

virtu<sup>HOT</sup>

more energy, less space

Virtu<sup>HOT</sup> Specification Sheet 2020\_v1

Solar  
Redefined



Naked Energy.

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Certified products:  
Virtu<sup>HOT</sup>: 011-7S2980 R  
Virtu<sup>HOT</sup> HD: 011-7S2981 R

## Unrivalled performance in any environment

- > Reduce **scope 1** emissions using 100% renewable **solar heat**
- > 3 x **CO<sub>2</sub> savings** per m<sup>2</sup> compared to PV panels
- > Higher **energy-density** compared to market-leading solar thermal panels

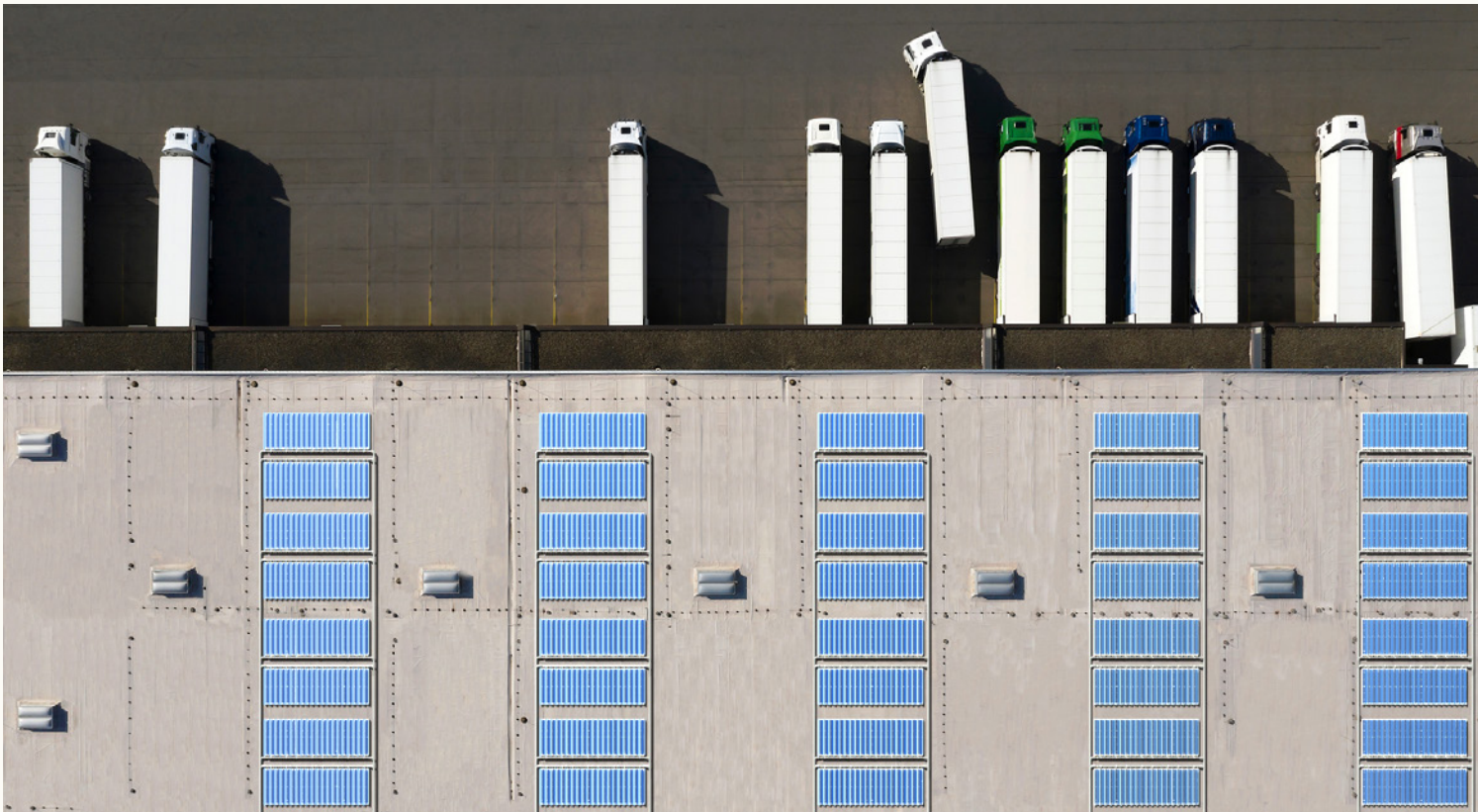
## Versatile and easy to install

- > Simple **modular** assembly
- > Integrated mounting with **self ballasting**: no need for roof penetration
- > **Compatible** with any roof type
- > **Low profile**: 26.5 cm installed height

