



Program Version	Creation Date	Program Author	Country	Calculator	ROM Version
1.00	10/23/2001	Miguel Angel CAPORALINI HERK	 ARGENTINA		HP49-C (#1.18)
Program Title					
Centrifugal and Reciprocating Gas Compressors (Calculus)					
Library Number			Checksum (CRC)		Bytes
L911 – GasCompress			# 811Fh		21,189.5

I'm writing this program in UsrRPL Language and create a Library with name ...
L911 - GasCompress, wich allow calculate as follow :

0.Centrifugal	
0.Performance	<u>0.Inlet Volume (ICFM) :</u> Wf - Weight Flow (lb/min) At - Absolute Inlet Temperature (°F) Cf - Inlet Compressibility Factor Mw - Molecular Weight Pr - Inlet Pressure (psia) <u>1.Head Isentropic Process (ft.lb/lb) :</u> Cf - Compressibility Factor Ug - Universal Gas Constant (1.986 BTU/lb mole x °R) At - Absolute Temperature (°R) Mw - Molecular Weight Ie - Isentropic Exponent Ip - Inlet Pressure (psia) Op - Outlet Pressure (psia) <u>2.Average Compressibility Factor :</u> Cf1 - Inlet Compressibility Factor Cf2 - Outlet Compressibility Factor
1.Isentropic	<u>0.Head (ft.lb/lb) :</u> Acf - Average Compressibility Factor Ugc - Universal Gas Constant (1.986 BTU/lb mole x °R) Ait - Absolute Inlet Temperature (°R) Mow - Molecular Weight Ise - Isentropic Exponent Opr - Outlet Pressure (psia) Ipr - Inlet Pressure (psia) <u>1.Gas Horsepower (Ghp) :</u> WFL - Weight Flow (lb/min) HIP - Head Isentropic Process (ft.lb/lb) EIP - Efficiency Isentropic Process (decimal) <u>2.Ideal Discharge Temperature :</u> <u>0.DTemperature Ideal (°R)</u>

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	<p>Ait - Absolute Inlet Temperature (°R) Oup - Outlet Pressure (psia) Inp - Inlet Pressure (psia) Ise - Isentropic Exponent <u>1.Absolute Temperature Outlet Condition (°R)</u> Ait - Absolute Inlet Temperature (°R) DTi - D Ideal Discharge Temperature (°R) <u>3.Actual Discharge Temperature :</u> <u>0.DTemperature Actual (°R)</u> Ait - Absolute Inlet Temperature (°R) Oup - Outlet Pressure (psia) Inp - Inlet Pressure (psia) Ise - Isentropic Exponent Eff - Efficiency (decimal) <u>1.Absolute Temperature Outlet Condition (°R)</u> Ait - Absolute Inlet Temperature (°R) DTa - D Actual Discharge Temperature (°R)</p>
2.Polytropic	<p><u>0.Head Polytropic Process (Ft.Lb/Lb) :</u> Scf - Suction Compressibility Factor Dcf - Discharge Compressibility Factor Ugc - Universal Gas Constant (1.986 BTU/lb mole x °R) Atp - Absolute Temperature (°R) Mwe - Molecular Weight Poe - Polytropic Exponent (# moles) Ipr - Inlet Pressure (psia) Opr - Outlet Pressure (psia) <u>1.Gas Horsepower (Ghp) :</u> Wfl - Weight Flow (lb/min) Hpp - Head Polytropic Process (ft.lb/lb) Epp - Efficiency Polytropic Process (decimal)</p>
3.Polytropic & Isentropic Head	<p>(ft.lb/lib) His - Head Isentropic Process (ft.lb/lb) Efp - Efficiency Polytropic Process (decimal) Eip - Efficincy Isentropic Process (decimal)</p>
4.Mechanical Losses	<p><u>0.Bearings & Seals Losses :</u> Wfl - Weight Flow (lb/min) Hpp - Head Polytropic Process (ft.lb/lb) Epp - Efficiency Polytropic Process (decimal) <u>1.Brake Horsepower with Mech.Losses (Bhp) :</u> Wfl - Weight Flow (lb/min) Hpp - Head Polytropic Process (ft.lb/lb) Epp - Efficiency Polytropic Process (decimal)</p>

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5.Compressor Speed	(rpm) Nsp - Nominal Speed at 10000 ft. of Head/Stage Thd - Total Head (ft.lb/lb) Now - Number of Wheels Hms - Head Maximum Stage (ft.lb/lb)
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1.Reciprocating

