Modular temperature controllers

Choosing the right temperature controller – water/oil – direct/indirect cooling

gwk

Process-optimized temperature control

Customer-specific and process-optimized heating and cooling technology – on a mass production basis

Each production process requires control that is exactly matched to it individually. Only in this way is it possible to achieve optimum results in terms of quality and economy of operation. The number of different processes determines the large number of temperature controllers to be designed and manufactured. A number of customer-specific wishes can be incorporated into the design and the ability to be integrated into the processing machines, as well as coping with country-specific forms of configuration. This requires a great deal of experience and well proven designs that nonetheless allow a great deal of latitude for incorporating the wishes of individual customers, and it also implies well organised and extremely flexible production methods to meet all these requirements within the generally short delivery times without in any way compromising the quality of the finished product. We at **gwk** can meet all of the above prerequisites.

The choice of a particular technical process starts with the sales process. There **gwk** has a team with many years of experience in the most varied forms of user applications from all branches. Depending on the overall configuration of the temperature controller, the order is either sent on directly to the production section or else is passed on to the technical departments for further work. The very latest CAD technology and a high level of standardisation mean that even the most technically demanding specifications can be handled within a short time. Mass production units, to some extent modular, are produced from individual configuration variations.

Our production capabilities help in implementation in actual instances. Facilities within the company for sheet metal processing, the construction of switch cabinets, a production centre for the machining of mechanical parts and modern pipe bending and welding units not only ensure consistently high quality but simultaneously reduce the throughput times. Nonetheless, our technical staff are of even greater importance, and we are justifiably proud of them. Many of our specialists have been trained by us all by ourselves. Thus the average age of our work force is relatively low despite considerable experience in technical areas – thus providing a strong potential capability for the future, and one which our customers value.

Since we are a recognised welding operation, our certified welders can produce pressure vessels up to a nominal rated pressure of 100 bar. This makes us specialists in pressurised hot water temperature controllers for circulating temperatures of up to 200 °C. Our international know-how allows us to produce machines and equipment to virtually all the standards required on the world market. As part of this, our comprehensive, certified quality management system guarantees monitoring of all production steps.

The most important facts at a glance

gwk temperature controllers for water, using indirect cooling

Values in () optional

Typ	Medium	Temperature range (°C)	Cooling	Heating capacity (kW)	Max. cooling capacity (kW)	Pump capacity max. (l/min / bar)
teco wi 100	water	140/150	indirect	9 - 54	100	70 / 4,7
teco wi 150	water	95/140/150/160	indirect	9 - 72	200	150 / 4,7
teco wi 250	water	95/140/150/160	indirect	9 - 72	270	230 / 4,7
teco wi 400	water	95/140/150/160	indirect	9 - 72	460	420 / 3,6
teco wi 500	water	95/140/150/160	indirect	9 - 72	600	500 /4,2
teco wh 60	water	200	indirect	9 - 27	32 - 64	60 / 5,0
teco wh 90	water	200	indirect	9 - 36	40 - 80	80 / 5,0
teco wh 120	water	200	indirect	18 - 54	48 - 96	120 / 5,0

gwk temperature controllers for water, with direct cooling

Typ	Medium	Temperature range (°C)	Cooling	Heating capacity (kW)	Max. cooling capacity (kW)	Pump capacity max. (l/min / bar)
teco wd 60	water	140	direct	6	47	45 / 6,0
teco wd 100	water	140/150	direct	9 - 54	100	70 / 4,7
teco wd 150	water	140/150	direct	9 - 72	200	150 / 4,7
teco wd 250	water	140/150	direct	9 - 72	270	230 / 4,7
teco wd 400	water	140/150	direct	9 - 72	460	420 / 4,2
teco wd 500	water	140/150	direct	9 - 72	600	500 / 4,2

