# PRODUCT DESCRIPTION

## USI

Signal Interface

# Content

# USI Board

### Application notes

➠ Not for ALX 73x (PMA)

**Utilization**

The USI (Universal Signal Interface) is an *optional* signal interface for the following machines:

- 64-xx (24 V)
- ALX 92x (5 V or 24 V)

The following machines come with an USI installed as standard:

- DPM (5 V or 24 V)
- PEM (5 V or 24 V)

Article numbers:

- USI 5 V: A2062 (5 V signal voltage)
- USI 24 V: A2345 (24 V signal voltage)

USI-equipped machines can for example control applicators or scanners. The input signals can be used to trigger the print-dispense-process. The output lines signal the operating status - e.g. material or ribbon end - so that the machine can be integrated completely into a system.

**Compatibility**

➠ DPM, ALX 92x: USI and AI (Applicator Interface) can not be installed both into the same device.
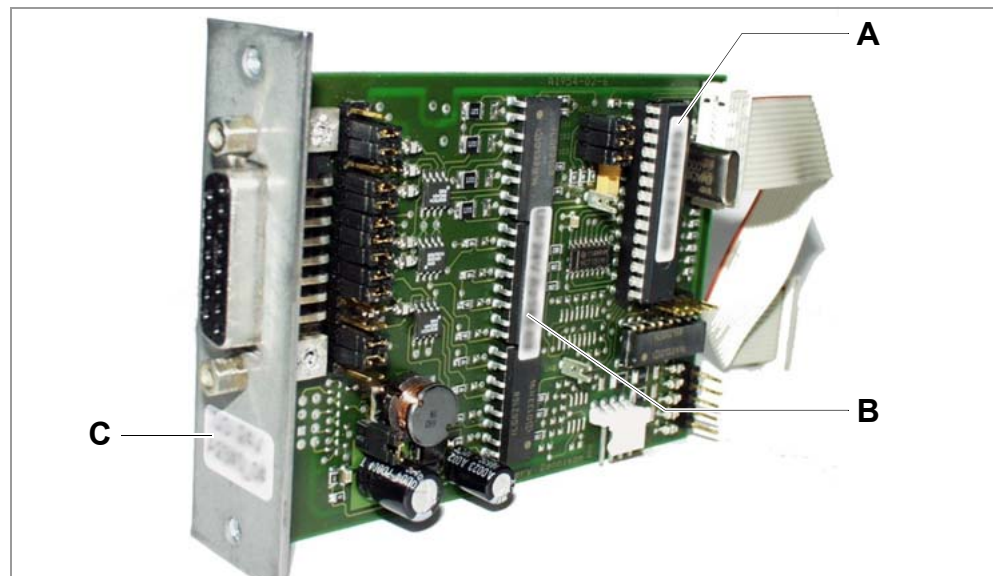


