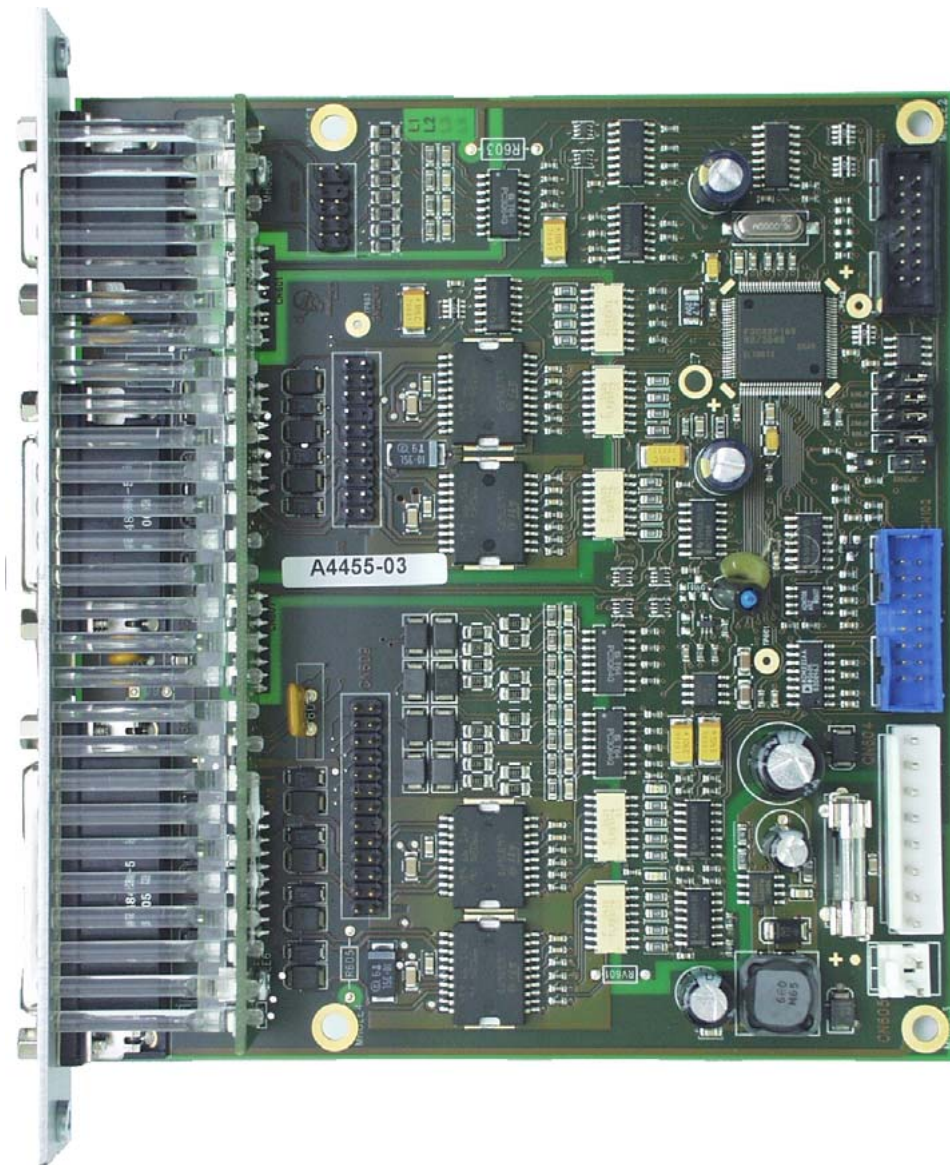


# PRODUCT DESCRIPTION

## AI Applikator Interface





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# INTERFACE DESCRIPTION

## Important notes

The Applicator Interface (AI) is an option board for the ALX 92x. The AI works as a mini-PLC, which can control almost any applicator type. The AI is available in two Versions:

- *AI Basic*: power supply via the ALX 92x main power pack
- *AI Pro*: higher output currents due to a separate power pack (only with ALX 92x)

► „Basic“ and „Pro“ is only mentioned in this description, if the two versions are different in something.

## Connectors

Required connectors: The „AI connector kit“, Article no. A5069, contains (connector and connector housing for each):

- 1x D-Sub 15 high density
- 1x D-Sub 26 high density
- 1x D-Sub 44 high density

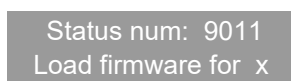
## Firmware requirements

Both firmware versions, for ALX and Applicator Interface must match the table below:

Firmware ALX 92x		ALX 73x (PMA)	Firmware AI
Gen. 2	Gen. 3		
3.40	—		1.03
4.00	—		1.11
4.10	—		1.15
4.11/4.22	5.00/5.01/5.02/ 5.03		1.17
4.31	5.31		1.19
4.33	5.33		1.23
--	6.35	6.36	1.36
--	6.37		1.36
--	6.42		1.38
--	6.43		1.38
--	6.52	6.52	1.41
--	6.60-SR1	6.60	1.42
--	6.75	6.75	1.44
--	6.75-SR1	6.75-SR1	1.44

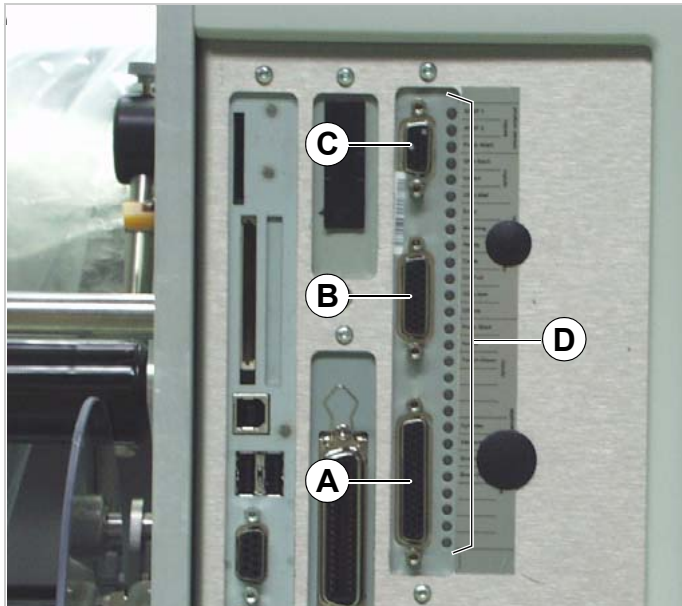
Showing the current firmware version: call SERVICE DATA >MODULE FW VERS.

Incompatible firmware versions for ALX and Applicator Interface cause the following status message to show up:



with x = „Applicator int.“

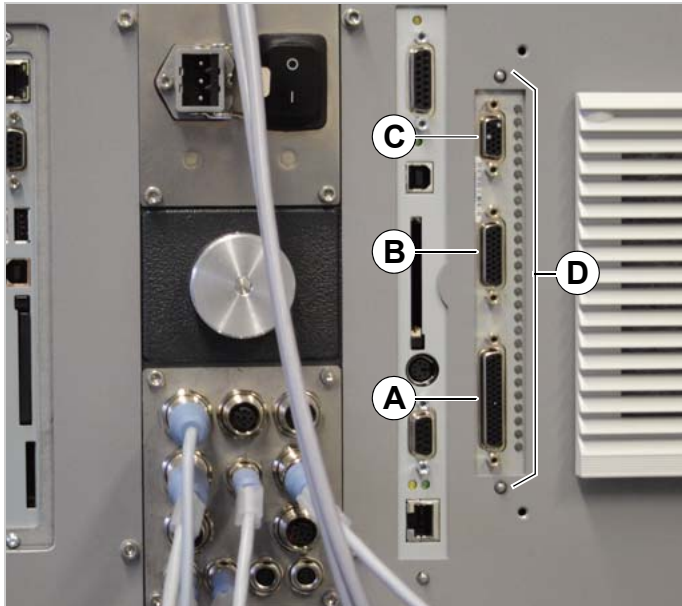
## Connector Position



- [1] Connections of the Applicator Interface (ALX 92x):
- A Applicator connection (D-Sub 44 hd)
  - B Machine status connection (D-Sub 26 hd)
  - C Product (Start) sensor connection (D-Sub 15 hd)
  - D Monitor-LEDs

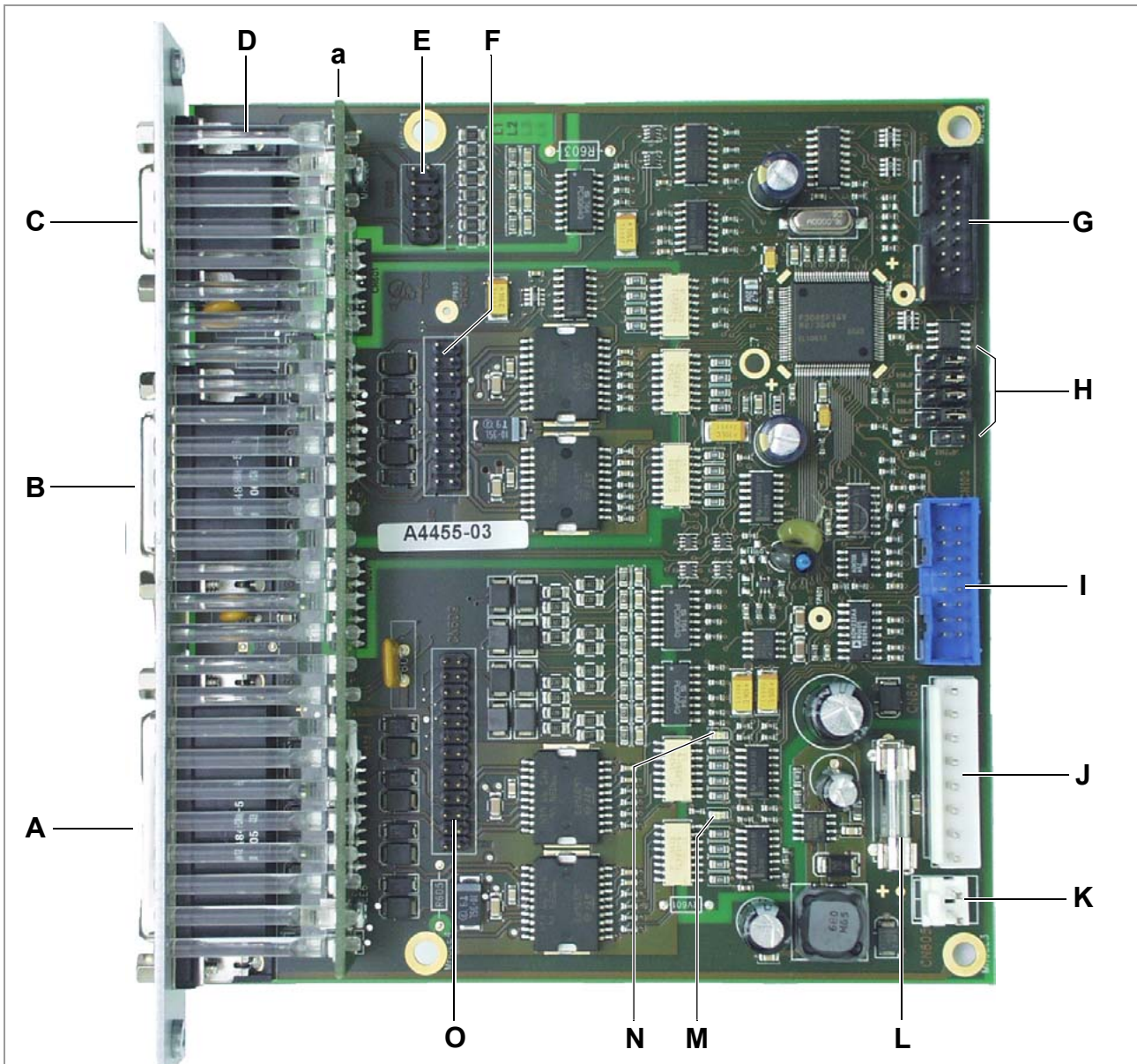


- [2] Connector for Novexx Applicators (arrow) at an ALS 92x (LH). The connector is internally connected to the AI board.



