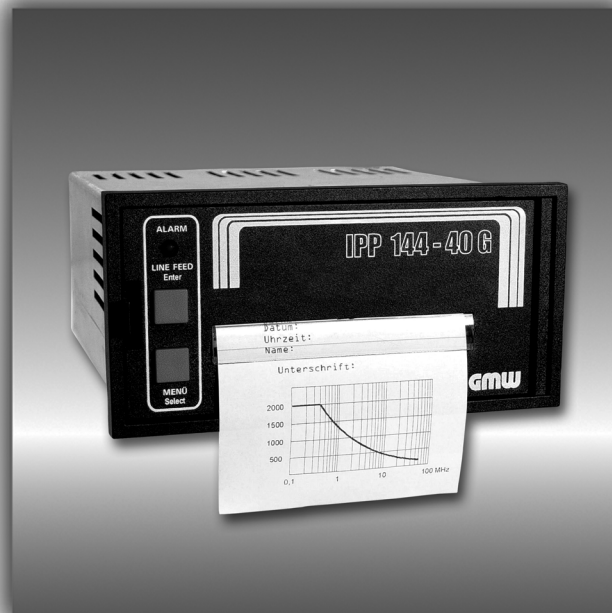**GMW GOSSEN Müller & Weigert**

USER`S MANUAL

Thermal Graphics Printers
IPP 144 - 40 G
IPP 144 - 40 GE

Paper Reroll Mechanism
IPP - AW

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;
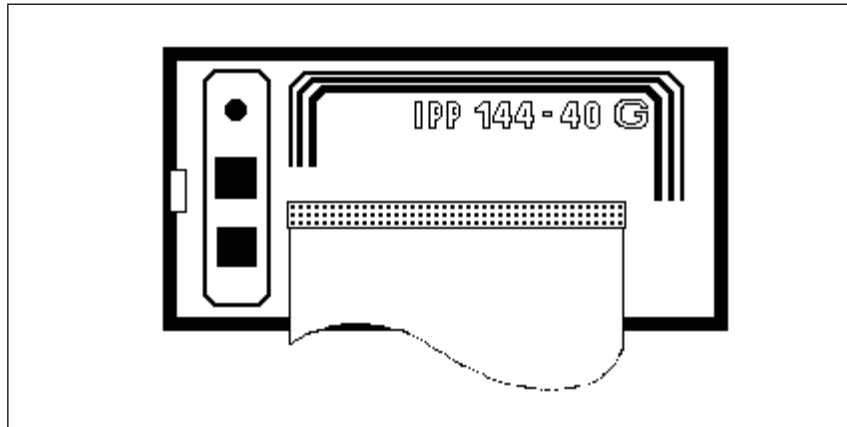Temperature: 5 °C to 40 °C;

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I. IPP 144 - 40 G / IPP 144 - 40 GE

1. General Features

The Thermal Graphics Printer IPP 144-40 G (Industrial Process Printer) is a device designed for outputting text, data and graphics, i.e. measured value, machine and process states, error messages, production data, etc.

Two application examples:

- If connected to a digital voltmeter, the IPP 144-40 G records the measuring values (with date/time for the E version).
- Its integrated interface allow the use of the IPP 144-40 G as a peripheral for all PLCs (RS 232 C; RS 422; RS 485; USB; Profibus DP).

The Thermal Graphics Printer is a DIN size panel mounting unit which is able to print line widths of up to 48 characters per line. The 14m paper roll (commercial grade document proof thermal paper) is located inside the housing and can be easily replaced by means of a swivel type front panel. Án end of paper indicator lights up if the printer runs out of paper.

3
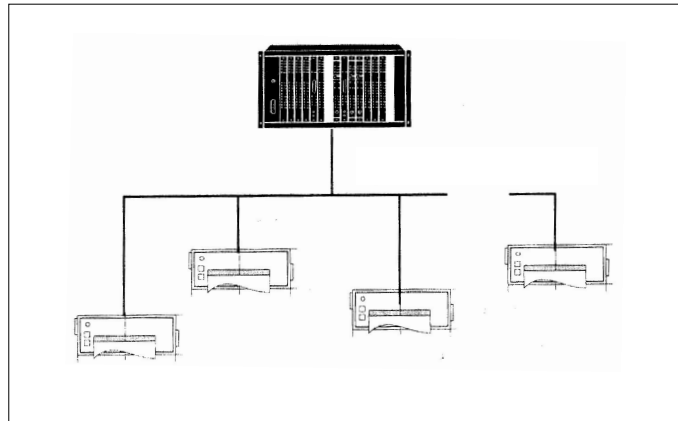
Each printer is addressable, which allows the connection of up to 31 devices to one sender device via a data line at the RS 485 interface, e.g. to a PLC.

Review of the model types

There are two version of the printer: The Basic Version IPP 144-40 G with the interface I and the Enhanced Version IPP 144-40 GE with the interfaces I and II.
There are three option for the voltage supply: 12V DC (10V...19V DC) or 24V DC (19V...36V DC) or 110/230V AC (switch-mode power supply: 85V...265V AC)
There are four option for the interface III :
RS 232 C, RS 485, ProfiBus or USB

Model	Supply Voltage			Interface I
IPP 144-40 G	12V DC	24V DC	110/230V AC	Yes
IPP 144-40 GE 232	12V DC	24V DC	110/230V AC	Yes
IPP 144-40 GE 485	12V DC	24V DC	110/230V AC	Yes
IPP 144-40 GE PB	12V DC	24V DC	110/230V AC	Yes
IPP 144-40 GE USB	12V DC	24V DC	110/230V AC	Yes

The connector for the interface II of RS 232 C, RS 485 and ProfiBus is a 9 pin D-Sub-socket. It is possible to change this interface card in the factory. The interface option USB has a special USB-B-socket. It is not possible to change this interface card with the other cards. Special adapter cables and converters are used in this situation.

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Windows-Programming software	A Windows-Programming software has been developed. This software will be available to progam the GE text memory, transfer user defined fonts or symbols and set the printer configuration parameters. Also this software package includes actual Windows printer drivers. The software will be on CD-ROM.
Basic Version IPP 144-40 G	The basic version IPP 144-40 G provides one serial interface capable of receiving only. Return (handshake) messages to the sender are sent via hardware line. Texts and measuring value to be printed must be transmitted from the sender device since the basic version does not have an internal text memory. It is possible to print with the basic version bitmap image and barcodes. The bitmap image files and the barcode files are generated with printer control commands in a terminal emulation program. These files are transmitted by interface I to the printer. It is possible to download this file onto the font ROM chip in the printer. For the printer control commands and download commands see section 8.3. in this manual. Note: The cyrillic character set is on the font ROM chip. If user defined fonts or symbols are downloaded onto the font ROM chip, the cyrillic character set will be overwritten, and the cyrillic character set will no longer be available.
Enhanced Version IPP 144-40 GE	The enhanced version IPP 144 - 40 GE provides a second, bi-directinal serial interface capable of outputting return messages under program control in compliance with a protocol. In addition, this model includes a text memory capable of storing up to 15 texts which are called by specifying the corresponding text number. Moreover, date and time may be printed with texts and data. The printer interfaces of the IPP 144-40 GE can be set in the menu program as serial transfer or standard Windows printer drivers. So it is possible to print data (e.g.user defined fonts and symbols) directly with Windows. It is not possible for the user to upgrade the basic version to the enhanced version; as this is a different factory version.

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2. Technical Data
2.1. Basic Version

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 24 characters 16 characters 8 characters
	Character height	3 mm at 48 characters 4 mm at 24 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

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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 ≤ 300 V pollution degree 2
	DC	10 V ... 19 V approx. 20 VA[2] 19 V ... 36 V approx. 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
Standards	Protection type housing terminals	acc. to EN 60529/VDE 0470 IP 50 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 EN 61000-4-4 B

CE

[1] See setting transmission parameters of the sender at page 9.

[2] Starting current approx. 1,2 A (10 V ... 19 V) or approx. 0,8 A (19 V ... 36 V).
This value can be used to rate the external fuse.