gwk temperature controllers for heat transfer oil

Values in () optional

Typ	Medium	Temperature range (°C)	Cooling	Heating capacity (kW)	Max. cooling capacity (kW)	Pump capacity max. (l/min / bar)
teco to 50	oil	180	indirect	4 - 8	40 - 85	60/ 6,0
teco tt 50	oil	300	indirect	4 - 8	15 - 30	60 / 6,0
teco tt 60	oil	300	indirect	9 - 18	82 - 200	60 / 6,0
teco tt 100	oil	300	indirect	9 - 36	82 - 275	100 / 8,0
teco tt 140	oil	300	indirect	12 - 54	82 - 450	160 (200) / 7,0 (5,6)
teco th 60	oil	350	indirect	3 - 6	82 - 110	60 / 6,0
teco th 100	oil	350	indirect	6 - 12	82 - 200	100 / 8,0
teco th 140	oil	350	indirect	9 - 27	82 - 200	160 / 7,0

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Presses

Extrusion

Mixing & Compounding

teco wi – Powerful temperature controllers in modular design

Absolute reliability, high control accuracy, easy handling and a favourable cost/performance ratio – besides the versatile features, these are the most important criteria of the temperature controller model **teco wi.**

In close teamwork with our customers a series has been developed, that covers a large performance range by means of a modular design. Various different combinations of heating and cooling elements offer the user a large range of applications. It offers various useful options for particularly demanding customers.

teco temperature controllers, model **wi**, are designed as water units with indirect cooling for usage at open consumers up to 95 °C and at closed consumers up to 160 °C.

The compact series is equipped with the new controller generation **gwk compactControl** and a fast 32-bit processor. This processor has an independent independent display, a control unit logotherm developed by **gwk**, and a 7-inch touch screen with intuitive user interface with a menu easy to navigate.

The top version **gwk modulControl** where also the inputs and outputs of different circuit boards can be chosen freely, completes the new controller family of **gwk**.

The requirements for high energy efficiency, complete process monitoring and industry 4.0 compatibility are also covered by the series.

- compactControl device with high-performance ARM Cortex microcontroller
- logotherm operator panel with multi-colour, high-resolution, multi-touch capable 7” touch screen
- Modern HMI design featuring intuitive operation and menu structure
- Simultaneous display of target values, actual values, flow quantities and more process parameters
- Integrated operating and service information
- Storage and retrieval of process parameters with SD card
- Wear-free energy-saving SSR heating control
- Continuous monitoring of process parameters
- Optional return flow temperature display
- Optional external sensor connection (Fe-CuNi or Pt 100)
- Optional interfaces on front of the device (analogue 0 - 10 V, 0/4 - 20 mA; serial RS 485, 20 mA Current Loop, profibus; profinet)
- Splash proof electrical system
- Covers: RAL 2004 pure orange
- Front panel and housing: RAL 7035 light grey

*High-quality components and proven designs mean that **gwk** temperature controllers are truly superior products.*

Temperature controllers water indirect
95 °C, 140 °C, 150 °C and 160 °C

• = Standard / o = Option /
Values in () optional

	Model **teco**	wi 100	wi 150	wi 250	wi 400	wi 500
Technical data	Medium	water	water	water	water	water
	Temperature max. (°C)	140 (150)	140 (95, 150, 160)		140 (95, 150)	
	Pump capacity max. (l/min / bar)	70 / 4,7	150 / 4,7	230 / 4,7	420 / 4,2	500 / 4,2
	Heating capacity, selectable (kW)	9/18/27/36/45/45/54	9/18/27/36/45/54/63/72	9/18/27/36/45/54/63/72	9/18/27/36/45/54/63/72	9/18/27/36/45/54/63/72
	Cooling	indirect	indirect	indirect	indirect	indirect
	Cooling capacity max. (kW) [1]	100	200	270	460	600
	Mould circuit supply and return connections [2]	G 1"	G 1¼"	G 1½"	DN 50	DN 65
	Housing length L (mm) [3]	990 (1120)	990 (1120/1320)	990 (1120/1320)	1320	1320
	Housing width W (mm) [3]	430 (510)	430 (510/570/695)	430 (510/570/695)	570 (695)	570 (695)
	Housing height H (mm) [3]	935	935 (1035/1275)	935 (1035/1275)	1275	1275
	Weight min., depending on the specification (kg)	80	120	150	200	200 - 500
Standard specification	Control of cooling with solenoid valve	•	•	•	•	•
	Automatic filling and top up device	•	•	•	•	•
	Automatic venting and pressure relief	•	•	•	•	•
	Electronic level control with dry-running protection	•	•	•	•	•
	Safety thermostat	•	•	•	•	•
	Adjustable set value limitation	•	•	•	•	•
	Ramp function for temperature alteration	•	•	•	•	•
	Cooling down to safety temperature when switching off	•	•	•	•	•
	Strainer in cooling water inlet	•	•	•	•	•
	Continuous heater control with switch cabinet fan	•	•	•	•	•
Options	Acoustic or optical warning	o	o	o	o	o
	Digital flow rate indication and monitoring	o	o	o	o	o
	Additional filling operation for treated water	o	o	o	o	o
	Pressurised air valve for mould draining	o	o	o	o	o
	Return temperature indication	o	o	o	o	o
	Connection for external Fe-CuNi or Pt 100	o	o	o	o	o
	Interface for central machine control	o	o	o	o	o
	Strainer in return line circulation medium	o	o	o	o	o
	Control of cooling with motor valve	o	o	o	o	o
	Additional expansion tank for large external valumes	o	o	o	o	o

