GIROMAT® EVO rotary packer
FLSmidth Ventomatic Spa is located nearby the historical town of Bergamo (North-East of Milan, Italy), where are concentrated all of its activities, from R&D to production and assembly. Here our company started the production of packing equipment in 1957. Since then FLSmidth Ventomatic Spa has been recognised for its innovative design and for the originality of the solutions it has proposed to the industry.

FLSmidth Ventomatic Spa was the first manufacturer to develop a microprocessor-based controller for filling and weighing units on packers and the first to introduce the electronic rotary packer in an industry that up until then had only known packers with mechanical weighing system.

The latest and most successful step in the continuous path of innovation is represented by the new GIROMAT® EVO rotary packer generation that distinguishes itself in the market for the very compact and modular design with very high flexibility and expandability, thanks to the modular integration between mechanical parts and electronic control.

GIROMAT EVO rotary packers are specially designed and developed for handling many types of building materials, with a wide range of configurations such as:
- Various impeller design;
- Bag clamping device for glued and stitched bags and suitable for various bag construction material;
- Quick discharge system;
- Bag sealing system on board (ultrasonic technology).

EVO: Electronic Versatile Open-ended

### Electronic
The packer is equipped with the last generation of electronic weighing units, EWU (OIML approved), encoder and optical connection.

### Versatile
Available for wide-range of bag types, sizes and for manual or automatic adjustment.

### Open-ended
Suitable either for cement material or drymix, gypsum and other powdery products and expandable in capacity.

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**Flsmidth Ventomatic supply and control complete packing lines including:**
- Cement feeding such as bucket elevator, vibrating screen and vane feeder;
- Filled bag transport system comprising bag cleaning, electronic check weigher, bag trap, belt conveyor, curves, bag diverters;
- Bag loading comprising automatic and manual truck loaders, palletisers;
- Dust recovery system comprising screw conveyors, bag filters, hoppers.
Main features

Optical connection
Infrared data transmission device for connecting the filling units (mounted on the rotating part), the operator panel and the control system

Encoder
To track the angular position of the filling units and control the bag filling sequences (filling cycle)

Electronic weighing unit
Multiprocessor electronic weighing unit specifically designed for bagging application

Impeller
Vertical configuration for optimal filling

Filling Unit
Designed for high weight accuracy, high output and low dust emission

Modularity and flexibility
A FLSmidth Ventomatic® packer is composed of a number of pre-assembled modules, which are prepared and tested before delivering. These modules are quickly and easily mounted on the central tank of the packer during the erection. The numbered pneumatic connector plugs and electric rapid connectors avoid the possibility of mistakes.

Example
4-spout packer (supplied with the tank for 8 spouts) which can be expanded with up to four additional filling units without modifying main pneumatic, electric plants and control system.

If required and in order to minimise the initial investment, it is possible to put the packer in service with a reduced number of bag filling units. In case of future growth in production demand, additional filling units can be easily added on.

Standard capacity table (bags per hour)

<table>
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<tr>
<th></th>
<th>min.</th>
<th>max.*</th>
<th>min.</th>
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<tr>
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<td>6000</td>
<td>5760</td>
<td>6000</td>
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</table>

* Depending on the characteristic of the product.
Vertical shaft impeller

Process
Since many years Ventomatic successfully introduced the bagging technology with the vertical shaft impeller. The product feed flow follows the direction of the impeller shaft, the blade design minimises the internal turbulence and the product is completely centrifuged. The result is an optimal deaeration of the product itself and a minimum kinetic energy dispersion which means high filling performance.

The performance of the vertical shaft impeller is optimal with cement and similar products assuring the best output to kW power ratio.

Maintenance

- Simple and compact design;
- Easy to be disassembled for inspection;
- Less components (minimum number of actuators and wearing parts installed);
- Less spare parts consumption;
- Lower power consumption.

