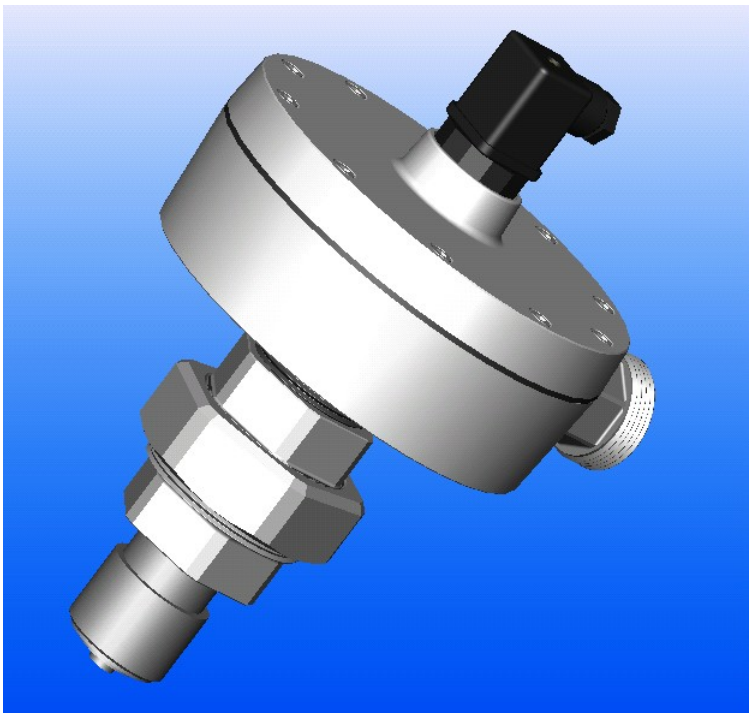
ALBRECHT
Ingenieurbüro GmbH

ALBRECHT Pulsors

Flow Promotion of Bulk Solids and Filter Dust



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ALBRECHT Engineering is a family business with 30 years of experience in the field of the flow promotion of bulk solids and filter dust.

We specialize in solving discharge problems with our self developed and manufactured flow aid devices,
the **ALBRECHT Pulsors**.

In 1978 launching of **Ingenieurbüro O. Albrecht** by
Otto Albrecht, Dipl.-Ing. (Diploma of Engineering),
development of the flow aid devices
'Pulsor' and **'Impulse Nozzle'**

In 1999 change of company's legal status and formation of **ALBRECHT Ingenieurbüro GmbH** together with son
Jens Christian Albrecht, Dipl.-Phys. (Diploma of Physics)

Since then we have been acting as an all-in-one supplier for manufacturing and installation of Pulsors together with all additional components e.g. installation of compressed air supply pipes, manufacture of electrical control boxes and electrical installations.
We provide consultancy, engineering and installation for all existing silos as well as new constructions.

- **Manufacture and installation of ALBRECHT Pulsors**
- **Hopper constructions and modifications**
- **Process technical consultancy**
- **Jenike shear tests**

ALBRECHT Pulsors

Pneumatic discharge aids for silos and dust bunkers

FUNCTION

ALBRECHT Pulsors supply pulses of compressed air with a frequency of about 5 Hz generated mechanically by a quick acting large surfaced plate valve within the Pulsor itself.
The air is then injected into the bulk solid through special Impulse Nozzles and flows both, radially and parallel to the funnel wall.

Due to the special construction Pulsor and Impulse Nozzle are nearly maintenance-free and present an extensive range of applications as well as a long working life.

For the operational monitoring an electronic proximity switch is integrated into the Pulsor.

INSTALLATION

ALBRECHT Pulsors
can easily be installed from the outside to any existing bin.

EFFECT

The air blown-in in quick succession results in a forced oscillation and fluidisation of the bulk solid.

Cohesive forces between the particles are diminished and the wall friction of bulk solids is considerably reduced.

ALBRECHT Pulsors break up powder compaction and eliminate arching and ratholing.

By reducing the wall friction and due to the homogenous air distribution in the bulk solid possible segregation of particles can be diminished.