[1]) at 15 °C cooling water temperature and 130 °C circulation medium temperature
[2]) depending on cooling water amount
[3]) depending on built in heating and cooling capacities as well as the size of the expansion tank

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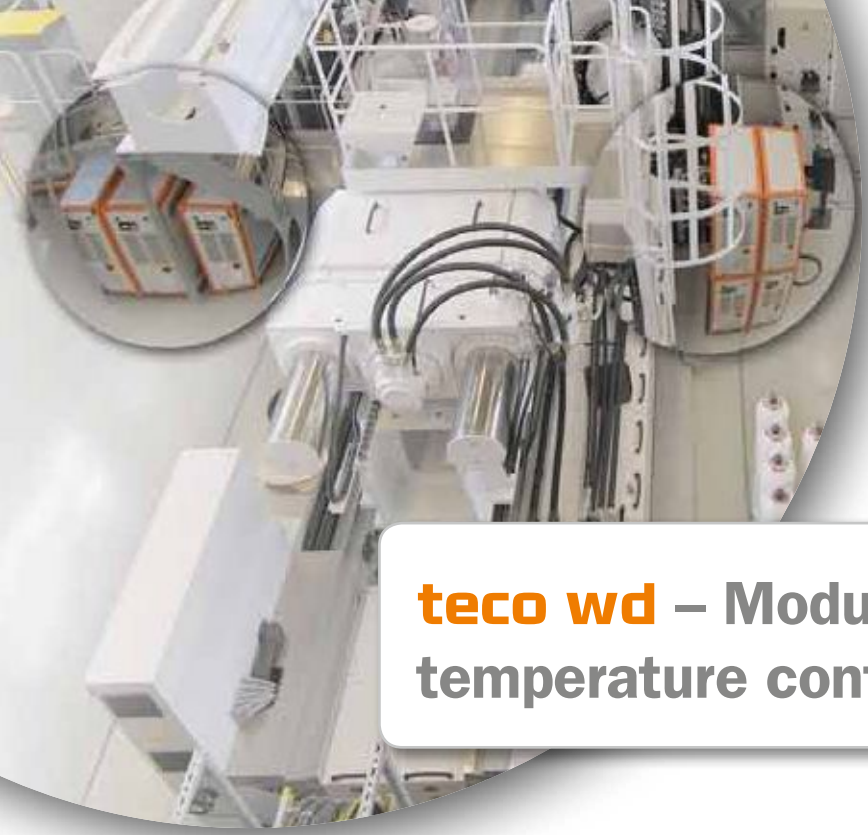

teco wd – Modular temperature controllers with direct cooling

The **gwk** temperature controllers series **teco wd** are heating and cooling units ready for connection to the process with direct cooling which are designed for operation with water as the circulation medium. Direct cooling is an advantage, when a high cooling capacity is required at low temperature differences between cooling water and the circulation medium. In this case the cooling water will be fed without temperature loss into the circulation circuit.

