



TMF250 ATEX

Vacuum conveyor

Instructions manual



Rev: 26/01/2023



Vacuum conveyors are units specially designed for suction transport of raw materials in powder or pellet form.

Ex Exceptions of products to use (dusts and gases): Sulfur, Hydrogen, Ethylene, Acetylene, Carbon disulfide, Carbon monoxide, Ethylene oxide.

The suction is obtained by:

- Pneumatic vacuum, generated by ventury effect in a vacuum ejector
- Electric vacuum generator (ask AR for more information)

The vacuum conveyor is composed by three main parts: vacuum generator unit, metal tank, and filtering system.



Vacuum generation using pneumatic ejectors has some important advantages, like an instant aspiration response and a reduction in consumption, performance without heat generation, absolute reliability without failures, filter self-cleaning system (using a blowing system from generator), etc.

The AR TMF250 series of vacuum conveyors, presents a whole modular design. These different modules are made of 316 stainless steel. The TMF250 standard models include volumes between 6 and 23 liters.

Transportation of the device

ATTENTION • It's very important not change the fabric settings, because it may affect the proper synchronization manoeuvre, and cause a malfunction of the system.

The lack of delicate mechanisms or moving parts in the vacuum conveyor makes them remarkably easy to move. The unit, that consists of three differentiated main groups, can be transported jointly or separately, without assembly of the device in it's final destination involving any difficulties.

However, we recommend avoiding knocking the components (to prevent potential subsequent mis-settings and/or leaks) and similarly, avoid the flexible hoses connected to the unit can be twisted or bended. This forces can produce breakings or weakenings.

The place assigned to operate the equipment requires a minimum of space conditions, to prevent forced postures or folds in the supply hoses. Same way, the supply must be sufficient to read the measuring instruments and the site of placement must be horizontal to ensure the equipment's stability.

Assembly

- 1 • Check that the filters are properly mounted under the lid (pressure-coupled) and fastened with flanges (flange version) or mounted on filter holder (snap ring version).
- 2 • Mount the lid on top of the first module and secure with metallic bracket. Be sure that the rubber seal is mounted between the two components to ensure the assembly is correctly sealed. Assure the correct position of the rubber seal and close the clamp. Proceed the same way with the following modules, unload cone and support module.
- 3 • If the equipment is supplied dismantled, couple the vacuum unit with the lid of vacuum conveyor using the thread provided for this purpose.
- 4 • Once the unit is assembled, all you need to do is manually connect the flexible hoses (not supplied) from the air distribution network to the equipment and from the power lead for the electric valve to the electricity mains.
- 5 • Next, splice the flexible suction hose to the material entrance of the module (40 mm diameter), taking care to insert it fully to ensure the connection is airtight.
- 6 • Make sure that the following characteristics of the network are properly set and correspond to the necessary conditions for the correct equipment function:

- power voltage of the electric valve,
- air pressure in the line,
- air quality in the circuit,
- diameters and lengths of the flexible hoses.

Precautions and safety

It's absolutely forbidden to go ahead with any inspection or repairment of any kind without first disconnecting the unit from both supply networks.

- Operator
The operator has to be aware that when the vacuum conveyor is operating, it has his unload mechanism working so it should not by any circumstances insert objects or his hand into the deposit to prevent accidents or injuries.
When the vacuum conveyor is operating with a vacuum generator, be aware not to get close to the air exhauster, to avoid eye and ear injuries.
- Vacuum conveyor
Be sure that all pipelines, connections, and reserve tanks are well connected and sealed.
For some products to transport, the friction produced during the displacement along the tube generates static electricity.