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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
Miscellaneous	Dimensions (W x H x D)	144 x 72 x 159 mm
	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 5.01.05 and higher

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2.2. Version E

Serial Interface II		
	Type	RS 232 C or RS 485[1] ProfiBus or USB
	Baudrate	110: 150; 300; 600; 1200; 2400; 4800; 9600;19200;38400
	Data format	7 bit / 8 bit [2]
	Parity bit	even, odd, mark, space, no [2]
Text entry for texts to be stored		separate configuration by interface II
Text memory	Type	CMOS-RAM, battery buffered[3]
	Battery life	10 years typical
	Memory size	600 Byte $\triangleq$ 15 texts
Internal clock	Type	CMOS, battery buffered[3]
	Accuracy	$\pm$ 10 ppm $\triangleq$ 0,8 sec / day

[1] Please specify when ordering; if nothing is specified, RS 232 C is supplied.

[2] See Setting transmission parameters of the sender

[3] Lithium battery: 3 V
type: VARTA CR 2/3 AA Typ 6237
              PANASONIC BR 2/3 A 1 P

⚠ **Warning !**

This product contains a Lithium battery which must not be cut open, incinerated, exposed to temperature above +60 °C or recharged.
Dispose of in accordance with national regulations.

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3. Design and Installation

Design

Front
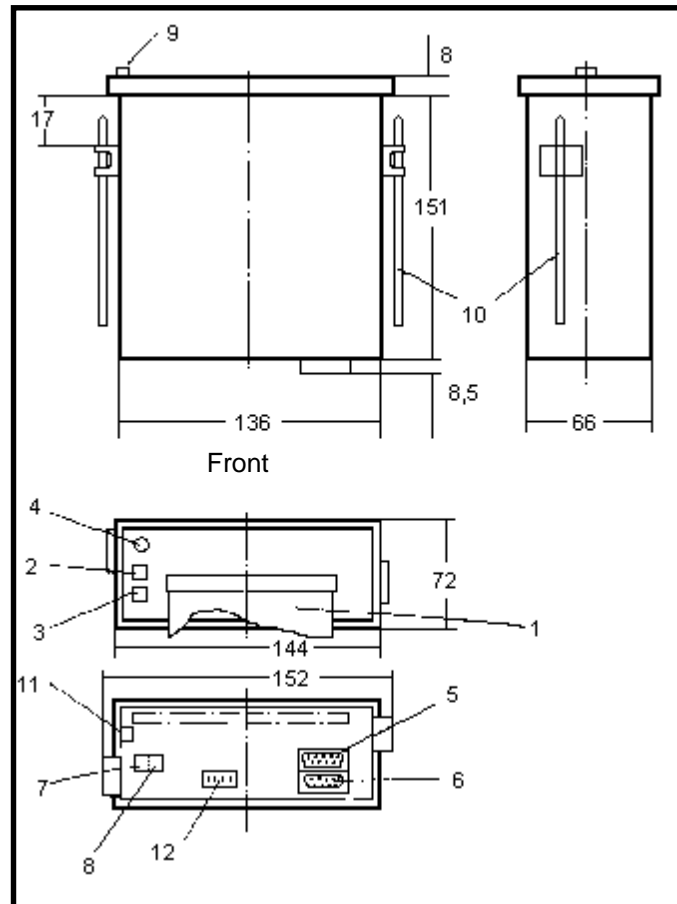
1 Paper and cutting edge
2 Key: LINE / FEED / Enter
3 Key: MENU / Select
4 Alarm LED (paper end indicator)
5 Serial interface
   Interface II (only version E)
6 Serial Interface I
7 Voltage supply

8 Alarm contact
   (paper end only version E)
9 Snap lock
10 Mounting screws
11 Protective conductor
   connection. Must be
   connected to ground.
12 Connection / paper reroll
   mechanism IPP-AW

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

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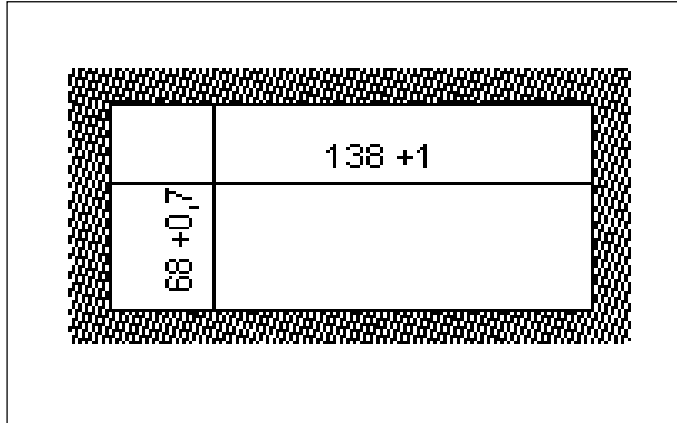
The IPP 144 - 40 G fits into a DIN standard panel cut out. It is inserted into the switchboard opening from the front side and is fixed against the switchboard rear using mounting screws. The switchboard thickness must not exceed 12 mm.

4. Connection
4.1. Pin assignments

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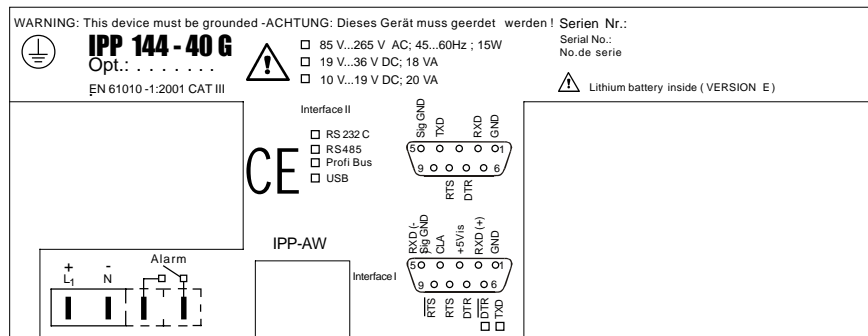
Connect the unit as shown in the connection diagramms.
Observe all national safety regulations, especially for the supply power connections.

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**Serial
Interface I**
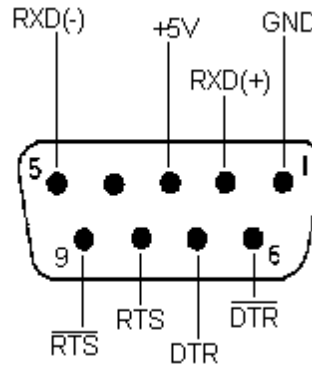
Pin	Signal	
1	GND	Ground (shield)
2	RXD (+)	Receive data
3	+5 V	Output +5 V / 20 mA
4	n.c.	
5	RXD (-)	Signal ground
6	$\overline{DTR}$	Open collector; active if DTR is +8 V
7	DTR	(Data Terminal Ready) +8 V: ready to receive -7 V: not ready to receive
8	RTS	(Request To Send) +8 V: ready to receive -7 V: not ready to receive (text buffer is full)
9	$\overline{RTS}$	Open Collector; active if RTS is +8 V

The serial interface I has been designed to allow the
implementation of all widely used interfaces:
RS 232 C; RS 422; RS 485 and Current loop.
See chapter 4.3.: Connecting diagram

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**Serial
Interface II
(only
 IPP 144 -40 GE)**

RXD(-)   RXD(+)

TXD   GND

```
5 ●  ●  ●  ●  ● 1
9 ●  ●  ●  ● 6
```

RTS
DTR
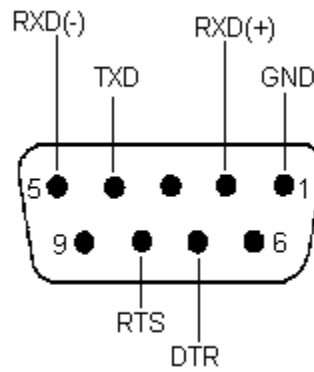
Pin	Signal	
1	GND	Ground (shield)
2	RXD (+)	Receive data
3	n.c.	
4	TXD	Transmit data
5	RXD (-)	Signal ground
6	n.c.	
7	DTR	(Data Terminal Ready) +8 V: ready to receive -7 V: not ready to receive
8	RTS	(Request To Send) +8 V: ready to receive -7 V: not ready to receive
9	n.c.	

This interface can either be operated under hardware
handshake (DTR, RTS) or software handshake
(XON / XOFF - Protocol). This does not require special
settings.