Advantages:

Within the hopper **ALBRECHT Pulsors**

- avoid formation of air channels, which often result from low-pressure air injection.
- prevent bulk solids from consolidating
- protect hopper walls and welded seams against damaging vibrations caused by traditional vibrators.
- achieve economic and trouble-free operation by reducing waiting times ost- and time-extensive stoppages and silo cleaning will be avoided and reduced.

APPLICATION

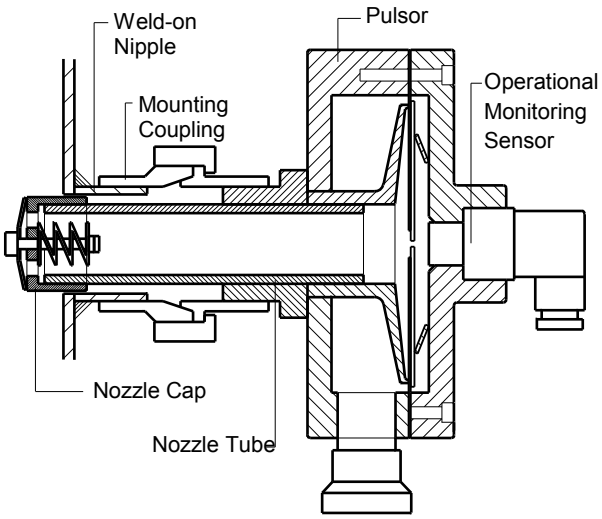
ALBRECHT Pulsors are employed in:

- building materials industries (lime, gypsum, cement)
- chemical industries (plastic powders, dyestuffs)
- foodstuff industries (milk-, coffee- , cocoa powder)
- power stations / waste incineration plants (filter dust, fly ash)

Technical Description

Pulsor and Impulse Nozzle

The nozzle tube which carries the nozzle cap is screwed into the cylindrical body of the Pulsor. The Pulsor is fixed to the vessel wall via a weld-on pipe nipple and rigidly screwed on using a taper seat pipe union. The nozzle cap projects about 15-20 mm into the vessel, through a hole drilled concentrically to the welded pipe nipple.



When compressed air is admitted, the valve disc in the Pulsor is lifted from its seat against the force of a disc spring. Through the resulting gap, air flows from the feed pipe into the nozzle tube. The valve plate of the nozzle is lifted, allowing the high pressure air to flow out radially through several holes in the face of the cap. A non-return valve prevents any powder from penetrating the nozzle tube.

At the same time, compressed air also passes through a hole in the Pulsor‘s valve disc which is abruptly pressed back against its seat interrupting the air flow. This course of events is repeated with a frequency of about 5 Hz as long as the compressed air supply is activated.

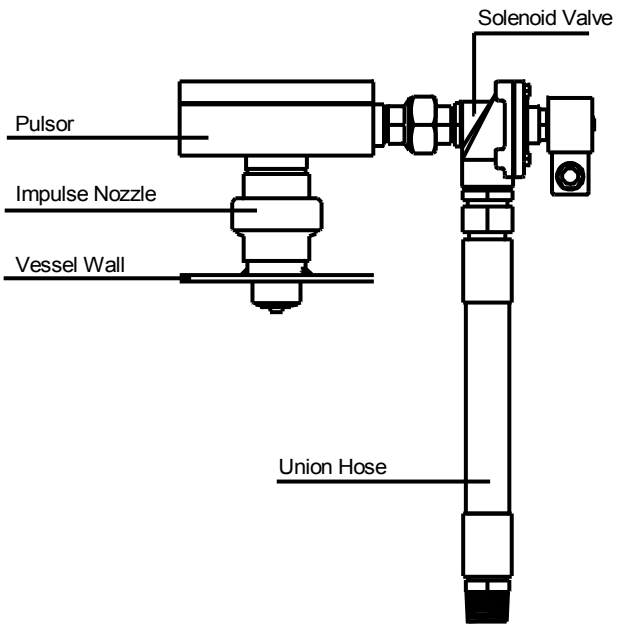
Control

The Pulsors are activated by opening a diaphragm valve connected in series.

