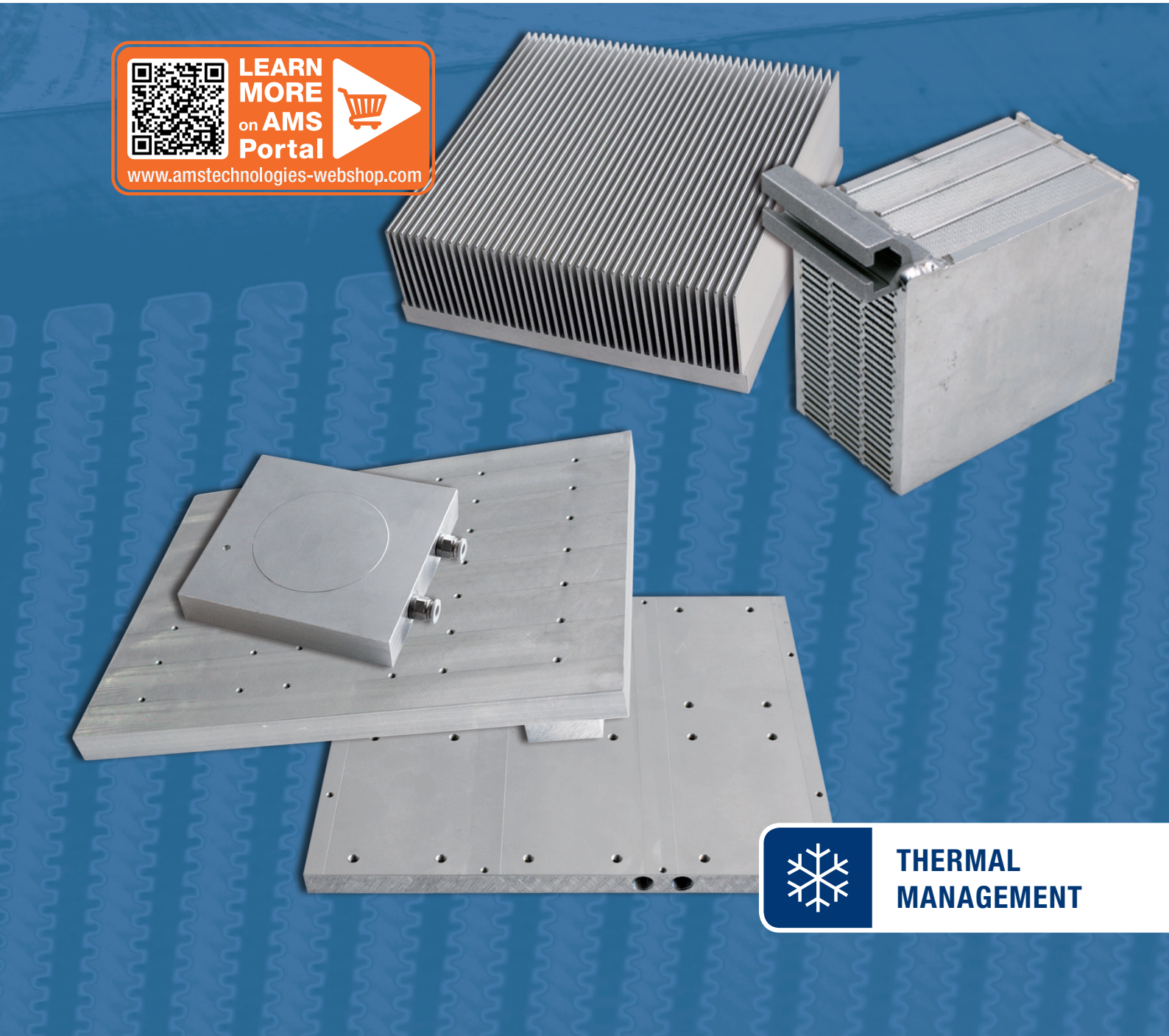
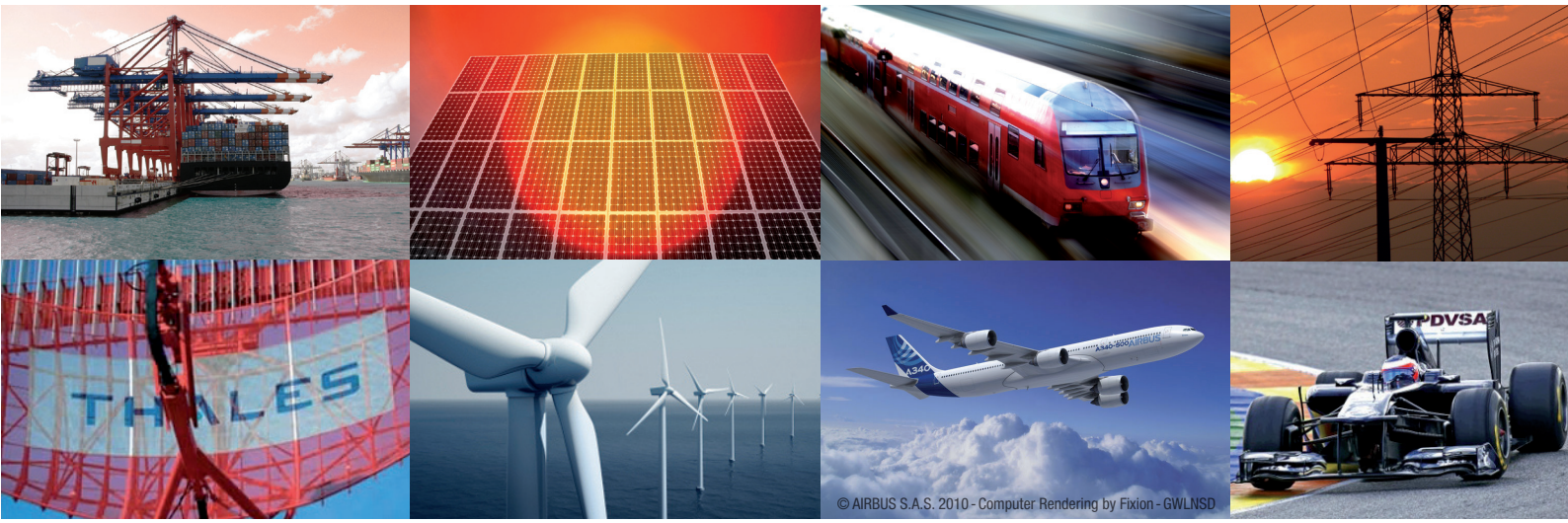
amsTECHNOLOGIES
where technologies meet solutions

HEAT SINKS AND WATER COOLERS

WEBRA aluminum extrusion profiles and friction stir weld water coolers





OUR COMMITMENT TO YOU

Webra and AMS Technologies are well known for delivering exceptional value in heat sinking products and thermal design. We are proud of our heat transfer technologies and depth of engineering expertise. We hope that we can put them to work for you.

In this catalog you find the standard line of heat sink profiles as well as an overview of water-glycol cooler plates for different configurations and a small selection of such standardized water-glycol cooler plates. Engineers may use the thermal performance data for their design or as guidelines for new developments. The data given in the catalog has been verified in the wind tunnel or in the water-glycol test bench.

For the formats PrimePack3 and 140x190 mm² as well as for press pack discs new water-glycol coolers were developed that meet the increased requirements for renewable energies, large industrial drives, traction and energy transmission.

For coolants like water-glycol, thermo oils, aviation fuels or refrigerants AMS Technologies and Webra provide thermo and fluid dynamic solutions and accompanying cooler plates, e.g. for the cooling of batteries and power semiconductors in electric and hybrid vehicles.

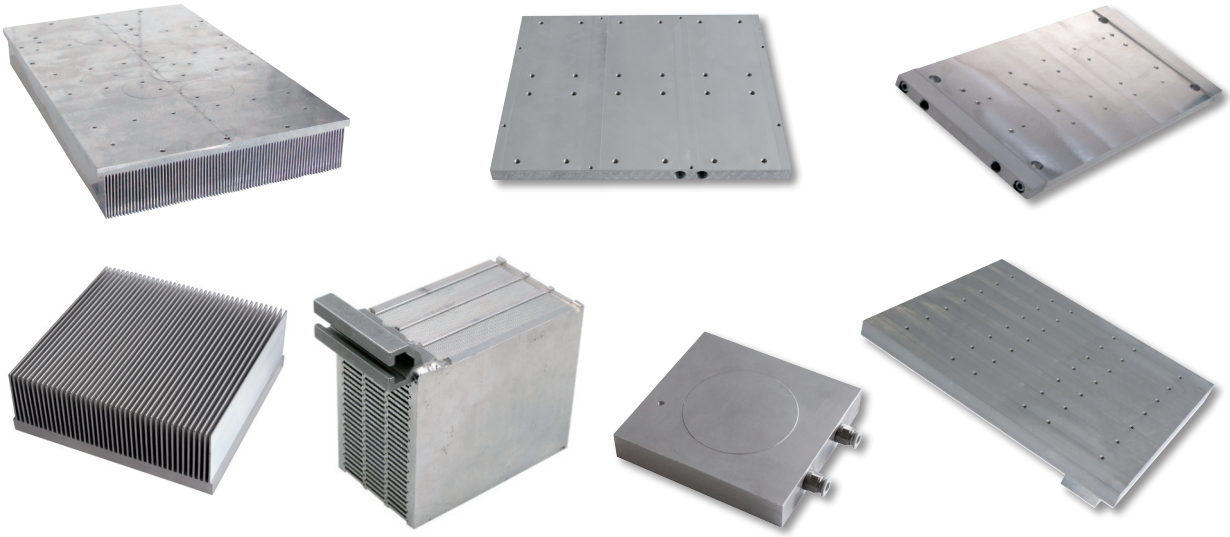
For the new cooler plates Webra combines newly developed modern extrusion profiles with the safe and progressive friction stir weld technology. The extrusion profiles exhibit geometries with big surface area for excellent thermal performance. They also allow for constructions with low pressure drop and cost effective production.

AMS Technologies has increased its capacities for engineering services. For the cooling of power electronics our graduated mechanical engineers, more computer power for CFD and the expertise from our close cooperation with our suppliers are readily available.

We are ready for the challenges you bring to us.

Erling Buråker
Managing Director
AB WEBRA INDUSTRI

Dr. Konrad Laufs
Division Manager
AMS Technologies AG



INDEX

HEAT SINKS FOR FORCED CONVECTION WITH AIR

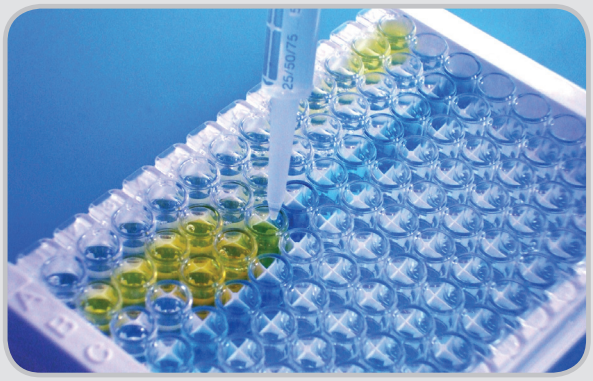
Webra heat sink profiles are aluminum extrusions that have proven their value in the most demanding industry tasks:

Cooling of inverter modules in renewable energies

Cooling of power semiconductor modules for traction and auxiliary power units in rail vehicles

Cooling of frequency converters as in soft starters or in large drives

Cooling of power amplifier components, i.e. for telecommunication or broadcasting

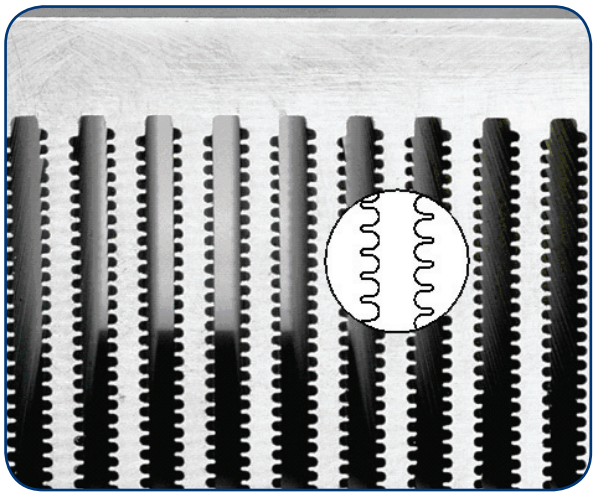


Re-cooling of thermoelectric modules, i.e. for cooling laser diodes or reagents

Cooling of batteries and Power Electronics in Electric- and Hybride Vehicles

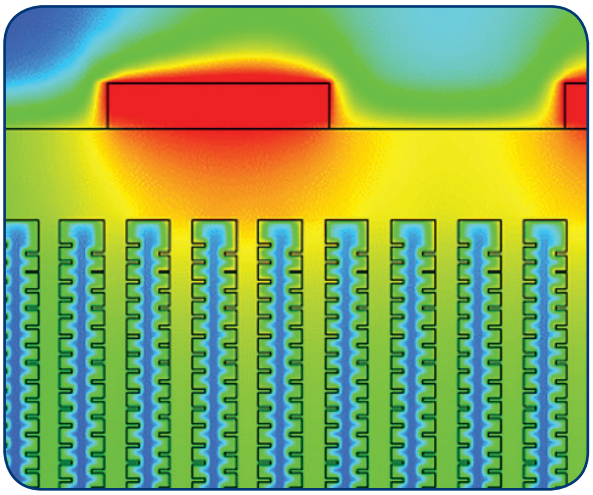
EXCEPTIONAL PERFORMANCE

Webra uses patented and protected technologies in order to optimize the geometry of heat sink profiles. Significant parameters for the unrivalled performance in the industry are:



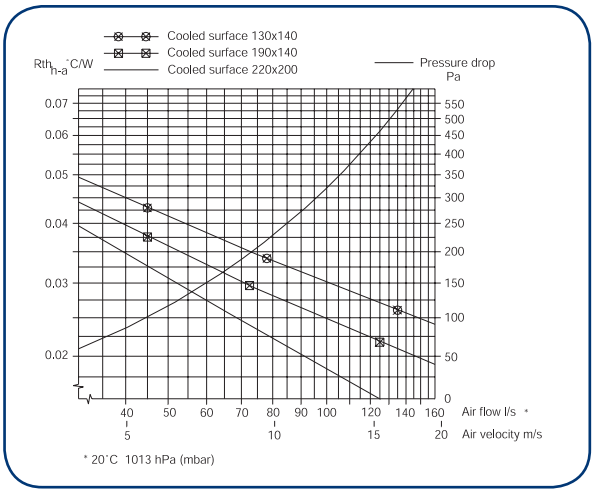
Surface enlargement

for heat transfer and adjusted flow cross section for pressure drop minimization



Unhindered heat conduction

from the heat sources to the fin surface



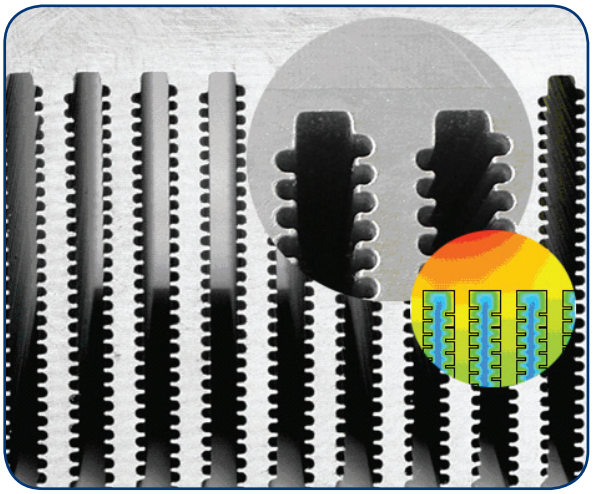
Performance

verified in the wind tunnel

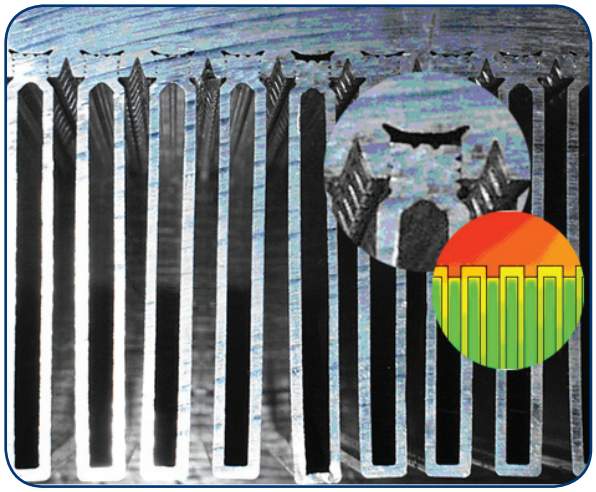
SAFETY AND LONG LIFE

The patented heat sink profiles are manufactured from a single aluminum extrusion. They offer a significant advantage compared to competitors' profiles that have thermal resistances at the joints of pressed-in, rolled-in or glued-in fins and thus experience the risk of aging and performance loss.

Webra's safe construction made of a single piece is without risk, its high thermal performance always remains the same.



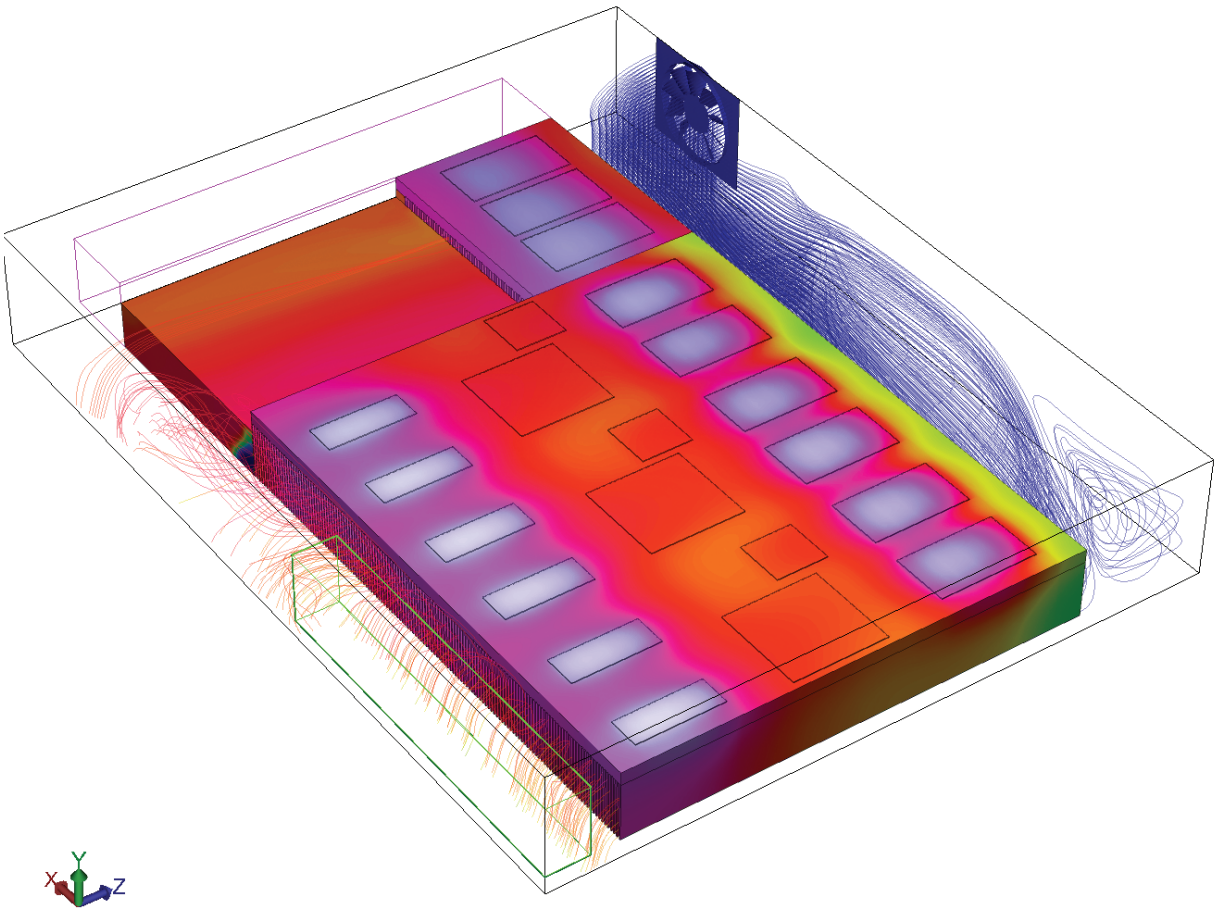
Webra's safe construction
made of a single piece, unhindered heat flow



Competitors' construction
with rolled-in fins, risk of aging, loosening of fins and performance loss

DIMENSIONING USING NUMERICAL METHODS

Thermal simulation with computational fluid dynamics (CFD) allows the engineer to dimension his system in great detail. Especially in complex systems life expectancy of electronic components, space, mass and cost may be optimized. The analysis of temperatures and air flows allows to take targeted measures such as adjusting air flow, positioning of power components, dimensioning of heat sinks and fans and others. AMS Technologies conducts thermal simulation since 2000 and has authored more than 200 reports for customers.



Homogeneous temperature distribution is achieved in despite of asymmetrical air flow using fine tuned air baffles. Computed with Coolit© from Daat Research.

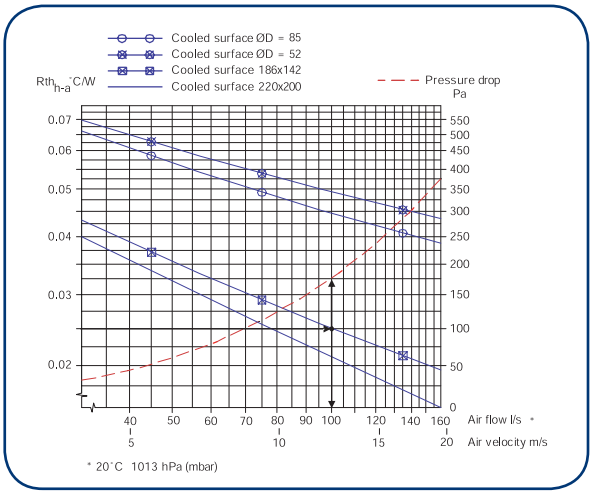
amsTECHNOLOGIES
where technologies meet solutions

DIMENSIONING USING PERFORMANCE CURVES

Performance curves that have been acquired empirically in the wind tunnel give the engineer a first reliable base for dimensioning.

The diagrams show the thermal resitance Rth of the heat sink as a function of its determining parameters air flow (l/s) and size of heat source (cooled surface).

The Rth value also depends on air ducting and the manifold possibilities of heat input. Pressure drop Δp is mainly a function of the air flow rate.

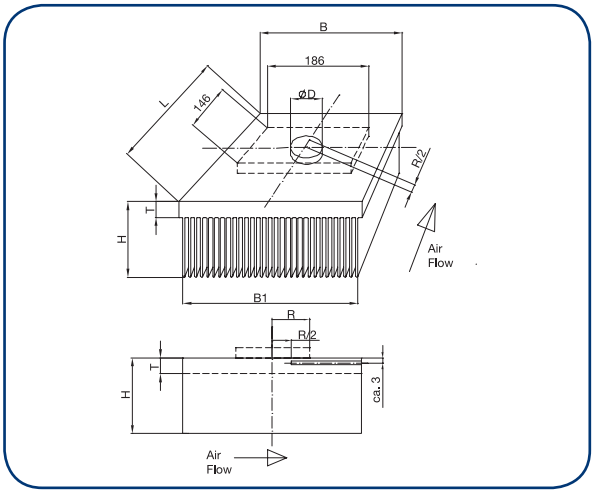


Thermal resistance Rth, h-a (hot sensor – ambient) and pressure drop as function of air flow.

Example:
for an IGBT 186 x 142 mm² a Rth of 0.025 K/W
is required

Taken from the -x- curve
the volumetric flow to be supplied from the fan = 100 l/s

Taken from the pressure drop curve - - -
the respective required pressure head = 175 Pa.



Position of the temperature sensor.

