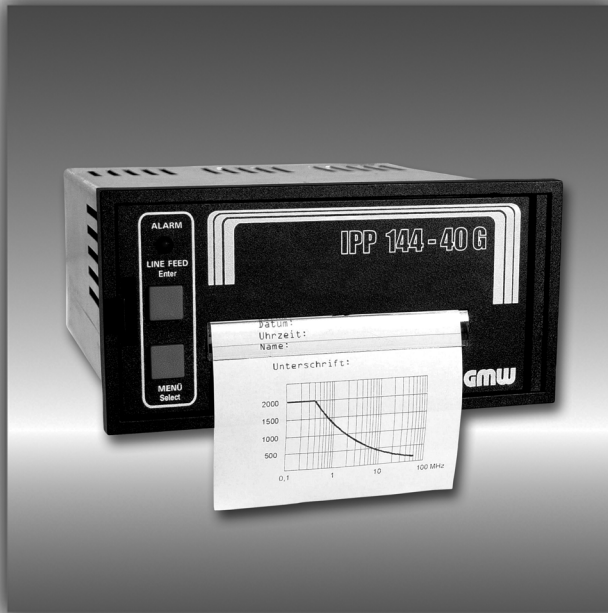**GMW** GOSSEN
Müller & Weigert

USER`S MANUAL

Thermal Graphics Printers
IPP 144 - 40 GS

Safety instructions (EN 61010-1)

In order to preclude any danger to the operator, the following instructions should be followed:

a)   In case any damage or malfunction is detected, take the unit out of operation without delay.

b)   Before disassembling the unit, disconnect all inputs / outputs and the supply voltage. When mounting the unit and the connections, make sure all live components are protected from being touched directly.

c)   Comply with the usual regulations and safety provisions for low and high current systems, in particular country-specific safety provisions (e.g. VDE 0100).

d)   The maximum admissible potential existing between the pin groups as well as to the external protective conductor must not be exceeded. Refer to the unit´s identification label.

e)   When connecting the unit to other devices (e.g. PCs), the connection must be carefully planned. Internal connections in external units (e.g. GND connected to protective earth) may cause excessive voltage potential.

f)   This device must be grounded! For low voltage $12V_{DC}$ and $24V_{DC}$ systems use screened cable. Units with a.c. supply voltage must be connected the protective conductor.

g)   Make sure that the unit is property mounted before connection and power on !

In order to preclude any damage to the unit, the following items must be taken into account:

The maximum admissible potential between the pin groups must not be exceeded.
This applies in particular to high voltage tests.

    Refer to the instruction manual !

    Warning: Hazardous live voltage !

WARNING:
There is always hazardous voltage present in certain parts during the operation of electrical equipment.
Non-observance of the safety instructions can result in severe personal injury or damage to property. Only qualified personnel should work on this equipment. The successful and safe operation of this equipment is dependant on proper transport, storage, set-up, installation and careful operation and maintenance.
QUALIFIED PERSONNEL
Are personnel who are familiar with the set-up, installation, commissioning and operation of the product and have the qualifications corresponding to their activities, e.g.:
- Are trained and authorised to energise, de-energise, clear, ground and tag circuits and equipment / systems in accordance with established safety standards.
- Are trained in the proper care and use of protective equipment in accordance with established safety practices.
- Are trained in first aid.

Safety according to EN 61010-1, VDE 0411
CAT III > 150 V 〔 300 V
Pollution degree   :   2; indoor use; altitude <2000 m; relative humidity <80 % up to 31 °C;
Temperature: 5 °C to 40 °C;

SUMMARY

Introduction

The IPP 144-40 GS is an industry-standard panel mounting printer designed for outputting data, text and graphics. It is utilised in many fields of application to give:

> fault signals
> machine / process status reports
> test reports
> production data / statistics

The thermal printing process requires no maintenance and uses commercial documentgrade thermo paper. The 80 mm width provides the optimum width-length ratio. This paper conforms to the PTB standards.

The printer prints max. 48 characters (normal font) per line. At least 4600 lines can be printed on a paper roll.

The shelf-life of a printed document is 10 years when stored in an ambient temperature of under 60 °C and a relative humidity of under 80 %.

Transmission is serial by means of an RS 232 (V24) or TTY (20 mA current loop) interface. A 16 kByte data buffer allows rapid transmission.

To format the text, IPP 144-40 GS supports the most important control characters of the siemens desktop printer PT88, e.g. bold, expanded.

A paper re-roll mechanism (optional) may be installed under the printer. A plexiglass cover allows IP64 protection.

First steps

Supplied with the printer:

> intruction manual, part no.: 27866 88139
> mounting kit
> adapter cable for connection compatibility with
> Siemens desktop printer PT88, part no.: 27866 79461

- Connect printer to the supply voltage indicated by a cross on the sticker. (see pin assignment page 6)
- Establish appropriate data connection (cable description: appendix D)
- Initiate a data transmission, e.g. hardcopy via message display, or a PC

Function description

The printout is invented and right justified, which gives the correct order after the paper has been torn off.

The IPP 144-40 GS starts the printing immediately after reception of <CR>. The control characters <CR>, <LF> and <FF> are print triggering characters. Unrecognized control characters are always ignored (Characters used: appendix E).

If a larger amount of data (more than 100 lines) must be printed at the same time, a socalled handshake controls the transmission. If the receive buffer is almost full, the printer transmits the character XOFF and activates the RTS line (neg. voltage). If the buffer contents are reduced, the printer transmits the character XON and switches the RTS line back to passive. This is also the case when:

- the printer door is open
- the printer is in menu mode
- the paper feed is empty

Pagination is possible via an internal line counter. At the end of a page the printer adds 3 blank lines. The page length is adjustable (appendix E). The character <FF> enables a form feed.

Configuration

The printer is adaptable to many different applications. the default settings are appropriate for most of them.

The set parameters are permanently stored (requires no maintenance). To avoid changing the menu parameters by accident, link jumper B, accessible from the front. This jumper is not linked at delivery. Jumper A must remain open all the times.

Locking the Menu / Select key
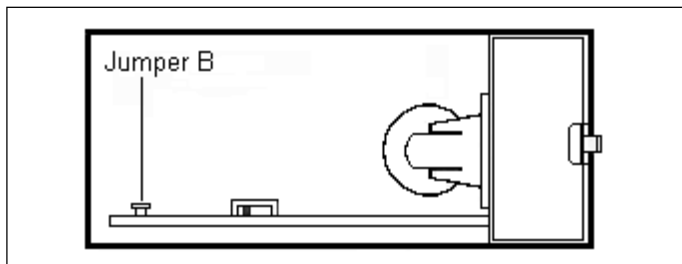
Jumper B

If the jumper B is connected, the „MENU / SELECT" key is locked; menu parameters can neither be printed or modified.

In order to print or modify parameters:
remove **jumper B** !

RESET -key

The key S102 resets the printer to the standby mode. The menu parameters will not to be changed.

S102
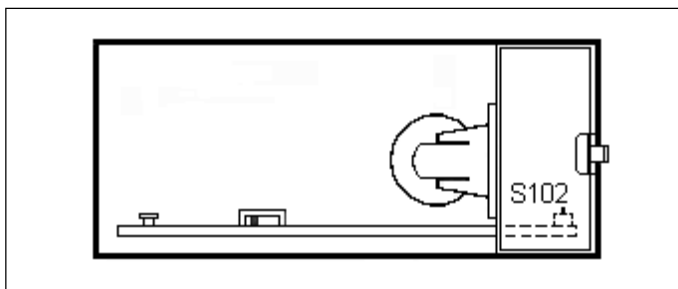
Menu Program

All functions of the IPP 144 are set via menu program using the „ENTER" and „SELECT" keys and are saved when the user quits the program.
From then the IPP 144 automatically uses these parameters.
The print format for the printout of the parameters is always NORMAL with 48 character per line, so that the parameters can be read during printing.

