

2. Individual Formulation

2.1 Moist Air as Mixture of Ideal Gases

2.1.1 Temperature Scale

International practical temperature scale 1968 (IPTS-1968)

2.1.2 The Names of Substance, Library File and Single Shot Program

Name of Substance:	Moist Air
Library File for UNIX:	libjmaig.a
Library File for DOS,Windows95/NT:	JMAIG.LIB
Single Shot Program for UNIX:	maig-ss
Single Shot Program for DOS,Windows95/NT:	MAIG-SS.EXE

2.1.3 Reference State and Formula

The specific enthalpy and entropy of dry air are both assigned the value zero at 101325 Pa and 273.15 K (0°C). The specific enthalpy and entropy of saturated liquid water are both assigned the value zero at 273.15K.

All equations for calculating thermodynamic properties of moist air have been cited from reference [1], which are based on ideal gas relations and do not include any correction with enhancement factor for the saturated state of moist air, i.e. $RW_s \cdot P = PST$ for every FUNCTION SUBPROGRAM other than ENHFAC itself.

References

- [1] ASHURAE HANDBOOK FUNDAMENTALS, (1993), Chapter 6, pp.6.1-6.10.

Table III-2.1-1 Moist Air as Mixture of Ideal Gas Function

No.	Name of Function	Function and Argument(s)	Range of Argument(s)
1	DPA(P,T,WB)	DPA: Dew Point Temperature [K] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] WB*: Wet-Bulb Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤WB≤T≤473.15 [K] PST/0.99≤P≤50 [bar] −100≤WB≤T≤200 [°C]
2	DPC(P,T,RH)	DPC: Dew Point Temperature [K] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] RH: Relative Humidity [−]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤RH≤1.0 [−] PST/0.99≤P≤50 [bar] −100≤T≤200 [°C] 0≤RH≤1.0 [−]
3	DPD(P,T,X)	DPD: Dew Point Temperature [K] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] X: Humidity Ratio [kg/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤X≤X _s [kg/kg _{DA}] PST/0.99≤P≤50 [bar] −100≤T≤200 [°C] 0≤X≤X _s [kg/kg _{DA}]
4	DPE(P,T,H)	DPE: Dew Point Temperature [K] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] H _a ≤H≤H _s [J/kg _{DA}] PST/0.99≤P≤50 [bar] −100≤T≤200 [°C] H _a ≤H≤H _s [J/kg _{DA}]
5	DPF(P,X,H)	DPF: Dew Point Temperature [K] P*: Total Pressure [Pa], [bar] X: Humidity Ratio [kg/kg _{DA}] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] PST/0.99≤P≤50 [bar] 0≤X≤X _s [kg/kg _{DA}] H _a ≤H≤H _s [J/kg _{DA}]
6	DSA(P,T,WB)	DSA: Degree of Saturation [−] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] WB*: Wet-Bulb Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤WB≤T≤473.15 [K] PST/0.99≤P≤50 [bar] −100≤WB≤T≤200 [°C]
7	DSB(P,T,DP)	DSB: Degree of Saturation [−] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] DP*: Dew Point Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤DP≤T≤473.15 [K] PST/0.99≤P≤50 [bar] −100≤DP≤T≤200 [°C]
8	DSC(P,T,RH)	DSC: Degree of Saturation [−] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] RH: Relative Humidity [−]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤RH≤1.0 [−] PST/0.99≤P≤50 [bar] −100≤T≤200 [°C] 0≤RH≤1.0 [−]
9	DSD(P,T,X)	DSD: Degree of Saturation [−] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] X: Humidity Ratio [kg/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤X≤X _s [kg/kg _{DA}] PST/0.99≤P≤50 [bar] −100≤T≤200 [°C] 0≤X≤X _s [kg/kg _{DA}]

Table III-2.1-1 Moist Air as Mixture of Ideal Gas Function (cont'd)