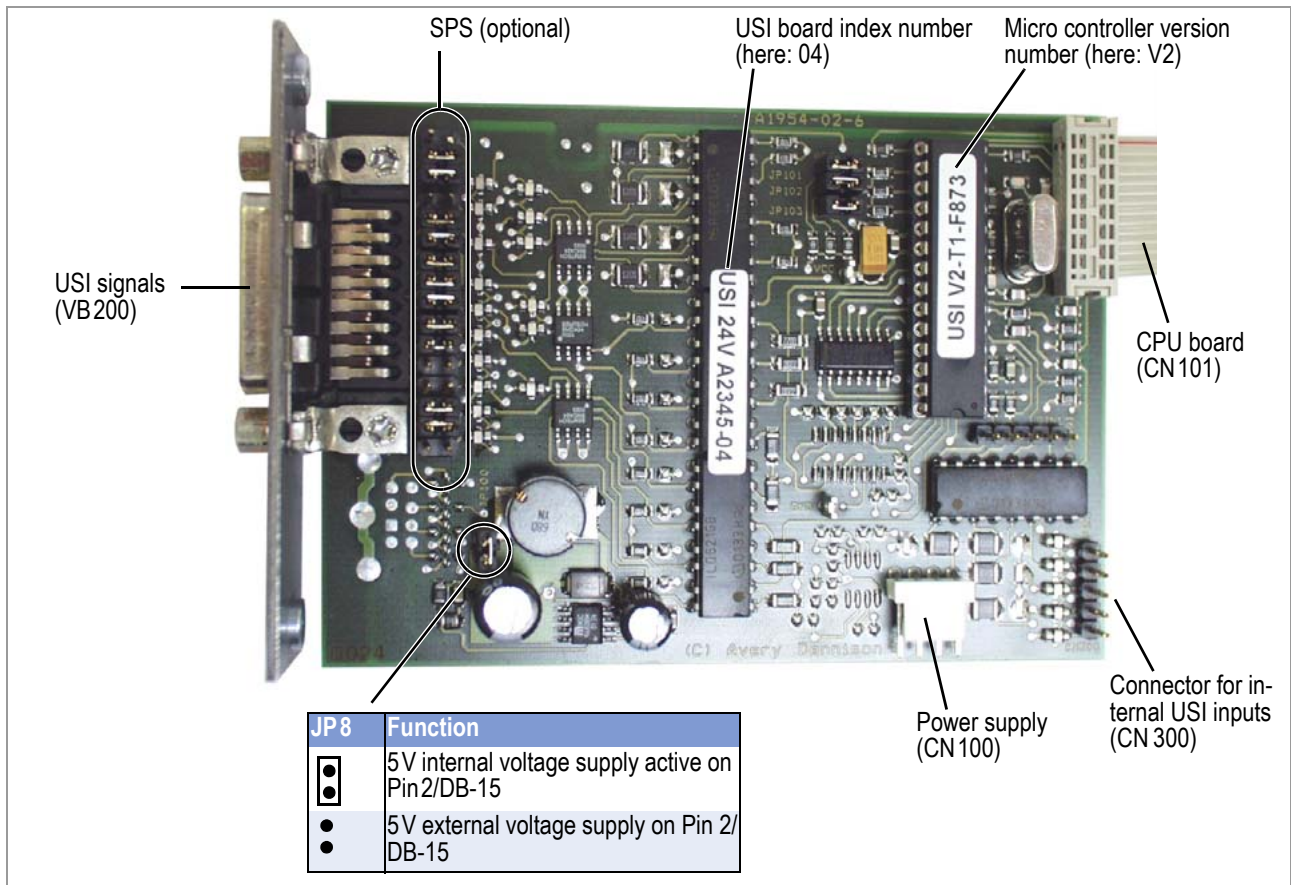[1]    *Version designations on the USI board.*

**Requirements**

➠ The functionality described in this section is only then fully available, if the following requirements are met:

- *USI board*: At least A2062-08 (5 V USI) or A2345-09 (24 V USI) or with a higher index number. Displaying the index number: Sticker on the board [1B, C].

- *USI controller*: At least V6-T36 or a later version with a higher V-number. Displaying the version:
  - Sticker on the microcontroller [1A]
  - Parameter menu: SERVICE DATA > > MODULE FW VERS. > USI interface
  - ⇒ Controller version *older* than V6-T36: Update is only possible by exchanging the controller (see chapter Replacing the controller 🗋 on page 11).
  - ⇒ Controller version V6-T36 or higher: Update can be done by loading new firmware (same procedure as for printer firmware update, see topic section Firmware 🗋). Requirement: printer firmware of at least version 5.30 is installed.

- *Printer firmware*: 5.0 or higher. Displaying the firmware version:
  - Parameter menu: SERVICE DATA > > MODULE FW VERS. > System version
  - During powering up the printer

- *Supply cable:* The USI comes with the data cable connected firmly to the board; But the voltage cable has to be ordered separately (article no. A2059)
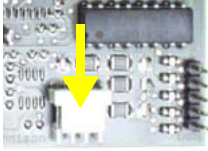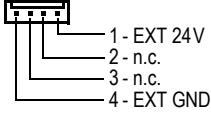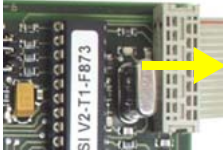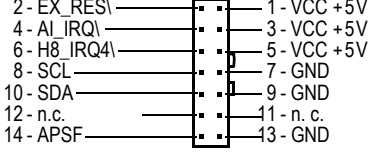
**Accessories**      *Product sensor:* For connection to the 24 V USI, a completely assembled product sensor with 2 m cable and D-Sub15 connector is available (article no. A2682).

## View



| JP 8 | Function |
|------|----------|
| (jumper on top pins) | 5 V internal voltage supply active on Pin 2/DB-15 |
| (jumper off) | 5 V external voltage supply on Pin 2/DB-15 |

[2]    USI-board (A2345).

