

Nomenclature

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Subscripts including entire words which are self explaining are not included.

Nomenclature



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Abbreviations

AR	Anti reflective
asl	Above sea level
ATES	Aquifer thermal energy storage
BHE	Borehole heat exchanger
BTES	Borehole thermal energy storage
CHP	Combined heat and power
CSHPSS	Central solar heating plants with seasonal storage
DH	District heating
EFTE	Ethylene tetrafluoroethylene
ESCO	Energy service company
ETC	Evacuated tubular collector
FEP	Fluorinated ethylene propylene
FPC	Flat plate collector
HX	Heat exchanger
IEE	Intelligent Energy Europe
PCM	Phase change material(s)
PTES	Pit thermal energy storage
PV	Photovoltaic
SDH	Solar district heating
ST	Solar thermal
TTES	Tank thermal energy storage
UV	Ultraviolet (radiation)
VAT	Value added tax

Nomenclature



Symbols

Subscripts are included when they are a part of a "non-stand alone" symbol.

α _e Heat transfer coefficient on the external surface of thermal insulation[W/(m²-K)]α _w Safety valve outflow coefficient[-]ηEfficiency[-]λ _{ic} Thermal conductivity of the insulation[W/(m-K)]ρDensity of fluid[Kg/m³]AArea[m²]a ₁ 1 ⁴¹ order collector heat loss coefficient[W/(K-m²])b ₂ 2 nd order collector heat loss coefficient[W/(K-m²])b ₀ Constant in incident angle modifier expression[-]c ₁ Slope of the linear function (P _{inc,mass})[K/]c ₂ Constant of the linear function f(P _{inc,mass})[K/]c _p Heat capacity of solar collector fluid[J/(Kg·K)]d _e Diameter of pipe (external)[K]D _{bocation} Distance from collector field to network connection point[-]F"Efficiency factor[-]F"Heat exchanger factor[-]F"Heat exchanger factor[-]f(P _{inc,mess})Linear function of P _{inc,mess} [K]GGlobal solar irradiance (if nothing else is mentioned: On collector plane)[KWh/y]gGravitational acceleration[m]H _A Highest point of the network[m]K ₄ Incidence angle modifier for the solar collector[-]K ₆ Incidence angle modifier for diffuse radiation[-]ILinear function of pinc,mess[-]GIncidence angle modifier for diffuse radiation[-]K ₆ Inciden	Symbol	Description	Unit
η Efficiency $[]$ λ_{lz} Thermal conductivity of the insulation $[W/(m\cdot K)]$ ρ Density of fluid $[kg/m^3]$ AArea $[m^2]$ a_1 1^{sl} order collector heat loss coefficient $[W/(K^-m^2)]$ a_2 2^{rd} order collector heat loss coefficient $[W/(K^2-m^2)]$ b_0 Constant in incident angle modifie expression $[]$ c_1 Slope of the linear function $f(P_{nx,meas})$ $[KW]$ c_2 Constant of the linear function $f(P_{nx,meas})$ $[K/gr,K]$ c_q Heat capacity of solar collector fluid $[J/(kg-K)]$ d_e Diameter of pipe (external) $[m]$ $D_{location}$ Distance from collector field to network connection point $[r]$ F'' Efficiency factor $[-]$ F'' Efficiency factor $[-]$ F'' Efficiency factor $[-]$ F'' Blobal solar irradiance (if nothing else is mentioned: On collector plane) $[W/hy]$ g Gravitational acceleration $[ms^2]$ H_H Height of the net supplier $[m]$ H_A Highest point of the network $[m]$ K_{e0} Incidence angle modifier for the solar collector $[-]$ K_{e1} Incidence angle modifier for the solar collector $[-]$ K_{e1} Incidence angle modifier for the solar collector $[-]$ F'' Height of the network $[M/mm^2]$ F'' Incidence angle modifier for the solar collector $[-]$ F_{e2} Inci	α _e	Heat transfer coefficient on the external surface of thermal insulation	[W/(m²·K)]
λ_{12} Thermal conductivity of the insulation $[W/(m-K)]$ ρ Density of fluid $[kg/m^3]$ AArea $[m^2]$ a_1 1^{sf} order collector heat loss coefficient $[W/(K^m^2)]$ a_2 2^{rd} order collector heat loss coefficient $[W/(K^m^2)]$ b_0 Constant in incident angle modifier expression $[-]$ C_1 Slope of the linear function $(P_{tax,meas})$ $[K/W]$ c_2 Constant of the linear function $f(P_{tax,meas})$ $[K/W]$ c_2 Constant of the linear function $f(P_{tax,meas})$ $[K]$ c_p Heat capacity of solar collector fluid $[J/(kg·K)]$ d_a Diameter of pipe (external) $[m]$ $D_{location}$ Distance from collector field to network connection point $[m]$ f^m Safety factor $[-]$ F^m Efficiency factor $[-]$ F^m Efficiency factor $[-]$ F^m Efficiency factor $[-]$ F^m Height of the heat supplier $[m]$ H_A Height of the network $[m]$ H_A Highest point of the network $[m]$ K_{ϕ} Incidence angle modifier for diffuse radiation $[-]$ I_{eq} Incidence angle m	α _w	Safety valve outflow coefficient	[-]
