



**Twister** | Laser Diffraction Particle  
Measurement | Laboratory  
Size and distribution | 0,25  $\mu\text{m}$  to 3,500  $\mu\text{m}$

# Particle Measurement

## Dynamic sampling for representative real-time analyses in production

»Representative sampling faces a particular challenge wherever inhomogeneous, widely distributed bulk solids are transported pneumatically or in free-fall through pipes. Depending on the type and distribution characteristics of the product, the orientation of the pipe and the local flow conditions, which are often unknown or may vary, segregation of the size fractions is to be expected across the pipe cross-section. Accordingly, representative sampling in a pipe assumes that all of the areas of the pipe cross-section are sampled with equal weighting. «

Dynamic sampling with **TWISTER** achieves this equal weighting by scanning the entire pipe cross-section on a spiral path with a constant speed. The sample collected in the process is representative of the entire product stream and is continuously fed to the measurement system for analysis. In combination with the laser diffraction system **MYTOS** or the image analysis system **PICTOS** and the integrated **RODOS** dry dispersion, a fine-tuned system with sampling, dispersion and sensing is formed. It provides real-time determination of meaningful and reliable information about the actual characteristics of particle size or shape in the process.

The principle of dynamic sampling is the same for all TWISTER models. When a signal is received from the analysis system, the probe tip traverses the entire pipe cross-section on a spiral path with a constant speed in order to achieve equally weighted sampling. The TWISTER scan starts from a protected parking position and moves across the cross-section in the spiral pattern around the center of the pipe, passes through the center axis and runs back to the parking position.

During the travel of the TWISTER probe, the vacuum in the connected analysis system ensures that a subsample is continuously extracted taking into account isokinetic conditions. The removed sample material is fed to the dispersion and analysis and measured in real-time. Dynamic sampling and representative analysis take between 10 and 40 seconds depending on the speed profile and the pipe diameter. Depending on the material, a sample weighing between 0.3 g and 30 g is used. In order to adjust the sampling to the product and to the process conditions, calibers from 4 mm to 10 mm are available for the sampling tip and for the dispersing line.



## Characteristics:

- Reproducible sampling in the process line
- For measurements under process-related conditions in a by-pass line (on-line with MYTOS or PICTOS) or directly in the process pipe (in-line with MYTOS)
- For dry and also cohesive powders, fibers and granules ranging from 0.25  $\mu\text{m}$  to 3.500  $\mu\text{m}$
- For pipe diameters from 38 mm to 800 mm with mass flow rates from 1 kg/h to over 100 t/h
- Suitable for product temperatures from -20°C to 150°C
- Operation at ambient temperatures from -35°C to 55°C
- Process pressure 0.8 to 1.1 (1.5) bar absolute (in-line) | Pressure surges (<1 s) up to 10 bar
- ATEX and GMP options



# Installation and options for TWISTER

The entire sampling mechanism for representative sampling with TWISTER is installed in a stainless steel pipe, which is integrated via flange connections in the process line that bears the product. The length of the pipe section required for installation of the TWISTER system depends on the diameter (nominal width) of the existing process line. The compact TWISTER 50 is typically used in smaller-scale production (e.g. in a kilo laboratory for integration in the air jet milling process) with pipe diameters of DN40 and DN50 and requires a pipe length of less than 600 mm. It is connected here via Tri Clamp connections (DIN 32676). The TWISTER 100 to 250 models cover a wide range of applications with average pipe diameters from DN80 to DN250 in the field of large-scale grinding, granulation and separation processes. The installation dimensions in the product-bearing line are still relatively compact here with a maximum pipe length of 1,000 mm. Pipe cross-sections from DN300 with corresponding, high mass flow rates can be matched with adaptable TWISTER models with larger dimensions.

TYPE	FOR PIPE DIAMETER	PIPE LENGTH	STANDARD CONNECTION	GMP	ATEX	IN-LINE	WEAR PROTECTION
TWISTER 50	DN50/DN40 red	458 mm / 591 mm	Tri Clamp	O	O		
TWISTER 100	DN100 / DN 80 red	689 mm / 899 mm	Flange PN10	O	O	w/ MYTOS	O
TWISTER 150	DN150	784 mm	Flange PN10	O	O	w/ MYTOS	O
TWISTER 200	DN200	875 mm	Flange PN10	O	O	w/ MYTOS	O
TWISTER 250	DN250	1000 mm	Flange PN10	O	O		
TWISTER 300+	DN300...800	1421...2800 mm	Flange PN10		O		

**O = optional**



# TWISTER 50



TWISTER 50 with expansion and Tri Clamp connections (DIN 32676) | Suitable for process lines from 38 mm (DN40) to 50 mm (DN50) | ATEX and GMP versions optionally available



# TWISTER 150



TWISTER 150 with expansion and attached reduction with sample ejector for on-line measurements | Suitable for process lines with a diameter of 150 mm (DN150) and for combination with in-line-MYTOS | ATEX and GMP versions optionally available



# TWISTER 150



TWISTER 200 with sample outlet for on-line measurement | Suitable for process lines with a diameter of 200 mm (DN200) and for combination with in-line MYTOS | ATEX and GMP versions optionally available



# TWISTER 150



TWISTER 300+ for on-line measurement | Suitable for process lines from 300 mm (DN300) to over 800 mm (DN800) | ATEX version optionally available



**TWISTER 100 | 150 | 200** models are optionally available with increased wear protection and – in combination with the **MYTOS** laser diffraction system – also as a fully integrated in-line system. The product-conveying line within the sampling mechanism is equipped with a continuous tube and is designed for product temperatures ranging from -20°C to 150°C. The sampling system operates at absolute process pressures between 0.8 bar and 1.1 bar (on-line | ATEX) or 1.5 bar (in-line) and can withstand pressure surges of up to 10 bar. In order to ensure consistent flow conditions, in some **TWISTER** models the pipe cross-section is expanded in the region of the sampling mechanism. The mechanical system of the **TWISTER** is fully encapsulated against the product stream, so no particles can come into contact with moving parts or seals. In the parking position, the sampler is sealed against the product flow and prevents uncontrolled particle ingress into the measurement system. To clean the sampler and the dispersing line during operation, an integrated blow-back device can be used optionally after every measurement. On request, all **TWISTER** systems can also be designed for potentially explosive gas, dust or hybrid environments (ATEX) – up to DN250 also as GMP-compliant versions.

The performance characteristics of the dynamic and representative sampling system in conjunction with the broad range of pipe diameters, ATEX and GMP options make **TWISTER** a versatile sampling system that can be used for both small and large-scale production.

**Customization to the specific process environment and to the products that are to be measured is achieved in close cooperation with your process engineers and our experienced engineering team. We are happy to offer special designs for other pipe diameters, different flange connections according to international standards or customer-specific requirements on request.**