Entering the menu program

> Press the „Menu / SELECT" key for approx. 3 s
> The IPP 144 reacts by printing
> „ACTUAL PARAMETERS ? PRESS ENTER"

Print current parameters

> Press the „ENTER" key,
> the IPP 144 prints the currently set parameters.
>
> The final printout says
> „CHANGE PARAMETERS ?"

The menu program „Change Parameters"

> Press „ENTER" and „SELECT" simultaneously
> for approx. 4 s; the IPP 144brings up the first
> function which can be modified
> (see changing parameters)

The menu program „Change Parameters" can be called in one of two ways:

☐ **Without** prior printing of the current parameters:
Press both keys following
„ACTUAL PARAMETERS ?".

☐ **With** prior printing of the current parameters:
Press both keys following
„CHANGE PARAMETERS ?".

Changing parameters

> The IPP 144 prints one of the changeable
> parameters
> ☐ Press „ENTER" to accept the parameter
> and to move to the next function
>
> ☐ Press „SELECT" to display the next
> parameter option

<table>
<tr><td>

Quitting the menu program

</td><td>

The program is terminated by simultaneously pressing „ENTER" and „SELECT". Following the printout „END" all modified functions are saved.

</td></tr>
</table>

If there are no keys pressed over a period of approximately 2 minutes, the program is terminated automatically and any **modifications** made **are not saved**.

Setting TTY (20 mA current loop)

If the transmission to the printer must be executed by means of the TTY interface, the selection switch must be positioned to the left. Default position is right: RS 232. Slide snap lock to the right hand side, swivel front door out. Now you can see the switch S 101 on the printed circuit board.

- For RS 232 C, RS 422 and RS 485 set switch S 101 to the **right** hand side.
- For Current loop, set switch S 101 to the **left** hand side.

Pin assignment

Connect the unit as shown in the connection diagramms. Observe all national safety regulations, especially for supply power connections.

Menu program / Complete Selection

SET INTERVAL	NO ?		30
	YES ?		00
			0_
SET INTERVAL	00 h 00 min 00 sec		01
	00 h 00 min _0 sec		.
	00 h 0_ min 50 sec		.
	00 h _4 min 50 sec		09
	0_ h 34 min 50 sec		00
	_2 h 34 min 50 sec	>>>	00
>>>	12 h 34 min 50 sec	SET PRINT FORMAT	NO ?
			YES ?
SET BAUDRATE	NO ?	PRINT FORMAT	INVERSE
	YES ?		INVERSE
BAUDRATE	19200		NORMAL
	19200	>>>	NORMAL
	38400		
	110	SET CHARACTER/LINE	NO ?
	150		YES ?
	300	CHARACTER/LINE	48 CHARACTERS
	600		48 CHARACTERS
	1200		40 CHARACTERS
	2400		24 CHARACTERS
	4800		20 CHARACTERS
	9600		16 CHARACTERS
>>>	9600		8 CHARACTERS
		>>>	8 CHARACTERS
SET DATA FORMAT	NO ?	CHARACTER SET	NO ?
	YES ?		YES ?
SET DATA FORMAT	8	SET CHARACTER	ASCII
	8		ASCII
	7		GERMAN
>>>	7		FRENCH
			DANISH
SET PARITY	NO ?		NORWEGIAN
	YES ?		SPANISH
SET PARITY	NO PARITY		UK
	NO PARITY		CYRILLIC
	EVEN		ASCII
	ODD	>>>	ASCII
	MARK	SET INTERFACE	NO ?
	SPACE		YES ?
	NO PARITY	SET INTERFACE	SERIAL
>>>	NO PARITY		SERIAL
PRINTER ADDRESS	NO ?		EMUL.EPS.LQ580 ESC/P2
	YES ?		EMUL.TALLYT2024
PRINTER ADDRESS	00	>>>	EMUL.TALLYT2024
	_0		
	10		*** END ***
	20		

Print graphics directly from WINDOWS®

It is possible to print graphics, such as bmp-, jpg- or tif-, directly from W INDOWS®
programs. Set the printer INTERFACE of EMUL.EPS.LQ580 ESC/P2 or
EMUL.TALLY T2024. Use a 24-pin type WINDOWS® printer.
The following configurations have been verified:
INTERFACE: EMUL.EPS.LQ580 ESC/P2
WINDOWS® printer driver: Epson Compatible 24 PIN and Epson LQ560
Details:
If the width of the graphic exceeds the paper print width, then the excess is
discarded. It is recommended to use the auto-sizing print option in WiNDOWS®
programs, where possible.

Replacing the Paper Roll

Proceed as described below:

1. For devices with a.c. power supply be very careful.

Warning: Dangerous voltage
        is accessible if replacing the paper roll after opening of the front panel !

2. Push the snap lock to the right hand side and open the front panel.

3. Tilt the wire frame upwards; remove the old paper roll.

4. Insert new paper roll; make sure it rotates clockwise during printing (see left side of the figure).

5. Trim the leading edge of the paper roll to get a clean straight edge (see right side of the figure). Insert paper into bottom of print mechanism (as shown in the diagram below) until roller automatically takes it up.

6. Press the „LINE FEED / ENTER" key until the paper appears at cutting edge.

7. If you have fed too much paper, carefully rewind the roll. push the wire frame back over the roll.

8. Close the front panel (snap lock must lock). The Alarm LED extinguishes and the printer is ready.

ACHTUNG !
PAPIER RICHTIG EINLEGEN
POSITION CAREFULLY THE PAPER
ATTENTION À LA MISE EN PLACE DU PAPIER !
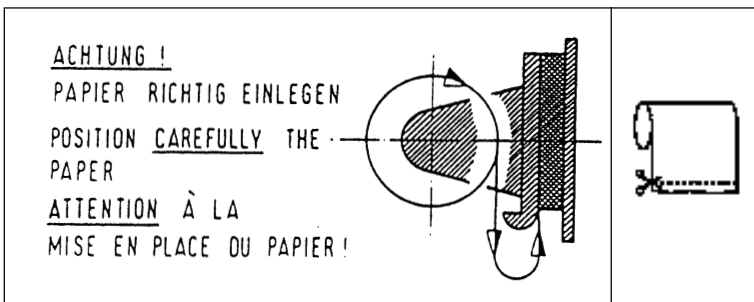
Possible errors

If there is no printout or if the printout is incorrect, verify the following:
- Has the paper run out? The end of paper is indicated by the „Alarm" LED.
- Did you insert the paper properly?
- Do the baud rate, parity and word length of both units correspond?
- Is the data cable disconnected? Does the pin assignment correspond to the description?
- Is the setting „RS232/TTY" correct?
- Is the transmitter transmitting? It can be tested electically on the printer line RxD by means of a measuring device.

The menu cannot be printed:
- Is the voltage supply correct? By pressing the „Line Feed" key, the paper scroll one line.

Blank lines appear without any reason:
- Text coming from the transmitter has more than 48 characters per line (24 in wide font). Blank characters are probably presnet between the text and character <CR>. The number of characters must be restricted to 48 (or 20) characters per line.

Accessories

Spare paper:
- 80mm document grade: item munber 49234 86910 Contains: 10 rolls.

Cable:
- The Printer can be connected to all cable of the PT 88 (Siemens desktop printer) via the screw-in adapter. The appropriate designation can be found in the Siemens catalogue. item mumber 27866 79461

Paper re-roll mechanism:
    Item number 57200 00000

The IPP-AW is a paper re-roll device specially designed for use with the IPP 144-40 GS. It can be installed directly underneath the printer. The printed paper is automatically wound onto a drum by a motor. All pull-out front panel allows easy paper handling (insertion, removing).