WARNING - ATEX Environments

Static electricity overload can produce a spark (blast risk in certain environments). In order to prevent these situations, **keep electrical continuity between ALL metallic parts and connect the equipment to ground.**

It should take into consideration:

- It's compulsory to use original AR anti static-filters.
- The conveyor body has been designed to keep electrical continuity through its metallic parts (module-bracket-module).
- In order to keep electrical continuity with the conical module, an earthing bridge has been mounted (see pic. 1 in chapter "Parts & configuration examples" in the next page).
- When using a pinch non-return valve to prevent dust returns, it is compulsory to ensure the electrical continuity. The wire of the suction anti-static hose pipe must have contact with the metallic conveyor metallic parts, being that they are connected to ground.
- When using a butterfly valve, no extra connection is needed, being that its metallic parts already have contact.
- It is compulsory to use anti-static pressure tube.
- It is compulsory to use anti-static suction hose.
- It is forbidden to modify the cylinder opening speed. This modification can cause risk of sparks.
- For powders with high resistivity or prone to electrostatic charge, additional safety considerations must be taken to prevent them from entering the equipment charged and constituting an additional risk of ignition.

Ex • The final user must include in its "EXPLOSION PROTECTION DOCUMENT" the risk evaluation in the communication or interface of the conveyor with the existing facility. The final user has the responsibility of the insulation or protection of the system in case of a possible propagation of an external explosion to the conveyor.

Ex ATTENTION: The continuity between modules is provided by the mounting bracket, which, when in contact with two elements, acts as a bridge between them. To ensure this contact, the screw must be tightened until the clamp touches the wall of the two modules. Otherwise, we will not have continuity.

Starting

Once the vacuum conveyor is ready to work with all security and installation requirements accomplished (see the Precautions and safety section) and pressure and electric networks are properly connected, the system is ready to start operating. Switching on the control system of the depressor device, vacuum conveyor cycle starts.

Operation

The equipment's operation consists of two stages: suction and unloading:

- Suction: When the vacuum generator is working, it causes an air flow from outside towards the conveyor through the aspiration hosepipe. All particles that may be in the opposite side of the hosepipe are dragged by the system. In this moment, the transport starts.
- Unloading: The vacuum conveyor loads material during the programmed time, according the model capacity. When the supply of the generator valve is interrupted, the aspiration process stops, the unload lid opens* and there is an expulsion of pressured air** wich can be used to clean the filter unit or to assist unloading operation of the material conveyed (see system in the ejector manual).

*,** Except in models with load and/or blowing controlled by independent solenoid valves.

Maintenance and cleaning

Filters are the only elements wich requires minimal periodic maintenance and cleaning to keep all system working properly. Consult the Filters technical data sheet to obtain all the information about their cleaning.

Ex Use cleaning procedures that do not favor the generation of charges electrostatic on non-conductive parts of equipment enclosures.

Malfunctions and troubleshooting

The chances of this equipment malfunctioning are very remote, in view of its exclusively pneumatic conception; however, accidental damage can be caused (for example, a hose becoming disconnected or breaking) and it will need to be attended to promptly.

