Property Functions

Functional Dependence	Function Name	Call from Fortran Program	Property or Function	Unit of the Result
$a = f(p,t,x)$	a_ptx_C5H10	A_PTX_C5H10(P,T,X)	Thermal diffusivity	m^2/s
$c_p = f(p,t,x)$	cp_ptx_C5H10	CP_PTX_C5H10(P,T,X)	Specific isobaric heat capacity	kJ/(kg K)
$c_v = f(p,t,x)$	cv_ptx_C5H10	CV_PTX_C5H10(P,T,X)	Specific isochoric heat capacity	kJ/(kg K)
$\eta = f(p,t,x)$	eta_ptx_C5H10	ETA_PTX_C5H10(P,T,X)	Dynamic viscosity	Pa . s
$h = f(p,t,x)$	h_ptx_C5H10	H_PTX_C5H10(P,T,X)	Specific enthalpy	kJ/kg
$\kappa = f(p,t,x)$	ka_ptx_C5H10	KA_PTX_C5H10(P,T,X)	Isentropic exponent	-
$\lambda = f(p,t,x)$	lam_ptx_C5H10	LAM_PTX_C5H10(P,T,X)	Thermal conductivity	W/(m . K)
$\nu = f(p,t,x)$	ny_ptx_C5H10	NY_PTX_C5H10(P,T,X)	Kinematic viscosity	m^2/s
$Pr = f(p,t,x)$	pr_ptx_C5H10	PR_PTX_C5H10(P,T,X)	*Prandtl*-number	-
$p_s = f(t)$	ps_t_C5H10	PS_T_C5H10(T)	Vapor pressure from temperature	bar
$\rho = f(p,t,x)$	rho_ptx_C5H10	RHO_PTX_C5H10(P,T,X)	Density	kg/m^3
$s = f(p,t,x)$	s_ptx_C5H10	S_PTX_C5H10(P,T,X)	Specific entropy	kJ/(kg K)
$t = f(p,h)$	t_ph_C5H10	T_PH_C5H10(P,H)	Backward function: Temperature from pressure and enthalpy	°C
$t = f(p,s)$	t_ps_C5H10	T_PS_C5H10(P,S)	Backward function: Temperature from pressure and entropy	°C
$t_s = f(p)$	ts_p_C5H10	TS_P_C5H10(P)	Saturation temperature from pressure	°C
$u = f(p,t,x)$	u_ptx_C5H10	U_PTX_C5H10(P,T,X)	Specific internal energy	kJ/kg
$v = f(p,t,x)$	v_ptx_C5H10	V_PTX_C5H10(P,T,X)	Specific volume	m^3/kg
$w = f(p,t,x)$	w_ptx_C5H10	W_PTX_C5H10(P,T,X)	Isentropic speed of sound	m/s

Functional Dependence	Function Name	Call from Fortran Program	Property or Function	Unit of the Result
$x = f(p,h)$	x_ph_C5H10	X_PH_C5H10(P,H)	Backward function: Vapor fraction from pressure and enthalpy	kg/kg
$x = f(p,s)$	x_ps_C5H10	X_PS_C5H10(P,S)	Backward function: Vapor fraction from pressure and entropy	kg/kg

Units:

t in °C

p in bar

x in (kg saturated steam)/(kg wet steam)

Range of validity

Temperature range: from - 93.428 °C to 326.85 °C

Pressure range: from 8.86403×10^{-5} bar to 2000 bar

Reference state

h = 0 kJ/kg and *s* = 0 kJ/(kg K) at *p* = 1.01325 bar on the saturated liquid line (x = 0)

Details on the vapor fraction *x*

The wet steam region is calculated automatically by the subprograms. For this purpose the following fixed details on the vapor fraction *x* are to be considered:

Single-phase region

If the state point to be calculated is located in the single-phase region (liquid or superheated steam) x = –1 must be entered as a pro-forma value.

Wet-steam region

If the state point to be calculated is located in the wet steam region, a value for *x* between 0 and 1 (x = 0 for saturated liquid, x = 1 for saturated steam) must be entered. In this case, the backward functions result in the appropriate value between 0 and 1 for *x*. When calculating wet steam either the given value for *t* and p = -1000 or the given value for *p* and t = -1000 and in both cases the value for *x* between 0 and 1 must be entered.

If *p* and *t* and *x* are entered as given values, the program considers *p* and *t* to be appropriate to represent the vapor pressure curve. If this is not the case the calculation for the property of the chosen function results in –1.

Wet steam region: Temperature ranges from t_{min} = - 93.428 °C to t_c = 238.54 °C

Pressure ranges from p_{min} = 8.86403 x 10^{-5} bar to p_c = 45.14993 bar

Note:

If the input values are located outside the range of validity, the calculated function will always result in –1000. Please find more exact details on every function and its corresponding range of validity in the enclosed software documentation in Chapter 3.