

# Pneumatic Studio 2015



**Software  
for  
Industrial Automation**

## Section two: 3D Simulations

- Components in the 3D screen
- Auxiliary components
- Simulations of equipments

# **Pneumatic Studio 2015**

## **Section two: 3D simulations**

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# Introduction

## How to install 3D components

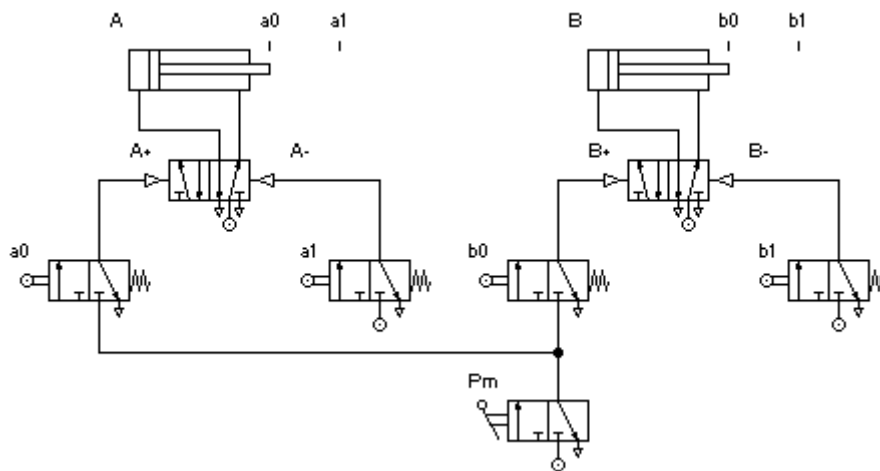
The 2015 version of the Pneumatic Studio Program presents an important innovation: a section dedicated to robotics with 3D simulations of working isles made by **robots, feeders, conveyors, unloading stations**, and so on.

This innovation allows you at first to create in the 2D screen pneumatic, electropneumatic, electric and PLC circuits and then to match any actuator of the circuits to an object of the 3D screen.

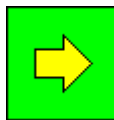
**You will be able to make two simulation.** The first allows you to check the pneumatic, electropneumatic or electric circuit in the 2D screen. The second simulation shows you the movements of feeders, robots and conveyors in the 3D screen.

**Naturally, the movements of the objects in the 3D screen will match exactly the movements of the related actuators in the 2D screen.**

For example let's consider a transport equipment made by a feeder, a linear conveyor and an unloading station. We can at first describe it with a simple pneumatic circuit in the 2D screen:

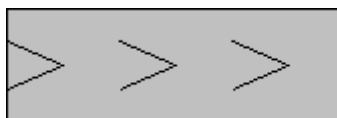


Later let's switch to the 3D mode.

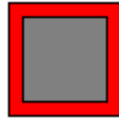


We create a green feeder with yellow pieces (related actuator: cylinder A).

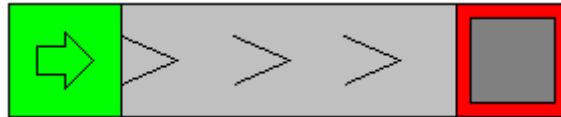
Then we install a silver linear conveyor (related actuator: cylinder B)



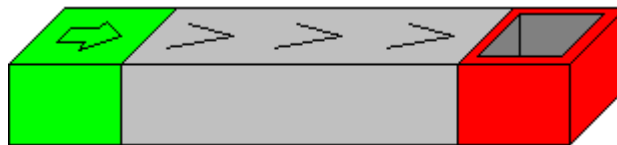
Finally we install a red unloading station (no actuator)



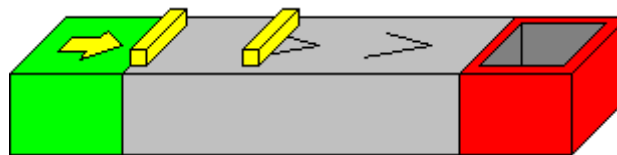
This is the transport equipment in the “from above” view:



This is the aspect in the “perspective view”:



In the 3D simulation you can see the yellow pieces supplied by the feeder and carried by the conveyor.



You can change the speed of the conveyor by changing the speed of the related cylinder B in the 2D screen.

You can change the distribution speed of the feeder by changing the speed of the related cylinder A in the 2D screen.

**Another example.** We want to install a cartesian robot wich takes pieces from a conveyor and leaves them in an unloading station.

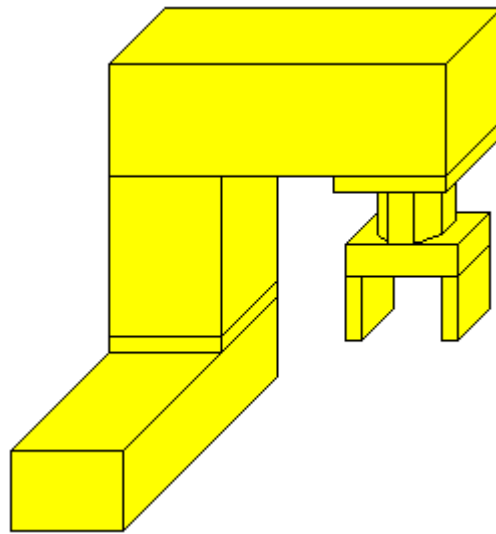
P is the name of the of the cylinder related to the **pincers**, M is the name of the cylinder related to the **upright**, B is the name of the cylinder related to the **base**.

These are the operations:

- **Pincers close**            **P+**
- **Upright go up**            **M+**
- **Base go ahead**           **B+**
- **Upright go down**       **M-**
- **Pincers open**            **P-**
- **Upright go up**            **M+**
- **Base go behind**        **B-**
- **Upright go down**       **M-**

This is the sequence of the operations of the cycle: **P+ M+ B+ M- P- M+ B- M-**

At first we realize the pneumatic circuit, then we switch to the 3D mode and install a yellow cartesian robot:



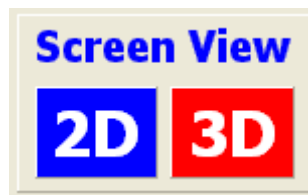
Naturally the actuator of the pincers is **P**, the actuator of the upright is **M** and the actuator of the base is **B**.

The wrist and the arm are fixed.

If we run the simulation in the 3D mode we can see the robot executing the movements of the pneumatic circuit.

### How to switch from the 2D mode to the 3D mode

In the Screen View panel there are two buttons:





The first, **2D**, switches to the 2D mode; the second, **3D**, switches to the 3D mode.

In the 2D mode you can install pneumatic, electropneumatic and PLC circuits and run the simulation.

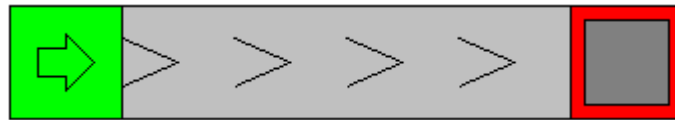
In the 3D screen you can install robots, feeders, conveyors, whose actuators are related to the cylinders and the motors of the 2D screen.

## 3D mode settings

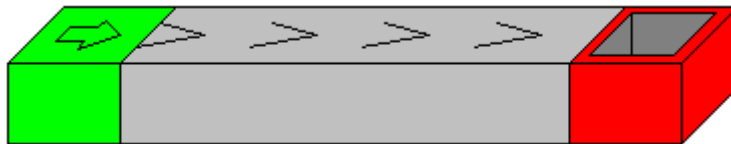
### “Perspective” and “from above” views

This button  set the “perspective” view, this other  set the “from above” view.