ρ Density of fluid[kg/m ³]AArea[mg] a_1 1 st order collector heat loss coefficient[W/(K·m²)] a_2 2 nd order collector heat loss coefficient[W/(K·m²)] b_0 Constant in incident angle modifier expression[-] C_1 Slope of the linear function $(P_{hx,meas})$ [K/W] c_2 Constant of the linear function $(P_{hx,meas})$ [K/W] c_p Heat capacity of solar collector fluid[J/(kg·K)] d_e Diameter of pipe (external)[m]DiocationDistance from collector field to network connection point[km]fSafety factor[-]F"Efficiency factor[-]F"Heat exchanger factor[-]F"Heat exchanger factor[-]F"Heat exchanger factor[-]f(P _{hx,meas})Linear function of P _{hx,meas} [K]GGlobal solar irradiance (if nothing else is mentioned: On collector plane)[KWhy]gGravitational acceleration[m]H _A Height of the heat supplier[m]H _A Highest point of the network[m]K ₈₀ Incidence angle modifier for diffuse radiation[-]ILength of pipe[m] m Mass flow[kg/s] Δ_{P_H} Pressure loss of the plant[bar] Δ_{P_0} Pressure loss of the network[bar] Δ_{P_0} Pressure difference at the last costumer station[bar]	η	Efficiency	[-]
AArea $[m^a]$ a_1 1^{sl} order collector heat loss coefficient $[W/(K:m^2)]$ a_2 2^{nd} order collector heat loss coefficient $[W/(K:m^2)]$ b_0 Constant in incident angle modifier expression $[-]$ c_1 Slope of the linear function $f(P_{hx,meas})$ $[K/W]$ c_2 Constant of the linear function $f(P_{hx,meas})$ $[K/W]$ c_p Heat capacity of solar collector fluid $[J/(kg·K)]$ d_o Diameter of pipe (external) $[m]$ $D_{location}$ Distance from collector field to network connection point (half the length of the total transmission pipe length) $[Km]$ f Safety factor $[-]$ F'' Efficiency factor $[-]$ F'' Efficiency factor $[-]$ F'' Heat exchanger factor $[-]$ $f(P_{hx,meas})$ Linear function of $P_{hx,meas}$ $[K]$ G Global solar irradiance (if nothing else is mentioned: On collector plane) $[KWh/y]$ g Gravitational acceleration $[m]^{s^2}$ H_H Height of the net supplier $[m]$ H_A Highest point of the network $[m]$ K_{g0} Incidence angle modifier for diffuse radiation $[-]$ i Length of pipe $[m]$ m Mass flow $[kg/s]$ Δp_H Pressure loss of the plant $[bar]$ Δp_0 Pressure difference at the last costumer station $[bar]$	λ_{iz}	Thermal conductivity of the insulation	[W/(m·K)]
a_1 1^{st} order collector heat loss coefficient $[W/(K:m^2)]$ a_2 2^{nd} order collector heat loss coefficient $[W/(K:m^2)]$ b_0 Constant in incident angle modifier expression $[-]$ c_1 Slope of the linear function $f(P_{hx,meas})$ $[KW]$ c_2 Constant of the linear function $f(P_{hx,meas})$ $[K]$ c_p Heat capacity of solar collector fluid $J/(kg·K)]$ d_e Diameter of pipe (external) $[m]$ $D_{location}$ Distance from collector field to network connection point $[Km]$ f Safety factor $[-]$ F'' Efficiency factor $[-]$ F'' Heat exchanger factor $[-]$ $f(P_{hx,meas})$ Linear function of $P_{hx,meas}$ $[K]$ G Global solar irradiance (if nothing else is mentioned: On collector plane) $[KWhy]$ g Gravitational acceleration $[m]$ H_h Height of the net supplier $[m]$ H_a Highest point of the network $[m]$ K_{s0} Incidence angle modifier for the solar collector $[-]$ i_m Length of pipe $[m]$ i_m Mass flow $[kg/s]$ Δ_{P_H} Pressure loss of the plant $[bar]$ Δ_{P_0} Pressure difference at the last costumer station $[bar]$	ρ	Density of fluid	[kg/m ³]
A_{2} 2^{nd} order collector heat loss coefficient $[W/(K^2-m^2)]$ b_0 Constant in incident angle modifier expression[-] C_1 Slope of the linear function $f(P_{hx,meas})$ [K/W] C_2 Constant of the linear function $f(P_{hx,meas})$ [K] C_p Heat capacity of solar collector fluid[J/(kg·K)] d_e Diameter of pipe (external)[M] $D_{location}$ Distance from collector field to network connection point (half the length of the total transmission pipe length)[Km]fSafety factor[-]F"Efficiency factor[-]F"Heat exchanger factor[-]f(P_{hx,meas})Linear function of $P_{hx,meas}$ [K]GGlobal solar irradiance (if nothing else is mentioned: On collector plane)[kWh/y]gGravitational acceleration[m]H_HHeight of the network[m]K_6Incidence angle modifier for the solar collector[-]K_6Incidence angle modifier for diffuse radiation[-] m Length of pipe[m] m Mass flow[kg/s] Δp_H Pressure loss of the plant[bar] Δp_0 Pressure difference at the last costumer station[bar]	А	Area	[m²]
