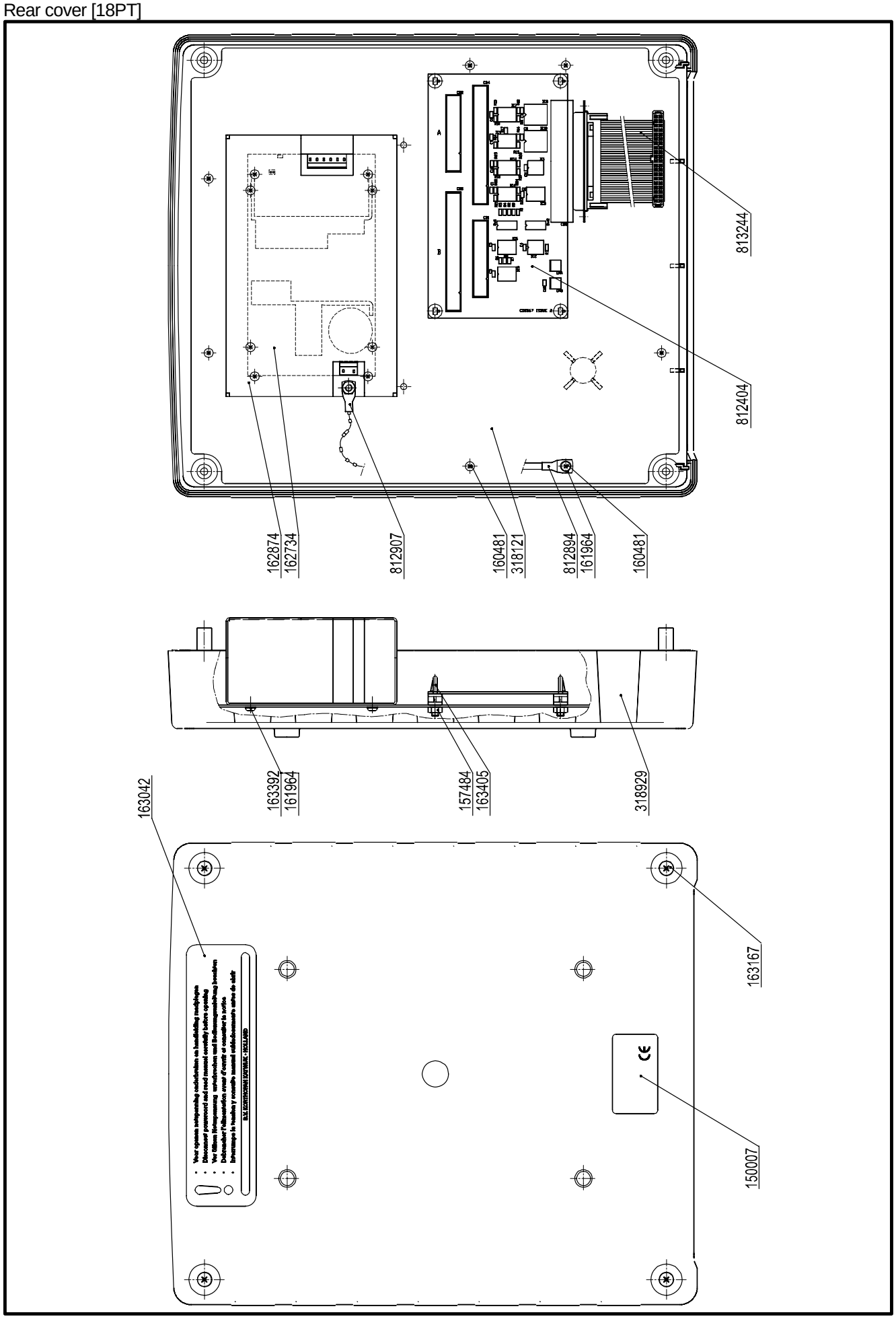


Rear cover [18PT]

CONTROL BOX, model independent parts							
Models:	**18PT, 18PTB**						
Part no.:	**812951, 814265**						
Line	**Partno.**	**description**	**Qty**	**Line**	**Partno.**	**description**	**Qty**
1	150007	STICKER DIM:44X25MM	1	21	318888	EARTHING STRIP CONTROLBOX	2
2	158308	FEMALE SCREWLOCKS HD20, L=13	8	22	318917	TOP CONTROLBOX 18P/48I	1
3	160481	ROUNDHEAD COUNTERSUNK SCREW 3X8 ST.	18	23	318929	BOTTOM CONTROLBOX 18P/48I	1
4	160675	HEXAGON NUT M4, SYNTHETIC	4	24	812404	CONTROL BOARD 18PT	1
5	160869	RNDHEAD COUNTERSUNK SCREW 3X10 ST.ST.	2	25	812432	CABLE 5 VDC, 18PT	1
6	161964	LOCKWASHER DIA 3,2 ST.	7	26	812445	CABLE 35 VDC, 18PT	1
7	162298	BATTERY X100-D2	1	27	812894	EARTH CABLE 18P CONTROLBOX	1
8	162734	POWER SUPPLY, CONTROLBOX KGJ	1	28	812907	INT. POWERCABLE 220/110V, 18P	1
9	162832	NAME PLATE CONTROLBOX GRAPHIC	1	29	812919	INT. POWERCABLE 35V, 18P	1
10	162874	BOX POWER SUPPLY, CONTROLBOX 18P	1	30	812992	LCD SCREEN, CONTROLBOX	1
11	162902	FILTER CONTROLBOX KGJ	1	31	813059	EARTH WIRE CONTROLBOX	1
12	163042	STICKER DANGER CONTROLBOX	1	32	813244	INT. DATACABLE, 18P	1
13	163167	CONVEX CIL HEADSCREW M4X25 ST.ST.	4	33	813257	INT. POWER- SIGNALCABLE, 18PT	2
14	163195	FASTON 45GR., 6,3X0,8	1				
15	163208	PLASTIC PLATE CONTROL BOX 18P/48I	1				
16	163392	CONVEX CIL HEADSCREW M3X5 ST.ST.	4				
17	163405	DISTANCE BUSH L=6,4	4				
18	164427	POWER CORD EURO-CONNECTOR	1				
19	164541	FUSE 2A, 5X20 (F)	2				
20	318121	MOUNTINGPLATE CONTROLBOX	1				

CONTROL BOX, model dependent parts				18PT	18PTB
				Model, part no.	
Pos.	**Part no.**	**description**	**Qty**	**812951**	**814265**
A	162829	NAME PLATE CONTROLBOX 18PT	1	X	X
B	162804	PANEL CONTROL BOX 18P/48I	1	X	
B	164792	PANEL CONTROL BOX 18P/48I BASIC	1		X
C	811268	FLASH MEMORY 2MB 18PT	1	X	
C	814319	FLASH MEMORY 2MB 18PT BASIC	1		X
D	813384	CONTROL BOARD PCB X100-2 KGJ, 48I/18PT	1	X	
D	814348	CONTROL BOARD PCB X100-2 KGJ, 48I/18PT BASIC	1		X
E	813482	CONNECTIONPLATE CONTROLBOX 18PT	1	X	
E	321131	CONNECTIONPLATE CONTROLBOX 18PT BASIC	1		X
F	812922	INT. ENCODER CABLE 18P	1	X	
G	813829	COMM.CABLE CONTROLBOX	1	X	

Rear cover [18PT]