For example this is the aspect of a transport line in the from above view:



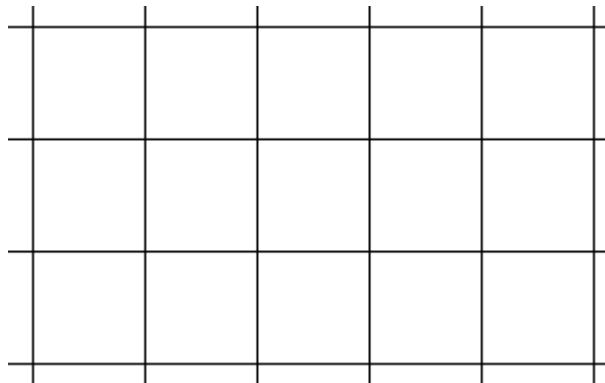
This is the same line in the perspective view:



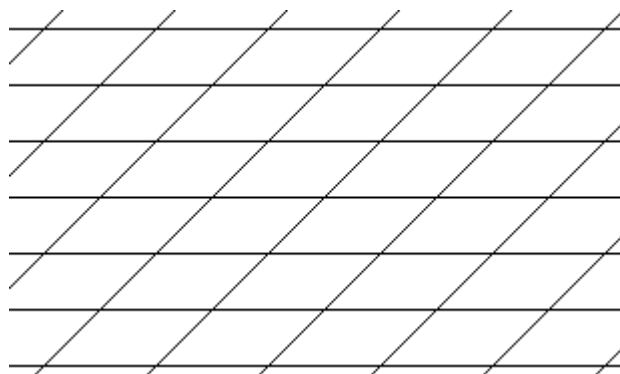
### Grid

To show the grid you must press the button .


This is the aspect of the grid in the “from above” view:



This is the aspect in the “perspective” view:



## Screen color











You may change the color of the screen by pressin the button  .

## 3D components panel



This is the panel of the 3D components:



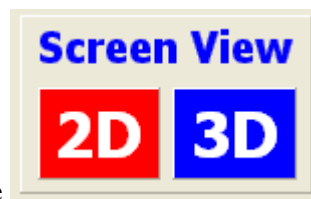
These are the components you install when you press the buttons:

-  **Cartesian robot**
-  **Cylindrical robot**
-  **Linear conveyor**
-  **Rotary conveyor**
-  **Feeder**
-  **Unloading station**
-  **Related button**
-  **Related lamp**
-  **Timer indicator**
-  **Counter indicator**

These are the buttons that allows you to set the view in the 3D mode:

-  **Perspective view**
-  **From above view**

## 2D simulations

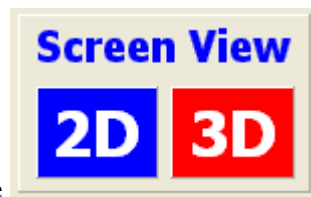


When the program is in the 2D mode

if you press the button  you will

run the 2D simulation.

## 3D simulations



When the program is in the 3D mode


if you press the button  you will

run the 3D simulation.

# Components of the 3D screen

## Cartesian robot

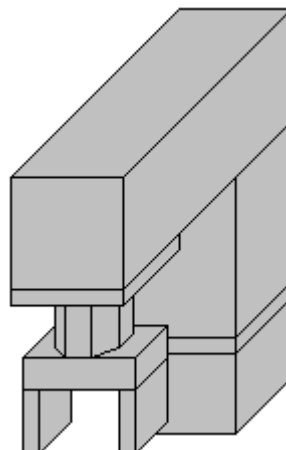
### Description

To create a cartesian robot you have to press the button .

A cartesian robot can execute three translations (base, upright and arm).

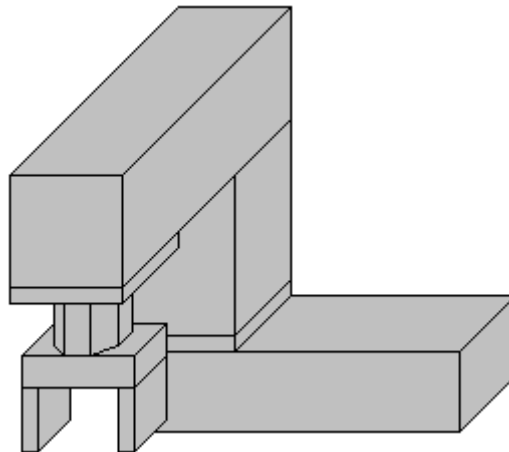
The other movements are the rotation of the wrist and the opening/closing of the pincers.

This is the aspect of a robot with fixed base:





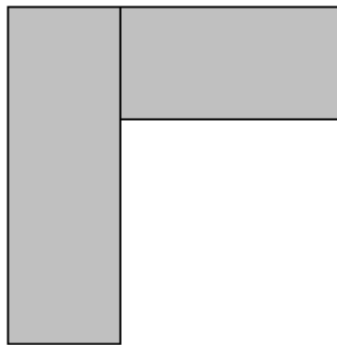
This is instead the aspect of a robot with a moving base:



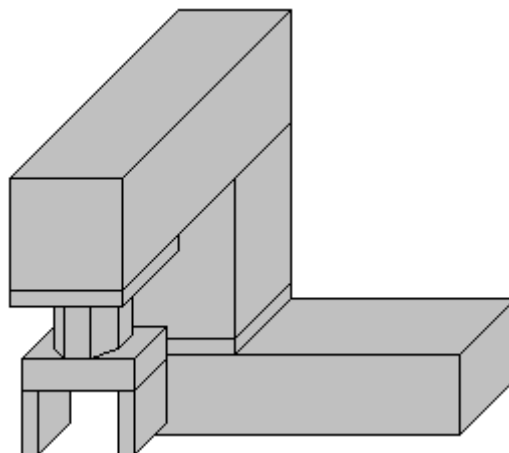
During the simulation in the 3D mode the cartesian robot can take pieces from a linear conveyor and can leave them on another linear conveyor or on an unloading station.

The actuators must be related to pneumatic cylinders.

This is the aspect of the robot with a moving base in the “from above” view:



This is instead the aspect of the same robot in the “perspective” view.



## Edit

You can modify the features of the robot by pressing the right button of the mouse on the robot in the “from above” view. A window will appear, and you will be able to change the geometry of the robot and the features of its components.

## Moving


You can move the cartesian robot and change its position by pressing the left button of the mouse on the robot in the “from above” view: when the button is pressed you must move the mouse and leave it in the new position.

## Uninstalling

In the window where you may change the features of the robot select the option “Uninstall robot “.

# Cylindrical robot

## Description

To create a cylindrical robot you have to press the button .

A cylindrical robot can execute two translations (upright and arm) and a rotation (base). The other movements are the rotation of the wrist and the opening/closing of the pincers.

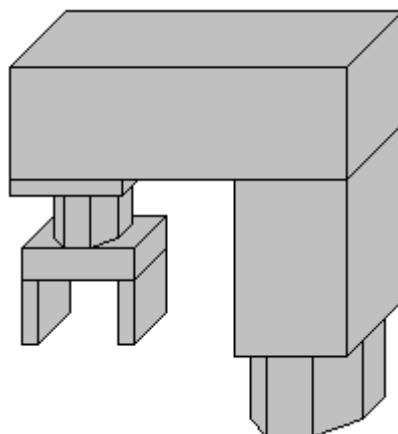
During the simulation in the 3D mode the cylindrical robot can take pieces from a linear conveyor and can leave them on another linear conveyor or on an unloading station.

The actuators must be related to pneumatic cylinders.

This is the aspect of the robot in the “from above” view:



This is instead the aspect of the same robot in the “perspective” view.



## Edit

You can modify the features of the robot by pressing the right button of the mouse on the robot in the “from above” view. A window will appear, and you will be able to change the geometry of the robot and the features of its components.

## Moving


You can move the cylindrical robot and change its position by pressing the left button of the mouse on the robot in the “from above” view: when the button is pressed you must move the mouse and leave it in the new position.

## Uninstalling

In the window where you may change the features of the robot select the option “Uninstall robot “.

# Feeder

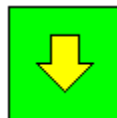
## Description

To create a feeder you have to press the button .

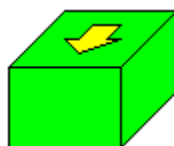
The feeder can supply pieces to linear and rotary conveyors.

The actuator may be related to a pneumatic cylinder or to an electric motor.