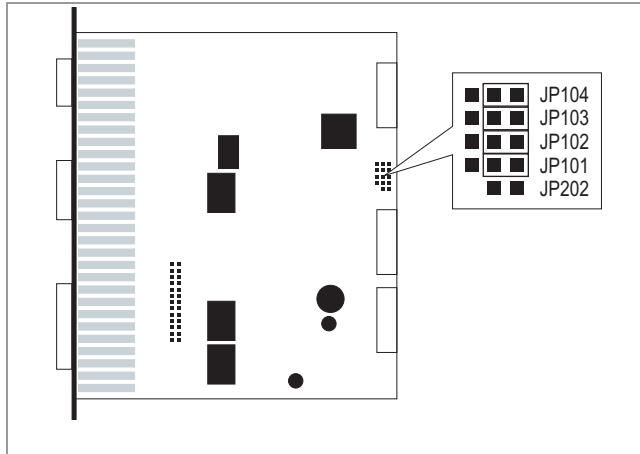
- [3] Connections of the Applicator Interface (ALX 73x):
- A Applicator connection (D-Sub 44 hd)
  - B Machine status connection (D-Sub 26 hd)
  - C Product (Start) sensor connection (D-Sub 15 hd)
  - D Monitor-LEDs

## Connections and configuration



[4] Applicator Interface (PCA-Assy. = A4455-03)

- A CN 603: Connection for applicator
- B CN 602: Signal interface machine status
- C CN 401: Connection product (start) sensor
- D Light guides, which lead the LED signals from the plug-on board (a) to the boards mounting panel
- E CN 402: Internal connection product (start) sensor
- F CN 610: Internal signal interface machine status
- G CN 101: Connection CPU board
- H JP 101-104; JP 202: Jumpers for factory internal use



[5] Default settings for the jumpers JP 101-104 and JP 202.

- I** CN 102: Debug interface
- J** CN 604: Connection power supply
- K** CN 605: not used
- L** SI 601: Fuse
  - *AI Basic*: T1AH 250V (article no.: A2328)
  - *AI Pro*: T4AH 250 V (article no.: A5179)
- M** D 331: Green LED; only for factory internal use; flashes if the AI works properly
- N** D332: Yellow LED; only for factory internal use
- O** CN 609: Internal connection applicator

## Replacing older boards

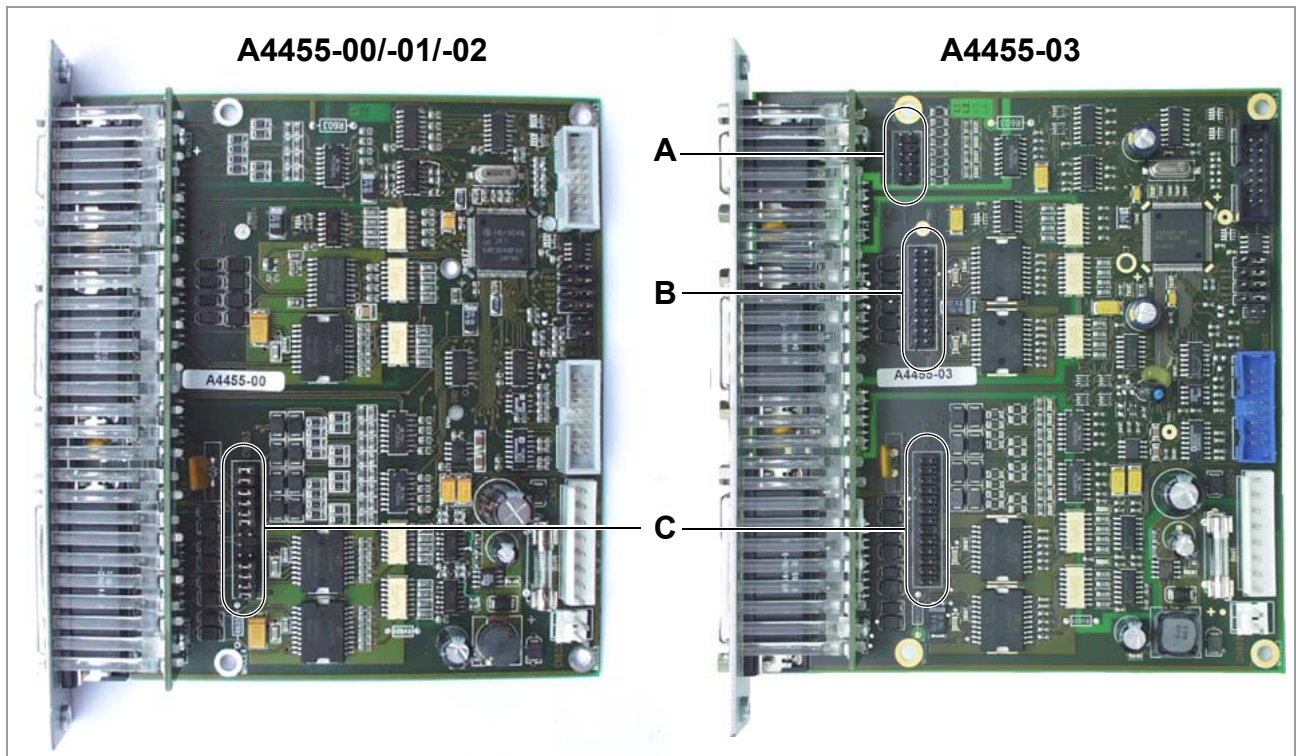
CAUTION! - Follow the following, to prevent malfunctioning:

→ When replacing an older board with index -00/-01/-02 against a new board with index -03 do *not* take over the jumpers from the old board.

Older boards with index -00/-01/-02 had jumpers set on connector [6C].

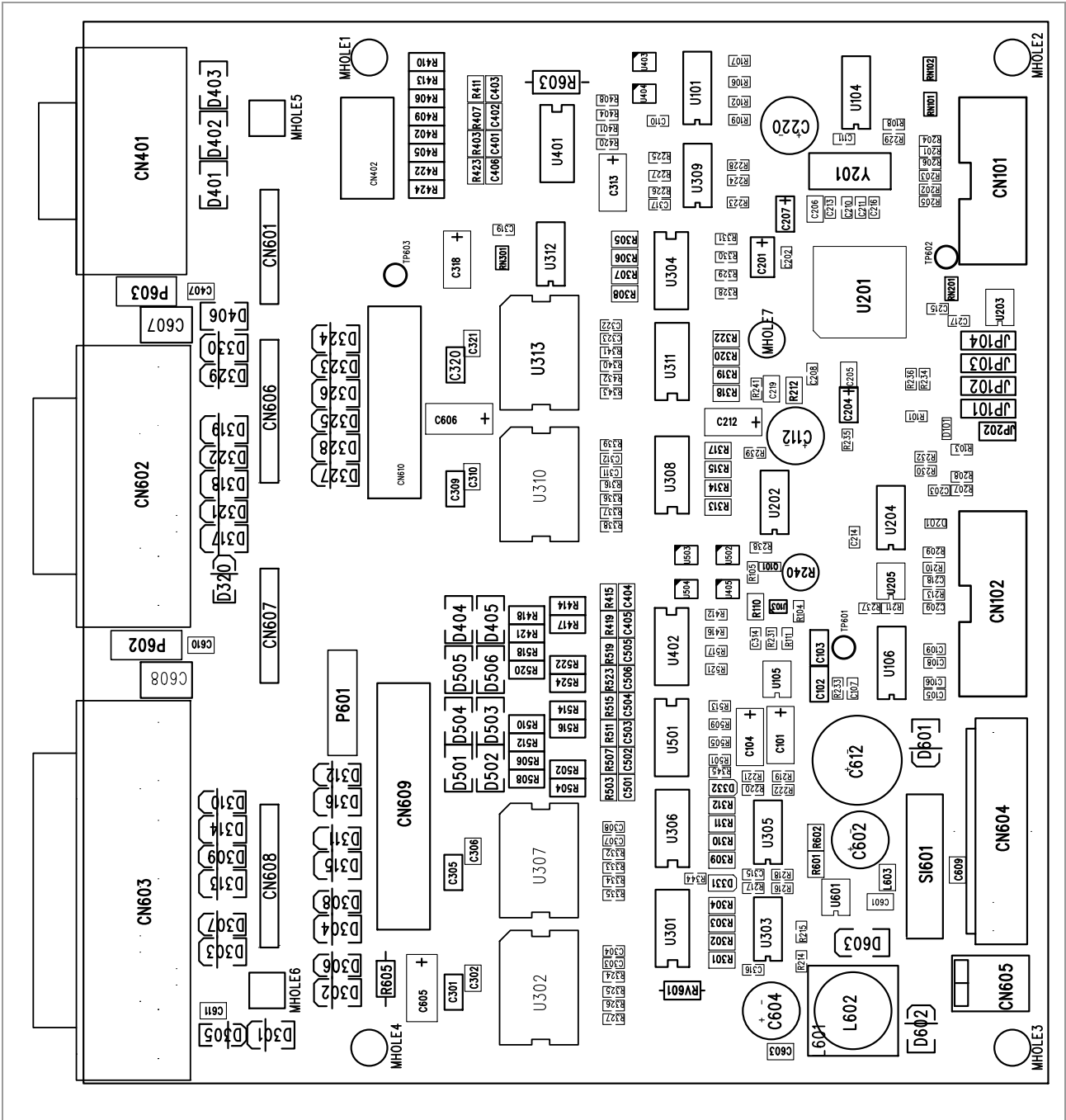
New boards (index -03) provide additionally to [6C] the connectors [6A] and [6B].

▣ None of the 3 connectors may have any jumpers put on it!