See chapter 4.3.: Connecting diagram

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4.2. Interface selection (Interface I)
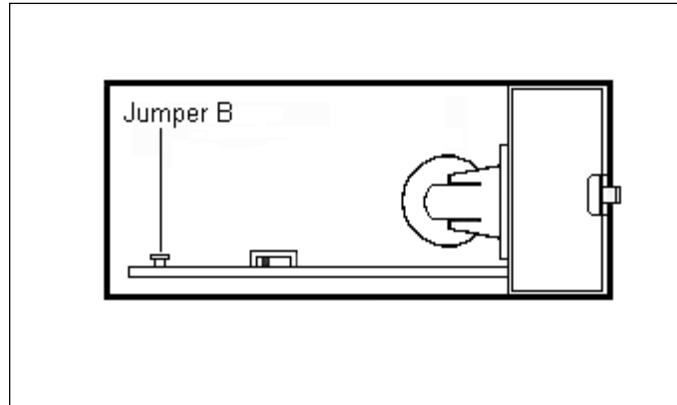
Slide snap lock to the right hand side, swivel front door out. Now you can see the switch S 101 on the printed circuit board.

- 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.

IMPORTANT:

This switching only applies to interface I.

If the printer is connected to the sender device (e.g. to a PLC) the interface parameters must be matched to those at the sender device.
See chapter 6.2. which describes the setting of the baudrate, data format, stop bit and parity bit.

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4.3. Connecting diagram
Interface I
Set slider switch S 101 to the right hand side !
(see „Interface selection" 4.2.)

RS 232 C

```
TXD ○
CTS ○
GND ○
              ○ 1
                ○ 6
              ○ 2
                ○ 7
              ○ 3
                ○ 8
              ○ 4
                ○ 9
              ○ 5
```

RS 422

```
GND ○
TX+ ○

TX– ○
              ○ 1
                ○ 6
              ○ 2
                ○ 7
              ○ 3
              ○ 4
                ○ 8
              ○ 5
                ○ 9
```

RS 485

```
C ○
A ○


B ○
              ○ 1
                ○ 6
              ○ 2
              ○ 3
                ○ 7
              ○ 4
                ○ 8
              ○ 5
                ○ 9
```
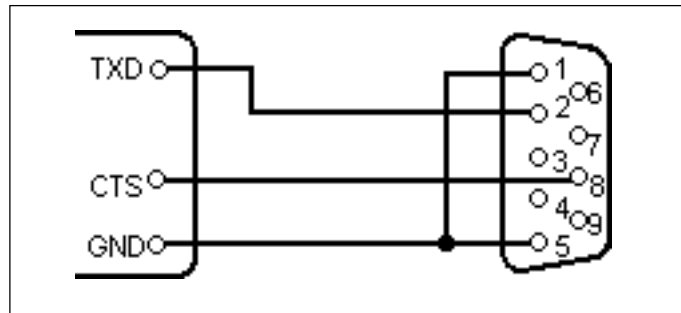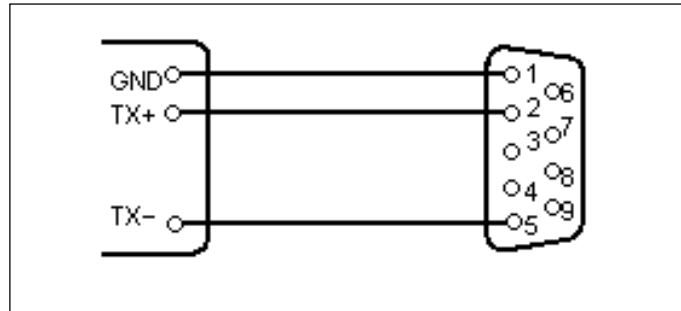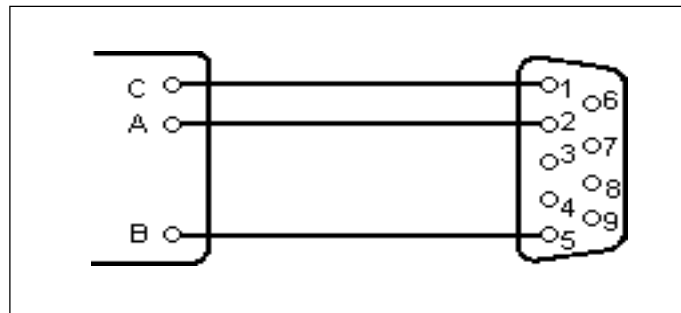
Sender   IPP 144

See explanation on page 17

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Current loop   **Set slider switch S 101to the left hand side !**
                        (see „Interface selection" 4.2.)

Sender **active**,
IPP 144 - 40 G
passive
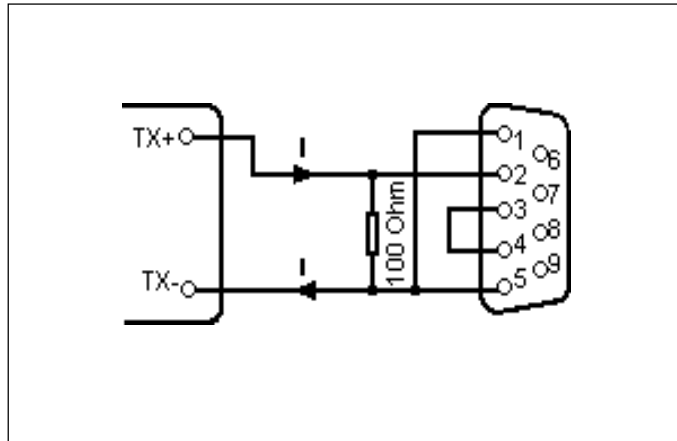
Sender active   IPP 144-40G passive

Sender passive   IPP 144-40G active

Sender **passive**
IPP 144 - 40 G
active
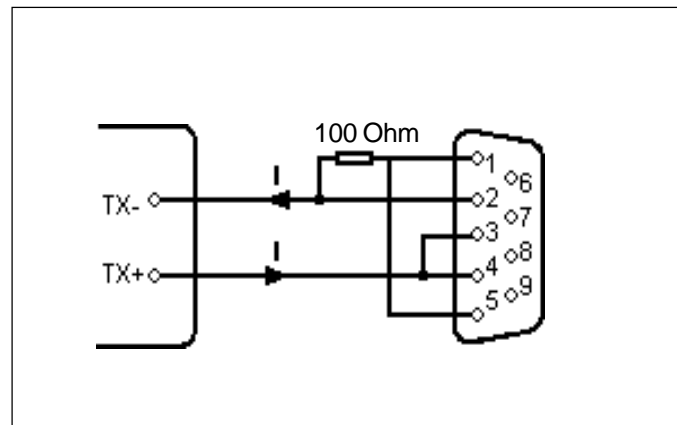
„I"identifies the direction in which the current flows (20 mA)

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Interface II

RS 232 C

TXD
CTS
RXD
GND

○1 ○6
○2 ○7
○3
○4 ○8
○5 ○9

RS 485
(Option)

B

A
C

○1
○2 ○6
○3 ○7
○4 ○8
○5 ○9

ProfiBus
(Option)

B

A

C

B Line
A Line   +5V
GND   RTS

○1 ○6
○2
○3 ○7
○4 ○8
○5 ○9
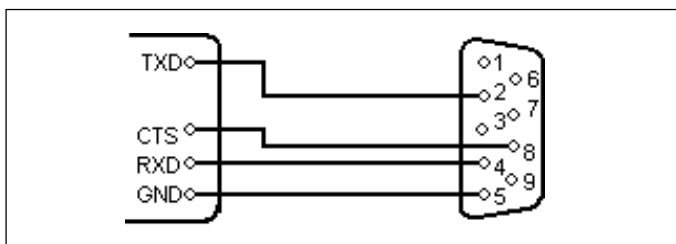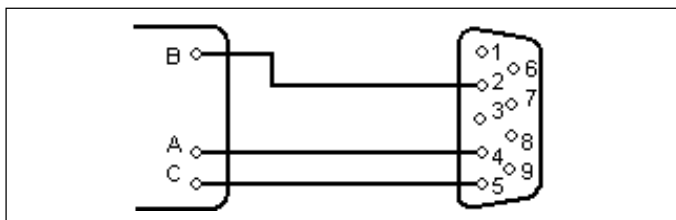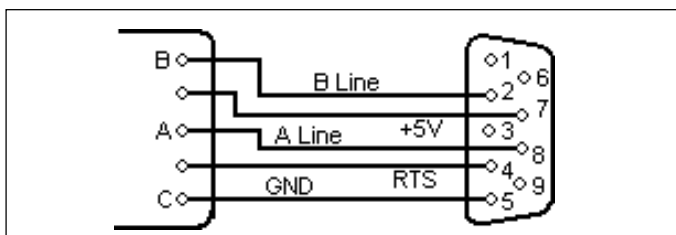
Sender / receiver   IPP 144-40 GE

Explanation concerning the signal names underRS 485.
The names A, B, C correspond to the EIA 485 - Standard:
inactive or logical „1"; A > B
              logical „0": B > A
If an interface does not comply with that standard, the
connections of A and B must be interchanged.