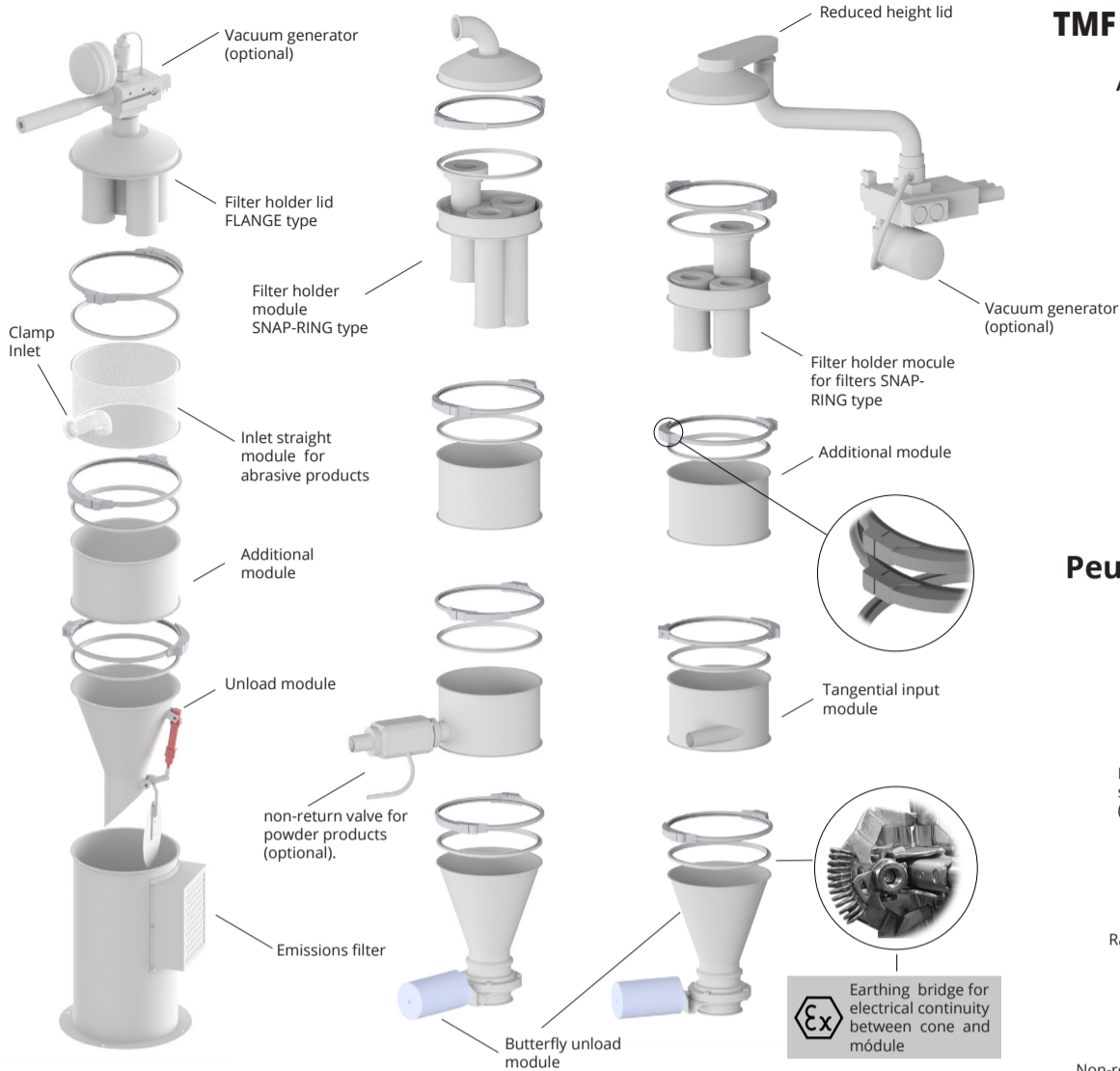
Problem	Cause	Remedy
The equipment doesn't start 	There's no supply pressure in the line	Check the pressure supply system
	There's no current in the solenoid valve supply	Check the electric supply system
	The coil of the solenoid valve is burned. (Highly improbably)	Replace the solenoid valve of the vacuum device
The equipment doesn't suction material 	Break of the solenoid valve and/or quick exhaust valve membrane	Proceed with the replacement of the broken membranes
	Filters saturation	Proceed with filters replacement or cleaning
	Insufficiency of supply pressure	Increase feed pressure. (With the ejector working, the pressure gauge should indicate a minimum of 6 bar)
	Insufficient diameter in supply pipeline	Excess loss of pressure load. Change the pipeline to bigger diameter, and eliminate restrictions caused by bad fittings connections
	The unload lid doesn't close completely, there are vacuum leaks	Verify the correct stroke path of the cylinder and proceed with the adjustments

Spare parts

Type	Element	Reference
Spare parts	Short suction filter, flange type	FIL TM TFL150GRIAL4
	Long suction filter, flange type	FIL TM TFL260GRIAL4
	Short suction filter, snap ring type	FIL TMF TFL150GRIAL4
	Long suction filter, snap ring type	FIL TMF TFL260GRIAL4
	Short stainless steel inner cage for flange filters	FIL TM J155INX
	Long stainless steel inner cage for flange filters	FIL TM J265INX
	Short stainless steel inner cage for snap ring filters	FIL TMF J155INX
	Long stainless steel inner cage for snap ring filters	FIL TMF J265INX
	Red silicone gasket FDA for butterfly valve DN100	VARVMRP100KIT
	Rectangular silicone gasket FDA for side filter	PCTMCACILJTSB
	Round silicone joint FDA for module gasket	TMF250JTSB
	Pneumatic cylinder for unload mechanism	VAR2025ES
	Metallic lid for unload	VARELIP100
	Polyurethane elbow Ø40	VARCPUR40
	Fluidization Nozzle	VARBFLUIDDN40
	Pinch non-return valve DN40	VARVMANG40NRL
	Accessories	Timer panel load/unload
Timer panel load/unload with AC level detector		VARCUAETC24220AC
Timer panel load/unload with DC level detector		VARCUAETC24C