## Designed for Commercial Scale

Ideal for:

- ✓ Multi-dwelling residential
- ✓ Manufacturing
- ✓ Food & beverage
- ✓ Hospitality & leisure



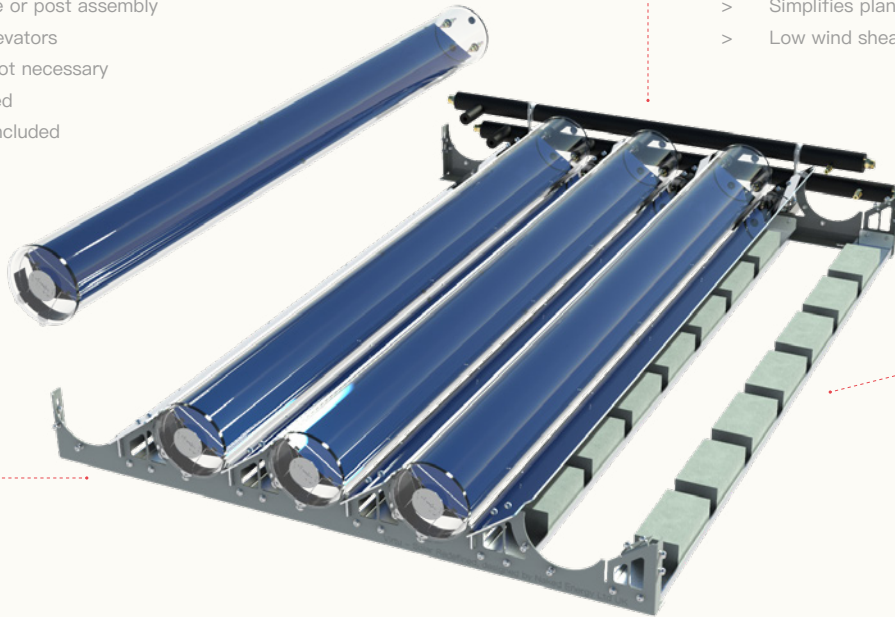


### Low install cost

- > Simple modular assembly
- > Lifted to roof pre or post assembly
- > Fits in service elevators
- > Use of a crane not necessary
- > Mounting included
- > Pipe manifolds included

### Low Profile

- > 26.5 cm height from roof/façade
- > Simplifies planning permission
- > Low wind shear



### Compatible with any roof type

6 X M8 mounting slots provide compatibility with, for example, clamp and rail systems

- > Suitable for:
  - ✓ Raised seamed roofs
  - ✓ Trapezoidal roofs
  - ✓ Sarnafil roofs
  - ✓ Nicholson fittings
  - ✓ Pitched roofs
  - ✓ Façade mounting