This is the aspect of a feeder in the “from above” view:

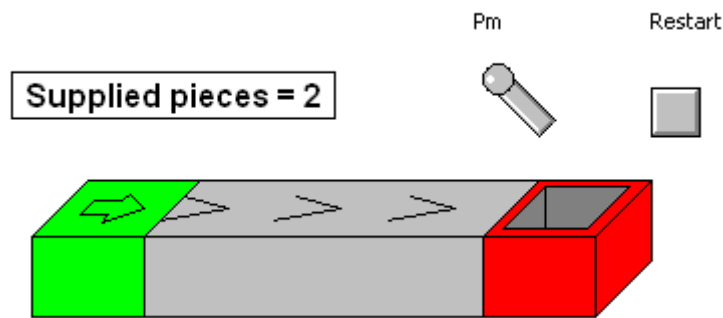


The aspect of a feeder in the “perspective view” is instead this other:

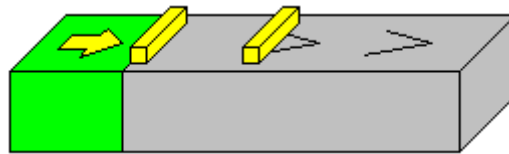


You may install a sensor in the feeder and match it to a counter in the 2D screen: the sensor will emit a pulse every time the feeder supplies a piece.

You can also match a counter indicator in the 3D screen to the counter of the 2D screen.



The color of the distributed pieces is the same of the arrow.



The speed of the distribution belongs to the speed of the related actuator in the 2D screen.

## Edit

You can modify the features of the feeder by pressing the right button of the mouse on the feeder in the “from above” view. A window will appear, and you will be able to change the features of the feeder.

## Moving


You can move the feeder and change its position by pressing the left button of the mouse on the feeder in the “from above” view: when the button is pressed you must move the mouse and leave it in the new position.

## Uninstalling

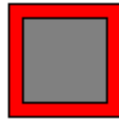
In the window where you may change the features of the feeder select the option “Uninstall feeder“.

# Unloading station

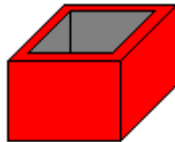
## Description

To create an unloading station you have to press the button  .  
The unloading station receives pieces from robots and conveyors.  
No actuator is related to this component.

This is the aspect of an unloading station in the “from above” view:

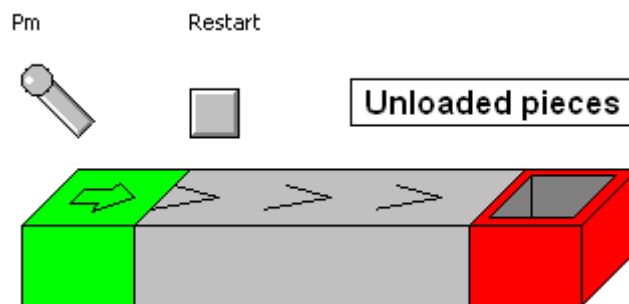


The aspect of an unloading station in the “perspective view” is instead this other:



You may install a sensor in the unloading station and match it to a counter in the 2D screen: the sensor will emit a pulse every time the station receives a piece.

You can also match a counter indicator in the 3D screen to the counter of the 2D screen.



## Edit

You can modify the features of the station by pressing the right button of the mouse on the component in the “from above” view. A window will appear, and you will be able to change the features of the station.

## Moving


You can move the station and change its position by pressing the left button of the mouse on the component in the “from above” view: when the button is pressed you must move the mouse and leave it in the new position.

## Uninstalling

In the window where you may change the features of the station select the option “Uninstall unloading station”.

# Linear conveyor

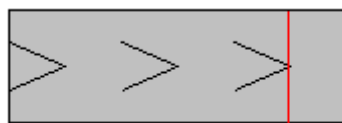
## Description

To create a linear conveyor you have to press the button .

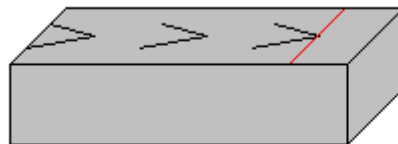
The linear conveyor receives pieces from a feeder, from a robot, from a rotary conveyor or from another linear conveyor. It can supply pieces to linear and rotary conveyors and to unloading stations.

The actuator may be related to a pneumatic cylinder or to an electric motor.

This is the aspect of a linear conveyor in the “from above” view:



The aspect of a linear conveyor in the “perspective view” is instead this other:

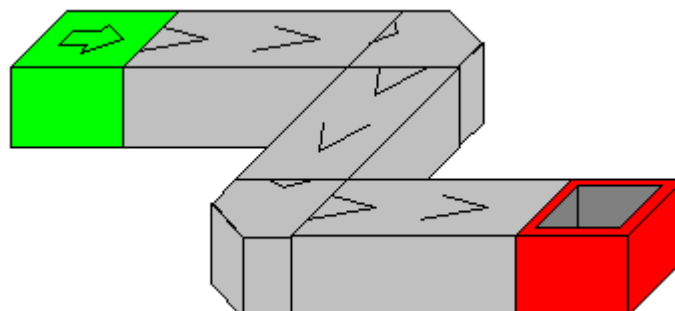


You may install a sensor in a linear conveyor: the sensor will emit a signal every time a piece is over the red line. You can install only one sensor in a linear conveyor. If you want to install two sensor you have to connect two linear conveyors:



The speed of the transportation belongs to the speed of the related actuator in the 2D screen.

You can connect linear conveyors to rotary conveyors to obtain lines of different forms.



## Edit

You can modify the features of the linear conveyor by pressing the right button of the mouse on the component in the “from above” view. A window will appear, and you will be able to change the features of the conveyor.

## Moving


You can move the conveyor and change its position by pressing the left button of the mouse on the component in the “from above” view: when the button is pressed you must move the mouse and leave it in the new position.

## Uninstalling

In the window where you may change the features of the conveyor select the option “Uninstall linear conveyor”.

# Rotary conveyor

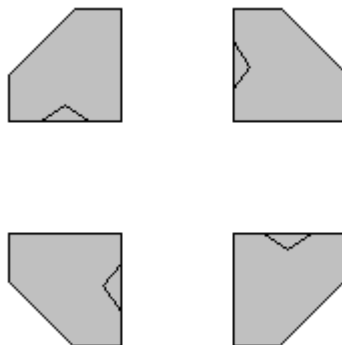
## Description

To create a rotary conveyor you have to press the button .

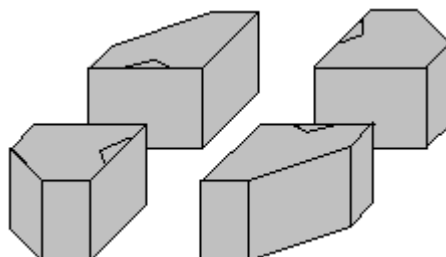
The rotary conveyor receives pieces from a feeder, from another rotary conveyor or from a linear conveyor. It can supply pieces to linear and rotary conveyors and to uninstall stations.

The actuator may be related to a pneumatic cylinder or to an electric motor.

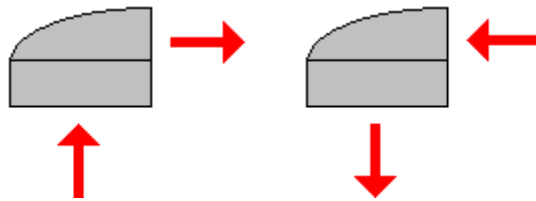
This is the aspect of the four types of rotary conveyor in the “from above” view:



This is the aspect in the “perspective” view:

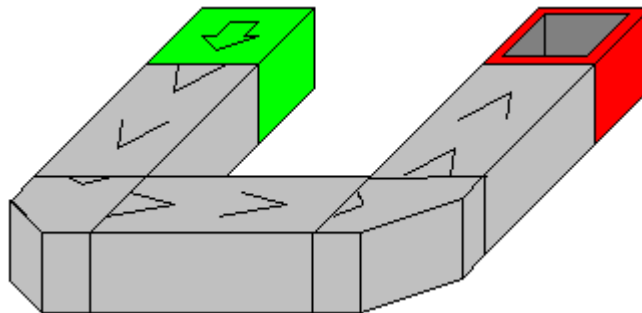


You can set the clockwise or anticlockwise rotation:



The speed of the transportation belongs to the speed of the related actuator in the 2D screen.

You can connect rotary conveyors to linear conveyors to obtain lines of different forms.



## Edit

You can modify the features of the rotary conveyor by pressing the right button of the mouse on the component in the “from above” view. A window will appear, and you will be able to change the features of the conveyor.

## Moving

You can move the conveyor and change its position by pressing the left button of the mouse on the component in the “from above” view: when the button is pressed you must move the mouse and leave it in the new position.

## Uninstalling


In the window where you may change the features of the conveyor select the option “Uninstall rotary conveyor”.



# Auxiliary components

## Related button


### Description

To create a related button you have to press the button .