b_0 Constant in incident angle modifier expression[-] c_1 Slope of the linear function $f(P_{hx,meas})$ [K/W] c_2 Constant of the linear function $f(P_{hx,meas})$ [K] c_p Heat capacity of solar collector fluid[J/(kg·K)] d_e Diameter of pipe (external)[m] $D_{location}$ Distance from collector field to network connection point (half the length of the total transmission pipe length)[km]fSafety factor[-]F"Efficiency factor[-]F"Heat capacity of $P_{hx,meas}$ [K]GGlobal solar irradiance (if nothing else is mentioned: On collector plane)[kWh/y]gGravitational acceleration[m]H_AHighest point of the network[m]K_8Incidence angle modifier for the solar collector[-]ILength of pipe[m]K_9Incidence angle modifier for diffuse radiation[-]ILength of pipe[m] K_9 Incidence angle modifier for diffuse radiation[-]ILength of pipe[m] m Mass flow[kg/s] Δp_h Pressure loss of the plant[bar] Δp_0 Pressure difference at the last costumer station[bar]	a ₁	1 st order collector heat loss coefficient	[W/(K·m²)]
C_1 Slope of the linear function $f(P_{hx,meas})$ $[K/W]$ C_2 Constant of the linear function $f(P_{hx,meas})$ $[K]$ C_p Heat capacity of solar collector fluid $[J/(kg·K)]$ d_e Diameter of pipe (external) $[m]$ $D_{location}$ Distance from collector field to network connection point $[km]$ f Safety factor $[-]$ F'' Efficiency factor $[-]$ F'' Heat exchanger factor $[-]$ $f(P_{hx,meas})$ Linear function of $P_{hx,meas}$ $[K]$ G Global solar irradiance (if nothing else is mentioned: On collector plane) $[kWh/y]$ g Gravitational acceleration $[m]$ H_A Highest point of the network $[m]$ K_6 Incidence angle modifier for the solar collector $[-]$ K_{60} Incidence angle modifier for diffuse radiation $[-]$ i_m Mass flow $[kg/s]$ Δp_H Pressure loss of the plant $[bar]$ Δp_N Pressure difference at the last costumer station $[bar]$	a ₂	2 nd order collector heat loss coefficient	[W/(K ² ·m ²)]
C_2 Constant of the linear function $f(P_{hx,meas})$ $[K]$ c_p Heat capacity of solar collector fluid $[J/(kg·K)]$ d_e Diameter of pipe (external) $[m]$ $D_{location}$ Distance from collector field to network connection point $[km]$ fSafety factor $[-]$ F"Efficiency factor $[-]$ F"Heat exchanger factor $[-]$ f(P _{hx,meas})Linear function of $P_{hx,meas}$ $[K]$ GGlobal solar irradiance (if nothing else is mentioned: On collector plane) $[kW/h/y]$ gGravitational acceleration $[m/s^2]$ H _H Height of the net supplier $[m]$ H _A Highest point of the network $[m]$ KPressure dependant coefficient of safety valve $[kW/m^2]$ K_{9} Incidence angle modifier for diffuse radiation $[-]$ i Mass flow $[kg/s]$ Ap_{H} Pressure loss of the plant $[bar]$ Ap_0 Pressure difference at the last costumer station $[bar]$	b ₀	Constant in incident angle modifier expression	[-]
c_p Heat capacity of solar collector fluid $[J/(kg-K)]$ d_e Diameter of pipe (external) $[m]$ $D_{location}$ Distance from collector field to network connection point $[km]$ f Distance from collector field to network connection point $[km]$ f Safety factor $[-]$ F'' Efficiency factor $[-]$ F'' Heat exchanger factor $[-]$ $f(P_{hx,meas})$ Linear function of $P_{hx,meas}$ $[K]$ G Global solar irradiance (if nothing else is mentioned: On collector plane) $[kWh/y]$ g Gravitational acceleration $[m]$ H_A Height of the network $[m]$ K_{e} Incidence angle modifier for the solar collector $[-]$ k_{e} Incidence angle modifier for diffuse radiation $[-]$ i Length of pipe $[m]$ m Mass flow $[kg/s]$ Δp_H Pressure loss of the plant $[bar]$ Δp_0 Pressure loss of the network $[bar]$	C ₁	Slope of the linear function f(P _{hx,meas})	[K/W]