The paper re-roll device is a DIN-specifiction panel mounting unit. It is supplied with power and controlled via the connector cable which comes with the unit. An LED indicates ready status. Depending on the distance between the two units at least the last 9 lines printed remain visible.

The paper re-roll device is inserted into the panel cut-out from the front and is clamped against the rear side of the switchborad using the lateral mounting bolts.The switchboard thickness must not exceed 12mm.
Operational principle: electromotor with friction clutch, electronically controlled.

⚠ Protective conductor connection must be connected (to ground).

Design

Front   Rear
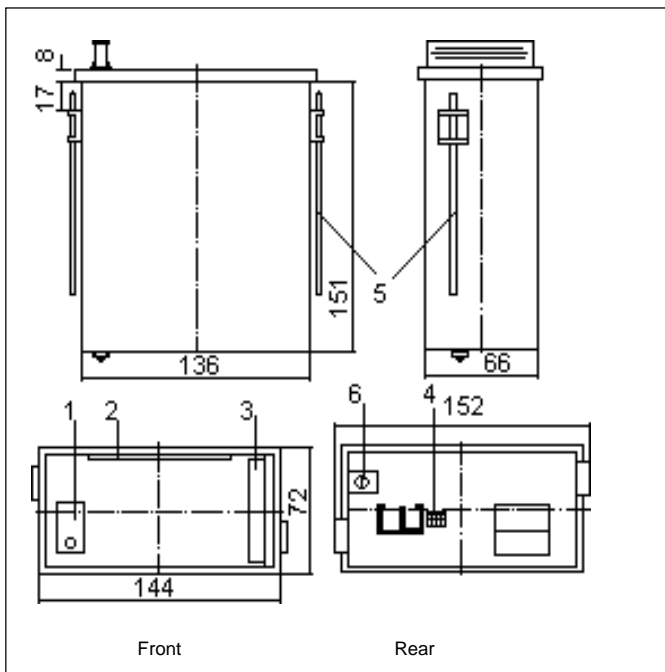
1	Status indicator	2	Opening for paper feed
3	Handle	4	Connector for connection
5	Mounting screws		cable IPP 144-40 GS
6	Protective conductor connection		(pin connection: Motor
	(must be connected to ground)		control, +5 V, open, GND)

Installation
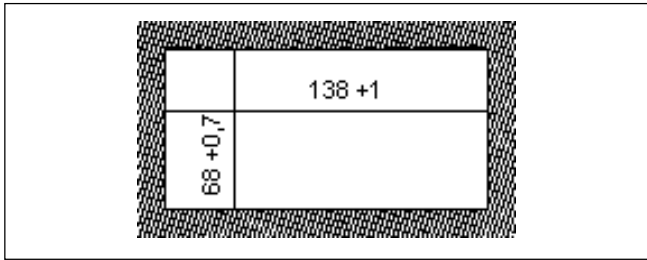
Make sure that the unit is properly mounted before connection and power on.

Operation
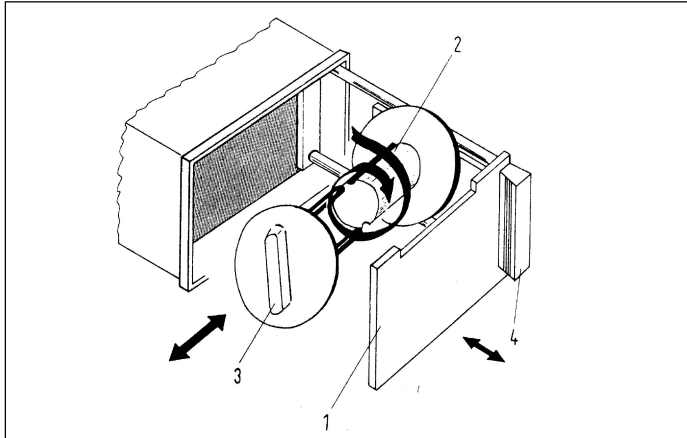
Removing the paper

➡ Use the handle (4) to pull out the front panel (1).

➡ Remove the holder (3) with the paper from roll body, rotate the notch of the holder as show in the diagram.

➡ Remove the paper drum from the holder.

Inserting the paper

➡ Wind the paper once around the drum body (2) in the direction indicated by the arrow.

➡ Plug in the holder (3) in such a way that the pins fit into the notches of the body.

➡ Close the front panel.

➡ Briefly press the „LINE FEED" key at the IPP 144 - 40 GS until the paper has been straightened out.

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Technical Data

Winding	Motor with friction clutch, electronic lag 3 sec	
	Paper width:	max. 80 mm
	Paper length:	max. 15 m
Ambient conditions	Store temperature range:	-20 °C to +80 °C
	Operating temperature range:	0 °C to +70 °C
	Climate:	relative humidity < 80 % up to 31 °C
Standards	Protection type housing:	IP 50 acc. to EN 60528/VDE 0470
	Mech.strength:	To IEC 1010
	Safety:	EN 61010-1:2001 CATIII >150V≤300V Pollution degree 2
	EMC Susceptibility:	DIN EN 610004-1 to EN 610004-4
	Emission:	DIN EN 50081-2 Class B
Miscellaneous	Dimensions (WxHxD):	144 x 72 x 159 mm
Connection	Connector:	MASCON female multi point connector, 4 pin keyed
	Connector cable:	AWG 26, approx. 100mm
	Power supply:	by IPP (5 V DC)
	CE	

Maintenance friction clutch

The torque of the friction clutch has been factory adjusted and should not require adjustment.

The winding force of the motor can be adjusted by slightly rotating the screw accessible through the left hand side hole in the body:

➡ **less   = turn left**
➡ **more   = turn right**
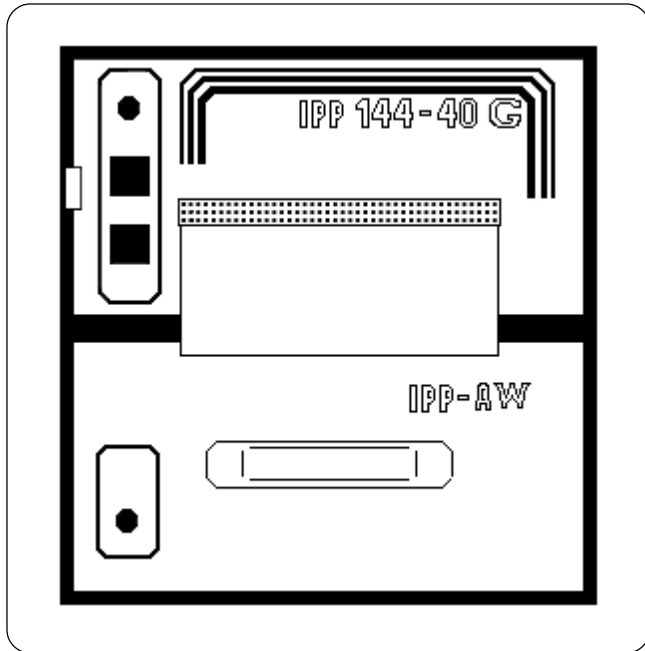
Plexiglass cover
- The plexiglass cover allows IP64 protection. It is latched on the front
  panel of the device.
  Item number 27863 15940
- Dimensions: 155 x 155 mm
- Material: Plexiglass and Santoprene 101-80 caoutchouc

