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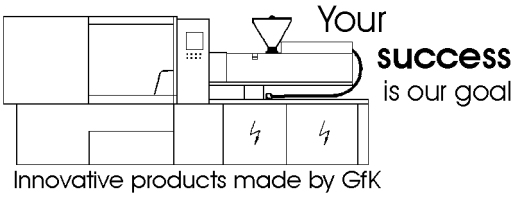


Small dry-air resin dryers (compressed air)

TORO-systems Dry-Jet

with **A**utomatic-**E**nergy-**S**aving-**System**

TORO-systems Dry-Jet
are the high-tech dryers for smaller amounts,
especially for hygroscopic polymers.

- top-mounted or stand-alone dryer

- material bins: 9, 15, 25, 35, 50, 75, 100 and 150 liters content

- 20 mm heat insulation for material bin and heater

- material bin made of stainless steel

- top of material bin thermo-insulated

- Viewing glass

- L-sliding guide for different processing machines (option)

- carriage with suction box (option)

- integrated conveying unit (option)
for automatic machine or dryer supply:
1- component cyclone or
2-component mixing compressed air conveyor

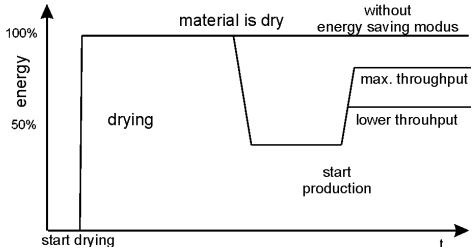
- self-optimizing temperature controller

- long-life heating unit directly mounted at the material bin

- weekly timer (option)

- AES-System (option)
Automatic – Energy – Saving – System
The control unit determines the throughput and automatically reduces energy consumption to the absolute minimum needed for dry material within the processing limits - the self optimizing system guarantees the lowest possible air consumption (fully automatic, no interaction required)

- easiest to use
(only setting the drying temperature is needed)



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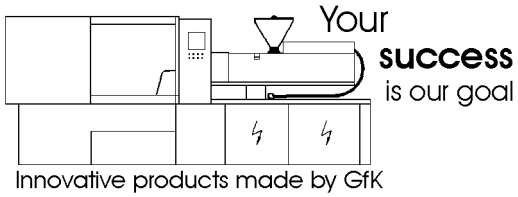

TORO-systems Dry-Jet dryers

Introduction

Hygroscopic resins (such as Nylon, Polycarbonate, PBT) have to be dried thoroughly before processing to avoid defects in molded parts.
The small compressed air dryers **TORO-systems Dry - Jet** are especially developed for **cost efficient and effective resin drying** of smaller amounts.
The TORO-systems Dry - Jet dryers uses compressed air as drying medium. This means the drying efficiency over the time will not decrease as long as standard pre-dried compressed air is provided.
The TORO-systems Dry Jet dryers can be used as top-mounted or stand alone dryers.
The most important advantage of the small amount dryers in combination with a small conveyor is:
Dried resin will stay dry until processing

Compressed air for resin drying

Nowadays, most plastic processing companies are equipped with a refrigerated -dried compressed air supply with pressures between 6 and 10 bar at a pressure dew point of 3°C.
If this compressed air is pressure-relieved to atmospheric pressure, this results in dew points from -20°C to -25°C.
This drying air quality is completely sufficient for up to 99% of jobs for drying thermoplastic materials in order to achieve the necessary residual humidity prior to processing.
Because these dryers are using standard pre-dried compressed air as drying medium the drying efficiency is not lowered by residual monomer or very high drying temperatures (over 120°C). Therefore these dryers are the best and most cost efficient solution for high temperature drying like Polycarbonate or LCP.

The dew point can be lowered down to -60°C if necessary through use of additional devices. This extra devices can be mounted easily to the dryers.

Why is using compressed air for resin drying extremely cost efficient?
They are easier built than desiccant dryers, nearly maintenance free and it is very easy to reduce the air flow and therefore the energy consumption.

The sophisticated TORO-systems Dry Jet dryers measure the exact amount that is necessary to dry the resin. Depending on the throughput, the air flow is reduced by a valve. This results in the lowest possible energy consumption!