d_e Diameter of pipe (external)[m] $D_{location}$ Distance from collector field to network connection point[km]fDistance from collector field to network connection point[km]fSafety factor[-]F"Efficiency factor[-]F"Heat exchanger factor[-]f(Phx,meas)Linear function of Phx,meas[K]GGlobal solar irradiance (if nothing else is mentioned: On collector plane)[kWh/y]gGravitational acceleration[m]H_hHeight of the heat supplier[m]H_AHighest point of the network[m]KPressure dependant coefficient of safety valve[kW/mm²]K_gIncidence angle modifier for the solar collector[-]iLength of pipe[m] m Mass flow[kg/s] Δp_H Pressure loss of the plant[bar] Δp_0 Pressure loss of the network[bar]	C ₂	Constant of the linear function f(P _{hx,meas})	[K]
$D_{location}$ Distance from collector field to network connection point (half the length of the total transmission pipe length)[km]fSafety factor[-]F"Efficiency factor[-]F"Heat exchanger factor[-]f($P_{hx,meas}$)Linear function of $P_{hx,meas}$ [K]GGlobal solar irradiance (if nothing else is mentioned: On collector plane)[kWh/y]gGravitational acceleration[m]H_HHeight of the heat supplier[m]H_AHighest point of the network[m]KPressure dependant coefficient of safety valve[kW/mm²]K_9Incidence angle modifier for diffuse radiation[-]ILength of pipe[m]mMass flow[kg/s] $\Delta p_{\rm H}$ Pressure loss of the plant[bar] Δp_0 Pressure difference at the last costumer station[bar]	Cp	Heat capacity of solar collector fluid	[J/(kg·K)]
Image: NameImage: NameImage: NamefSafety factor[-]F"Efficiency factor[-]F"Heat exchanger factor[-]f(Phx,meas)Linear function of Phx,meas[K]GGlobal solar irradiance (if nothing else is mentioned: On collector plane)[kWh/y]gGravitational acceleration[m/s ²]H _H Height of the heat supplier[m]H _A Highest point of the network[m]KPressure dependant coefficient of safety valve[kW/mm ²]K ₆₀ Incidence angle modifier for the solar collector[-]ILength of pipe[m]mMass flow[kg/s]Ap _H Pressure loss of the plant[bar]Ap _N Pressure loss of the network[bar]Ap ₀ Pressure loss of the network[bar]	d _e	Diameter of pipe (external)	[m]
fSafety factor[-]F''Efficiency factor[-]F''Heat exchanger factor[-]f(Phx,meas)Linear function of $P_{hx,meas}$ [K]GGlobal solar irradiance (if nothing else is mentioned: On collector plane)[kWh/y]gGravitational acceleration[m/s ²]H _H Height of the heat supplier[m]H _A Highest point of the network[m]KPressure dependant coefficient of safety valve[kW/mm ²]K ₆ Incidence angle modifier for the solar collector[-]ILength of pipe[m]mMass flow[kg/s] $\Delta p_{\rm H}$ Pressure loss of the plant[bar] Δp_0 Pressure difference at the last costumer station[bar]	D _{location}	Distance from collector field to network connection point	
F"Efficiency factor[-]F"Efficiency factor[-]F"Heat exchanger factor[-]f(Pnx,meas)Linear function of $P_{nx,meas}$ [K]GGlobal solar irradiance (if nothing else is mentioned: On collector plane)[kWh/y]gGravitational acceleration[ms²]H _H Height of the heat supplier[m]H _A Highest point of the network[m]KPressure dependant coefficient of safety valve[kW/mm²]K ₆₀ Incidence angle modifier for the solar collector[-]ILength of pipe[m] m Mass flow[kg/s] $\Delta p_{\rm H}$ Pressure loss of the plant[bar] Δp_0 Pressure loss of the network[bar]		(half the length of the total transmission pipe length)	[km]
F'''Heat exchanger factor[-] $f(P_{hx,meas})$ Linear function of $P_{hx,meas}$ [K]GGlobal solar irradiance (if nothing else is mentioned: On collector plane)[kWh/y]gGravitational acceleration[m/s ²]H _H Height of the heat supplier[m]H _A Highest point of the network[m]KPressure dependant coefficient of safety valve[kW/mm ²]K _e Incidence angle modifier for the solar collector[-]ILength of pipe[m] m Mass flow[kg/s] Δp_H Pressure loss of the plant[bar] Δp_0 Pressure difference at the last costumer station[bar]	f	Safety factor	[-]
f(P_hx,meas)Linear function of P_hx,meas[K]GGlobal solar irradiance (if nothing else is mentioned: On collector plane)[kWh/y]gGravitational acceleration[m/s ²]H_HHeight of the heat supplier[m]H_AHighest point of the network[m]KPressure dependant coefficient of safety valve[kW/mm ²]K_{\theta}Incidence angle modifier for the solar collector[-]K_{60}Incident angle modifier for diffuse radiation[-]ILength of pipe[m] \dot{m} Mass flow[kg/s] $\Delta p_{\rm H}$ Pressure loss of the plant[bar] $\Delta p_{\rm U}$ Pressure difference at the last costumer station[bar]	F"	Efficiency factor	[-]