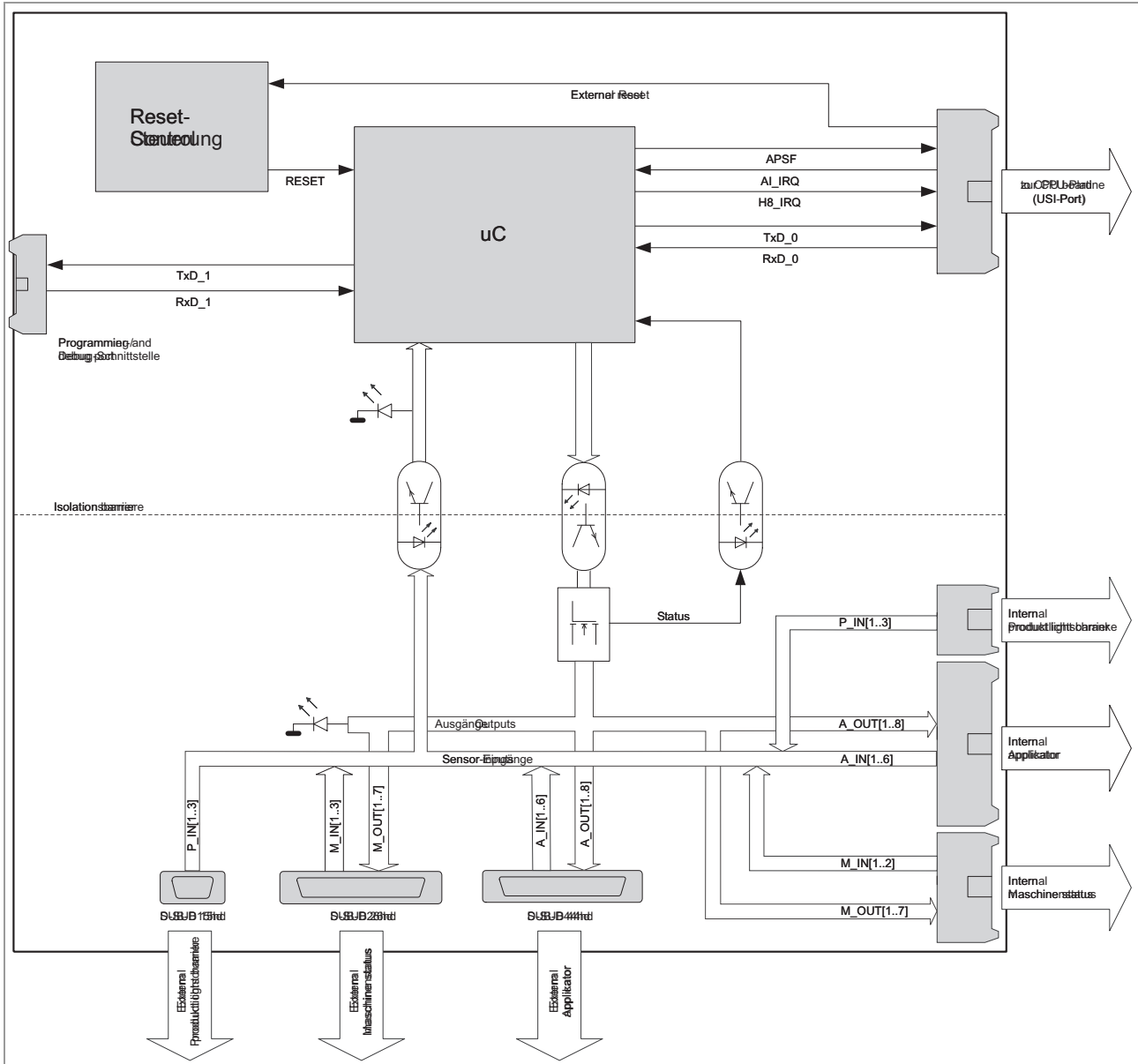
[6] Left: older board; right: current board.

Layout diagram



[7] Layout diagram for Applicator Interface (PCB = A3417-03)

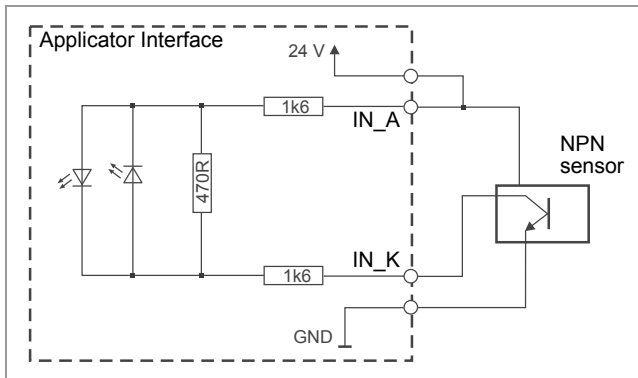
### Block diagram



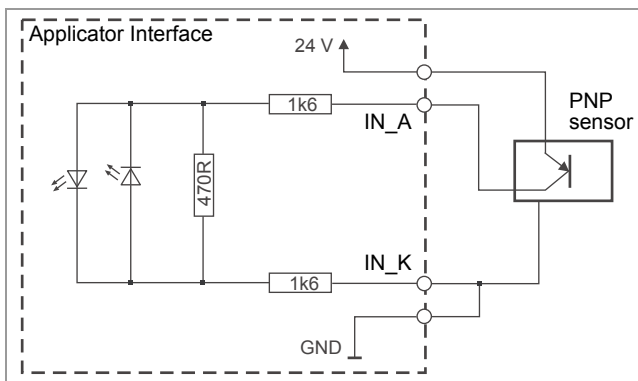
[8] Block diagram Applicator Interface.

### Circuit diagrams for signal inputs

For each signal input are +24 V and GND 24 V separately available.



[9] Main circuit for signal inputs (NPN).



[10] Main circuit for signal inputs (PNP).

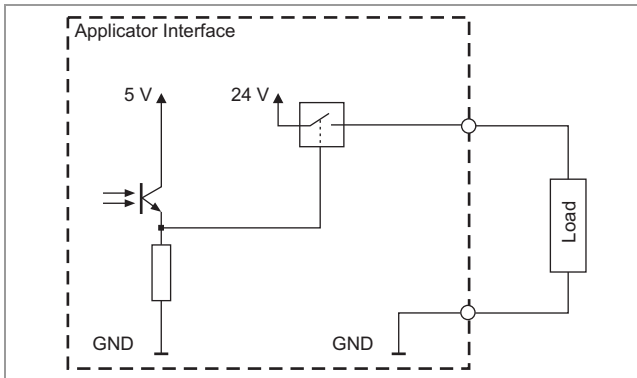
Quantity	Value
Supply voltage	24 V ± 10%
$V_{IL}$ (state „0“)	≤ 5 V
$V_{IH}$ (state „1“)	18.0 V @ 3.8 mA 26.4 V @ 5.7 mA
$t_{delay}$ (propagation delay)	≤ 60 μs
$t_{debounce}^a$ (software debouncing)	10 ms

[Tab. 1] Switching level definitions for signal inputs.

a) 24 V input → 5 V microcontroller input

### Circuit diagrams for signal outputs

All signal outputs are designed as PNP and are galvanically separated from the 5 V control system (optocoupler).



[11] Main circuit for outputs (PNP).

### Signal outputs

Signal outputs are mainly used for connecting to other devices or to machine controls.

Admissible resistive load:  $\geq 240 \text{ Ohm @ } 24 \text{ VDC}$ .

Maximum admissible output current for each signal output: 0.1 A.

Quantity	Value	Note
Supply voltage	$24 \text{ V} \pm 10\%$	
Voltage drop at $V_{OH}$	$\leq 0.3 \text{ V @ } 0.1 \text{ A}$	
$t_{pLH}$	$\leq 1 \mu\text{s}$	Rise time „0“ $\rightarrow$ „1“ at 240 Ohm
$t_{pHL}$	$\leq 1 \mu\text{s}$	Fall time „1“ $\rightarrow$ „0“ at 240 Ohm
$t_{\text{delay}}$	$\leq 30 \mu\text{s}$	5 V microcontroller output $\rightarrow$ 24 V output

[Tab. 2] Switching levels of power outputs.

### Power outputs

Power outputs can directly drive loads.

Load	Max. value
Resistive load	$\geq 48 \text{ Ohm @ } 24 \text{ VDC}$
Inductive load	$\leq 200 \text{ mJ}$
Lamp	$\leq 10 \text{ W}$

[Tab. 3] Admissible loads at power outputs.

Maximum admissible output current for each power output: 0.5 A: Total output current  $I_{\max}$  over all outputs not more than:

- AI Basic: 1 A
- AI Pro: 4 A

Quantity	Value	Note
Supply voltage	$24 \text{ V} \pm 10\%$	
Voltage drop at $V_{OH}$	$\leq 0.5 \text{ V @ } 0.5 \text{ A}$	
$t_{pLH}$	$\leq 5 \mu\text{s}$	Rise time „0“ → „1“ at 48 Ohm
$t_{pHL}$	$\leq 5 \mu\text{s}$	Fall time „1“ → „0“ at 48 Ohm
$t_{\text{delay}}$	$\leq 60 \mu\text{s}$	5 V microcontroller output → 24 V output

[Tab. 4] Switching levels of power outputs.

### Max power

Connection	Max. current
Signal output	0.1 A
Power output	0.5 A

[Tab. 5] Maximum output current for each output.

The maximum output power drawable from the 24 V supply is:

- AI Basic: 24 W (1 A)
- AI Pro: 96 W (4 A)

This is the sum of all sensor supplies and of all switch outputs which are active at the same time.

### Overload

The outputs are equipped with quad channel power switches, which are protected against overcurrent and overtemperature as follows:

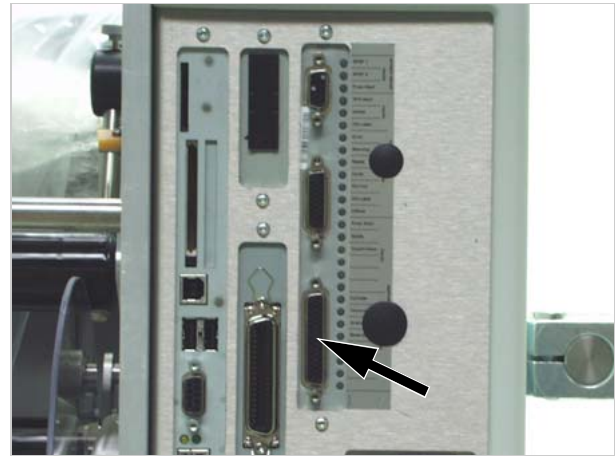
- *Overtemperature* of a power switch: all outputs of the power switch are turned off, until the temperature reaches the admissible range.
- *Overcurrent* of one or several outputs: the respective outputs are pulsed until the overcurrent condition is removed. During this, the output current is limited to 400 mA

During an error case, each quad channel power switch sets a diagnosis signal, which is detected and sent to the CPU by the microcontroller.