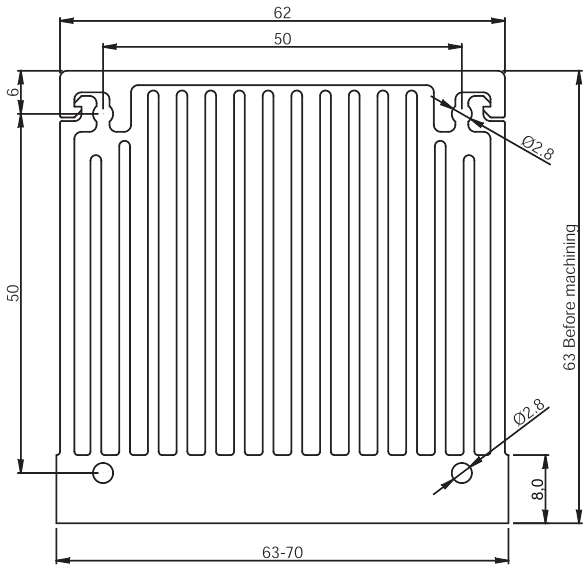
OVERVIEW: HEAT SINKS

Webra Profile	Width x Height W × H mm²	Weight kg/m	Length test heat sink mm	Flow rate@Δp[1]	Heat sources[2] wind tunnel test	Rth for reference operational conditions °C/W	Page
W-62-51-9-16	63 × 62	5.7	75	w/ 60×60 axial fan	40 x 40 mm²	0.292	13
W-91-19-7-30	92 × 26	4.7	100	8 l/s @ 70 Pa	Ø 25 mm	0.225	14
W-92-81-10-13	92 × 92	12.8	120	20 l/s @ 50 Pa	Ø 85 mm	0.15	15
W-98-19-6-38	100 × 26	4.4	100	8 l/s @ 70 Pa	Ø 25 mm	0.208	16
W-109-70-9-26	111 × 80	14.3	100	35 l/s @ 30 Pa	Ø 52 mm	0.082	17
W-137-37-10-28	137 × 47	7.3	200	50 l/s @ 240 Pa	62 × 122 (2×)	0.058	18
W-148-35-10-21	150 × 46	11.6	120	25 l/s @ 70Pa	Ø 52 mm (2×)	0.091	19
W-150-44-11-22	150 × 55	14.2	200	35 l/s @ 150 Pa	Ø 52 mm (2×)	0.065	20
W-155-60-15-16	160 × 75	21.0	200	40 l/s @ 80 Pa	130 × 140 mm²	0.053	21
W-172-62-13-24	172 × 75	20.2	200	85 l/s @ 300 Pa	130 × 140 mm²	0.030	22
W-175-44-11-26	175 × 55	16.6	200	42 l/s @ 150 Pa	Ø 52 mm (2×)	0.051	23
W-194-60-15-20	200 × 76	26.0	200	80 l/s @ 105 Pa	182 × 146 mm²	0.030	24
W-198-62-12-28	210 × 75	23.6	200	80 l/s @ 170 Pa	182 × 146 mm²	0.027	25
W-209-60-15-22	210 × 75	26.6	200	80 l/s @ 170 Pa	182 × 146 mm²	0.030	26
W-209-60-15-34	210 × 75	26.0	200	120 l/s @ 425Pa	182 × 146 mm²	0.022	28
W-209-60-15-41	215 × 75	25.0	200	100 l/s @ 180 Pa	140 × 190 (2×)	0.019	29
W-209-61-15-50	210 × 76	25.0	200	80 l/s @ 125 Pa	182 × 146 mm²	0.028	31
W-209-75-17-21	210 × 92	31.5	200	80 l/s @ 100 Pa	Ø 85 mm	0.052	32
W-210-60-16-18	212 × 66	24.7	200	110 l/s @ 100 Pa	182 × 146 mm²	0.035	33
W-229-50-12-29	230 × 62	19.9	200	100 l/s @ 275 Pa	190 × 140 (2×)	0.017	34
W-240-64-15-23	240 × 79	26.0	400	270 l/s @ 760 Pa	90 × 270 (3×)	0.011	35
W-275-73-15-26	275 × 89	38.2	200	160 l/s @ 155 Pa	130 × 142 (2×)	0.023	37
W-343-35-12-40	345 × 48	26.0	200	80 l/s @ 170 Pa	Ø 25 mm (9×)	0.031	38
W-351-41-10-83	360 × 50	22.0	400	Ebm D2E @ 100 Pa	90 × 270 (3×)	0.015	39
W-473-44-11-70	476 × 56	44.8	200	120 l/s @ 170 Pa	Ø 52 mm (6×)	0.019	40
W-GTM-45	152 × 45	2.6 kg/pc.	180	15 l/s @ 350 Pa	Ø 100 mm (2×)	0.065	41
W-GTL-75	152 × 75	3.9 kg/pc.	180	60 l/s @ 700 Pa	Ø 100 mm (2×)	0.023	42
W-GTK-105	152 × 105	5.25 kg/pc.	180	80 l/s @ 550 Pa	Ø 100 mm (2×)	0.020	43

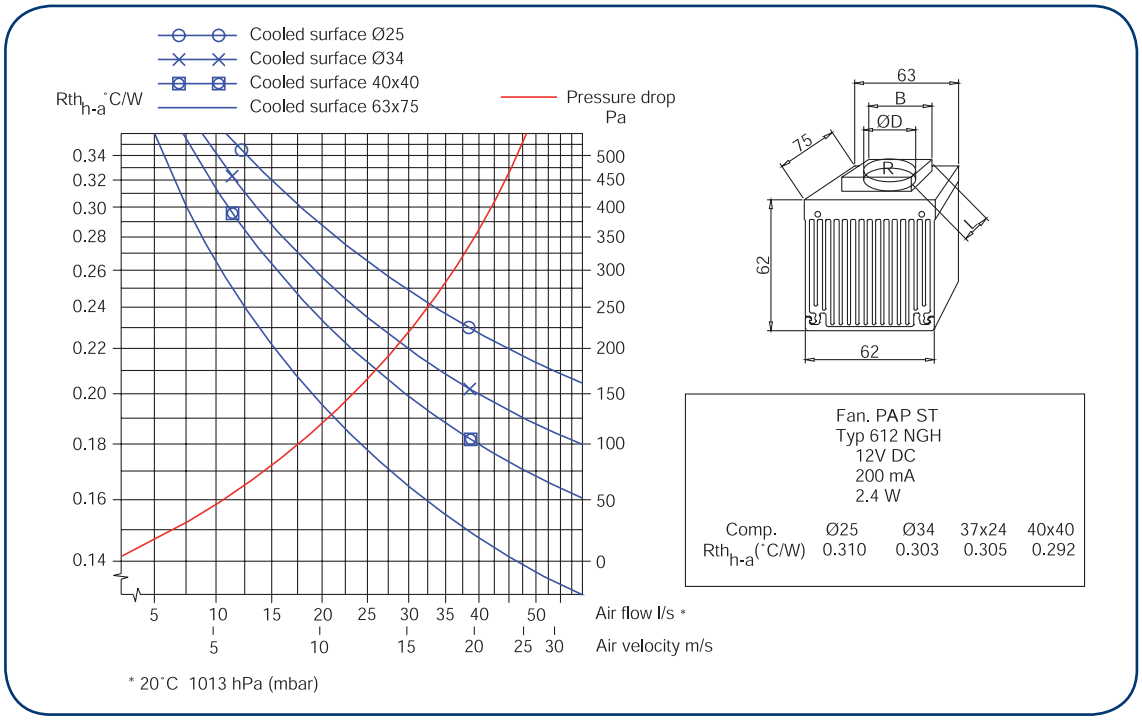
[1]selected values for quick selection [2]uniform heat sources

W-62-51-9-16

Product Dimensions

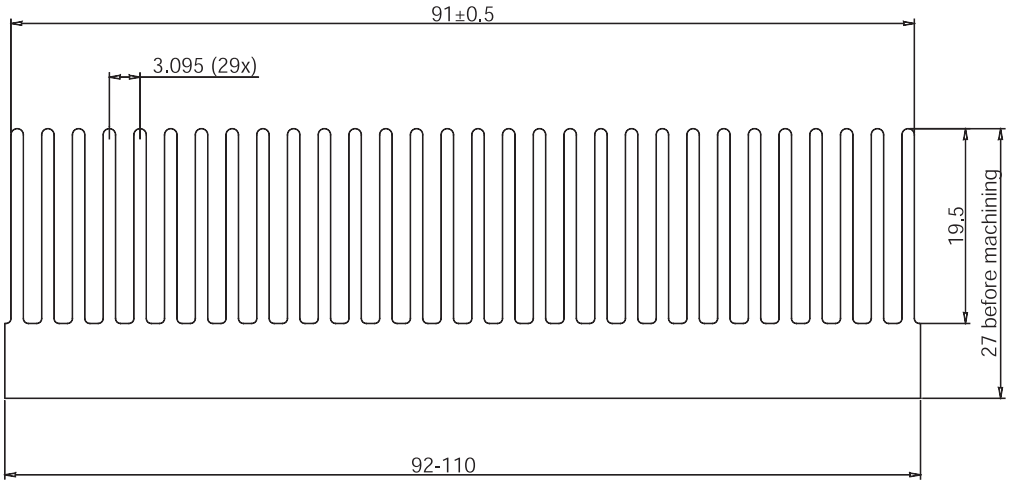


Performance L = 75

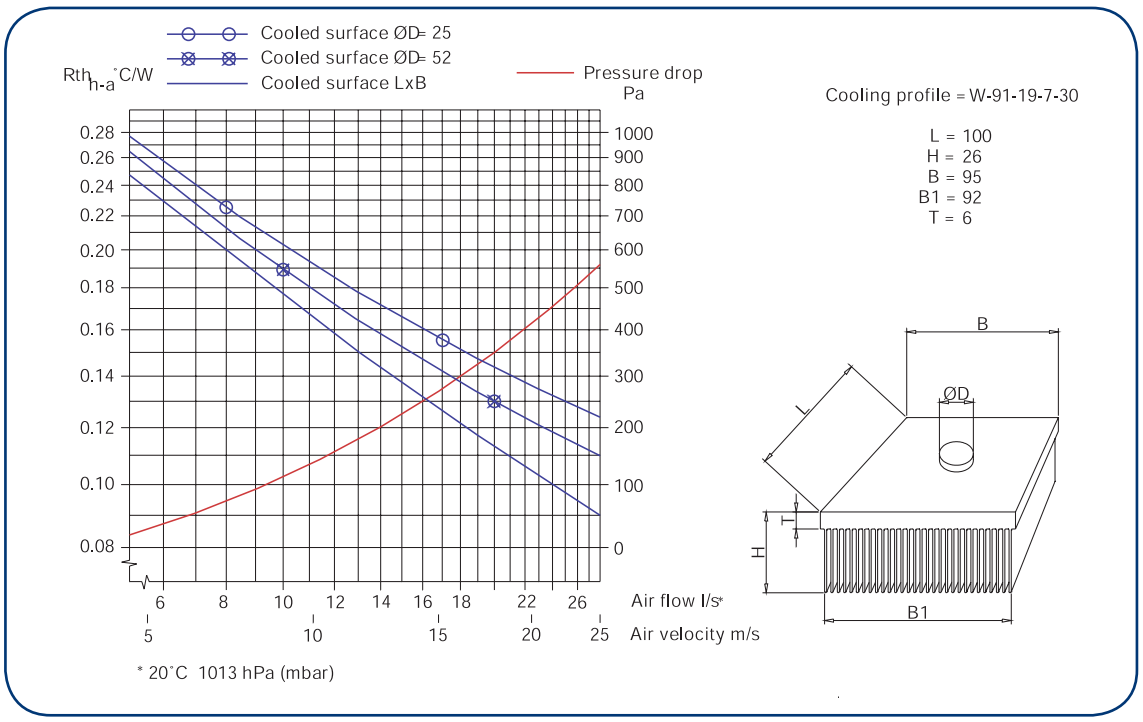


W-91-19-7-30

Product Dimensions



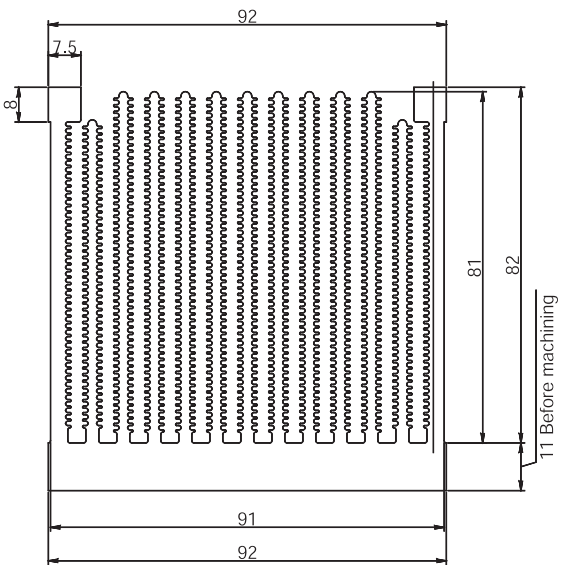
Performance L = 100



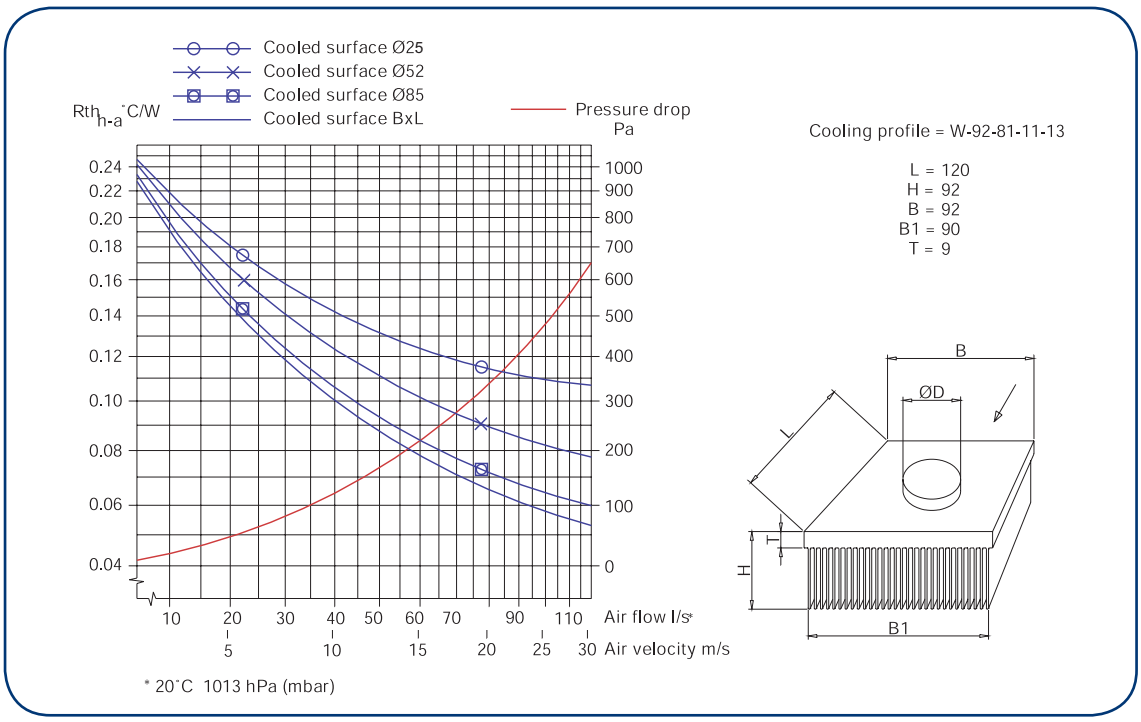
amsTECHNOLOGIES
where technologies meet solutions