GGlobal solar irradiance (if nothing else is mentioned: On collector plane) $[kWh/y]$ gGravitational acceleration $[m/s^2]$ H _H Height of the heat supplier $[m]$ H _A Highest point of the network $[m]$ KPressure dependant coefficient of safety valve $[kW/mm^2]$ K $_{\theta}$ Incidence angle modifier for the solar collector $[-]$ K $_{60}$ Incident angle modifier for diffuse radiation $[-]$ ILength of pipe $[m]$ m Mass flow $[kg/s]$ Δp_{H} Pressure loss of the plant $[bar]$ $\Delta p_{\hat{U}}$ Pressure difference at the last costumer station $[bar]$	F""	Heat exchanger factor	[-]
gGravitational acceleration $[m/s^2]$ H_HHeight of the heat supplier $[m]$ H_AHighest point of the network $[m]$ KPressure dependant coefficient of safety valve $[kW/mm^2]$ K_{\theta}Incidence angle modifier for the solar collector $[-]$ K_{60}Incident angle modifier for diffuse radiation $[-]$ ILength of pipe $[m]$ m Mass flow $[kg/s]$ Δp_H Pressure loss of the plant $[bar]$ Δp_{U} Pressure difference at the last costumer station $[bar]$	$f(P_{hx,meas})$	Linear function of P _{hx,meas}	[K]
H_H Height of the heat supplier[m] H_A Highest point of the network[m] K Pressure dependant coefficient of safety valve[kW/mm²] K_{θ} Incidence angle modifier for the solar collector[-] K_{60} Incident angle modifier for diffuse radiation[-]ILength of pipe[m] \dot{m} Mass flow[kg/s] Δp_H Pressure loss of the plant[bar] Δp_{0} Pressure difference at the last costumer station[bar]	G	Global solar irradiance (if nothing else is mentioned: On collector plane)	[kWh/y]
H_A Highest point of the network[m]KPressure dependant coefficient of safety valve[kW/mm²] K_{θ} Incidence angle modifier for the solar collector[-] K_{60} Incident angle modifier for diffuse radiation[-]ILength of pipe[m] m Mass flow[kg/s] Δp_H Pressure loss of the plant[bar] Δp_{V} Pressure loss of the network[bar] Δp_{U} Pressure difference at the last costumer station[bar]	g	Gravitational acceleration	[m/s²]
KPressure dependant coefficient of safety valve $[kW/mm^2]$ K $_{\theta}$ Incidence angle modifier for the solar collector $[-]$ K $_{60}$ Incident angle modifier for diffuse radiation $[-]$ ILength of pipe $[m]$ m Mass flow $[kg/s]$ Δp_H Pressure loss of the plant $[bar]$ Δp_N Pressure loss of the network $[bar]$ Δp_{U} Pressure difference at the last costumer station $[bar]$	H _H	Height of the heat supplier	[m]
K_{θ} Incidence angle modifier for the solar collector[-] K_{60} Incident angle modifier for diffuse radiation[-]ILength of pipe[m] m Mass flow[kg/s] Δp_H Pressure loss of the plant[bar] Δp_N Pressure loss of the network[bar] Δp_{U} Pressure difference at the last costumer station[bar]	H _A	Highest point of the network	[m]
K_{60} Incident angle modifier for diffuse radiation[-]ILength of pipe[m] m Mass flow[kg/s] Δp_H Pressure loss of the plant[bar] Δp_N Pressure loss of the network[bar] Δp_{U} Pressure difference at the last costumer station[bar]	К	Pressure dependant coefficient of safety valve	[kW/mm²]
ILength of pipe[m] m Mass flow[kg/s] Δp_H Pressure loss of the plant[bar] Δp_N Pressure loss of the network[bar] Δp_{U} Pressure difference at the last costumer station[bar]	K _θ	Incidence angle modifier for the solar collector	[-]
m Mass flow[kg/s] Δp_H Pressure loss of the plant[bar] Δp_N Pressure loss of the network[bar] $\Delta p_{\ddot{U}}$ Pressure difference at the last costumer station[bar]	K ₆₀	Incident angle modifier for diffuse radiation	[-]
Δp_H Pressure loss of the plant[bar] Δp_N Pressure loss of the network[bar] $\Delta p_{\ddot{U}}$ Pressure difference at the last costumer station[bar]	I	Length of pipe	[m]
Δp_N Pressure loss of the network[bar] $\Delta p_{\ddot{U}}$ Pressure difference at the last costumer station[bar]	• m	Mass flow	[kg/s]
Δp _N Pressure loss of the network[bar]Δp _Ü Pressure difference at the last costumer station[bar]	Δp _H	Pressure loss of the plant	[bar]
$\Delta p_{\ddot{U}}$ Pressure difference at the last costumer station [bar]		Pressure loss of the network	
		Pressure difference at the last costumer station	[bar]
		Power	





