ErmaFlex #8

Multitec

Stacking and unstacking system for pallets in ½ european size 800 x 600

Multitec at a glance

- **Family of components addressed**
  - ✓ **PLC** and HMI (Pupitre colour graphic touchscreen)
  - Displacement (Axe vertical, roller conveyors)
  - Grip (Taquets)
  - Industrial communication (Ethernet) and supervision
  - ✓ **Electrical** energy (LV switchgear, Motor)
  - ✓ **Pneumatics** (Filter and regulator, Distributors, Cylinders)
  - ✓ **Hydraulics** (, Distributors, Cylinder)
  - ✓ **Sensors** (ILS, photoelectric, electro-mechanical)

- **Educational activities**
  - ✓ Functional **analysis** and study of technologies and construction solutions (3D SolidWorks)
  - ✓ **Settings** and **Operation of** the automatic or manual system
  - Assembly, disassembly and **technology change of** the vertical axis (3 animation kits)
  - ✓ **Connection of** actuators and sensors
  - ✓ Development and updating of a maintenance operating file
  - ✓ **Programming** and study of Grafcet
  - ✓ **Preventive** and **corrective maintenance** (electrical and mechanical fault diagnosis)
  - ✓ **Improvements** (e.g. integration of components)
  - ✓ System performance analysis, static or dynamic **testing**

- **Related products**
  - ✓ **OS50**: Multitec Vertical Axis Module
  - ✓ **CT10**: Multitec Cleat Module
  - ✓ **TM50**: Multitec Motorised Roller Transfer Table Module
  - ✓ **HD10** : Hydraulic Lifting Module
  - ✓ **MN10:** Multitec programmable digital mock-up
  - ✓ **HY10**: Oil analysis case
  - ✓ **HY11**: Hydraulic Measurement Case
  - ✓ **HY12**: Oil filtration unit
  - ✓ **MG10** : CMMS software

This system is accompanied by a technical and educational file

References

✓ ***OM50-AC51:*** *Multitec operating part with 5 paddles supplied*
✓ ***AC60:*** *Power and control cabinet equipped with a M340 Telemechanical PLC and touch panel (UNITY PRO and VIJEO DESIGNER not supplied)*
✓ ***AS60:*** *Power and control cabinet equipped with a Siemens S7-1200 PLC and touch panel (programming software supplied)*
✓ ***KE50:*** *Electric Animation Kit*
✓ ***KH50 :*** *Hydraulic animation kit*
✓ ***KP50:*** *Pneumatic Animation Kit*
✓ ***UC13:*** *Industrial Supervision Option for a Machine*
✓ ***UC90:*** *Option: Fault box for electrical cabinet, remotely configurable on a tablet (Not supplied)*
✓ ***UC51:*** *Option: Visual Instructions & Monitoring of Production Indicators on the Tulip open application environment and touch pad, for one machine*
✓ ***UC52:*** *Option Visual instructions on Tulip open application environment and touch pad, for one machine*
✓ ***SK20:*** *Smart IoT Gateway Kit Sick TDCE & Smart Sensors for Multitec Ermaflex*
✓ ***IO00:*** *IO-Link package for electrical and pneumatic measurements*
✓ ***DF00:*** *Industrial augmented reality solution DIOTA Tablet*

Bac Pro PLP - MSPC
BTS MS - IUT
Universities - Engineering schools

TULIP · IO-Link · Trouble-shooting box · IoT Sick Pack

Features

- ✓ L/ W/ H: 2020 x 1350 x 2250 mm
- ✓ Electrical energy: 400 V three-phase + Neutral
- ✓ Pneumatic energy: 0.6 MPa (6 bar)

Functional description

✓ The Multitec automated system is a system for stacking and destacking empty pallets on packaging lines.
✓ Two types of configuration can be envisaged on the system:
•In unstacker mode, the system allows empty pallets to be unstacked and placed on a palletising line.
•In Stacker mode, the system stacks empty pallets from a depalletising line.