The pneumatic and electric buttons allow you to manage simulations in the 2D mode: when you switch to the 3D mode, you can press the related buttons to manage the simulation with robots, conveyors and so on.

These components have the same name of the corresponding pneumatic and electric buttons of the 2D screen. This is the related button of a bistable pneumatic or electric button of the 2D screen



, this is the related button of a monostable one of the 2D screen: .

Note: The buttons of the PLC circuits are visible in the 2D screen and also in the 3D screen, and then you don't need to introduce related button for them.

This is the aspect of a PLC bistable button



, this is the aspect of a PLC monostable one:



### Edit

You can modify the features of the related button by pressing the right button of the mouse on the component in the “from above” view. A window will appear, and you will be able to change the features of the component.

### Moving


You can move the related button and change its position by pressing the left button of the mouse on the component in the “from above” view: when the button is pressed you must move the mouse and leave it in the new position.

### Uninstalling

In the window where you may change the features of the related button select the option “Uninstall related button”.


# Related lamp

## Description

To create a related lamp you have to press the button .

The lamps in the electric circuits of the 2D mode show you that an event happens: when you switch to the 3D mode, you can watch the related lamps during the simulations with robots, conveyors and so on.

These components have the same name of the corresponding lamps of the 2D screen. This is the

related lamp of a white one of the 2D screen  A.

Note: The lamps of the PLC circuits are visible in the 2D screen and also in the 3D screen, and then you don't need to introduce related lamps for them.

This is the aspect of a PLC lamp:  Lamp1  
A2.0.

## Edit

You can modify the features of the related lamp by pressing the right button of the mouse on the component in the “from above” view. A window will appear, and you will be able to change the features of the component.

## Moving


You can move the related lamp and change its position by pressing the left button of the mouse on the component in the “from above” view: when the button is pressed you must move the mouse and leave it in the new position.

## Uninstalling

In the window where you may change the features of the related lamp select the option “Uninstall related lamp”.

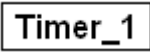
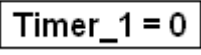
# Timer indicator

## Description

To create a timer indicator you have to press the button .

The timers in the pneumatic and electric circuits of the 2D mode show you the passing of time: when you switch to the 3D mode, you can watch the timer indicators during the simulations with robots, conveyors and so on.

These components have the same name of the corresponding timers of the 2D screen.

A timer indicator looks like a text with a black edge: if the simulation is “off”, the text shows you only the name of the timer , if the simulation is “on” the text shows you also the current value of the timer .

## Edit

You can modify the features of the timer indicator by pressing the right button of the mouse on the component in the “from above” view. A window will appear, and you will be able to change the features of the component.

## Moving


You can move the timer indicator and change its position by pressing the left button of the mouse on the component in the “from above” view: when the button is pressed you must move the mouse and leave it in the new position.

## Uninstalling

In the window where you may change the features of the timer indicator select the option “Uninstall timer indicator”.

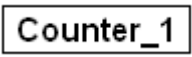
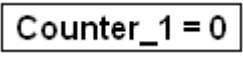
# Counter indicator

## Description

To create a counter indicator you have to press the button .

The counters in the pneumatic and electric circuits of the 2D mode show you the increasing or the decreasing of a calculation: when you switch to the 3D mode, you can watch the counter indicators during the simulations with robots, conveyors and so on.

These components have the same name of the corresponding counters of the 2D screen. A counter indicator looks like a text with a black edge: if the simulation is “off”, the text shows you only the

name of the counter , if the simulation is “on” the text shows you also the current value of the calculation .

## Edit

You can modify the features of the counter indicator by pressing the right button of the mouse on the componet in the “from above” view. A window will appear, and you will be able to change the features of the component.

## Moving

You can move the counter indicator and change its position by pressing the left button of the mouse on the componet in the “from above” view: when the button is pressed you must move the mouse and leave it in the new position.

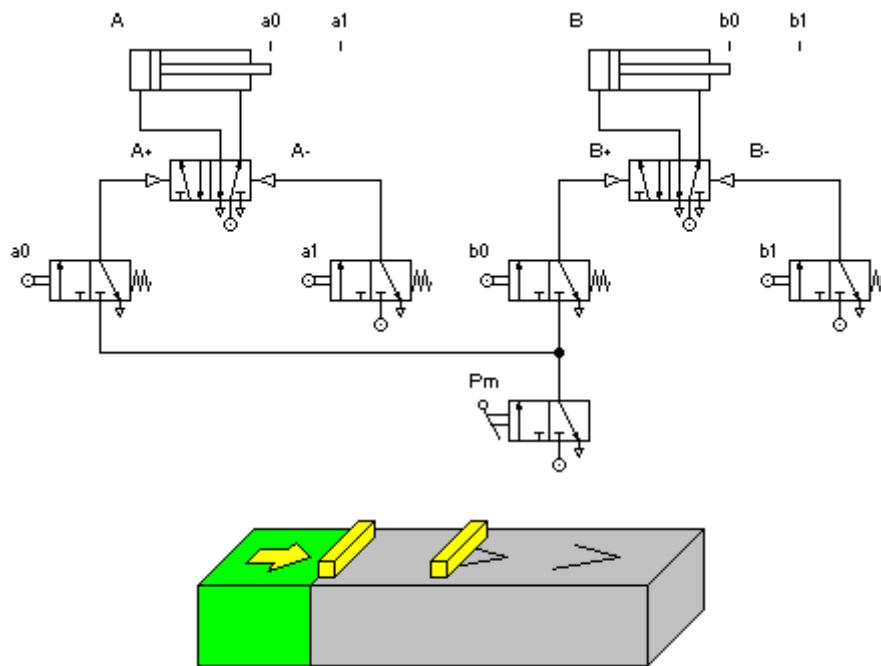
## Uninstalling

In the window where you may change the features of the counter indicator select the option “Uninstall counter indicator“.

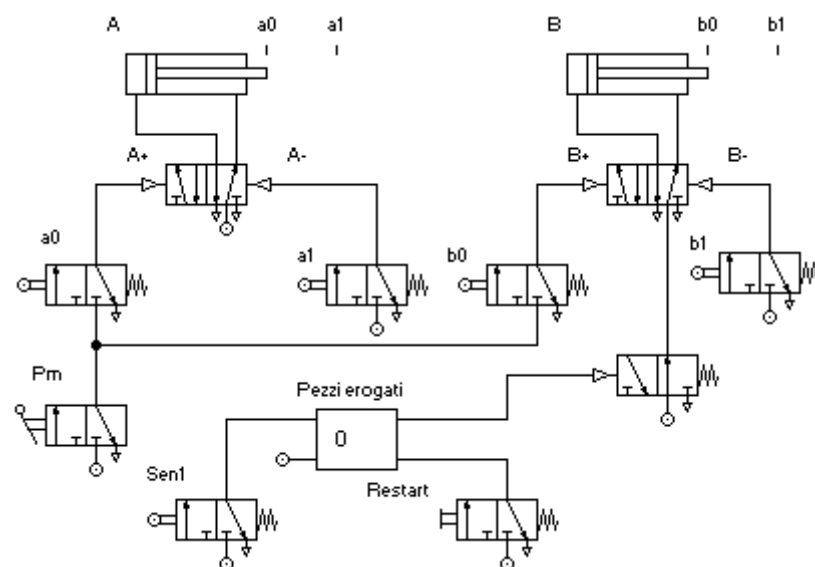
# Simulation of equipments

## Feeder

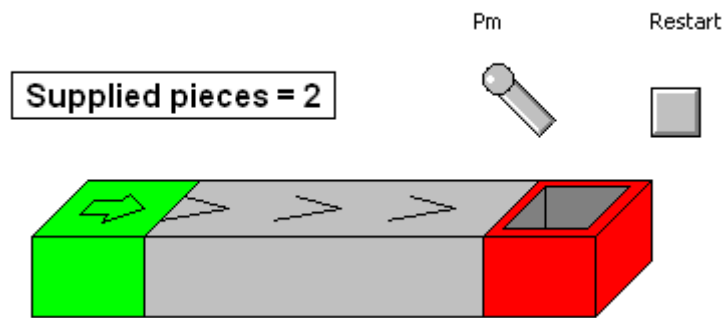
### Pneumatic circuit for feeder and linear conveyor



