



SINGLE Alternating Temperature Technology

ATT series

SINGLE ATT 'Alternating Temperature Technology' is an individually configured system solution for liquid-operated variotherm temperature control of injection molds, compression molds and other mold types. As the active system fills molds alternately with warm and cold thermal fluids, it can actively heat or cool processes in defined alternation.

Variotherm temperature control used in combination with suitable mold inserts allows variations in temperature of more than 100 °C in critical areas or in complete molds. In order to achieve this, the SINGLE ATT system operates with two separate circuits that contain thermal fluid with a different temperature.

Both ATT circuits contain the same fluid. Water is recommended for temperatures of up to 200 °C, while oil is suitable for very rare applications that operate with temperatures of up to 300 °C. The system is equipped with an external valve station for switching the two circuits from bypass mode to mold temperature control mode.

Signals for the switch-over from cooling to heating are transmitted by the machine control via programmed I/Os according to process requirements.



ATT alternating temperature system with valve station

Areas of application

- Injection molding of thermoplastics
- Production of components made from fiber-reinforced composites
- Other cyclic processes with temperature profile

Standard equipment

General

- Temperature control system with one heating and one cooling circuit and circuit switch
- Fast alternation between heating and cooling circuit thanks to hydraulic switching
- Energy-saving temperature-controlled feeding of return fluid into the corresponding circuit
- Easy operation with mobile operation option
- Connection to standard molds
- Rugged, powder-coated steel sheet housing

Hydraulics

- High-quality materials and reliable components
- Wear-free flow metering and flow monitoring
- Hose connection between system and valve station

Electric and control equipment

- Programmable logic controller with touch screen
- Heating control by solid state relay with fail-safe pilot contractor
- Electronic safety temperature cut out
- Switch box to IP54

Options

- Remote control via remote touch screen or via Ethernet-based PC
- Connection for 20-mA current loop (TTY)
- Hose connections between valve station and mold



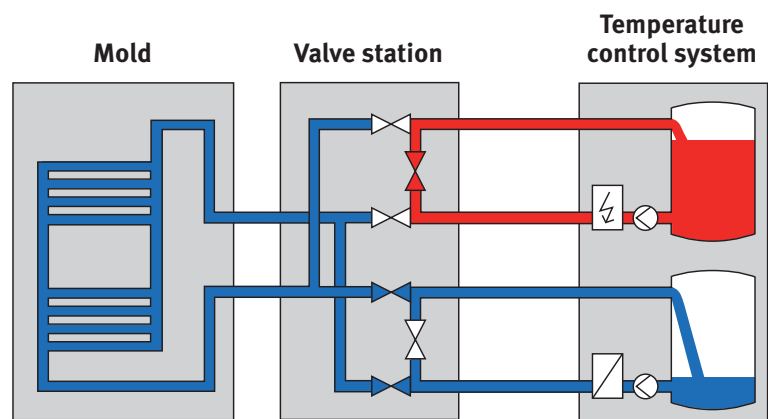
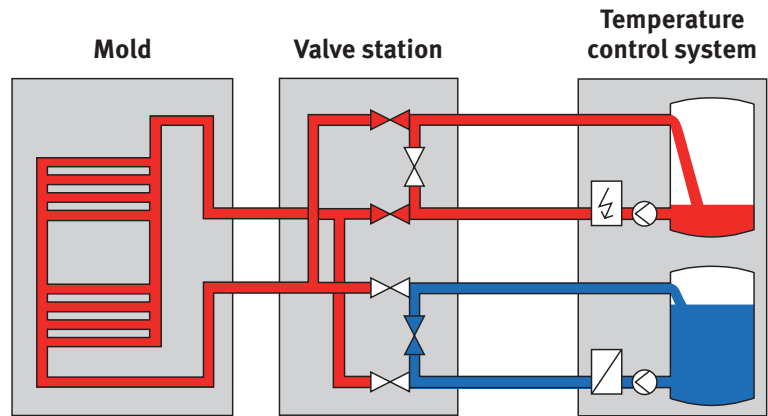
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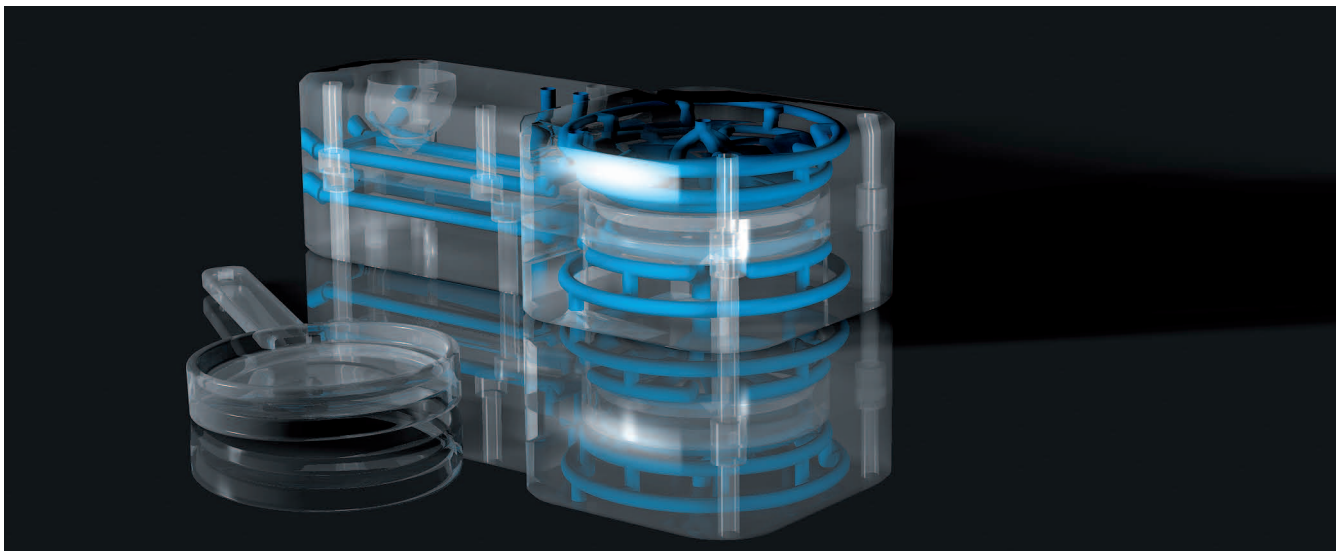
Mold design is a significant factor that affects the efficiency of variotherm temperature control. In order to promote fast temperature changes, molds are recommended to combine an effective thermal conductivity with low weight and a good heat transfer to the cavity.