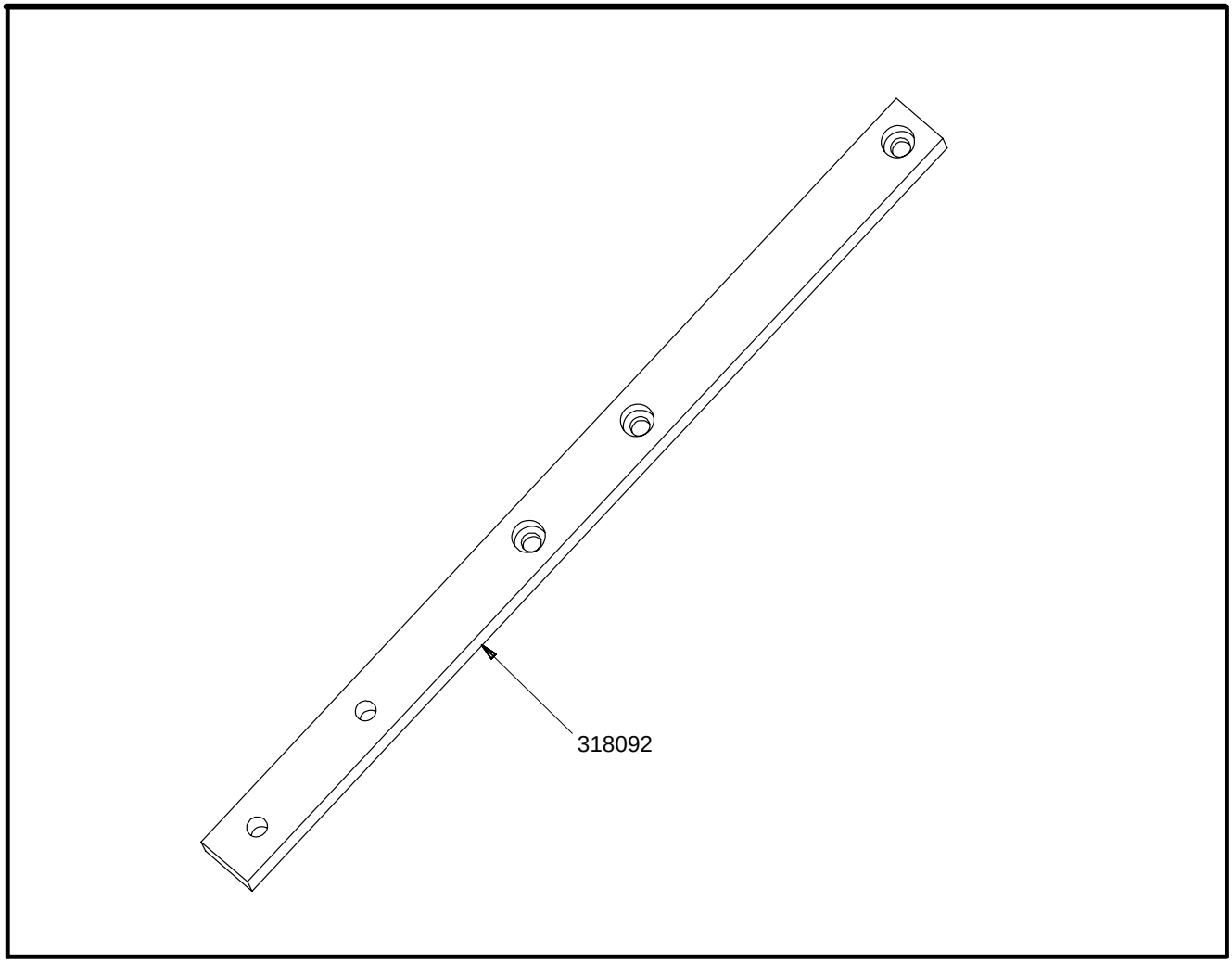


Control Box Support

Fixed

318092		CONTROL BOX SUPPORT STRIP	
Line	Part no.	description	Qty
1	318092	SUPPORT STRIP	2

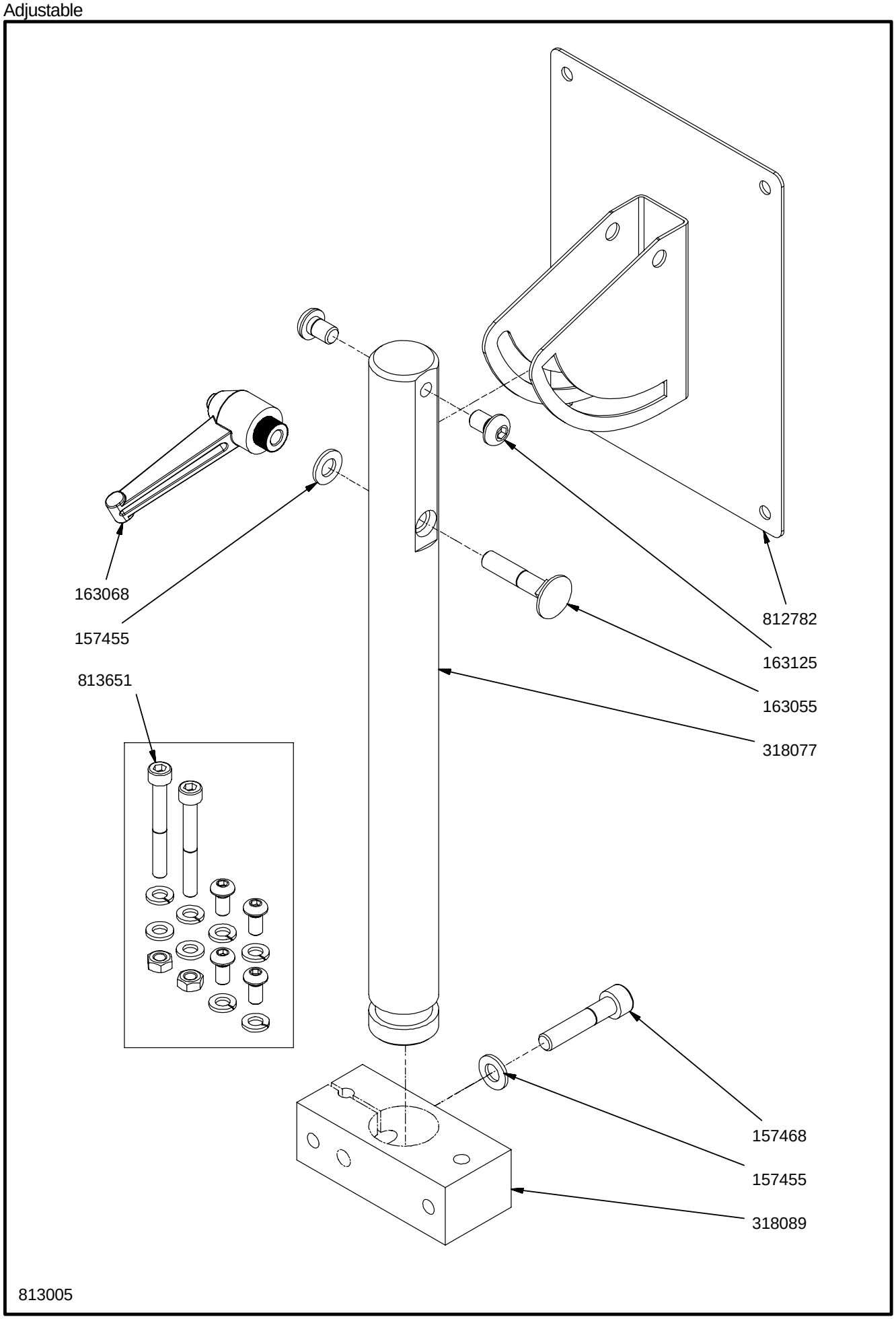
Fixed



Adjustable

813005		ADJUSTABLE CONTROL BOX SUPPORT	
Line	Part no.	description	Qty
1	157455	WASHER D=8,4 STAINL.ST.	2
2	157468	SOCKET HEAD SCREW M8X40 STAINL.ST.	1
3	163055	CARRIAGE BOLT M8X40 ST.ST.	1
4	163068	HANDLE M8, BLACK	1
5	163125	LOW HEADSCREW M8X12 ST.ST.	2
6	318077	SUPPORT CONTROLBOX	1
7	318089	SUPPORT CONTROLBOX	1
8	812782	CONNECTION PLATE CONTROLBOX	1
9	813651	SET MOUNT.PARTS SUPPORT CODING UNIT KGJ	1