Pallet transfer sub-assembly

✓ It allows pallets to be transferred from the system input to the lift (or vice versa depending on the mode chosen).
✓ It consists mainly of :
•A roller conveyor
•A three-phase asynchronous electric motor driving the rollers
•Two photocells to detect the presence of pallets at the conveyor entrance and under the lift.

Pallet input sub-assembly

✓ The pallets are gripped by a set of 4 articulated cleats associated with pneumatic cylinders and connecting rods.
✓ This subset includes:
•A symmetrical set of 2 x 2 articulated cleats
•Two double-acting pneumatic cylinders to manoeuvre the cleats
•Four magnetic ILS limit switches mounted on the cylinders

Functional architecture (continued)

Elevation and storage sub-assembly

➢ It includes:
- ✓ A mobile pallet storage magazine guided vertically by rails and rollers
- ✓ A motorisation system that can be realised by three different actuators:
  Electric motor
  Pneumatic cylinders
  Hydraulic cylinder

➢ The electric motor system consists of :
- ✓ A three-phase electric gear motor associated with the chain to ensure the up and down movement of the mobile part
- ✓ Three position switches

➢ The pneumatic cylinder system consists of :
- ✓ Two pneumatic cylinders mounted in tandem ensure the lifting of the mobile part, the descent being carried out by gravity under the weight of the mobile unit
- ✓ Four ILS magnetic limit switches mounted on the cylinders

➢ The hydraulic cylinder system consists of :
- ✓ A hydraulic cylinder associated with a hydraulic unit to ensure the lifting of the mobile part, the descent being carried out by gravity under the weight of the mobile unit
- ✓ Three position sensors

ELECTRIC MOTORIZATION

Hollow shaft geared motor (KE50)

PNEUMATIC DRIVE

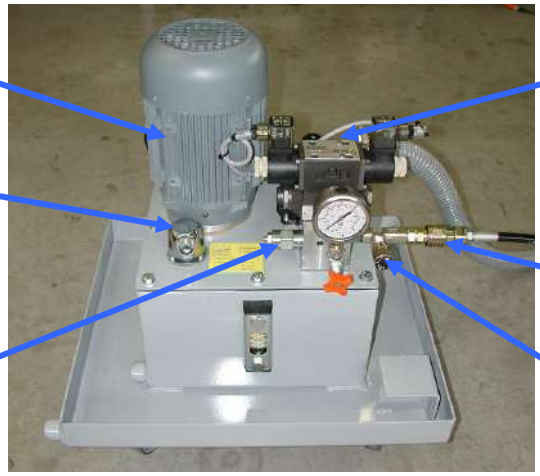
2 Double acting cylinders (used as singles) mounted in tandem (KP50)

MOTORIZATION HYDRAULICS

Single acting cylinder + hydraulic power pack (KH50)

Functional architecture (continued)

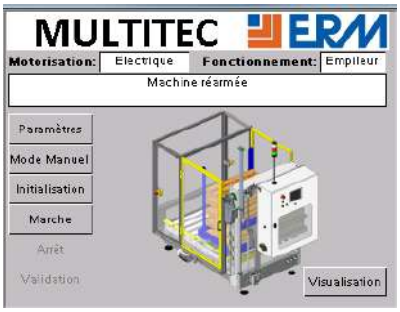
DETAILS OF THE KH50 HYDRAULIC ACTUATOR



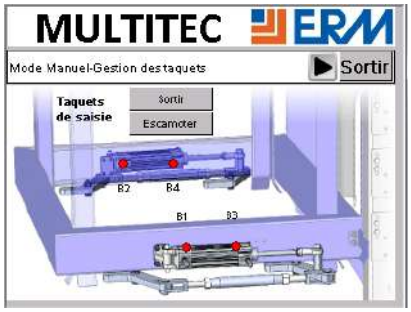
Control and power cabinet

✓It contains :
•A programmable logic controller
•A touch panel to control and supervise the system and to test the actuators/sensors
•A set of circuit breakers protecting the electrical components (motor starters)
24V DC power supply
•A set of contactors and relays to control the various electrical actuators
•A safety relay to manage the emergency stop
Terminal blocks

