

Rado/Taso Data Sheet



Unit operations for solids processing involves the ability to effectively process and measure a variety of stream types. For example, granulation often results in a dense and "sticky" particle stream and spray drying results in a disperse and dry particle stream. The ability to measure these solids inline with PAT inform on critical quality attributes of particle size, moisture content, and crystallinity in real time. These PAT data are the foundation for advanced manufacturing approaches such as risk-based process development, advanced process control, digital twins, and real-time release. Based on our years of experience in pharmaceutical solids manufacturing, we have developed novel process-to-PAT interfaces to ensure robust PAT in solids and enable advanced manufacturing approaches.

Rado™:



Granulation is a mixing technique for solids. Wet granulation uses a liquid binder and agitation to form a conglomerate particle called a granule. Dry granulation uses mechanical means to form a granule.

PAT probes are often installed inside powder and granule dryers and granulators for real-time moisture and particle size prediction. However, these granules can accumulate on the window of a PAT probe because of its moist or adhesive properties. The accumulated materials on a PAT window has a serious consequence of the PAT only measuring the accumulated material rather than the granules in flow. This biases the PAT measurement and can eventually lead to inaccurate modelling of critical quality attributes.

The Rado™ is an inline process-to-PAT interface that uses a mechanical wiper to continually clean the PAT probe window. It is a proven approach to significantly reduce probe fouling. A heating element option is also available to further improve wiping performance by elevating the probe window temperature slightly above the process temperature. This approach has advantages over compressed air streams because it does not require a new utility line, does not introduce a new substance into the process, and can be automated for hands-free operation.

Taso™:



Disperse streams are commonly found in milling and spray drying operations.

Spray drying uses hot gas to create a fine powder from a liquid or slurry, and it is an important unit operation in the manufacture of pharmaceutical solids and foods. Milling uses a variety of mechanical operations to achieve the target particle size and morphology. A suboptimal spray drying or milling operation wastes utilities costs, affects a product's critical quality attributes, and impacts the product's ability to be processed in downstream operations such as blending. PAT approaches are commonly proposed to provide automated quality control on critical quality attributes of particle size and moisture content.

The disperse amount of these powders that come out of these processes is a challenge for spectroscopic PAT systems because these unit operations require a fast measurement time in a vanishingly amount of sample. Spectroscopic PAT probes such as Near Infrared Spectroscopy (NIR) installed at the outputs of mills and dryers are often unable to capture data of sufficient quality to allow accurate particle size and moisture prediction due to the disperse nature of the granule and powder streams at these points in the process.

We developed the Taso™ process-to-PAT interface to address this challenge. The Taso™ is an inline probe interfaces that uses a "spoon" to collect this dispersed sample stream in front of the probe window until a dense sample bed has been built up to allow a high quality PAT measurement. The "spoon" then flips to return the sample to the process and starts collecting again. Similar to the Rado™, it also performs mechanical wiping to reduce probe fouling (available with an optional heater element).

Rado/Taso Key Features

- ▶ Single robust interface with probe.
- ▶ Process interface via standard DNA flange.
- ▶ Allows inline access to the process stream for Spectral Analysis.
- ▶ Quick release coupling for air supply.
- ▶ Control can be run standalone with periodic wiping or plant control

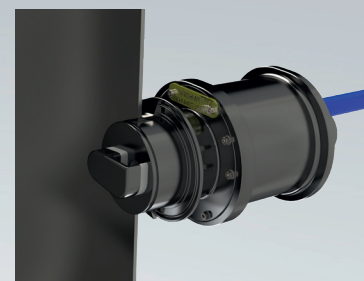


Figure 1: Concept of Taso installed in a vessel wall

Technical Specifications

Specifications	Device (Rado/Taso)	Control Panel
Dimensions (LxWxH)	199x105x115mm (envelope, without probe)	459x200x350mm
Mass	4kg	11kg
Environmental temperature limits	10°C - 40°C	
External & Internal working atmosphere	Standard atmospheric conditions	
Supply voltage & frequency	110 – 240 VAC, 50-60 Hz	
External Control/Communication		MODBUS TCP/IP
Cable between device & control panel	10 meters, hard-wired	
IP Rating	IP65	None
ATEX Certification	Unheated: ATEX Zone 20 Internal Heated: ATEX Zone 21 Internal All: ATEX Zone 22 External	Safe Area
Pressure rating	10 Barg	
Process vessel connection	DN65 Tri Clamp hygienic connector	
PAT Probe diameter suitability	¾" / 19.05 mm outer diameter as standard (Smaller sizes available upon request)	
Minimum probe length	200mm	
Actuation frequency of spoon/wiper	1 to 20 seconds	
Heater available	Optional (will heat probe window up to 80°C)	
Actuation mechanism	Pneumatic Motor (5.5-7 Barg)	
Pneumatic connections	4mm OD push-in fittings	
Torque Limit	0.45Nm	
Soft product contact components	Food-grade seals with FDA certificates	
Hard product contact components	316L Stainless Steel with FDA certificates UHMWPE with product contact certificates	
Hard material finish	0.5Ra product contact faces 0.8Ra non product contact surfaces	



Figure 2: Control Unit



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