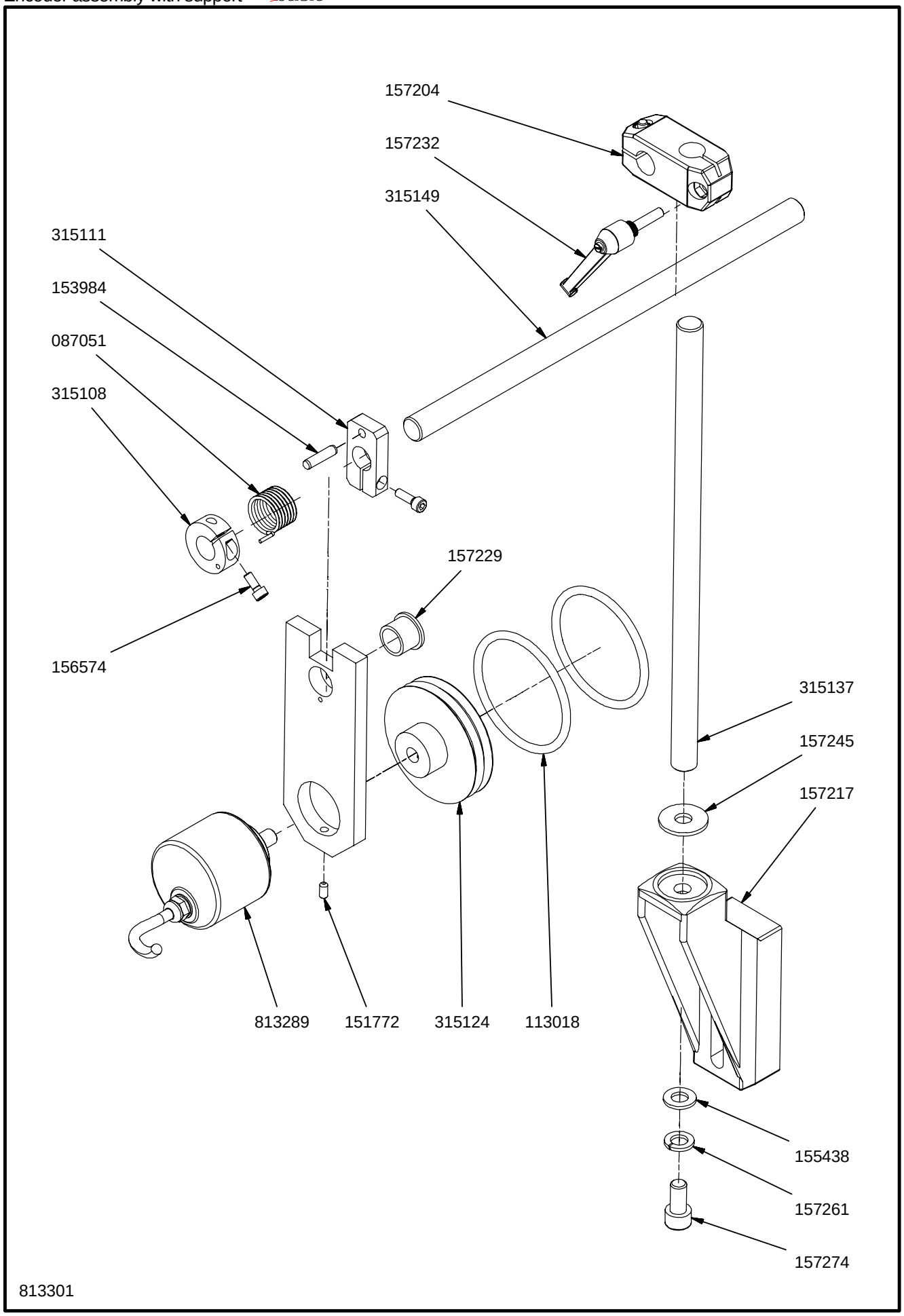
Adjustable


163068
157455
813651
812782
163125
163055
318077
157468
157455
318089
813005

Encoder assembly with support basic

813301		ENCODER ASSEMBLY WITH SUPPORT	
Pos.	**Part no.**	**description**	**Qty**
1	087051	SPRING TORSION RIGHT	1
2	113018	O-RING D=80	2
3	151772	SET SCREW M5X10 STAINLESS ST.	2
4	152218	CYL. HEAD SCREW MBZ M5X16 STAINL.ST.	1
5	153984	CYLINDRICAL PIN STAINL. STEEL 6M6X24	1
6	155438	WASHER D=10,5 STAINL.ST.	1
7	156574	HEX.SOCK.HEAD CAP SCREW M5X12	1
8	157204	CROSS CLAMP D=16	1
9	157217	BRACKET D=16	1
10	157229	COLLAR BEARING BRONZE 20/16X16	1
11	157232	HANDLE M6x25, BLACK	1
12	157245	WASHER 30/10,5 STAINLESS STEEL	1
13	157261	SPRING RING STAINL.ST. D=10,2	1
14	157274	CYL.HEAD SCREW M10X20	1
15	315095	STRIP ENCODER	1
16	315108	RING ENCODER	1
17	315111	STRIP ENCODER	1
18	315124	WHEEL ENCODER	1
19	315137	BRACKET SHAFT ENCODER	1
20	315149	SHAFT ENCODER	1
21	813298	ENCODER GRAPHICJET	1