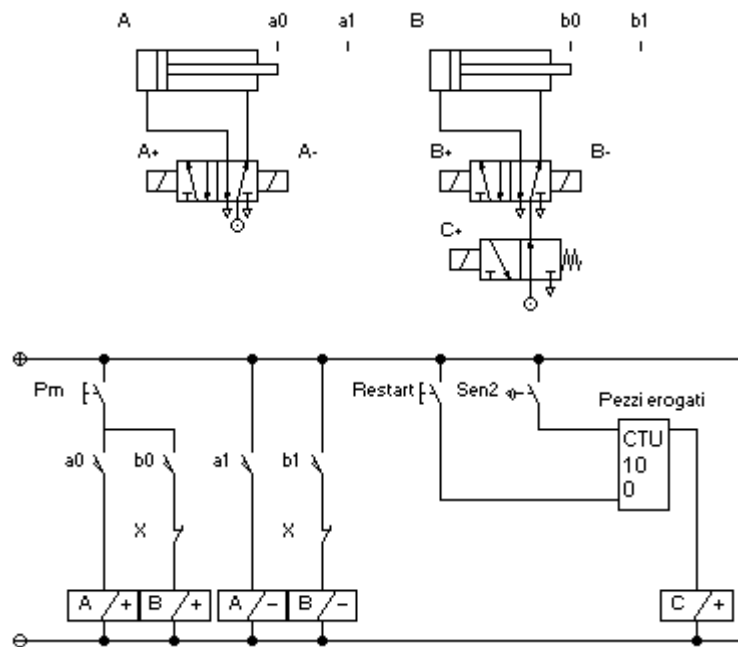
### Pneumatic sensor of a feeder and counter



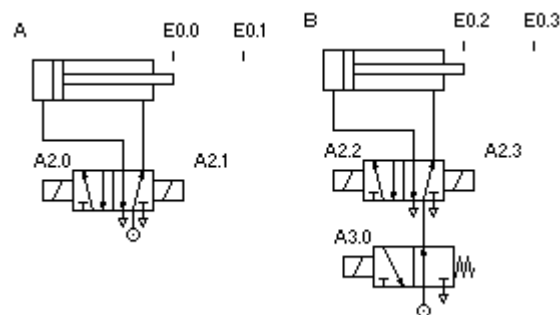
## Related buttons and counter indicator

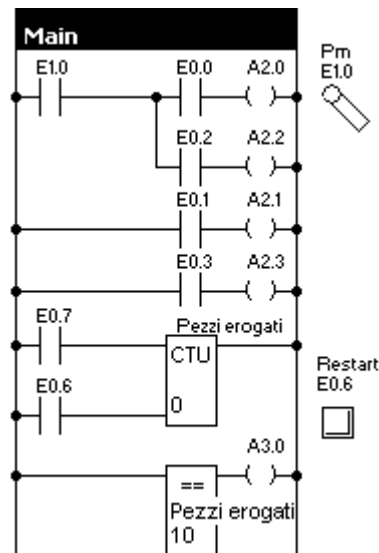


## Electropneumatic circuit for feeder and linear conveyor



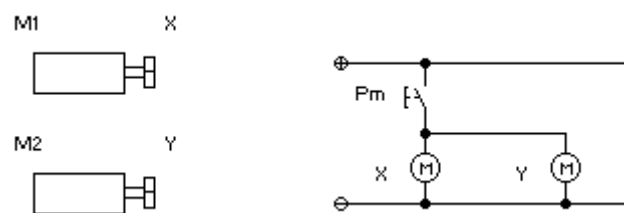
## Electropneumatic circuit for feeder and linear conveyor (PLC)



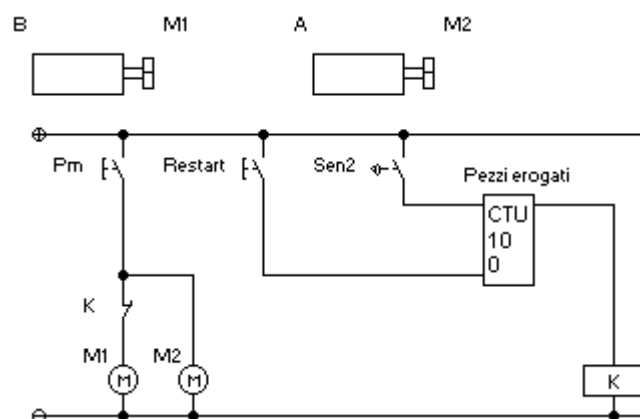


The input element with address E 0.7 is related to the sensor of the feeder.

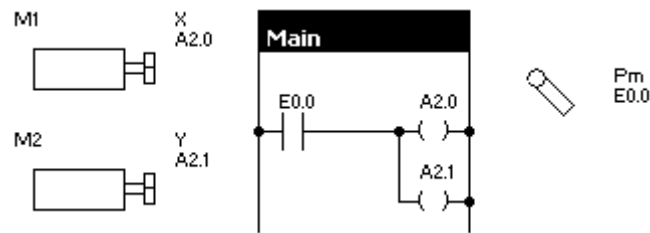
### Electric circuit for feeder and linear conveyor



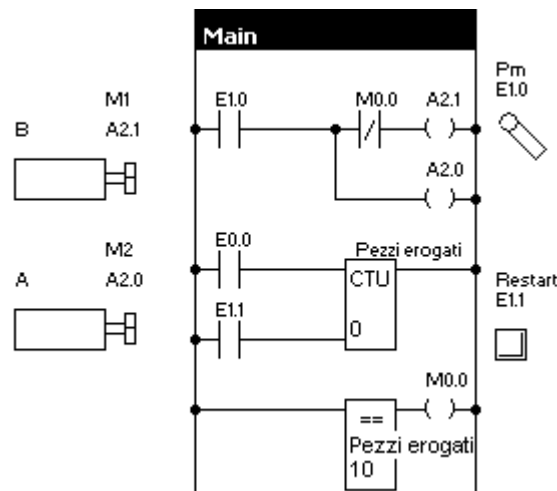
### Electric sensor of a feeder and counter



## Electric circuit for feeder and linear conveyor (PLC)



## Electric sensor of a feeder and counter (PLC)

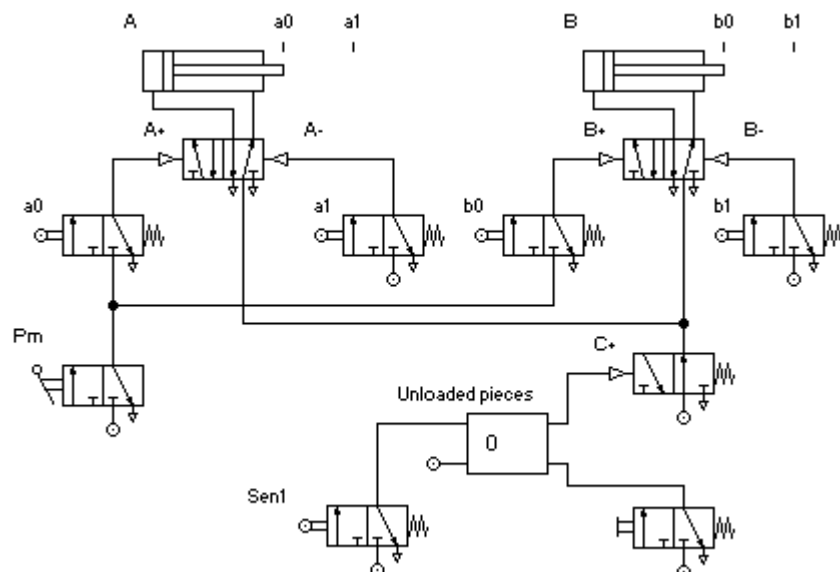


The input element with address E 0.0 is related to the sensor of the linear conveyor.

## Unloading station

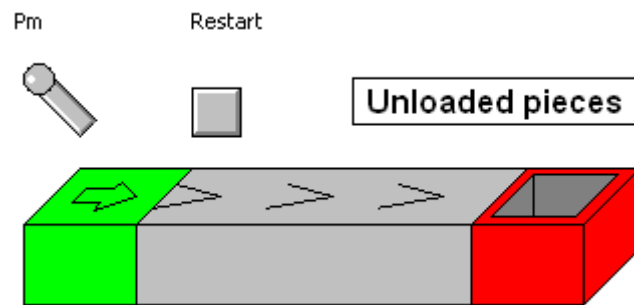
The unloading stations have no actuator.