USB
(Option)

Standard USB chassis socket type B

pin 1   +5V
pin 2   USBDM
pin 3   USBDP
pin 4   GND

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5. Operation
5.1. Operating Controls

The numbers with the operating controls refer to the diagrams in chapter 3.

LED „Alarm" (4)

The ALARM LED has two functions.
1. To indicate „end of paper" or „no paper"
2. To indicate the front door is open
Examples:
1. The front door is closed.
If this LED is lit, the printer has run out of paper. Insert a new paper roll; see section 5.2. „Replacing the Paper Roll". the front press-button switches (LINE FEED & MENU keys) are deactivated.
2. The front door is open.
The LED is lit. Printing may continue until the input buffer is empty, and then the data transmission goes to standby.
3. The front door is open and the printer has run out of paper.
The LED lit. The printer stops printing and the front press-button switches are deactivated.
After replacing the paper roll the front press-button switches are active. The ALARM LED remains ON until the front door is closed. The printer can start working.

LINE FEED / ENTER (2)

This key has two functions:

☐   LINE FEED:
During operation used for manual paper feed.

☐   In the menu program it is used to accept and save the parameters selected via „Select".

MENU / SELECT (3)

This key has two functions:

☐   MENU:
If during operation this key is pressed continuously for more than 3s, the printer switches to menu program mode in which device parameters are printed out and can be modified.

☐   Select:
Within the menu program it is used for selecting the device parameters.

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Paper cutting edge (1)   In order to tear off the paper, pull the paper quickly sideways and up.

Snap lock (9)   Push this to the right hand side to open the front panel in order to be able to replace the paper roll or to set the slider switch S 101 which is used to set the desired interface (see chapter 4.2. „Interface selection") or to set the RESET switch S 102.

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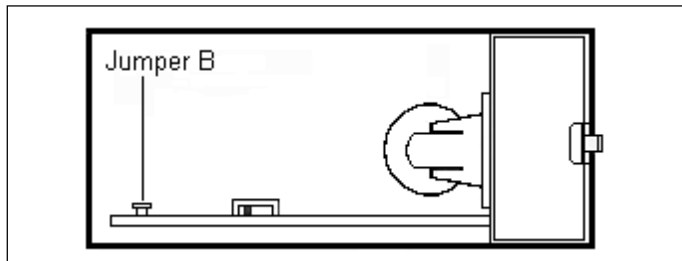
If the jumper B is connected, the „MENU / SELECT" key is locked; menu parameters can neither be printed or modified.

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.
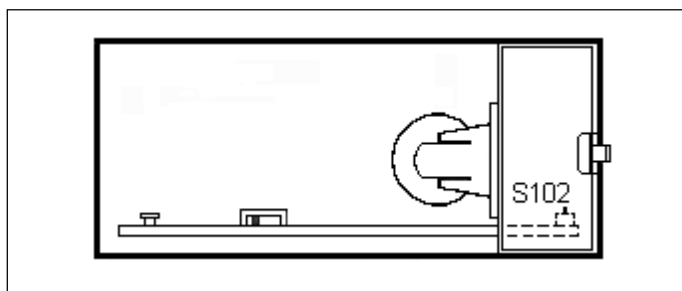
5.2. Replacing the Paper Roll

Proceed as described below:

1. For devices with a.c. powersupply 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.

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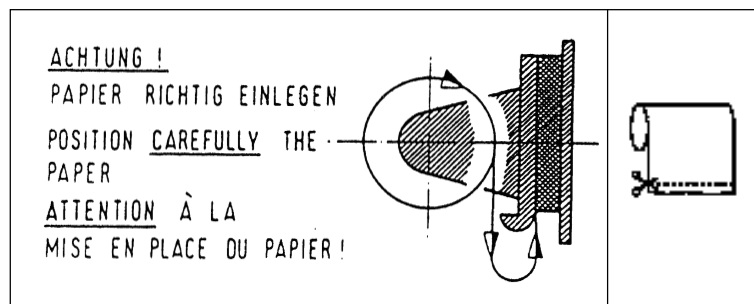
5.3. Menu Program

All functions of the IPP 1444 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.

The possible setting are explained in chapter 6.

**Entering
the menu
program**

Press the „MENU / SELECT" key for approx.
3 seconds.
The IPP 144 reacts by printing

„ACTUAL PARAMETRS ? PRESS „ENTER"

**Print current
parameters**

Press the „ENTER" key,
the IPP 144 prints the currently set parameters.

The final printout says

„CHANGE PARAMETERS ?"

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The menu program „Change Parameters"

Press „ENTER" and „SELECT" simultaneously for approx. 4 seconds; the IPP 144 brings 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 ?".

Quitting the menu program

The program is terminated by simultaneously pressing „ENTER" and „SELECT" Following the printout

„END"
all modified functions are saved.

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**.

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**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.

Example:

| SET BAUDRATE   NO ? |

„SELECT"   „ENTER"

| YES ? |

„ENTER"

| BAUDRATE   300
                 300 |

„SELECT"

| 600 |

„ENTER"

| >>>   600
TO STORE BAUDRATE; PLEASE PRESS „ENTER"
SET BAUDRATE AGAIN, PLEASE PRESS „SELECT" |

„ENTER"

| SET DATA FORMAT   NO ? |
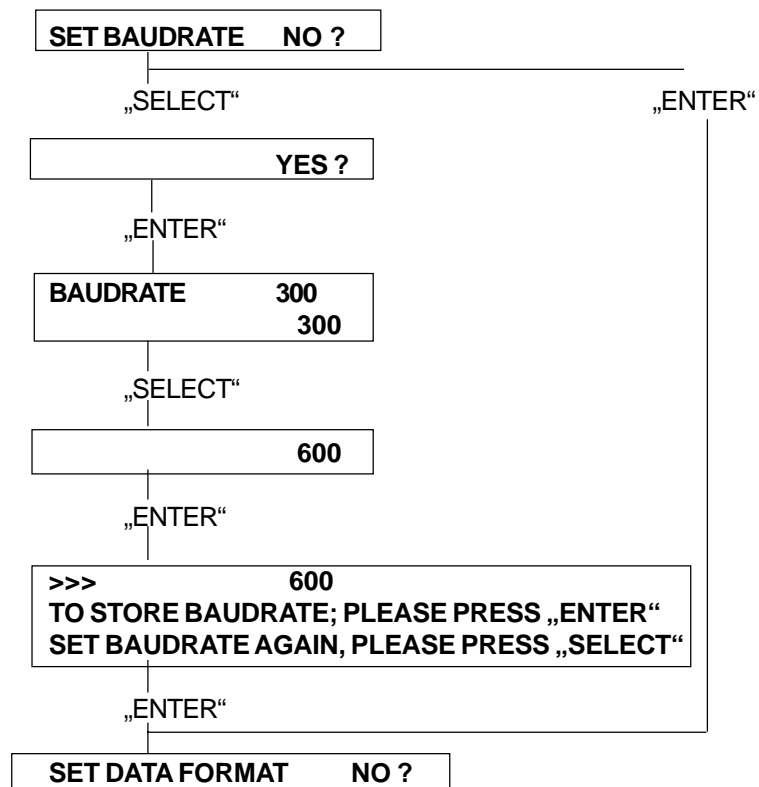
In case

1: Baudrate 600 (Baud)   2: Baudrate 300 (Baud)
   is saved   is saved

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6. Adjustment
6.1. General Functions

The various functions and device parameters are selected
and set via the menu program (see chapter 5.3.).
The appendix contains a summary.

PRINT FORMAT

[] NORMAL: The printout can be read during printing, the
last print line is at the top.

[] INVERSE: The printout is made top down, the last print
line is at the bottom. In this case the
printout is in the proper chronological order
after the paper has been torn off.

Print formats can be switched via the serial interface (see
appendix 8.2. „additional control characters"), if the input
buffer is empty!

[] 90-degree rotation: It is possible to set the printing with
90-degree right or left rotation. This
function can not be set via the menu
program but via control commands
(see section 8.3. „Details of Printer
Control Commands").

CHARACTER / LINE

48: 48 character per line = standard character width
24: 24 character per line
16: 16 character per line
8:   8 character per line

The character width can be switched via the serial interface
(at the beginning of a line and only if the input buffer is empty).