## Connectors

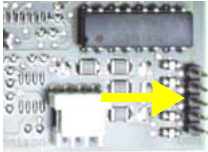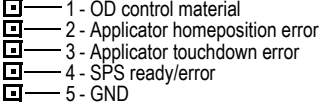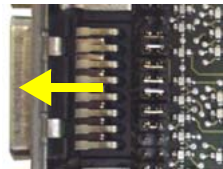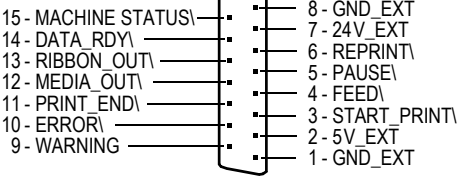| Picture | Comp. Diagr. | Type on board | Pin assignment on board |
|---|---|---|---|
|  | CN100 | AMP 640457-4 | 1 - EXT 24V<br>2 - n.c.<br>3 - n.c.<br>4 - EXT GND |
|  | CN101 | Cable is soldered to the board | 2 - EX_RES\  1 - VCC +5V<br>4 - AI_IRQ\  3 - VCC +5V<br>6 - H8_IRQ4\  5 - VCC +5V<br>8 - SCL  7 - GND<br>10 - SDA  9 - GND<br>12 - n.c.  11 - n. c.<br>14 - APSF  13 - GND |
|  | CN300 | | 1 - OD control material<br>2 - Applicator homeposition error<br>3 - Applicator touchdown error<br>4 - SPS ready/error<br>5 - GND |
|  | VB200 | | 15 - MACHINE STATUS\  8 - GND_EXT<br>14 - DATA_RDY\  7 - 24V_EXT<br>13 - RIBBON_OUT\  6 - REPRINT\<br>12 - MEDIA_OUT\  5 - PAUSE\<br>11 - PRINT_END\  4 - FEED\<br>10 - ERROR\  3 - START_PRINT\<br>9 - WARNING  2 - 5V_EXT<br>  1 - GND_EXT |

[Tab. 1]    Connectors on the USI board.

## Signals at the D-Sub 15 connector

| Pin | Signal | Function |
|---|---|---|
| 1 | GND_EXT | Ground contact |
| 2 | 5V_EXT (Voltage supply) | *JP8 connected*: Internal 5 V source can be used via the wire for external sensors.<br>*JP8 clear*: Wire can be used for an external 5 V source. |
| 3 | START_PRINT\ (Input) | The machine starts printing depending on the setting of parameter DP INTERFACE > Start print mode.<br>Preconditions: Printjob is available (DATA RDY\ low), printer is in online mode, no error messages. |
| 4 | FEED\ (Input) | Feeding of the label material as long as the signal is low. Minimum feed quantity: 1 label. The display shows „USI feed" during feeding.<br>Preconditions for feeding:<br>• Offline mode, printing has been stopped or the printer is in USI-paused mode.<br>• Online mode and no print job loaded. |

[Tab. 2]    Signal designations and functions of the USI interface.

| Pin | Signal | Function |
|-----|--------|----------|
| 5 | PAUSE\ (Input) | A high-low-transition switches the printer into the USI-paused mode. A further high-low-transition switches the printer back into the online mode.<br><br>If parameter DP INTERFACE > Start print mode is set to *Level high active* or *Level low active*, any activating of the PAUSE\ signal stops the printing after the current label.<br><br>Features:<br>• „USI Pause" is displayed<br>• ERROR\ is activ (low)<br>• If a print job is available: DATA RDY\ is inactive (high)<br>• Start print signals are suppressed<br>• Reprint requests are proceeded after switching into online mode.<br>• Precondition: START PRINT\ inactive (high). |
| 6 | REPRINT\ (Input) | The last printed label is being reprinted as long as REPRINT\ is low. Minimum reprint quantity: 1 label.<br><br>Preconditions:<br>• The label which is ought to be reprinted, must be ready printed and dispensed.<br>• Printer is in online mode.<br>• If a REPRINT\ is triggered while the printer is in USI-pause mode, the reprint will be proceeded as soon as the printer is switched back in online mode.<br>• Precondition: START PRINT\ inactive (high). |
| 7 | 24V_EXT (Voltage supply) | Voltage supply for external sensors |
| 8 | GND_EXT (GND) | Ground contact |