### Self ballasting

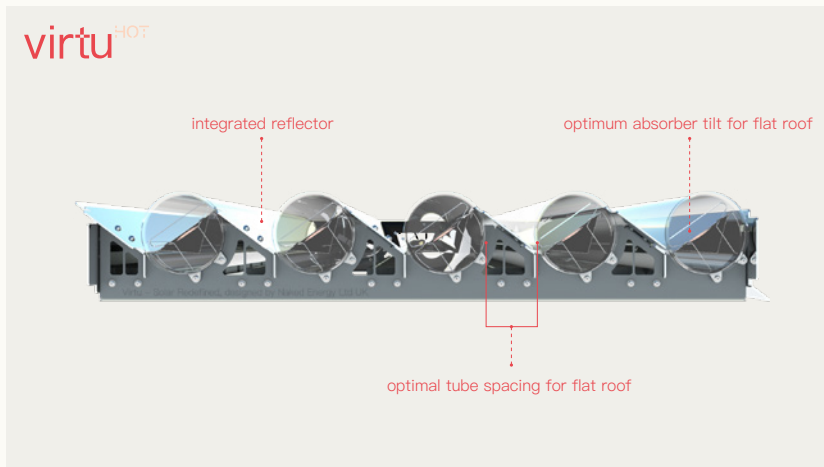
In-built ballast trays can be loaded with concrete blocks.

- > No need for roof penetration
- > No need for additional mounting
- > Suitable for:
  - ✓ Felt roofs
  - ✓ EPDM roofs
  - ✓ Rubber roofs
  - ✓ Sarnafil roofs



## Flat roof performance

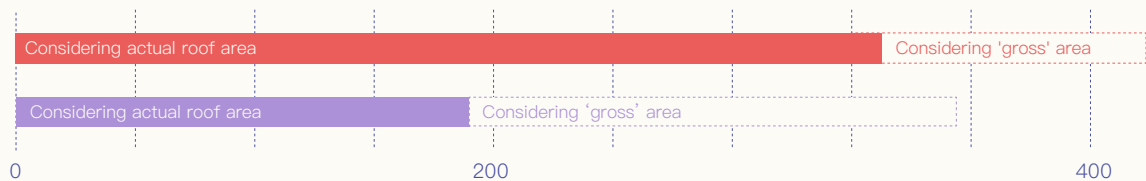
Virtu<sup>HOT</sup> maximises energy density on a flat roof



Annual kWh per m<sup>2</sup> roof area (Würzburg @50°C)\*

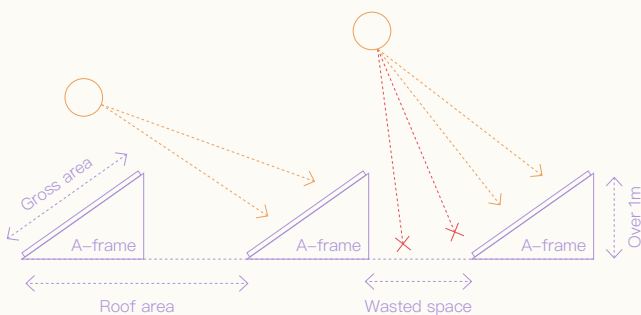
virtu<sup>HOT</sup>

Market leading flat panel



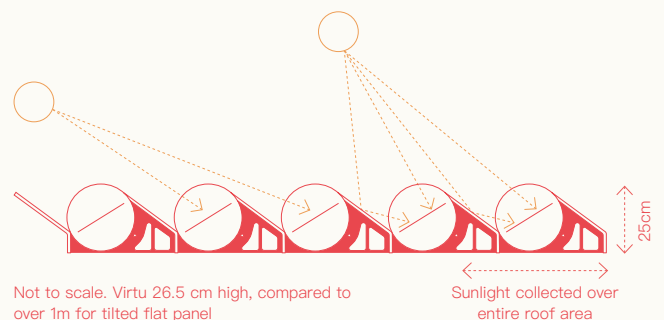
### Standard panels waste space

- > Panels/collectors tilted towards the sun on A-frames
- > Spaced to avoid self shading in winter
- > Roof area required is larger than panel gross area



### No wasted space with Virtu<sup>HOT</sup>

- > Absorber plates are tilted to optimum angle within tubes
- > Integrated reflector captures sunlight in space between tubes
- > More energy, less space

