



# Dosaxe

*Automatic linear axis Brushless filler.*

## ErmaSmart #2

### Description of the system

The **Dosaxe** system is an **automated system for filling jars/vials** of different sizes on the fly in a continuous production process. It is based on a real industrial machine used in the food, pharmaceutical or cosmetic industry.

This automated system can be used as a stand-alone system with e.g. jars/vials or within the **ErmaSmart** flexible production line (see page 3).

The **main functions of the Dosaxe system** are:

- ✓ **Convey** the jars/vials from the inlet to the outlet of the system (jars/vials can be conveyed either singly or in pairs in parallel, of different sizes).
- ✓ **Filling** pots/vials on the fly or at a standstill with the linear axis using the **brushless motor**

This **automated** system, designed in the spirit of the **Industry of the Future** (Industry 4.0), meets the main requirements for intelligence and the evolution of production methods:

- ✓ **Scalability & Flexibility** with the possibility to assign the system to different types of production
- ✓ **IoT & Communications** with the PLC and communicating drives
- ✓ **Efficient actuators** with brushless motor linear axis

This training system is mainly intended for **activities in the fields of operation, system control, industrial maintenance, electrical engineering, automation and mechanics**.

This product is accompanied by a technical and educational file in digital format.

### Highlights

- Genuine **industrial system** with the latest **technologies** (**asynchronous & brushless motors, USS, Profinet, Ethernet communication**)
- **Several operating modes** including "on-the-fly" filling with **synchronisation of the brushless motorised linear axis** to the conveyor speed
- **Improvement activities**
- Includes TIA Portal programming software for programming the PLC and the dialogue terminal
- Possible extensions to the ErmaSmart flexible production line

CAP CIP - Bac PRO PLP / MELEC / MSPC  
BTS CRSA / Electrical engineering / MS  
IUT - Universities - Engineering schools

### Main themes

Industrial Maintenance  
Production Control  
Multi-technology Systems Design  
Electrical Engineering and Automation

Themes  
"Industry 4.0"  
addressed

Scalability & Flexibility

Personalization

Simplified programming

Digital twin

Mobile Robotics

Collaborative Robotics

Efficient Actuators

CAPM & CMMS

Digital instructions &  
MES

Quality control  
"online".

Vision & Smart Sensors

IOT & Communications

Big Data, AI &  
Predictive Maintenance

Virtual reality

Additive manufacturing  
for tooling...



Overview



*In partnership with*

**SIEMENS**



### General

The Dosaxe system consists mainly of :

- ✓ A welded frame with epoxy paint on 4 castors with brakes and trays for product storage
- ✓ An electrical cabinet with man-machine interface fixed to the chassis
- ✓ An operating section with three main functional chains: the conveyor, the hopper mounted on a linear axis, and the automatic hopper filling system.
- ✓ Protective enclosures only for the so-called "hazardous" areas in order to give priority to accessibility and visualization of the various components

### "Conveyor" functional sub-assembly

It consists mainly of :

- ✓ A frame in anodised aluminium structure
- ✓ A 9 m/min belt conveyor with adjustable outer edges and removable middle edge for different jar/vial sizes (conveying two jars in parallel, one jar...)
- ✓ A 230/400V 0.09 kW three-phase asynchronous geared motor controlled by a variable speed drive



*Dosaxe operating part with Module for dosing granules into pots/flasks*

### Functional sub-assembly "Linear axis filler

It consists mainly of :

- ✓ A linear axis mounted on the welded frame
- ✓ A translational guide with cylindrical rail and associated bushes
- ✓ A toothed belt drive with pulleys
- ✓ A brushless geared motor with encoder and control / command provided by a drive
- ✓ Two limit switches and two mechanical stops
- ✓ An optical sensor for the presence of pots/vials or cans/pallets under the filling heads

### Functional subassembly "Dosing of granules in pots/vials

It allows the filling of the pots/flasks with granules.

It consists mainly of :

- ✓ A raw material storage hopper with one or two filling nozzles
- ✓ An electromagnet for opening and closing the filling nozzles
- ✓ A low level detector for the raw material in the hopper

### Electrical control / command cabinet

It is mainly made up of :

- ✓ A padlockable disconnect switch
- ✓ A set of electrical protections
- ✓ A safety relay, an emergency stop button and a system reset button
- ✓ A Siemens S7-1200 programmable logic controller
- ✓ A Siemens SIMATIC HMIMTP700 Unified (7 inch) colour touch screen Human Machine Interface
- ✓ A switch to ensure communication between the PLC, the HMI and the connected environments
- ✓ A variable speed drive for the conveyor
- ✓ An intelligent drive for the linear axis
- ✓ An area dedicated to the electrical wiring of new components as part of system improvements (new sensors, actuators, vision, traceability, etc.)