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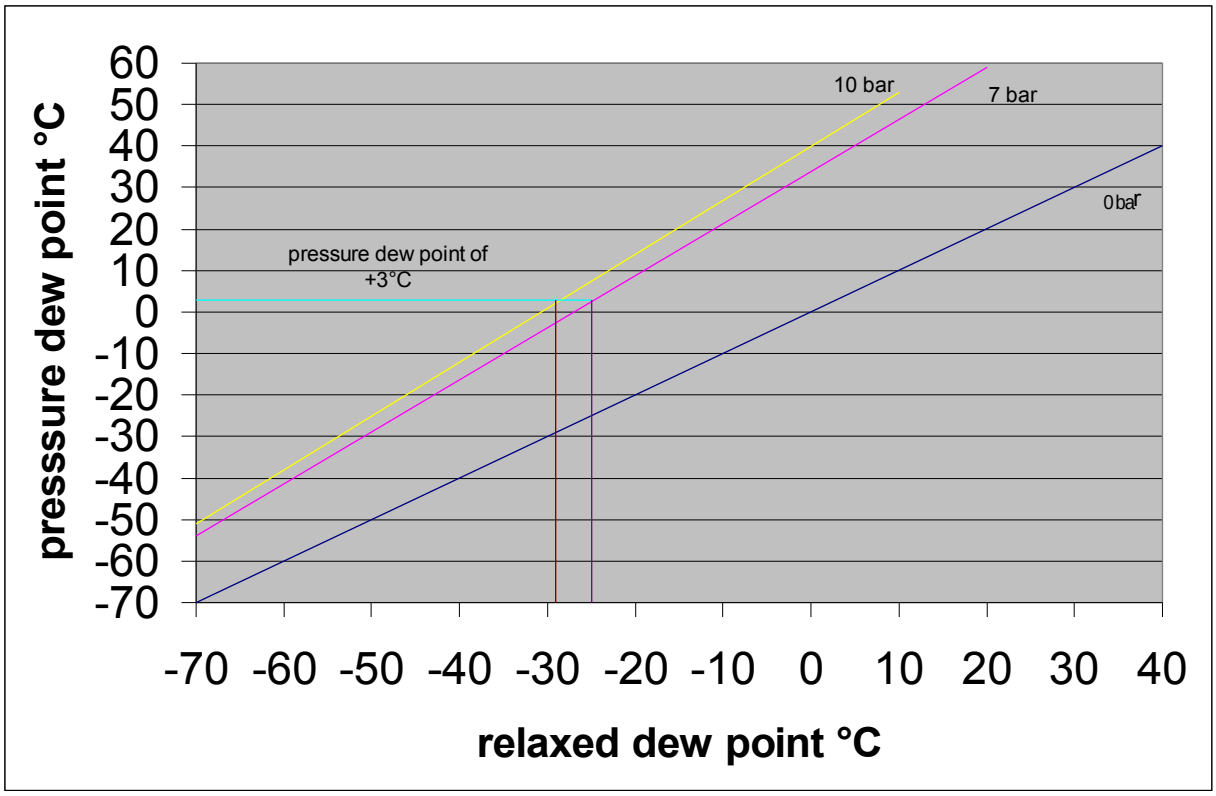

The figure above shows the pressure dew point and the corresponding relaxed dew point.

AES-System: Automatic – Energy – Saving - System

Hygroscopic resins absorb moisture in capillaries formed between their molecular chains and as condensed water at the surface.

Drying a resin can be divided in the following steps:

- the condensed water at the surface will vaporize
- the resin will be heated (lower than the drying temperature)
- the moisture that is absorbed will come to the surface and is vaporized
- the resin will heat up to the set drying temperature

These steps can easily be recognized by the AES-System. When the resin is dried the TORO-systems Dry Jet dryers with AES-System automatically reduce the energy consumption of the dryer to the lowest possible amount.