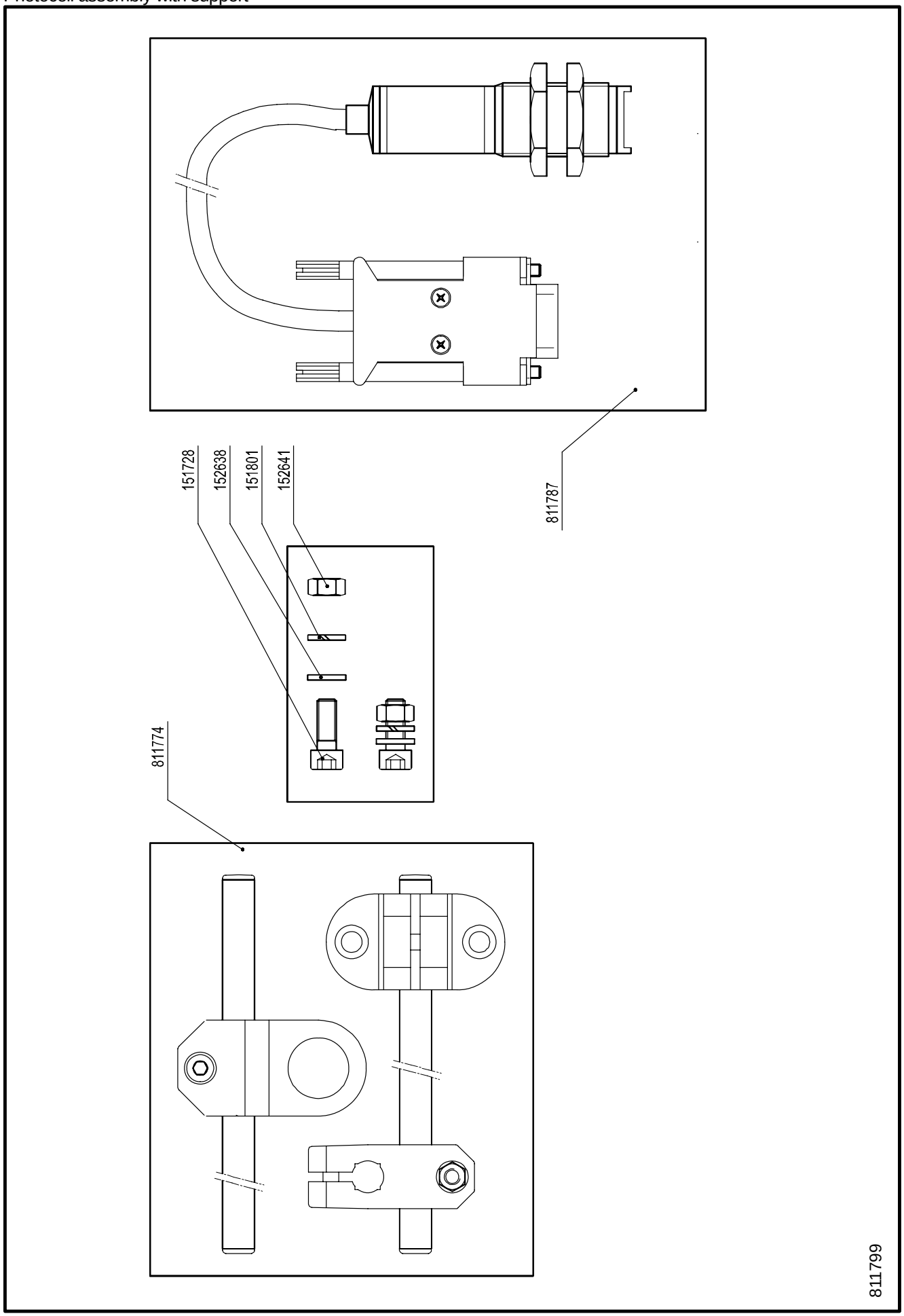
Encoder assembly with support basic



Photocell assembly with support

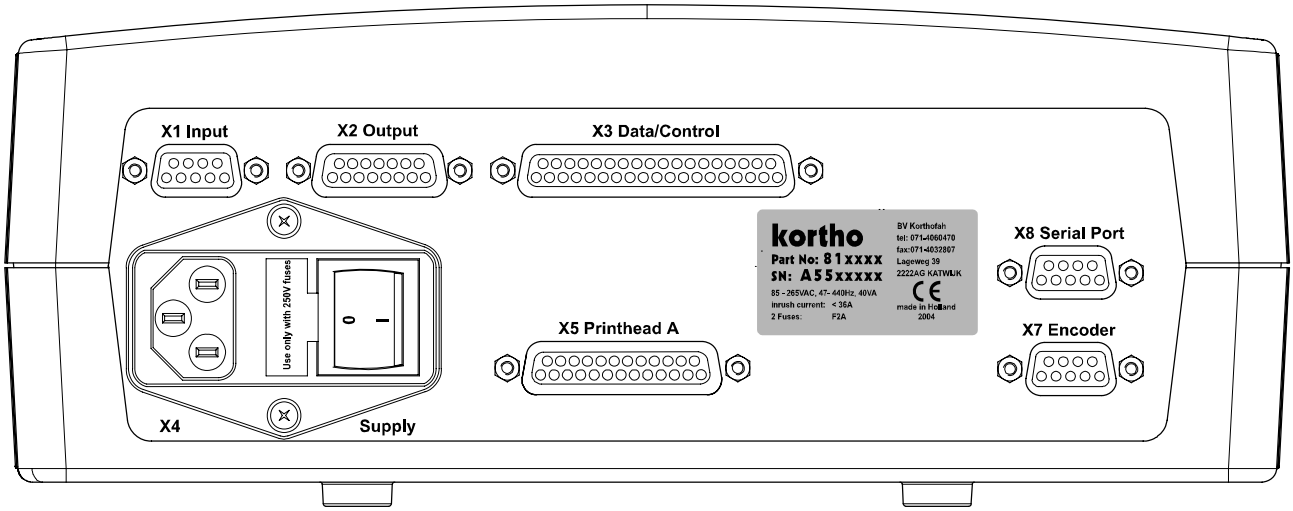
811799		PHOTOCELL ASSEMBLY WITH SUPPORT	
Pos.	**Part no.**	**description**	**Qty**
1	151728	SOCKET HEAD SCREW M6X16	2
2	151801	SPRING WASHER DIA 6,1 STAIN.ST	2
3	152638	WASHER D=6,4 STAINL.ST.	2
4	152641	NUT M6 STAINL.ST.	2
5	811774	SUPPORT PHOTO-CELL KGJ	1
6	811787	PHOTO-CELL KGJ, NPN	1

Photocell assembly with support



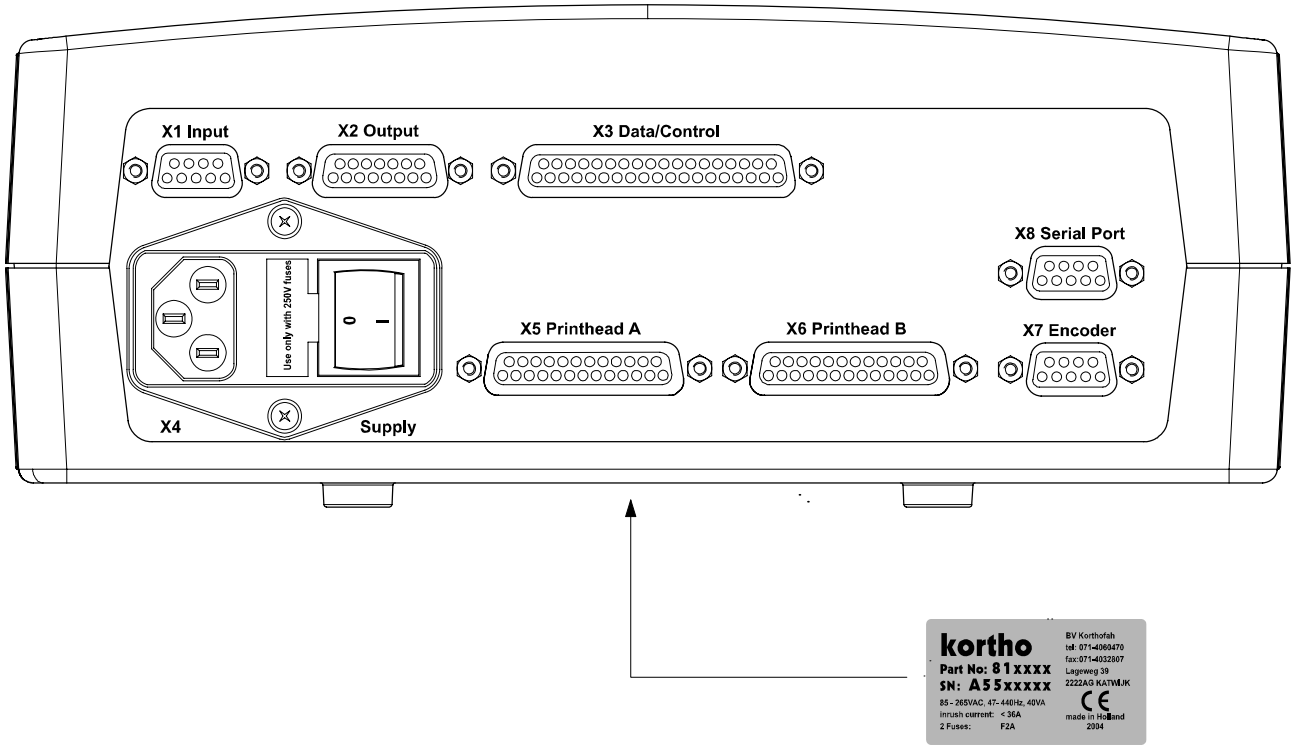
Appendix D Connections

Control Box Connector Plate [18P, 35P]



Item	Description	Connector type
X1	Interface Input	sub-D 9-ways, socket
X2	Interface Output	sub-D 15-ways, socket
X3	Not used	sub-D 37-ways, socket
X4	Mains Supply with switch and 2 fuses	
X5	Printhead A	sub-D 25-ways, socket
X7	Encoder (not present at basic printer)	sub-D 9-ways, socket
X8	Serial port (not present at basic printer)	sub-D 9-ways, socket
LABEL	Partnumber, serialnumber and mains supply specification	

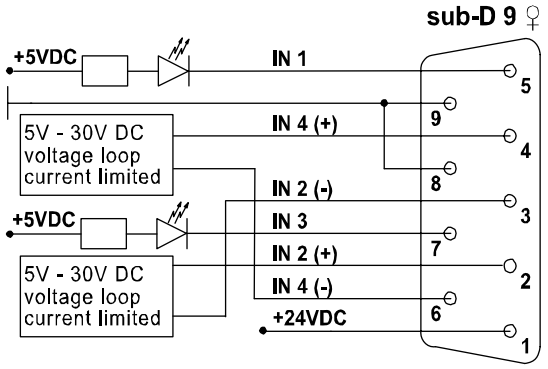
Control Box Connector Plate [18PT]



Item	Description	Connector type
X1	Interface Input	sub-D 9-ways, socket
X2	Interface Output	sub-D 15-ways, socket
X3	Not used	sub-D 37-ways, socket
X4	Mains Supply with switch and 2 fuses	
X5	Printhead A	sub-D 25-ways, socket
X6	Printhead B	sub-D 25-ways, socket
X7	Encoder (not present at basic printer)	sub-D 9-ways, socket
X8	Serial port (not present at basic printer)	sub-D 9-ways, socket
LABEL (at back)	Partnumber, serialnumber and mains supply specification	