Example of filling unit inspection for the vertical shaft impeller

A special tool is provided to be connected to the filling unit (fig. 1). By turning the tool, the filling unit tilts until the impeller is cleared from the packer body (fig. 2, fig. 3). The impeller and the shaft sealing are designed for easy access and disassembling from the motor shaft (fig. 4).

The motor shaft has a high insulation and protection level thanks to a grease barrier that does not request periodical re-filling: the grease retention is ensured by a labyrinth system and sliding scrapers.
The sequence of the bag filling operations is defined by the peripheral location of the bag on the packer during the filling cycle: empty bag application location, tare location, bag discharge location, etc. During the rotation and according to its location, the filling unit receives the relevant commands. These points, on bag location, are normally determinated by a complicated system of microswitches, solenoid valves, pneumatic cylinders etc., all mounted on the external perimeter of the packer.

FLSmidth Ventomatic® packers, however, fulfill the same operations with an encoder mounted on the top of the rotating shaft of the packer. It continuously tracks the angular position of the packer and, via a field-bus connection, the information is sent to the filling units that react accordingly.

**Legend**
0) Control Status (ALARM)
1) Bag application
2) Tare
3) Not filled bag removing position
4) Bag Evacuation
5) Saddle Return

**Encoder**

The encoder tracking system significantly simplifies the packer and offers shorter and easier erection and tuning and eliminates sources of possible malfunctioning.

The positions for each of the filling operations is quickly and accurately set on the operator panel, eliminating the need to physically position externally mounted mechanical devices on the packer. Specific sequences of the filling cycle (and their positions) can be set in relation to type of product, empty bag size, etc.

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**Optical connection**

The encoder tracking system significantly simplifies the packer and offers shorter and easier erection and tuning and eliminates sources of possible malfunctioning.

**ENCODER L1**

<table>
<thead>
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<th>Position</th>
<th>T. azionamento</th>
<th>T. correzione</th>
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</thead>
<tbody>
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<tr>
<td>1. Applicazione sacco (SYNCHRON)</td>
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<td>100ms</td>
</tr>
<tr>
<td>2. Discesa blocco sacco (AUT)</td>
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<tr>
<td>3. Start ciclo (AUT)</td>
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<tr>
<td>4. Discesa blocco sacco (MAN)</td>
<td>800</td>
<td>100ms</td>
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<tr>
<td>5. Start ciclo (MAN)</td>
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<tr>
<td>6. Evacuazione sacco</td>
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<td>400ms 50ms</td>
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<td>7. Riavvi evacuazione</td>
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</tr>
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<td>8. Pulizia evaiutore</td>
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</table>
FLSmith Ventomatic Spa has been a pioneer in manufacturing electronic packers since 1980 and with the VENTODIGIT has achieved the objective of introducing a new modular electronic unit.

The modules are:
- The CPU for each packer;
- The analogic for each filling unit;
- The I/O digital, applied for each filling; unit or depending on the configuration.

The new weighing unit is based on the huge experience gained from our packer installations worldwide. All the filling units of one packer are controlled by only one CPU.

HW platform
The completely redesigned HW platform includes the following main new features:
- Powerful microprocessor permits high-speed response and very accurate control of the dynamic weighing process;
- Separate weighing module, equipped with sigma-delta technology A/D converter with a double post digital filter action;
- Possibility of installing optional modules, i.e. analog I/O, additional digital I/O, etc for covering special applications.

Weighing functions
- Automatic taring;
- Zero setting;
- Coarse and fine flow;
- Filling parameters self adjusting;
- Filling time control;
- Dynamic filling cycle optimisation;
- Set-point correction feedback from the check weigher (in option).

Packing functions
- Check correct empty bag application;
- Bag breakage detection;
- Filling unit aeration (start/stop);
- Automatic bag support saddle levelling system;
- Rapid product emptying control;
- Continuous bag discharge adjustment according to rotation speed, bag sizes and product conditions.