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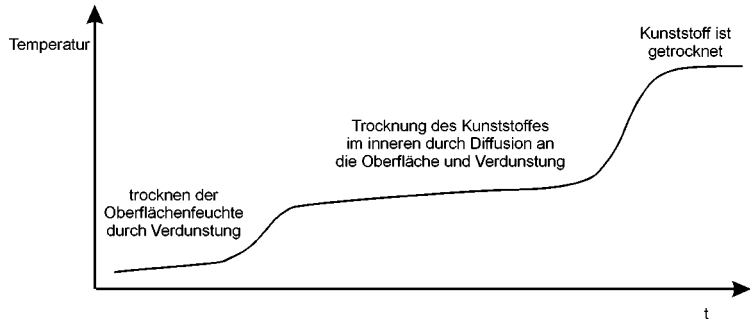
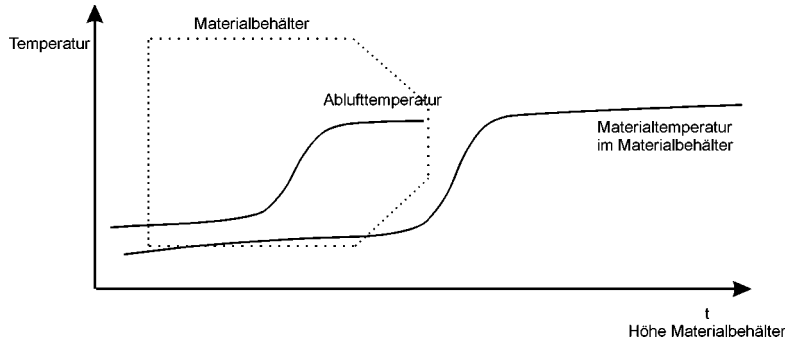
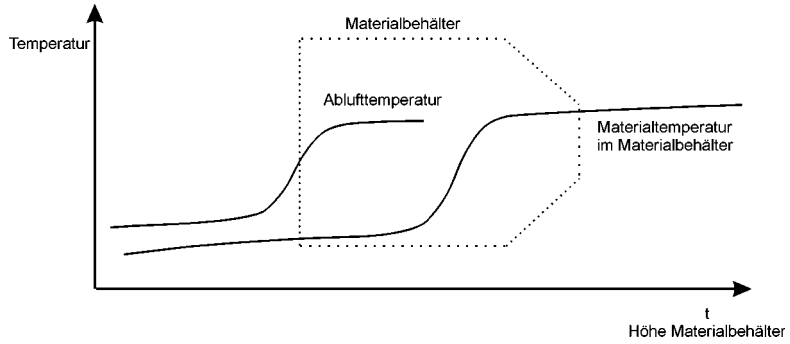
The picture below shows the temperature curve at the air outlet of the material bin in accordance to the drying time (when the material bin is filled up with material at environmental temperature). The first slow increase is for drying the surface humidity and the second holding point is drying the inside of the pellets (this takes a relatively long time). When the polymer is heated and the water vaporized the temperature will increase to nearly below the set temperature.



Temperature inside a material bin after starting
(Ablufttemperatur = temperature at air outlet / Materialtemperatur = temperature of polymer)



Temperature inside a material bin at operating point (AES-System)



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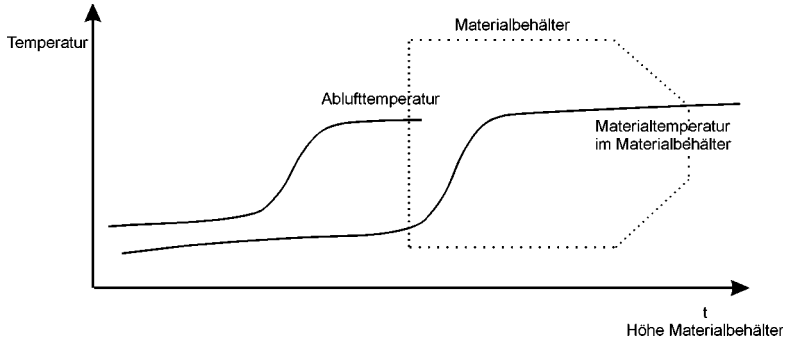
Temperature inside a material bin without AES-System
(the system is over dried and a lot of energy is wasted)



The AES-System can also determine the throughput and the content of moisture of the drying resin and change the air flow according to your production.

The best thing for you is, the operator has nothing more to do, as to set the drying temperature. Everything else is done by the AES-System.

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Function

After switching on the dryer the air valve opens the air flow.
To reduce possible effects due to pressure variation there is an internal pressure reduction unit set to 4,5 bar.
Every TORO-systems Dry Jet dryer has a pressure switch to shut down the heating elements in the case of pressure fall down.
To regulate the air flow there is a regulation valve used that is driven by a step motor.