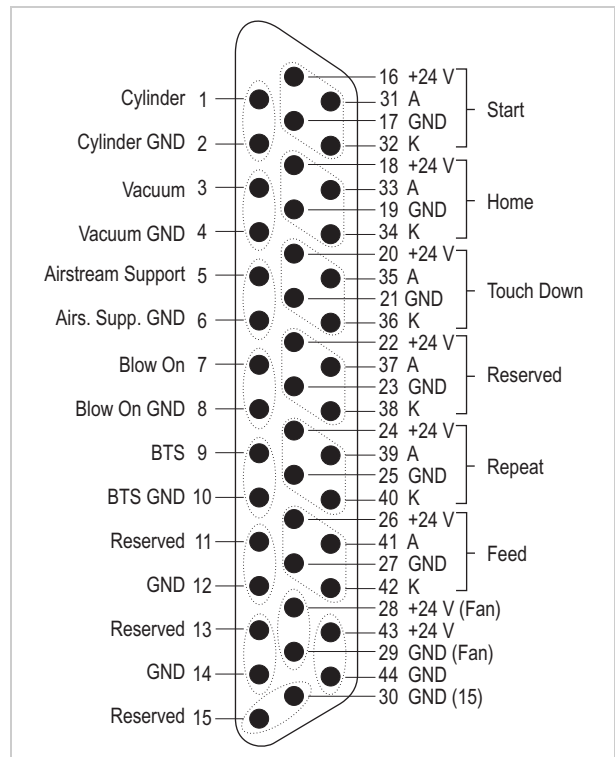
# PIN ASSIGNMENTS

## Applicator connection

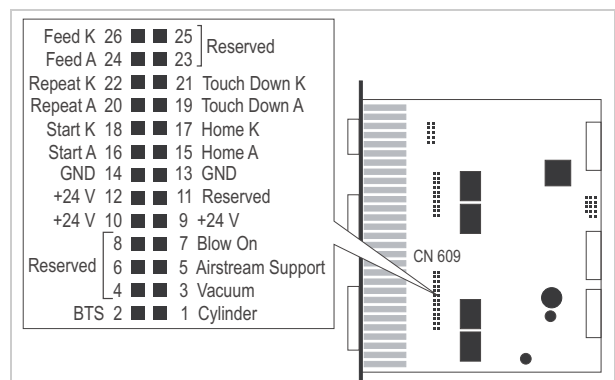
Signal name	Function
<i>Cylinder</i>	Power output ( $I_{out} < 500 \text{ mA}$ ) Controls the pneumatic cylinder of the applicator Active during the dwell time or until touch down Duration setable with: APPLICATOR PARA > Dwell time
<i>Vacuum</i>	Power output ( $I_{out} < 500 \text{ mA}$ ) Controls the vacuum at the applicator plate Active after the start signal until end of application (cylinder)
<i>Airstream Support</i>	Power output ( $I_{out} < 500 \text{ mA}$ ) Controls the airstream, which presses the label against the applicator plate. Active after the start signal until start of application (cylinder)
<i>Blow On</i>	Power output ( $I_{out} < 500 \text{ mA}$ ) Controls the blow-on valve of the applicator Active after end of application (cylinder) Duration setable with: APPLICATOR PARA > Blow on time
<i>BTS</i>	Power output ( $I_{out} < 500 \text{ mA}$ ) Controls the Bad Tag Separator (BTS) Active, if a bad RFID tag is detected Is set back by the following action (e.g. devaluating the bad tag)
<i>Start</i>	Input ( $I_{in} < 8 \text{ mA}$ ) Signal is generated by the product sensor Starts the (print)/dispense/apply cycle
<i>Home</i>	Input ( $I_{in} < 8 \text{ mA}$ ) Active, if the applicator has reached the home position (application is finished)



[12] Applicator connection at an ALX 92x (arrow).



[13] Pin assignment applicator connection.



[14] Position and pin assignment of the internal applicator connection (CN 609).

[Tab. 6] Signals at applicator connection.

Signal name	Function
<i>Touch Down</i>	Input ( $I_{in} < 8 \text{ mA}$ ) Use with sensor-controlled applicators (e. g. LTP) Active, if the applicator touches the product
<i>Repeat</i>	Input ( $I_{in} < 8 \text{ mA}$ ) <i>Labeler</i> : Starts a dispense/apply cycle <i>Print &amp; Apply system</i> : Repeats the last print/dispense/apply cycle
<i>Feed</i>	Input ( $I_{in} < 8 \text{ mA}$ ) Feeding of the label material as long as the signal is active; at least one label is dispensed

[Tab. 6] Signals at applicator connection.

24 V supply voltage outputs:

- Sensors:  $I_{max} = 10 \text{ mA}$
- Fan (pin 28):
  - AI Basic:  $I_{max} = 1 \text{ A}$
  - AI Pro:  $I_{max} = 4 \text{ A}$
- Pin 43/44:  $I_{max} = 100 \text{ mA}$

▮▮▮ Total output current  $I_{max}$  over all outputs not more than:

- AI Basic: 1 A
- AI Pro: 4 A

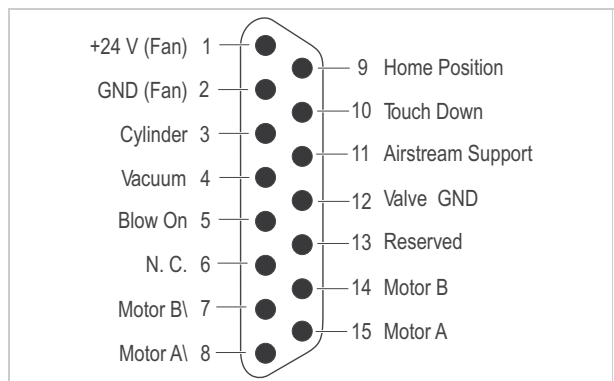
### Novexx-Applicator-connection

This connection is only available at an ALX 92x.

Signal description see [Applicator connection](#) on page 16.



[15] Connector (arrow) for Novexx-Applicators



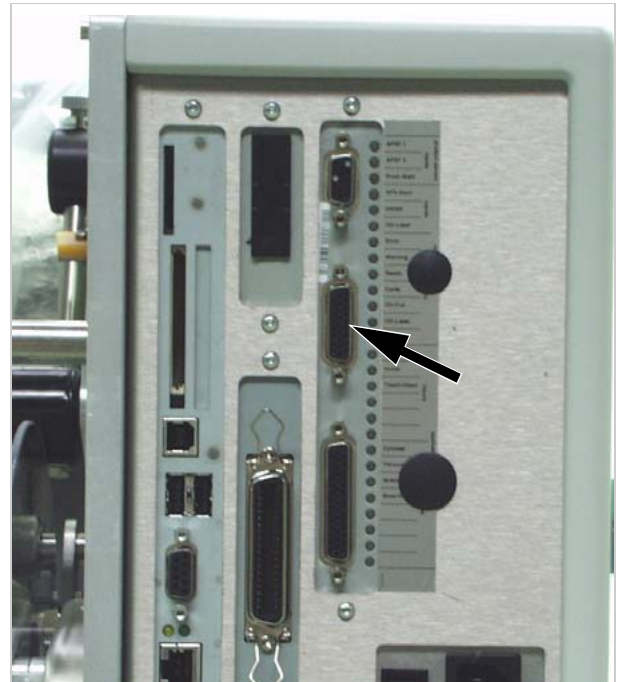
[16] Pin assignment Novexx-Applicator connection

## Machine status connection

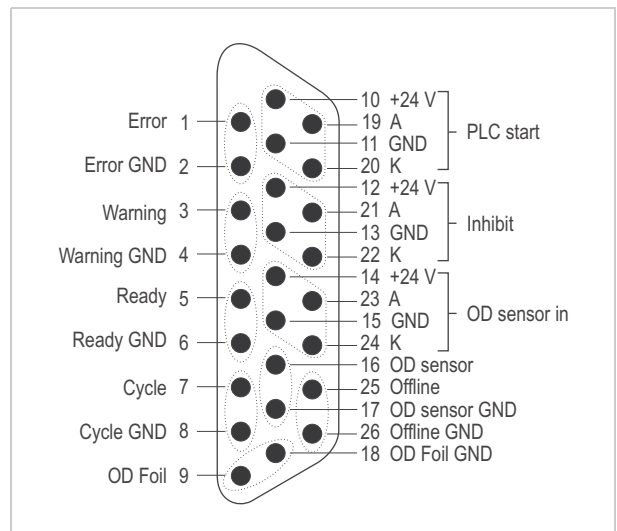
24 V supply voltage outputs:  $I_{max} = 10 \text{ mA}$

Signal name	Function
<i>Error</i>	Power output ( $I_{out} < 500 \text{ mA}$ ) Signal active when an error message appears on the operator panel display
<i>Warning</i>	Power output ( $I_{out} < 500 \text{ mA}$ ) Active, if a warning status occurs (e. g. label roll diameter below desired nominal value)
<i>Ready</i>	Power output ( $I_{out} < 500 \text{ mA}$ ) Active in online mode, if a printjob is loaded.  If Ready is active, the machine starts to print and dispense immediately after arrival of a start signal.
<i>Cycle</i>	Power output ( $I_{out} < 500 \text{ mA}$ ) Active during application cycle (start signal up to homeposition signal)
<i>OD foil</i>	Power output ( $I_{out} < 500 \text{ mA}$ ) Active, if the foil roll $\varnothing$ fell below the value set in SYSTEM PARAMETER > Foil end warning
<i>PLC start</i>	Input ( $I_{in} < 8 \text{ mA}$ ) Same function as start signal, see chap. <b>Applicator connection</b> on page 16
<i>Inhibit</i>	Input ( $I_{in} < 8 \text{ mA}$ ) Start signals are ignored, while signal is active
<i>OD sensor in</i>	Input ( $I_{in} < 8 \text{ mA}$ ) Connection for optional roll outer diameter (OD) sensor, see service manual, topic section „Electronics Gen. 3“, chapter „OD sensor (ALX 92x)“.
<i>OD sensor</i>	Power output ( $I_{out} < 500 \text{ mA}$ ) May be used for driving a signal lamp indicating that the roll $\varnothing$ is low.  Active (0 V), if the OD light barrier is closed (roll $\varnothing$ is too small).  Active (0 V), if no OD sensor is connected.  Inactive (24 V), if the OD light barrier is open (roll $\varnothing$ is sufficient).

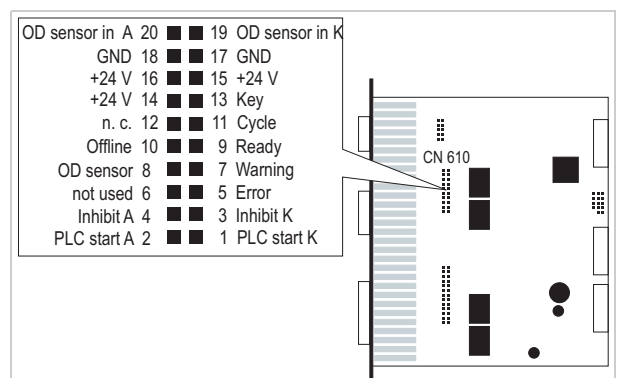
[Tab. 7] Signals at machine status connection.



[17] Machine status connection at an ALX92x (arrow).



[18] Pin assignment machine status connection.



[19] Position and pin assignment of the internal machine status connection (CN 610).

Signal name	Function
<i>Offline</i>	Power output ( $I_{out} < 500 \text{ mA}$ ) Active in offline mode

[Tab. 7] Signals at machine status connection.