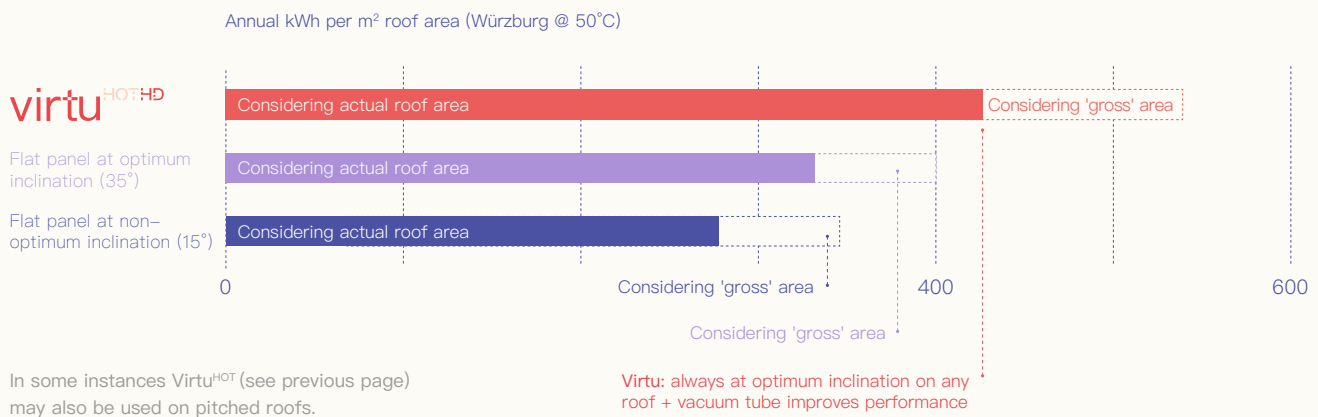
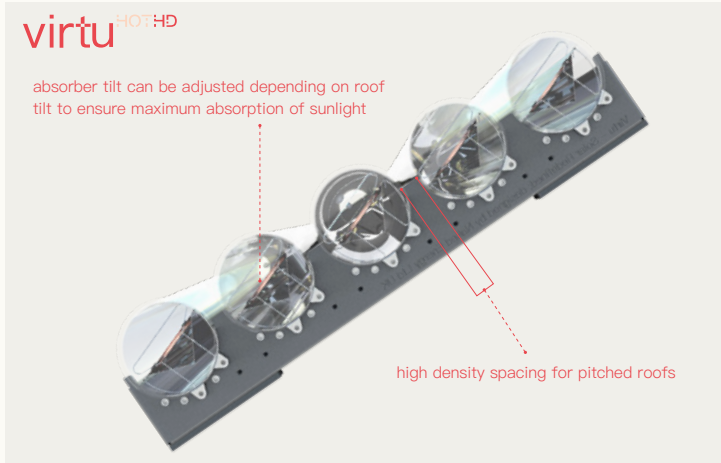


#### \*Chart notes

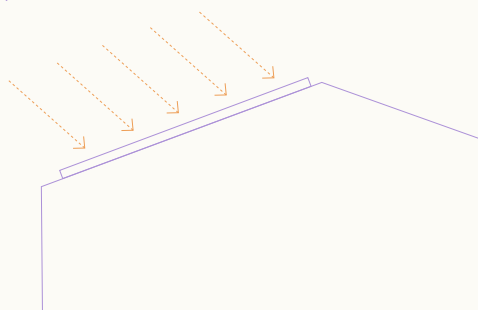
- > All annual kWh values are calculated using industry-standard Scenocalc tool, taking Würzburg as location, 50°C fluid temperature and 0° azimuth.
- > Virtu<sup>HOT</sup> kWh calculation takes parameters from the [Virtu<sup>HOT</sup> Solar Keymark certificate](#). Calculation is made at 0° inclination. Service corridor allowance is considered in roof area calculation (see layout on page 6).
- > Flat panel kWh calculation takes parameters from [Viessmann Vitosol 200 FM Solar Keymark certificate](#). Similar results are achieved by other best-in-class panels. Calculation is made at 15° inclination, by interpolating between 0° and 25° inclination. Space between panels is calculated using [Viessman Technical Guide – Solar Thermal Systems](#). The 15° inclination has been chosen to produce best trade off between gross area and roof area performance.