W-92-81-10-13

Product Dimensions

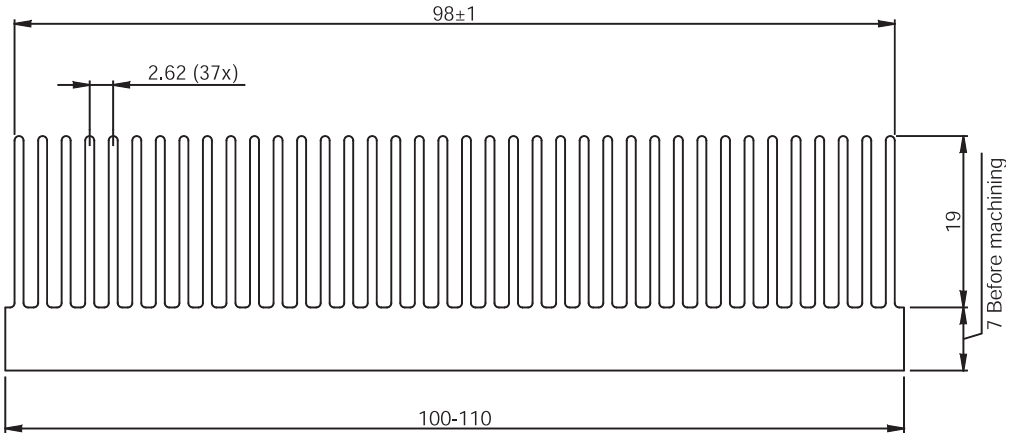


Performance L = 120

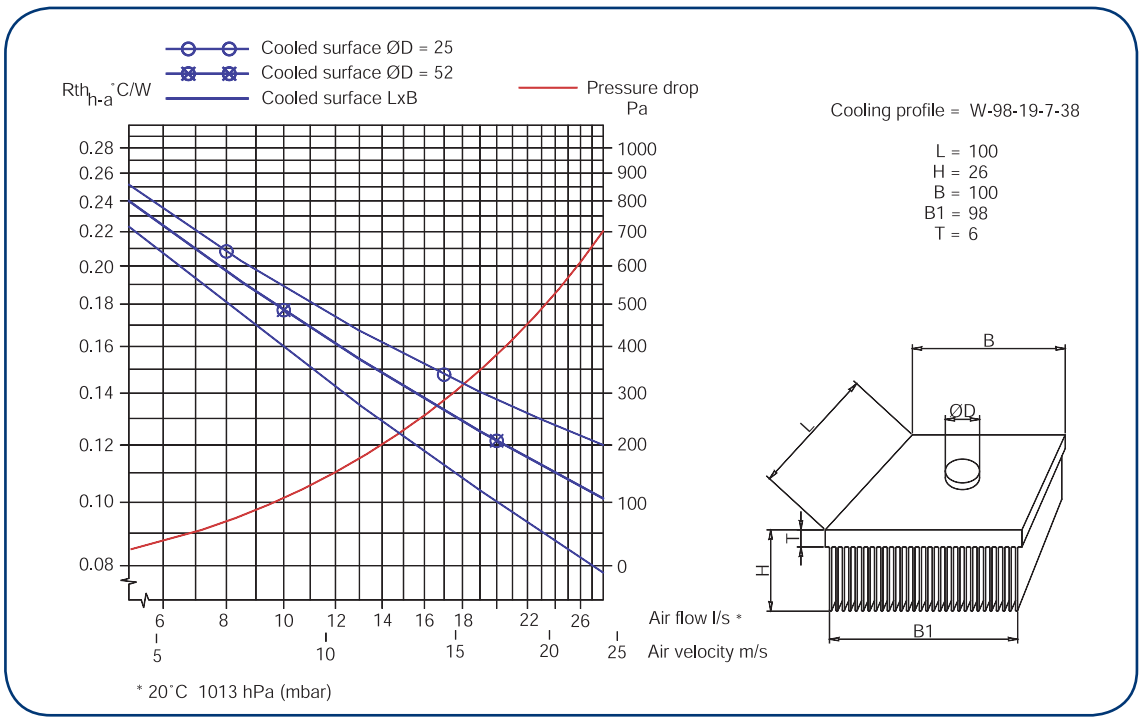


W-98-19-6-38

Product Dimensions

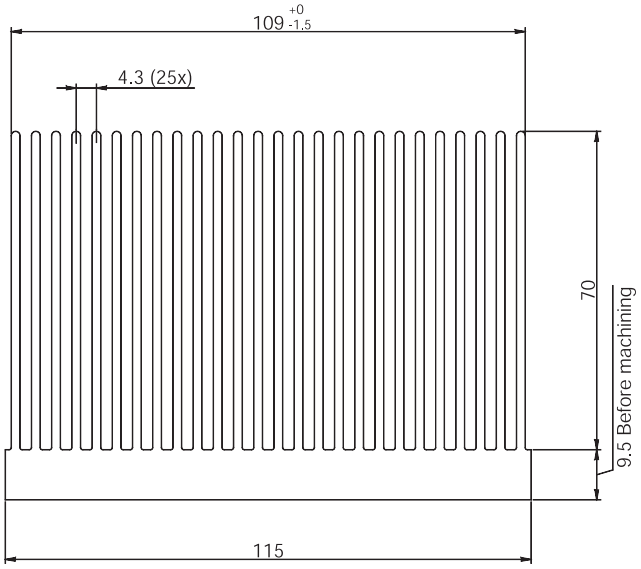


Performance L = 100

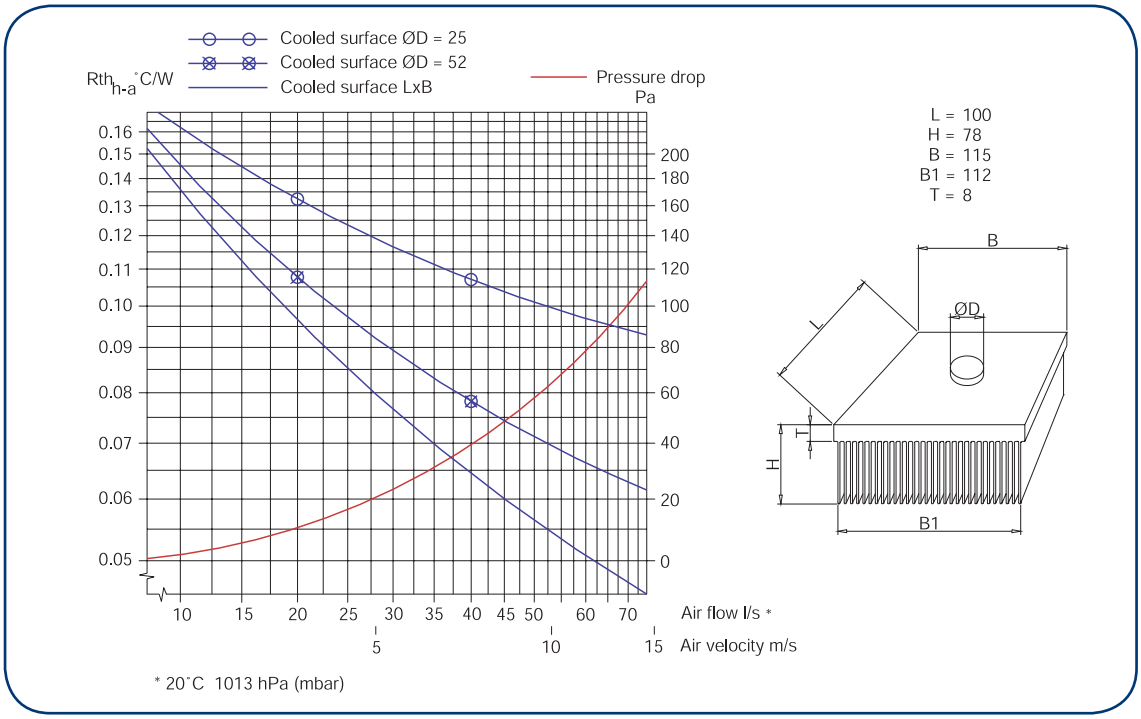


W-109-70-9-26

Product Dimensions

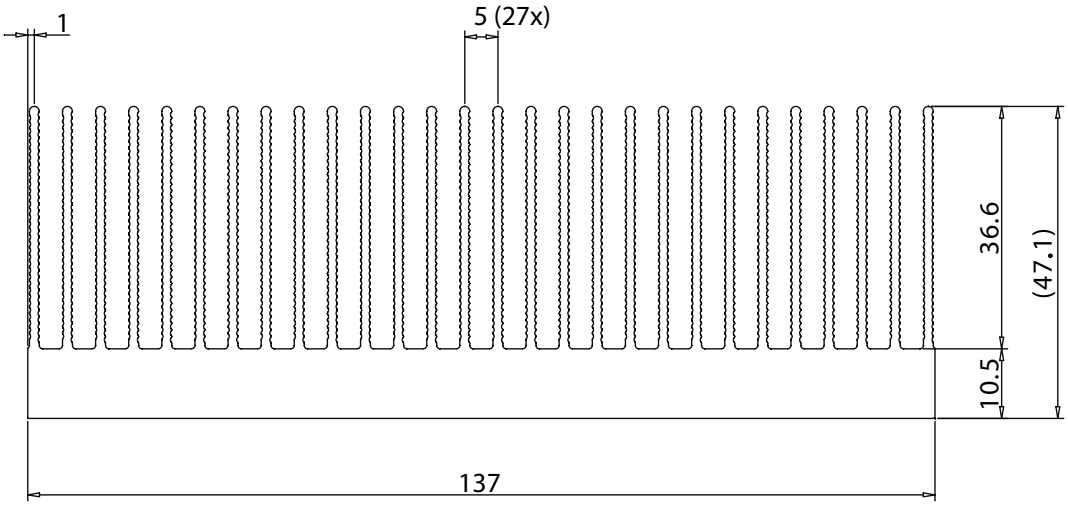


Performance L = 100

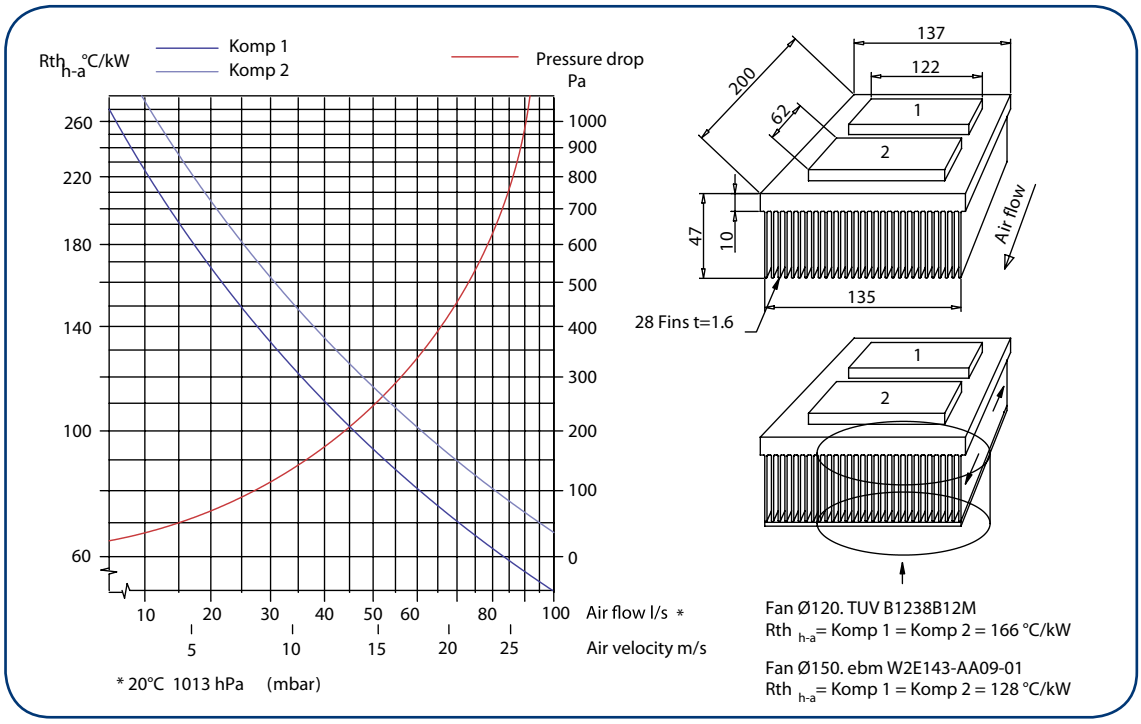


W-137-37-10-28

Product Dimensions

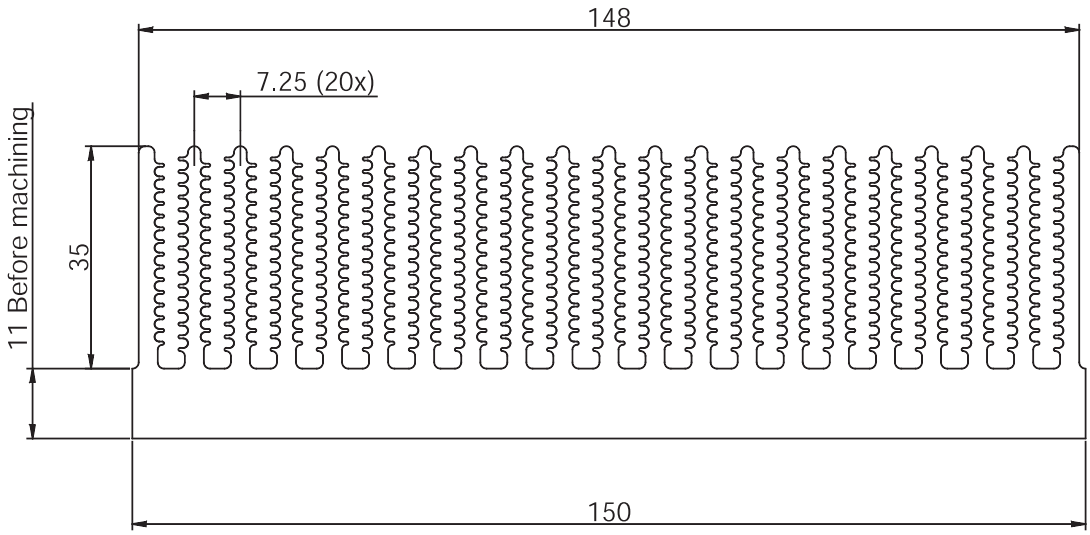


Performance L = 200

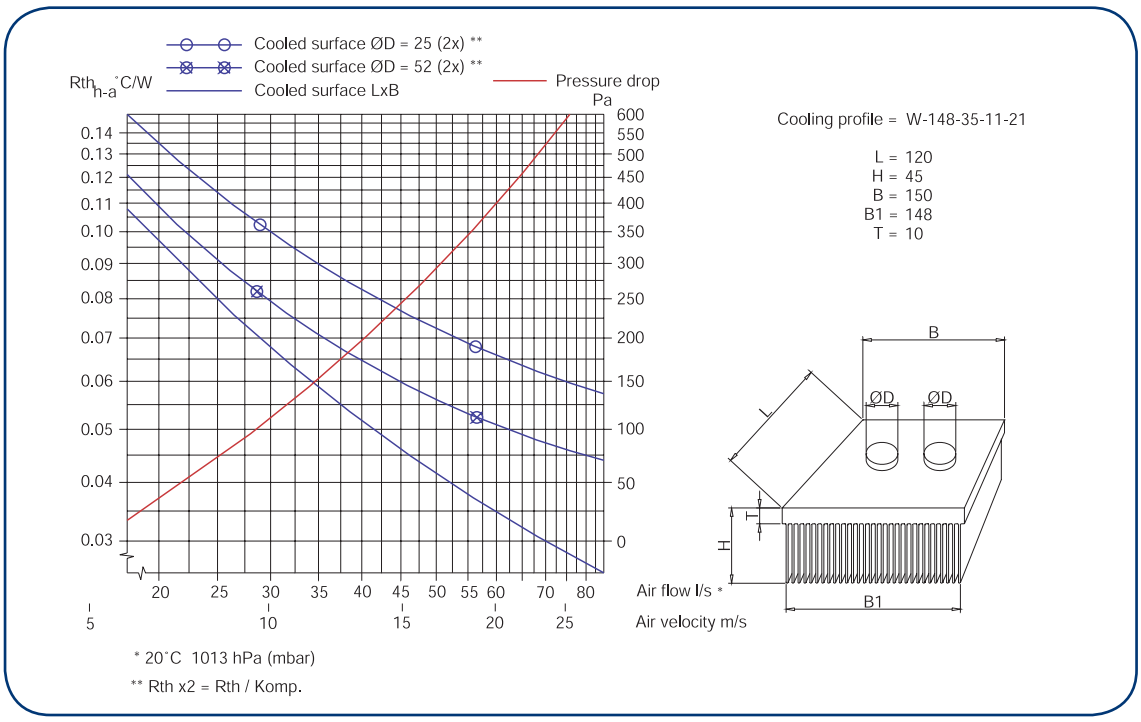


W-148-35-10-21

Product Dimensions

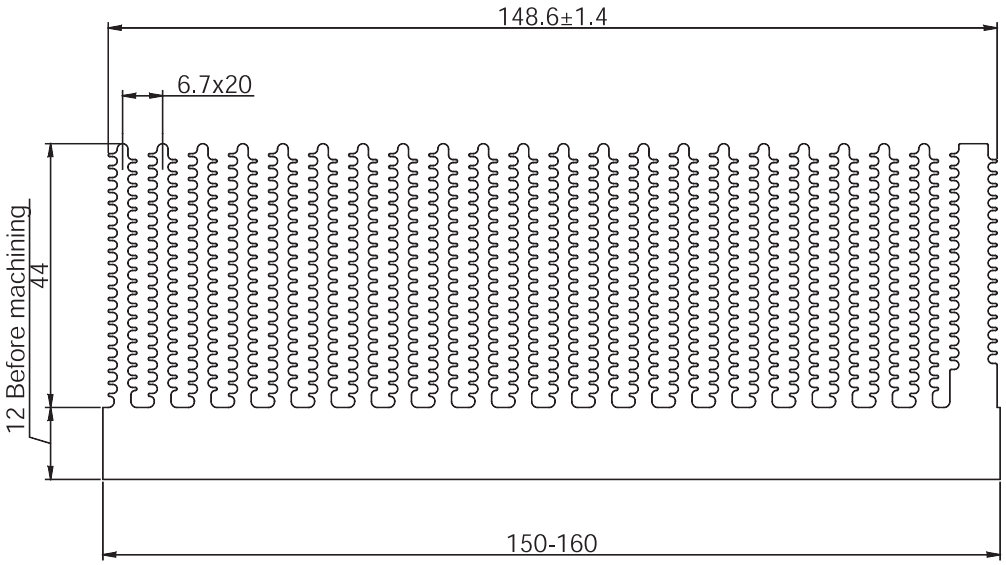


Performance L = 120

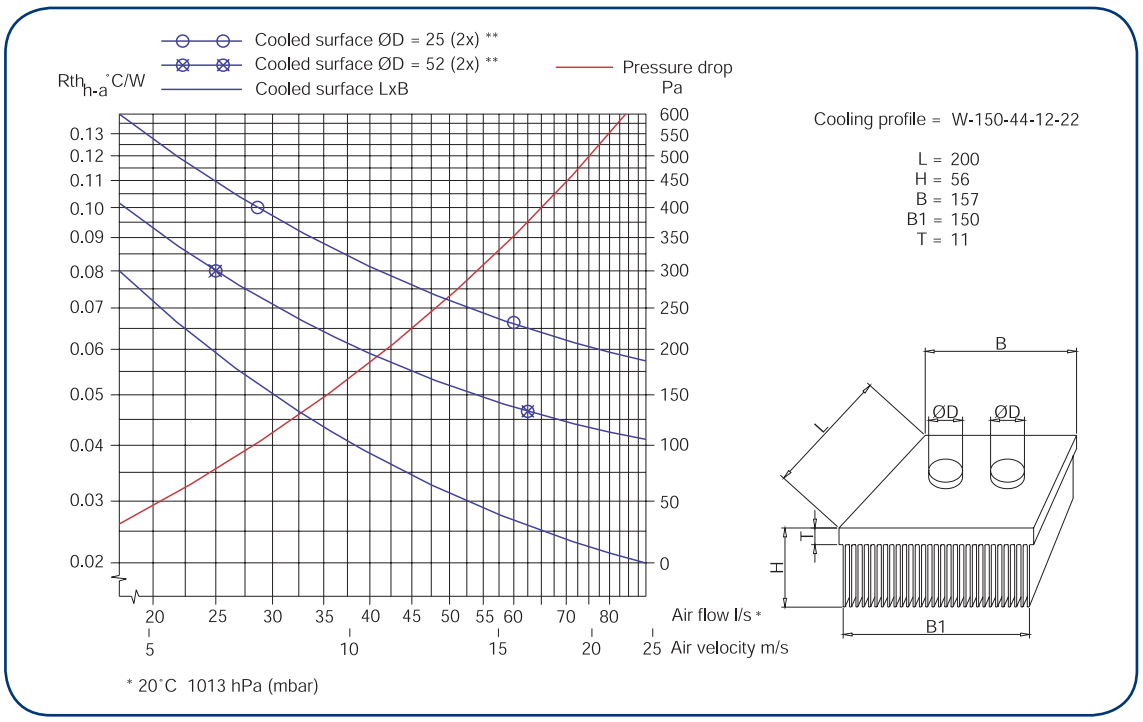


W-150-44-11-22

Product Dimensions

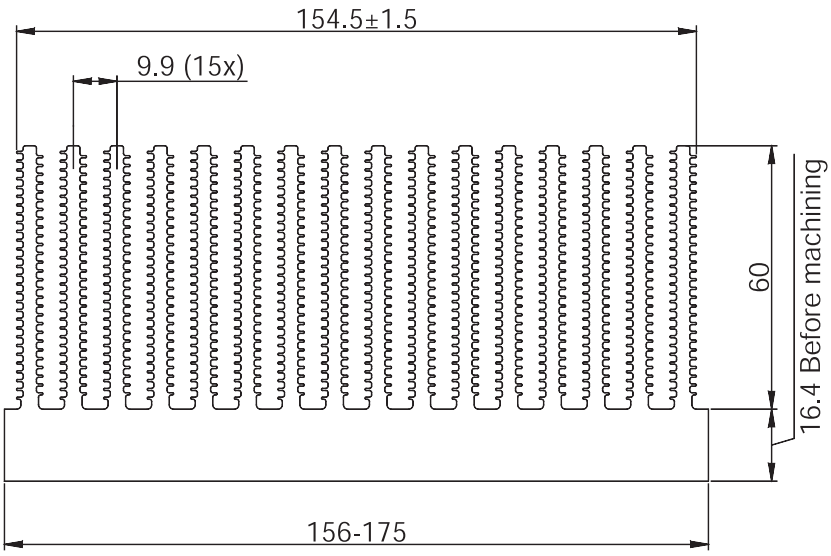


Performance L = 200

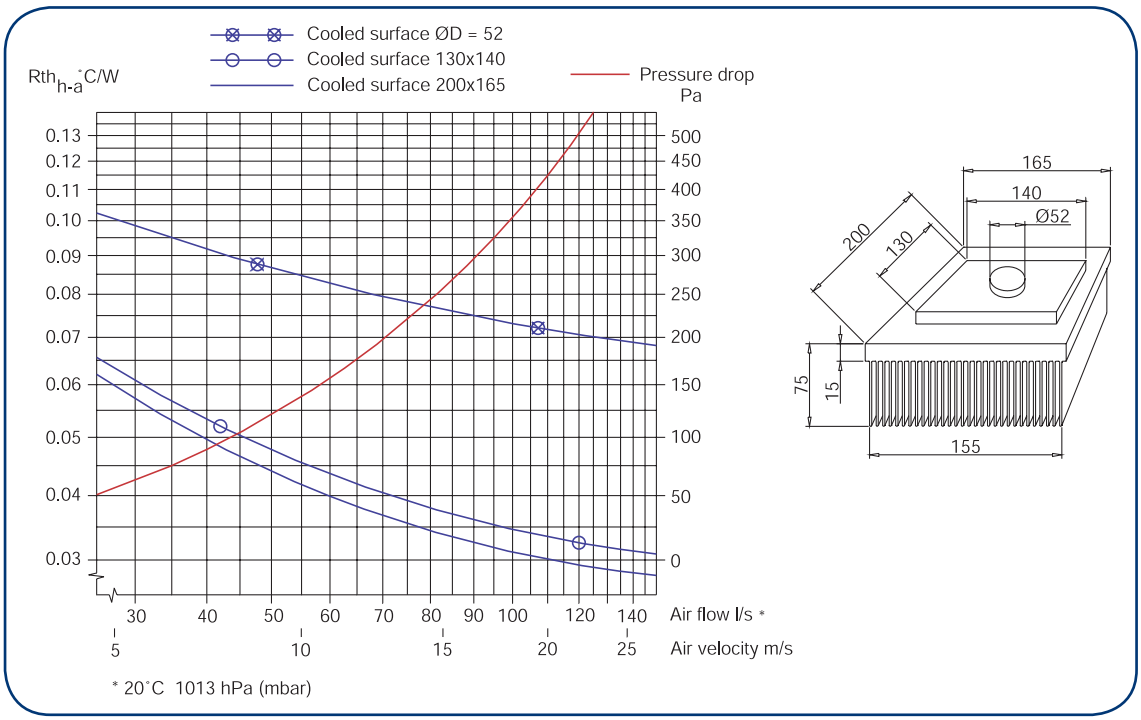


W-155-60-15-16

Product Dimensions

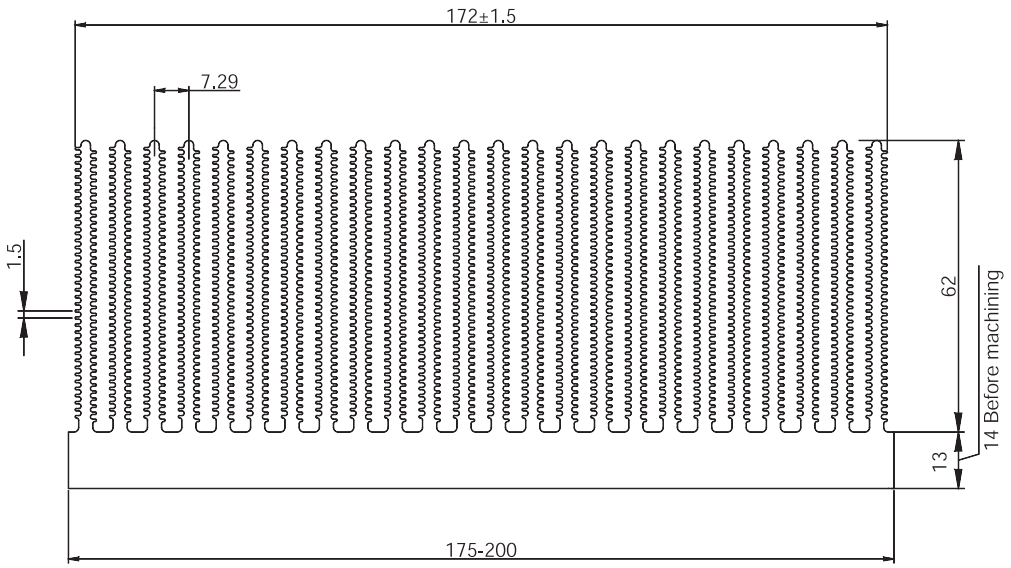


Performance L = 200

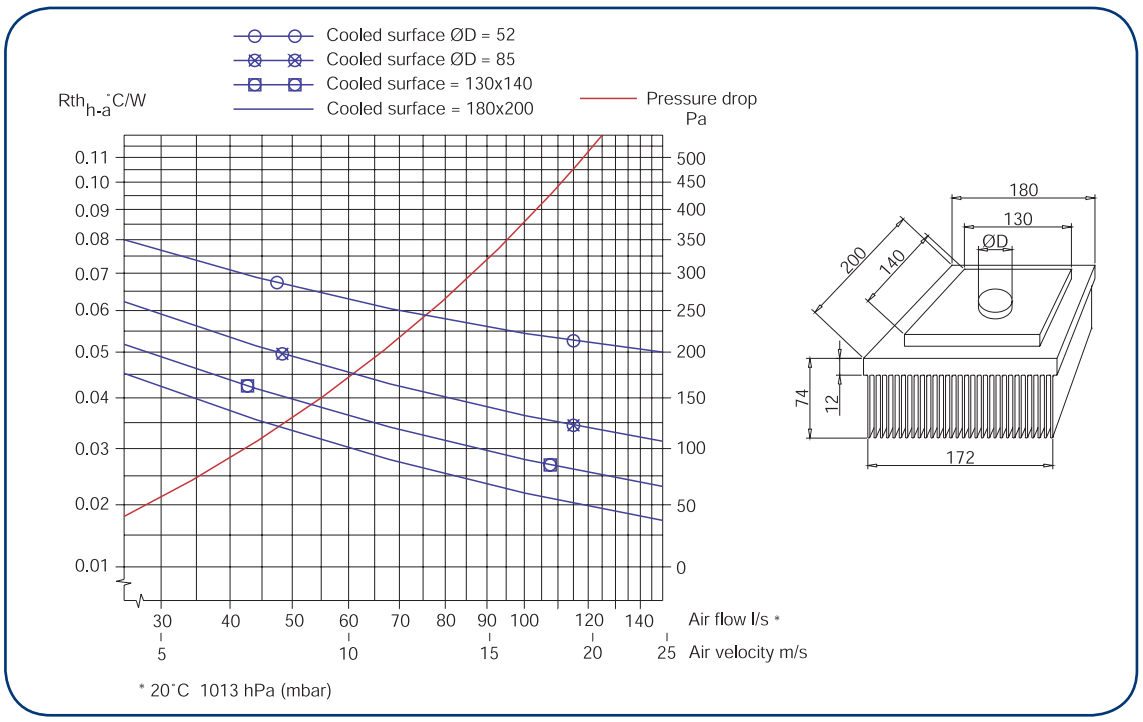


W-172-62-13-24

Product Dimensions

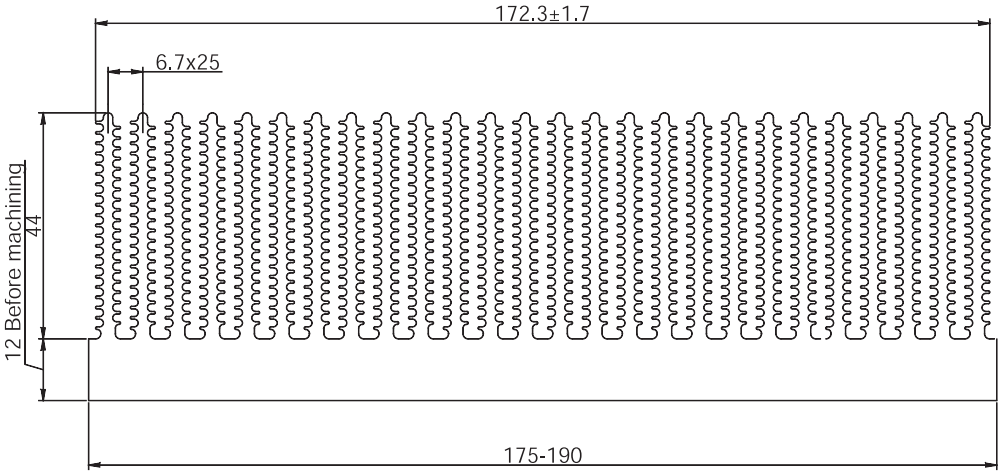


Performance L = 200 (Graph for L=360 available, please contact AMS Technologies sales team)