In this pneumatic circuit A and B are the actuators of the feeder and of the conveyor.



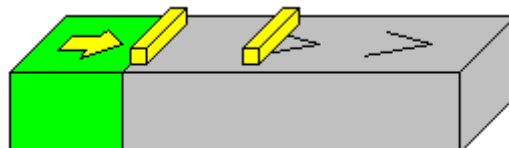
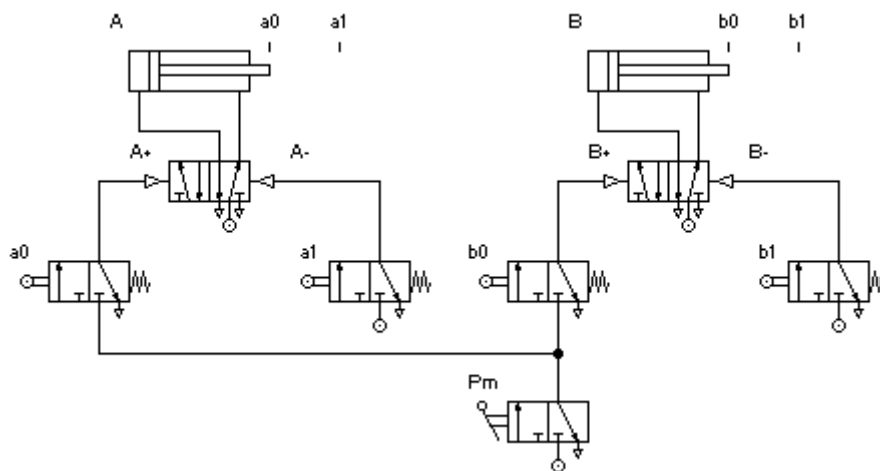


You can install a sensor in an unloading station to count the unloading pieces.  
Sen1 is the sensor of the unloading station.

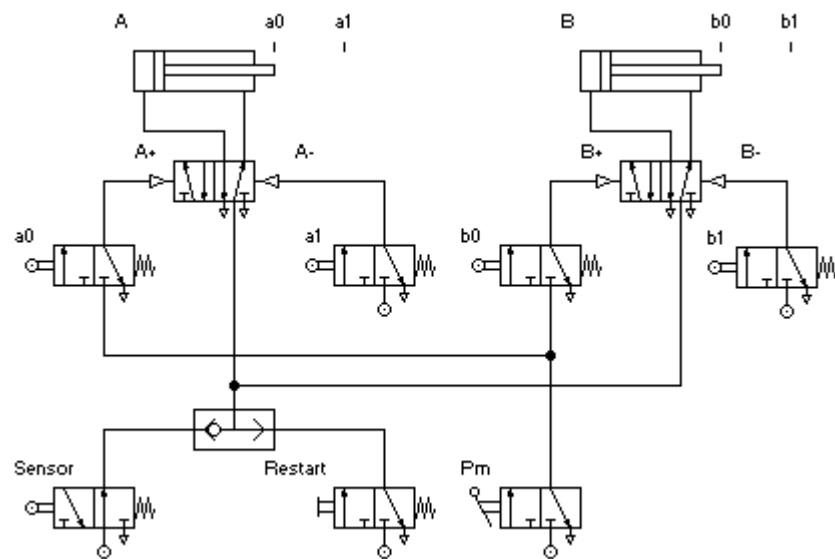


## Linear conveyoy

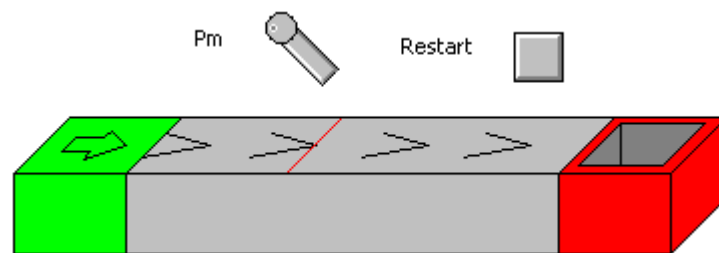
### Pneumatic circuit for feeder and linear conveyoy



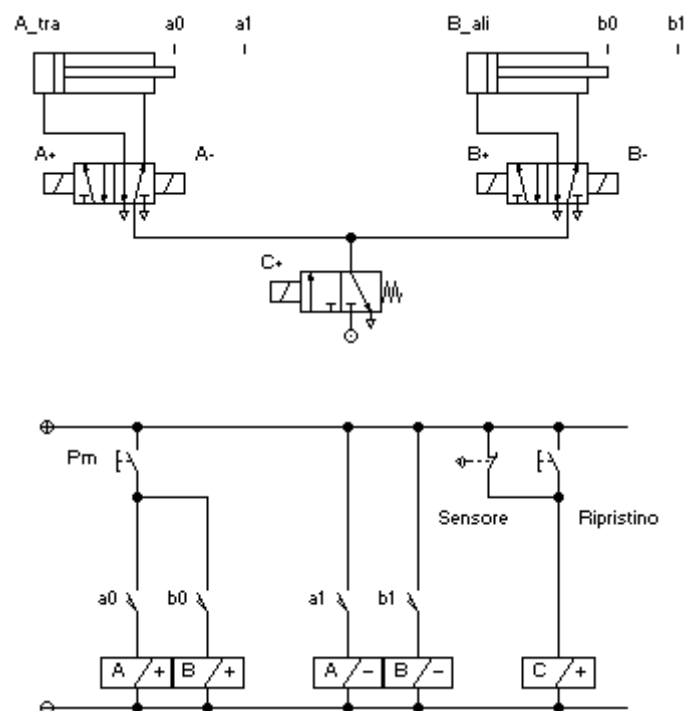
## Pneumatic sensor of a linear conveyor



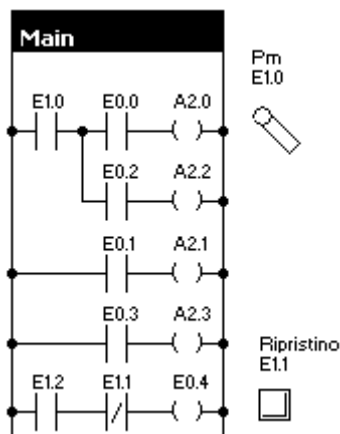
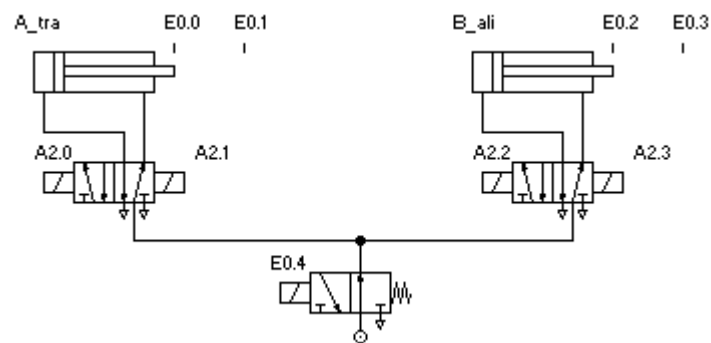
## Related buttons



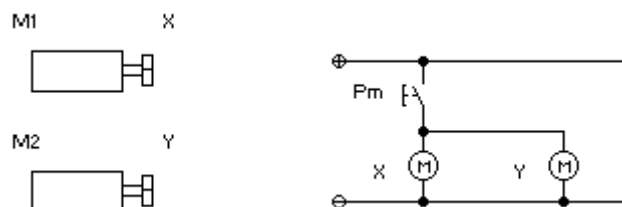
## Electropneumatic circuit for feeder and linear conveyor



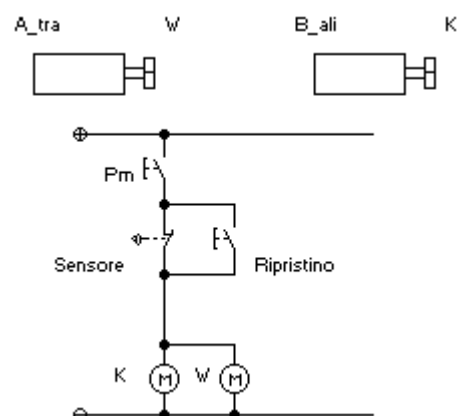
## Electropneumatic circuit (PLC) for feeder and linear conveyor