## Pitched roof performance

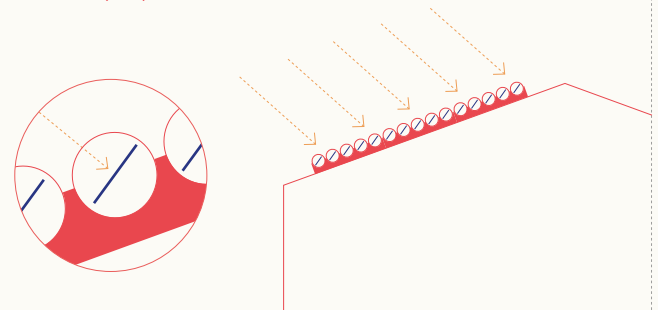
Sister product Virtu<sup>HOT HD</sup> is designed for pitched roofs. Very few roofs are optimally angled for solar collectors. Virtu<sup>HOT HD</sup> has the flexibility to tilt absorbers towards the sun, giving optimum performance on any roof inclination.



Flat panel: non-optimum inclination



Virtu: always optimum

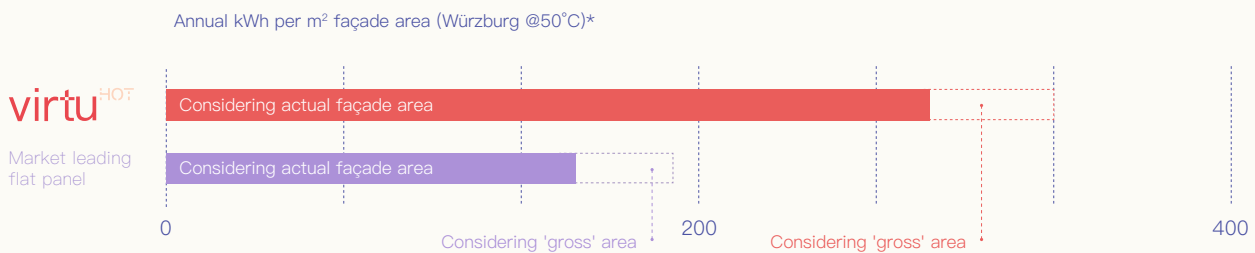
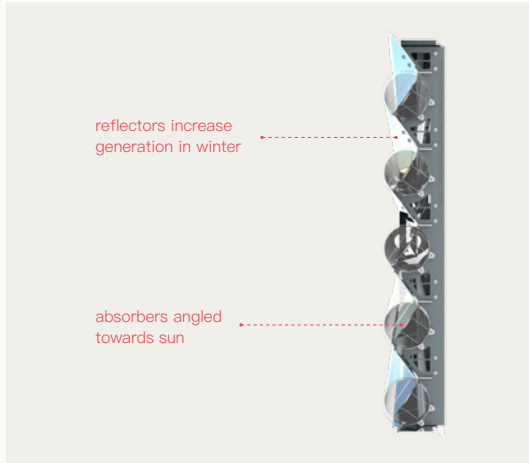


\*Chart notes

- > All annual kWh values are either taken directly from Solar Keymark datasheets, or calculated using the industry-standard Scenocalc tool, taking Würzburg as location, 50°C fluid temperature and 0° azimuth.
- > Virtu<sup>HOT HD</sup> kWh numbers are taken directly from Virtu<sup>HOT HD</sup> Solar Keymark certificate, since absorbers can be adjusted to produce optimal result on any roof inclination between 15° and 45°. Service corridor allowance is considered in roof area calculation (see layout on page 6).
- > Flat panel kWh calculation takes parameters from Viessmann Vitosol 200 FM Solar Keymark certificate. Similar results are achieved by other best-in-class panels. Values for 35° inclination are taken directly from Solar Keymark certificate. Values at 15° inclination are calculated using Scenocalc, interpolating between 0° and 25° inclination. For roof area calculation, similar clearance to Virtu<sup>HOT HD</sup> is assumed.