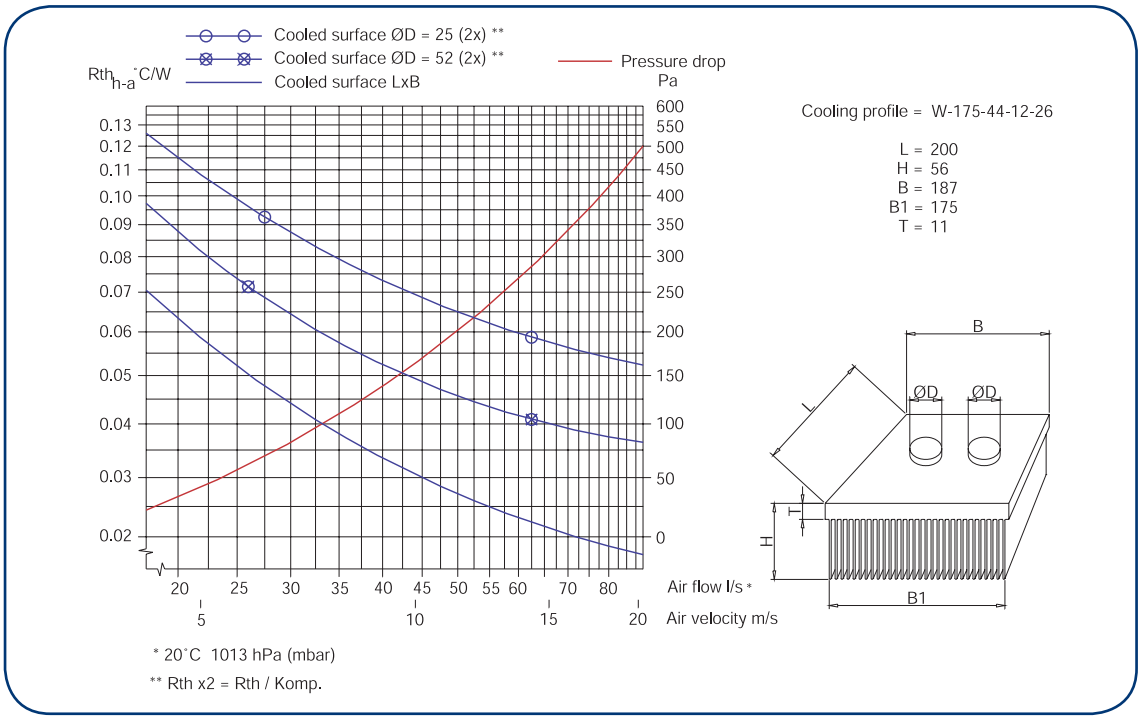


W-175-44-11-26

Product Dimensions

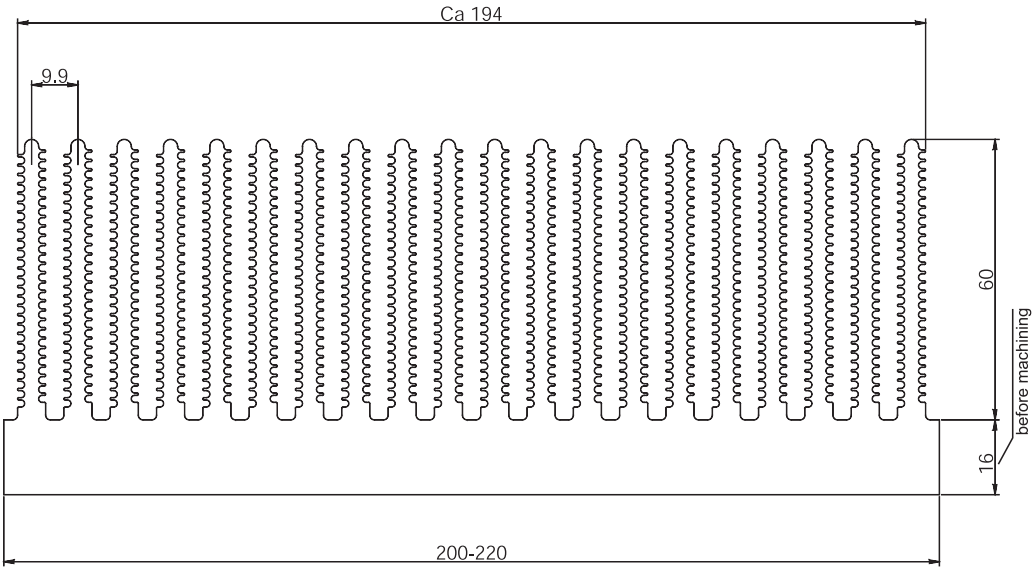


Performance L = 200

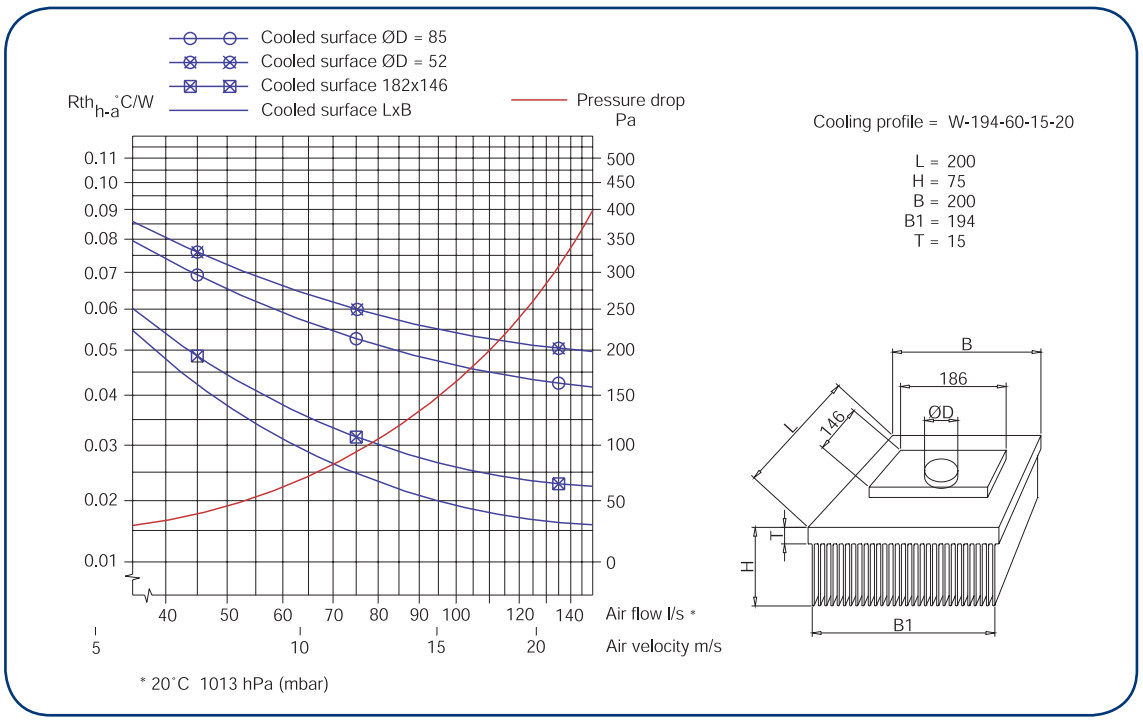


W-194-60-15-20

Product Dimensions

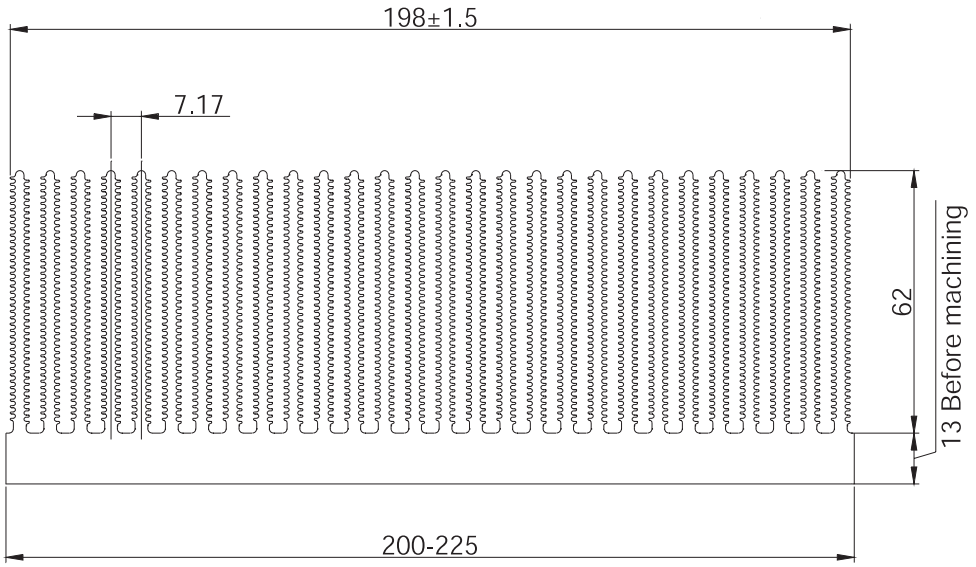


Performance L = 200 (Graph for L=300 available, please contact AMS Technologies sales team)

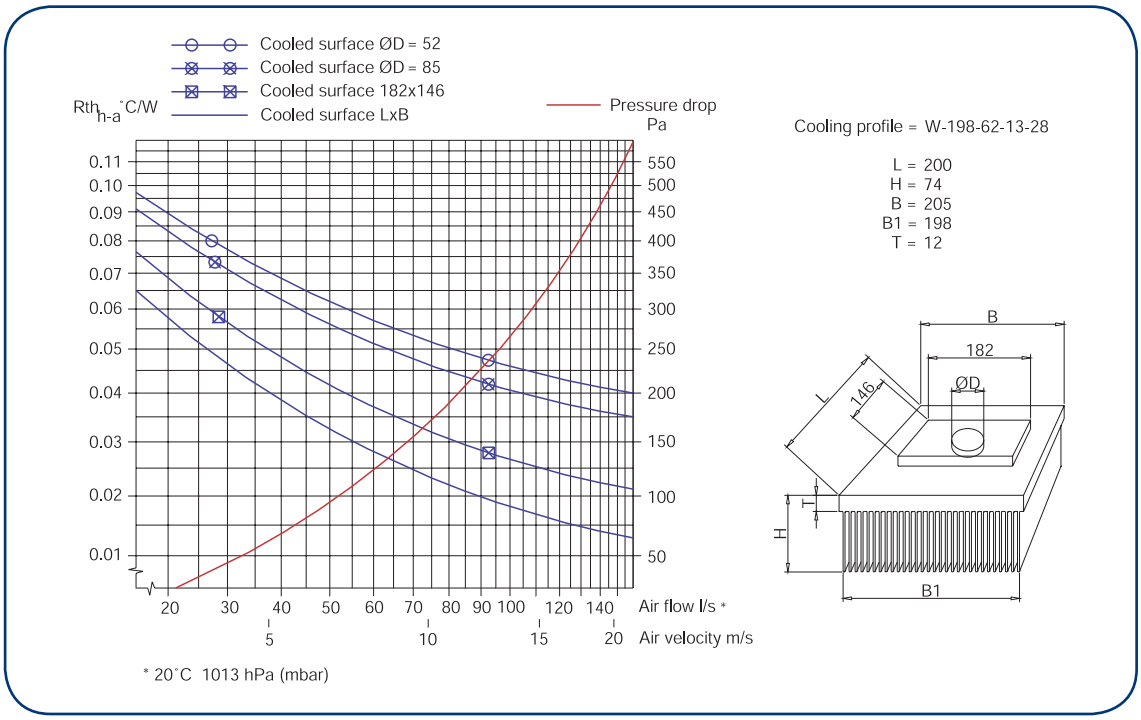


W-198-62-12-28

Product Dimensions

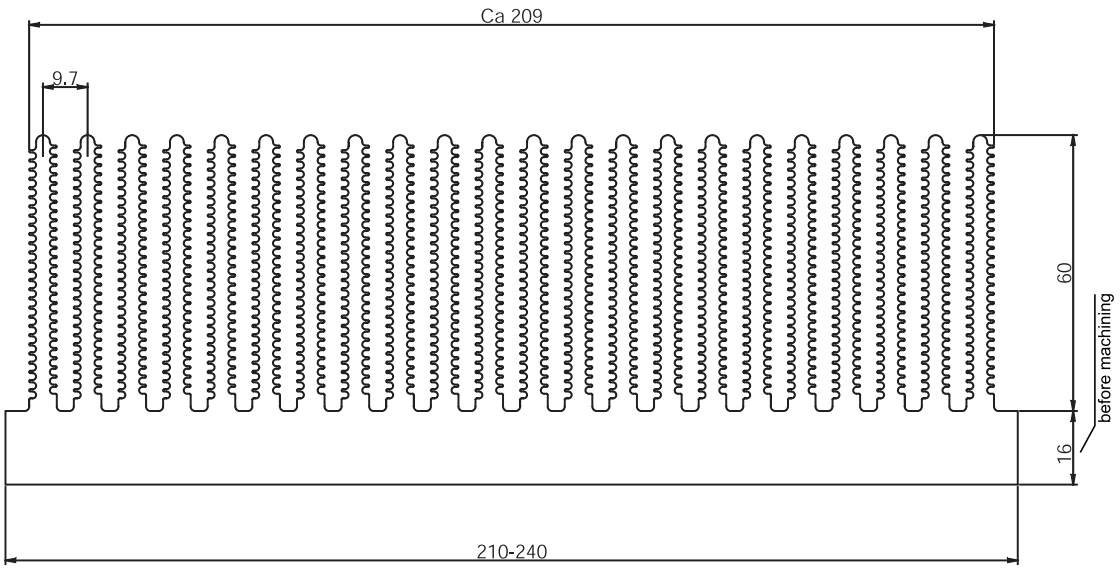


Performance L = 200

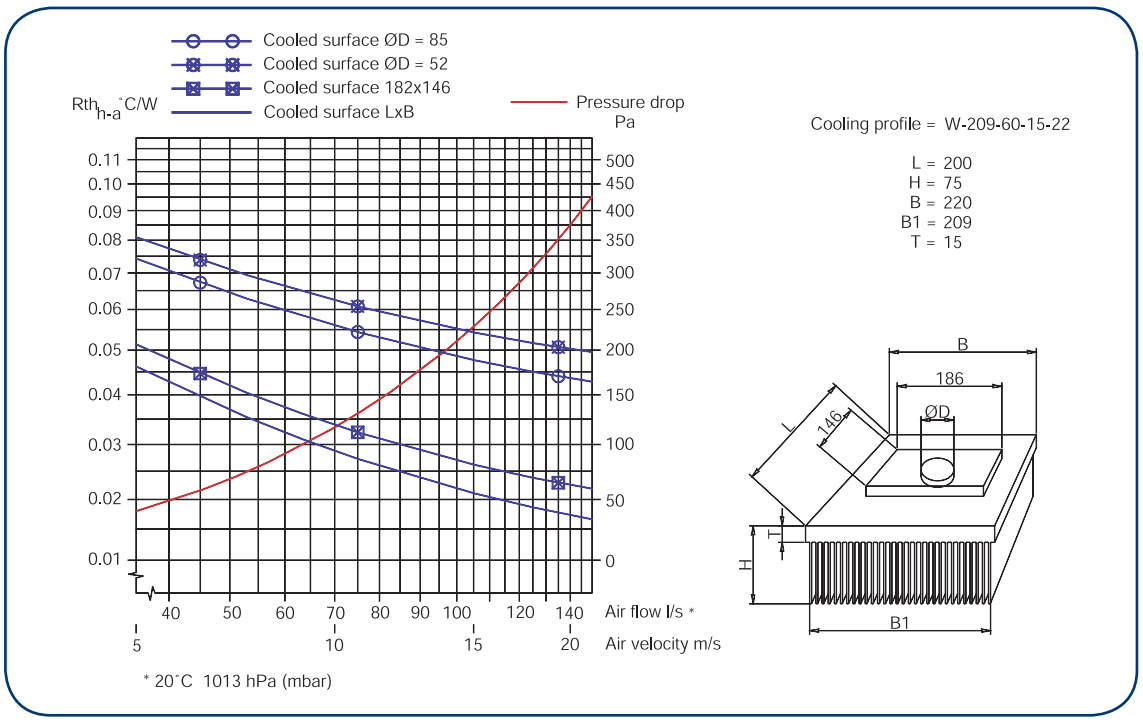


W-209-60-15-22

Product Dimensions



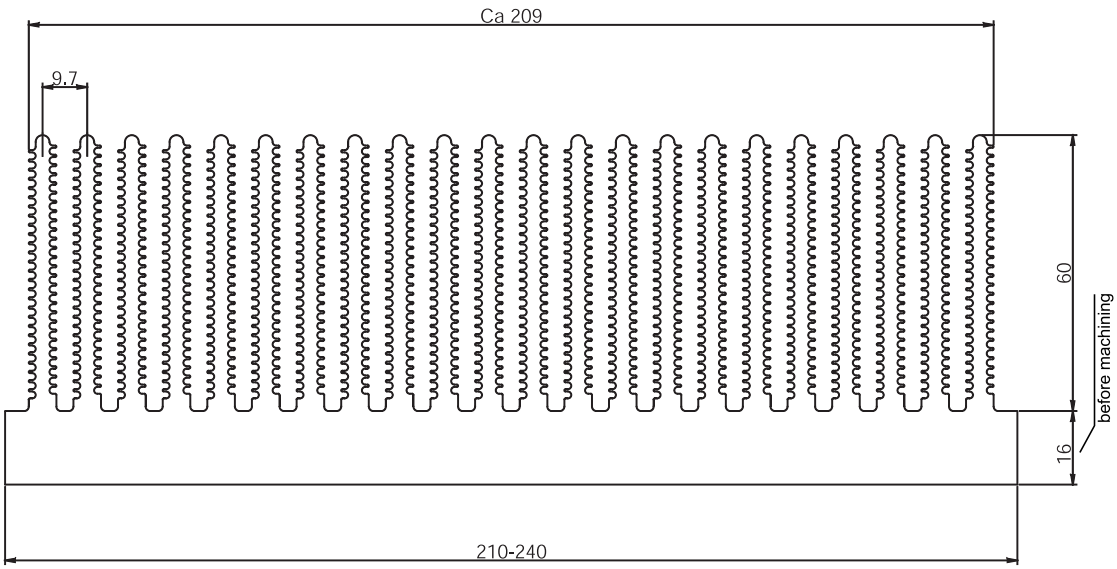
Performance L = 200



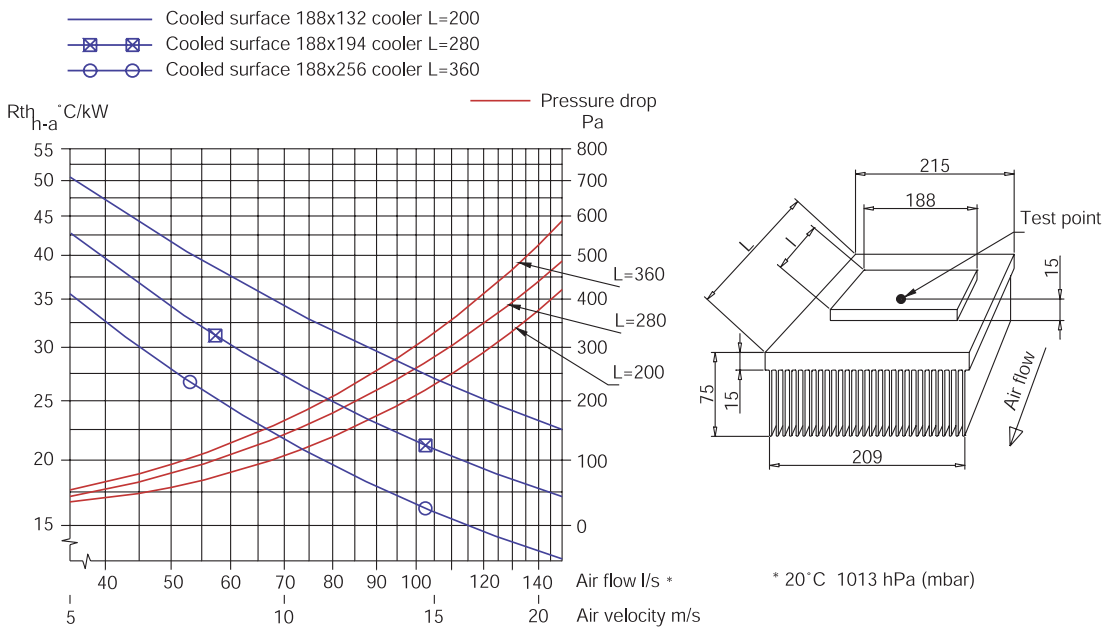
amsTECHNOLOGIES
where technologies meet solutions