Appendix A: Design and installation

Design
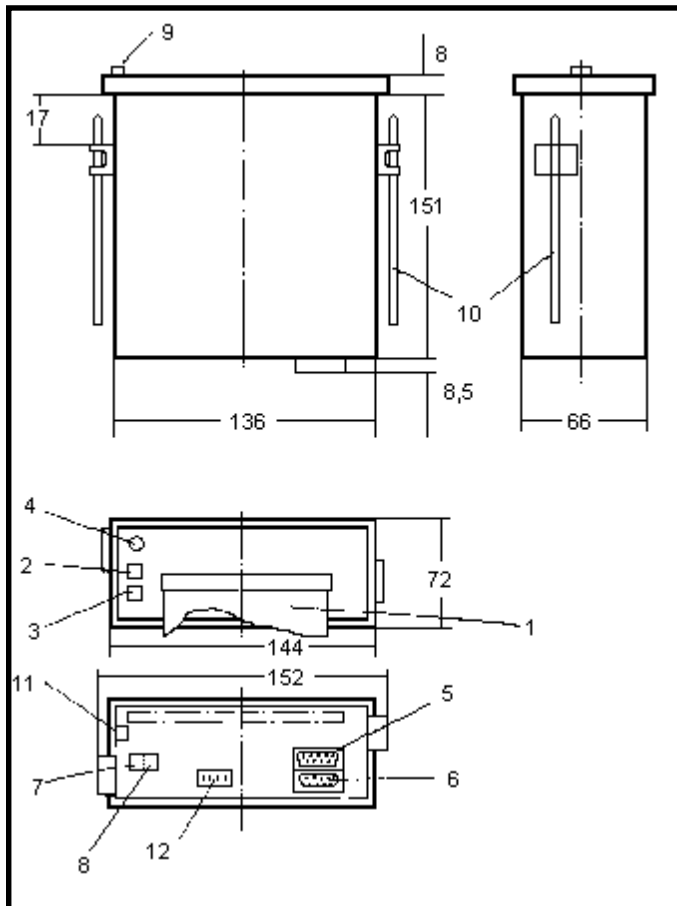
1	Paper and cutting edge	8	alarm contact (paper end only version E)
2	Key: LINE / FEED / Enter	9	Snap lock
3	Key: MENU / Select	10	Mounting screws
4	Alarm LED (paper end indicator)	11	Protective conductor connection. Must be connected to ground.
5	Serial interface Interface II (only version E)		
6	Serial Interface I	12	Connection / paper reroll mechanism IPP-AW
7	Voltage supply		

Make sure that the unit is properly
mounted before connection and power on.

Installation
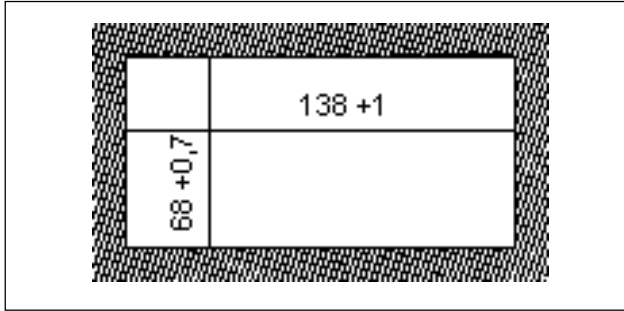
The IPP 144 - 40 G fits into a DIN standard panel cut out. It is inserted into the switchboard opening from the front side and is fixed against the switchboard rear using mounting screws. The switchboard thickness must not exceed 12 mm.

Appendix B: Technical Data

Print mechanism

Type of printing	Fixed head thermal line
Character representation	576 dots/line, 8 dots/mm
Print speed approx.	15 line/s (standard text mode)
Character/line	48 characters
	40 characters
	24 characters
	20 characters
	16 characters
	8 characters
Character height	3 mm at 48/40 characters
	4 mm at 24/20 characters
	9 mm at 16 characters
	18 mm at 8 characters
Character sets	ASC II, german, french, danish, norwegian, swedish / finnish, spanish, english, cyrillic
Service life	min. 10×10^6 Impulse or 50 km

Paper		
	Type	commercial grade, document proof thermal paper
	Width	80 mm (+0 / -1 mm)
	Length	approx. 14 m (approx. 4.600 line up to 48 characters per line)
	Max. outer roll diameter	40 mm
	Min. inner roll diameter	11,5 mm
	Temperature	standard paper: 0 °C to 60 °C
Input buffer	Serial	16 kB
Serial Interface I	Type	RS 232 C; RS 422; RS 485 or Current loop
	Baudrate	110; 150; 300; 600; 1200; 2400; 4800;9600;19200; 38400
	Data format	7 bit / 8 bit [1]
	Parity bit	even, odd, mark, space, no [1]
Voltage supply	Safety	acc. to EN 61010-1:2001 CAT III > 150 V $\leq$ 300 V pollution degree 2
	DC	10 V ... 19 V approx. 20 VA[2]
		19 V ... 36 V apprpx. 18 VA[2]
	AC	85 V ... 265 V , 45 - 65 Hz, approx. 15 W switch-mode power supply
Ambient conditions	Storage temperature range	-20 °C to +60 °C
	Operating temperature range	0 °C to +45 °C
	Climate	relative humidity < 80 % up to 31 °C

[1] With 7 bit no parity, the sender must be set to 2 stoppbits.

[2] Starting current approx. 1,6 A (at 12 V) or approx. 0,8 A (at 24 V). This value can be used to rate the external fuse.
Attention! Higher current demand like the predecessor typ IPP 144-40.

Standards		
	Protection type	acc. to EN 60529/VDE 0470
	housing	IP 50
	terminals	IP 00
	Insulation group	C acc. to VDE 0110
	Mech. strength	acc. to IEC 1010
	EMC	
	Emission	EN 55011, Class A
		EN 55022, Class B
	Susceptibility	EN 61000-4-2 B
		EN 61000-4-3 A
	CE	EN 61000-4-4 B

Connections		
	Voltage supply	Screw type/terminals
		fixed: 0,2 to 4 mm²
		flexible: 0,2 to 2,5 mm²
		AWG: 24 to 12
	Interface I	9pin D-Sub socket
	Interface II	9 pin D-Sub socket or
		USB-B socket
	Connection for paper reroll mechanism	4pin MASCON, MLAS
	Connection for Alarm relay output	Screw type/terminal
		fixed: 0,2 to 4 mm²
		flexible: 0,2 to 2,5 mm²
		AWG: 24 to 12
		normally open
		50 V AC, 2 A
		30 V DC, 2 A

	Dimensions (W x H x D)	144 x 72 x 159 mm
Miscellaneous	Switchboard mounting	screws against rear side of switchboard
	Internal fuse (on power supply board)	12V DC : T 3,15 A
		24V DC : T 2 A
		110V - 230V AC : T 2 A

This operating manual applies to software version 5.01.06 and higher

Appendix D: Connections

The support of the XON/XOFF protocol depends on the PC (or PG) software. This handshake is necessary if more than 100 lines are to be transmitted at one time (4k/40) and is not possible with transmission mode TTY.