## Product sensor connection

24 V supply voltage outputs:  $I_{max} = 100 \text{ mA}$

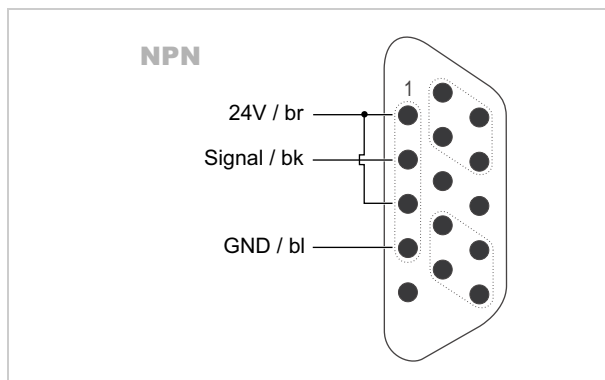
Signal name	Function
<i>Start</i>	Input $I_{in} < 8 \text{ mA}$ Signal is generated by the product sensor Starts printing/dispensing
<i>Key</i>	Mechanic coding of the connector (reverse polarity protection)
<i>Reserved</i>	Input not applied $I_{in} < 8 \text{ mA}$

[Tab. 8] Signals at product sensor connection.

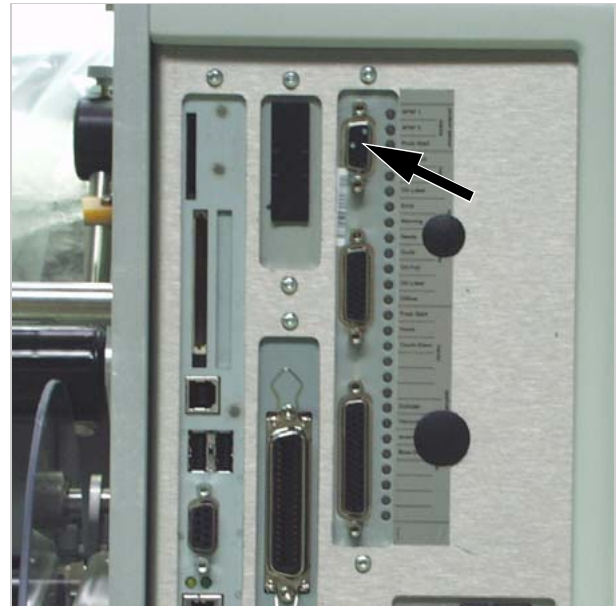
Ready assembled product sensor:

- *Product sensor* (PNP): article no. A7112 (M12 connector)
- *Product sensor cable*: article no. N100136 (M12 coupling to DSub15 connector, cable length: 3 m, for PNP sensor<sup>1)</sup>)

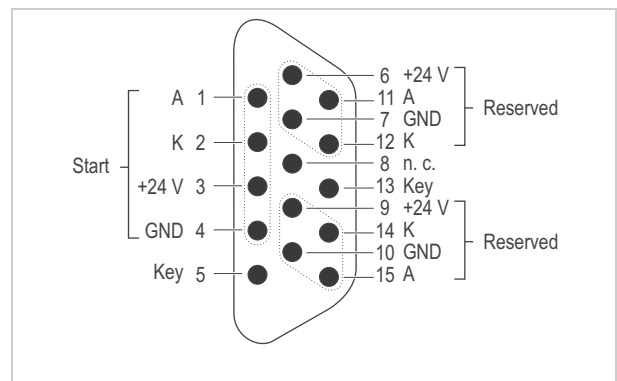
Diagram signal input



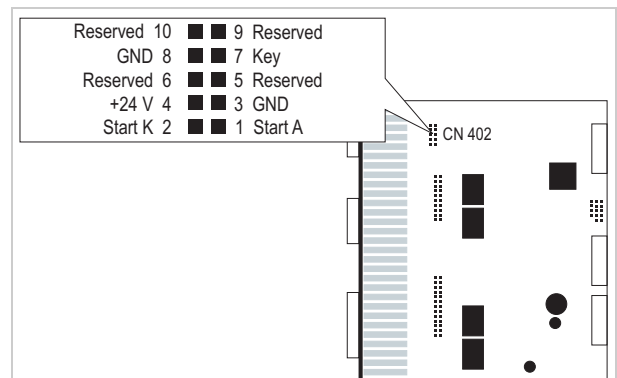
[23] Signal input with NPN start sensor.



[20] Product sensor connection (arrow).

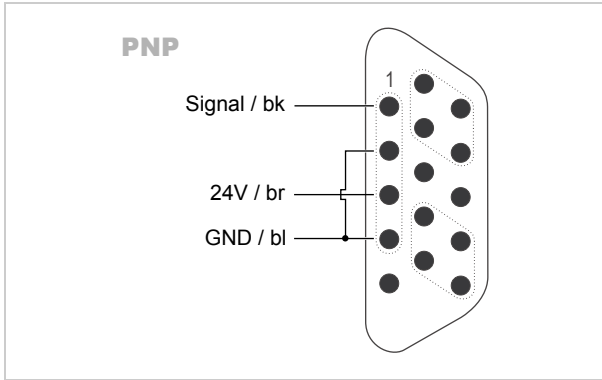


[21] Pin assignment product sensor connection.



[22] Position and pin assignment of the internal product sensor connection (CN 402).

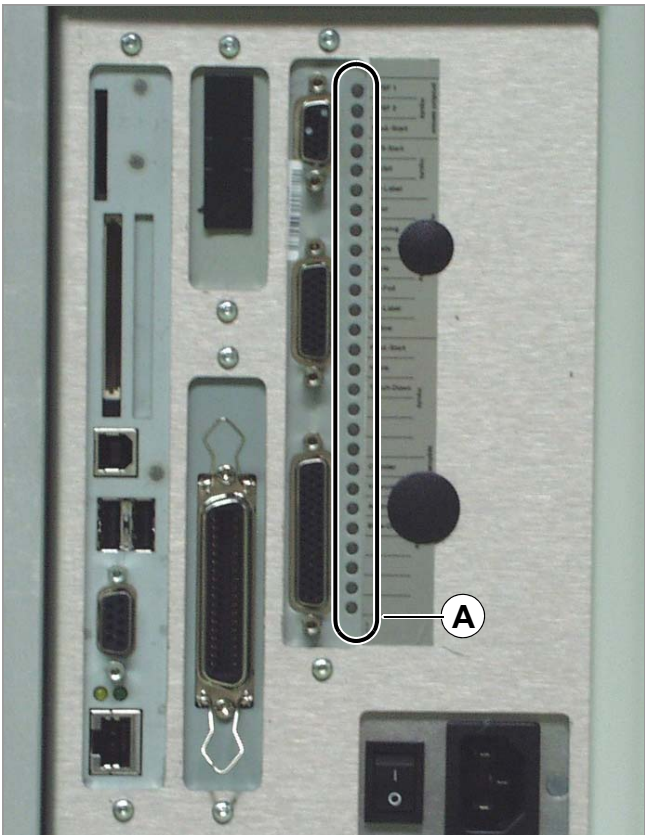
1) Alternatively: cable for NPN sensor: article no. N100137



[24] Signal input with PNP start sensor.

See also [Circuit diagrams for signal inputs](#) on page 13.

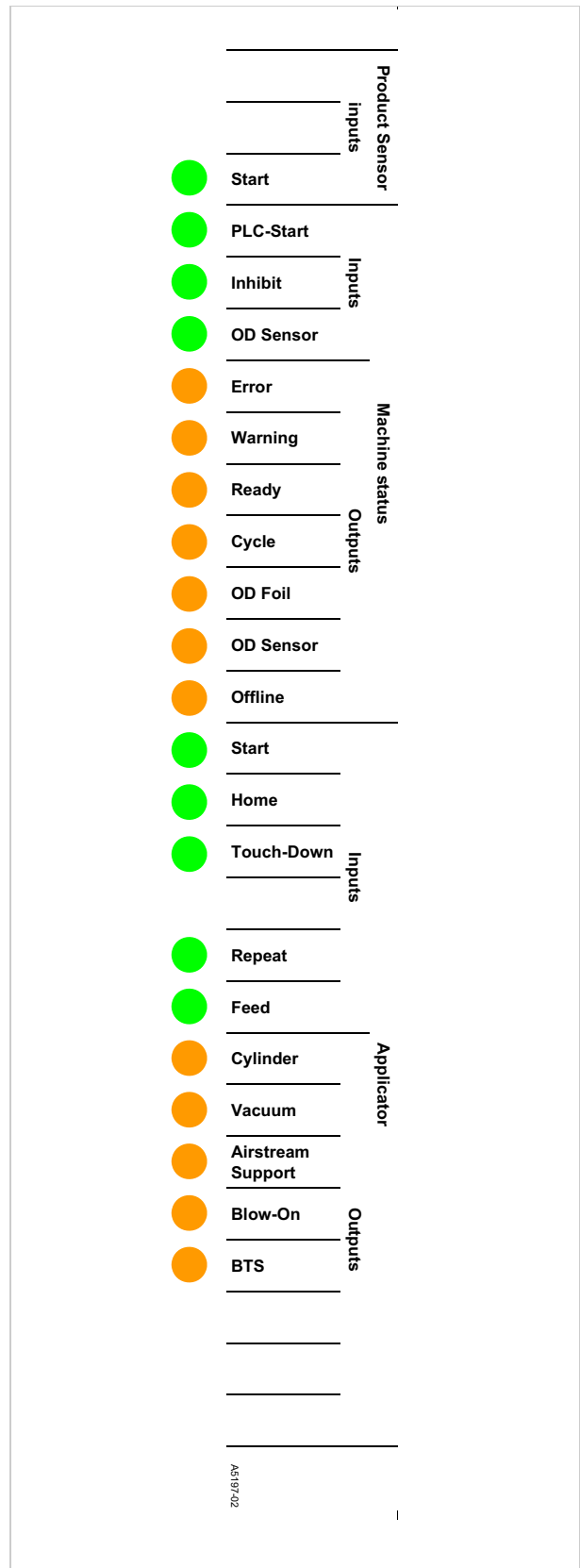
## SIGNAL LEDs



[26] Signal LEDs at an ALX 92x (A).

The signal LEDs have the following meaning:

- Orange = Output
- Green = Input
- Lighting LED = Signal is active



[25] Signal LEDs schematic

## APPLICATOR OPERATION

### Function

If direct labelling from the dispensing edge is not possible, the labeller can be equipped with an applicator. In applicator mode, the applicator takes the label from the dispensing edge and carries it to the product.

The labeller can be equipped with various applicators, depending on the need. Those applicators are all driven by compressed air. The following are possible:

#### **LTP / LTPV**

LTP (Light Touch Pneumatic) and  
LTPV (Light Touch Pneumatic Vacuum):

Applicator with „Light Touch“ function. „Light Touch“ means, that the movement of the (compressed air) cylinder is limited by sensors, which react to a light touch onto the product. The LTPV additionally sucks the labels on with a vacuum nozzle.

Advantages:

- Application on products with different heights possible
- Only light pressure onto the product (important with sensitive products)

#### **PEP IV**

The cylinder movement is limited by a setable length of time. After the run out of this application time, the applicator moves back into home position.

#### **PEP Blow on**

PEP-type applicator with blow on function: After run out of the application time, the blow on function is activated. After run out of the blow on time, the applicator moves back into home position.

#### **PEP II Sensor**

The cylinder movement is limited by a (touch down) sensor, which signals the contact to the product and triggers the backwards-movement.

#### **ASA**

ASA (Air Stream Applicator)

This applicator type has no moving parts, but blows the label onto the product (also called „blow box“). After the start signal, the blow on valve is opened for a setable time length.