The valve is controlled by a clock generator unit which is started simultaneously with the particular discharge device.

In each case the ON-time of the Pulsor is only about0.7 seconds (4-5 powerful compressed air pulses are generated during this period).

The activation is repeated after a pause time varying from a few seconds to minutes, depending on requirements and product properties.



Compressed Air Supply

ALBRECHT Pulsors require dried compressed air with a pressure of 0.6 MPa (~90 psi) (min 0.4 MPa, max 0.8 MPa). The use of an adsorption dryer is highly recommended.

The supply pipes must be of sufficient size; the main supply pipes of at least 1½ “, NW 40 mm and the branch pipes to the single Pulsors of at least 1”, NW 25 mm.

The supply lines must be free of any filters, pressure controllers or other restrictions which may decrease the air throughput.

Operational Monitoring

The ALBRECHT Pulsor‘s operational monitoring system consists of an inductive proximity switch with an internal time delay element which is integrated into the Pulsor cover. This sensor monitors the Pulsor‘s valve plate and furnishes a signal if no movement is detected after activation.

Two types of sensors are available according to whether the sensor is closing or opening the alarming circuit. The sensors are operated by a 3-wire-connection. The power supply required is 24 V DC wired in parallel to the magnetic valve of the corresponding Pulsor.

Sensor type 0221 (output in case of failure):

In case of a failure - when the movement of the Pulsor valve disk is broken down - the output of the sensor unit (plug pin 2) raises after the lapse of a time delay of 0.3 s from 0 V to +24 V.

Connection:
Pin 1: +24 V supply voltage
Pin 3: 0 V ground
Pin 2: Output (+24V in case of failure)

The following cases lead to a failure signal:

a) Pulsor is defective
b) Operation air pressure too low
c) Broken wires or bad connection to the magnetic valve

Sensor type 0517 (output at normal operation):

In case of a failure - when the movement of the Pulsor valve disk is broken down - the output of the sensor unit (plug pin 2) falls after the lapse of a time delay of 0.3 s from +24 V to 0 V.

Connection:
Pin 1: +24 V supply voltage
Pin 3: 0 V ground
Pin 2: Output (+24V at normal operation)

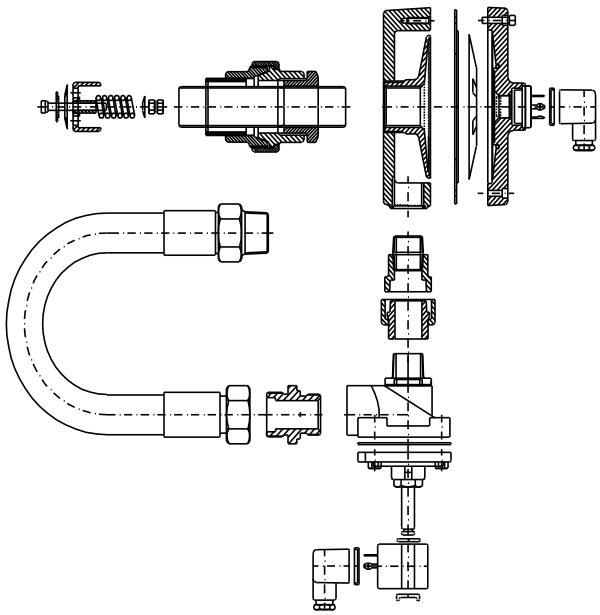
The following cases lead to a failure signal:

a) Pulsor is defective
b) Operation air pressure too low
c) Broken wires or bad connection to the magnetic valve
d) Broken wires or bad connection to the sensor

Construction and Technical Data

ALBRECHT Pulsors are made in Germany to exact standards and only the best materials are employed in the construction process.