RS232

PC - PG   25 pin and CP 521 B

IPP 9 pin Socket	Pins	Socket	P C 25 pin Pins 2)
RXD	—— 2 ——	—— 2 ——	TXD
TXD 1)	—— 6 ——	—— 3 ——	RXD
RTS	—— 8		
GND	—— 1 ┐	7 ——	GND
Sig. GND	—— 5 ┘	┌ 5 ——	CTS
		└ 4 ——	RTS
		┌ 6 ——	DSR
		└ 20 ——	DTR

1) With ITT standard cable, this connection is made to pin 4.
2) New series PGs have sockets. Please specify „Gender Changer" on the order form. Item number: 27866 79500

PC - PG   9 pin

IPP 9 pin Socket	Pins	Socket	P C 9 pin Pins
RXD	—— 2 ——	—— 3 ——	TXD
TXD	—— 6 ——	—— 2 ——	RXD
RTS	—— 8		
GND	—— 1 ┐	5 ——	GND
Sig. GND	—— 5 ┘	┌ 8 ——	CTS
		└ 7 ——	RTS
		┌ 6 ——	DSR
		└ 4 ——	DTR

DAA   25 pin   Item number: 27866 79438

IPP 9 pin Socket	Pins	Pins	DAA 25 pin Socket
RXD	—— 2 ——	—— 2 ——	TXD
TXD	6		RXD
RTS	—— 8 ——	—— 5 ——	CTS
GND	—— 1 ┐	7 ——	GND
Sig. GND	—— 5 ┘		

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TD/OP   15 pin

```
| IPP                                          TD/OP
| 9 pin                                        15 pin
| Socket      Pins            Pins             Socket
| ────────────────────────────────────────────────────
| RXD        ──2 ────────────── 4 ──────      TXD
| TXD        ──6 ────────────── 3 ──────      RXD
| RTS        ──8          ┌── 12 ──────
| GND        ──1          │   15 ──────       GND
| Sig. GND ── 5 ──────────┘    5 ──────       CTS
|                         └── 10 ──────       RTS
|                         ┌── 8 ──────
|                         └── 1 ──────        Protection
```

Only with XON/XOFF protocol

CP 524 and CP 525   25 pin

```
| IPP                                          C P
| 9 pin                                        25 pin
| Socket      Pins            Pins             Socket
| ────────────────────────────────────────────────────
| RXD        ──2 ────────────── 2 ──────      TXD
| TXD        ──6 ────────────── 3 ──────      RXD
| RTS        ──8 ──────┐        5 ──────      CTS
| GND        ──1       │        7              GND
| Sig. GND     5 ──────┘
```

CP 521   25 pin

```
| IPP                                          C P
| 9 pin                                        25 pin
| Socket      Pins            Pins             Socket
| ────────────────────────────────────────────────────
| RXD        ── 2 ───────────── 11 ──────     TXD
| TXD        ── 6 ───────────── 3 ──────      RXD
| RTS        ── 8 ───────────── 9 ──────      CTS
| DTR        ── 7 ───────────── 7 ──────      DSR
| GND        ── 1 ──┐            2 ──────      GND
| Sig. GND   ── 5 ──┘        ┌── 21 ──────
|                           └── 23 ──────
```

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TTY

passive

DAA 25 pin

```
┌─────────────────────────────────────────────────────────────────┐
│  IPP  passive                                      DAA active     │
│  9 pin                                             25 pin         │
│  Socket          Pins              Pins            Socket         │
│  ─────────────────────────────────────────────────────────────   │
│  RXD+          ──── 2 ────────────── 9 ────        CST+           │
│  5V 20mA       ──── 3 ──┐                                         │
│                         │ ▭ 100                                   │
│                ──── 4 ──┘                                         │
│  GND           ──── 1 ──┐           10 ────        CST-           │
│  Sig. GND      ──── 5 ──┘                                         │
└─────────────────────────────────────────────────────────────────┘
```

OP/TD   15 pin

```
┌─────────────────────────────────────────────────────────────────┐
│  IPP  passive                                      TD/OP active   │
│  9 pin                                             15 pin         │
│  Socket          Pins              Pins            Socket         │
│  ─────────────────────────────────────────────────────────────   │
│  RXD+          ──── 2 ────────────── 7 ────        TXD-           │
│  5V 20mA       ──── 3 ──┐    ┌──── 11 ────        +24V 20mA       │
│                         │▭100│      6 ────        TXD+            │
│                ──── 4 ──┘    └──                                  │
│  GND           ──── 1 ──┐          15 ────        GND             │
│  Sig. GND      ──── 5 ──┘                                         │
└─────────────────────────────────────────────────────────────────┘
```
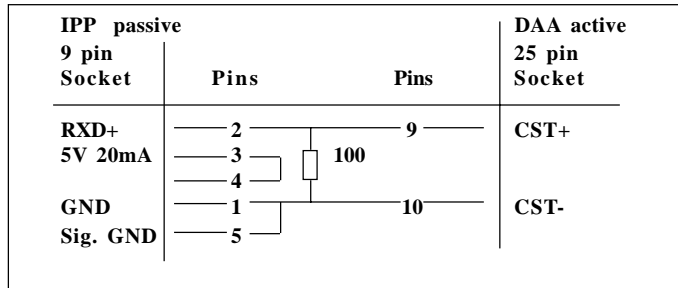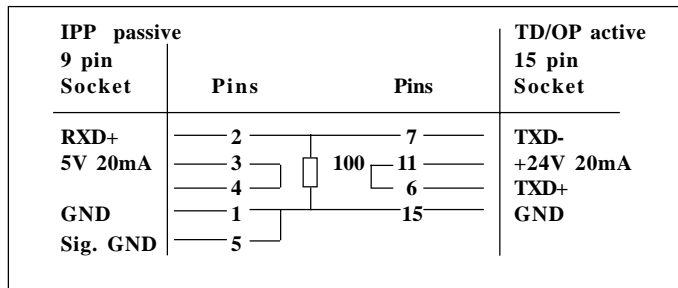
Appendix E: Control characters

Print Commands

LF	Line feed
CR	Carriage return
ESC J n	Prints and feeds paper
ESC d n	Prints and feeds paper by n lines

Print Character Commands

ESC % n	Specifies/clears download character set
ESC - n	Specifies/clears underline
ESC R n	Selects international character
ESC V n	Specifies/clears character rotation
GS ! n	Specifies character size

Print Position Commands

HT	Horizontal tab
ESC $ nL nH	Specifies absolute position
ESC D	Specifies horizontal tab position

Bitmap image Commands

ESC * m nL nH	Specifies column bitmap image
ESC A* nL nH	Specifies raster bitmap image
GS * x y	Defines download bitmap image
GS / m	Prints download bitmap image

Line Feed Commands

ESC 2	Specifies initial line feed
ESC 3 n	Specifies line feed

Barcode Commands

GS H n	Selects print position of HRI character
GS h n	Sets barcode height
GS w n	Sets width of barcode
GS k m / GS k m n	Prints barcode

Print Commands

Line feed **Command: LF**
<< Code >>
0x0A
<< Function >>
Moves the print position to the start of the next line after execution.

Carriage return	**Command: CR**
	<< Code >>
	0x0D
	<< Function >>
	Executes the same action as (LF: „Line feed") if auto line feed is effective. This command is ignored if auto line feed is not effective.

Prints and feeds paper	**Command: ESC J n**
	<< Code >>
	0x1B , 0x4A , n (0≦n≦255)
	<< Function >>
	Prints the data in the print buffer and feeds paper by (nx8) dots.

Prints and feeds paper by n lines	**Command: ESC d n**
	<< Code >>
	0x1B , 0x64 , n (0≦n≦255)
	<< Function >>
	Prints the data in the print buffer and feeds paper by n lines.
	<< Details >>
	Moves the print position to the start of the next line after execution.
	Has not effect on the number of line feed set by the following commands:
	ESC 2:" Sets initial line feed"
	ESC 3: „Sets line feed"

Print Character Commands

Specifies / clears character rotation	**Commands: ESC V n**
	<< Code >>
	0x1B , 0x56, n (0≤n≤3 , 48≤n≤51 , initial value n=0)
	<< Function >>
	Specifies or clears character rotation.
	The definition of parameters is as follows

n	Function
0, 48	Cancels rotation
1, 49	Specifies 90-degree rigth rotation
3, 51	Specifies 90-degree left rotation

<< Details >>
  Specifies 180-degree rotation (Inverse-Print)
  see menu program.
  Rotated characters are not underlined even if character
  rotation is specified (ESC !), (ESC -) or (FS -).
  If a 90-degree right or left rotation is specified , the vertical
  and horizontal magnifications of a character specified
  before the rotation is reversed.