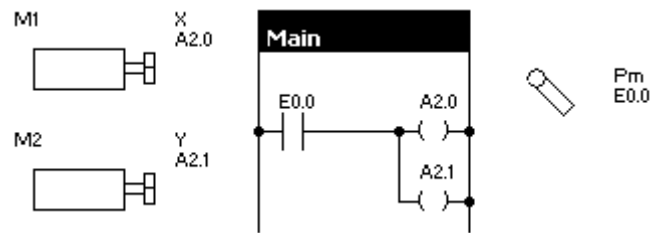
## Electric circuit for feeder and linear conveyor



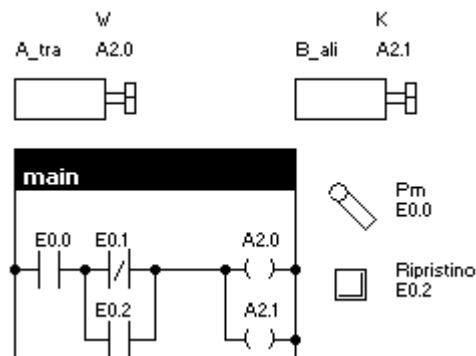
## Electric sensor of a linear conveyor



### Electric circuit (PLC) for feeder and linear conveyor



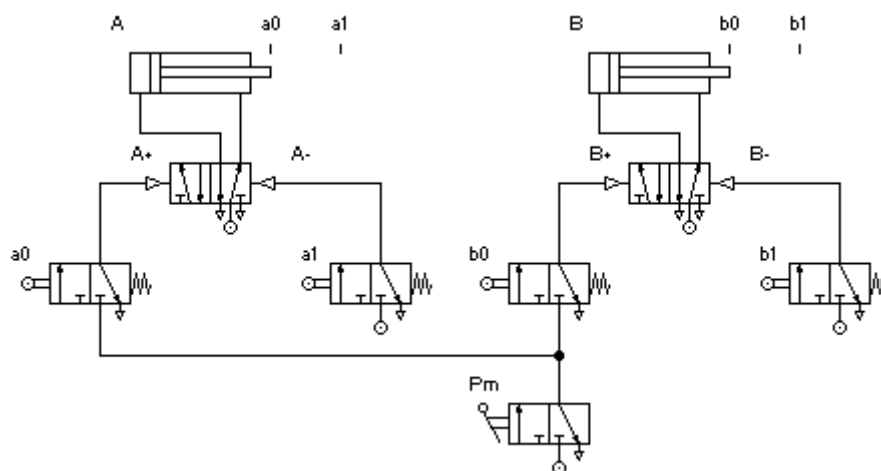
### Electric sensor (PLC) of a linear conveyor



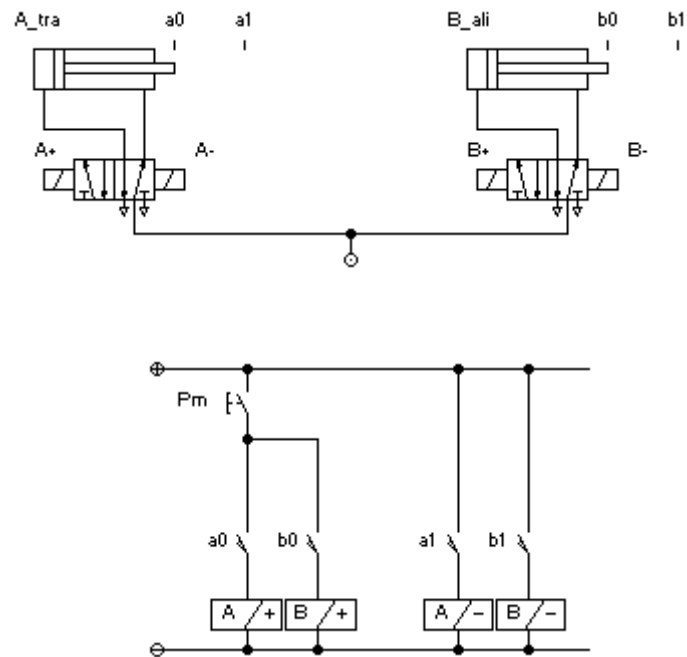
The input element with address E 0.1 is related to the sensor of the linear conveyor.

## Rotary conveyor

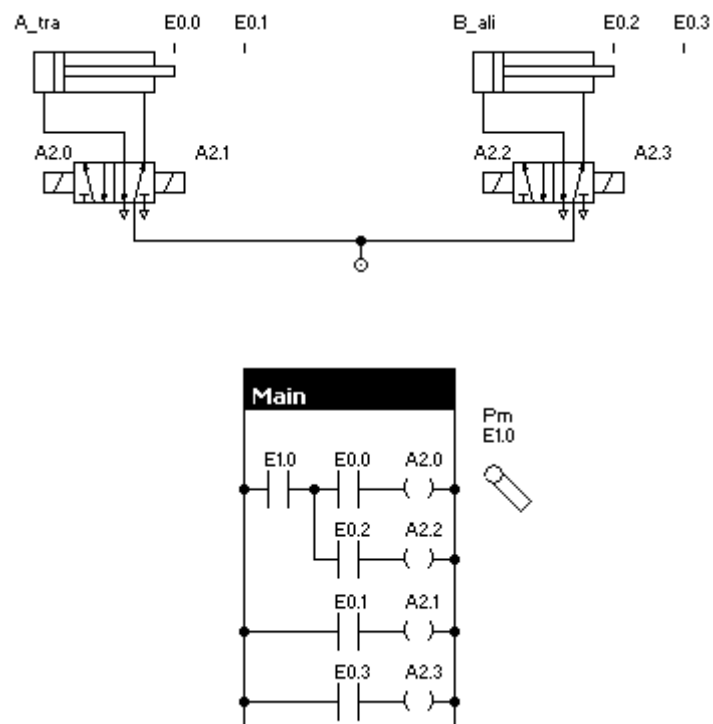
### Pneumatic circuit for feeder and rotary conveyor



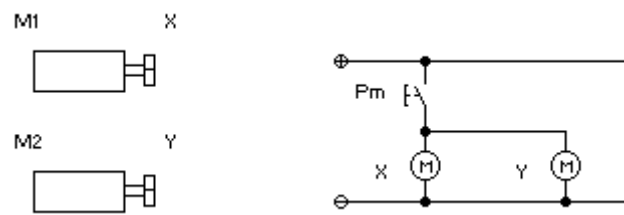
## Electropneumatic circuit for feeder and rotary conveyor



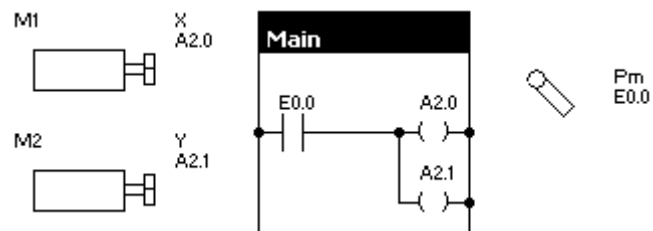
## Electropneumatic circuit (PLC) for feeder and rotary conveyor



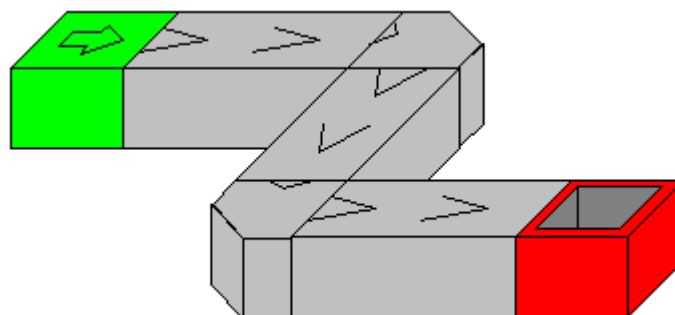
### Electric circuit for feeder and rotary conveyor