CHARACTER SET

Available character sets are:
ASCII, GERMAN, FRENCH, SWEDISH/FINNISH (S/SF),
DANISH, NORWEGIAN, SPANISH, UK (English) and
CYRILLIC.

Character sets see appendix 8.2. „Character Sets" !

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INTERFACE	SERIAL:
	This sets the printer for data transmission via serial interface.
	EMUL.EPS.LQ580 ESC/P2:
	This sets the printer for data transmission via EPSON LQ580 ESC/P2 protocol.
	EMUL.TALLY T2024:
	This sets the printer for data transmission via TALLY T2024 protocol.
Print graphics directly from WINDOWS®	It is possible to print graphics, such as bmp-, jpg- or tif-, directly from WINDOWS® 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.

PRINT INTERVAL	The printing of measuring values can be carried out under internal timer control.
	Setting range: 10 s ... 24 h in steps of 10 s.
	The interval of starts **after** the printing of the line received last.
	❏ For more information see chapter 7.3. „Handshake Messages" !

6.2. Serial Interfaces

BAUDRATE	There areten options available:
	110; 150; 300; 600; 1200; 2400; 4800; 9600; 19200 and 38400 baud.

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DATA FORMAT There are two formats available:

> 7 - bit- or 8 - bit - transmission
> 1 startbit / ... / parity / 1 stoppbit
> **Attention:**
> With 7 bit NO PARITY, the sender must be set to 2
> stoppbits !

PARITY There are five options available:

> Even; Odd; Mark; Space; No parity.
> There is no check made.

PRINTER Each printer IPP 144 - 40 G / IPP 144 - 40 GE can be
ADDRESS addressed. This allows the concurrent supply of diffe-
rent data to several printers via one data line.

> Up to 31printers may be called from one sender (e.g. a
> PLC). The respective address is set in the menu
> program.

> for more information see chapter 7.2. „Addressing" !

6.3. Date / Time (only E-version)

Date entry Date and time are factory set. In order to modify
these values the menu program must be called and
the following message must be displayed:

SET CALENDAR	NO ?

„SELECT"

YES ?

„ENTER"

SET CALENDAR	15. 03.04
	_5. 03. 04

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The printed cursor to the left of the 5 indicates that this position can be modified; in our example this is the decimal digit of the day. The „Select" key is used to print the possible values successively; in our example this is 0, 1, 2 and 3, To accept the value press „Enter"; the cursor jumps to the next position to the right ... etc.

>>>	24. 03. 04

Eventually, the current date is printed.

Note:

Incorrect entries, e.g. day 33 of a month, will not be accepted by the printer. Instead, it starts over at the base value 00.

Setting the time

The time is set like the date. After the current date has been printed, the following line appears:

SET TIME	NO ?

■
■   Minute
■   Hour   Second
■

SET TIME	12	: 31	: 33
	_2	: 31	: 00

If the time is modified, the seconds are automatically set to zero.

If the time has been entered and „Enter" has been pressed, the following is displayed:

>>>	22	: 31	: 00
TO STORE TIME; PLEASE PRESS „ENTER"			
SET TIME AGAIN; PLEASE PRESS „SELECT"			

If time has been entered correctly, press „Enter". If the time has been entered incorrectly, repeat the entry by pressing „Select".

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Set Summer Winter Time Mode Set one hour plus or minus for Summer/ Winter Time Mode following is displayed:

CHANGE TIME W<->S   NO ?

If „YES" is selected, the follow selectíons are displayed:
„W ---> S (+1 h)"
„S ---> W (-1 h)"

After setting time the current time will been printed. Press „ENTER" to store time or press „SELECT" to set time again.

It means:
W...Winter Time
S...Summer Time

6.4. Date / Time Output
(E - Version)

Output Date and time may be transmitted via the serial interface II

Request: .   .

< Ctrl W > < CR >

Addressed:

<Ctrl E> Adr. <Ctrl E> <Ctrl W> <CR> <Ctrl D>

The IPP 144 returns date / time in the format:

< CR > < LF >
15.03.04   17:03:24
< CR > < LF >

During the transmission, nothing can be received (RTS = LOW).

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Serial protocol

The IPP 144 is capable of printing date and time together with measured values or text as a protocol. In this case, date and time precede the printout.

There are two options available:
Each transmission is preceded with the date/time (always). Date and time only precede the transmission if control command has been received.

this optional feature is selected in the menu program under:

Print date/time „always"

PRINT DATE / TIME	HEADLINE

Each transmission is preceded with the date/time (always).

For several messages in a row (i.e. the IPP 144 is still printing), the date & time is printed once only at the beginning of the transmission.

e.g.:
15.03.04   16:57:30
Oil temperature 367,5 °C
Oil pressure o.k.
Boiler 1

Pause >

15.03.04   16:58:59
Boiler 2   still active
Temperature   258,6 °C

Print date/ time with a received control command

PRINT DATE / TIME	CTRL „ ^ „

Date and time only precede the transmission if the character <Ctrl ^> has been received.

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7. Functional Description
7.1. Start Printing

To start the printing, the IPP 144-40 G expects only the character
<CR> Carriage return, Enter

Note:
<LF> alone has by itself **no** effect combined with other control characters (calling text, send clock, start print interval -see following sections).

If these characters are transmitted **without** a print triggering character, the IPP 144 - 40 G prints them after approx. 3 seconds.

Other widely used print trigger characters such as <FF> Form feed are ignored.

7.2. Addressing

Each IPP 144 - 40 G / IPP 144 - 40 GE printer is addressable.Thus, several printers can be supplied with different data via one data line.
Up to 31printers can be connected by one sender device (e.g. a PLC). The respective address is set in the menu program.

Note:
-    Standard interface RS 232 only permits 1 sender / 1receiver; Do not connect more than 4 IPP's as receivers.
-    Only interface RS 485 allows up to 32 receivers !

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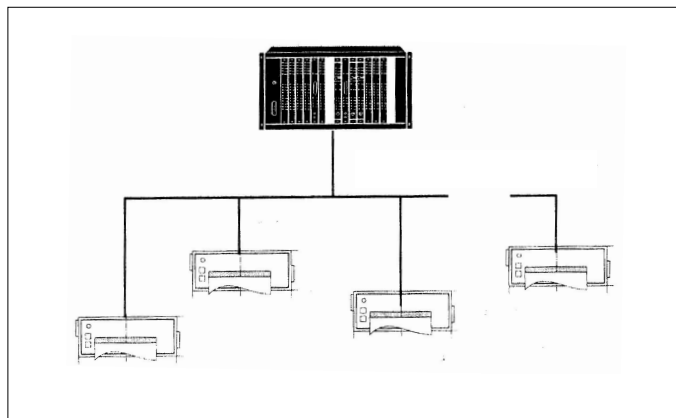
Address / ASCII character assignment example:

Address	Address in Protocol (HEX)	corresponding ASCII - character
0	-	without addressing
1	31	1
.	.	.
.	.	.
.	.	.
30	4 E	N
31	4 F	O

Protocol &
Text

The addressing protocol is:

> <Ctrl E> address <Ctrl E> characters ...<CR> <Ctrl D>
> A text of more than one line is possible.

(<Ctrl E>, <Ctrl D>, see appendix).

A transmission is only accepted if the sequence <Ctrl E> address <Ctrl E> is used !

e.g. print date/time/text:
<Ctrl E> address <Ctrl E> <Ctrl \> <CR> characters...
<CR> <Ctrl D>

7.3. Handshake Messages
Serial   Interface

RTS / DTR

These lines indicate the printer status to the sender; DTR (device is on) is rather insignificant and is in general not used.

RTS high   (+8 V) indicates: printer is ready to receive.
RTS low   (-7 V) indicates: printer is not ready to receive.

The reasons for printer not being ready could be:

- Out of paper
- Print interval running
- Buffer is full
- Change menu

RTS / DTR are only used by the RS 232 C interface and can be used for interface I and II.

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Print interval (serial)	During the preset wait delay the interface is **not ready to** receive. After expiry of the wait delay the RTS signal (or XON) becomes active again and requests the subsequent transmission. The next interval begins upon receiving of <CR> or <CR + LF>. <LF> on its own is not accepted.
XON / XOFF	The report functions „Printer read/not ready" are handled by this protocol if no handshake lines are connected (RS 232 C, RS 422 or RS 485). This function only applies to the E version, interface II.

XON	is transmitted if the IPP 144-40 GE is ready to receive.
XOFF	is transmitted if the IPP 144-40 GE is not ready to receive (see above).