0.Preliminary Bhp	(bhp) RS - Ratio per Stage Nº - Number of Stages CC - Capacity (MMcfd at 14,4 psia) AL - Allowance for Interstage Pressure Drop (*)
1.Molar Heat (Cv)	(BTU/lb mol x °F @ 150 °F) MCp - Molar Specific Heat at Cp (constant pressure) UGC - Universal Gas Constant (1.986 BTU/lb mole x °R)
2.Molar Heat (Cp)	(BTU/lb mol x °F @ 150 °F) MVc - Molar Specific Heat at Cv (constant volume) UGC - Universal Gas Constant (1.986 BTU/lb mole x °R)
3.Isentropic Exponent	MCp - Molar Specific Heat at Cp (constant pressure) MCv - Molar Specific Heat at Cv (constant volume)
4.Inlet Capacity	<u>0.ICFM (inlet cu.ft. per minute at 14.7 psia and 60 °F):</u> Ti - Absolute Inlet Temperature (°R) Pi - Inlet Pressure (psia) Cf - Inlet Compressibility Factor Sc - Standard Compressibility Factor <u>1.Weight Flow (lb/min):</u> Mw - Molecular Weight Wf - Weight Flow (lb/min) Ti - Absolute Inlet Temperature (°R) Pi - Inlet Pressure (psia) Cf - Inlet Compressibility Factor Sc - Standard Compressibility Factor <u>2.Molar Flow (moles/min):</u> Mf - Molecular Flow (moles/min) Ti - Absolute Inlet Temperature (°R) Pi - Inlet Pressure (psia) Cf - Inlet Compressibility Factor Sc - Standard Compressibility Factor

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5.Piston Displacement	<u>0.Single Action Piston (ft³/min):</u> <u>0.Outer End:</u> St - Lenght (stroke) of Piston Movement (inches) Sp - Speed (rpm) Cd - Cylinder Diameter (inches) <u>1.Crank End:</u> St - Lenght (stroke) of Piston Movement (inches) Sp - Speed (rpm) Cd - Cylinder Diameter (inches) Rd - Piston Rod Diameter (inches) <u>1.Double Action Piston (ft³/min):</u> St - Lenght (stroke) of Piston Movement (inches) Sp - Speed (rpm) Cd - Cylinder Diameter (inches) Rd - Piston Rod Diameter (inches)
6.Volumetric Efficiency (aprox.)	(%) Cr - Compression Ratio (Pressure Oultlet / Pressure Inlet) Cc - Cylinder Clearance (%) Cs - Compressibility Factor (Suction) Cd - Compressibility Factor (Discharge) Ie - Isentropic Exponent (Pressure / Volume)
7.Equivalent Capacity	(MMcfd @ 14.4 psia & suction temperature) Pd - Piston Displacement (ft ³ /min) Ve - Volumentric Efficiency (%) Sp - Suction Pressure (psia) Cd - Compressibility Factor (suction)
8.Discharge Temperature (abs.)	(°F) St - Absolute Suction Temperature (°F) Cr - Compression Ratio (Outlet Pressure / Inlet Pressure) Ie - Isentropic Exponent
9.Rod Loading	<u>0.Compression (pounds):</u> Dpr - Discharge Pressure (psia) Csp - Cross Sectional Piston Area (inches ²) Spr - Suction Pressure (psia) Crp - Cross Sectional Piston Rod Area (inches ²) <u>1.Tension (pounds):</u> Dpr - Discharge Pressure (psia) Csp - Cross Sectional Piston Area (inches ²) Spr - Suction Pressure (psia) Crp - Cross Sectional Piston Rod Area (inches ²)

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10.Effective Brake Horsepower	(bhp) Pba - Pressure Base (psia) Ast - Absolute Suction Temperature (°R) Ats - Absolute Temperature for Standard Condition (°R) Cfs - Compressibility Suction Factor Cfd - Compressibility Discharge Factor
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References :

ICFM	Inlet Cubic Feet per Minute
SCFM	Standard Cubic Feet per Minute (measured at 14.7 psia and 60 °F)
°R	°F + 460
Universal Gas Constant	1.986 BTU / lb mole x °R
Allowance for Interstage Pressure Drop (*)	1.00 for single stage compression 1.08 for two stage compression 1.10 for three stage compression

For any questions, please contact me :

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