W-209-60-15-22 Continuation

Product Dimensions

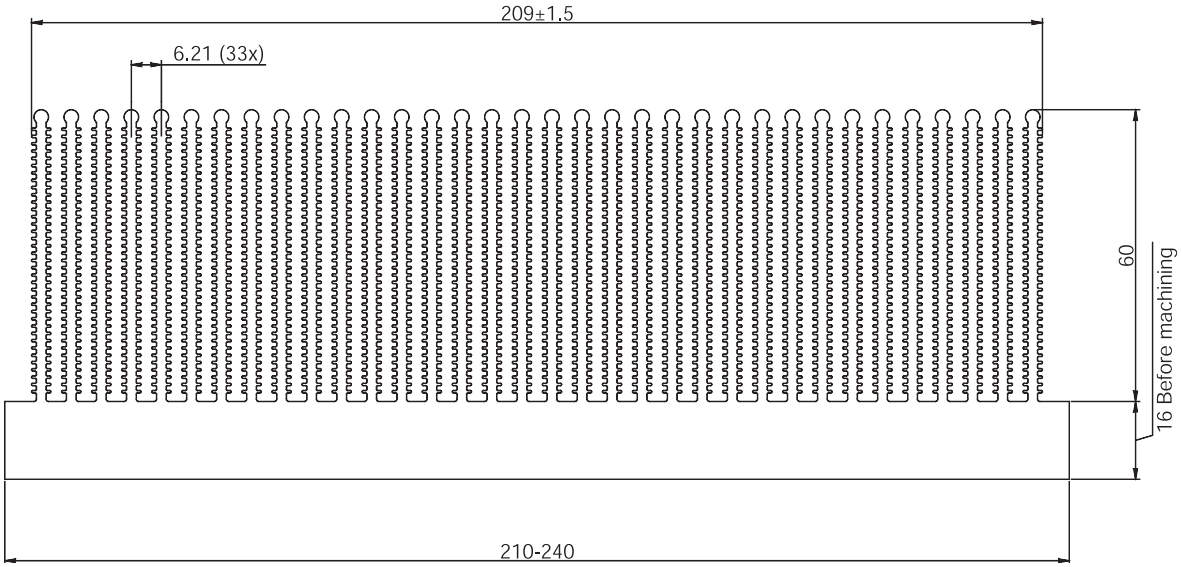


Performance L = 200, L = 280, L = 360

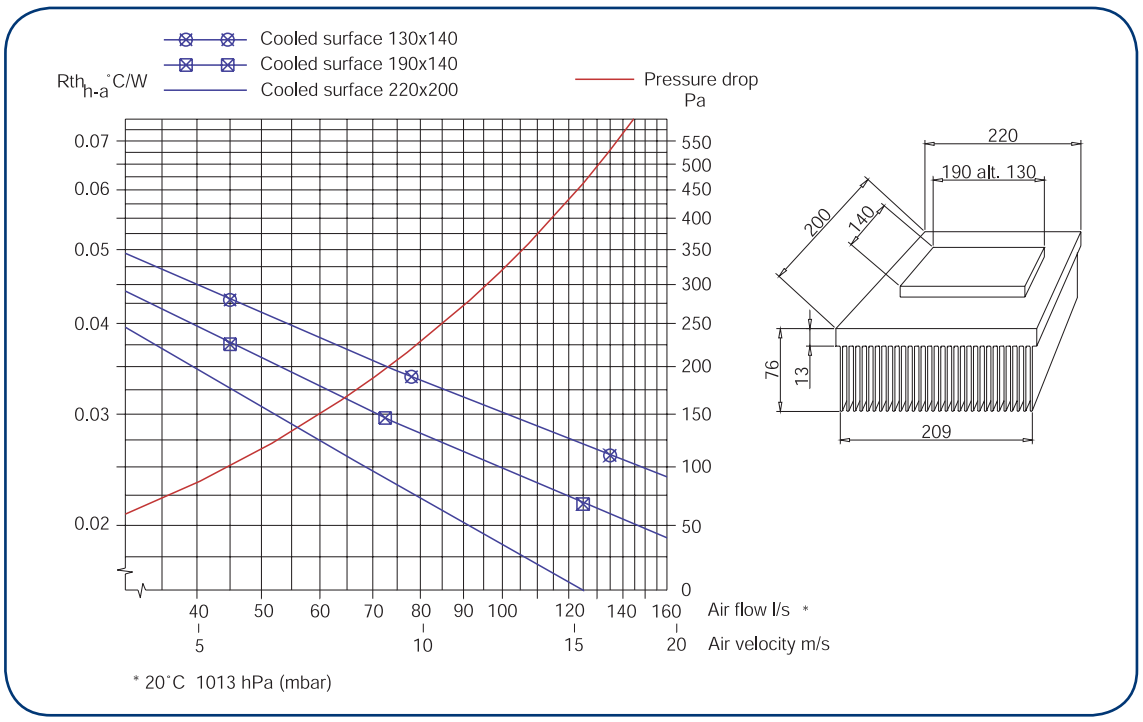


W-209-60-15-34

Product Dimensions

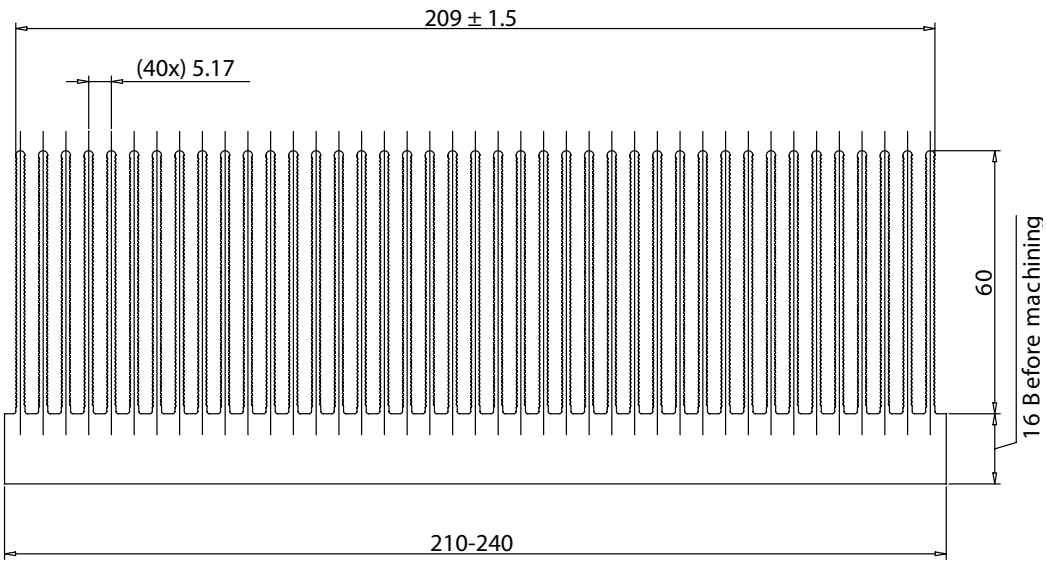


Performance L = 200

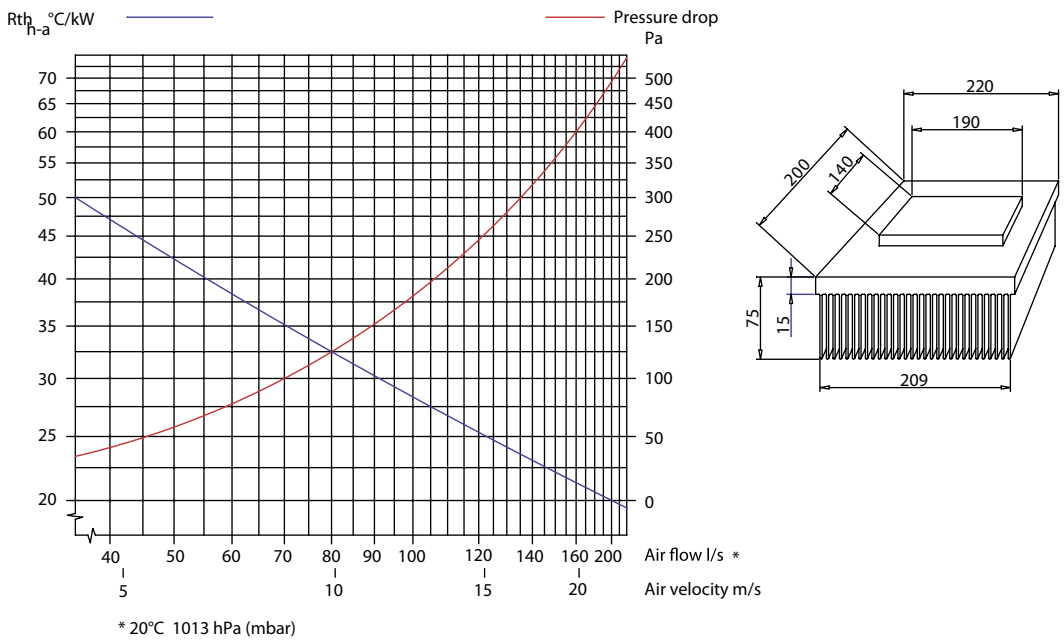


W-209-60-15-41

Product Dimensions

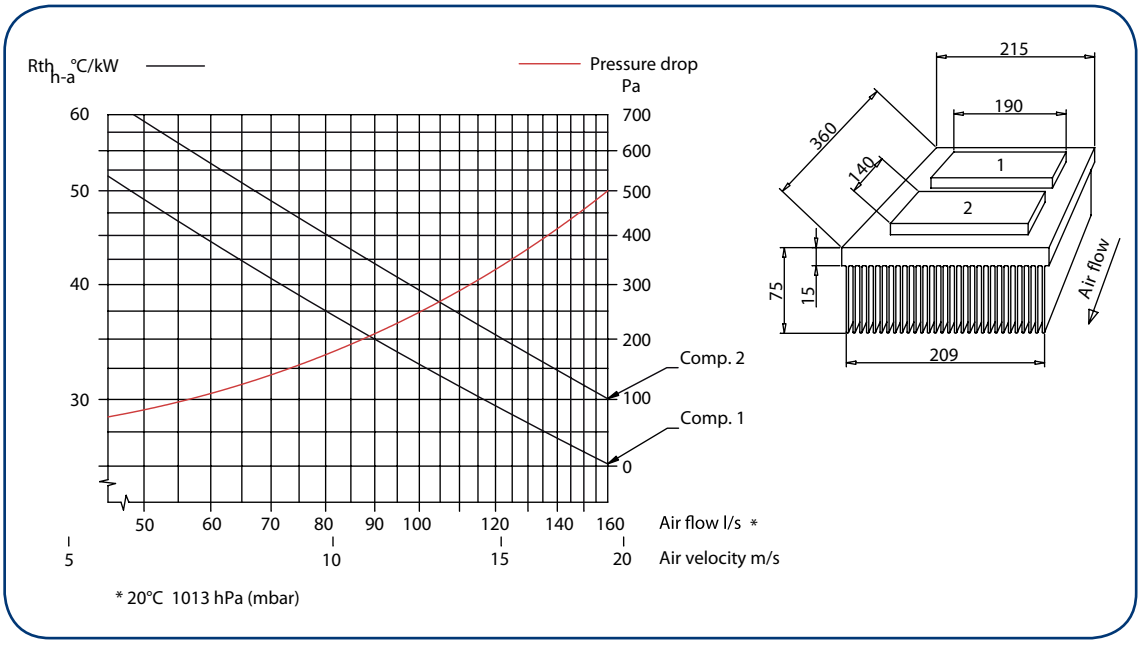


Performance L = 200

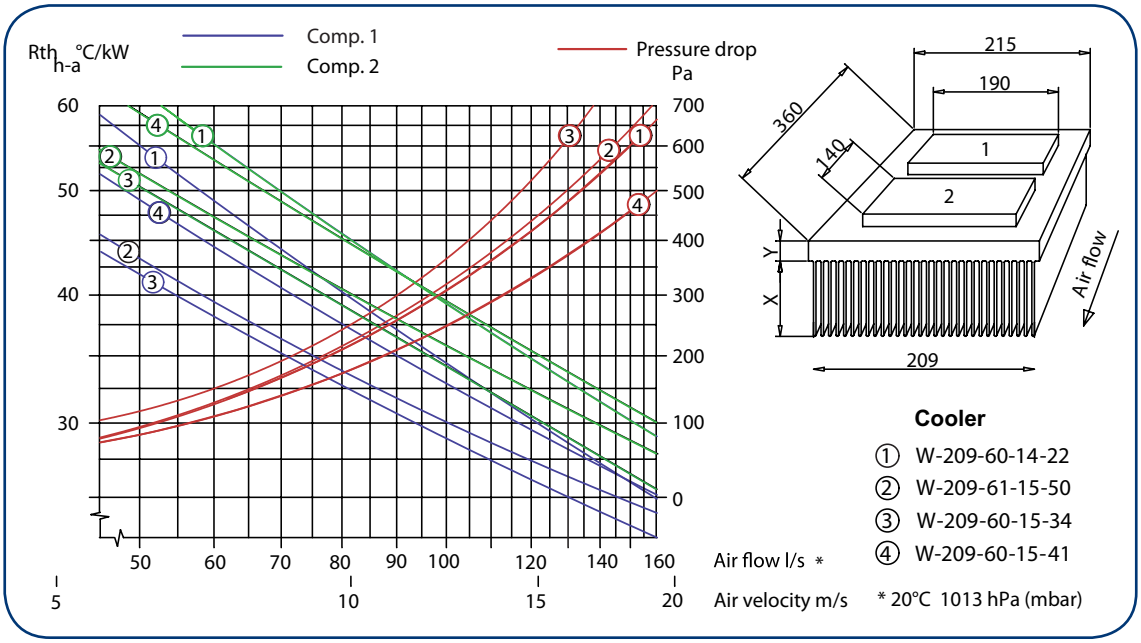


W-209-60-15-41 Continuation

Performance L = 360

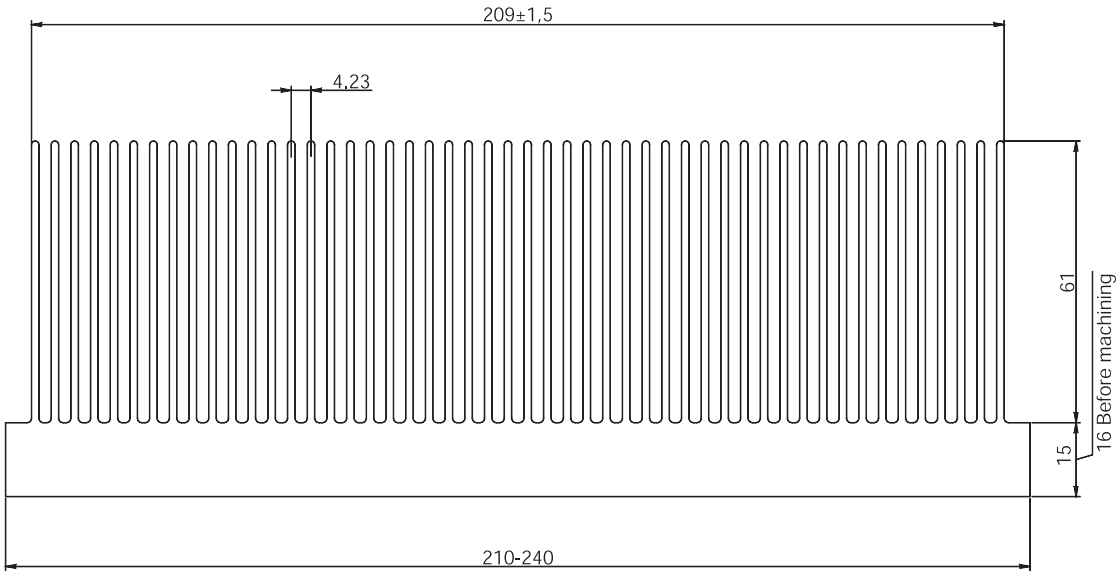


Performance L = 360 Heat sink performance compared to other W-209 profiles

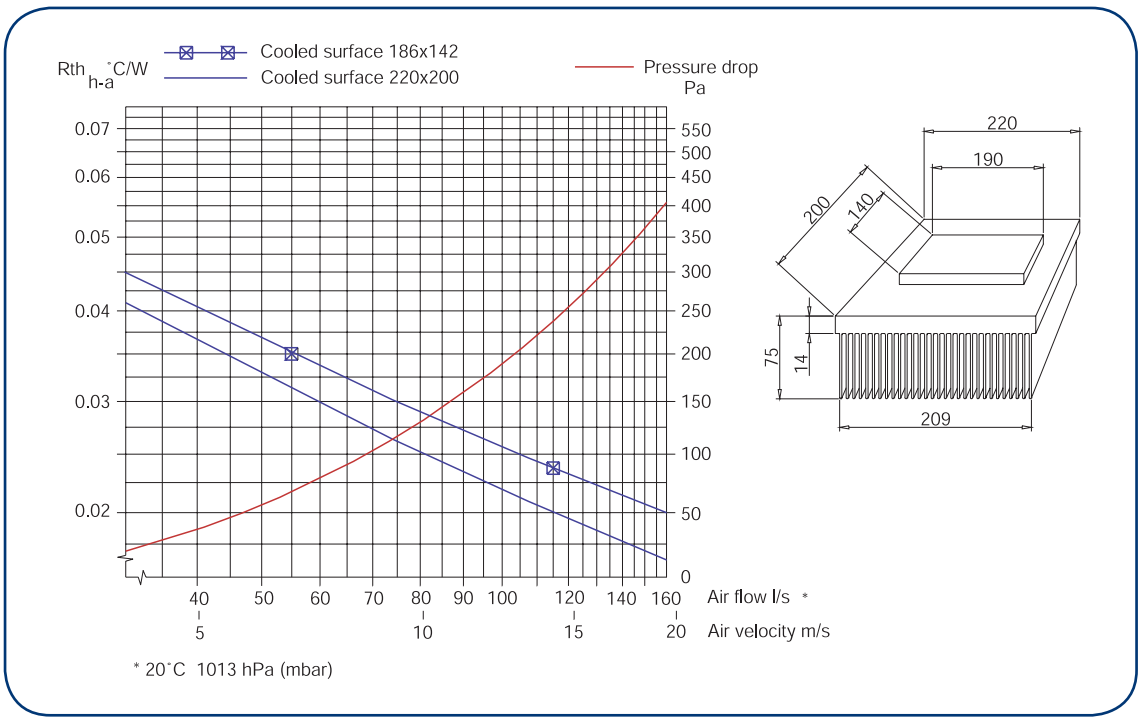


W-209-61-15-50

Product Dimensions

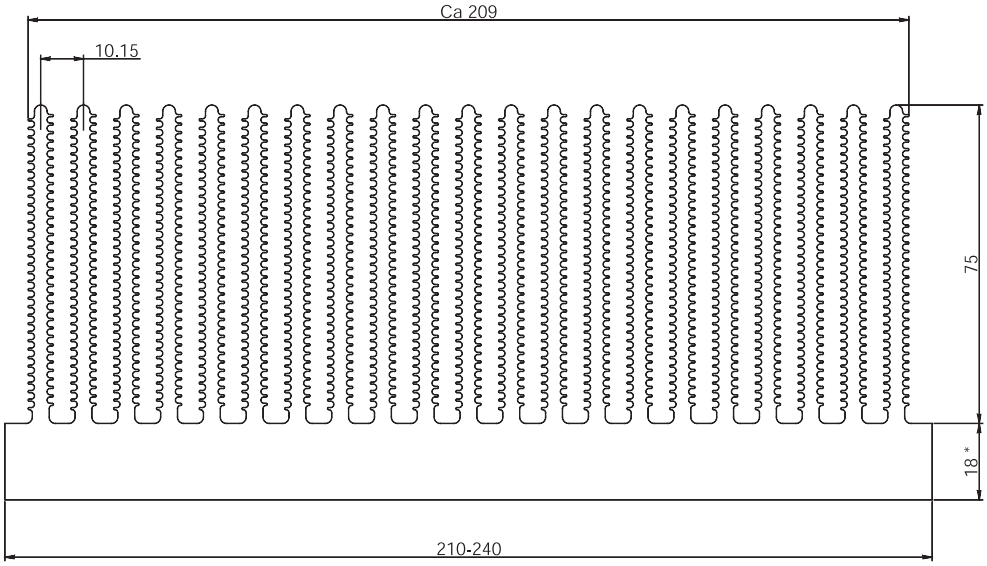


Performance L = 200

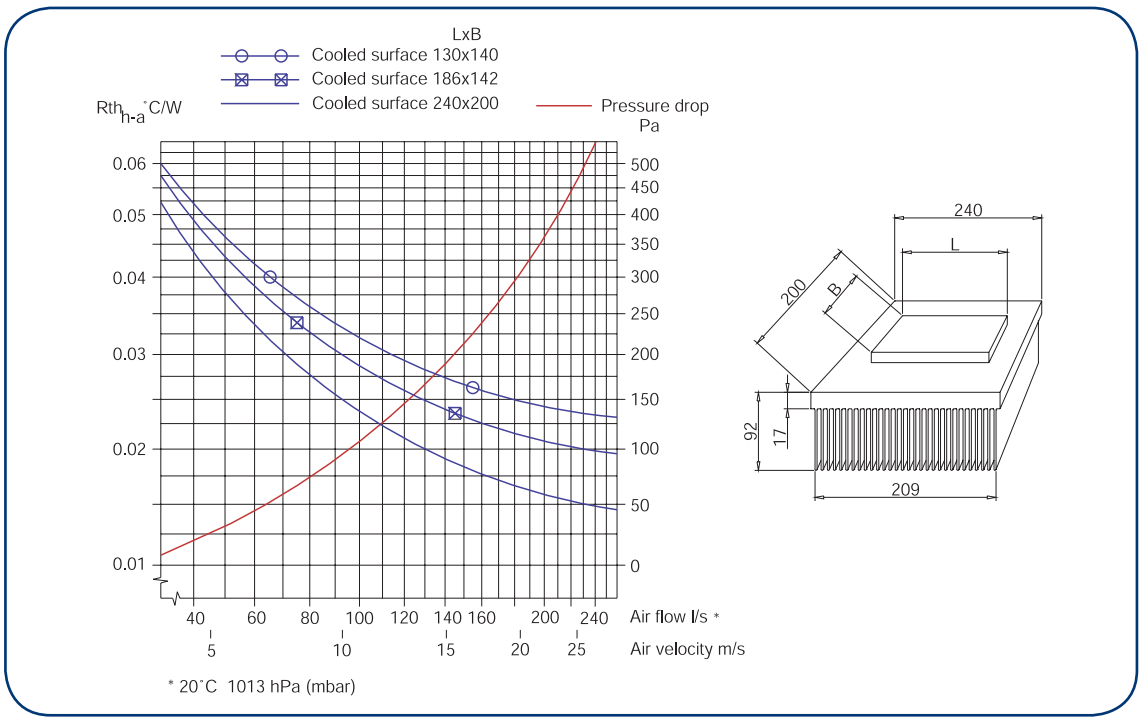


W-209-75-17-21

Product Dimensions

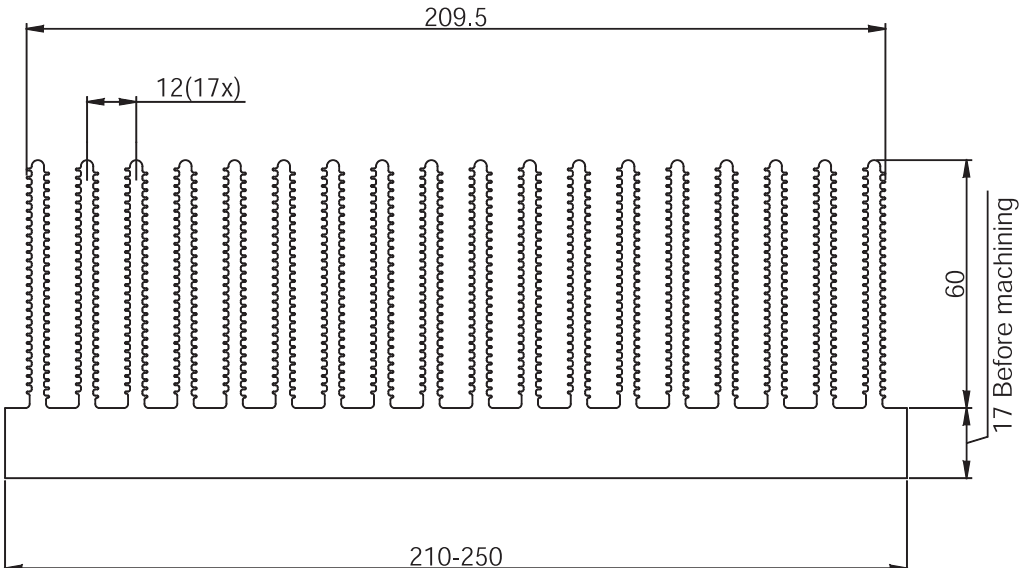


Performance L = 200

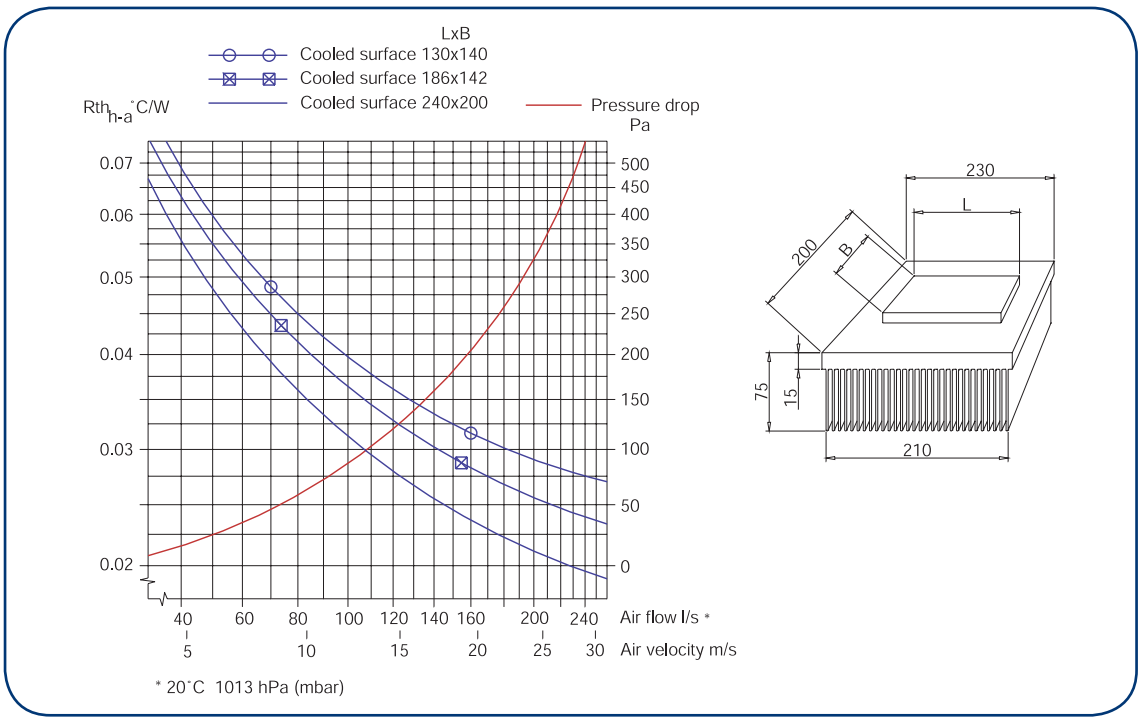


W-210-60-16-18

Product Dimensions

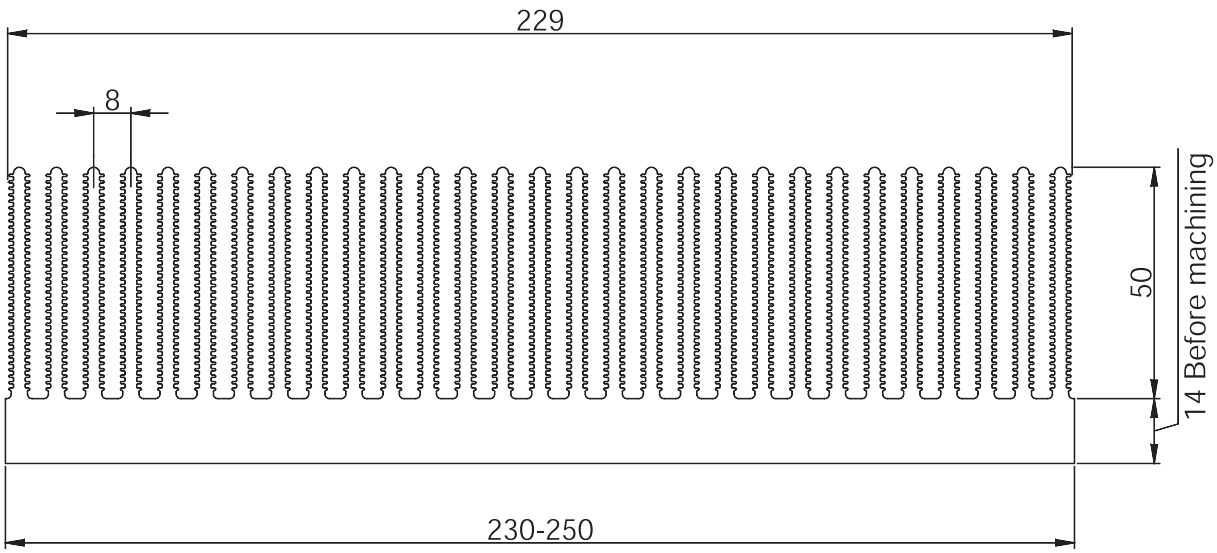


Performance L = 200

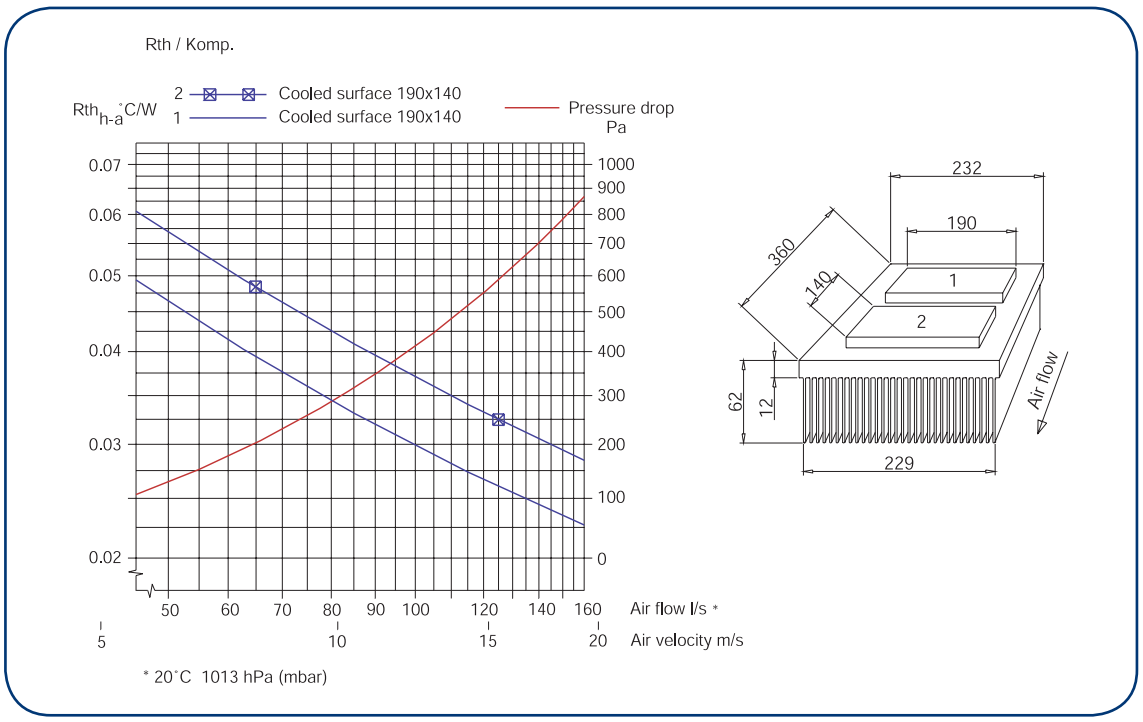


W-229-50-12-29

Product Dimensions

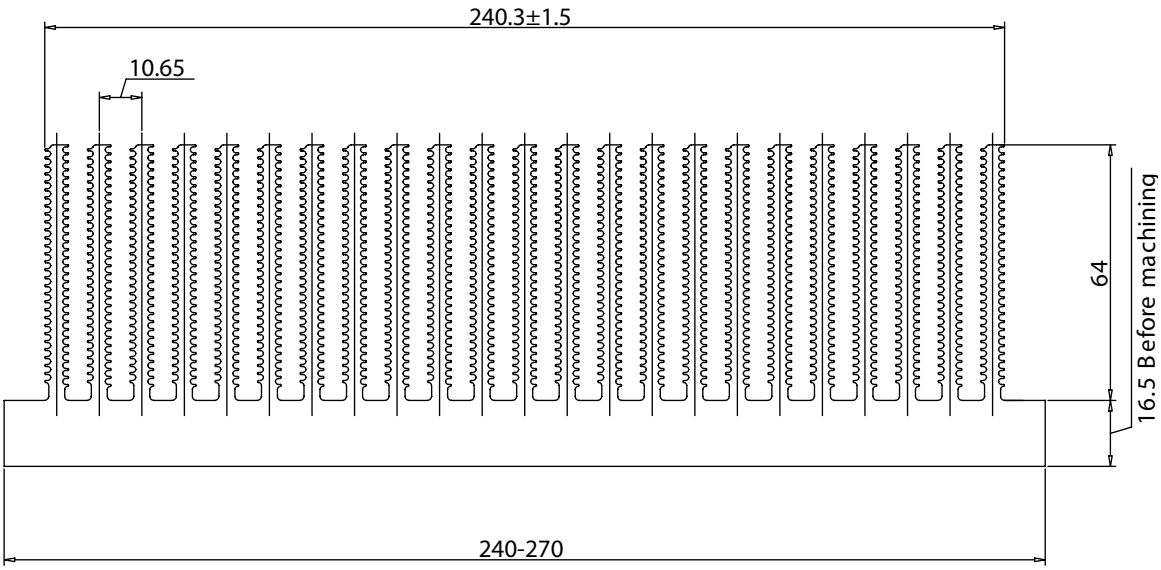


Performance L = 360 (Graph for L=200 available, please contact AMS Technologies sales team)