## Vertical façade performance

Ever think of using your façade to produce solar energy whilst introducing a unique architectural feature and broadcasting your green credentials? Virtu<sup>HOT</sup> unique design means it generates nearly as much energy on a south-facing façade as it does on a rooftop.

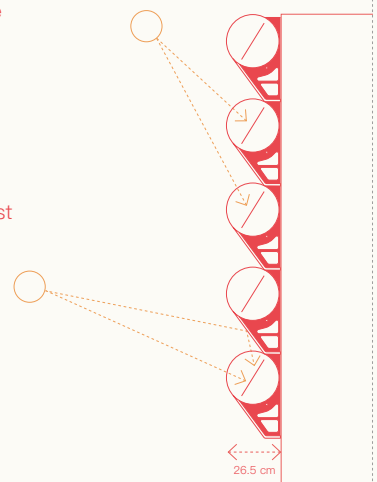


Flat panels are non-optimum in both summer and winter



Virtu: Absorbers tilted upwards for optimal summer performance

Virtu: Reflectors provide boost to winter output



\*Chart notes

- > All annual kWh values are calculated using industry-standard Scenocalc tool, taking Würzburg as location, 50°C fluid temperature and 0° azimuth.
- > Virtu<sup>HOT</sup> kWh calculation takes parameters from the [Virtu<sup>HOT</sup> Solar Keymark certificate](#). Calculation is made at 90° tilt. The IAMs have been inverted to account for the orientation of the collector on the façade. Service corridor allowance is considered in façade area calculation (see layout on page 6).
- > Flat panel kWh calculation takes parameters from [Viessmann Vitosol 200 FM Solar Keymark certificate](#). Similar results are achieved by other best-in-class panels. Calculation is made at 90° tilt. For roof area calculation, similar clearance to Virtu<sup>HOT</sup> is assumed.



virtu<sup>HOT</sup>

Includes integrated reflector. Suitable for:

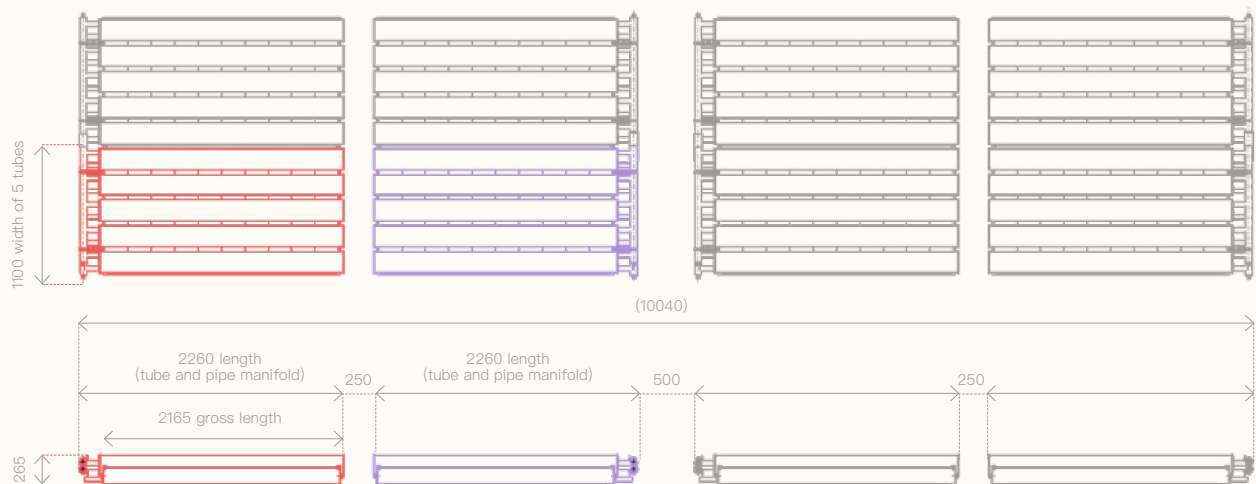
- > Flat roofs
- > Vertical façades
- > Low pitch roofs (< 15° tilt)
- > Installed in sets of 5 tubes
- > Sets connected together to form an array of any size
- > Can be configured with manifolds on **left** or **right** side