The water circuit, designed as a closed system, allows a pressurized use up to 150 °C. Depending on the operating condition, the heat will either be removed from the consumer by cooling or transferred to the consumer by heating. The heat transfer occurs by the circulation medium water which is to be transferred with an efficient pump through the consumer.

Control of the circulation medium temperature takes effect automatically. A temperature sensor, installed inside the unit, measures the existing actual temperature. The microprocessor controller compares the measured value with the adjusted set value and switches the heating or cooling accordingly. A trouble-free operation is guaranteed by a comprehensive safety system.

As standard the unit is equipped with a large number of functions, on request this may be complimented by various useful options. For connection with the controllers of the processing machines all current interfaces are available.

The **compact series** is equipped with the new controller generation **gwk compactControl** and a fast 32-bit processor. This processor has an independent independent display and control unit logotherm developed by **gwk**, and a 7-inch touch screen with intuitive user interface with a menu easy to navigate.

The top version **gwk modulControl** where also the inputs and outputs of different circuit boards can be chosen freely, completes the new controller family of **gwk**.

- CompactControl device with high-performance ARM Cortex microcontroller
- logotherm operator panel with multi-colour, high-resolution, multi-touch capable 7” touch screen
- Modern HMI design featuring intuitive operation and menu structure
- Simultaneous display of target values, actual values, flow quantities and more process parameters
- Integrated operating and service information
- Storage and retrieval of process parameters with SD card
- Wear-free energy-saving SSR heating control
- Continuous monitoring of process parameters
- Optional return flow temperature display
- Optional external sensor connection (Fe-CuNi or Pt 100)
- Optional interfaces on front of the device (analogue 0 - 10 V, 0/4 - 20 mA; serial RS 485, 20 mA Current Loop, profibus; profinet)
- Splash proof electrical system
- Covers: RAL 2004 pure orange
- Front panel and housing: RAL 7035 light grey

*The temperature controllers of the series **teco wd** with their modular design cover a large range of applications with a high range of performance.*
Motor valves in the cooling water circuit provide for an exact temperature control and simultaneously avoid pressure surges during cooling.

Temperature controllers water direct 140 °C and 150 °C

• = Standard / o = Option / Values in () optional

	Model **teco**	wd 60	wd 100	wd 150	wd 250	wd 400	wd 500
Technical data	Medium	water	water	water	water	water	water
	Temperature max. (°C)	140	140 (150)	140 (150)	140 (150)	140 (150)	140 (150)
	Type of operating pump	peripheral pump	multi-stage stainless steel centrifugal pump	two-stage centrifugal pump	two-stage centrifugal pump	centrifugal pump	centrifugal pump
	Pump capacity max. (l/min / bar)	45 / 6,0	70 / 4,7	150 / 4,7	230 / 4,7	420 / 3,6	500 / 4,2
	Heating capacity, selectable (kW)	6	9/18/27/36/45/54	9/18/27/36/45/54/63/72	9/18/27/36/45/54/63/72	9/18/27/36/45/54/63/72	9/18/27/36/45/54/63/72
	Cooling	direct	direct	direct	direct	direct	direct
	Cooling capacity max. (kW) [1]	47	100	200	270	460	600
	Mould circuit supply and return connections	G 3/4"	G 1"	G 1 1/4"	G 1 1/2"	DN 50	DN 65
	Cooling water supply and return connections [2]	G 1/2"	G 1 1/2", 3/4"	G 1/2", 3/4", 1", 1 1/4"	G 1/2", 3/4", 1", 1 1/4"	G 3/4", 1", 1 1/4", 1 1/2", 2"	G 3/4", 1", 1 1/4", 1 1/2", 2"
	Housing length L (mm) [3]	720	990 (1120)	990 (1120/1320)	990 (1120/1320)	1320	1320
	Housing width W (mm) [3]	295	430 (510)	430 (510/570/695)	430 (510/570/695)	570 (695)	570 (695)
	Housing height H (mm) [3]	597	735 (935)	735 (935/1275)	735 (935/1275)	1275	1275
	Weight min., depending on the specification (kg)	35	120	150	160	200	250
Standard specification	Control of cooling with motor valve	•	•	•	•	•	•
	Control of cooling with solenoid valve	•	o	o	o	o	o
	Automatic filling and top up device	•	•	•	•	•	•
	Automatic venting	•	•	•	•	•	•
	Electronic level control with dry-running protection	•	•	•	•	•	•
	Safety thermostat	•	•	•	•	•	•
	Adjustable set value limitation	•	•	•	•	•	•
	Ramp function for temperature alteration	•	•	•	•	•	•
	Cooling down to safety temperature when switching off	•	•	•	•	•	•
	Strainer in cooling water inlet	•	•	•	•	•	•
	Continuous heater control	•	•	•	•	•	•
Options	Acoustic or optical warning	o	o	o	o	o	o
	Digital flow rate indication and monitoring	o	o	o	o	o	o
	Pressurised air valve for mould draining	o	o	o	o	o	o
	Return temperature indication	o	o	o	o	o	o
	Interface for central machine control	o	o	o	o	o	o
	Connection for external Fe-CuNi or Pt 100	o	o	o	o	o	o
	Strainer in return line circulation medium	o	o	o	o	o	o