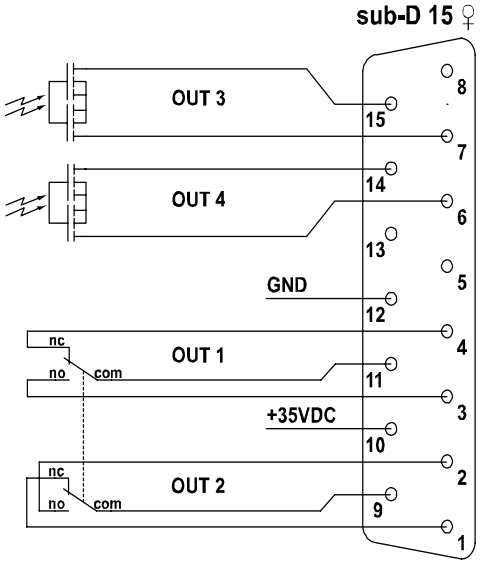
X1 Interface Input

Pin	Tag	Description
1	+24V	+24VDC / 30mA
2	IN 2 +	Print Request 2 +
3	IN 2 -	Print Request 2 -
4	IN 4 +	not used
5	IN 1	Print Request 1
6	IN 4 -	not used
7	IN 3	not used
8	GND	ground, non isolated
9	GND	ground, non isolated



X2 Interface Output

Pin	Tag	Description
1	OUT 2 nc	ALARM 2 normally closed
2	OUT 2 no	ALARM 2 normally open
3	OUT 1 no	ALARM 1 normally open
4	OUT 1 nc	ALARM 1 normally closed
5		not connected
6	OUT 4	READY (max 100mA, 35VDC)
7	OUT 3	not used
8		not connected
9	OUT 2	ALARM 2 common (max 1A, 35VDC)
10	+35V	+35VDC / 200mA
11	OUT 1	ALARM 1 common (max 1A, 35VDC)
12	GND	ground, non isolated
13		not connected
14	OUT 4	READY (max 100mA, 35VDC)
15	OUT 3	not used



The outputs ALARM 1 and ALARM 2 are logical but not physical the same output. They are activated when an ink low condition occurs.

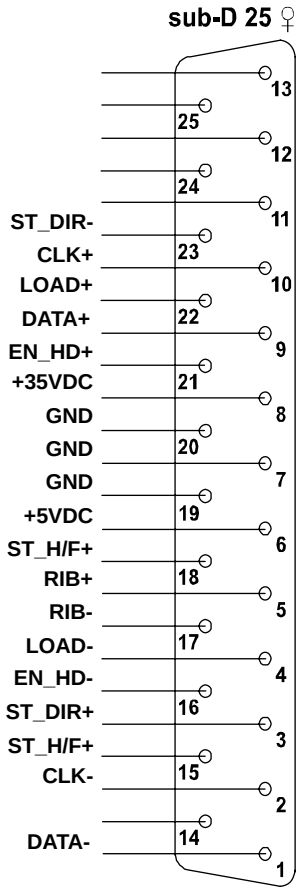
The READY output is activated when the printer is ready to accept the trigger signal (PRINT REQUEST) for making a print

X3 Data/Control

Not used.

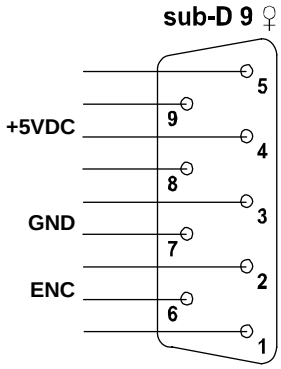
X5 Printhead A / X6 Printhead B

Pin	Tag	Description
1	DATA -	printhead data
2	CLK -	printhead clock
3	ST_DIR +	
4	LOAD -	printhead load data
5	RIB +	low ink alarm
6	+5VDC	+5VDC logic power
7	GND	ground
8	+35VDC	+35VDC printhead power
9	DATA +	printhead data
10	CLK +	printhead clock
11-14		not connected
15	ST_H/F +	
16	EN_HD -	enable printhead power
17	RIB -	low ink alarm
18	ST_H/F +	
19	GND	ground
20	GND	ground
21	EN_HD +	enable printhead power
22	LOAD +	printhead load data
23	ST_DIR -	
24-25		not connected



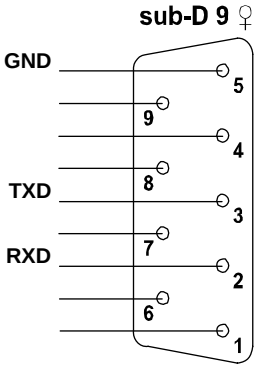
X7 Encoder basic

Pin	Tag	Description
1		
2		
3		
4	+5VDC	+5VDC encoder power
5		
6	ENC	encoder channel
7	GND	ground
8		
9		



X8 Serial port basic

Pin	Tag	Description
1		
2	RXD	RS232 receive data line
3	TXD	RS232 transmit data line
4		
5	GND	ground
6		
7		
8		
9		



Standard cables and sensors

Wire colour code table (IEC 60757)

Code	Wire colour
BK	black
BN	brown
RD	red
OG	orange
YE	yellow
GN	green
BU	blue
VT	violet (*purple*)
GY	grey
WH	white
PK	pink
TQ	turquoise *(cyan)*
GD	gold
SR	silver
GNYE	green/yellow (EARTH)

NPN Photocell assembly (811799)

Pin	Wire colour	Description
1	BN	+24VDC
5	BK	Print Request 1
9	BU	ground

Standard input cable (812655)

Pin	Wire colour	Description
1	BK	+24VDC / 30mA
2	WH	Print Request 2 +
3	RD	Print Request 2 -
4	GN	Open Head Cap 2 +
5	BN	Print Request 1
6	BU	Open Head Cap 2 -
7	OG	Open Head Cap 1
8	YE	ground, non isolated
9	VT	ground, non isolated

Standard output cable (812668)

Pin	Wire colour	Description
1	BK	ALARM 2 normally closed
2	WH	ALARM 2 normally open
3	RD	ALARM 1 normally open
4	GN	ALARM 1 normally closed
5	OG	not connected
6	BU	READY
7	WH/BK	not used
8	RD/BK	not connected
9	GN/BK	ALARM 2 common
10	OG/BK	+35VDC / 200mA
11	BU/BK	ALARM 1 common
12	BK/WH	ground
13	RD/WH	not connected
14	GN/WH	READY
15	BU/WH	not used

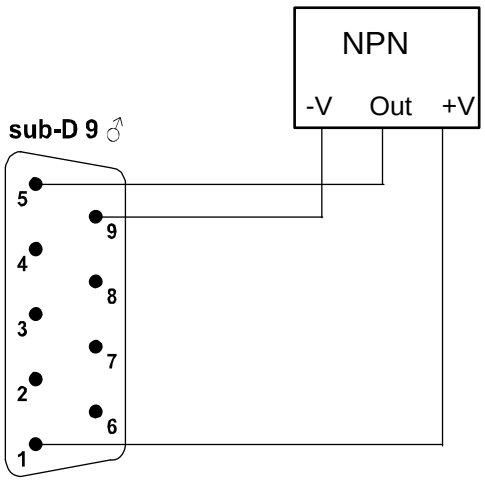
Encoder (813289) ~~basic~~

Pin	Wire colour	Description
4	RD	+5VDC encoder power
6	WH	encoder channel
7	BK	ground
COVER	SHIELD	protective shield

Examples of I/O circuitry

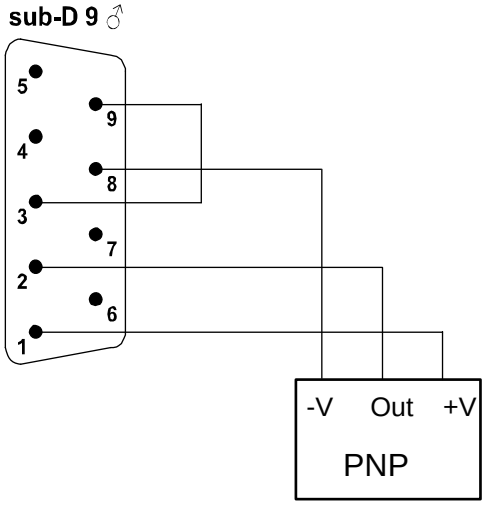
Input with NPN sensor

Sensor	description
NPN	Print Request 2



Input with PNP sensor

Sensor	description
PNP	Print Request 1



Appendix E Material safety data sheets (MSDS)

Kortho Ink GJ1 black (MSDS)

MATERIAL SAFETY DATA SHEET

Kortho
the mark of preference
bv korthofah
coding & marking

Date: November 2006

1. PRODUCT IDENTIFICATION

Identification of the substance: PRINTING INK

Product identification number: 083437

Product name: KORTHO INK GJ1 BLACK, 2X 200 CM3

Company:
B.V. KORTHOFAH
LAGEWEG 39, P.O. BOX 3040
2220 CA KATWIJK ZH
NEDERLAND
Tel: +31-71-4060460
Fax: +31-71-4032807

Emergency telephone:

2. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous components	EC No.	CAS-NO.	Conc.%	Symbol	Risk Phrases
Distillated (petroleum), Hydrotreaded middle [1]		64742-46-7	50-60%		T R45
Polyamine, fatty acid [2]		---	1-5%		Xi R36/38, R43

Risk phrases, explanations:
R36/38 = Irritating to eyes and skin, R43 = May cause sensitisation by skin contact, R45 = May cause cancer.