[Tab. 2]     (Forts.)Signal designations and functions of the USI interface.

| Pin | Signal | Function |
|-----|--------|----------|
| 9 | WARNING (Output) | *Ribbon low warning:*<br>The signal is activated (high), if<br>a) DP INTERFACE > Ribbon signal = „On" and<br>b) The ribbon stock is below the threshold value, which is set in parameter SYSTEM PARAMETER > Foil end warning. After changing the ribbon roll, the signal will be inactivated after a short time.<br><br>*Material end warning:*<br>The signal is activated (high), if<br>a) DP INTERFACE > Material signal = „On" and<br>b) The label material stock is below the threshold, which is set by positioning the light barrier. After changing the material roll, the signal will be inactivated.<br><br>The WARNING output is only then inactivated (low), if ribbon and material both are available in a sufficient amount. If one of both rolls falls below the threshold value, the output switches activ (high).<br>In practice, the more or less eccentric running material roll will trigger the material warning repeatedly, until the roll diameter falls below a certain tolerance zone.<br><br>This signal is only a warning, what means that the printing goes on.<br><br>*Bad Tag warning*:<br>The signal is activated (high), if<br>a) DP INTERFACE > USI profile = „Bad Tag" and<br>b) Reading or writing a RFID tag failed. The signal timing depends on several factors, e. g. the applied read/write unit, the position of the transponder on the label, the number of retries. |
| 10 | ERROR\ (Output) | *Active* (low) in offline mode *or* if an error occurs:<br><br>*Not active* (high) in online mode.<br><br>During the initialization of the printer, the output is inactive (high)! |
| 11 | PRINT_END\ | The manner in which this output is switched depends on the setting of parameter DP INTERFACE > End print mode.<br><br>Difference to older versions of printer firmware (below 2.46): The output is now also activated as long as labels are fed.<br><br>➧ Limitation: This functionality is not available in Batch mode!<br><br>➧ 64-xx with LTSI applicator mounted (with PLC version 5.0 and higher): PRINT_END\ is not available. |
| 11 | HOME_POS\ (Output) | ➧ Only valid for 64-xx with LTSI applicator mounted (with PLC version 5.0 and higher):<br>• HOME_POS\ replaces PRINT_END\.<br>• HOME_POS\ is active, if the LTSI is in home position (upper limit position) |
| 12 | MEDIA_OUT\ (Output) | Low in case of material end. Additionally activated are:<br>• ERROR\<br>• MACHINE STATUS\ |

[Tab. 2]     (Forts.)Signal designations and functions of the USI interface.

| Pin | Signal | Function |
|-----|--------|----------|
| 13 | RIBBON_OUT\ (Output) | Low in case of ribbon end. Additionally activated are:<br>• ERROR\<br>• MACHINE STATUS\ |
| 14 | DATA_RDY\ (Output) | *Active* (low) in online mode, if a printjob is loaded (--> detecting a loaded printjob). If the signal is active, the printer starts to print immediately after arrival of a start signal.<br><br>The signal toggles to *deactivated*, if<br>• the print job is done, or<br>• the printer is switched to stopped mode, offline mode or USI-pause mode. |
| 15 | MACHINE STATUS\ (Output) | This output is activated (low), if the printing has been interrupted by a disturbance or an error. Examples are: Pressure roll open, hood open, ribbon- or material end error, start print error or another fault that avoids printing.<br><br>The output is also activated during the initialization of the printer.<br><br>▰➡ In comparison to ERROR\, MACHINE STATUS\ is *not* low if the printer has been switched to offline or pause mode.<br><br>▰➡ 64-xx with LTSI applicator mounted (with PLC version 5.0 and higher): MACHINE_STATUS\ is not available. |

[Tab. 2]    (Forts.)Signal designations and functions of the USI interface.

## Application of the internal inputs at CN 300

The following parameter settings are required to make the internal inputs useable:

**PLC**

For usage with PLC:
• DP INTERFACE > Interface type = *USI Applicator*
• DP INTERFACE > Internal inputs = *Enabled*

**OD sensor**

For useage with „OD sensor material":
• DP INTERFACE > Material signal = *Enabled*
• DP INTERFACE > Internal inputs = *Enabled*

If PLC and „OD sensor material" are ought to be used, all three parameter settings have to be done.