Housing body: *cast aluminium*
Nozzle tube: *stainless steel*
Nozzle cap: *hardened stainless steel*



To suit any application there are three unit sizes available:

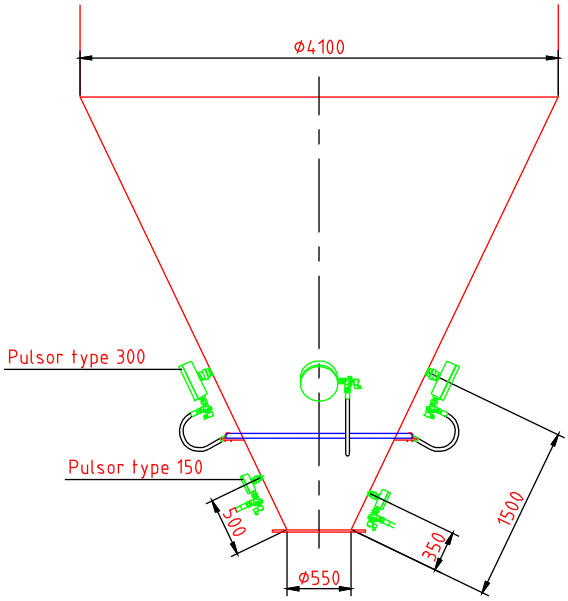
	type 100	**type 150**	**type 300**
Diameter of Pulsor body	110 mm	160 mm	310 mm
Nom. Width of Nozzle tube	DN 20 (R ½")	DN 25 (R 1")	DN 40 (R 1 ½")
Length of Nozzle tube	90-150 mm	130-220 [mm	160-250 mm
Weight (Pulsor+Nozzle)	2 kg	4 kg	20 kg
Air consumption (per pulsing-phase at 6 bar)	30 litre (atm.press.)	75 litre (atm.press.)	150 litre (atm.press.)

Examples of Application

Any application of ALBRECHT Pulsors is well supported by ALBRECHT Engineering office.
A scale true sketch of the bin or funnel in question will be established, showing the arrangement of the Pulsors on the funnel, the Pulsor type (size) and the recommended number of instruments. Also information on the air supply piping requirements and the air consumption is given.

Types of application, in general:

Storage Silos



Application of ALBRECHT-Pulsors on cement silo

When Pulsors are fitted to silos it is important to locate the units in such a way that as large a portion as possible of the hopper content is set in motion during the product discharge. As a rule it is not sufficient to locate just a single unit at the hopper outlet. Usually further Pulsors are needed in the upper part to avoid arching or ratholing in the funnel. This is particularly true for products which tend to consolidate during long storage periods.
To ensure the correct arrangement of the Pulsor units on the hopper a Jenike shear test of the product is recommended. This investigation determines product properties, such as friction coefficients, compressive strength and consolidation due to storage time, which are then used to derive the critical diameters of arches and ratholes.

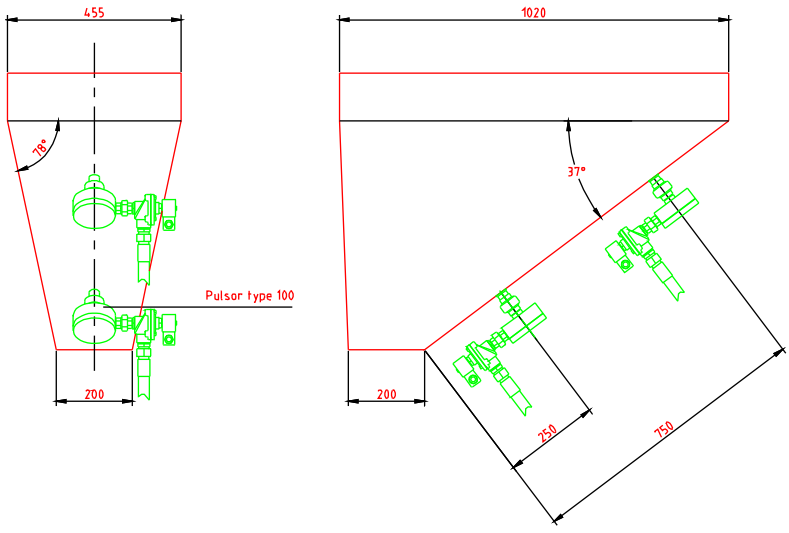
However in many cases we can with adequate accuracy determine the Pulsors' proper location on the basis of years of experience.