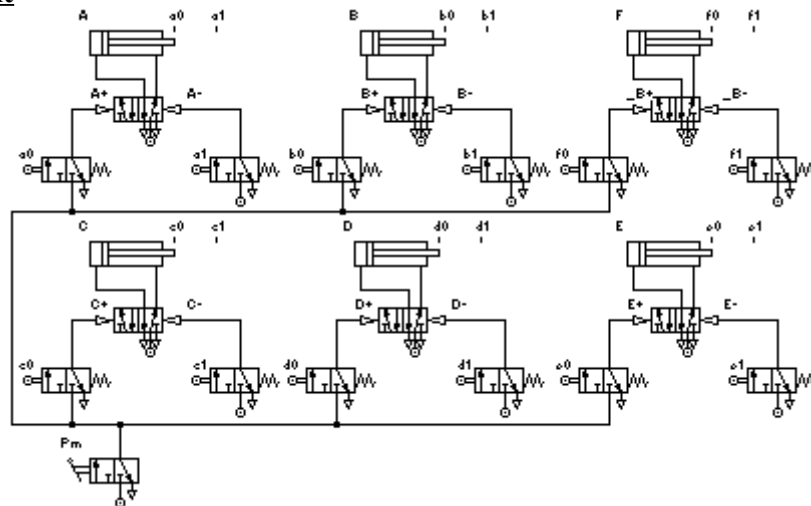
### Electric circuit (PLC) for feeder and rotary conveyor



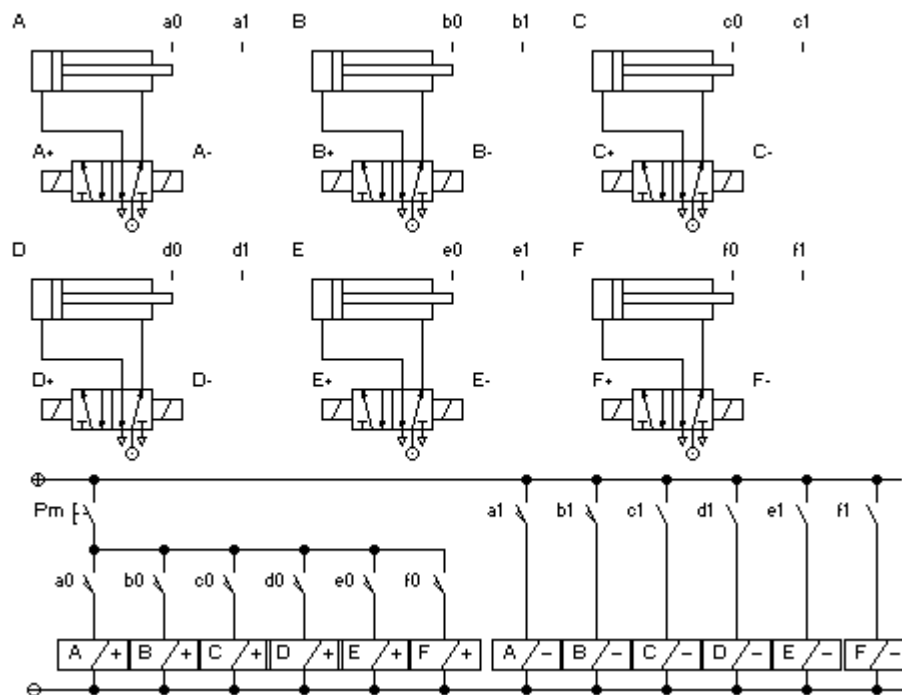
## Transport line



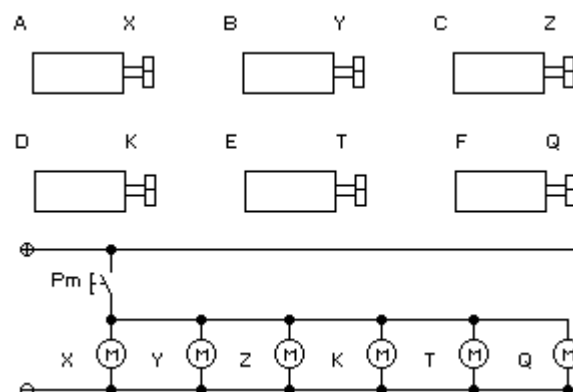
## Pneumatic circuit



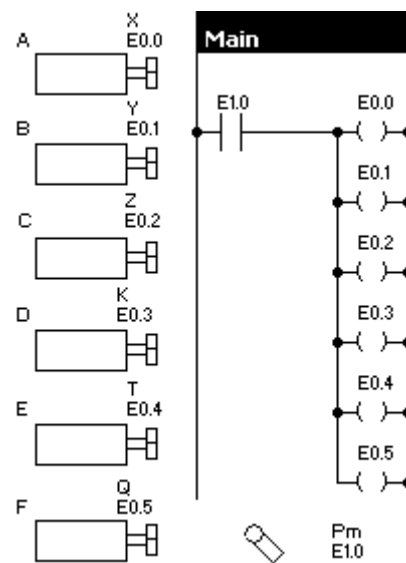
## Electropneumatic circuit



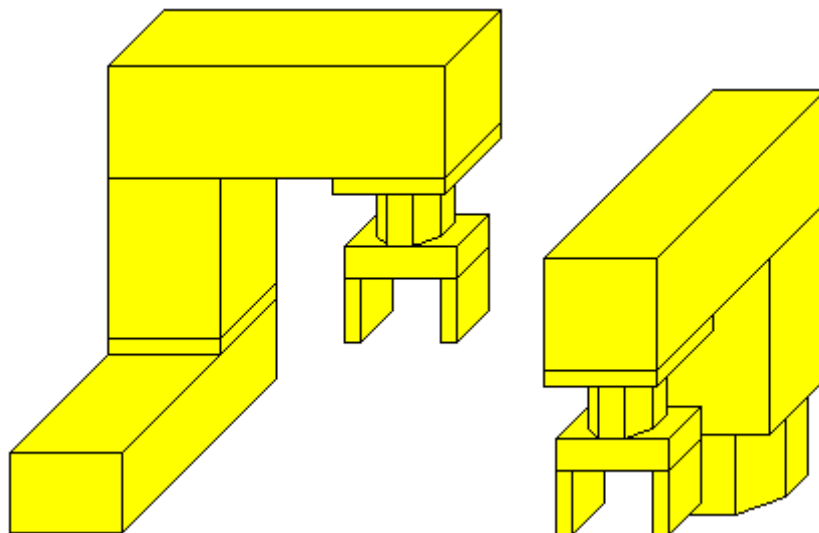
## Electric circuit



## Electric circuit (PLC)

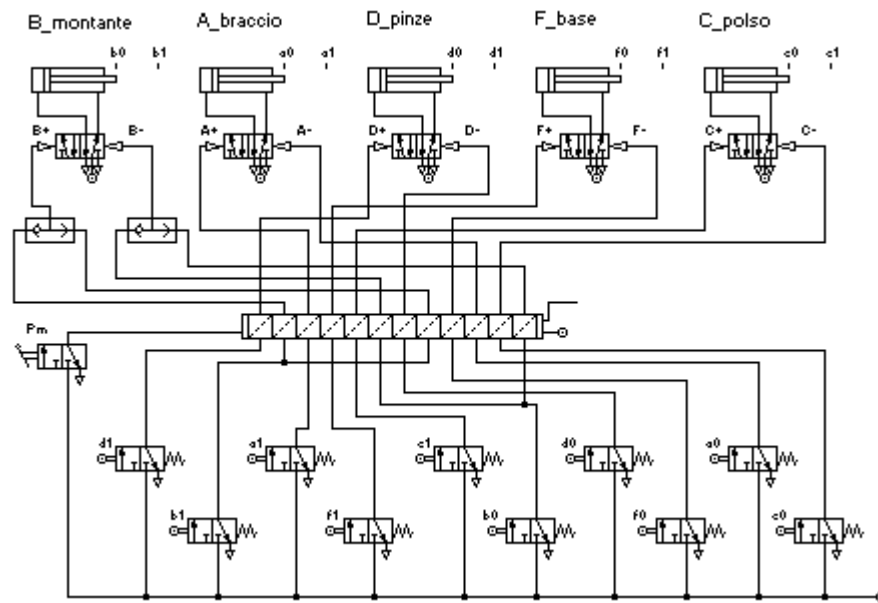


## Cartesian and cylindrical robots





## Pneumatic Cycle



There is not enough space in these pages to show you the electropneumatic cycles of the robots. Please open the demo files of the program **Pneumatic Studio 2015**.

## Working isles

There is not enough space in these pages to show you the cycles of working isles. Please open the demo files of the program **Pneumatic Studio 2015**.