Specifies /
clears
underline

Command: ESC - n
<< Code >>
0x1B , 0x2D, n ($0 \leq n \leq 2$, $48 \leq n \leq 50$, initial value n=0)

<< Function >>
Specifies or clears an underline

n	Function
0, 48	Clears underline
1, 49	Sets a 1-dot wide underline and specifies an underline
2, 50	Sets a 2-dots wide underline and specifies an underline

<< Details >>
  Rotated characters (ESC V) are not underlined.
  If the underlining of characters is cleared with n=0 or
  n=48, subsequent data are not underlined but the
  previously set under size is retained. In addition,
  a one-dot underline is set by default.
  The size of an underline is the same for all character
  sizes as specified.

Specifies
character size

Command: GS ! n
<< Code >>
0x1D , 0x21, n
($0 \leq n \leq 255$, $1 \leq$ vertical magnification ≤ 8 ,
$1 \leq$ horizontal magnification ≤ 8 , initial value n=0)

<< Function >>
Specifies character size (vertical and horizontal
magnification)

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Bit	Function	Value	
		0	1
0			
1	vertical		
2	magnification	see Table 2	
3			
4			
5	horizontal		
6	magnification	see Table 1	
7			

Table 1

bit7	bit6	bit5	bit4	Magnification
0	0	0	0	1 (Std.)
0	0	0	1	2 (horizontal)
0	0	1	0	3
0	0	1	1	4
0	1	0	0	5
0	1	0	1	6
0	1	1	0	7
0	1	1	1	8

Table2

bit3	bit2	bit1	bit0	Magnification
0	0	0	0	1 (Std.)
0	0	0	1	2 (vertical)
0	0	1	0	3
0	0	1	1	4
0	1	0	0	5
0	1	0	1	6
0	1	1	0	7
0	1	1	1	8

<< Details >>
This command is ignored if either a vertical or horizontal magnification is outside the definable range.
In the standard mode, the vertical direction refers to the direction of paper feed, and the horizontal direction the direction right to the direction of paper feed. If characters are 90-degree right or left are specified, the relationship of the vertical and horizontal directions is reversed.
If characters with different vertical magnifications are contained in the same line, they are aligned to the baseline.

Specifies / **Command: ESC %n**
clears << Code >>
download 0x1B , 0x25 , n (0≤n≤255 , initial value n=0)
character set

<< Function >>
Specifies or clears a download character set.
Only the lowest bit of n is effective. Download character setting is specified if n=1 and cleared if n=0.

<< Details >>
 Automatically specifies the internal character set if the
 downloading of a character set is cleared.

Selects international character

Command: ESC R n
<< Code >>
0x1B . 0x52 , n (0≦n≦13 , initial value n=0)

<< Function >>
Selects the following international character sets.
where n means:

n=0	USA	n=7	Spain 1
n=1	France	n=8	Japan
n=2	Germany	n=9	Norway
n=3	UK	n=10	Denmark 2
n=4	Denmark 1	n=11	Spain 2
n=5	Sweden	n=12	Latin America
n=6	Italy	n=13	Korea

Print Position commands

Horizontal tab

Command: HT
<< Code >>
0x09

<< Function >>
Moves the print position to the next horizontal tab position.

Specifies absolute position

Command: ESC $ nL nH
<< Code >>
0x1B , 0x24, nL , nH (0≤nL≤255 , 0≤nH≤255)

<< Function >>
Specifies the next print start position as an absolute position
based on the left margin position.
The next print start position is (nL + nH x 256) dots away
from the left margin position.

<< Details >>
 A print start position specified outside the print area is
 ignored.

Sets	**Command: ESC D n1~nk NULL**
horizontal tab	<< Code >>
position	0x1B , 0x44 , n_1~n_k (k bites) , 00H ($1 \leq k \leq 32$, $1 \leq n \leq 255$)

Selects a tab position every 8 characters (at 9th point , 17th point, 25th point ...), if the setting for character right space = 0.

<< Function >>
Sets horizontal tab positions.
n refers to the number of points to the tab position from the left amrgin or the start of line.
k indicates the number of data of horizontal tab positions to be set.

<< Details >>
A tab position to be set is (n x character width) from the left margin or the start of line. Character width includes the right space of character (ESC SP), and increases in proportion to the horizontal magnification of the character if the magnification is larger than two.
After this coommand is executed, the previously set horizontal tab positions are cleared.
If n=8 is set for horizontal tab position, the next print start position is moved to the 9th point by (HT: „Horizontal tab").
The maximum allowable number of horizontal tab positions is 32 (k=32). If this is exceeded, subsequent data is treated as normal data.
Enter n1~ nk for specifying tab positions in ascending order. The data is ended with an 00H input. If n is equal to or smaller than the previous value, the horizontal tab setting process stops and subsequent data is processed as normal data.
Use (ESC D NULL) to clear all horizontal tab positions.
Even if character width is changed after setting horizontal tab positions, the set horizontal tab positions are retained.

Bitmap image Commands

Prints column bitmap image

Commandl: ESC *m nL nH d1~dk

<< Code >>

0x1B , 0x2A , m , nL , nH , d1~dk

where: m=0, 32, $0 \leq nL \leq 255$, $0 \leq nH \leq 3$, $0 \leq d \leq 255$

<< Function >>

Specifies a bitmap image in mode m for the number of dots specified by nL and nH.

m	Mode	No. of vertical dots	No. of Data (K)
0	8-dot single density	8 dots	nL+nHx256
1	8-dot double density	8 dots	nL+nHx256
32	24-dot single density	24 dots	(nL+nHx256)x3
33	24-dotdouble density	24 dots	(nL+nHx256)x3

<< Details >>

Processes the data after nL as normal data if m is outside the definable range.

nL and nH denote the number of horizontal dots of the bitmap image to be printed, which is (nL+nHx256).

If bitmap image data exceeding the number of printable dots in a line is entered, the excess data is discarded.

d denotes bitmap image data. The bit for the dot to be printed is „1" and the bit the dot not to be printed is „0".

Returns to normal data processing after bitmap image processing.

Has no effect on print modes (underline, character size) excluding NORMAL.

Prints the entered bitmap image magnified three times in the vertical direction if m=0 or 1 (8-dot mode) is specified and two times in the horizontal direction if m=0 or 32 (single density mode) is specified.

The data format of a bitmap is as follows:

Bitmap-Data format

Dot	Col.1	Col.2		Col.n	
1 : 8	d1	d4	....	d 3n-2	MSB
9 : 16	d2	d5	....	d 3n-1	
17 : 24	d3	d6	....	d 3n	LSB
	d 3(n+1)-2	d 3(n+2)-2	....	d 6n-2	
	d 3(n+1)-1	d 3(n+2)-1	....	d 6n-1	
	d 3(n+1)	d 3(n+2)	....	d 6n	

Prints raster bitmap image

Command: ESC A* nL nH d1~ dk

<< Code >>

0x1B , 0x41 , 0x2A , nL , nH , d1~dk

where: $0 \leq nL \leq 255$, $0 \leq nH \leq 255$, $0 \leq d \leq 255$

<< Function >>

Specifies the raster bitmap image specified with
(nL + nH x 256) lines in the vertical direction.

<< Details >>

This command is effective only if this command is
entered at the start position of a line in the standard
mode.

d refers to bitmap image data. The bit for the dot to be
printed is „1" and the bit for the dot not to be printed is
„0".

The required number of image data per line is as follows
depending on the number of heating elements in the
head:

dots of heating element	192 dots	288 dots	384 dots	576 dots
No. data per line	24 bytes	36 bytes	48 bytes	72 bytes

The required total number of bitmap image data is
((nL + nH x 256) x no. of data per line) bytes.