[1]) at 15 °C cooling water temperature and 130 °C circulation medium temperature
[2]) depending on cooling water amount [3]) depending on built-in heating and cooling capacities as well as the kind of cooling control

Subject to technical modification without notice!

teco wh – Reliable water temperature controllers for high temperatures

Water has a major advantage compared to heat transfer oil if relatively large amounts of heat need to be extracted from small cooling surfaces. In order to be able to transfer a constant amount of heat between the mould wall and the medium for the same median temperature differential, four to five times the area of cooling surfaces, or the same number of cooling channels, is required if heat transfer oil is used instead of water. It is precisely this which often cannot be achieved in practice with small moulds. The use of water as a heat transfer medium has the further advantage that the amount of liquid to be circulated by the pump is reduced by a factor of two to three compared with heat transfer oil.

The **gwk** hot water temperature controllers of the **teco wh** series are designed for special applications in the temperature range up to 200 °C. Magnetically-coupled pumps, return flow temperature monitoring and limiting, a built-in condensing unit to prevent steam impacts, level monitoring via a built-in high-pressure makeup feed unit and a ramp function included as standard for temperature changes to heat up the mould more gently at the start of production and the corresponding cooling down at the end of production guarantee the highest possible level of process security. The modular construction of the heating and cooling sections allows a unit to be designed for any type of application.

The production of precision parts out of high-capacity plastic materials requires a precise temperature control inside of the mould on a high temperature level.

Proven equipment technology ensures safe operation with pressurised water at up to 200 °C.

Temperature controllers water direct 200 °C

• = Standard / o = Option / Values in () optional

	Model **teco**	wh 60	wh 90	wh 120
Technical data	Medium	water	water	water
	Temperature max. (°C)	200	200	200
	Pump capacity max. (l/min / bar)	60 / 5,0	80 / 5,0	120 (200) / 5,0
	Heating capacity (kW)	9 (18/27)	18 (9/27)	27 (18/36/45/54)
	Cooling	indirect	indirect	indirect
	Cooling capacity max. (kW) [1]	50 (90)	50 (90/150)	50 (90/150/250)
	Mould circuit supply and return connections PN 40	DN 25	DN 32	DN 32
	Cooling water supply and return connections	G 1/2"	G 1/2"	G 1/2"
	Housing length L (mm) [2]	1320	1320	1320 (1465)
	Housing width W (mm) [2]	500	570	570
	Housing height H (mm) [2]	1275	1275 (1515)	1275 (1515)
	Weight min., depending on the specification (kg)	95	105	120
Standard specification	Sealless pump with magnetic coupling	•	•	•
	Temperature controlled pressure overlay	•	•	•
	Condensing unit to prevent steam impacts in cooling medium return	•	•	•
	Return temperature indication	•	•	•
	Return flow temperature monitoring and limiting	•	•	•
	Built-in high-pressure makeup feed unit	•	•	•
	Automatic venting and pressure relief	•	•	•
	Electronic level control with dry-running protection	•	•	•
	Safety thermostat	•	•	•
	Adjustable set value limitation	•	•	•
	Ramp function for temperature alteration	•	•	•
	Cooling down to safety temperature when switching off	•	•	•
	Strainer in cooling water inlet	•	•	•
	Continuous heater control with switch cabinet fan	•	•	•
Options	Acoustic or optical warning	o	o	o
	Connection for external Fe-CuNi or Pt 100	o	o	o
	Interface for central machine control	o	o	o
	Additional filling operation for treated water	o	o	o
	Strainer in return line circulation medium	o	o	o
	Control of cooling with motor valve	o	o	o