No.	Name of Function	Function and Argument(s)	Range of Argument(s)
10	DSE(P,T,H)	DSE: Degree of Saturation [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] Ha≤H≤Hs [J/kg _{DA}] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] Ha≤H≤Hs [J/kg _{DA}]
11	DSF(P,X,H)	DSF: Degree of Saturation [-] P*: Total Pressure [Pa], [bar] X: Humidity Ratio [kg/kg _{DA}] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] PST/0.99≤P≤50 [bar] 0≤X≤Xs [kg/kg _{DA}] Ha≤H≤Hs [J/kg _{DA}]
50	ENHFAC(P,T)	ENHFAC: Enhancement Factor [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C]
89	FC('A')	FC: Fundamental Constants MA: 'A'='MA': 28.9645 Relative Molecular Mass of Dry Air MW: 'A'='MW': 18.01528 Relative Molecular Mass of Water RA: 'A'='RA': 461.520 Gas Constant of Dry Air RW: 'A'='RW': 287.055 Gas Constant of Water Vapor	one of 'MA', 'MW', 'RA' and 'RW'
12	HA(P,T,WB)	HA: Specific Enthalpy [J/kg _{DA}] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] WB*: Wet-Bulb Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤WB≤T≤473.15 [K] PST/0.99≤P≤50 [bar] -100≤WB≤T≤200 [°C]
13	HB(P,T,DP)	HB: Specific Enthalpy [J/kg _{DA}] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] DP*: Dew Point Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤DP≤T≤473.15 [K] PST/0.99≤P≤50 [bar] -100≤DP≤T≤200 [°C]
14	HC(P,T,RH)	HC: Specific Enthalpy [J/kg _{DA}] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] RH: Relative Humidity [-]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤RH≤1.0 [-] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] 0≤RH≤1.0 [-]
15	HD(P,T,X)	HD: Specific Enthalpy [J/kg _{DA}] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] X: Humidity Ratio [kg/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤X≤Xs [kg/kg _{DA}] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] 0≤X≤Xs [kg/kg _{DA}]
84	IDENTF('A')	IDENTF: CHARACTER TYPE FUNCTION for Package Identification (Length 20) C: 'A'='C': 'MIXTURE OF DRY AIR AND WATER VAPOR' S: 'A'='S': 'MOIST AIR' Name of Substance V: 'A'='V': '10.1' Version Number	one of 'C', 'S' and 'V'
49	PST(T)	PST: Saturation Pressure of Pure Water [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C]	173.15≤T≤473.15 [K] -100≤T≤200 [°C]

Table III-2.1-1 Moist Air as Mixture of Ideal Gas Function (cont'd)

No.	Name of Function	Function and Argument(s)	Range of Argument(s)
22	RHA(P,T,WB)	RHA: Relative Humidity [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] WB*: Wet-Bulb Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤WB≤T≤473.15 [K] PST/0.99≤P≤50 [bar] -100≤WB≤T≤200 [°C]
23	RHB(P,T,DP)	RHB: Relative Humidity [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] DP*: Dew Point Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤DP≤T≤473.15 [K] PST/0.99≤P≤50 [bar] -100≤DP≤T≤200 [°C]
24	RHD(P,T,X)	RHD: Relative Humidity [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] X: Humidity Ratio [kg/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤X≤X _s [kg/kg _{DA}] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] 0≤X≤X _s [kg/kg _{DA}]
25	RHE(P,T,H)	RHE: Relative Humidity [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] H _a ≤H≤H _s [J/kg _{DA}] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] H _a ≤H≤H _s [J/kg _{DA}]
26	RHF(P,X,H)	RHF: Relative Humidity [-] P*: Total Pressure [Pa], [bar] X: Humidity Ratio [kg/kg _{DA}] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] PST/0.99≤P≤50 [bar] 0≤X≤X _s [kg/kg _{DA}] H _a ≤H≤H _s [J/kg _{DA}]
16	RWA(P,T,WB)	RWA: Mole Fraction of Water Vapor [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] WB*: Wet-Bulb Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤WB≤T≤473.15 [K] PST/0.99≤P≤50 [bar] -100≤WB≤T≤200 [°C]
17	RWB(P,T,DP)	RWB: Mole Fraction of Water Vapor [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] DP*: Dew Point Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤DP≤T≤473.15 [K] PST/0.99≤P≤50 [bar] -100≤DP≤T≤200 [°C]
18	RWC(P,T,RH)	RWC: Mole Fraction of Water Vapor [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] RH: Relative Humidity [-]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤RH≤1.0 [-] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] 0≤RH≤1.0 [-]
19	RWD(P,T,X)	RWD: Mole Fraction of Water Vapor [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] X: Humidity Ratio [kg/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤X≤X _s [kg/kg _{DA}] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] 0≤X≤X _s [kg/kg _{DA}]

Table III-2.1-1 Moist Air as Mixture of Ideal Gas Function (cont'd)