▰➡ To all four inputs applies: The input is inactivated if it is connected to ground potential!

Universal Signal Interface (USI)

# Signal description of the internal inputs at CN300

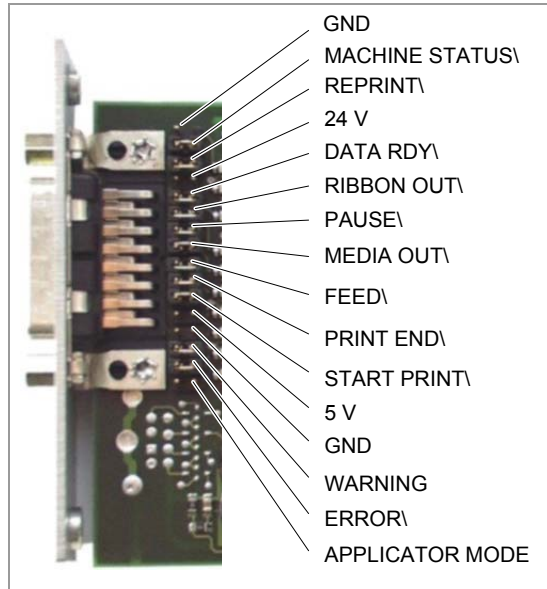| Pin | Signal | Signal type | Function |
|-----|--------|-------------|----------|
| 1 | OD control material | In | To be applied to the OD control material option.<br>The signal WARNING at pin 9 of the DB 15 is switched activ, if<br>• Parameter DP INTERFACE > Material Signal = *Activated* and<br>• the input is high |
| 2 | Applicator fault home position | In | If one of the inputs is high or makes a low-high-transition, the appropriate status message is displayed at the printer. Additionally, the outputs ERROR\ and MACHINE STATUS\ will be activated (low). |
| 3 | Applicator fault touch down | In | |
| 4 | PLC ready / fault | In | |
| 5 | GND | Ground | GND potential of the internal inputs |

*[Tab. 3]     Signal designations and functions of the internal inputs*
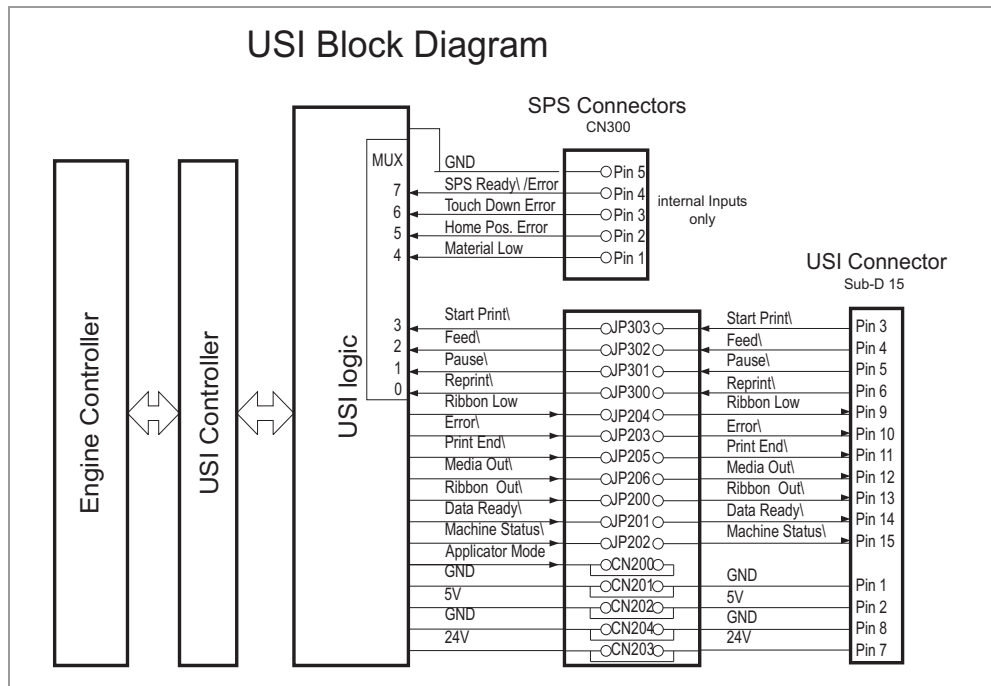
## Pin assignment jumper block

Each signal of the D-Sub connector can be interrupted separately at the jumper block.