The format of bitmap data for a printer with n heating elements in the head is as follows:

| MSB | | | | | | | | LSB |

d1	d2	d3	......	d (n/8)
d (n/8)+1	d (n/8)+2	d (n/8)+3	......	d (2n/8)
d (2n/8)+1	d (2n/8)+2	d (2n/8)+3	......	d (3n/8)

:
:

			....	
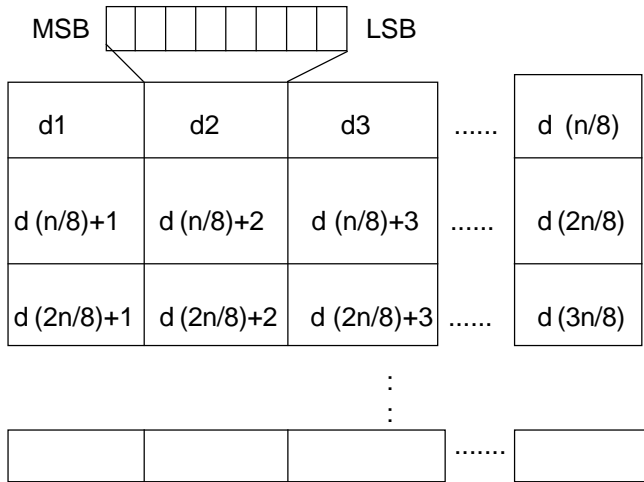
Defines download bitmap image

Command: GS * xy [d1] ... [d]x X y X 8

<< Code >>

0x1D , 0x2A , x , y , [d1] ~ [d]x X y x 8
where:
$0 \leq x \leq 255$
$0 \leq y \leq 48$, where: x X y ≤ 1536
$0 \leq d \leq 255$

<< Function >>
This command downloads bitmap image into the font ROM, for example logos. The parameters x and y define the dimension of the bitmap image.

<< Details >>
Frequent use of this command may cause damage to the option font ROM. It is recommended to use this command no more than 10 times a day.
The number of dots in the horizontal and vertical direction is x X 8 dots and y X 8 dots respectively.
x specifies the number of dots in the horizontal direction.
y specifies the number of dots in the vertical direction.
d refers to bitmap image data. The bit for the dot to be printed is „1" and the bit for the dot not to be printed is „0".

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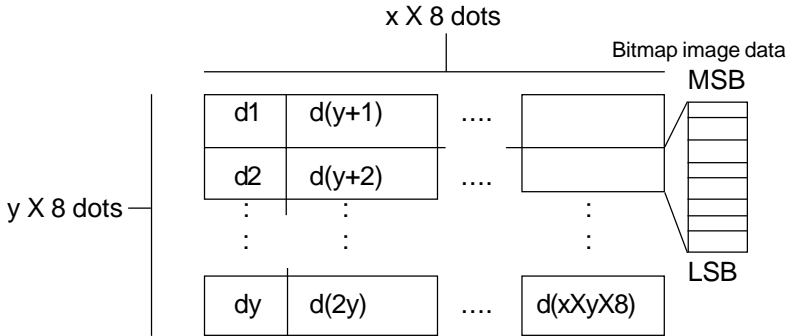The relationship between a download bitmap image and print data is as follows:

Print download bitmap image

Commandl: GS / m

<< Code >>
0x1D , 0x2F , m (0≤m≤3 , 48≤m≤51)

<< Function >>
Prints the defined downloaded bitmap image.
m specifies the required print mode.

m	Print mode
0, 48	Normal mode
1, 49	Double-with mode
2, 50	Double-height mode
3, 51	Double-height/width mode

<< Detail >>
  This command is ignored if download bitmap image data is not defined.
  Effective only when no data is contained in print buffer if standard mode is selected.
  Has no effect on print modes (underline, character size) excluding NORMAL.
  If the number of the defined download bitmap data exceeds the print area, the excess data is not printed.
  the maximum print width is 72 mm (576 dots per line).

Line Feed Commands

Sets initial line feed

Command: ESC 2

<< Code >>
0x1B , 0x32

<< Function >>
Sets the amount of the initial line feed per line to 30 dots.

<< Details >>:
The amount of the initial line feed can be set separately for the standard mode.

Sets line feed

Command: ESC 3n

<< Code >>
0x1B , 0x33 , n ($0 \leq n \leq 25$, initial value n=60)

<< Function >>
Sets the amount of line feed per line to n dot.

<< Details >>
Line feed can be set separately for the standard mode.

Barcode Commands

Selects printing position of HRI character

Command: GS H n

<< Code >>
0x1D , 0x48 , n ($0 \leq n \leq 3$, $48 \leq n \leq 51$, initial value n=0)

<< Function >>
Selects the print position of HRI characters when printing a barcode.

<< Details >>
HRI refers to Human Readable Interpretation.
The HRI character font for barcode printing is fixed as FONT A (12x24).

Sets barcode height

Command: GS h n

<< Code >>
0x1D , 0x68 , n ($1 \leq n \leq 255$, initial value n=162)

<< Function >>
Sets barcode height to n dots.

Sets width of barcode

Command: GS w n

<< Code >>

0 x 1D , 0 x 77 , n (2≤n≤6 , initial value n=3)

<< Function >>

Specifies barcode width.

n	Module width of multi-level-barcode (dots)	2-level-barcode	
		Thin bar width (dots)	Thick bar width (dots)
2	2	2	5
3	3	3	9
4	4	4	11
5	5	5	14
6	6	6	18

<< Details >>

The multi-level-barcode refers to the following barcode systems:

- A) UPC-A
- B) UPC-E
- C) JAN13
- D) JAN8
- E) CODE93
- F) CODE128

The 2-level-barcode refers to the following barcode systems:

- A) CODE39
- B) ITF
- C) CODABAR

Prints barcode

Command: GS k m d1~ dk NULL/GS k m n d1~ dn

<< Code >>

0x1D , 0x6B , m , d1~ dk 00H   (0≤m≤6 , the definable range of k and d varies with m.)

0x1D , 0x6B , m , n , d1~ dn   (65≤m≤73 , the definable range of n and d varies with m.)

<< Function >>

Selects a barcode system and prints barcodes.

.

m	Barcode-System	Definable range of k	Definable range of d
0	UPC-A	fixed (11≤k≤ 12)	48≤d≤ 57
1	UPC-E	fixed (11≤k≤ 12)	48≤d≤ 57
2	JAN13 (EAN)	fixed (12≤k≤13)	48≤d≤ 57
3	JAN8 (EAN)	fixed (7≤k≤ 8)	48≤d≤ 57
4	CODE39	variable (1≤ k)	48≤d≤ 57 65≤d≤ 90 32,36,37,43,45,46,47
5	ITF	variable (1≤ k, even number)	48≤d≤ 57
6	CODABAR	variable (1≤ k)	48≤d≤ 57 65≤d≤ 68 36,43,45,46,47,58

In the case of GS k m n:

m	Barcode-System	Definable range of k	Definable range of d
65	UPC-A	fixed (11≤n≤ 12)	48≤ d≤ 57
66	UPC-E	fixed (11≤n≤ 12)	48≤ d≤ 57
67	JAN13 (EAN)	fixed (12≤n≤13)	48≤ d≤ 57
68	JAN8 (EAN)	fixed (7≤n≤ 8)	48≤ d≤ 57
69	CODE39	variable (1≤ n≤ 255)	48≤ d≤ 57 65≤ d≤ 90 32,36,37,43,45,46,47
70	ITF	variable (1≤ n≤ 255, even number)	48≤ d≤ 57
71	CODABAR	variable (1≤ n≤ 255)	48≤ d≤ 57 65≤ d≤ 68 36,43,45,46,47,58
72	CODE93	variable (1≤ n≤ 255)	0≤ d≤ 127
73	CODE128	variable (2≤ n≤ 255)	0≤ d≤ 127

<< Details >>

In the case of GS k m:

This command is terminated by the NULL code.
In the case of UPC-A and UPC-E, after 12 bytes of barcode data are entered, the barcode is printed, and subsequent data is processed as normal data.
In the case of JAN-13, after 13 bytes of barcode data are entered, the barcode is printed, and subsequent data is processed as normal data.