With this system it is possible to regulate the air flow (energy consumption) absolute exactly to reach the lowest possible value.

The air flow is then heated to the set temperature by heating elements and goes through the material bin.

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EASY control system

The EASY control system has a manual regulation valve for the air flow. With this regulation valve the air flow through the material bin can be varied according to the material and throughput.

The EASY control system is also suitable for batch drying (no automatic reduction of the air flow) or drying of small samples (lower cost).

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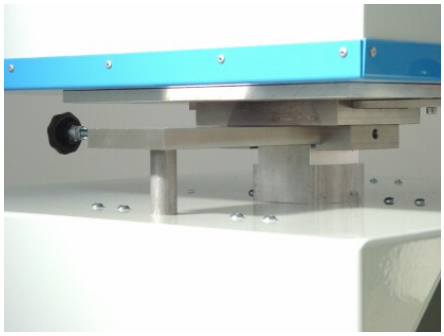
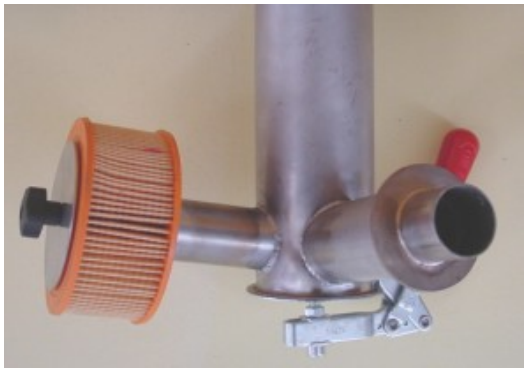
TORO-systems Dry Jet 35 with carriage and integrated compressed air material conveyor for automatic machine supply

TORO-systems Dry Jet 150 with carriage and suction box



L-sliding guide
different sizes for installation on different machines



suction box with filter

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Technical data: TORO-systems Dry-Jet						
Model	**Dry-Jet 9**	**Dry-Jet 15**	**Dry-Jet 25**	**Dry-Jet 35**	**Dry-Jet 50**	**Dry-Jet 150**
Description	**High tech dryer for polymer resin**					
DIS-System	**drying-parameter-identification-system** (automatic detection of the drying resin by the control unit and using the necessary drying parameters without any interference by the operator)					
Energy saving potential by AES	**60%**					
Material bin	9 Litre	15 Litre	25 Litre	35 Litre	50 Litre	150 Litre
Max. air flow	4 m³ / h	6 m³ / h	10 m³ / h	14 m³ / h	20 m³ / h	50 m³/h
Dew point	normally –20 to -25°C (refrigeration-dried compressed air supply) with additional devices down to – 60°C					
Drying capacity (PC: 120°C, 2 h)	up to 2,7 kg/h	up to 4,6 kg/h	up to 7,7 kg/h	up to 10,8 kg/h	up to 15,4 kg/h	up to 38,5 kg/h
Drying temperature	max. 180 °C					
Heating power	0,75 kW		1,5 kW			3,0 kW
Installed power	0,75 kW		1,5 kW			3,0 kW
Air supply	> 6 bar					
Height H mm	620	650	650	780	950	1300
Width W/W1WB2 mm	350/110/110	400/130/130	450/160/160	450/160/160	500/180/180	500
Depth D/D1/D2 mm	350/130/220	400/130/240	450/160/270	450/160/270	500/180/290	600
Equipment	Top-mounted compact dryer Stainless steel material bin Automatic-Energy-Saving-System (AES-System) preventing from “over” drying (air flow is automatically reduced) Drying-Parameter-Identification-System (DIS-System) alarm function signal process heating element mounted to material bin					
Option	- 2nd set temperature for reducing the drying temperature when the processing machine is not working (failure) failure detection: integrated hopper loader is not conveying material within a defined time (set at the control unit) - carriage with suction box - different sliding guides - weekly timer - portion drying - top-mounted dryer as extension for central drying and conveying system loader for dryer or processing machine: - 1-component compressed air conveying unit - 2-component mixing compressed air conveying unit					