[1]) at 15 °C cooling water temperature and 150 °C circulation medium temperature

[2]) depending on built-in heating and cooling capacities as well as the size of the expansion tank

Subject to technical modification without notice!

teco to/tt/th – Heat transfer oil-temperature controllers for highest demand

As a rule, temperature controllers which are designed for operation with heat transfer oil are used for circulating temperatures above 200 °C.
Dealing with thermal oil makes it necessary to take different criteria into account which also have a constructive influence on the design of oil temperature controllers.
Hot thermal oil has a low oxidation stability when direct contact to ambient air is allowed as found in some competitors units which use a submersible pump and tank. This increase of air absorption can cause the oil to become more viscous and the pump flow rate to decrease. As an open design does not allow for a defined flow with reliable monitoring this oxidation due to the lowering flow rate can cause an excess of oil film at high temperature on the heating element which will lead to a tarry coating and carbon deposits forming within the heat transfer system eventually leading to the decomposition of the oil and subsequent clogging of the heat transfer system. The consequence of choosing the wrong type of oil temperature controller are more waste product, poor product quality and higher maintenance costs. It is due to these reasons that **gwk** do not manufacture oil temperature controllers with an open circuit.
The **gwk teco to, teco tt** and **th** series have been specially designed for applications that require higher temperatures. The specific heating surface loading is designed to be such that thermal decomposition of the heat transfer oil can be prevented without fail at normal flow rates. Built-in flow monitoring ensures that an alarm is given if the flow rate becomes too low. It is necessary to prevent oxygen from entering the system in order to avoid damage to the heat transfer oil from oxidation. The closed circuits of the **teco tt** units have a layer of cold oil in the expansion vessel, which can also be equipped with a nitrogen covering supply device on request.
The high-quality design allows operating temperatures up to 300 °C, for **teco-th** units even up to 350 °C.

Temperature controllers thermal oil

	Model **teco**	
Technical data	Medium	
	Temperature max (°C)	
	Pump capacity max. (l/min/bar)	
	Heating capacity max. (kW)	
	Cooling	w
	Cooling capacity max. (kW) [1]	
	Mould circuit supply and return connections	
	Cooling water supply and return connections [2]	
	Housing length L (mm) [3]	
	Housing width W (mm) [3]	
	Housing height H (mm) [3]	
	Weight min., depending on the specification (kg)	
Standard specification	Control of cooling with solenoid valve	
	Sealless pump with solenoid coupling	
	Water seal in expansion tank	
	Difference temperature control with switch-off function	
	Electronic level control with dry running protection	
	Safety thermostat	
	Adjustable set value limitation	
	Ramp function for temperature alteration	
	Cooling down to safety temperature when switching off	
	Strainer in cooling water inlet	
	Galvanized steel, painted in RAL 2004 / 7035	
	Continuous heater with switch cabinet fan	
	Return temperature indication	
Options	Flow control with switch-off function	
	Filter group in suction pipe	
	Bellows type valve in UV, UR	
	Acoustic alarm	
	Connection for external Fe-CuNi or Pt 100	
	Interface for central machine control	
	Strainer inreturn line circulation medium	
	Cooling in Bypass with 3-way motor valve	
	Connection for nitrogen overlay at expansion tank	