Bulk Material is discharged quickly and reliably from silos and bunkers.
The air is distributed homogenously without the formation of air channels.
The material begins to flow immediately without flooding.

Asymmetrical Bin

If Pulsors are installed on walls with a shallow inclination, flow of stubborn material will be activated.

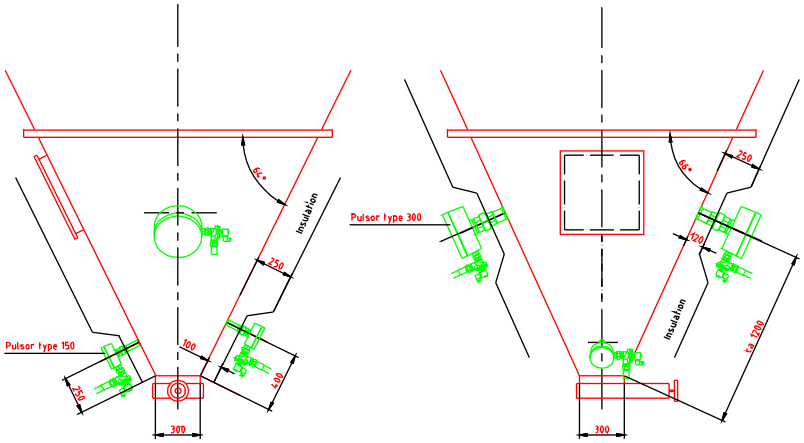
Due to the radial air flow pattern along the bin walls undercutting the material, the friction between the wall and the stored material is reduced considerably and the product set in motion.



Application of ALBRECHT-Pulsors on outlet chute

Fly Ash / Filter Dust Bunker

Hoppers and bunkers as part of dust filters, such as in waste incinerators and power plants, can be affected by condensing moisture. This causes both cohesion of the particles to each other and adhesion of the particles to the hopper walls. In silos on the other hand, product consolidation and build up on the hopper wall is mainly the result of heavy compaction due to large filling loads.



Application of ALBRECHT-Pulsors on filter dust bunker

Layers of dust deposited on the vessel wall will regulary be forced to slide down. Clogging of the outlet will reliably be cleared and avoided.

Bonding forces caused by residual electrostatic charging of the particles, in the case of electrostatic precipitators, can be another reason for such consolidation.

During the course of time, layers of precipitated dust of varying fineness and type, build up on the walls of a filter hopper, especially in corners and areas shielded from the gas flow.

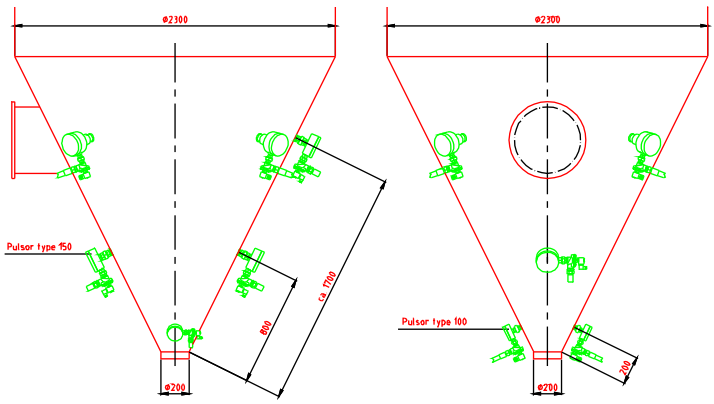
These dust layers consolidate and have a tendency to slide in large slabs from the hopper walls and to obstruct the outlet of the hopper.

This means that repeated flow activation by the Pulsors must be provided not only close to the outlet opening, but also to other critical points in the upper part of the hopper.