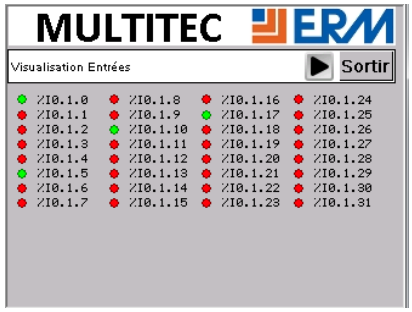
✓ This cabinet can be used for the electrical qualification of maintenance and mechanical engineering students



Home page



Manual mode: Management of input taps



Dynamic visualization of inputs

Pneumatic island

✓ It includes:
- 3 bistable dispensers
- 1 monostable dispenser

✓ Its power supply is provided by :
- 1 emergency stop solenoid valve
- 1 conditioning unit (filter and regulator)
- 1 shut-off valve (allowing, among other things, the consignment of pneumatic energy)

Pedagogical approach

Educational potential

- ✓ Functional analysis (e.g. schematic diagrams in the form of SADT)
- ✓ **Change of technologies** (e.g. electric, pneumatic, hydraulic)
- ✓ **Assembly** / **disassembly** (e.g. replacement of the conveyor gear motor)
- ✓ Elaboration / Development of a maintenance operation file (e.g.: Exploitation of guides and manufacturers' documents)
- ✓ Carrying out **diagnostics** (e.g. detection of a faulty sensor on a pneumatic cylinder)
- ✓ Static or dynamic **tests** (e.g. using the test console)
- ✓ **Integration** of components (e.g. bearings and drive shaft of the electric motorisation)
- ✓ Wiring and **connection** (e.g. motor and solenoid valves of the hydraulic power plant)
- ✓ **Programming** (e.g. execution of the pallet destacking cycle)
- ✓ **Analysis of** system performance (e.g. depending on the technology used)
- ✓ **Study of** constructive **solutions** (e.g. justification of the evolution from electric to hydraulic motorisation)
- ✓ **Driving** (e.g., performing a stacking cycle)
- ✓ Optional **supervision** (e.g. selection of an operating cycle)
- ✓ Study of **Grafcet** (from a system and PLC point of view)
- ✓ Working in **safety** (e.g.: energy consignment)

Practical work proposed by ERM Automatismes

TP 1 - Mechanical intervention :

Replacement of the conveyor gear motor.
(Corrective maintenance activity)

1. Locate the defective component on the asset,
2. Gather and check tools,
3. Analyse the risks of the intervention,
4. Record energies,
5. Carry out the removal,
6. Install the replacement component, adjust it,
7. Commission the system.

TP 2 - Troubleshooting and repair following a methodology

Two scenarios: "the lift does not go up" or "the lift does not go down" (faulty sensors, contactor, etc.).
(Corrective maintenance activity)

1. Establish the failure report,
2. Identify the faulty function,
3. Make assumptions,
4. Rank the hypotheses,
5. Carry out measurements,
6. Locate the fault,
7. Record energies,
8. Remove the component,
9. Examine the defective component,
10. Reassemble the replacement component, adjust it,
11. Check that the system is working properly,
12. Draw up the intervention report.

TP 3: Proposal and implementation of an improvement :

Setting up an hour meter.
(Preventive maintenance activity)

1. Exploit the history of the property,
2. Propose and justify the improvement,
3. Produce documents presenting the development,
4. Prepare the intervention area,
5. Record energies,
6. Receive and check the component subject to installation,
7. Install the new component,
8. Carry out tests and fine-tune,
9. Restore the environment of the property,
10. Put the system back into operation.