Therefore, ATT is ideally used in combination with mold inserts with contour-aligned heating/cooling channels. These inserts or components can be produced by generative methods using layer-by-layer construction from steel powder from data supplied by a 3D-CAD volume model.

This way, even cooling inserts with highly complex geometries can be produced quickly, cost-efficiently and with high accuracy.



Schematic diagram: Warm fluid heats the mold during the filling phase while cold fluid cools it during the cooling phase



Mold insert with contour-aligned channel (Factory photo by Sauer & Sohn KG, Dieburg/Germany)



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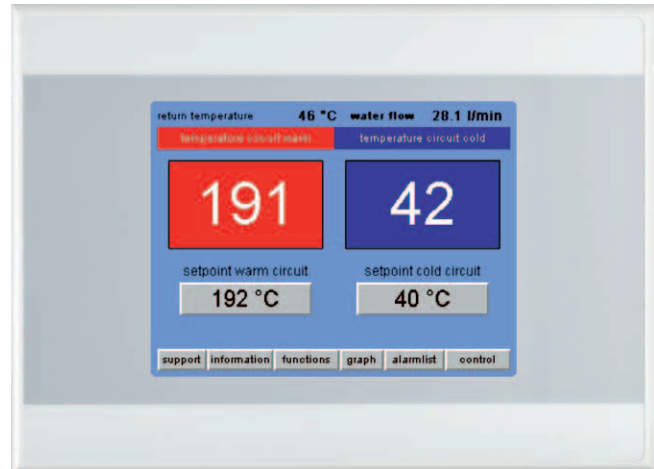
Benefits of ATT for injection molding processes

Variotherm mold temperature control has a variety of benefits that positively affect processes, part surfaces, part strength and the cost-efficiency of production processes. ATT

- prolongs the holding pressure even in areas that are away from the gate and helps reduce injection pressure and clamping force,
- decreases internal stress during compression molding of thick-wall optical components,
- enhances surface properties such as self-cleaning or antireflection coating, the reproduction of microstructures and nanostructures as well as the production of particularly smooth and high-grade glossy surfaces with piano effect,
- introduces a better homogeneity of glass fibers in technical parts,
- increases the welding time for melt fronts and prevents weld lines,
- reduces the risk of warpage caused by shrinkage and improves the dimensional stability and consistency of injection molded parts and
- cuts cycle times thanks to longer wall contact of melt agglomerations with the result of an intensified cooling action.

Benefits of ATT for processing fiber-reinforced composites

Variotherm mold temperature control also has a variety of benefits that positively affect the process, part stability, surface quality and cost-efficiency of thermoset processing and composite structure production. It cuts cycle times by optimizing the process stages thanks to faster curing and subsequent cooling.