Ex For ATEX spare parts orders is mandatory to indicate the unit serial number (included on characteristics plate)

Parts and configuration examples



***IMPORTANT: Note on feed pressure in equipment with pneumatic vacuum generator ***

A minimum supply pressure of 5.5 bar must be guaranteed, read at the inlet of the vacuum generator and with it running. IF THE REAL PRESSURE IS LESS THAN 5.5 BAR, THE SUCTION POWER OF THE EQUIPMENT WILL BE ALSO LOWER.

Many generators have their own pressure gauge (clock type) where we can read the operating supply pressure. It is not enough to have more than 5.5 bar in the compressed air network of the plant, since this does not guarantee that the pressure reaches the equipment generator.

The usual installation errors that cause the equipment to not suck properly are:

- Insufficient inner diameter air tube
- Air tube too long with insufficient inside diameter
- Air maintenance group too small
- Connection fittings with an inner diameter smaller than the inside diameter of the pipe they join.

In no case should the air supply fitting of the vacuum generator be replaced with a smaller one than the one that is factory installed.

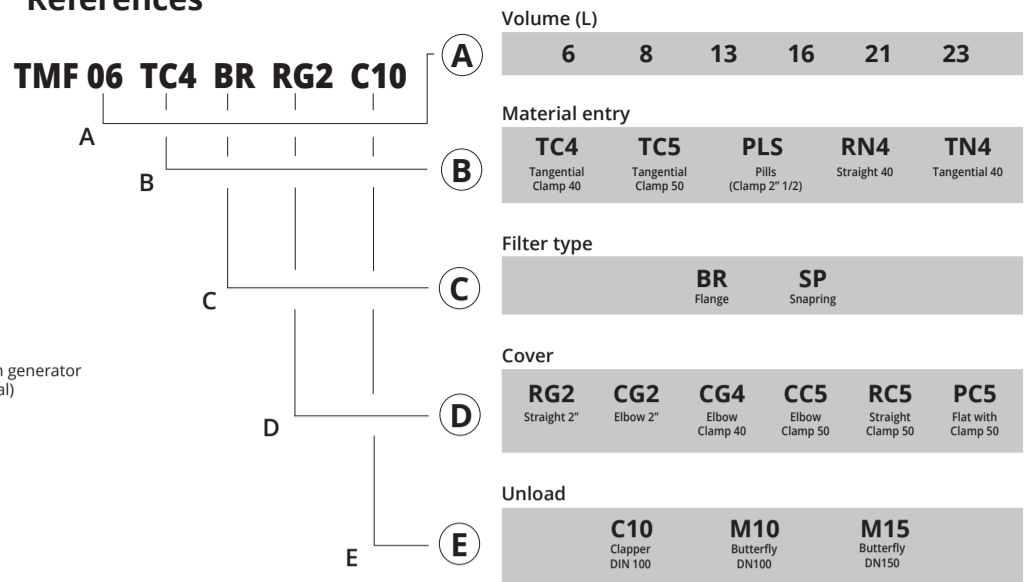
Connection example: Connect half a meter of pipe to the generator supply connector, the size corresponding to the fitting itself, which is already assembled at the factory.

Then, connect the rest of the feeding tube, with a diameter larger than the previous point. The more tube meters needed up to the compressed air network, the larger the pipe diameter is necessary to avoid pressure losses.

