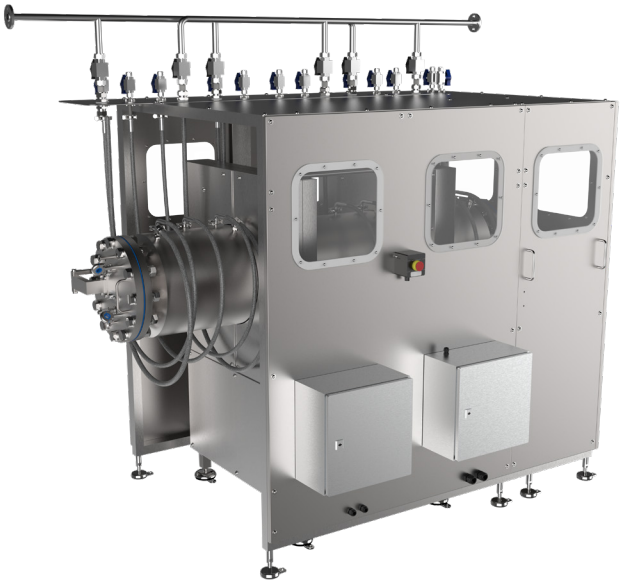
Coflore® RTR - Rotating Tube Reactor

Production Scale Flow Reactor

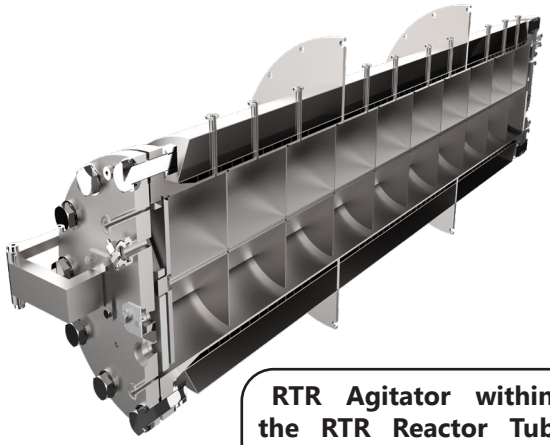


The **Coflore® RTR (Rotating Tube Reactor)** operates as a ten-stage, actively-mixed continuous flow reactor with a 100 L capacity that is capable of processing theoretically limitless reactor volumes without interruption. The Coflore RTR enables the versatility, productivity and scalability of batch manufacturing combined with the efficiencies of flow, within a single flow reactor.

Our Coflore® range of flow reactors based on our patented mixing technology, which eliminates the need for drive shafts and rotary seals for improved ease of use & cleaning are actively mixed and multi-stage. Compatible with all types of reaction media, including liquid, liquid-liquid, solid-liquid, liquid-gas, and solid-liquid-gas, capable of producing thousands of tonnes of material per year from a single Coflore® flow reactor.

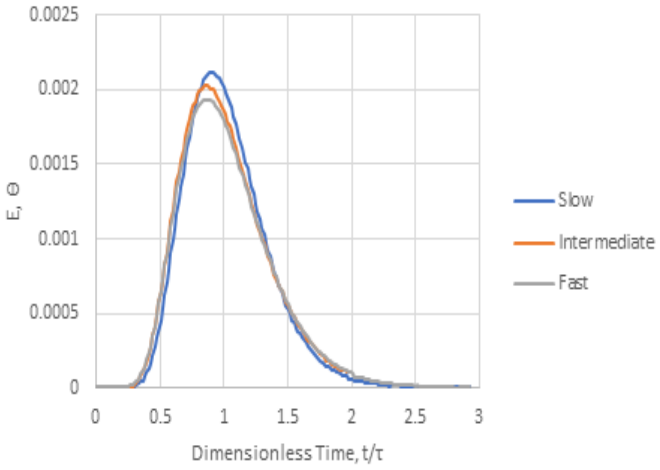
The **RTR Enclosure** creates a physical barrier between the process operation and the operator, and houses a multitude of services. The enclosure is designed with viewing apertures on all panel sections, with removable end sections for easy access to the **Reactor Assembly** for routine strip down, maintenance, and inspections.

The **RTR Reactor Tube** houses the **Agitator Assembly**. The **Agitator** is free to rotate inside the tube, and is supported at either end by **Agitator Supports**. The **Radial Baffles** on the **Agitator** split the **RTR Reactor Tube** into ten stages for efficient plug flow performance. The ten process connections along the side of the RTR Reactor tube align with each stage.