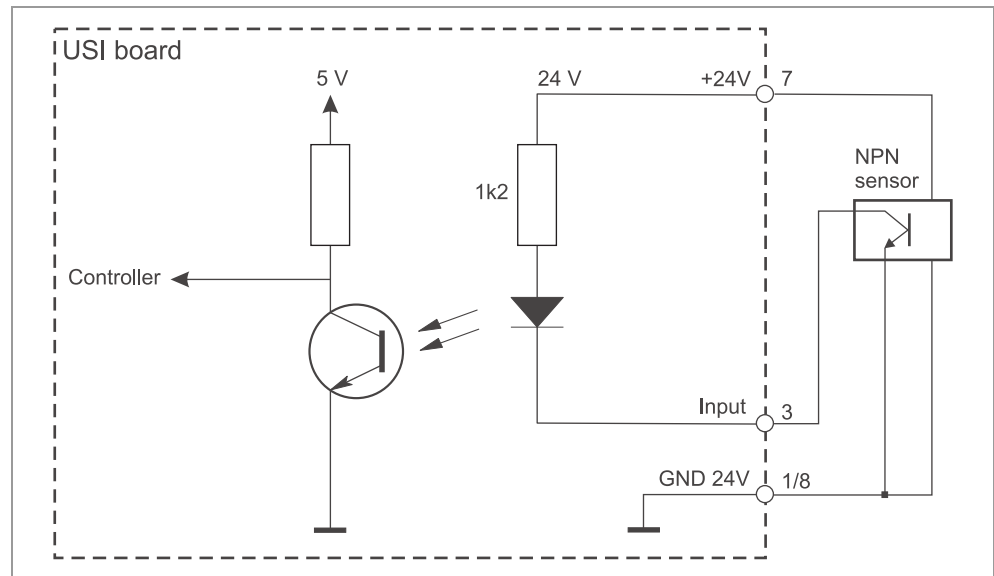➠ The voltage and ground wires are through-connected and cannot be interrupted [3]!



GND
MACHINE STATUS\
REPRINT\
24 V
DATA RDY\
RIBBON OUT\
PAUSE\
MEDIA OUT\
FEED\
PRINT END\
START PRINT\
5 V
GND
WARNING
ERROR\
APPLICATOR MODE

[3]  Pin assignment jumper block
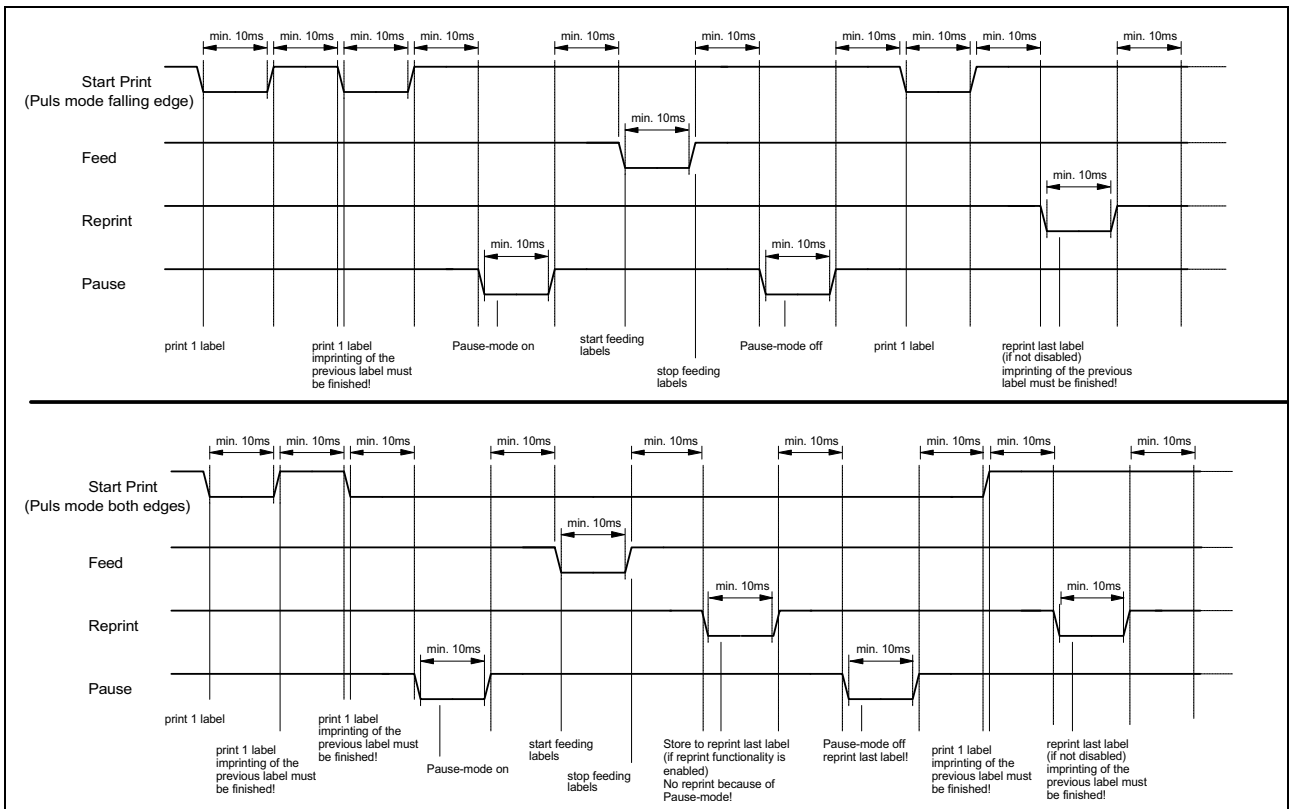
## Block diagram