* All ingredients in this product are listed on the EINECS.

3. HAZARD IDENTIFICATION

[1] Distillates (petroleum), hydrotreated middle is classified as very toxic R45. But this ingredient is hydrogenated and fractioned naphthenic hydrocarbons, and applies to Note N in Directive 67/548/EEC. Note N in the relevant legislation (67/548/EEC) applies: The refining history of petroleum distillate is will known and it can be shown that original feedstock from which it was produced is not a carcinogen. So this preparation need not be classified as very toxic with R45.

[2] Polyamine, fatty acid condensate is classified as irritant with R43. But this preparation shows a negative response under skin sensation test Annex V to Directive 67/548/EEC. So this preparation need not be classified as Irritant with R43.

Health:	Inhalation of high concentrations of vapour or mist may cause headache, tiredness, nausea and dizziness. May cause skin dryness or cracking. May cause lung damage if swallowed.
Environmental:	None of the substances in this product is classified as dangerous for the environment.
Fire:	The product is not classified as flammable.

4. FIRST AID MEASURES

General advise:	In case of doubt or with persisting symptoms obtain medical attention. Never pass anything through the mouth of an unconscious person. Keep the victim calm and warm.
Inhalation:	Remove to fresh air. Provide rest, warmth and fresh air. Get medical attention.
Skin contact:	Immediately remove contaminated clothing, and then wash the affected area with soap and water. Contaminated clothing should be laundered before reissue. If symptoms occur, obtain medical attention.
Eye contact:	In case of contact immediately rinse with water for at 15 minutes. Obtain medical attention if irritation continues.
Ingestion:	If swallowed, seek medical advice immediately.

5. FIRE-FIGHTING MEASURES

Flammable properties:	Flash Point	: >134 ºC.
	Flammable limit, (% by volume)	: 0.6 ~ 6.0
Extinguishing media:	Use foam or dry powder or carbon dioxide.	
Specific hazards:	Not classified as flammable. Combustion will evolve toxic and irritating vapours. Take precautions against static discharges.	
Protective equipment for fire fighters:	Self-contained breathing apparatus.	

6. ACCIDENTIAL RELEASE MEASURES

Shut off all sources of ignition. Keep public away. Scrape spilled materials with disposal towels or dry sand. For large sills, dike and cover liquid with foam. Take up the spill by equipment made of plastics to avoid sparks and place in closed containers.

7. HANDLING AND STORAGE

Handling: Keep container closed. Ensure good ventilation. Avoid contact with skin and eyes. Do not handle near an open flame, sources of heat or sources of ignition.

Storage: Keep container tightly closed in a dry place at ambient temperature. Take precautionary measures against static discharge. Keep away from strong oxidising agents.

8. EXPOSURE CONTROL/PERSONAL PROTECTION

Engineering measures: Ensure good ventilation. Where reasonably practicable, this should be achieved by the use of local exhaust ventilation and good general extraction. Avoid contact with the product. Keep away from sources of ignition.

Personal Protective equipment

Respirators: Wear to avoid breathing organic solvent vapour.

Hand protection:  Wear chemical resistant gloves.

Eye protection:  Use safety glasses or goggles.

Skin protection:  Wear working clothes and safety shoes.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Liquid

Colour: Black

Odour: Solvent

Flash point (ºC): >134

Boiling point (ºC): 280-320

Flammability limits (vol-%): No data

Relative density (g/cm³, 25 ºC): 0,86-0,88

Solubility in water (g/l, 20 ºC): Not soluble

Vapour pressure (KPa/38 ºC): 0.13k

10. STABILITY AND REACTIVITY

Stability: Stable under normal conditions in tightly closed vessels.

Conditions to avoid: Avoid sources of ignition. Take precautions discharge.

Materials to avoid: Avoid strong oxidizing agents.

11. TOXICOLOGICAL INFORMATION

Inhalation: Inhalation of vapours or mist at high concentrations may cause headache, dizziness, drowsiness and nausea. Prolonged inhalation of high concentrations may also have other central nervous system effects.

Skin contact: Irritates the skin and may cause ski dryness or cracking. Prolonged and repeated contact may cause dermatitis.

Eye contact: Splashes may give eye irritation.

Ingestion: Ingestion may result in gastric disturbance.

Long term exposure: This product is not considered as a known human carcinogen.

12. ECOLOGICAL INFORMATION

Environmental fate and distribution: This product is insoluble in water. Treat using the best available techniques to avoid environmental contamination.

13. DISPOSAL CONSIDERATIONS

Product and contaminated packaging: Disposal must be in accordance with current national and local regulations. Chemical residues generally count as special waste.

14. TRANSPORT INFORMATION

The product is not subject to regulations (ADR/RID, IATA/ICAO and IMDG).

15. REGULATORY INFORMATION

CLASSIFICATION AND LABELLING

Classification symbol: Xi (Irritant) 

Risk phrases: R36/38- Irritating to skin and eyes.

Safety phrases: S24- Avoid contact with skin.
S26 - In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
S37- Wear suitable gloves.

16. OTHER INFORMATION

This data sheet was prepared in accordance with Directive 91/155/EEC (93/112/EC). The information on this sheet is not a specification; it does not guarantee specific properties. The information is intended to provide general guidance as to health and safety based upon knowledge of the handling, storage and use of the product. It is not applicable to unusual or non-standard uses of the product, nor where instructions or recommendations are not followed.

Date first release : June 2003
Date previous release : December 2005
Release date : 11-2007
Version : 3

AGU/001
Date: November 2006

Kortho Solvent GJ (MSDS)

MATERIAL SAFETY DATA SHEET

Kortho
the mark of preference
bv korthofah
coding & marking

Date: June 2007

1. PRODUCT IDENTIFICATION

Identification of the substance: SOLVENT
Product identification number: 083449

Page: 1/5
Version: 1

Product Name: KORTHO ATOMIZER SOLVENT GJ, 200 CM3

Company:
B.V. KORTHOFAH
LAGEWEG 39, P.O. BOX 3040
2220 CA KATWIJK ZH
NEDERLAND
Tel: +31-71-4060460
Fax: +31-71-4032807

Emergency telephone:
NL - Nationaal Vergiftigingen Informatie Centrum : 0302-748888
B - Antigif Centrum :+32-(0)70-245245

2. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous components	EC No.	CAS-NO.	Conc.%	Symbol	Risk Phrases
Distillated (petroleum), Hydrotreaded middle		64742-46-7	100%	Xn	R65, R66, R67

Risk phrases, explanations:
R65 = Harmful: May cause lung damage if swallowed, R66 = Repeated exposure may cause ski dryness or cracking, R67 = Vapours may cause drowsiness and dizziness.

3. HAZARD IDENTIFICATION

Health: Inhalation of high concentrations of vapour or mist may cause headache, tiredness, nausea and dizziness. May cause skin dryness or cracking. May cause lung damage if swallowed.

Environmental: None of the substances in this product is classified as dangerous for the environment.

Fire: The product is not classified as flammable.

4. FIRST AID MEASURES

General advice: In case of doubt or with persisting symptoms obtain medical attention. Never pass anything through the mouth of an unconscious person. Following severe exposure the patient should be kept under medical review for at least 48 hours as delayed pulmonary oedema may develop.

Inhalation: Remove patient from exposure, keep warm and at rest. If ill effects occur obtain medical attention and show this Material Safety Data Sheet, label or container.

Skin contact: Remove contaminated clothing, and then wash the affected area with soap and water. Contaminated clothing should be laundered before reissue.

Eye contact: Rinse with water for at least 15 minutes and get medical attention if irritation persists.

Ingestion: Wash out mouth with water and give 200 – 300ml of water to drink. Do **NOT** induce vomiting. Obtain medical attention and show this Material Safety Data Sheet, label or container.