Note:
If the IPP 144-40 GE is not ready to receive, it transmits this character just once, not continuously.
No adjustments have to be made, this protocol always runs parallel to the hardware handshake.

Improved handshaking for pre-stored texts
After receiving the control command <CR> the printer now sets RTS at „BUSY" or the signal XOFF is transmitted. When the printing of pre-stored text is complete, RTS is reset or the signal XON is transmitted.
This handshake can be used to control the data transmission and prevent rapid text calls being lost or overwritten.
Note:
Without Handshake the following can occur, if the text calls are sent in too quickly:
Data input:
<Ctrl C> 1 <CR> <Ctrl C> 2 <CR> <Ctrl C> 3 <CR>

Actual Print-out:

Machine No. 3	pre-stored Text No. 1
2	just „2" printed, Text No. 2 missing
3	just „3" printed, Text No. 3 missing

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With Handshake, provided RTS (or XON/XOFF protocol) is used to control the data transmitter:
Data input:
<Ctrl C> 1 <CR> <Ctrl C> 2 <CR> <Ctrl C> 3 <CR>

Actual Print-out:

Machine No. 3	pre-stored Text No. 1
Automatic mode	pre-stored Text No. 2
Status NORMAL	pre-stored Text No. 3

7.4. Version E (IPP 144 - 40 GE)
7.4.1. Text Entry

Text can only be entered via interface II.

The maximum text length is 40 characters; if the text length exceeds 40 characters only the first 40 characters are saved.

Text will be input via Windows programming software. There is a special task for inputting, adding, overwriting and deleting texts. The text number must be two-digit.

You must set the following printer parameters:

Baudrate:	9600
Data format:	8
Parity:	NO PARITY
Interface:	SERIAL

For details of the Input task see the Windows programming software manual.

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Reserving space for measured variables

In order to be able to insert measured value (variables) into text afterwards, the location within the text must be marked using „Ctrl V", which reserves 6 spaces into which any characters may be entered, since they are overwritten at a later time anyway; they are merely wildcards.

Example:
Entry:
TEMPERATURE <Ctrl V> XXXXX °C <CR>
<Ctrl> counts as one digit, so you only have to enter 5 wildcard characters.

The printout would look like this:
TEMPERATURE 263,45 °C.

Creating a text block

A text block is created by combining several texts.

A text block can be printed in a single call.

To achieve this, place the beginning and the end of the text in brackets at entry time. Use the control characters:

Ctrl X = opening bracket
Ctrl Y = closing bracket

> The texts within a text block
> must have **continuous** numbers !

To delete text within a text block without creating a blank line, the text numbers following the deleted line must be decreased by 1 to move them forward.

This is not done automatically but has to be entered manually.

7.4.2. Text Output

Calling via serial interface

In order to print text, the printer must receive a transmission with the following format:

< Ctrl C >	text number	< CR >

The printer looks up the stored text related with that number and prints it.

If there is no such text, nothing is printed.

Important notes:

- <LF> on its own does not start the printing !

- Between several text calls in a row there has to be a gap of least 2 seconds to make sure no text is skipped during printing !

- Several text calls using <Ctrl C> and „normal" transmissions must not be combined !

- Combination of text and Date / time (protocol) see chapter 6.4. !

The call for a printer with an address:

<Ctrl E> Adr. <Ctrl E> <Ctrl C> Nr. <CR> <Ctrl D>

Precede the call with the address (see chapter 7.2.).
Example for text entry see chapter 8.5.

8. Appendix
8.1. Menu program / Complete Selection

Basic version

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

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```
┌─────────────────────┐
│    Version E        │
└─────────────────────┘
┌──────────────────────────────────────────────┐
│ SET TIME            NO ?                       │
│                     YES ?                      │
│ SET TIME            15:57:26                   │
│                     _5:57:00                   │
│                        .      .                │
│                        .      .                │
│                     15:4_:00                   │
│ >>>                 15:48:00                   │
│ TO STORE TIME, PLEASE PRESS „ENTER"            │
│ TO SET TIME AGAIN, PRESS „SELECT"              │
│ SET CALENDAR        NO ?                       │
│                     YES ?                      │
│ SET CALENDAR        12.01.03                   │
│                     _2.01.03                   │
│                     1_.01.03                   │
│                        .      .                │
│                        .      .                │
│                     16.02.0_                   │
│ >>>                 16.02.04                   │
│ CHANGE TIME W<->S   NO ?                       │
│                     YES ?                      │
│ CHANGE TIME W<->S   14:07:14                   │
│ W --> S  (+1h)                                 │
│ S  --> W  (-1h)                                │
│ >>>                 15:07:14                   │
│                                                │
│ PRINT DATE/TIME     NO?                        │
│                     YES?                        │
│ PRINT DATE/TIME     CTRL " ^ "                 │
│                     HEADLINE                   │
│ >>>                 HEADLINE                   │
└──────────────────────────────────────────────┘