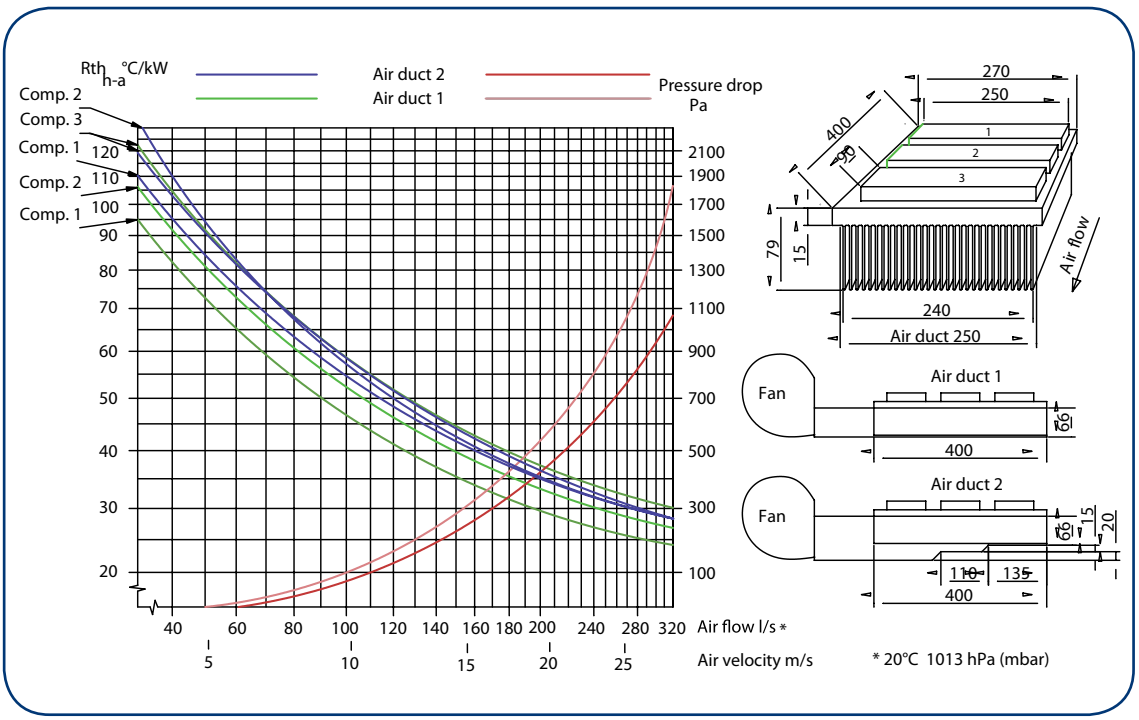


W-240-64-15-23

Product Dimensions

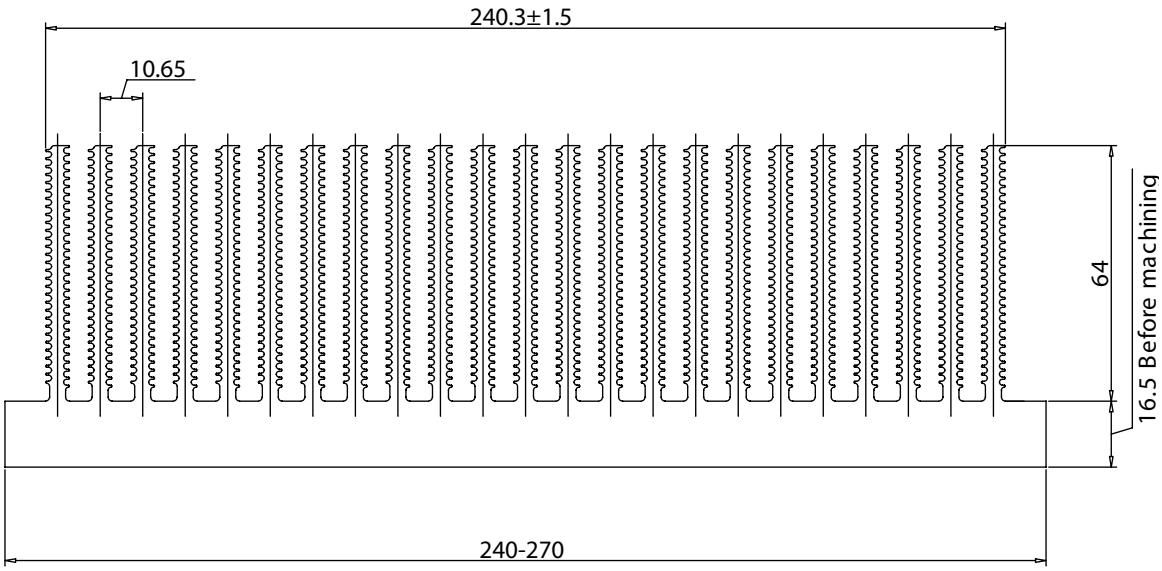


Performance L = 400

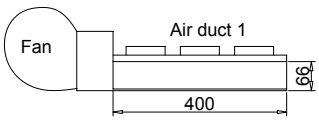


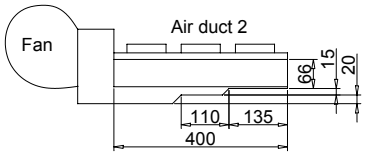
W-240-64-15-23 Continuation

Product Dimensions



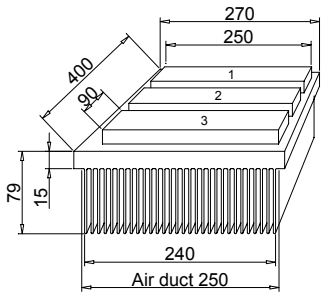
Performance L = 400

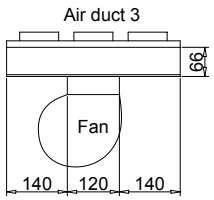




Fan	Pressure drop (Pa)	Air duct	Rth_{h-a} °C/kW Comp.1	Comp.2	Comp.3
RE22P-2DK.3F.1R	910	1	27.4	31.3	34.2
ebm D2E135-AM47-70	280	1	39.1	48.1	55.1
RD135-2EP.WC.2R	98	1	56.6	70.9	79.7
RE22P-2DK.3F.1R	760	2	30.2	32.9	33.1
ebm D2E135-AM47-70	240	2	44.1	51.3	53.9
RD135-2EP.WC.2R	94	2	63.8	73.6	77.3
RE22P-2DK.3F.1R	420	3	30.5	27.7	30.5
ebm D2E135-AM47-70	100	3	44.9	40.6	44.9
RD135-2EP.WC.2R	40	3	68.5	63.5	68.5

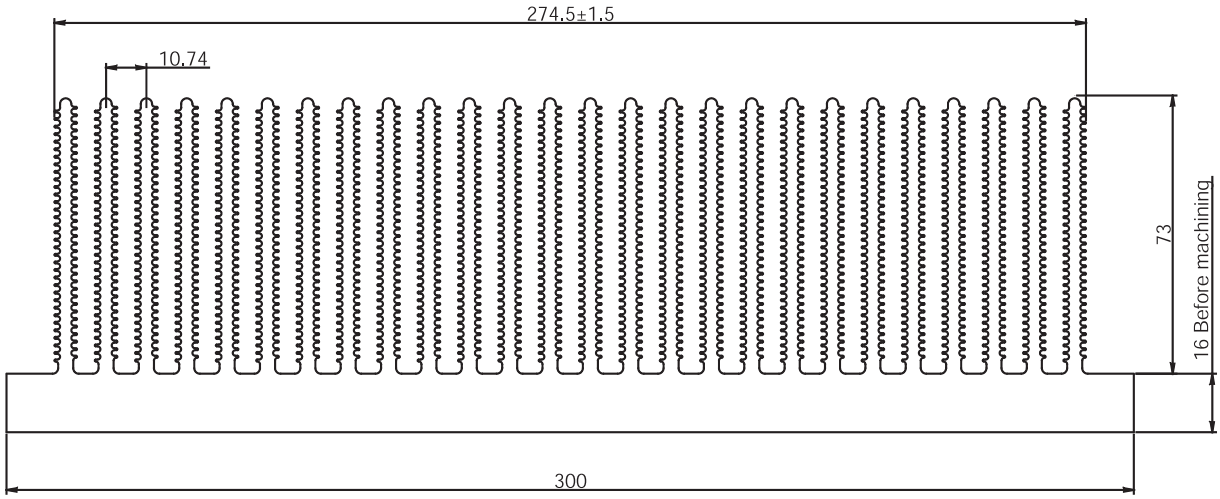
Rem. Ambient air temerature before fan.



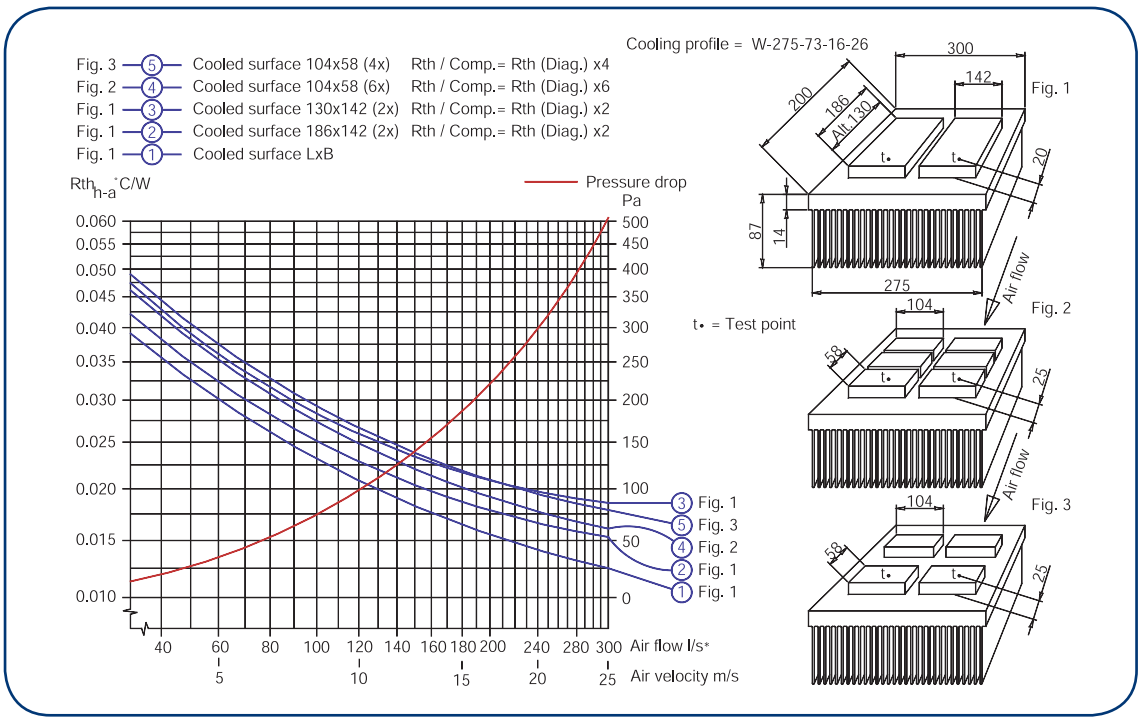


W-275-73-15-26

Product Dimensions

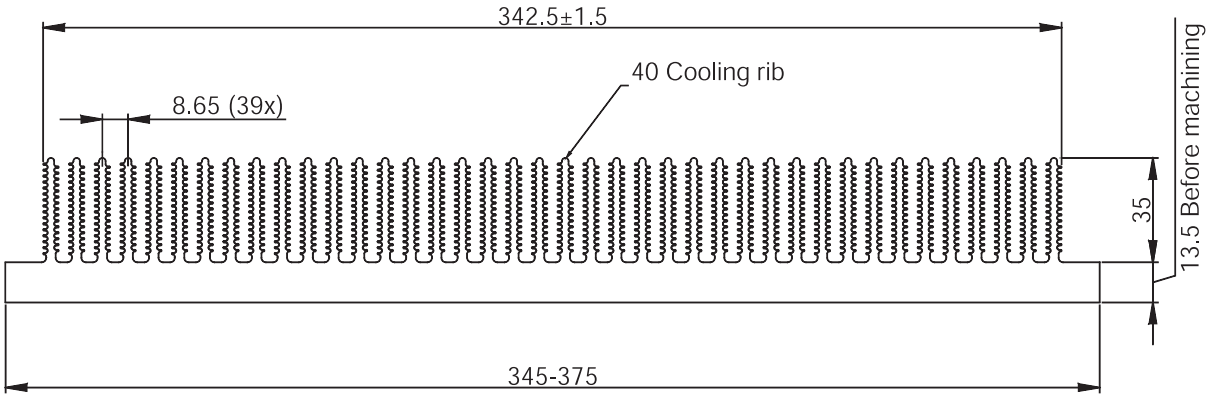


Performance L = 200

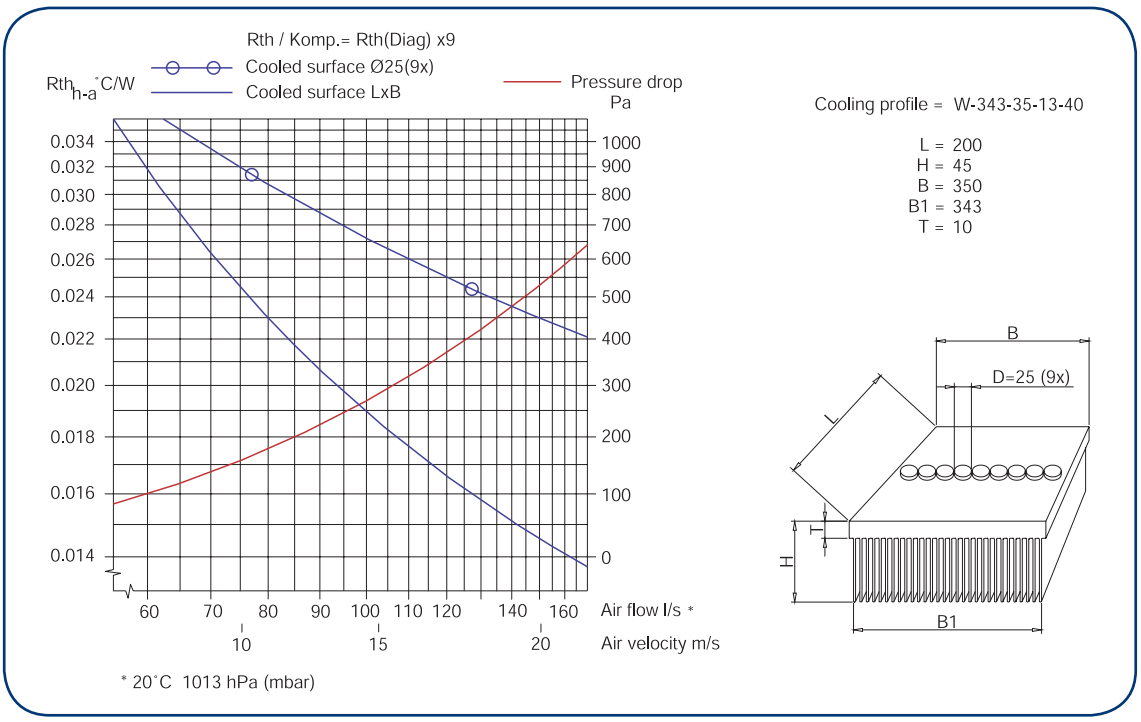


W-343-35-12-40

Product Dimensions



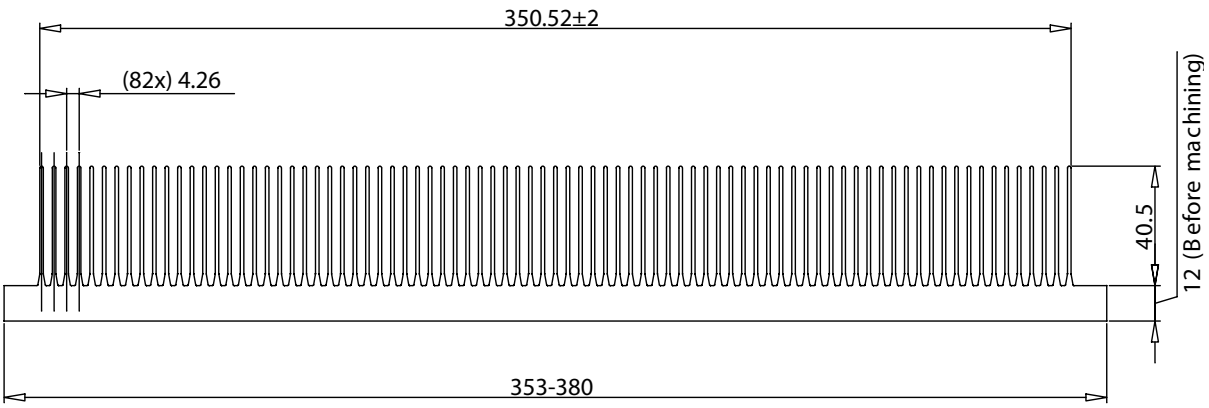
Performance L = 200 (Graph for different configurations of components available, please contact AMS Technologies sales team)



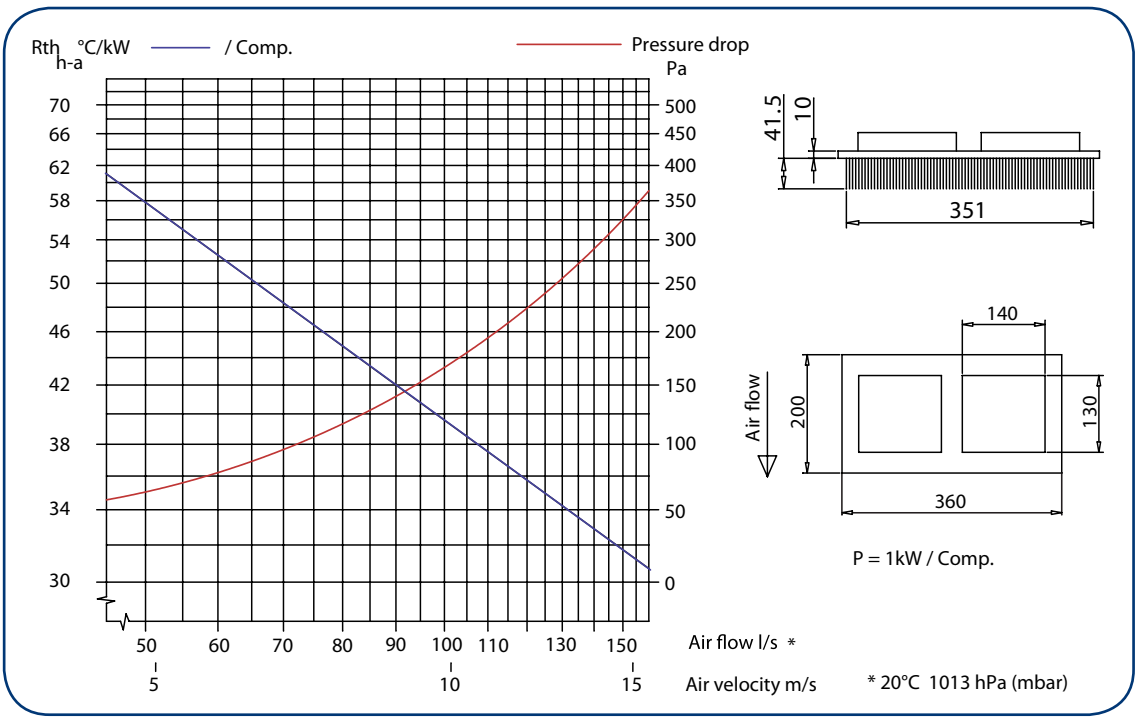
amsTECHNOLOGIES
where technologies meet solutions