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Technical data: TORO-systems Dry-Jet EASY						
Model	**Dry-Jet EASY 9**	**Dry-Jet EASY 15**	**Dry-Jet EASY 25**	**Dry-Jet EASY 35**	**Dry-Jet EASY 50**	**Dry-Jet EASY150**
Description	**Low cost dryer for polymer resin**					
Air flow regulation	**manual regulation valve**					
Material bin	9 Litre	15 Litre	25 Litre	35 Litre	50 Litre	150 Litre
Max. air flow	4 m³ / h	6 m³ / h	10 m³ / h	14 m³ / h	20 m³ / h	50 m³/h
Dew point	normally –20 to -25°C (refrigeration-dried compressed air supply) with additional devices down to – 60°C					
Drying capacity (PC: 120°C, 2 h)	up to 2,7 kg/h	up to 4,6 kg/h	up to 7,7 kg/h	up to 10,8 kg/h	up to 15,4 kg/h	up to 38,5 kg/h
Drying temperature	max. 180 °C					
Heating power	0,75 kW		1,5 kW			3,0 kW
Installed power	0,75 kW		1,5 kW			3,0 kW
Air supply	> 6 bar					
Height H mm	620	650	650	780	950	1300
Width W/W1WB2 mm	350/110/110	400/130/130	450/160/160	450/160/160	500/180/180	500
Depth D/D1/D2 mm	350/130/220	400/130/240	450/160/270	450/160/270	500/180/290	600
Equipment	Top-mounted compact dryer Stainless steel material bin manual air flow regulation valve alarm function signal process heating element mounted to material bin					
Option	- carriage with suction box - different sliding guides - weekly timer loader for the dryer: - 1-component compressed air conveying unit - 2-component mixing compressed air conveying unit					

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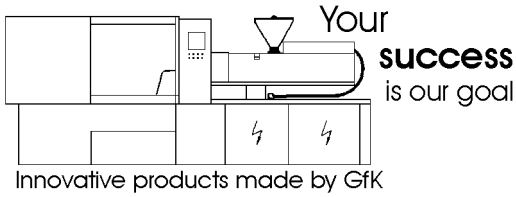

TORO-systems Dry-Jet
material throughput (kg/h)

Type Material (drying-temperature / time / air)	Dry-Jet 9	Dry-Jet 15	Dry-Jet 25	Dry-Jet 35	Dry-Jet 50	Dry-Jet 150
max. compressed air consumption m³/h	4	6	10	14	20	50
ABS (80°C, 2h, 1,7)	2,1	3,6	5,9	8,3	11,8	29,4
PA 12 (80°C, 4h, 2,5)	1,4	2,4	4	5,8	8	20
PA 6 (80°C, 4h, 2,2)	1,5	2,5	4,1	5,7	8,2	24,4
PA 6.6 (80°C, 4h, 2,2)	1,5	2,5	4,1	5,7	8,2	24,4
PC (120°C, 2h, 1,3)	2,7	4,6	7,7	10,8	15,4	38,5
PE [1] (90°C, 1h, 1,2)	3	5	8,4	11,7	16,7	41,7
PET (120°C, 4h, 1,7)	1,9	3,2	5,3	7,4	10,6	32
PETG (70°C, 4h, 2,0)	1,9	3,2	5,3	7,4	10,6	32
PBT (120°C, 4h, 1,7)	1,5	2,6	4,4	6,2	8,8	26,3
PI (120°C, 3h, 1,3)	1,8	3	5	7	10	30
PMMA (80°C,3h, 2,0)	1,8	3	5	7	10	25
POM (80°C, 3h,1,7)	1,8	3	5	7	10	30
PP [1] (90°C, 1h, 1,2)	3	5	8,4	11,7	16,7	41,7
PPO (80°C. 2h, 1,5)	2,2	3.8	6,3	8,8	12,5	33,5
PS [1] (80°C, 1h, 1,0)	3,6	6	10	14	20	50
PUR (90°C, 3h, 2,0)	1,8	3	5	7,5	10	25
SAN (80°C, 2h, 1,5)	2,2	3,8	6,3	8,8	12,5	34

[1]**dryer capacity for surface moisture only**

Material throughputs are depending from:

- **initial moisture**
- **drying time**
- **additives (glass fibers)**

For your specific material the suppliers recommendation are obligatory.

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