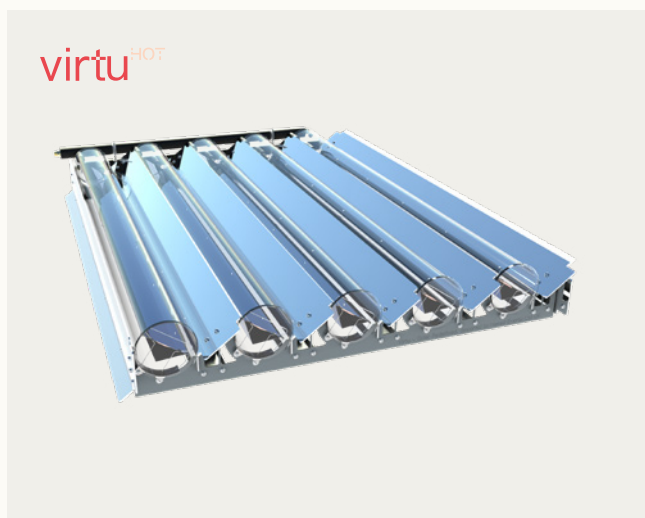


virtu<sup>HOT HD</sup>

Higher density tubes without reflector. Suitable for:

- > Pitched roofs
- > Flat roofs in very low latitudes (< 30° from equator)
- > Installed in sets of 5 tubes
- > Sets connected together to form an array of any size
- > Can be configured with manifolds on **left** or **right** side





Model	Virtu <sup>HOT</sup>	Virtu <sup>HOT</sup> HD
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SINGLE TUBE DIMENSIONS (refer to drawing on previous page)		
Gross length	2165 mm	2165 mm
Gross width (single tube)	300 mm	220 mm
Gross height	265 mm	265 mm
Absorber area	0.324 m <sup>2</sup>	0.324 m <sup>2</sup>
Gross area	0.65 m <sup>2</sup>	0.47 m <sup>2</sup>
Roof area occupied (incl. pipe manifold and service corridor)	0.78 m <sup>2</sup>	0.57 m <sup>2</sup>
Total weight (wet)	19.1 kg	14.8 kg
Roof loading	22.9 kg/m <sup>2</sup>	23.7 kg/m <sup>2</sup>
Additional ballast	Up to 21.7 kg (7 x 3.1 kg) of ballast blocks can be added per tube. Choose additional ballast based on wind loading calculations.	
Absorber plate angle	35°	Adjustable: 20°, 0° or -20°
SET OF 5 CONNECTED TUBES DIMENSIONS (refer to drawing on previous page)		
Gross width	1500 mm	1100 mm

MATERIALS	
Absorber plate	Aluminium/copper
Glass	Borosilicate 3.3

SINGLE TUBE HEAT OUTPUT		
Peak thermal output	400 W	290 W

OPERATING CONDITIONS	
Flow rate range	0.1–1 l/min
Maximum pressure	6 bar
Fluid output temperature range	10 – 90 (°C)
Manifold diameter (external)	22 mm
Manifold connections	DN16 male (3/4" flat face threaded)
Heat transfer fluid	Water–Glycol Solution
Mounting slots	6 x M8 slots per set of 5 tubes



## Annual performance in Solar Keymark standard locations

Fluid temperature	ATHENS			DAVOS			STOCKHOLM			WÜRZBURG		
	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C