5. FIRE-FIGHTING MEASURES

Extinguishing media: Use foam or dry powder. Remove containers from fire or cool them with water spray.

Specific hazards: Not classed as flammable. Take precautions against static discharges.

Protective equipment for fire fighters: Self-contained breathing apparatus and safety goggles.

6. ACCIDENTIAL RELEASE MEASURES

Personal precautions: The material can create slippery conditions underfoot. Keep unnecessary and unprotected personnel away from the spillage area. Wear appropriate protective clothing. Avoid breathing vapours.

Environmental precautions: Do not allow material to enter drains or watercourses. In the event of larger spills, contact the emergency services.

Method for cleaning up: Absorb onto inert material, like earth or sand, and place in suitable container for disposal. Dispose of according to Special Waste. Wash the spillage area clean.

7. HANDLING AND STORAGE

Handling: Keep container closed. Ensure good ventilation. Avoid contact with skin and eyes.

Storage: Keep container tightly closed in a dry place at ambient temperature. Take precautionary measures against static discharge. Keep away from strong oxidising agents.

8. EXPOSURE CONTROL/PERSONAL PROTECTION

Engineering measures: Ensure good ventilation. Where reasonably practicable, this should be achieved by the use of local exhaust ventilation and good general extraction. Avoid contact with the product. Keep away from sources of ignition.

Personal Protective equipment

Respirators: Wear approved mask/respirator if necessary.

Hand protection:  Where contact may occur, wear chemical resistant gloves.

Eye protection:  Where contact may occur, Use safety goggles.

Skin protection:  Wear suitable protective clothing as protection against splashing or contamination.

Occupational exposure Limits: The current OEL (Occupation Exposure Standard is 1000 mg/m^3.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Liquid
Colour: Colourless
Odour: Solvent
Boiling point (ºC): 280-320
Flash point (ºC): >120
Auto-ignition temperature (ºC): >200
Flammability limits (vol-%): 0,6-7
Solubility in water (g/l, 20 ºC): Not soluble

10. STABILITY AND REACTIVITY

Stability: Stable under normal conditions in tightly closed vessels.

Conditions to avoid: Avoid sources of ignition. Take precautions discharge.

Materials to avoid: Avoid strong oxidizing agents.

11. TOXICOLOGICAL INFORMATION

Inhalation: Inhalation of vapours or mist at high concentrations may cause headache, dizziness, drowsiness and nausea. Prolonged inhalation of high concentrations may also have other central nervous system effects.

Skin contact: Prolonged and repeated contact may skin dryness or cracking.

Eye contact: May cause eye irritation.

Ingestion: Low acute oral toxicity, but small amounts aspirated into the lungs during ingestion may cause pulmonary injury.

12. ECOLOGICAL INFORMATION

Environmental mobility: This substance has low solubility and floats and can migrate from water to the land. This material has a potential to partition to the sediment and to bioconcentrate.

Environmental degradability: Based on data for similar materials, this substance is expected to biodegrade rapidly and be readily biodegradable according to OECD guidelines. The material can degrade rapidly in the air, and is expected to be removed in a wastewater treatment facility.

Ecotoxicity: Based on data for similar materials, this substance is expected to have no acute toxicity to aquatic organisms at the maximum water solubility of this material. Long-term adverse effects to aquatic organisms are not expected.

13. DISPOSAL CONSIDERATIONS

Product and Contaminated Packaging: Disposal must be in accordance with current national and local regulations. Chemical residues generally count as special waste.

14. TRANSPORT INFORMATION

The product is not subject to transport regulations (ADR/RID, IATA and IMO).

15. REGULATORY INFORMATION

CLASSIFICATION AND LABELLING

Classification symbol: Xi (Irritant) 

Risk phrases:
R65- May cause lung damage if swallowed.
R66- Repeated exposure may cause skin dryness or cracking.

Safety phrases:
S24- Avoid contact with skin.
S37- Wear suitable gloves.
S51- Use only in well-ventilated areas.
S62- If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

16. OTHER INFORMATION

This date sheet was prepared in accordance with Directive 91/155/EEC (93/112/EC).

The information on this sheet is not a specification; it does not guarantee specific properties. The information is intended to provide general guidance as to health and safety bases upon our knowledge of the handling, storage and use of the product. It is not applicable to unusual or non-standard uses of the product, nor where instructions or recommendations are not followed.

Date first release : June 2003
Date previous release : November 2006
Release date : 06-06-2007
Version : 2

AGU/002
Date: June 2007

Appendix F EC Declarations of conformity

kortho

EC DECLARATION OF CONFORMITY

(According to Annex II.A of the Machinery Directive (98/37/EC)

We, **B.V. Korthofah**
Lageweg 39
NL 2222 AG Katwijk ZH
The Netherlands

declare under own responsibility that the products

GraphicJet 18P	**(901807)**
GraphicJet 18PB	**(901864)**

to which this declaration relates is in conformity with the following standards or other normative documents

EN 292-1 (1991)
EN 292-2 (1991) + A1 (1995)
EN 55022 (1998) + A1 (2000) + A2 (2003)
EN 55024 (1998) + A1 (2001) + A2 (2003)
EN 60950-1 (2000)
EN 61000-3-2 (2000)
EN 61000-3-3 (1995) + A1 (2001)

following the provisions of the

Machinery Directive 98/37/EC
EMC Directive 89/336/EEC
Low Voltage Directive 73/23/EEC

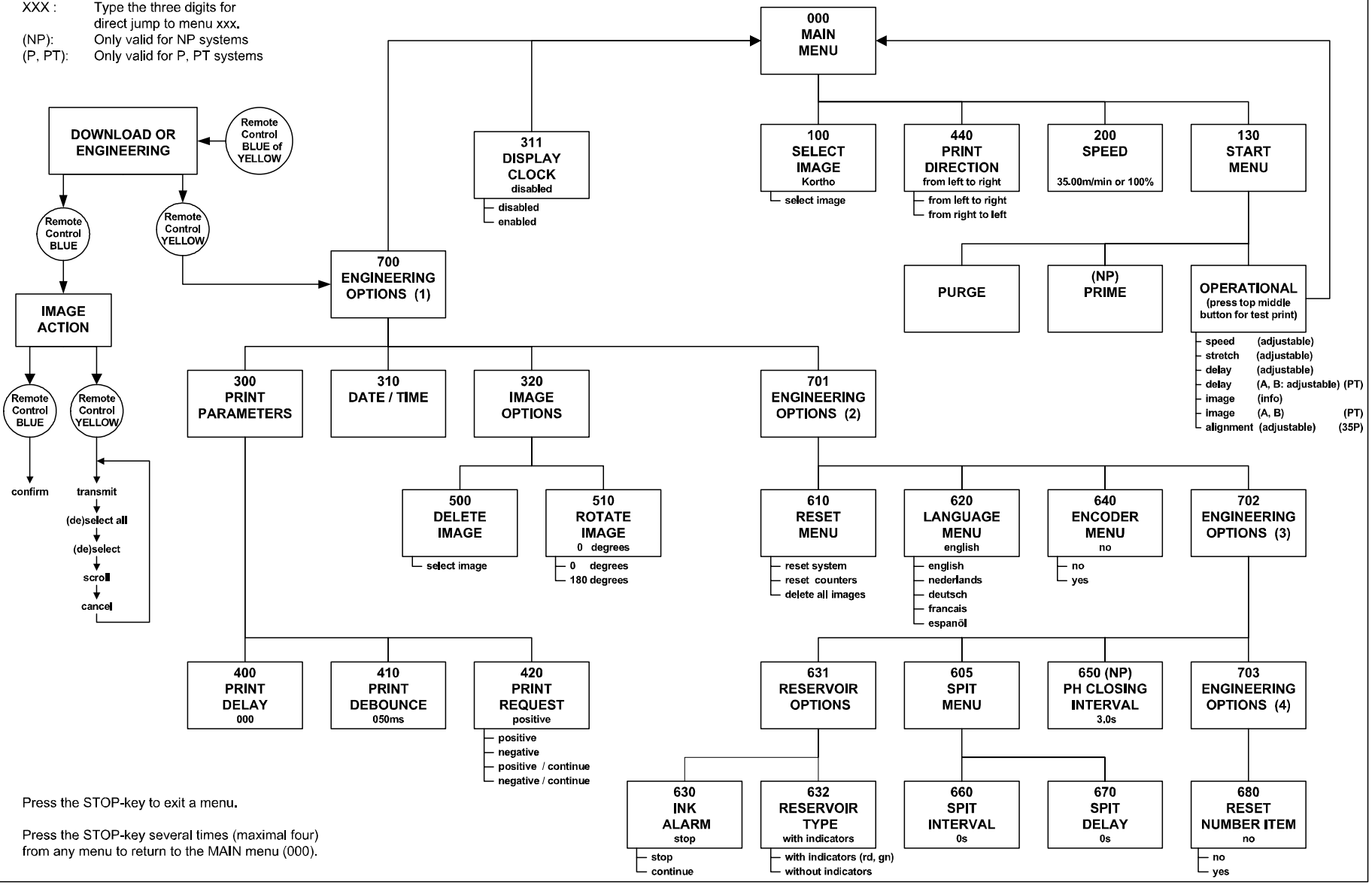
M.P.J.J. de Groot, Director
1 September 2005, Katwijk ZH, The Netherlands