RTR Agitator within the RTR Reactor Tube Assembly (cut away)

RTR Agitator Assembly



For a 5-minute residence time, the RTR can produce 1,200 L continuously per hour, or 28,800 L continuously per day. Such throughputs have the potential to produce many thousands of tonnes of material per year from a single RTR reactor.

An easy route from laboratory optimisation and feasibility to production has been established in conjunction with the lab and pilot scale Coflore ACR and ATR flow reactors.

The Coflore® flow reactor range: the **Realistic Alternative** to Batch Chemical Manufacturing

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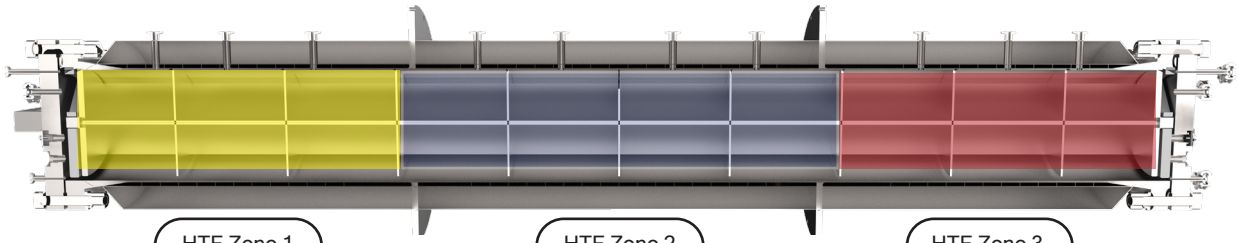
The **Coflore RTR** is operated via a separate control panel, connected to the **RTR Enclosure** via control cables. The control panel incorporates a PLC with 5.5" touch-screen HMI for operator interface. Local monitoring of the RTR can be performed via an optional **ATEX touch-screen HMI** located in the ATEX area. The optional **ATEX HMI** located within the hazardous area mirrors the user screen of the control panel HMI.

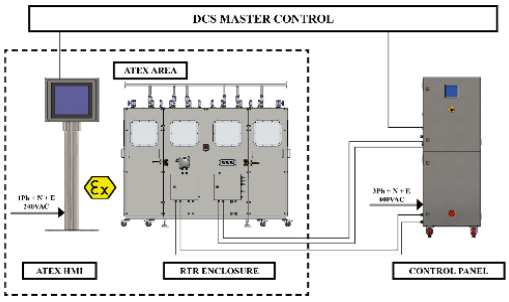
The **Heat Transfer System** is split into three zones, covering stages 1 to 3, 4 to 7 and 8 to 10, with each zone containing an HTF jacket with a spiral baffle insulated and clad in stainless steel. Suitable thermal fluid J/Q dowtherm or equivalent thermal fluid should be used for heating or cooling the reactor to achieve internal operating temperatures of between **-40 °C** to **+150 °C**.



RTR Agitator within the RTR Reactor Tube (cut away)

RTR Reactor Tube Specifications:	
Mass (Empty)	700 kg
Operating Temperature Range (in °C)	-40 °C to +150 °C
Operating Air Pressure Range (in Bar (g)	0 to 10 Bar (g)
Power Supply	3ph +N+E 400 VAC 50 Hz 10 A
Motor Power	2.2 kW (ATEX)
RTR Enclosure Dimensions:	
Width	2240 mm
Depth	1200 mm
Height	2000 mm
RTR 100L Reactor Tube Dimensions:	
Inside Diameter	264.7 mm
Tube Length (Internal)	1800 mm
Volume (without agitator (in Litres)	100 L
Volume (with agitator (in Litres)	97.7 L
Agitator Volume (in Litres)	2.3 L
RTR 100L HTF Jacket Dimensions:	
HTF Zone 1 Jacket Volume	3.5 L
HTF Zone 1 Jacket Volume (incl. HTF manifold hoses)	4.4 L
HTF Zone 2 Jacket Volume	5 L
HTF Zone 2 Jacket Volume (incl. HTF manifold hoses)	5.9 L
HTF Zone 3 Jacket Volume	3.5 L
HTF Zone 3 Jacket Volume (incl. HTF manifold hoses)	4.4 L
Total HTF Jacket Volume	12 L

Coflore RTR Reactor and Enclosure



Coflore RTR Control System Overview

	Reactor throughput (L/day)						
	Reaction time	1m	5m	30m	1h	2h	5h
Reactor Volume	50 L	72000	14400	2400	1200	600	240
	100 L	144000	28800	4800	2400	1200	480