Network
All filling units on the rotary packer are connected to a data network CANBUS. Through the unique FLSmidth Ventomatic® optical connection system, all the weighing units are also connected to the absolute (encoder for tracking their angular position) and to the operator panel. The operator panel, and the remote control system VENTOLINK™, receive in real time the complete status of each bag filling unit and also its weighing performance. Furthermore, all filling units can be completely programmed from the operator panel.

An infra-red optical communication system specially developed for high-speed data communication in heavy industrial environments. It is 100% dust proof and not sensitive to any kind of vibrations or EMC noise. Furthermore, there is no mechanical wear.

High performance industrial bus
- The supervision and reporting system VENTOLINK (optional) collects and presents production data from packers and belt weighers in tables and graphic form.

Check weigher
The belt weigher VENTOCHECK™ can also be connected to the same network exchanging data with the other systems such as packer, operator panel, VENTOLINK.

Operator panel
- The supervision and reporting system VENTOLINK (optional) collects and presents production data from packers and belt weighers in tables and graphic form.

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Execution with VENTOCHECK™ belt check weigher

The belt weigher can be directly connected, without using external master or other additional device, to the packer operator panel and then to all the filling units on board.

A real-time monitor and basic production statistic page of the belt check weigher is always available on the operator panel display.

VENTOCHECK belt check weigher completes the packing process and improves the overall control by providing the following main functions:
- Sorting of broken bags, underweight and overweight bags;
- Providing overall production data;
- Monitoring each bag single filling unit performance on the packer;
- Adjusting automatically the set-point of each filling unit on the packer (correction “spout-by-spout”) see “Important Note”;
- Disabling automatically a filling unit in case of malfunction or mechanical problems.

Important note
The packer is able to achieve the target weight performance without necessarily using the feedback from the belt weigher.

Operator panel

The achievement of greater flexibility and higher level of automation requires an operator panel quite different to the conventional pushbutton desk. The HMI (Human Machine Interface) is an IP65 industrial graphic terminal designed for industrial use and dusty environments which thanks to a dynamic mimic of the packing line, provides a clear and detailed overview and monitoring of all the main equipment. The overall feeding and packing processes monitored with the possibility to adjust/optimise the performance through specific pages of the HMI (protected by different password levels) such as adjusting timers, variables and abilitations of the PLC program. Furthermore, all alarms and warnings are recorded, facilitating troubleshooting and supporting preventive maintenance planning.
The new VENTOLINK™ data acquisition and statistical system for Ventomatic® packing lines runs on Microsoft Windows. The VENTOLINK™ purpose is focused on monitoring packing plant performance in terms of bag weight precision, bag produced number, quality of bag produced collecting and analyzing data from the packers and VENTOCHECK™ belt checkweighers. The system can manage, store and display data up to 5 packing systems, with single or double discharge. Data can be analyzed with many views such as: packer, single filling spout, belt checkweigher and time frame: hour, shift, day and others. All data are stored in a SQL database and can be exported to Access, Excel or other formats according to ODBC standards.

The system includes:
- Run time supervision of the packing line showing equipment status and information.
- Shift setting module; customizable according to the production unit organization.
- Statistical module.

Run time supervision:
It displays the current status either of the complete line or of each machine. The user can get data and relevant information from fields like actual throughput and weights and display recipes main parameters or settings.

Shift setting
User can set up to three different shifts for each day of the week with different recipes.

Statistical module
This module allows user to get relevant information (i.e. mean weight, standard deviation, shift statistics etc.) about packing process.

Statistical module is basically structured in tables which can be arranged as per user needs.

The module manages the data and defines query for data file as follows:
- Day/shift database (relevant data for each filled bag are available);
- Last year historical database, the system makes available hourly triggered compounded data;
- Previous years historical database (preceding the last one), the system monthly stores and displays triggered and compounded data;
- View the Gaussian weight data of the stored compounded data;
- Print or save on files of all reports.