W-351-41-10-83

Product Dimensions

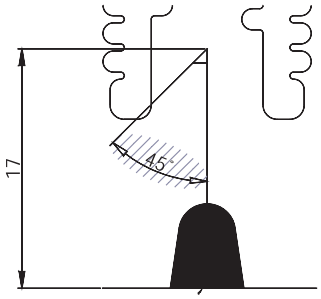


Performance L = 200

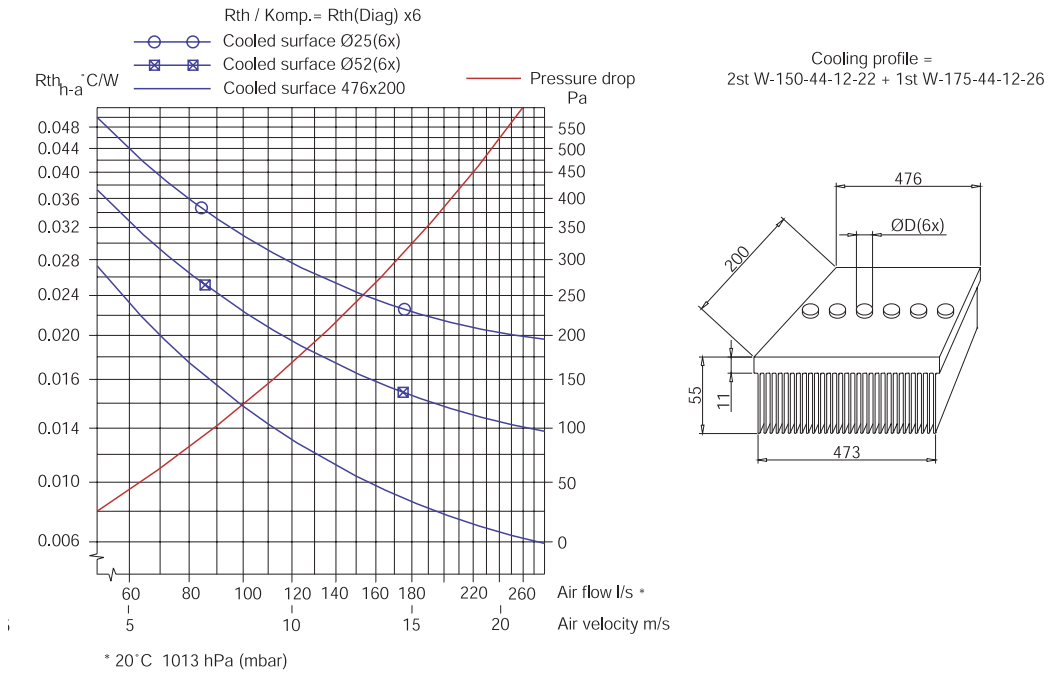


W-473-44-11-70

Product Dimensions

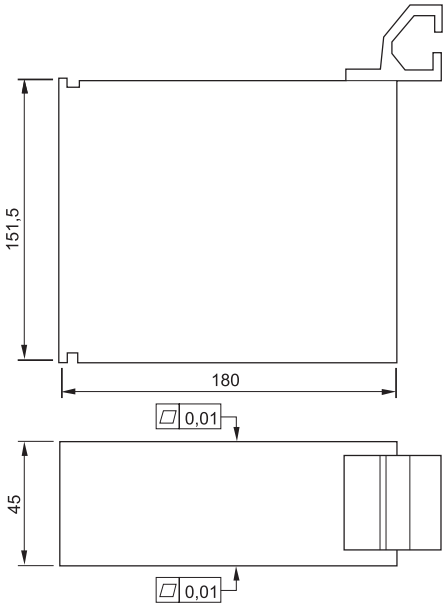


Performance L = 200



W-GTM-45

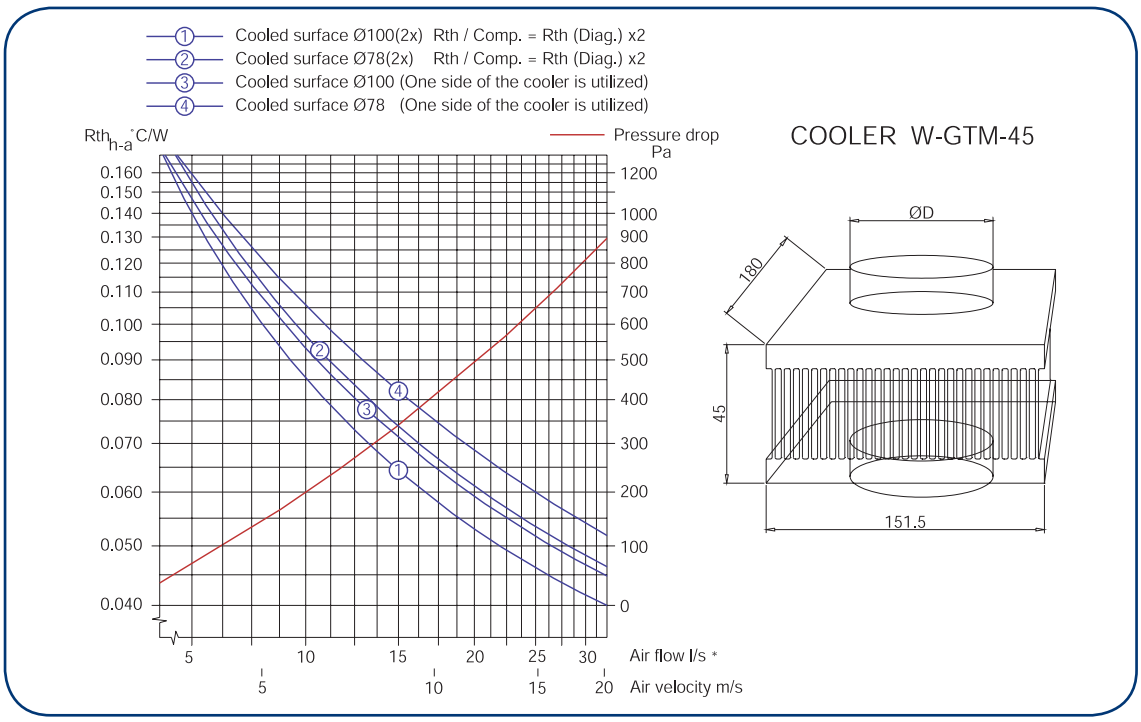
Product Dimensions



Options:
- A: no bus bar
- B: 1 bus bar
- C: 2 bus bars

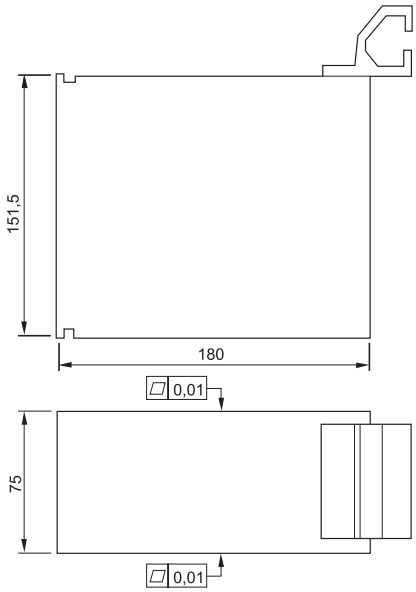
Anodized Nickel plated

Performance L = 180



W-GTL-75

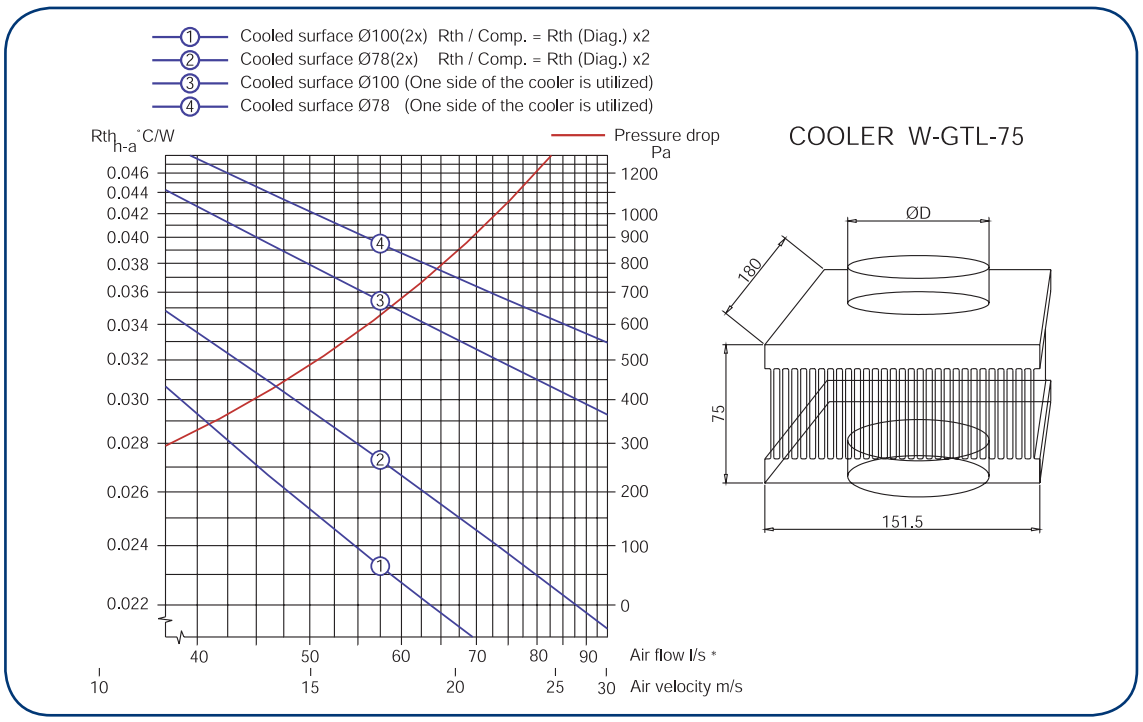
Product Dimensions



Options:
- A: no bus bar
- B: 1 bus bar
- C: 2 bus bars

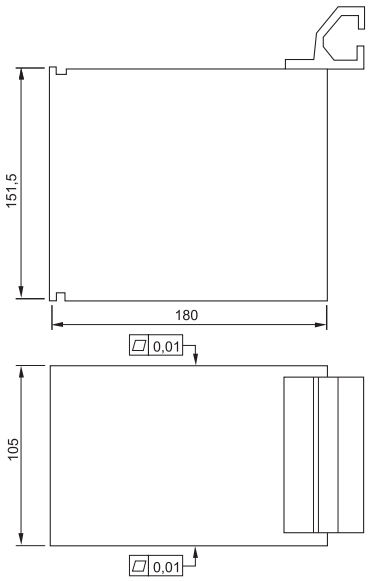
Anodized Nickel plated

Performance L = 180



W-GTK-105

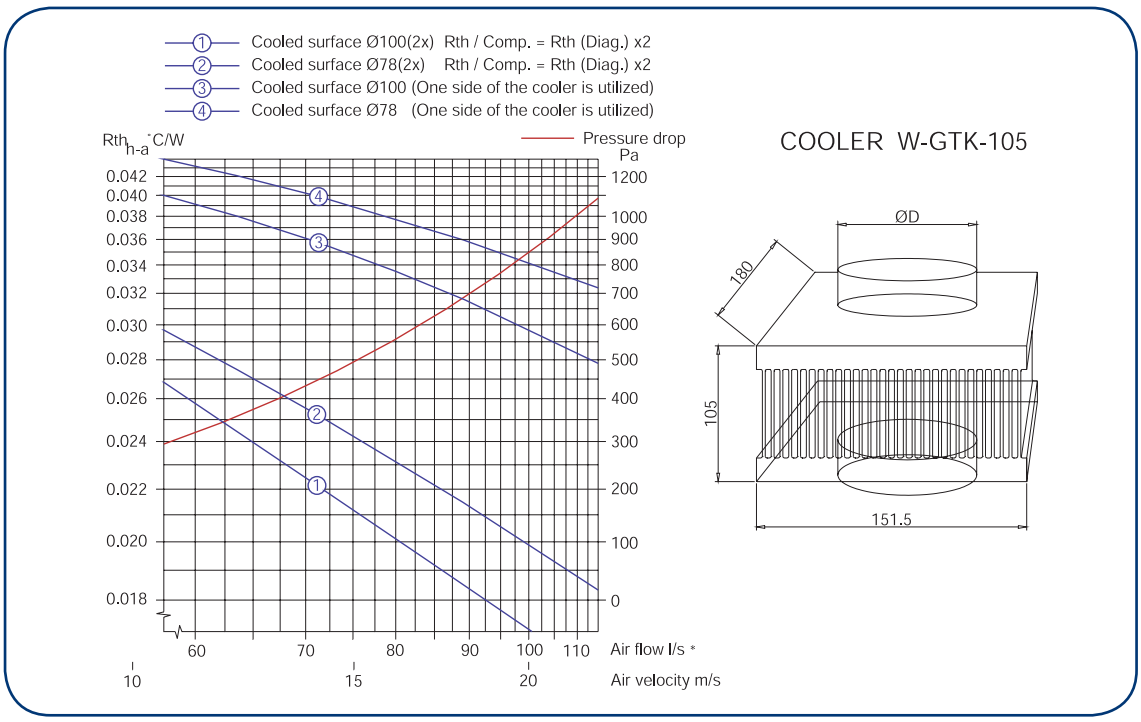
Product Dimensions



Options:
- A: no bus bar
- B: 1 bus bar
- C: 2 bus bars

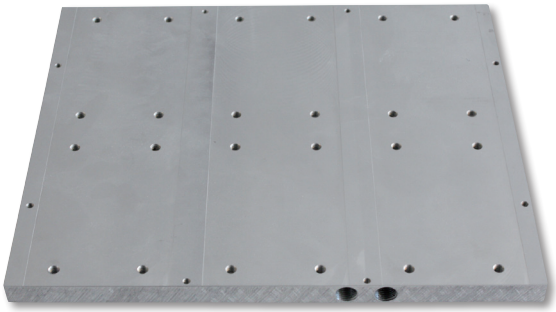
Anodized Nickel plated

Performance L = 180



ALUMINUM COOLER PLATES FRICTION STIR WELDED

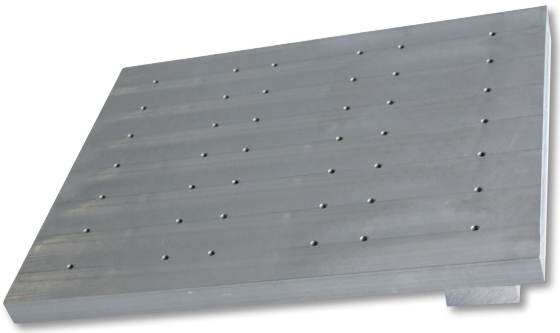
Water Coolers for Power Semiconductors



(6×) 62 mm module cooler

Power electronics engineers across Europe develop new converter/ inverter systems for renewable energy, transportation, defense, energy transmission and industrial applications. Your goals of increasing power densities and utilizing newly launched IGBT modules and innovative concepts frequently benefit from customized cooling solutions. Webra and AMS Technologies are proud to offer leading edge thermal solutions and products.

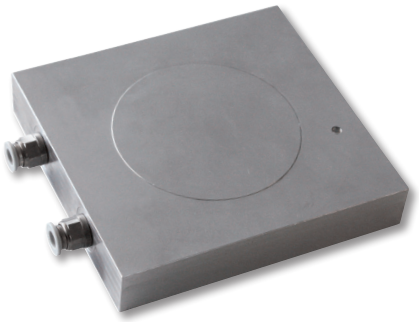
Water coolers for IGBT modules



PrimePack 3 cooler*

Aluminum water coolers for IGBT modules 140x190, 130x 140, Infineon PrimePACK2 and PrimePACK3, EconoPACK3, Semikron SKiiP3 and SKiiP4, SKiM63 and 93, Semipack2, Fuji Electric High Power 6-Pack, Mitsubishi Mega Power Dual IGBT and others are available in standard configurations. Thermo- and fluid dynamic behavior may be tailored to your set of IGBT modules. Webra aluminum water coolers utilize modern extrusions and safe seals with friction stir welding.

Water coolers for press-pack discs



Press-pack cooler

A uniform pressure distribution is vital for your press pack discs. Webra's unique makes of aluminum FSW water coolers offer a rigid construction, perfectly flat surfaces for ideal contact and excellent performance. The press pack coolers are suitable for 4", 5" and 6" discs. Different options for disc centering and tools for replacement are available.

Cooler selection by semiconductor component

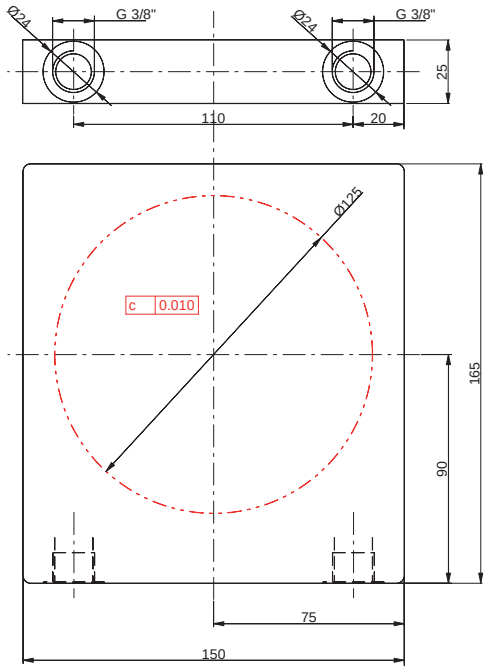
Semiconductor component	Drill pattern	Water-glycol cooler (vattenkylare-L-W-H)	Number of compo-nents[2]	Flow rate, pressure drop[1]	Rth K/kW/Comp (ref. temp.)[3]	Page
3” or 4” discs	-	VK-145-135-26	2×	6 l/min, 100 kPa	5.3 (n.s.)	
5” or 6” discs	-	VK-165-150-25	2×	10 l/min, 125 kPa	3.3 (inlet)	46
		VK-350-150-25	2× (2×)	7.5 l/min, 120 kPa	5.0 (inlet)	
62 mm housing	48 × 93	VK-280-215-24	3×	10 l/min, 90 kPa	16.4 (n.s.)	
		VK-305-300-15	8×	6 l/min, 100 kPa	< 43 (inlet)	
		VK-370-230-28	6×	50 l/min oil, 200 kPa	< 50 (n.s.)	
		VK-440-W-33	8×	30 l/min, 50 kPa	< 20 (n.s.)	
EconoPACK™ 3”	50 × 110	VK-300-280-20	6×	16 l/min, 27 - 32 kPa	16 - 20 (n.s.)	
		VK-430-150-20	6×	16 l/min, 50 - 70 kPa	< 18 (outlet)	
EconoPACK™+, 122 × 162	110 × (50 × 3)	VK-1400-W-20	14×	40 l/min, 110 kPa	5.2 (average)	
PrimePACK2 89 × 172	73 × (39 × 4)	VK-440-200-18	3×	10 l/min, n.s.	(n.s.)	
		VK-L-260-18	7×	25 l/min, 65 kPa	9.2 (average)	
		VK-550-180-20	6×	16 l/min, 50 kPa	20.2 (inlet)	53
		VK-L-400-18	Custom	30 l/min, 50 - 100 kPa	< 5 (n.s.)	
PrimePACK3 89 × 250	73 × (39 × 6)	VK-369-299-22	3×	7 l/min, 50 kPa	< 15 (inlet)	
		VK-370-300-22-E	3×	20 l/min, 70 kPa	6.6 (average)	47
		VK-691-300-22	6×	20 l/min, 100 - 130 kPa	6 (average)	48
		VK-L-400-18	Custom	30 l/min, 50 - 100 kPa	< 5 (n.s.)	
SKiiP3	Special	VK-360-215-26	8×	25 l/min, 100 kPa	n.s.	
		VK-390-215-18	4×	12 l/min, 45 kPa	5.3 (inlet)	
SKiiP4	Special	VK-360-215-18	4×	12 l/min, 50 kPa	6 (inlet)	49
SKiM63 120 × 160	101 × (50 × 3)	VK-400-265-33	2×	50 l/min oil, 200 kPa	< 17 (inlet)	
SKiM93 150 × 160	137 × (50 × 3)	VK-400-265-33	2×	50 l/min oil, 200 kPa	< 17 (inlet)	
130 × 140	124 × (57 × 2)	VK-L-534-56	6×	30 l/min, 80 kPa	7.7 (n.s.)	
		VK-L-400-18	Custom	30 l/min, 50 - 100 kPa	< 5 (n.s.)	
140 × 190	124 × (57 × 3)	VK-280-185-21	1×	5 l/min, 50 kPa	< 6.3 (inlet)	
		VK-430-150-22	2×	10 l/min, 40 kPa	6.4 (outlet)	50
		VK-480-394-22	4×	8 - 15 l/min, 70 - 200 kPa	3 - 6 (n.s.)	
		VK-500-460-24	4×	20 l/min, 140 kPa	5 (n.s.)	
		VK-560-222-27	2×	6 - 18 l/min, 30 - 160 kPa	3 (n.s.)	
		VK-600-400-28	8×	30 l/min, n.s.	< 10 (inlet)	
		VK-640-570-23	6×	30 l/min, 60 kPa	< 10 (inlet)	
		VK-692-200-20	6×	20 l/min, 130 kPa	8.5 (average)	51
		VK-920-400-20	16×	20 l/min, 220 kPa	6.6 (average)	52
Mitsubishi 150 × 166 (contact area 150 × 129,5)	137,5 × (38 - 42,5 - 38)	VK-540-150-12	4×	20 l/min, 50 kPa	< 5 (n.s.)	
		VK-550-180-20	6×	16 l/min, 50 kPa	13.8 (inlet)	53
		VK-L-200-20	Custom	20 l/min, 100 kPa	< 5 (average)	

1 selected values for quick selection, often at 2/3 of recommended maximum flow **2** uniform heat sources **3** Rth at conditions as in (1),
EasyPACK, **EconoPIM**, **EconoPACK** and **PrimePACK** are trademarks of **Infineon Technologies**
SKiiP and **SKiM** are trademarks of **Semikron**

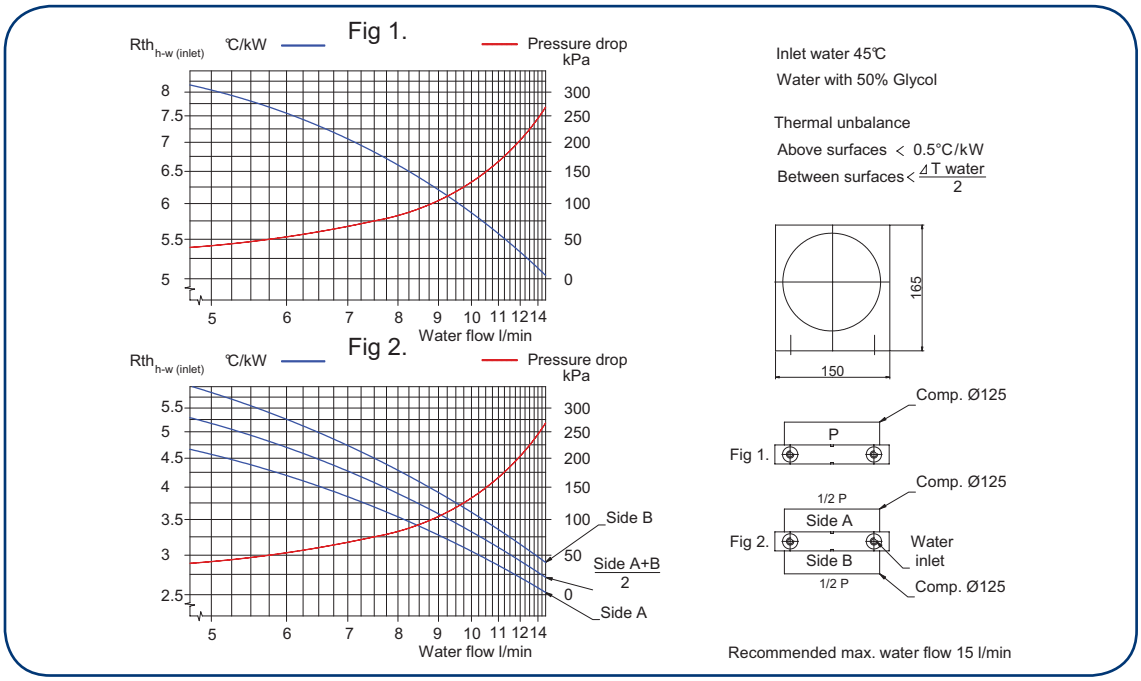
Definitions
Rth h-w /Comp (inlet) = (T max, cooler – T fluid, inlet) / P (Comp)
Rth h-w /Comp (average) = (T max, cooler – (T fluid, inlet + T fluid, outlet)/2) / P (Comp)
Rth h-w /Comp (outlet) = (T max , cooler – T fluid, outlet) / P (Comp)
Performance curves and mechanical drawings upon request

VK-165-150-25-A PressPack Ø125 mm, Ø 85 mm

Product Dimensions

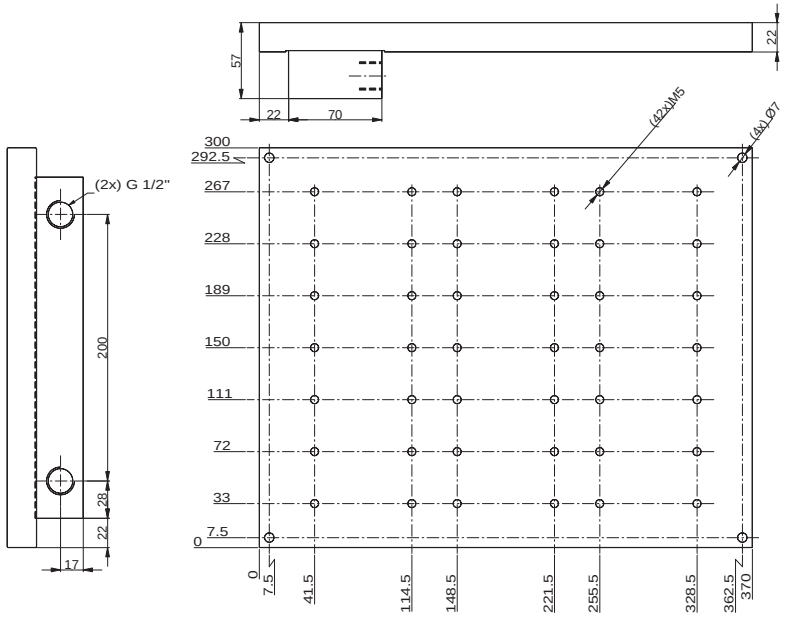


Performance

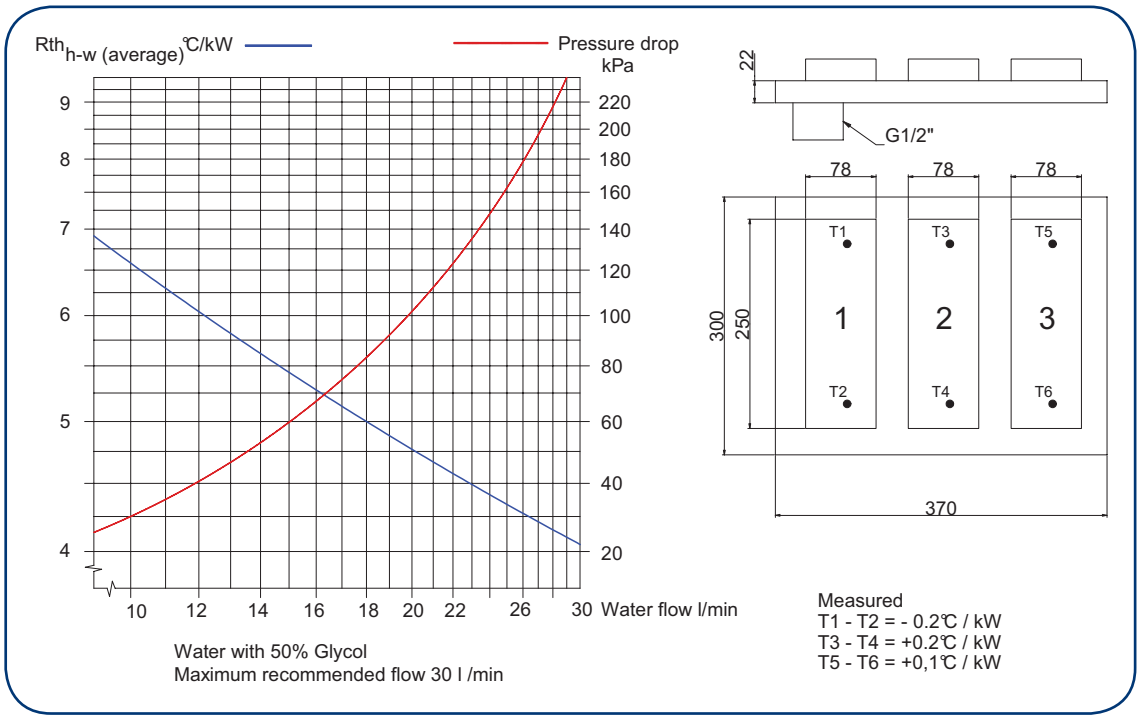


VK-370-300-22 (3×) PrimePack 3 (89 × 250)