No.	Name of Function	Function and Argument(s)	Range of Argument(s)
20	RWE(P,T,H)	RWE: Mole Fraction of Water Vapor [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] Ha≤H≤Hs [J/kg _{DA}] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] Ha≤H≤Hs [J/kg _{DA}]
21	RWF(P,X,H)	RWF: Mole Fraction of Water Vapor [-] P*: Total Pressure [Pa], [bar] X: Humidity Ratio [kg/kg _{DA}] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] PST/0.99≤P≤50 [bar] 0≤X≤Xs [kg/kg _{DA}] Ha≤H≤Hs [J/kg _{DA}]
27	SA(P,T,WB)	SA: Specific Entropy [J/(kg _{DA} ·K)] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] WB*: Wet-Bulb Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤WB≤T≤473.15 [K] PST/0.99≤P≤50 [bar] -100≤WB≤T≤200 [°C]
28	SB(P,T,DP)	SB: Specific Entropy [J/(kg _{DA} ·K)] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] DP*: Dew Point Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤DP≤T≤473.15 [K] PST/0.99≤P≤50 [bar] -100≤DP≤T≤200 [°C]
29	SC(P,T,RH)	SC: Specific Entropy [J/(kg _{DA} ·K)] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] RH: Relative Humidity [-]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤RH≤1.0 [-] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] 0≤RH≤1.0 [-]
30	SD(P,T,X)	SD: Specific Entropy [J/(kg _{DA} ·K)] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] X: Humidity Ratio [kg/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤X≤Xs [kg/kg _{DA}] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] 0≤X≤Xs [kg/kg _{DA}]
31	SE(P,T,H)	SE: Specific Entropy [J/(kg _{DA} ·K)] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] Ha≤H≤Hs [J/kg _{DA}] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] Ha≤H≤Hs [J/kg _{DA}]
32	SF(P,X,H)	SF: Specific Entropy [J/(kg _{DA} ·K)] P*: Total Pressure [Pa], [bar] X: Humidity Ratio [kg/kg _{DA}] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] PST/0.99≤P≤50 [bar] 0≤X≤Xs [kg/kg _{DA}] Ha≤H≤Hs [J/kg _{DA}]
33	TF(P,X,H)	TF: Dry-Bulb Temperature [K], [°C] P*: Total Pressure [Pa], [bar] X: Humidity Ratio [kg/kg _{DA}] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] PST/0.99≤P≤50 [bar] 0≤X≤Xs [kg/kg _{DA}] Ha≤H≤Hs [J/kg _{DA}]
34	VA(P,T,WB)	VA: Specific Volume [m ³ /kg _{DA}] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] WB*: Wet-Bulb Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤WB≤T≤473.15 [K] PST/0.99≤P≤50 [bar] -100≤WB≤T≤200 [°C]

Table III-2.1-1 Moist Air as Mixture of Ideal Gas Function (cont'd)