In-service operation of an ATT touch panel



ATT system of the K series for small to medium-sized applications



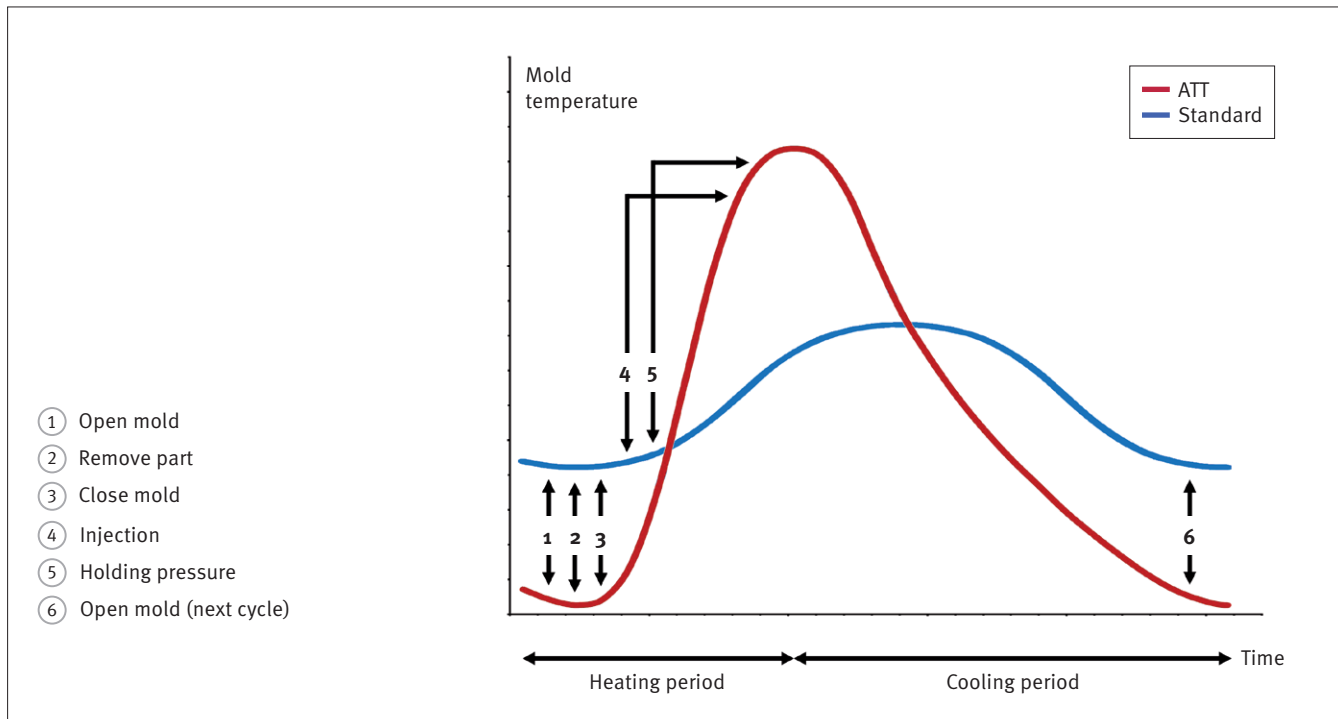
Compact valve station for contour aligned installation



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Structural units		K		N1		S		SG		G		G2/65	H0.2	H2	H3	H4	
Max. temperature range	°C	150	160	150	180	150	180	150	180	150	180	150.18	200	200	200	200	
Max. external volume	l	2	1.5	4	3	10	7	15	12	20	14	30	4	10	20	30	
Heating capacity heating circuit	kW	12.18		24.36		36.48		72		96.120		120.144	24.36	48.72	96.120	120.144	
Cooling capacity cooling circuit <i>80°C flow 15°C cooling water</i>	kW	50		50		100		120		150		200	50	100	150	200	
Maximum flow rate	l/min	60		75		150		240		400		650	60	200	300	870	
Maximum outlet pressure <i>Characteristic maximum values</i>	bar	6		7.3		7.5		6.2		7.1		7.7	6	8	4.7	4.2	
Pump capacity	kW	1		1.1		2.2		2.2		4		7.5	1	4	4	7.5	
Valve station supply		AD 18-L		AD 22-L		G 1 1/2" _DN 32		G 1 1/2" _DN 40		G 2" _DN 50		DN 65	AD 22-L	DN 32	DN 40	DN 65	
Valve station outlets		G 1/2"		G 3/4"		G 1 1/4" _DN 32		G 1 1/2" _DN 40		G 2" _DN 50		DN 65	G 3/4"	DN 32	DN 40	DN 65	
Cooling water supply		14 mm		21 mm		G 1"		G 1 1/4"		G 1 1/2"		DN 50	21 mm	G 3/4"	G 1 1/4"	G 1 1/2"	
Dimensions	L	mm	840		885		1350		1600		1900		2300	885	1200	1900	2300
	W	mm	620		630		755		1400		1600		1630	630	1000	1600	1630
	H	mm	765		1070		1180		1500		1700		1950	1070	1400	1700	1950
Approximate weight	kg	130		220		400		700		900		1500	240	600	1000	1700	



Cycle time of ATT Alternating Temperature Technology and cycle time of standard system