GRAPHICJET 18P / 18PB

Kortho Graphicjet Series — Menu Structure

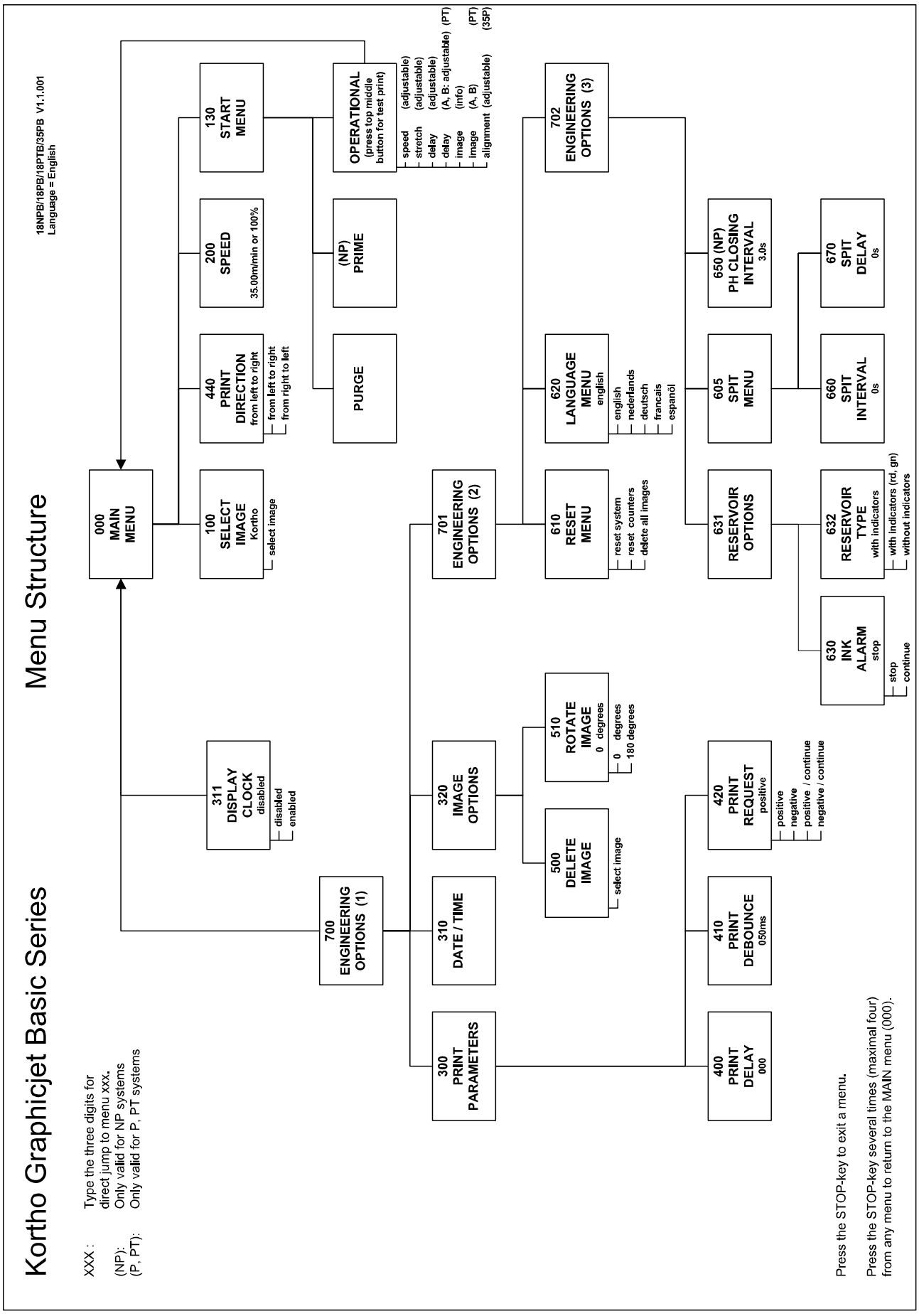
18NP/18P/18PT/35P V5.3.002
Language = English

XXX : Type the three digits for direct jump to menu xxx.
(NP): Only valid for NP systems
(P, PT): Only valid for P, PT systems



Press the STOP-key to exit a menu.

Press the STOP-key several times (maximal four) from any menu to return to the MAIN menu (000).


Kortho Graphicjet Basic Series
Menu Structure
18NPB/18PB/18PTB/35PB V1.1.001
Language = English
XXX : Type the three digits for direct jump to menu xxx.
(NP): Only valid for NP systems
(P, PT): Only valid for P, PT systems
000 MAIN MENU
100 SELECT IMAGE Kortho
select image
130 START MENU
OPERATIONAL (press top middle button for test print)
speed (adjustable)
stretch (adjustable)
delay (adjustable)
delay (A, B: adjustable) (PT)
image (info) (PT)
image (A, B) (35P)
alignment (adjustable)
200 SPEED 35.00m/min or 100%
(NP) PRIME
440 PRINT DIRECTION from left to right
from left to right
from right to left
PURGE
700 ENGINEERING OPTIONS (1)
311 DISPLAY CLOCK disabled
disabled
enabled
310 DATE / TIME
320 IMAGE OPTIONS
510 ROTATE IMAGE 0 degrees
0 degrees
180 degrees
500 DELETE IMAGE
select image
300 PRINT PARAMETERS
400 PRINT DELAY 000
410 PRINT DEBOUNCE 050ms
420 PRINT REQUEST positive
positive
negative
positive / continue
negative / continue
701 ENGINEERING OPTIONS (2)
610 RESET MENU
reset system
reset counters
delete all images
620 LANGUAGE MENU english
english
nederlands
deutsch
francais
espanol
702 ENGINEERING OPTIONS (3)
650 (NP) PH CLOSING INTERVAL 3.0s
605 SPIT MENU
660 SPIT INTERVAL 0s
670 SPIT DELAY 0s
631 RESERVOIR OPTIONS
632 RESERVOIR TYPE with indicators
with indicators (rd, gn)
without indicators
630 INK ALARM stop
stop
continue
Press the STOP-key to exit a menu.
Press the STOP-key several times (maximal four) from any menu to return to the MAIN menu (000).

Templates

KORTHO COD

Template 1: 1 line, 18 mm, Capitals

Kortho Coding &

Template 2: 1 line, 18 mm, Normal font

Kortho Coding & Ma

Template 3: 1 line, 16 mm

Kortho Coding & Marking
Kortho Coding & Marking

Template 4: 2 lines, 9 mm

Kortho Coding & Marking 1234567890

Kortho Coding & Marking 1234567890

Template 5: 2 lines, 6.5 mm

Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890

Template 6: 3 lines, 5.5 mm

Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890

Template 7: 4 lines, 4 mm

Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890

Template 8: 4 lines, 3 mm

Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890

Template 9: 5 lines, 3 mm

Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890

Template 10: 5 lines, 2.5 mm

Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890
Kortho Coding & Marking 1234567890

Template 11: 6 lines, 2.5 mm

Template 12: 6 lines, 2 mm

- Only use capital characters for template 1. Lowercase characters are possible, but the characters with decenders are moved upwards.
- The text height is calculated in mm from highest to lowest point of the font. As example: 

- The length of a template line can be up to 50 characters.
- For the GraphicJet 35PB the number of lines is doubled compared to the templates mentioned above.

bv korthofah
P.O. box: 3040
2222 AG, Katwijk
The Netherlands