[4]  Block diagram of the USI

# Circuit diagrams for signal inputs



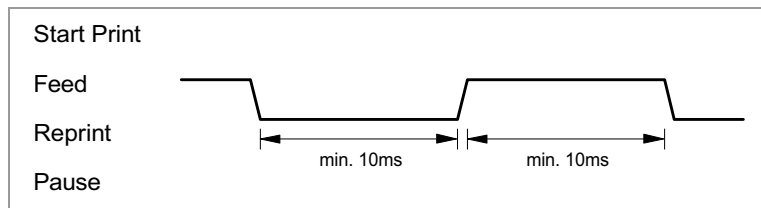*[5]    Main circuit for signal inputs (NPN) at the USI interface (here: connecting a start sensor).*

**Timing waveform of input signals**

The following criteria must be matched by the input signals of the USI:
➠ Only one signal at a time may be switched active!
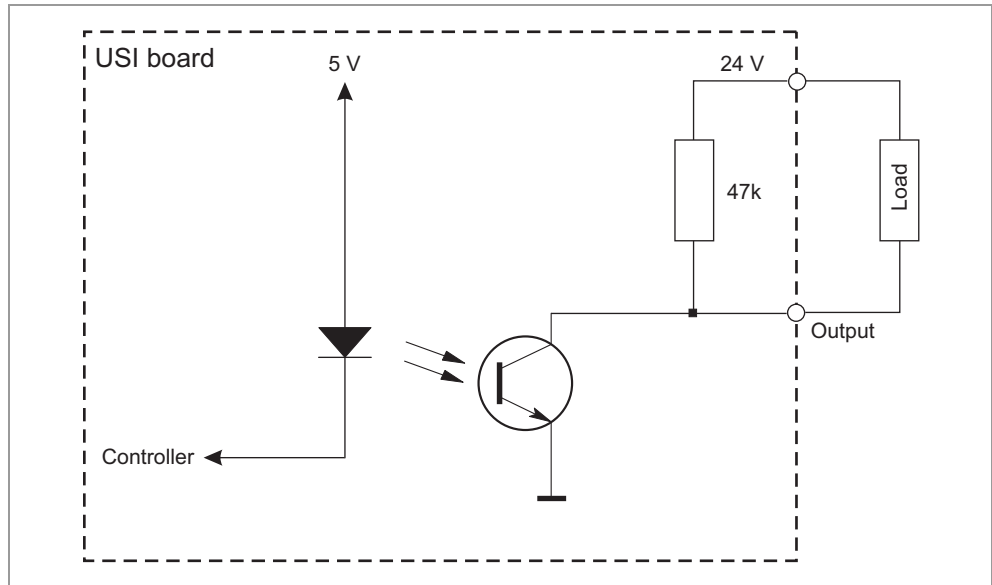➠ The input signals must switch bounce-free!