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р	Constant in incident angle modifier expression	[-]
p'(t _v)	Saturated steam pressure	[bar]
p _{B,max}	Maximum operating pressure	[bar]
P land,location	Investment costs for collector land area	[€]
p _{RU}	Static pressure	[bar]
p _S	Pressure safety factor for saturation	[bar]
P SD	Pressure fluctuations safety factor	[bar]
pr	Price	[€ per]
Q	Energy	[kWh/y]
q _{land}	Solar energy output in kWh per m ² of land used and per year	[kWh/m²/y]
Qı	Total heat loss of pipes (from collectors to heat exchanger)	[W]
Q _{pipe,loss}	Heat loss from pipe in kWh/y per km distance between collector field	
	and network connection point	[kWh/y/km]
R _T	Temperature correction factor	[-]
S ₀	Cross section of safety valve	[mm ²]
S _F	Solar fraction	[-]
S _{iz}	Thickness of thermal insulation	[m]
т	Temperature	[°C]
ΔΤ	Temperature difference	[K]
T _{hx,prim,in,min}	Minimum inlet temperature on the primary side of the heat exchanger	[°C]
U	Heat loss coefficient for the pipes from collectors to the heat exchanger	
	(loss per m of pipe length)	[W/(m·K)]
UA	Heat transfer coefficient (e.g. of heat exchanger)	[W/K]
• V	Flow rate	[m ³ /h] [†]
w	Capacity flow	[W/K]