#### **Reverse PEP**

This applicator is partly time related. Working procedure:

The applicator moves to its end position and „waits“ for the start signal. The start signal triggers the blow on valve which is active for the defined blow on time. After the run out or the blown on time, the applicator moves to home position, gets the next label and moves to the wait position.

#### **BTS**

BTS (Bad Tag Separator)

This device does the opposite of an applicator: it removes labels from the dispensing edge of a labeller. The BTS is used for sorting out RFID labels, which could not be read/written properly.

#### **LA-BO**

The LA-BO (Label Applicator Blow On) is a blow-on applicator. It works like the ASA does (see above).

#### **LA-SO**

The LA-SO (Label Applicator Swing On) attaches the label with a rotating movement of its swivelling arm to the product.

#### **LA-TO**

The LA-TO (Label Applicator Tamp On) is a classic tamp-on applicator, which is available time controlled or sensor controlled. The sensor control is done optionally by an end position sensor (LA-TO sensor) or by a touchdown sensor (LA-TO TD), which is triggered, when the applicator touches the product.

#### **LA-TO BO**

LA-TO with additional blow-on function. The applicator first moves to the end position and then it blows the label over the remaining stretch onto the product, without the applicator foot touching the product. The LA-TO BO is available sensor or time controlled.

## Connecting an applicator

Depending on the applied applicator type, different input and output signals are used.

The following applicator types, which are distributed by Novexx Solutions, can be connected directly to the connector for Novexx applicators, using the delivered cable, see .

- LTP / LTPV
- PEP IV
- BTS
- LA-BO
- LA-TO (all versions)
- LA-SO

For all other applicator types, the connection cable must be configured by the system integrator.

		Applicator types:															
		LTP(V)	PEP	LA-TO timed	LA-SO	PEP Blow on	LA-TO BO timed	PEP II sensor	LA-TO sensor	LA-TO BO sensor	ASA	LA-BO	Rev. PEP	Direkt Spenden	BTS	O-Ring Appl.	
Inputs	Home Position	x		x		x		x				x			x		
	Touch Down	x						x								x	
Outputs	Airstream Support	x	x	x		x		x		x		x	x <sup>a</sup>			x	
	Vacuum	x <sup>b</sup>	x	x		x		x		x		x				x	
	Cylinder	x	x	x		x		x				x		x		x	
	Blow On	x				x		x		x		x				x	
	+24V for fan	x	x	x		x		x									x
	BTS														x		

[Tab. 9] Signals which are used by the different applicator types („x“ = signal is in use)

a) With pneumatic dispensing edge

b) Only with LTPV

## Selecting an applicator type

→ Select the applicator type using the function APPLICATOR PARA > Applicator type.

Dependent on the applicator type chosen, different functions for setting up the applicator appear in the APPLICATOR PARA menu.

APPLICATOR PARA >							
Applicator	Apply mode	Lab release time <sup>a</sup>	Dwell time	Blow on time	Restart delay	Stop lag time	Position timeout
LTP - LTPV	X <sup>b</sup>	0	--	0	0	--	2000
PEP	X	0	200	--	0	--	2000
PEP Blow on LA-TO BO Timed	X	0	200	50	0	--	2000
PEP II Sensor LA-TO BO Sensor	X	0	--	50	0	--	2000
ASA	X	--	--	50	0	--	--
Reverse PEP	X	0	200	50	0	--	2000
BTS	X	0	--	50	0	--	2000
O-ring applicat.	X	0	200	50	0	--	2000
LA-BO	X	0	--	60	0	--	--
LA-CE	--	0	--	--	0	80	2000
LA-SO	X	0	500	--	0	--	2000
LA-TO Timed	X	0	500	--	0	--	2000
LA-TO Sensor	X	0	--	--	0	--	2000

[Tab. 10] Parameters in the APPLICATOR PARA menu, whose visibility depends on the setting of APPLICATOR PARA > Applicator type (numbers = default settings in ms; Firmware version: 6.52).

- a) Parameter is only visible with the setting APPLICATOR PARA > Apply mode = „After print“.
- b) X = default setting „After start sig.“

## SIGNAL-TIME-DIAGRAMS

### Time/sensor controlled applicators

With *time controlled* applicators, extension is stopped after the settable application time run down.  
(APPLICATOR PARA > Dwell time).

To this applicator group belong:

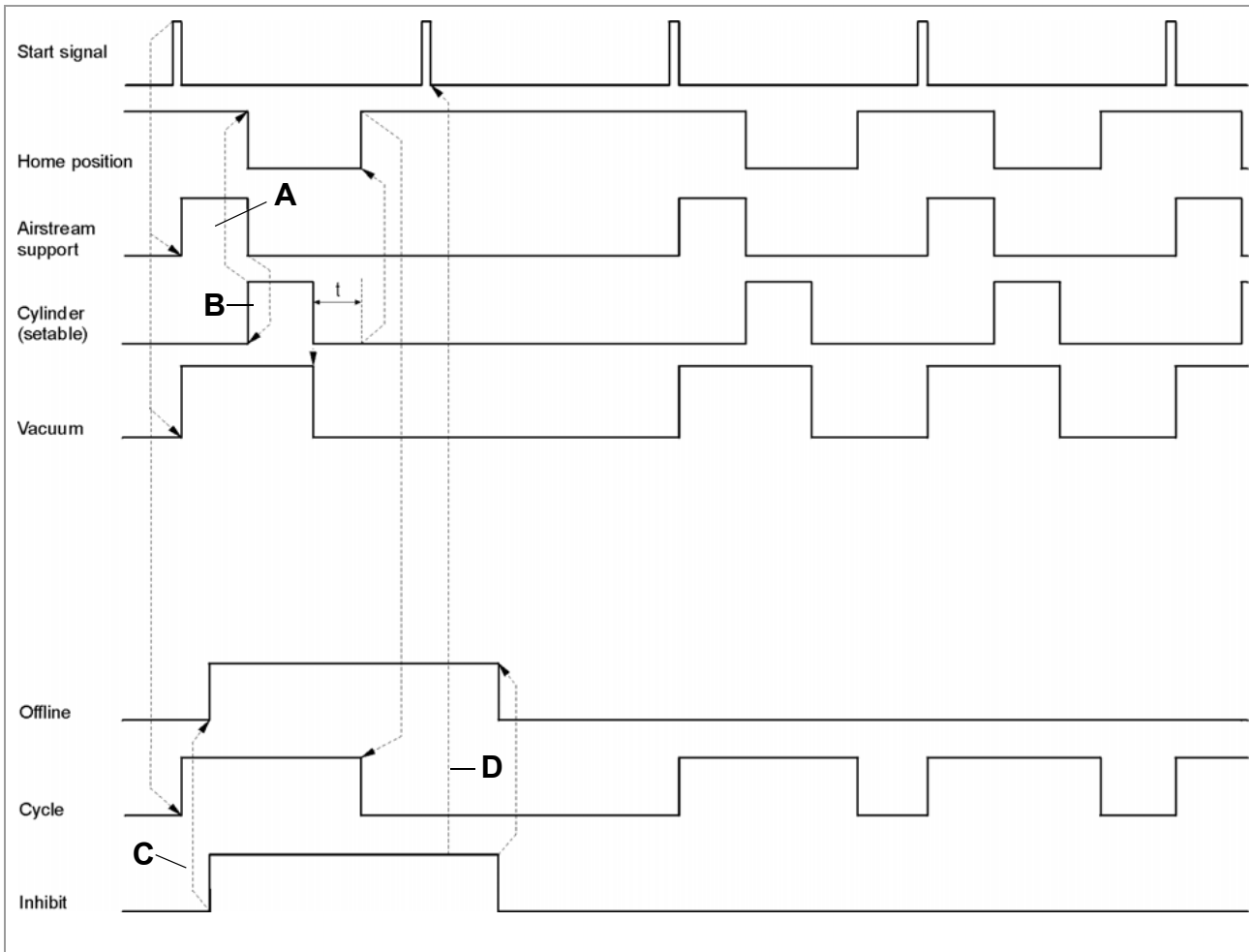
- PEP IV
- PEP Blow On
- Reverse PEP
- LA-TO timed
- LA-TO BO timed
- LA-SO

With *sensor controlled* applicators, extension is stopped by the endposition or by the touchdown signal.

To this group belong:

- LTP(V)
- PEP II Sensor
- LA-TO sensor
- LA-TO BO sensor

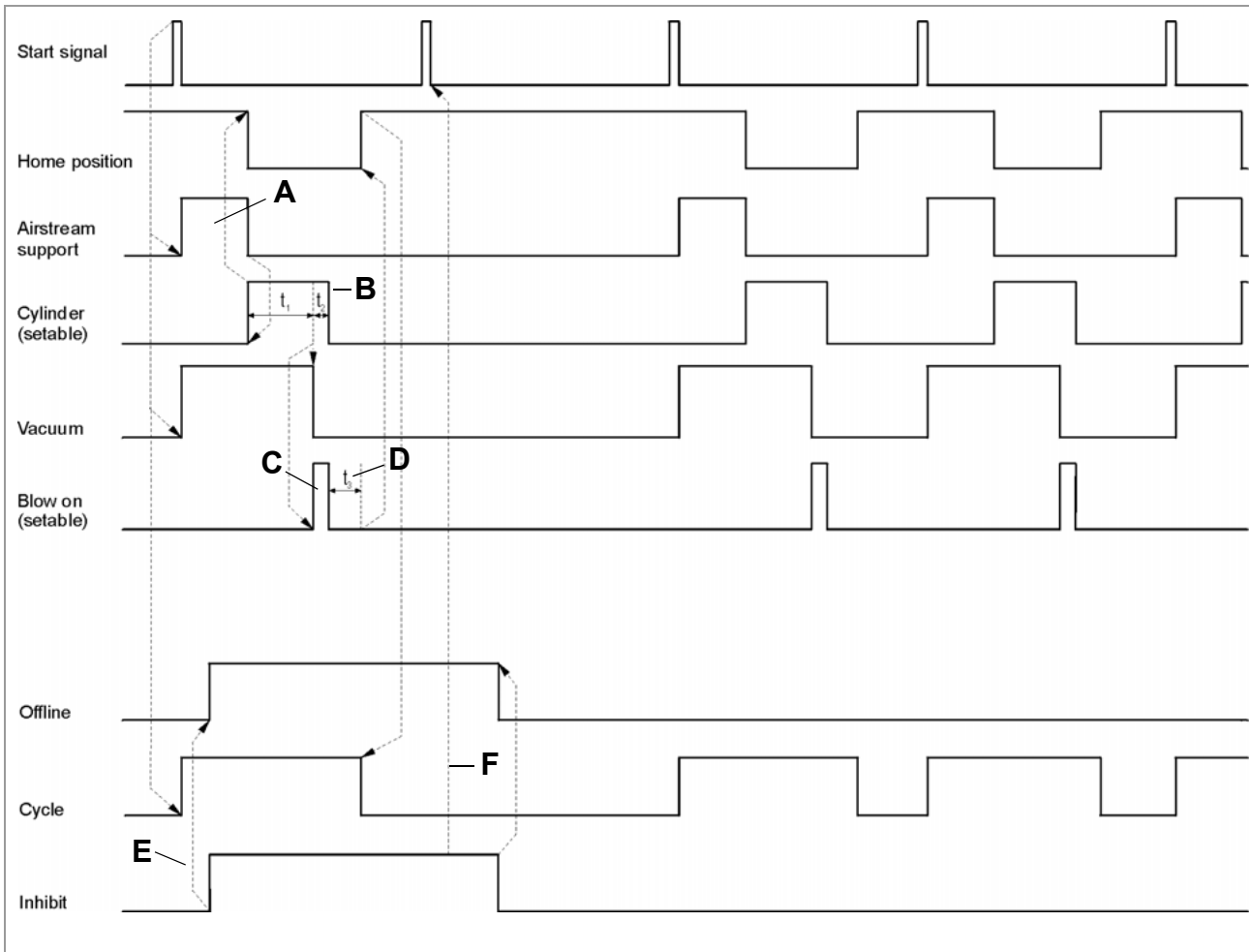
PEP IV / LA-TO timed / LA-SO



[27] Pattern of control signals over time for PEP IV, LA-TO timed and LA-SO applicators.