┌──────────────────────────────────────────────┐
│ SET ACCORDING TO THE BASIC VERSION             │
│ SET INTERVAL                                   │
│ SET BAUDRATE                                   │
│ SET DATA FORMAT                                │
│    SET PARITY                                  │
│    PRINTER ADDRESS                             │
│    SET PRINT FORMAT                            │
│    SET CHARACTER/LINE                          │
│    SET CHARACTER                               │
│    SET INTERFACE                               │
│                                                │
│                                                │
│               ***  END  ***                    │
└──────────────────────────────────────────────┘
```

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8.2. Character Sets

Control Character used for Data Transmission

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 / time
Ctrl ^	1E	Print: date / time in protocol
Ctrl C	03	Text call
Ctrl X	18	Start of text block
Ctrl Y	19	End of text block
Ctrl V	16	Reserve space for measure variable (6 digits)

Character set - various languages

The following HEX codes differ from the ASCII character set:

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	£	$	@	[	\	]	^	`	{			}	~

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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   " "   —▷ "□"

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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	я	6C
-	-	2D		M	Ё	4D		m	ё	6D
.	.	2E		N	Т	4E		n	т	6E
/	/	2F		O	Щ	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

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8.3. Details of Printer Control Commands
8.3.1. Short View of Control Commands

Print Character Commands (Section 8.3.2.)
ESC % n   Specifies/clears download character set
ESC - n   Specifies/clears underline
ESC V n   Specifies/clears character rotation
GS ! n   Specifies character size

Print Position Commands (Section 8.3.3.)
ESC $ nL nH   Specifies absolute position
ESC D   Specifies horizontal tab position

Bitmap image Commands (Section 8.3.4.)
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 (Section 8.3.5.)
ESC 2   Specifies initial line feed
ESC 3 n   Specifies line feed

Barcode Commands (Section 8.3.6.)
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

8.3.2. Print Character Commands

Specifies / clears character rotation

Commands: **ESC V n**

<< Code >>

0x1B , 0x56, n ($0 \leq n \leq 3$, $48 \leq n \leq 51$, 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

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<< Details >>
Specifies 180-degree rotation (Inverse-Print)
see section 6.1.
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≤n≤2 , 48≤n≤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≤n≤255 , 1≤ vertical magnification ≤ 8 ,
1≤ 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 / clears download character set

Command: ESC %n

<< Code >>
0x1B , 0x25 , n (0≤n≤255 , initial value n=0)

<< 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.

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

8.3.3. Print Position Commands

Specifies absolute position

Command: ESC $ nL nH

<< Code >>
0x1B , 0x24, nL , nH $(0 \leq nL \leq 255 , 0 \leq nH \leq 255)$

<< 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 horizontal tab position

Command: ESC D n1~ nk NULL

<< Code >>
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 margin or the start of the 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 the 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.

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After this command 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.

8.3.4. Bitmap image Commands

Prints column bitmap image

Command: 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-dot double 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).

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

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<< 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
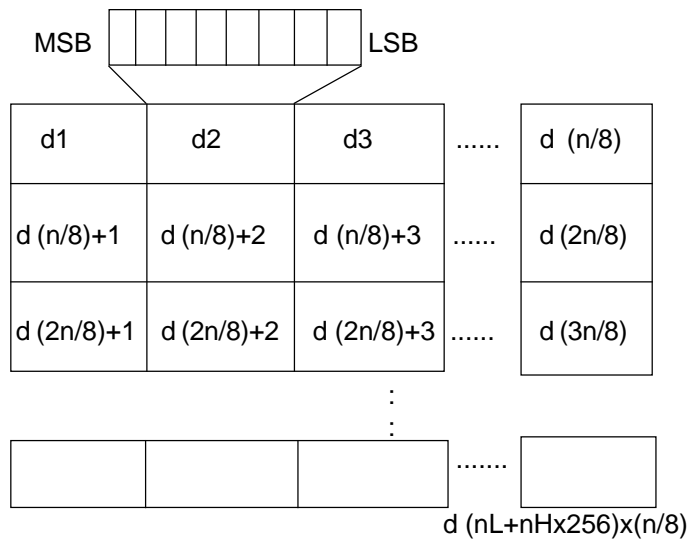printed is „1" and the bit for the dot not to be printed is
„0".
The required number of image data per line is as follows
depending on the number of heating elements in the
head:

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)

:
:

| | | | .... | |

d (nL+nHx256)x(n/8)

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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≤x≤255
0≤y≤48, where: x X y≤1536
0≤d≤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".
  The relationship between a download bitmap image and print data is as follows:

x X 8 dots

Bitmap image data
MSB

d1	d(y+1)	....	
d2	d(y+2)	....	
⋮	⋮		⋮
dy	d(2y)	....	d(xXyX8)

y X 8 dots

LSB
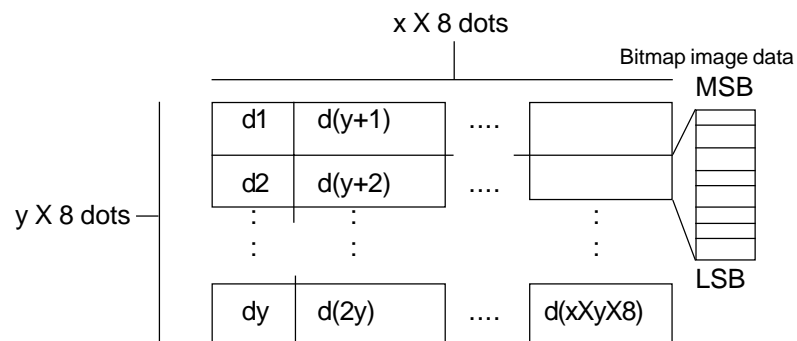
Print download bitmap image

Command: GS / m

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

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<< 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).

8.3.5. 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≤n≤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.

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8.3.6. Barcode Commands

Selects printing position of HRI character

Command: GS H n

<< Code >>

0x1D , 0x48 , n (0≤n≤3 , 48≤n≤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≤n≤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

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<< 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.

In the case of GS k m:

.

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≤n≤ 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

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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.

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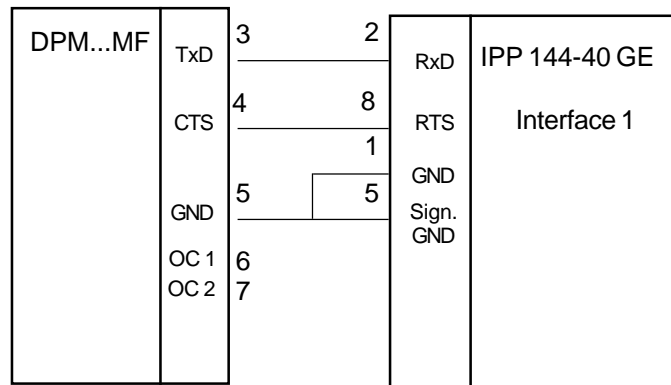   barcode print is completed.
    Has no effect on print modes (underline, character size)
    excluding NORMAL.

8.4. Connection Examples for
Gossen Müller & Weigert instruments
8.4.1. Connection of the IPP 144-40 GE to the DPM-MF
for the insertion of measured value into texts

For this configuration you must input and save the text as shown in section 7.4.1. of this manual.
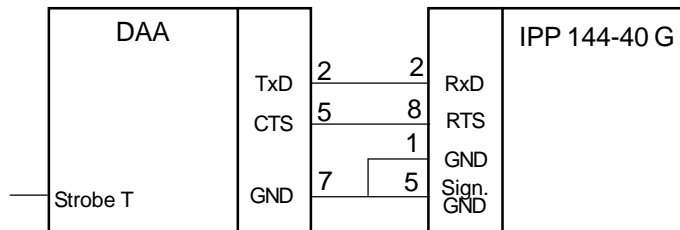The printer receives the measuring values via interface I / RS 232 C (also possible via interface II). To selected the text see section 7.4.2 in this manual. The relevant interface is the interface for which the parameters have to be set in the menu program. The recommended configuration is: 8 data bits, no parity, 1 stop bit, 9600 baud. With 7 bit, no parity, the sender must be set to 2 stop bits.

DPM...MF				IPP 144-40 GE
	TxD	3 — 2	RxD	
	CTS	4 — 8	RTS	Interface 1
		1	GND	
	GND	5 — 5	Sign. GND	
	OC 1	6		
	OC 2	7		

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8.4.2. Connection of IPP 144 - 40 G with a DAA message display to print fault messages

Messages can be sent by all DAA type B and C versions. (The A version DAA are not capable of outputting data but only of displaying them since there is only one serial interface available which is used to receive data).

The connection of the printer is made via the interface II (RS 232 C) of the DAA. The printout is normally triggered by a control device (e.g. a PLC) with a strobe signal (strobe T) via the terminal strip for control inputs (parallel interface) at the DAA.