TP 4 - Engine Changeover

(Improved preventive maintenance activity)

1. Prepare the intervention area,
2. Carry out the removal of the part of the asset to be modified,
3. Install the elements of the modification,
4. Carry out tests and fine-tune,
5. Prepare the system for commissioning,
6. Learn the different commissioning and safety procedures,
7. Check the effectiveness of the safety chain,
8. Participate in the implementation and bring the system into its initial position,
9. Start the system,
10. Check that the various start and stop modes are working properly.

TP 5 - Making an improvement by programming :

Programming a new depilating cycle.
(Improved preventive maintenance activity)

1. Decode the different Grafcet of the Multitec in stacker mode,
2. Describe the system in its environment from a functional (SADT), temporal (Grafcet) and structural (PO and PC point of view) point of view,
3. Prepare the intervention area,
4. Install (using programming software) the modification elements,
5. Carry out the tests,
6. Prepare the property for commissioning,
7. Learn the different commissioning and safety procedures,
8. Check the effectiveness of the safety chain,
9. Move the system to the initial position,
10. Start the system,
11. Check the correct operation of the various start and stop modes (GMMA),
12. Pass on any new instructions to the user.

Multitec integrated in the Ermaflex line

Related & complementary products

Sick TDCE Smart IoT Gateway & Smart Sensors Kit for Ermaflex and Unbundler (Ref: SK20)

The Sick TDCE Smart IoT Gateway & Smart Sensors Kit for Ermaflex and Unbundler (Ref: SK20) contains :

- 1 Sick Smart IoT Gateway TDC-E200EU
- 1 IO-Link Master communicating with Node-RED to create a dashboard and dashboard and generate alerts
- 1 USB IO-Link Master Kit for setting up IO-Link components
- 1 IO-Link photoelectric sensor
- 2 TOR photoelectric sensors
- 2 Temperature sensors with IO-Link signal conditioners
- 1 Vibration sensor
- 1 IO-Link compressed air meter (to detect possible leaks)
- 1 MODBUS TCP electrical energy meter

SICK
Sensor Intelligence.

www.erm.li/sk00

Smart IoT Sick TDCE & Smart Sensors Case (SK00)

The Smart IoT Sick TDCE & Smart Sensor Gateway Toolkit contains several industrial smart sensor application cases.

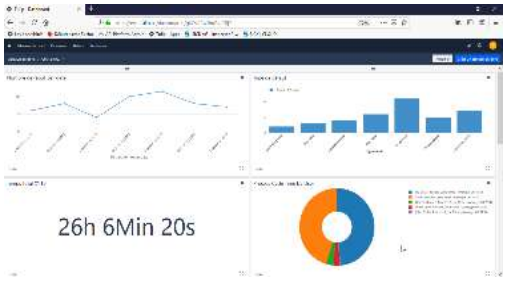
www.erm.li/sk00

SICK
Sensor Intelligence.

Visual instructions & Monitoring of production indicators (UC51-UC52)

Tulip is a web-based environment for creating applications on tablets and touch screens designed to digitalise workstations
✓Visual 0-paper intervention procedures
✓Supervision of machines by OPC-UA to retrieve production data
✓Declarations of production stoppages and defects
✓Suggestions for continuous improvement by operators
✓0-paper control thanks to connected tools (Scale...)
✓Dashboards for monitoring production indicators (OEE, output, etc.)
✓Easy to modify applications and create new ones (100% graphical)
✓Implementation of lean manufacturing concepts (Andon, 5S...)

TULIP



www.erm.li/tul

Oil analysis case

www.erm.li/hy10

Oil Filtration Group

www.erm.li/hy12

Hydraulic measurement case

www.erm.li/hy11

Portable on-line and off-line particle and hydraulic contamination counter

www.erm.li/ico

Related & complementary products

Augmented reality Diota Multitec

- **Scenario** on the Multitec system, stacker and destacker of pallets in ½ European format

DIOTA
AUGMENTING INDUSTRIES