[1]) at 15 °C cooling water temperature and 200 °C circulation medium temperature

[2]) depending on cooling water

ds

180 °C, 300 °C and 350 °C

• = Standard / o = Option / – = not available / Values in () optional

to 50	tt 50	tt 60	tt 100	tt 140	th 60	th 100	th 140
thermal oil	thermal oil	thermal oil	thermal oil	thermal oil	thermal oil	thermal oil	thermal oil
180	300	300	300	300	350	350	350
60 / 6,0	60 / 6,0	60 / 6,0	100 / 8,0	150 / 7,0 (200 / 5,6)	60 / 6,0	100 / 8,0	150 / 7,0
8	4/6/8	9/13,5/18	9/12/18/27/36	12/18/27/36/45/54	3/6	6/9/12	9/18/27
ater indirect	water indirect	water indirect	water indirect	water indirect	water indirect	water indirect	water indirect
28/85	15/30	82/110/200	82/110/200 250/275	82/110/200/ 250/275/450	82/110	82/110/200	82/110/200
G 3/4"	G 3/4"	DN 25	DN 25	DN 32	DN 25	DN 25	DN 32
G 1/2"	G 1/2"	G 1/2", 3/4"	G 1/2", 3/4", 1"	G 1/2", 3/4", 1" , 1 1/4"	G 1/2"	G 1/2", 3/4"	G 1/2", 3/4"
990	860	1320	1320 (1465)	1320 (1465)	1320	1320	1320
350	350	500	570	570 (695)	500	570	570
735	735	1275 (1515)	1275 (1515/1720)	1275 (1515/1720)	1275 (1515)	1275 (1515)	1275 (1515/1720)
75	75	210	310	410	210	310	410
•	•	•	•	•	•	•	•
-	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•
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-	-	o	o	o	o	o	o
-	-	o	o	o	o	o	o

*The temperature controllers of the **teco-tt** and **th**-series meet the special requirements for operating temperatures up to 300 °C respectively 350 °C.*

r amount

[3]) depending on built-in heating and cooling capacities

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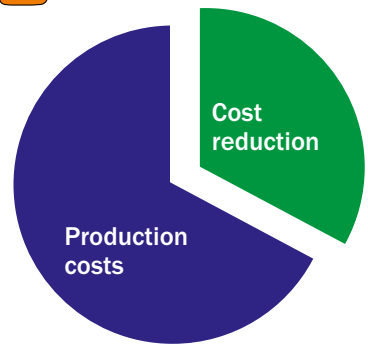
gwk Perfect Cooling and Temperature Control



Increased productivity
In many areas of the industry, cooling and temperature control provides a great potential for increasing productivity and thus for lowering costs.

Many factors serve to improve productivity:

- Reduction of cooling time, therefore savings in required machine hours
- Improvement of product quality
- Increasing availability of production plants
- Decreasing running cost
- Reduction of maintenance cost

gwk protemp
High-performance temperature controller with increased flow rate and reduced energy consumption due to high quality stainless steel centrifugal pump.

gwk hermeticool hybrid
Innovative cooling system to decrease the running and maintenance cost in comparison to conventional cooling systems.

integrat 40/80/direct
Increase of productivity by means of specific and segmented mould temperature control.

gwk container-plants
Highest flexibility and lowest expenses for planning, installation and relocation of a centralised cooling plant.

gwk teco wi/wd
Effective temperature control of applications with high material throughput. Also ideal for pre-heating of large injection moulds.

gwk skl/skw
Reliable and economic supply of cooling water in the low temperature range, even under the toughest ambient conditions.

gwk moldclean
Increased productivity through effective, automatically controlled cleaning of heat exchange surfaces in cooling and temperature controlled circuits.

gwk ku-plants
The simplest and cheapest solution to increase the availability and to decrease the maintenance cost of open cooling systems.

gwk weco
Controllable production in variable climatic conditions and high flexibility with compact, energy-saving water chillers using environmentally friendly refrigerant.

gwk service
Decreasing the maintenance cost and protection of company owned resources through professional execution of installation and maintenance works incl. cooling water treatment.

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