*Maitre IO-Link*



*Programmable Logic Controller  
Industrial S7-1200*



*Human Machine Interface  
Siemens HMI MTP700 Unified*



*Armoire électrique*



## Dosaxe

### Station 2 of the ErmaSmart flexible production line "Packaging"

#### ErmaSmart Station 2 "Conditioning"

In the context of ErmaSmart "Packaging", the Dosaxe is used to dose granules into jars/vials.

Upstream of the Dosaxe is:

- Station 1: The 2D Unscrambling & Screwing Robot, 2D/3D jar/flask unscrambling and conveyor placement system (ref UR03 or UR05 or ON10 and associated codes)

Downstream of the Dosaxe are:

- Station 3: The Collaborative Capping & Assembly Robot, capping system, custom overcapping and control (ref MI00 and associated codes)
- Item 4: The XYZ Cartesian Pick&Place (ref XY10 and associated codes)
- Item 5: The Dynamic Vertical Store (ref VL10 and associated codes)
- Station 6: The manual order picking, packing and palletising station with RFID tracking (ref PM91).

#### ErmaSmart Configuration "Conditioning"

In the ErmaSmart "Packaging" configuration, the Dosaxe dispenses granules "on the fly" into pots/flasks.

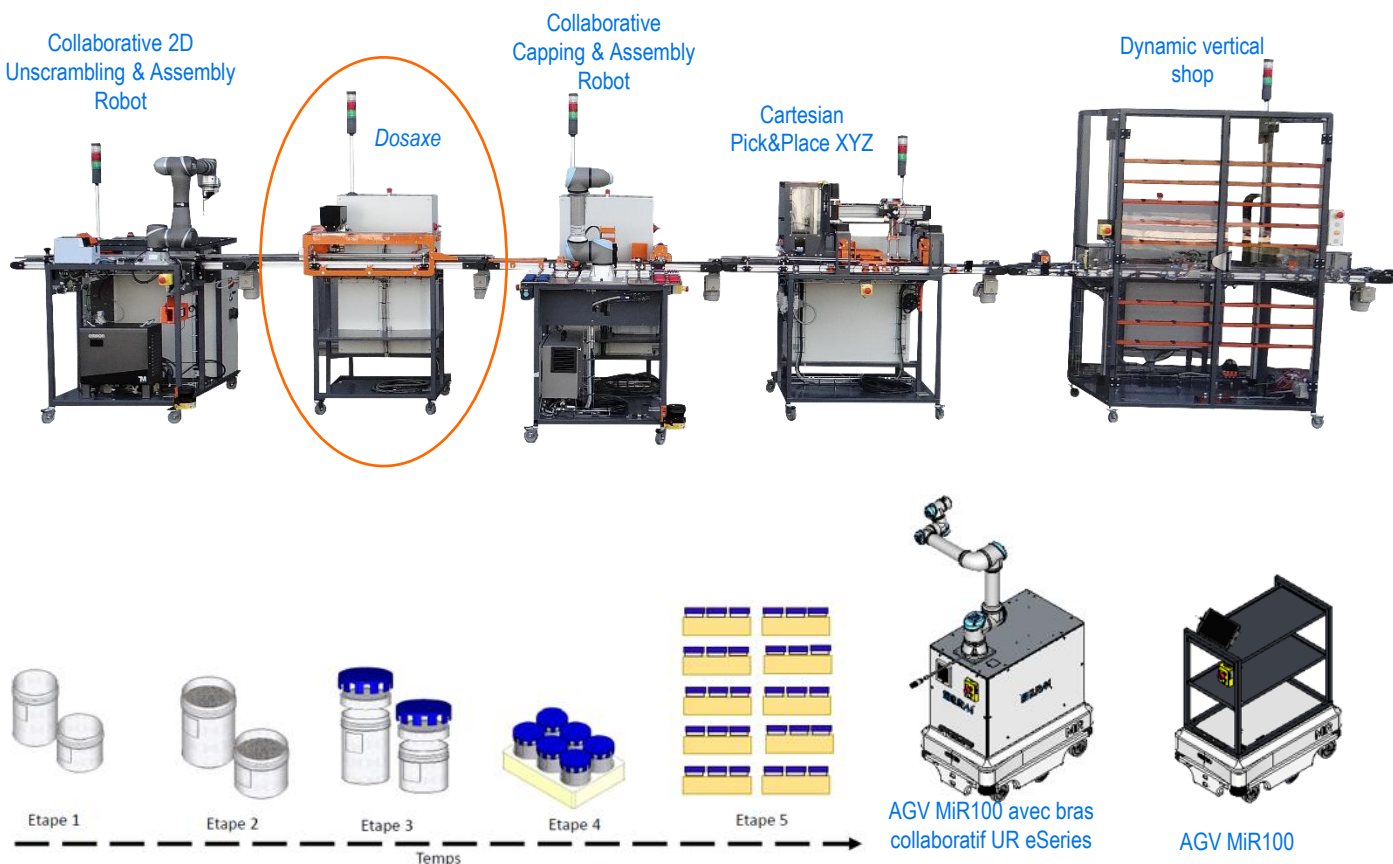
Three jar/vial sizes are available for format changes.