```
┌─────────────────┬──────────┐     ┌──────────┬─────────────────┐
│  DAA            │          │     │          │  IPP 144-40 G   │
│                 │          │     │          │                 │
│                 │ TxD   2 ─┼─────┼─ 2  RxD  │                 │
│                 │ CTS   5 ─┼─────┼─ 8  RTS  │                 │
│                 │          │     │    1     │                 │
│                 │          │     │  GND     │                 │
│  Strobe T       │ GND   7 ─┼─────┼─ 5  Sign.│                 │
│                 │          │     │     GND  │                 │
└─────────────────┴──────────┘     └──────────┴─────────────────┘
```

Interface RS - 232 C:

DAA 144 - 120 B: 9 pin   D - SUB 9 pin D - SUB
DAA 288 - 120 B: 25 pin   D - SUB
DAA 288 - 240 B, C: 25 pin   D - SUB

The required connection cable is available as an accessory.

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8.5. Examples for Automatic text Insert mode

Example 1:
Consignment print-out, with time & date, marks and weights

Data input:

10:15:33 15/10/03 <CR>1<CR> 123 <CR> 1 <CR> 1027<CR> 997 <CR> 30 <CR>

Actual Print-out:

10:15:33	15/10/03	
Product Ref:	123	
Operator No:	1	
Gross:	1027	kg
Nett:	997	kg
Tare:	30	kg

Pre-stored texts
(„*" = spaces reserved for variable data)

1	******	
2	Product Ref:	******
3	Operator No:	******
4	Gross:	******
5	Nett:	******
6	Tare:	******

Six blocks of data are inserted and printed in sequence.

Example 2:
Quality test print-out, with several measured value

In this example, the IPP..GE automatically adds date & time from its own real-time clock using the „PRINT DATE / TIME-HEADLINE" menu option. Four blocks of variable data are sent to the printer.

Data input: 115<CR> 33.7<CR> 62.8<CR> 228.7<CR>

Actual Print-out:

13.10.03	13:49:52	
Metrix Electronics Ltd.		
Rankine Road, Daneshill West		
GB-Basingstoke RG24 8PP		
————————————		
Test Number:	115	
- - - TEST RESULTS - - -		
Ambient Temp	33.7	℃
Burn-in Temp	62,8	℃
Nom. Supply	230	Vac
Actual	228.7	Vac

Pre-stored texts

1	Metrix Electronics Ltd.	
2	Rakine Road, Daneshill West	
3	GB-Basingstoke RG24 8PP	
4	————————	
5	Test Number:	******
6	- - - TEST RESULTS - - -	
7	Ambient Temp	******℃
8	Burn-in-Temp	******℃
9	Nom. Supply	230 Vac
10	Actual	******Vac

Example 3:
A simple way to print a group of texts

This mode can be used to print a group of texts, triggered by a single <CR> input, even if no variable data is required to be inserted.

NOTE: Text No. 7 is only pre-programmed with a variable data field.

Actual Printout:

15.10.03	10:34:53
Manufactured by::	
————————————	
Metrix Electronics Ltd.	
Rankine Road, Daneshill West	
GB-Basingstoke RG24 8PP	
————————————	

Pre-stored texts

1	Manufactured by:
2	————————————
3	Metrix Electronics Ltd.
4	Rankine Road, Daneshill West
5	GB-Basingstoke RG24 8PP
6	————————————
7	******

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All the texts up to Text No. 6 (without variable fields) are printed. Text No. 7 (the first variable field) just prints a blank line. (If there was any variable data sent before the <CR> this would be inserted and printed here.)

# II Paper reroll mechanism IPP - AW

1. General information
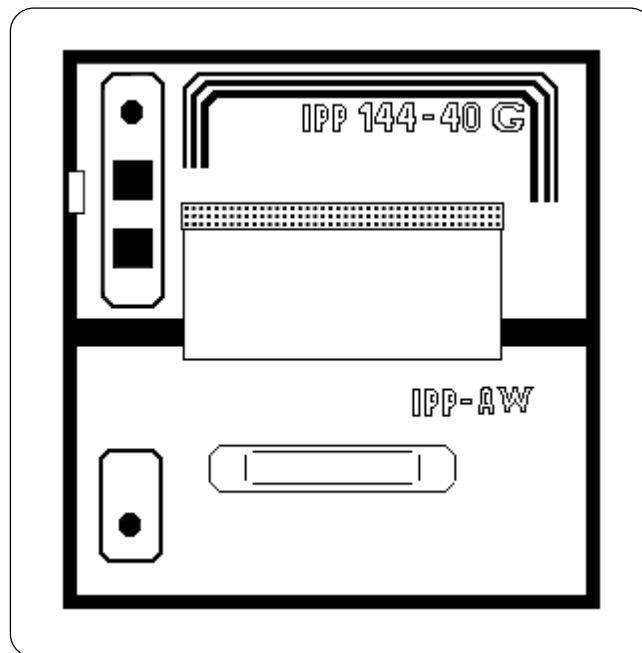
The IPP-AW is a paper reroll mechanism designed for use with the Thermal
Graphics Printer IPP 144-40 G. It has been designed to match the printer in
colour and style. It is preferably installed directly underneath the printer. The
printed paper is automatically wound on a drum by a motor. A front panel
draw allows easy paper handling.

The paper reroll mechanism is a DIN size panel mounting unit. It is supplied
with power and controlled via connector cable which comes with the unit and
which is connected to connector 12 of the IPP 144-40 G (see chapter 3.). An
LED indicates the ready status. Depending on the distance beween the two
devices at least the last 9 lines printed remain visible.

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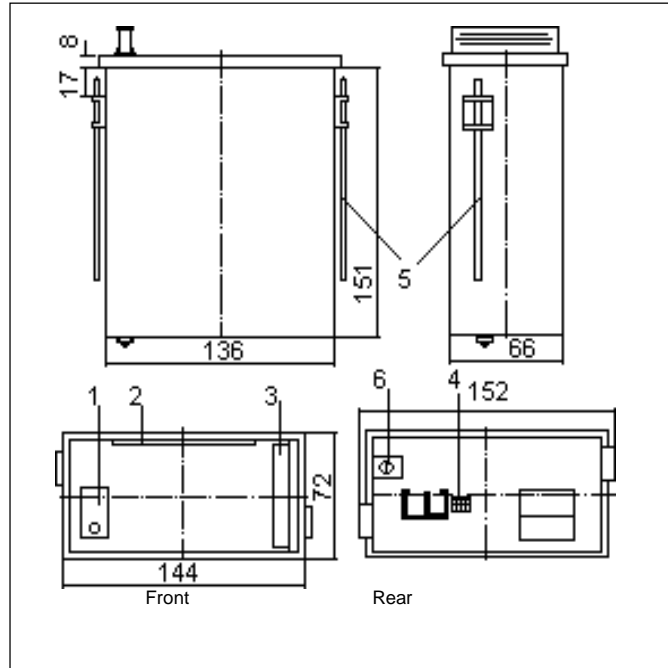
1	Status indicator	2	Opening for paper feed
3	Handle	4	Connector for connection
5	Mounting screws		cable IPP 144-40;
6	Protective conductor connection		(pin connections: Motor
	(must be connected to ground)		control, +5V, open, GND)

Installation
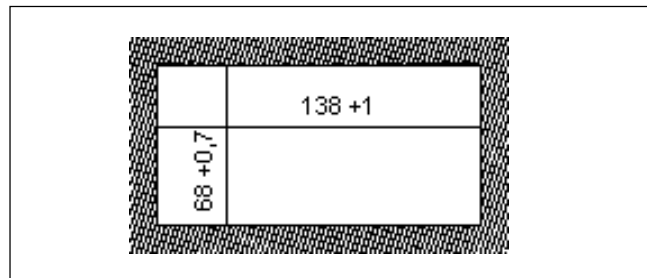
The paper reroll mechanism is inserted into the DIN size panel cutout from the front side and is clamped against the rear of the switchboard using the mounting screws. The switchboard thickness must not exceed 12 mm.

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

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2. 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**

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3. Operation
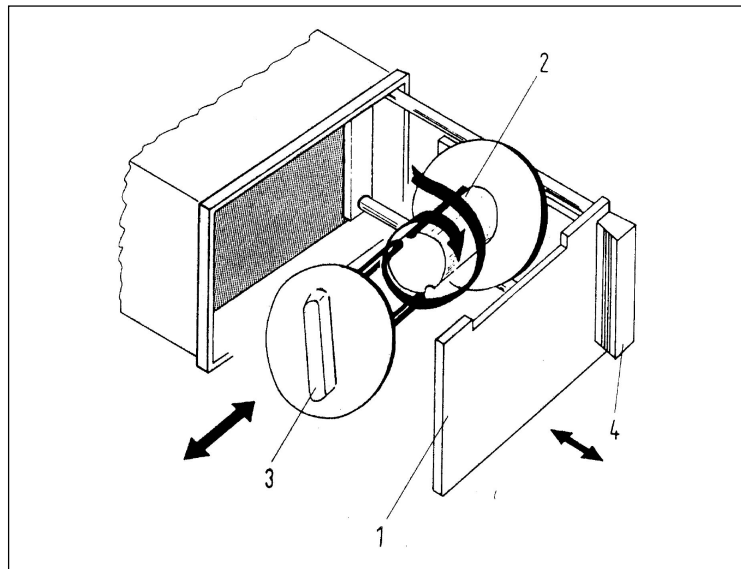
Removing the paper

➡ 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 G until the paper has been straightened out.

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III Accessories

◆ Paper reroll mechanism IPP - AW
(incl. connection cable).

◆ Protection cover for use of IPP 144-40 G with IPP-AW,
Protection class: IP 64.
Dimensions: 155 x 155 [mm].
Material: Plexiglas and
                        Santoprene 101-80 rubber

◆ Connection cable for serial data transmission
to the following devices:

IBM-PC XT and AT or compatibles
Siemens PG 685 (V 24)
Siemens PG 675 / 685 (printer interface)
Siemens GP270 /TP270/MP370 TOUCH(RS232C)
(printer interface)
Message displays:
DAA 144-120B / 288-120B / 288-240B, C
others on request.

Connection cable for USB-interface:
USB-A connector - USB-B connector

◆ Windows programming software for IPP 144-40 GE version (CD-R)

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Exclusive agent for UK & Ireland:

Metrix Electronics Ltd.

Precision Enterprise House
Rankine Road, Daneshill West
GB-Basingstoke RG24 8PP

Tel. +44 (0) 1256 86 41 50
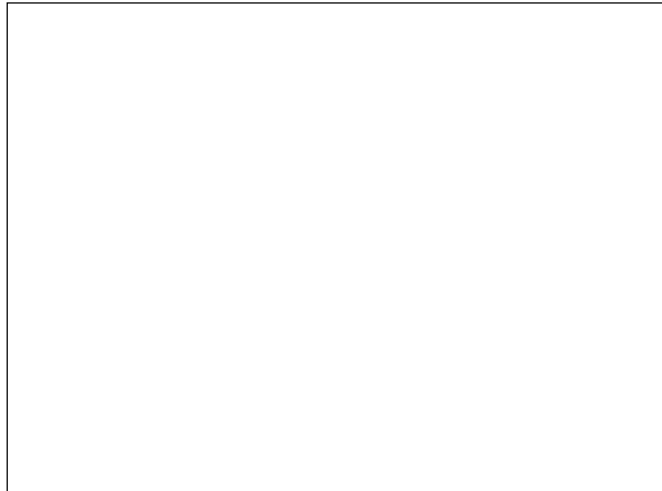Fax: +44 (0) 1256 86 41 54
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