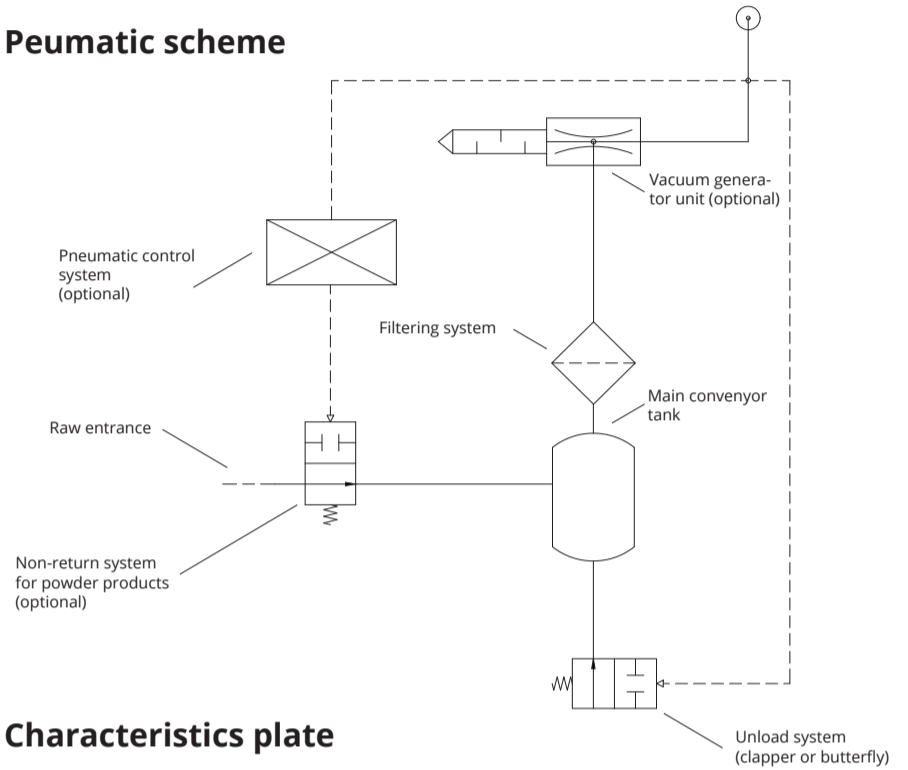
Datasheet

	Models with pneumatic generator	Models with electric generator
Air pressure required	> 5,5 bar generator supply and unload operation MAXIMUM blowing 2 bar for pinch non-return pneumatic valve (optional)	> 5,5 bar generator supply and unload operation MAXIMUM blowing 2 bar for pinch non-return pneumatic valve (optional)
Air consumption (NI/min)	See specific generator manual	--
Environment temperature allowed	-20 a 70° C	-20 a 70° C
Conveyor body material and brackets	INOX 316 L	INOX 316 L
Gasket material between modules	FDA silicone (Optionally EPDM)	FDA silicone (Optionally EPDM)
Product transport tube diameter	40 mm	40 mm
Electrovalve voltage supply (vacuum generator)	See generator tag and specific manual - usually 24VDC (optionally 220V AC or 24 VAC)	--
Electrical consumption (W)	See specific generator manual	See specific generator manual
Supply air quality	Clean, dry and no lubricated	Clean, dry and no lubricated

References



Pneumatic scheme



Characteristics plate

The characteristics plate identifies the unit, giving information about machine, series, model, manufacturing number, manufacturer data and norms. Below it is presented a generic scheme about its design.

1. Manufacturer data and complete location.
2. Manufacturer logo.
3. Maximum pressure and consumed airflow (depending of the vacuum unit).
4. European Community norms and directives.
5. Type and device category.
6. Device model and reference.
7. Manufacturing year.
8. Serial number
9. Protection **Ex II 2 GD c** specific mark, referring to equipment security, design and construction, and standing for the security conditions needed for use in potential explosive atmospheres.
10. Hexagonal symbol with information about the country, year of fabrication, category reference number that doesn't requires CEE approval model when this one is predictable in special directive
11. European Community Symbol. Manufacturer designs and builds his machines under community norms and directives, EN norms or similar, that they guarantee a correct and secure performance.
12. Laboratory certification and number file
13. Temperature range for secure work