Flat roof (0° inclination) – Virtu<sup>HOT</sup>

kWh per tube	567	474	381	439	355	277	314	244	183	353	277	208
kWh per m <sup>2</sup> gross area	857	717	575	675	547	426	484	375	281	544	426	320
Annual efficiency (%)	54%	45%	36%	50%	41%	32%	49%	38%	29%	50%	39%	29%

Pitched roof (15° – 45° degree inclination, south facing) – Virtu<sup>HOT</sup> HD<sup>2</sup>

kWh per tube	492	391	295	417	326	245	300	224	159	325	243	171
kWh per m <sup>2</sup> gross area	1047	832	628	887	694	521	639	476	338	691	516	365
Annual efficiency (%)	59%	47%	36%	55%	43%	32%	56%	42%	30%	56%	42%	30%

Vertical Façade (90° degree inclination, south facing) – Virtu<sup>HOT</sup>3

kWh per tube	389	304	226	405	328	260	287	223	170	283	216	160
kWh per m <sup>2</sup> gross area	598	467	348	623	505	400	441	344	261	436	332	246
Annual efficiency (%)	55%	43%	32%	51%	41%	33%	51%	40%	30%	50%	38%	28%

### Table notes

1. Calculated using industry-standard Scenocalc tool, taking input parameters from Virtu<sup>HOT</sup> Solar Keymark datasheet
2. Values taken directly from Virtu<sup>HOT</sup> HD Solar Keymark datasheet
3. Calculated using industry-standard Scenocalc tool, taking input parameters from Virtu<sup>HOT</sup> Solar Keymark certificate. IAMs are inverted to account for collector orientation.

## Guide to calculations for building regulations / compliance, for example SBEM, FSAP, LEED

SBEM calculations should take the Solar Keymark values according to EN 12975-2 (table below). Tilt should be set to the roof inclination.

	virtu <sup>HOT</sup>	virtu <sup>HOT</sup> HD
Area	0.65 m <sup>2</sup> per tube	0.47 m <sup>2</sup> per tube
Zero-loss efficiency ( $\eta_0$ )	0.39	0.56
First-order coefficient ( $a_1$ )	1.3 W/(m <sup>2</sup> K)	2.06 W/(m <sup>2</sup> K)
Second-order coefficient ( $a_2$ )	0.006 W/(m <sup>2</sup> K <sup>2</sup> )	0.007 W/(m <sup>2</sup> K <sup>2</sup> )
Incidence angle modifier (IAM)	1.8	1.46

FSAP calculations should take a corrected zero-loss efficiency to account for the fact that Virtu<sup>HOT</sup> has been tested at a solar incidence angle that is not perpendicular to the absorber (table below). Corrected zero-loss efficiency has been calculated as  $\eta_0 \times \text{IAM} (35) \times \cos(35)$  for Virtu<sup>HOT</sup>, and  $\eta_0 \times \text{IAM} (20) \times \cos(20)$  for Virtu<sup>HOT</sup> HD. Tilt should be set to 35° for flat roofs, the roof inclination for pitched roofs, and 55° for vertical façades

	virtu <sup>HOT</sup>	virtu <sup>HOT</sup> HD
Area	0.65 m <sup>2</sup> per tube	0.47 m <sup>2</sup> per tube
Zero-loss efficiency ( $\eta_0$ )	0.582	0.605
First-order coefficient ( $a_1$ )	1.3 W/(m <sup>2</sup> K)	2.06 W/(m <sup>2</sup> K)

## Guide to inputting Virtu<sup>HOT</sup> into simulation software, e.g. Polysun, Tsol, EnergyPro, Scenalc

When using more sophisticated simulation software, be sure to use the full parameter set from the Solar Keymark datasheets **Virtu<sup>HOT</sup>** or **Virtu<sup>HOT</sup>HD**, and take the full IAM into account. **The collector tilt should be set to the roof inclination.** For vertical façades, the collector is rotated through 180 degrees.



# Solar Redefined

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