No.	Name of Function	Function and Argument(s)	Range of Argument(s)
35	VB(P,T,DP)	VB: Specific Volume [$\text{m}^3/\text{kg}_{DA}$] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [$^{\circ}\text{C}$] DP*: Dew Point Temperature [K], [$^{\circ}\text{C}$]	PST/ $0.99 \leq P \leq 5.0 \times 10^6$ [Pa] $173.15 \leq DP \leq T \leq 473.15$ [K] PST/ $0.99 \leq P \leq 50$ [bar] $-100 \leq DP \leq T \leq 200$ [$^{\circ}\text{C}$]
36	VC(P,T,RH)	VC: Specific Volume [$\text{m}^3/\text{kg}_{DA}$] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [$^{\circ}\text{C}$] RH: Relative Humidity [-]	PST/ $0.99 \leq P \leq 5.0 \times 10^6$ [Pa] $173.15 \leq T \leq 473.15$ [K] $0 \leq RH \leq 1.0$ [-] PST/ $0.99 \leq P \leq 50$ [bar] $-100 \leq T \leq 200$ [$^{\circ}\text{C}$] $0 \leq RH \leq 1.0$ [-]
37	VD(P,T,X)	VD: Specific Volume [$\text{m}^3/\text{kg}_{DA}$] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [$^{\circ}\text{C}$] X: Humidity Ratio [kg/kg_{DA}]	PST/ $0.99 \leq P \leq 5.0 \times 10^6$ [Pa] $173.15 \leq T \leq 473.15$ [K] $0 \leq X \leq X_s$ [kg/kg_{DA}] PST/ $0.99 \leq P \leq 50$ [bar] $-100 \leq T \leq 200$ [$^{\circ}\text{C}$] $0 \leq X \leq X_s$ [kg/kg_{DA}]
38	VE(P,T,H)	VE: Specific Volume [$\text{m}^3/\text{kg}_{DA}$] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [$^{\circ}\text{C}$] H: Specific Enthalpy [J/kg_{DA}]	PST/ $0.99 \leq P \leq 5.0 \times 10^6$ [Pa] $173.15 \leq T \leq 473.15$ [K] $H_a \leq H \leq H_s$ [J/kg_{DA}] PST/ $0.99 \leq P \leq 50$ [bar] $-100 \leq T \leq 200$ [$^{\circ}\text{C}$] $H_a \leq H \leq H_s$ [J/kg_{DA}]
39	VF(P,X,H)	VF: Specific Volume [$\text{m}^3/\text{kg}_{DA}$] P*: Total Pressure [Pa], [bar] X: Humidity Ratio [kg/kg_{DA}] H: Specific Enthalpy [J/kg_{DA}]	PST/ $0.99 \leq P \leq 5.0 \times 10^6$ [Pa] PST/ $0.99 \leq P \leq 50$ [bar] $0 \leq X \leq X_s$ [kg/kg_{DA}] $H_a \leq H \leq H_s$ [J/kg_{DA}]
40	WBB(P,T,DP)	WBB: Wet-Bulb Temperature [K] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [$^{\circ}\text{C}$] DP*: Dew Point Temperature [K], [$^{\circ}\text{C}$]	PST/ $0.99 \leq P \leq 5.0 \times 10^6$ [Pa] $173.15 \leq DP \leq T \leq 473.15$ [K] PST/ $0.99 \leq P \leq 50$ [bar] $-100 \leq DP \leq T \leq 200$ [$^{\circ}\text{C}$]
41	WBC(P,T,RH)	WBC: Wet-Bulb Temperature [K] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [$^{\circ}\text{C}$] RH: Relative Humidity [-]	PST/ $0.99 \leq P \leq 5.0 \times 10^6$ [Pa] $173.15 \leq T \leq 473.15$ [K] $0 \leq RH \leq 1.0$ [-] PST/ $0.99 \leq P \leq 50$ [bar] $-100 \leq T \leq 200$ [$^{\circ}\text{C}$] $0 \leq RH \leq 1.0$ [-]
42	WBD(P,T,X)	WBD: Wet-Bulb Temperature [K] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [$^{\circ}\text{C}$] X: Humidity Ratio [kg/kg_{DA}]	PST/ $0.99 \leq P \leq 5.0 \times 10^6$ [Pa] $173.15 \leq T \leq 473.15$ [K] $0 \leq X \leq X_s$ [kg/kg_{DA}] PST/ $0.99 \leq P \leq 50$ [bar] $-100 \leq T \leq 200$ [$^{\circ}\text{C}$] $0 \leq X \leq X_s$ [kg/kg_{DA}]
43	WBE(P,T,H)	WBE: Wet-Bulb Temperature [K] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [$^{\circ}\text{C}$] H: Specific Enthalpy [J/kg_{DA}]	PST/ $0.99 \leq P \leq 5.0 \times 10^6$ [Pa] $173.15 \leq T \leq 473.15$ [K] $H_a \leq H \leq H_s$ [J/kg_{DA}] PST/ $0.99 \leq P \leq 50$ [bar] $-100 \leq T \leq 200$ [$^{\circ}\text{C}$] $H_a \leq H \leq H_s$ [J/kg_{DA}]

Table III-2.1-1 Moist Air as Mixture of Ideal Gas Function (cont'd)

No.	Name of Function	Function and Argument(s)	Range of Argument(s)
44	WBF(P,X,H)	WBF: Wet-Bulb Temperature [K] P*: Total Pressure [Pa], [bar] X: Humidity Ratio [kg/kg _{DA}] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] PST/0.99≤P≤50 [bar] 0≤X≤X _s [kg/kg _{DA}] H _a ≤H≤H _s [J/kg _{DA}]
45	XA(P,T,WB)	XA: Humidity Ratio [kg/kg _{DA}] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] WB*: Wet-Bulb Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤WB≤T≤473.15 [K] PST/0.99≤P≤50 [bar] -100≤WB≤T≤200 [°C]
46	XB(P,T,DP)	XB: Humidity Ratio [kg/kg _{DA}] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] DP*: Dew Point Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤DP≤T≤473.15 [K] PST/0.99≤P≤50 [bar] -100≤DP≤T≤200 [°C]
47	XC(P,T,RH)	XC: Humidity Ratio [kg/kg _{DA}] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] RH: Relative Humidity [-]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤RH≤1.0 [-] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] 0≤RH≤1.0 [-]
48	XE(P,T,H)	XE: Humidity Ratio [kg/kg _{DA}] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] H _a ≤H≤H _s [J/kg _{DA}] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] H _a ≤H≤H _s [J/kg _{DA}]