In the case of JAN-8, after 8 bytes of barcode data are entered, the barcode is printed, and subsequent data is processed as normal data.

The number of data of an ITF barcode must be an even number. If is an odd number, the last data is ignored.

After the number of input data reaches 255, the processing of the command starts automatically.

In the case of GS k m n:

n denotes the number of data. n bytes of subsequent data are processed as barcode data.

If n is outside the definable range, the processing of the command stops, and the subsequent data is processed as normal data.

In the case of standard mode:

If d is outside the definable range, only paper feed is executed, and subsequent data is processed as normal data.

If the barcode width exceeds the print area of one line, the barcode is not printed, and only paper feed is executed.

Regardless of the amount of line feed specified by the following commands, the paper is fed by the amount equal to the barcode height (including HRI characters if HRI character print is specified):

* (ESC 2:" Sets initial line feed")
* (ESC 3:"Sets line feed")

Effective only if no data is contained in the print buffer. If data is contained in print buffer, the data after m is processed as normal data.

Moves the print position to the start of the next line after barcode print is completed.

Has no effect on print modes (underline, character size) excluding NORMAL.

General purpose characters

Character	HEX	Significance	Name
Ctrl D	04	End of transmission	EOT
Ctrl E	05	Set address	ENQ
Ctrl J	0A	Line feed	LF
Ctrl M	0D	Carriage return	CR
Ctrl Q	11	Ready to receive	XON
Ctrl S	13	Busy	XOFF

Additional characters used by the printer

Ctrl F	06	48 character / line
Ctrl R	12	24 character / line
Ctrl T	14	Inverted printing
Ctrl U	15	Normal printing
Ctrl W	17	transmit request: date / timet
Ctrl^	1E	Print: date / time in protocol
Ctrl C	03	Text call
Ctrl X	18	Sart of text block
Ctrl Y	19	End of text block
Ctrl V	16	Reserve space for measure variable (6 Digits)

More Printer Commands [1]

ASCII	HEX	Significance
FF	0C	Print in page mode and return
ESC FF	1B, 0C	Print data in page mode
ESC E n	1B, 45	Specifies emphasized character
ESC G n	1B, 47	Clears emphasized character
ESC T n	1B, 54	Selects character print direction in page mode
ESC W...	1B, 57	Specifies Printing area in page mode
ESC a n	1B, 61	Alignment
GS W...	1D, 57	Sets width of printing area

[1] aks for more informationspleace seperatly

Appendix F: Character sets
Character set - various languages

Hex-Code	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
ASCII	#	$	@	[	\	]	^	`	{	¦	}	~
German	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
S / SF	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
French	#	$	à	°	ç	§	^	`	é	ù	è	¨
Danish	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Norwegian	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Spanish	#	$	à	Í	Ñ	¿	é	`	□	ñ	ó	ú
English	£	$	@	[	\	]	^	`	{			}	~

33	!	71	G	109	m	147	ô	185	╣	222	▐
34	"	72	H	110	n	148	ö	186	║	223	▀
35	#	73	I	111	o	149	ò	187	╗	224	α
36	$	74	J	112	p	150	û	188	╝	225	β
37	%	75	K	113	q	151	ù	189	╜	226	Γ
38	&	76	L	114	r	152	ÿ	190	╛	227	π
39	'	77	M	115	s	153	Ö	191	┐	228	Σ
40	(	78	N	116	t	154	Ü	192	└	229	σ
41	)	79	O	117	u	155	¢	193	┴	230	µ
42	*	80	P	118	v	156	£	194	┬	231	τ
43	+	81	Q	119	w	157	¥	195	├	232	Φ
44	,	82	R	120	x	158	₧	196	─	233	Θ
45	-	83	S	121	y	159	ƒ	197	┼	234	Ω
46	.	84	T	122	z	160	á	198	╞	235	δ
47	/	85	U	123	{	161	í	199	╟	236	∞
48	0	86	V	124	|	162	ó	200	╚	237	ø
49	1	87	W	125	}	163	ú	201	╔	238	∈
50	2	88	X	126		164	ñ	202	╩	239	∩
51	3	89	Y	127	■	165	Ñ	203	╦	240	≡
52	4	90	Z	128	Ç	166	ª	204	╠	241	±
53	5	91	[	129	ü	167	º	205	═	242	≥
54	6	92	\	130	é	168	¿	206	╬	243	≤
55	7	93	]	131	â	169	⌐	207	╧	244	⌠
56	8	94	^	132	ä	170	¬	208	╨	245	⌡
57	9	95	_	133	à	171	½	209	╤	246	÷
58	:	96	`	134	å	172	¼	210	╥	247	≈
59	;	97	a	135	ç	173	¡	211	╙	248	°
60	<	98	b	136	ê	174	«	212	╘	249	·
61	=	99	c	137	ë	175	»	213	╒	250	·
62	>	100	d	138	è	176	░	214	╓	251	√
63	?	101	e	139	ï	177	▒	215	╫	252	ⁿ
64	@	102	f	140	î	178	▓	216	╪	253	²
65	A	103	g	141	ì	179	│	217	┘	254	■
66	B	104	h	142	Ä	180	┤	218	┌	255	□
67	C	105	i	143	Å	181	╡	219	█		
68	D	106	j	144	É	182	╢	220	▄		
69	E	107	k	145	æ	183	╖	221	▌		
70	F	108	l	146	Æ	184	╕				

*) The following characters have been modified as compared to the IBM character set No. 437:

244 F4	" ⌠ "	→	" | "
245 F5	" ⌡ "	→	" | "
246 FF	" "	→	" □ "

Character set: ASCII and cyrillic
it means:
1.Column = ASCII / 2. Column = cyrillic / 3. Column = Hexadecimal

ASCII	cyrillic	Hex		ASCII	cyrillic	Hex		ASCII	cyrillic	Hex
		20		@	@	40			Ю	60
!	!	21		A	Ф	41		a	ф	61
"	"	22		B	И	42		b	и	62
#	#	23		C	С	43		c	с	63
$	$	24		D	В	44		d	в	64
%	%	25		E	У	45		e	у	65
&	&	26		F	А	46		f	а	66
/	Ю	27		G	Ч	47		g	ч	67
(	(	28		H	П	48		h	п	68
)	)	29		I	Ш	49		i	ш	69
*	ь	2A		J	О	4A		j	о	6A
+	+	2B		K	Л	4B		k	л	6B
,	,	2C		L	Д	4C		l	д	6C
-	-	2D		M	Ё	4D		m	ё	6D
.	.	2E		N	Т	4E		n	т	6E
/	/	2F		O	Ш	4F		o	щ	6F
0	0	30		P	З	50		p	з	70
1	1	31		Q	Й	51		q	й	71
2	2	32		R	К	52		r	к	72
3	3	33		S	Ы	53		s	ы	73
4	4	34		T	Е	54		t	е	74
5	5	35		U	Г	55		u	г	75
6	6	36		V	М	56		v	м	76
7	7	37		W	Ц	57		w	ц	77
8	8	38		X	Р	58		x	р	78
9	9	39		Y	Я	59		y	я	79
:	:	3A		Z	Н	5A		z	н	7A
;	;	3B		[	Э	5B		{	э	7B
<	<	3C		\	Ж	5C		`	ж	7C
=	=	3D		]	Х	5D		}	х	7D
>	>	3E		^		5E		~	б	7E
?	Б	3F		_	ь	5F		■	■	7F