Product Dimensions

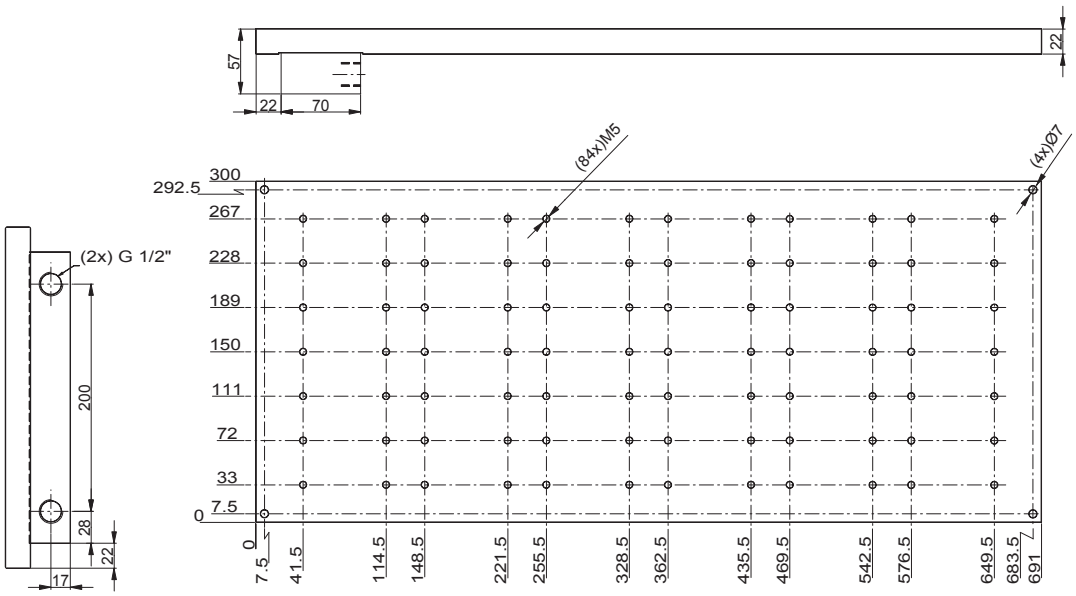


Performance

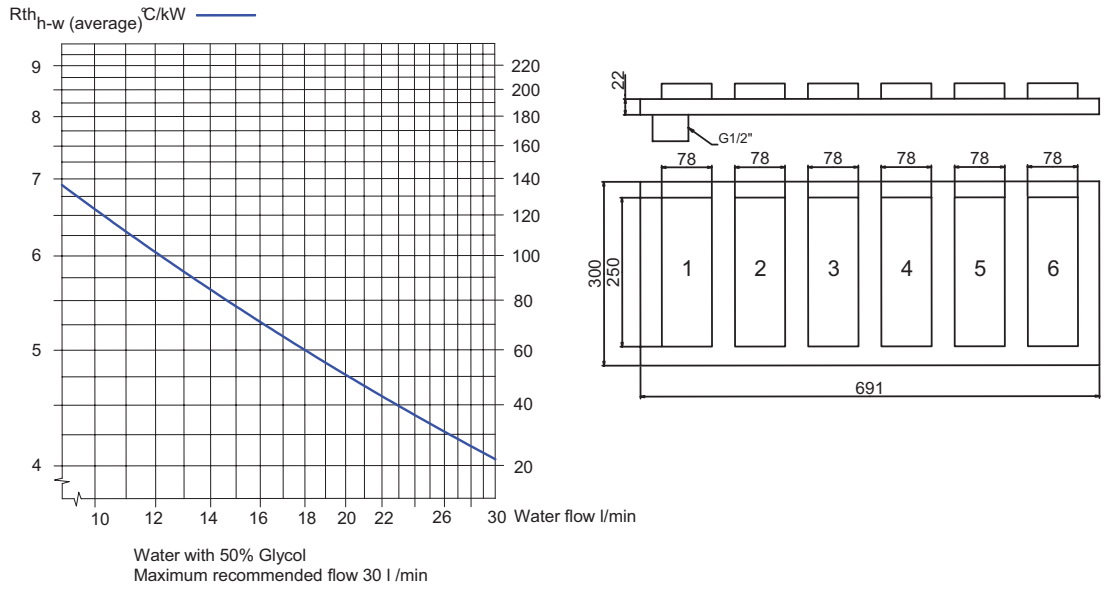


VK-691-300-22 (6×) PrimePack 3 (89 × 250)

Product Dimensions



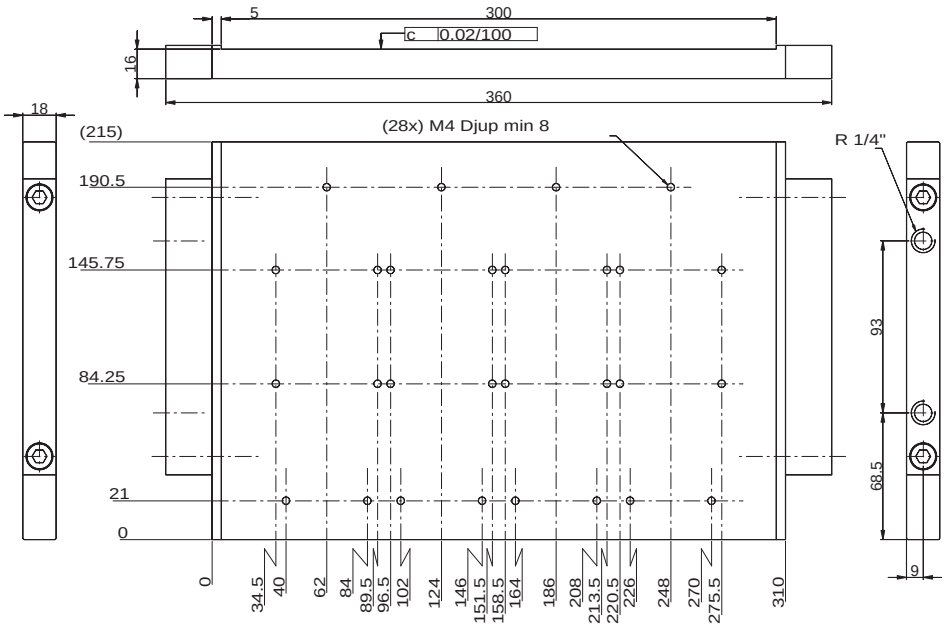
Performance



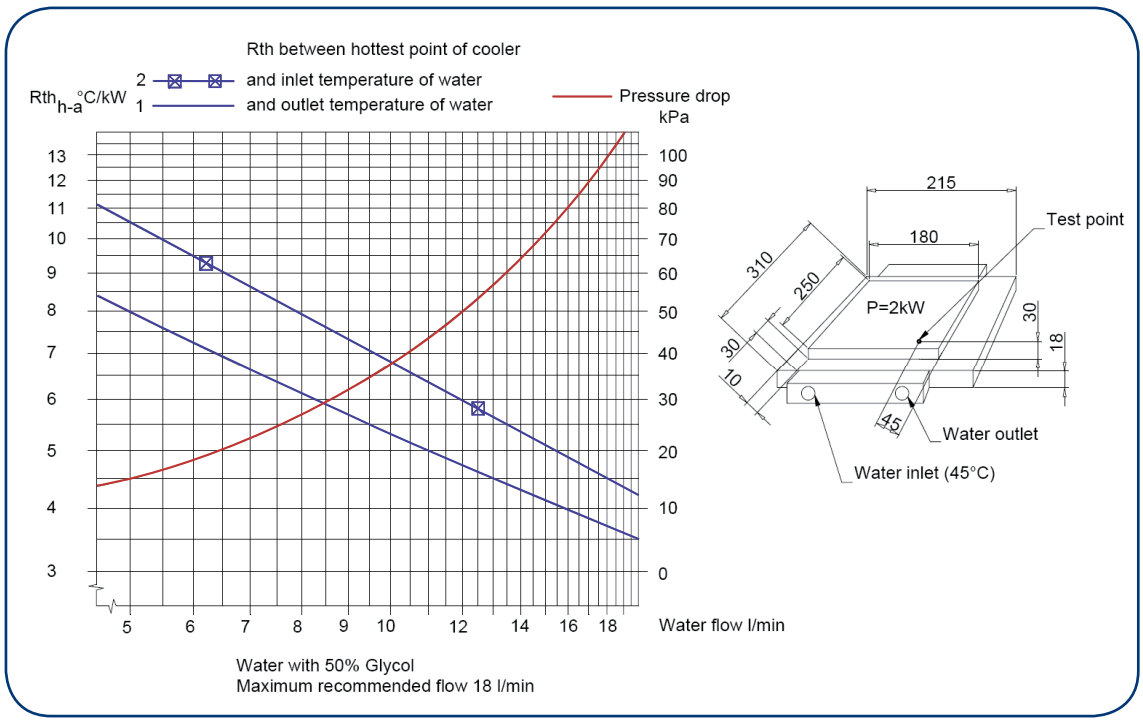
Water with 50% Glycol
Maximum recommended flow 30 l /min

VK-360-215-18 SkiiP 4* (4-fold)

Product Dimensions



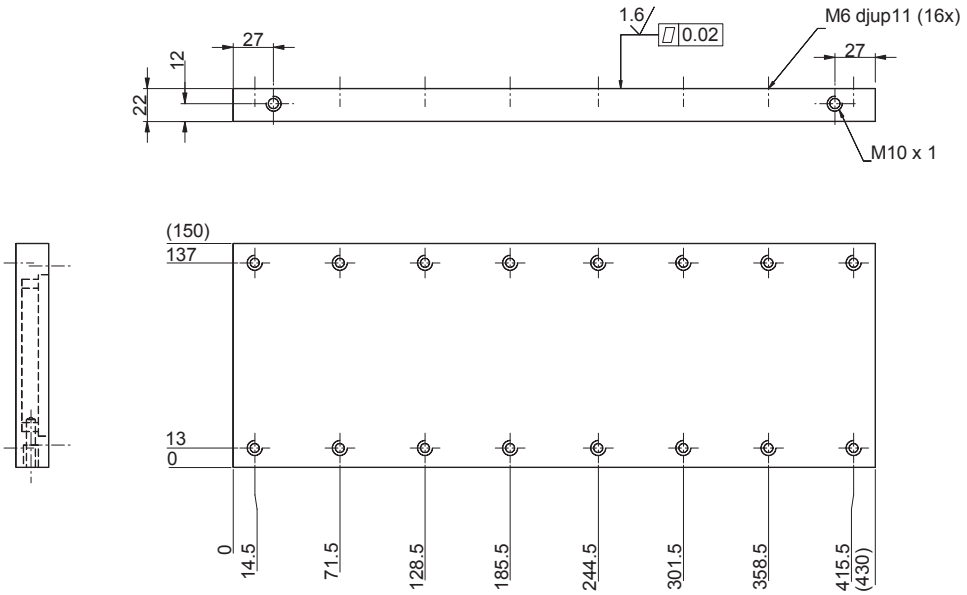
Performance



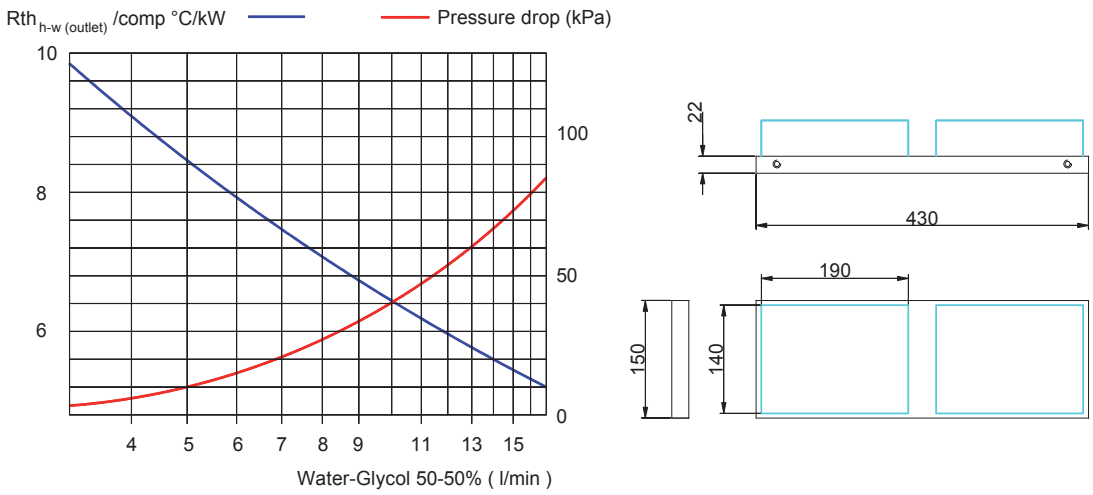
* **SkiiP** is a trademark of Semikron

VK-430-150-22 (2×) 140×190

Product Dimensions



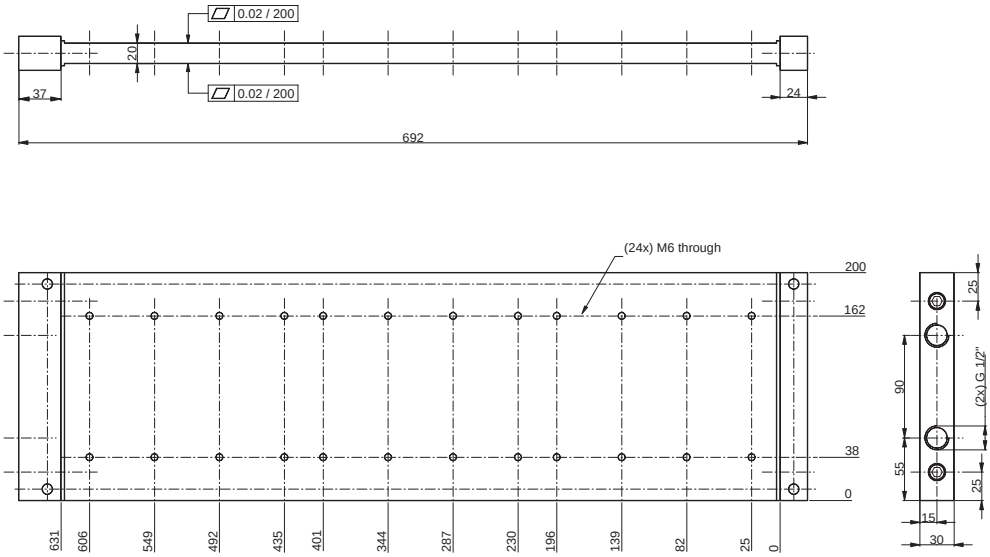
Performance



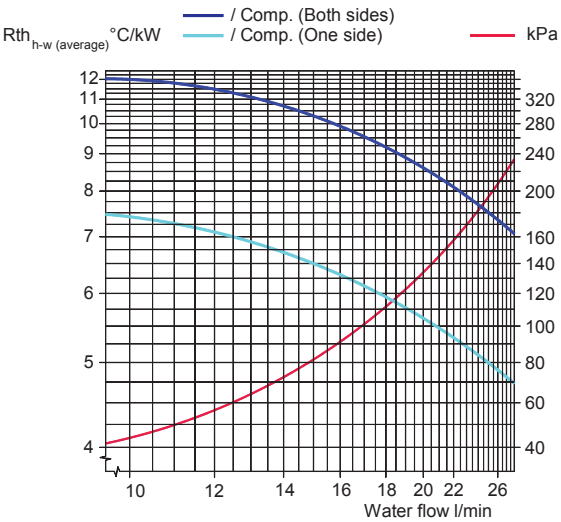
amsTECHNOLOGIES
where technologies meet solutions

VK-692-200-20 (6×) (140 × 190)

Product Dimensions

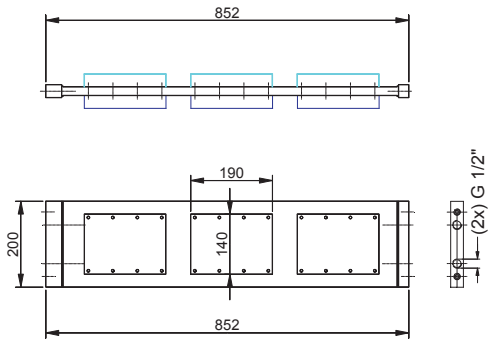


Performance



Inlet water 45°C
Water with 50% Glycol

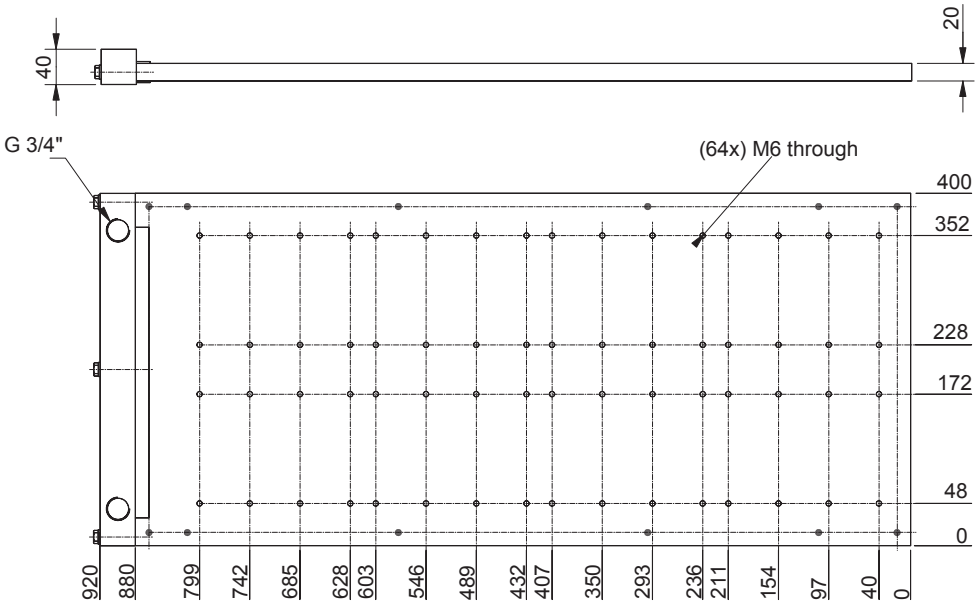
Cooler VK-852-200-20-A no unbalance over and between comp.



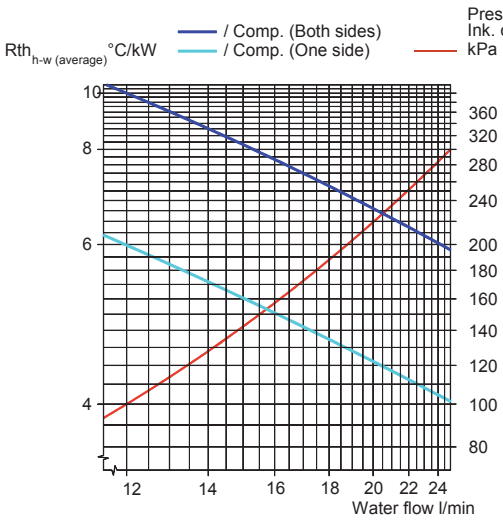
Recommended max. water flow 30 l/min

VK-920-400-20 (8×) 140 × 190 or double sided (16×) 140 × 190

Product Dimensions

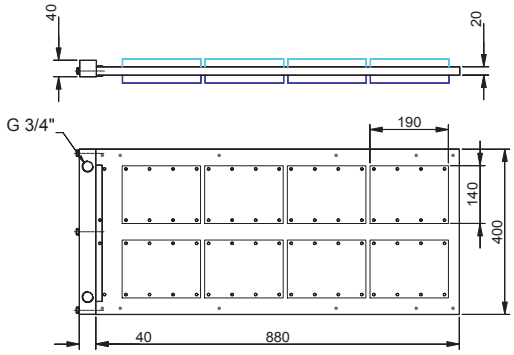


Performance



Inlet water 45°C
Water with 50% Glycol

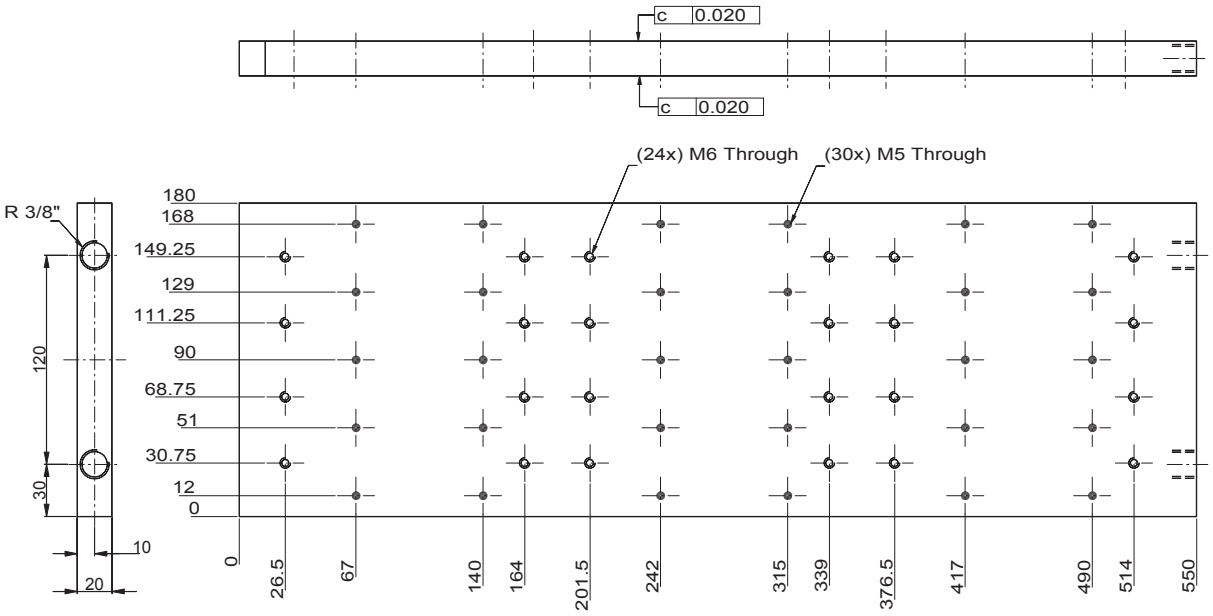
VK-920-400-20 no unbalance over and between comp.



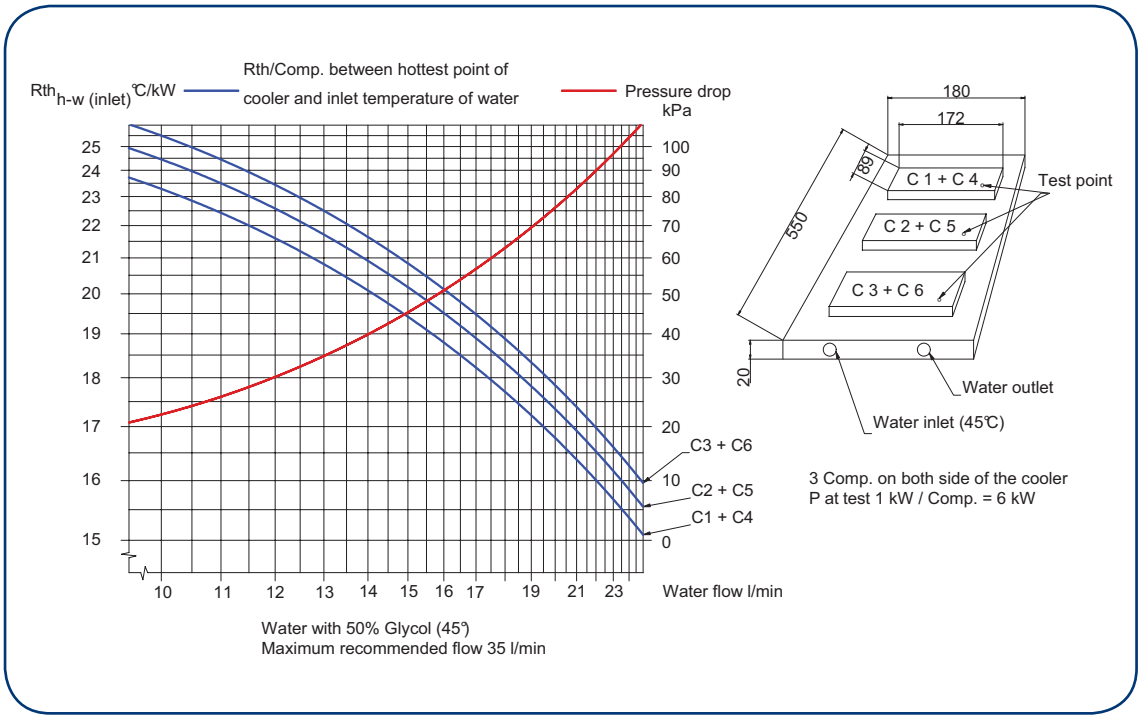
Recommended max. water flow 30 l/min

VK-550-180-20 (3×) or double sided (6×) PrimePack 2 (89 × 172) or Mitsubishi (150 × 166)

Product Dimensions



Performance



amsTECHNOLOGIES
where technologies meet solutions

enabling your ideas.

Optical, Power and Thermal Management Technologies

GERMANY
AMS Technologies AG
Fraunhoferstr. 22
82152 Martinsried, Germany
Phone + 49 (0) 89 895 77 0

ITALY
AMS Technologies S.r.l.
Via Copernico, 21
20025 Legnano (MI), Italy
Phone + 39 0331 596 693

SPAIN
AMS Technologies S.L.
C/Filadors 35, 3º, 7ª
08208 Sabadell, Spain
Phone + 34 93 380 84 20

FRANCE
AMS Technologies S.A.R.L.
Silic 649 – Bâtiment Magnolia
16, avenue du Québec
91945 Courtaboeuf Cedex
Phone + 33 (0) 1 64 86 46 00

NORDICS
AMS Technologies Nordics
Azpect Photonics AB
Aminogatan 34
431 53 Mölndal, Sweden
Phone + 46 (0) 8 55 44 24 80

UNITED KINGDOM
AMS Technologies Ltd.
Nene House, Drayton Way
Daventry, Northamptonshire
NN11 8EA, United Kingdom
Phone + 44 (0)1455 556360

Download Brochure

ISO 9001 • ISO 14001 CERTIFICATION™ Intertek

info@amstechnologies.com
www.amstechnologies.com
www.amstechnologies-webshop.com