- A** Duration is determined by label length and dispensing speed. „Airstream Support“ switching to low means the label is dispensed.
- B** Can be adjusted via `APPLICATOR PARA > Dwell time`. Duration  $t$  is determined by the backwards movement of the applicator. The application cycle ends when the home position signal is high again.
- C** The output signal „Offline“ follows the input signal „Inhibit“.
- D** The start signal is ignored because of the active „Inhibit“.

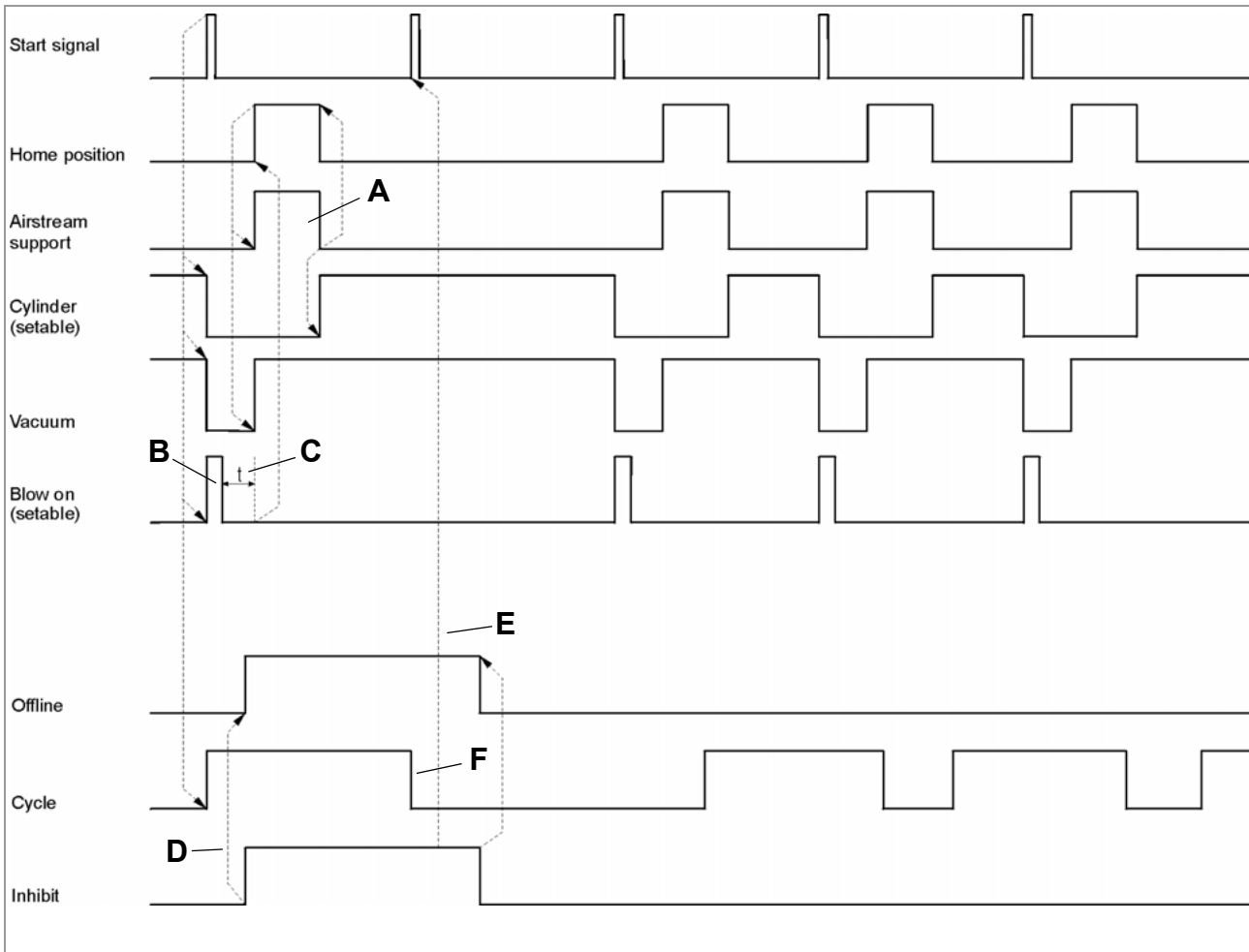
PEP Blow On / LA-TO BO timed



[28] Pattern of control signals over time for PEP Blow On applicators.

- A** Duration is determined by label length and dispensing speed. „Airstream Support“ switching to low means the label is dispensed.
- B** The total duration of Cylinder is the sum of both durations  $t_1$  and  $t_2$ . The duration  $t_1$  is setable by APPLICATOR PARA > Dwell time;  $t_2$  is setable by APPLICATOR PARA > Blow on time (see note C).
- C** Can be adjusted with APPLICATOR PARA > Blow on time.
- D** Duration  $t_3$  is determined by the backwards movement of the applicator. The application cycle ends when the home position signal is high again.
- E** The output signal „Offline“ follows the input signal „Inhibit“.
- F** The start signal is ignored because of the active „Inhibit“.

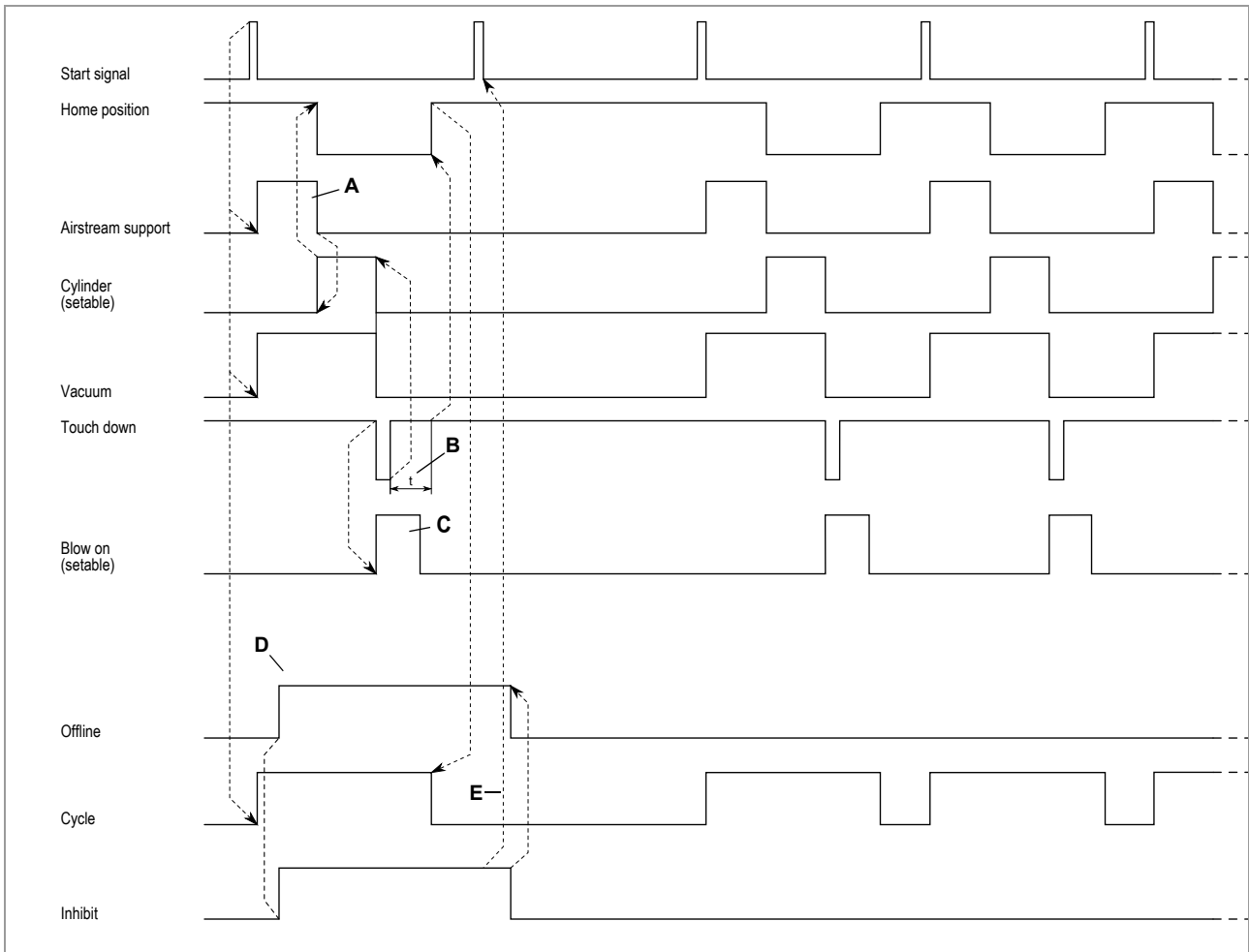
### Reverse PEP



[29] Pattern of control signals over time for Reverse PEP applicators.

- A** Duration is determined by label length and dispensing speed. „Airstream Support“ switching to low means the label is dispensed.
- B** Adjustable with `APPLICATOR PARA > Blow on time`.
- C** Duration  $t$  is determined by the backwards movement of the applicator. The application cycle ends when the home position signal is high again
- D** The output signal „Offline“ follows the input signal „Inhibit“.
- E** The start signal is ignored because of the active „Inhibit“.
- F** The end of „Cycle“ can be adjusted with `APPLICATOR PARA > Dwell time` (usually, this function sets the end of the „Cylinder“ signal, in case of the Reverse PEP, „Cylinder“ stays active up to the next start signal, what means that the dwell time is ignored).