*[6]    Examples of timing waveform for the USI inputs.*

[7]  *Signal timing - to be met.*

## Circuit diagrams for signal outputs



[8]  *Main circuit (NPN) for signal outputs at the USI interface.*

**Max output current**   In the state of delivery (jumper 8 closed, cable A2059 connected), the supply voltages (5 V on pin 2 and 24 V on pin 8) are provided by the USI. The output current is limited:

➠ Maximum current per output line: 50 mA; all output currents together may not exceed 700 mA.
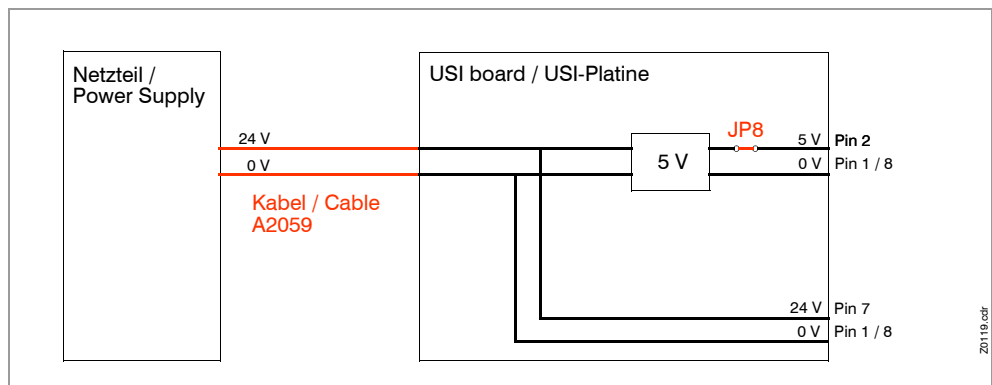


[9]  *USI in the state of delivery: The voltage cable is connected, JP 8 is closed.*

**External supply**

| ⚠ | CAUTION |
|---|---------|
| | In previous versions of this document, the external voltage supply of the USI was described. |
| | External voltage supply without external current limiting elements is no longer permitted (risk of fire)[a]. |
| | In case of applications that externally supply voltages, a current limiting element *must* be provided by the system integrator. |
| | Examples of suitable current limiting elements in the supply circuit are: |
| | • Poly fuse with UL 1434 approval<br>24 VDC: $I_{hold}$ = 650 mA; $U_{min}$ = 30 V<br>5 VDC: $I_{hold}$ = 650 mA; $U_{min}$ = 6 V |
| | • Micro fuse according to IEC EN 60127<br>24 VDC: T 630 mA L 250 V<br>5 VDC: T 630 mA L 250 V |

*a. Due to an update of EN 60950-1.*

## Replacing the controller

A firmware update for controller versions older than V6-T36 can only be done by replacing the controller [10A].

Article number of the controller with the most recent firmware: A3379.

**Version check**   Displaying the current controller version: SERVICE DATA > >MODULE FW VERS. > USI interface.
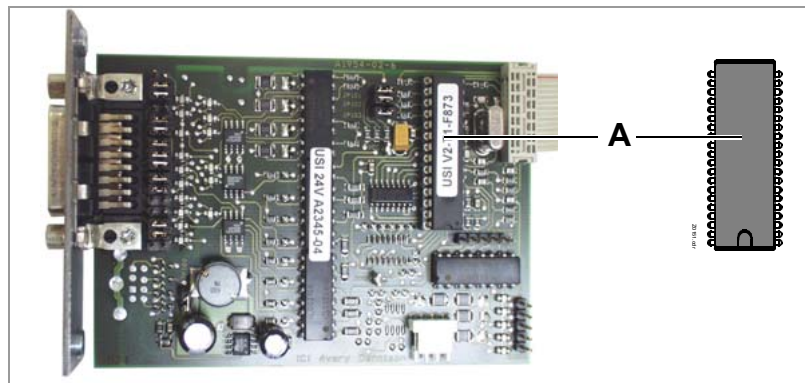


*[10] The controller (A) contains the USI firmware.*

**Controller replacement**

1. Switch the printer off, pull out the mains connector.

2. Open the rear hood.
   See topic section Service Mechanics 🗋, section „Housing", chapter „Rear hood".

3. Take the controller [10A] out of the socket.

4. Insert the new controller into the socket.
   ⇒ The dent in the controller housing must show in the pictured direction!