This configuration requires the code:

- DX20 : Dosaxe with linear axis with brushless motorization



#### Dosaxe integrated into the Industry 4.0 ErmaSmart "Packaging" plant





## Educational activities

**Le système Dosaxe permet de réaliser notamment les activités pédagogiques suivantes :**

### ✓ Electrotechnique

- **Découverte et prise en main du système** (analyse fonctionnelle et étude des technologies de système)
- **Contrôle des grandeurs électriques du système** (réseau, alimentation de la puissance, des variateurs, de l'automate programmable, de l'interface homme machine et du circuit de commande).
- **Mise en service et validation du fonctionnement** du système (des différents modes de production)
- **Réglage et paramétrage** des composants de l'installation (axe linéaire brushless et son variateur intelligent, motoréducteur triphasé asynchrone et son variateur de fréquence)
- **Câblage** de nouveaux capteurs et actionneurs (amélioration et/ou remplacement d'un composant électrique de l'installation)
- **Modification des programmes** de l'automate et de l'interface Homme Machine (logiciels Tia Portal et WinnCC fourni avec licence 1 an).
- **Diagnostic d'un ou des dysfonctionnements**
- **Exploitation des outils numériques et communication**

### ✓ Automatismes

- **Analyse fonctionnelle et structurelle** du système
- **Modification des programmes des cycles de production** (logiciel Tia Portal livré avec le système)
- **Programmation des périphériques complémentaires associés**

(vision, traçabilité,...)

- **Programmation de l'interface homme machine** (logiciel TIA Portal livré avec le système)

### ✓ Pilotage de production

- *Pilotage de la production* avec convoyeur en marche et synchronisation de l'axe linéaire, ou convoyeur à l'arrêt
- **Changement de format** de production
- Mise en place d'une **traçabilité de production**
- **Développement de procédures d'assistance des opérateurs**
- **Optimisation de la production avec les outils numériques 4.0**

### ✓ Maintenance industrielle

- **Maintenance préventive** (convoyeur, axe linéaire,...)
- **Maintenance corrective** (diagnostic de panne à l'aide du logiciel TIA PORTAL basic livré avec la cellule, fabrication rapide en impression 3D d'outils et pièces...)
- **Maintenance améliorative** (ajout de capteurs sur le convoyeur, contrôle avec vision, traçabilité...)

### ✓ Mécanique

- Etude d'un poste avec axes linéaires, ergonomie, dimensionnement axes et actionneurs...
- Conception de pièces imprimées en 3D

## Software tools

The Dosaxe is supplied with the Siemens TIA Portal suite required for the implementation of the system and the PLC, control panel and drive programs.

## References

**DX20** : Dosaxe with linear axis with brushless motorization

**UC90** : Option: Fault box for electrical box, remotely configurable on a tablet (Not supplied)

**UC50** : MES Tulip, visual instructions & production indicator monitoring

**UC52** : Option: Visual instructions on the Tulip open application environment and touchscreen tablet, for one machine (with a 3-year subscription to Tulip Standard, €570 excl. tax per year beyond that)

**TU//THEO** : Tulip Edge I/O Gateway - Passerelle IoT Tulip I/O

**UC41**: Siemens Remote Desk Option on iPad (Included)

**IO11**: IFM Monéo kit for multi-machine IOT deployment

**IO00** : Optional electrical and pneumatic measurement sensors (IO-Link) for monitoring the power, flow and electrical and pneumatic consumption of a machine equipped with an IO-Link master and supervision and preventive maintenance software (to be ordered with IO11)

**VI27** : DOSAXE 3D programmable digital twin on Virtual Universe Pro, featuring the Siemens S7-1200 PLC Pack and I/O card (Virtual Universe Pro license sold separately)

### UC90 – Fault box for Wi-Fi



The Trouble Shooter makes it quick and easy to create faults, so that you can find and diagnose them.

- Adaptable to any type of machine.
- Ability to create a large number of different faults.
- Wireless control of faults via dedicated web interface.
- Possibility of setting fault timeouts, thanks to dedicated interface.
- Troubleshooting and diagnostic activities