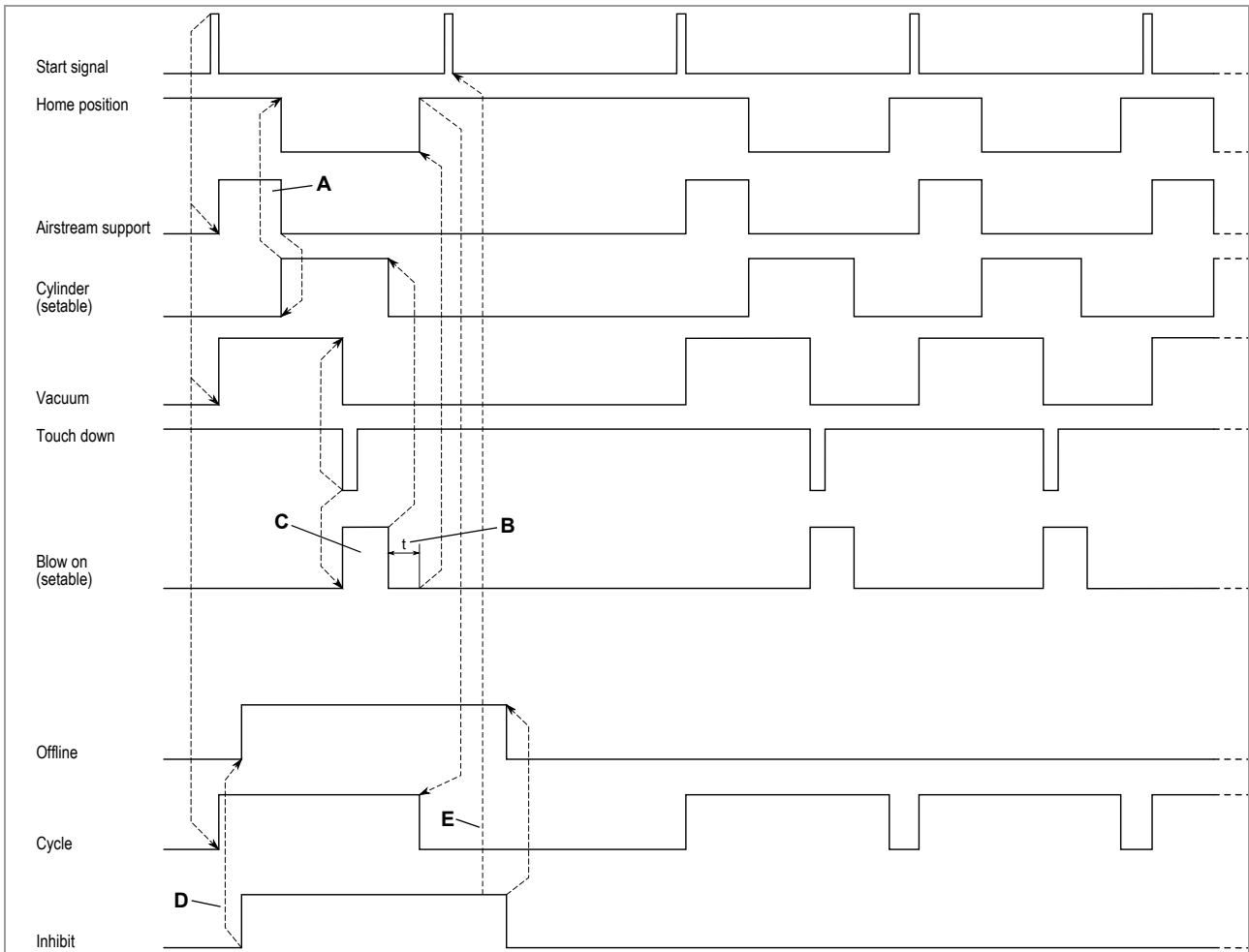
### LTP / LTPV / LA-TO BO Sensor



[30] Pattern of control signals over time for LTP/LTPV and LA-TO BO applicators.

- A** Duration is determined by label length and dispensing speed. „Airstream Support“ switching to low means the label is dispensed.
- B** Duration  $t$  is determined by the backwards movement of the applicator. The application cycle ends when the home position signal is high again
- C** Adjustable with `APPLICATOR PARA > Blow on time`.
- D** The output signal „Offline“ follows the input signal „Inhibit“.
- E** The start signal is ignored because of the active „Inhibit“.

### PEP II sensor / LA-TO sensor

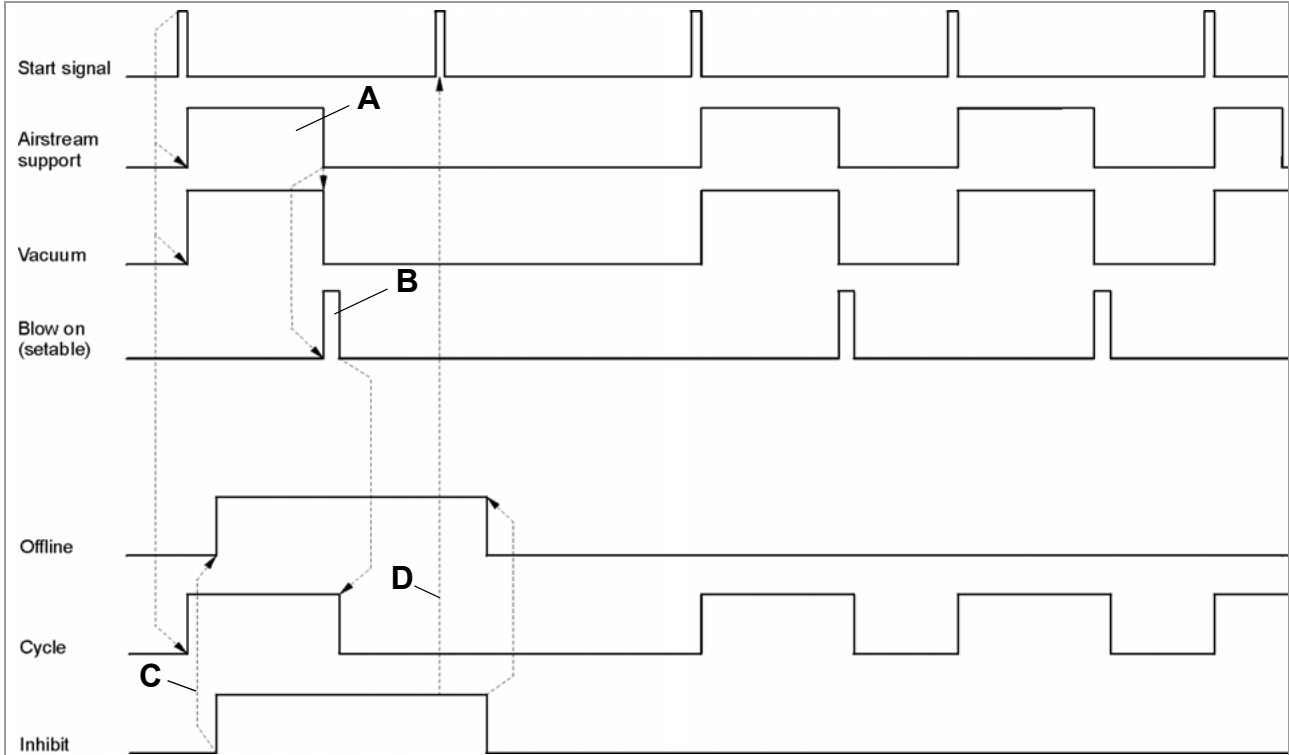


[31] Pattern of control signals over time for PEP II sensor and LA-TO sensor applicators.

- A** Duration is determined by label length and dispensing speed. „Airstream Support“ switching to low means the label is dispensed.
- B** Duration  $t$  is determined by the backwards movement of the applicator. The application cycle ends when the home position signal is high again.
- C** Adjustable with APPLICATOR PARA > Blow on time.
- D** The output signal „Offline“ follows the input signal „Inhibit“.
- E** The start signal is ignored because of the active „Inhibit“.

### ASA / LA-BO

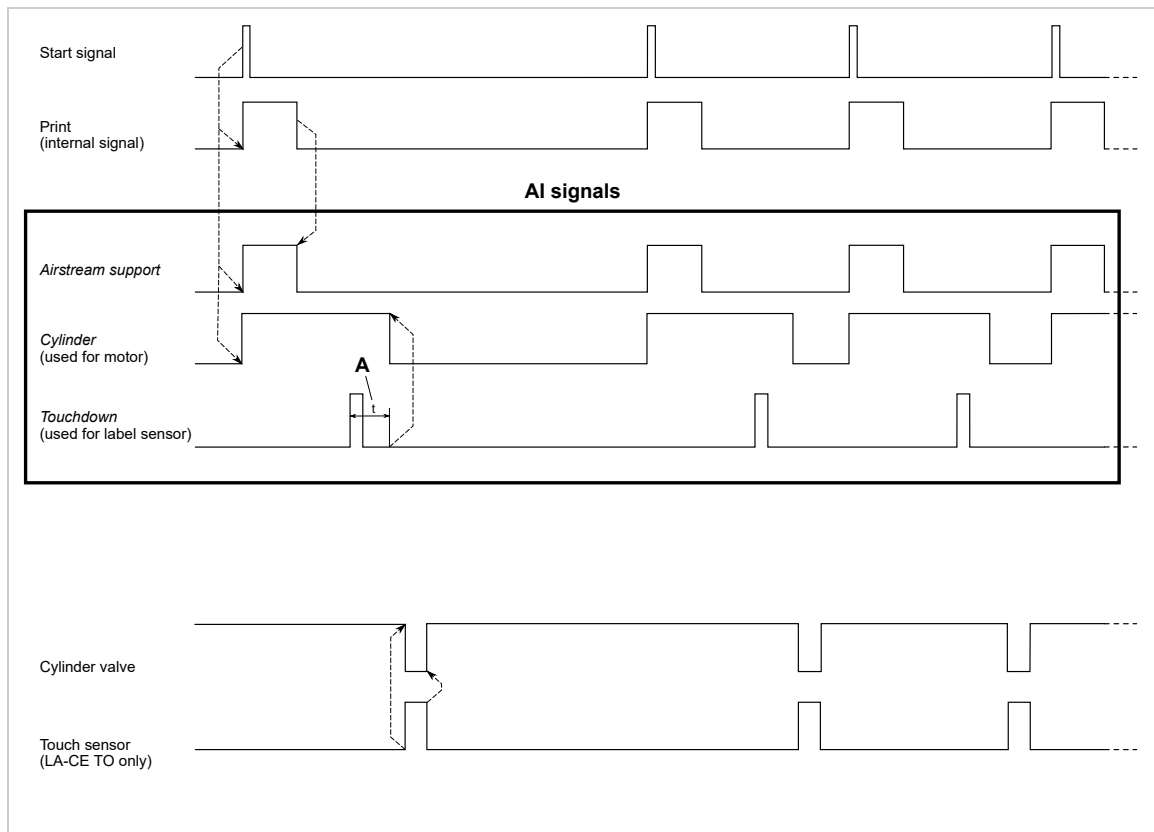
The ASA and LA-BO type applicators are special cases, which do not have any moving parts. The label is applied only by compressed air. Therefore, signals controlling the movement of the applicator (Home Position, Cylinder) are not required.



[32] Pattern of control signals over time for ASA and LA-BO applicators.

- A** Duration is determined by the label length and dispensing speed. „Airstream Support“ switching to low means the label is dispensed.
- B** Can be adjusted via APPLICATOR PARA > Blow on time.
- C** The start signal is ignored because of the active „Inhibit“.

## LA-CE (TO)



[33] Pattern of control signals over time LA-CE or LA-CE TO applicators.

**A** The duration  $t$  is set via parameter APPLICATOR PARA > Stop lag time.



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