[†] Normally measured in m³/h and converted to m³/s by multiplying with 3600 s/h.

Nomenclature



Subscripts

0	Horizontal (e.g. global radiation on horizontal) or maximum/optical (efficiency)
50	At 50 ℃
60	At 60°
а	Ambient air
θ	Incidence angle (current for the given irradiation onto the collector plane)
actual	actual operating temperature
b	Beam
С	Collector
d	Diffuse
е	External
f	At full load
g	Guarantee
hx	Heat exchanger
in	Inlet (e.g. collector fluid inlet)
land	land used for the collector field orper m ² of land used.
location	distance to location orper km in distance to location
low	At low solar fractions
m	Mean
max	Maximum
meas	Measured
min	Minimum
0	Other things
out	Outlet (e.g. collector fluid outlet)
р	Performance
Р	Pipe heat loss
prim	Primary side (of heat exchanger) i.e. solar collector loop
sec	Secondary side (of heat exchanger) i.e. district heating network side
solar	Provided by solar energy
U	Uncertainty

¹ The SDH fact sheets addresses both technical and non-technical issues, and provide state-of-the-art industry guidelines to which utilities can refer when considering/realizing SDH plants. For further information on Solar District Heating and the SDHtake-off project please visit <u>www.solar-district-heating.eu</u>.