Cyclone / Dust Filter Hopper

When Pulsors are fitted to cyclone hoppers they have to be positioned on the vessel close to the impact zone of the particle jet.
With regular operation, Pulsors reliably avoid material adhesion to the walls.

Additional Pulsors installed near the hopper outlet are necessary to avoid obstructions and to ensure a steady discharge.



Application of ALBRECHT-Pulsors on cyclone hopper

References

	Company, location	Plant
POWER STATIONS / WASTE INCINERATION PLANTS	**AVA AUGSBURG GMBH**, D-Augsburg	Electrofilter dust bunker
	FZ KARLSRUHE GMBH, D-Karlsruhe	Filterdust bunker
	GSB-BETRIEB, D-Baar-Ebenhausen	Filterdust bunker
	HEIZKRAFTWERK MERKENICH, D-Köln	Electrofilter dustbunker
	HEIZKRAFTWERK WIEN-WEST, A-Wien	Fly ash silo
	KVA JOSEFSTRASSE, ZÜRICH, CH-Zürich	Electrofilter dustbunker
	MHKW NEUSTADT, D-Neustadt (Holstein)	Filterdust bunker
	MÜLLVERWERTUNG BORSIGSTRASSE, D-Hamburg	Electrofilter dustbunker
	MVA ALKMAAR, NL-Alkmaar	Electrofilter dustbunker
	MVA INGOLSTADT, D-Ingolstadt	Electrofilter dustbunker
	MVA WELS, A-Wels	Electrofilter dustbunker
	PCK RAFFINERIE GMBH, D-Schwedt/Oder	Electrofilter dustbunker
CHEMICAL INDUSTRIES	**BASF PIGMENT GMBH**, D-Köln	several dyestuff silos
	BAYER AG, D-Uerdingen	adipic acid sil
	DEGUSSA-HÜLS AG, D-Kalscheuren	big-bag station for fine carbon black
	ERACHEM EUROPE S.A., B-Tetre	spray dryer for manganese compound
	HENKEL KG A.A., D-Düsseldorf	soda and potash silos
	NIRO A/S, DK-Soeborg	several spray dryers
	PEROXID CHEMIE GMBH, D-Pullach	storage silo
	SIKA TROCAL GMBH, D-Troisdorf	several PVC-powder silos
	SOLVAY BARIUM STRONTIUM GMBH, D-Bad Hönningen	several loading silos
	VINNOLIT KUNSTSTOFF GMBH, D-Köln, D-Burghausen	several PVC-powder silos
	WACKER CHEMIE GMBH, D-Burghausen	several plastic powder silos
BUILDING MATERIALS INDUSTRIES	**BAUSTOFFWERKE BRIESELANG GmbH**, D-Brieselang	several silo plants
	BAUSTOFFWERKE DURMERSHEIM, D-Dresden	several blending silos
	DYCKERHOFF AG, D-Lengerich, D-Göllheim	cement and lime hydrate silos
	E.ON KRAFTWERK HEYDEN, D-Petershagen	lime hydrate silos
	HEIDELBERGER BAUCHEMIE GMBH, D-Datteln	several cement and blending silos
	HEIDELBERGER ZEMENT AG, D-Istein	limestone silo
	KNAUF GIPS KG, D-Hüttenheim, D-Neuss, D-Iphofen	several gypsum and plaster silos
	NOVOZMES A/S, DK-Kalundborg	Gericke loss-in-weight-feeder
	RIGIPS AUSTRIA GESMBH, A-Puchberg	gypsum silos
	VEBA KRAFTWERK SCHOLVEN, D-Gelsenkirchen	lime hydrate silo
COAL SILOS	**DUBAI ALUMINIUM CO. LTD.** über ALESA AG, CH-Zürich	several petrol coke silos
	RKW GMBH & CO. KG, D-Flandersbach	brown coal silo plant age
	RÜDERSDORFER ZEMENT GMBH,	several coal silos and bins
	SACHTLEBEN CHEMIE GMBH, D-Duisburg	brown coal silo plant
	SOLVAY BARIUM STRONTIUM GMBH, D-Bad Hönningen	brown coal silo