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`adoptedLatentHeatOfVaporizationOfLiquidHe4`
Adopted database for latent heat of vaporization of liquid 4He

---

Description

`adoptedLatentHeatOfVaporizationOfLiquidHe4` is a table with the Adopted database for latent heat of vaporization of liquid He4

Usage

```
adoptedLatentHeatOfVaporizationOfLiquidHe4
```

Author(s)

Jose Gama

Source

Donnelly R J The Observed Properties of Liquid Helium at the Saturated Vapor Pressure http://pages.uoregon.edu/rjd/vapor17.htm

References

Donnelly R J The Observed Properties of Liquid Helium at the Saturated Vapor Pressure http://pages.uoregon.edu/rjd/vapor17.htm

Examples

```
data(adoptedLatentHeatOfVaporizationOfLiquidHe4)
str(adoptedLatentHeatOfVaporizationOfLiquidHe4)
```

AWGTOmm *Convert American wire gauge (SWG) to mm*

Description

AWGTOmm converts American wire gauge (SWG) to mm

Usage

```
AWGTOmm(n)
```

Arguments

n	AWG gauge

Value

g	gauge in mm

Author(s)

Jose Gama

Source

rapidtables.com, 2014 convert American wire gauge (SWG) to mm http://www.rapidtables.com/calc/wire/awg-to-mm.htm

References

rapidtables.com, 2014 convert American wire gauge (SWG) to mm http://www.rapidtables.com/calc/wire/awg-to-mm.htm

BimaterialStripCurvatureRadiusFromTemperature *curvature radius of a bimetallic strip uniformly heated from T0 to T*

Description

BimaterialStripCurvatureRadiusFromTemperature curvature radius of a bimetallic strip uniformly heated from T0 to T in the absence of external forces

Usage

```
BimaterialStripCurvatureRadiusFromTemperature(T0, R0, T, m, n, alpha1, alpha2, thickn)
```

Arguments

T0	Initial temperature
R0	1/R0 = Initial curvature of the strip at temperature T0
T	Measured temperature
m	t1/t2, with t1 and t2 their respective thicknesses
n	E1/E2, with E1 and E2 their respective Young's moduli
alpha1	Coefficient of expansion of element 1
alpha2	Coefficient of expansion of element 2
thickn	t1 + t2 thickness of the strip

Value

R	voltage (V)

Author(s)

Jose Gama

Source

John G. Webster, 1999 The Measurement, Instrumentation and Sensors Handbook CRC Press LLC

References

John G. Webster, 1999 The Measurement, Instrumentation and Sensors Handbook CRC Press LLC

DiameterAWG *American Wire Gauge (AWG) diameter from AWG number*

Description

DiameterAWG Calculates American Wire Gauge (AWG) diameter from AWG number

Usage

```
DiameterAWG(AWG)
```

Arguments

AWG	AWG number

Value

d	American Wire Gauge (AWG) diameter

Author(s)

Jose Gama

Source

Lund Instrument Engineering, Inc., 2014 Wire Gauge and Current Limits Including Skin Depth and Strength http://www.powerstream.com/Wire_Size.htm

References

Lund Instrument Engineering, Inc., 2014 Wire Gauge and Current Limits Including Skin Depth and Strength http://www.powerstream.com/Wire_Size.htm

---

dielectricC.Density.ThermExpLiquid4HeSatVapPress

Recommended values of the dielectric constant, density and thermal expansion coefficient of liquid 4He at saturated vapor pressure

---

Description

`dielectricC.Density.ThermExpLiquid4HeSatVapPress` is a table with the Recommended values of the dielectric constant, density and thermal expansion coefficient of liquid 4He at saturated vapor pressure

Usage

```
dielectricC.Density.ThermExpLiquid4HeSatVapPress
```

Author(s)

Jose Gama

Source

Donnelly R J The Observed Properties of Liquid Helium at the Saturated Vapor Pressure http://pages.uoregon.edu/rjd/vapor2.htm

References

Donnelly R J The Observed Properties of Liquid Helium at the Saturated Vapor Pressure http://pages.uoregon.edu/rjd/vapor2.htm

Examples

```
data(dielectricC.Density.ThermExpLiquid4HeSatVapPress)
str(dielectricC.Density.ThermExpLiquid4HeSatVapPress)
```

DS1820CalcCRCbit *Calculate 8-bit CRC for DS1820*

Description

DS1820CalcCRCbit Calculates 8-bit CRC for DS1820

Usage

```
DS1820CalcCRCbit(shiftReg, dataBit)
```

Arguments

shiftReg	shift register
dataBit	data bit

Value

b	beta coefficient

Author(s)

Jose Gama

Source

Peter H. Anderson, 1998 DS1820 Digital Thermometer - Calculating an 8-bit CRC Value http://www.phanderson.com/PIC/16C84/crc.html

References

Peter H. Anderson, 1998 DS1820 Digital Thermometer - Calculating an 8-bit CRC Value http://www.phanderson.com/PIC/16C84/crc.html

---

ds18B20TemperatureData
Temperature/Data Relationship DS18B20

Description

ds18B20TemperatureData is a table with the Temperature/Data Relationship for the DS18B20

Usage

```
ds18B20TemperatureData
```

Author(s)

Jose Gama

Source

Maxim Integrated Products, Inc., 2014 DS18B20 datasheet REV: 042208 DS18B20 Programmable Resolution 1-Wire Digital Thermometer

References

Maxim Integrated Products, Inc., 2014 DS18B20 datasheet REV: 042208 DS18B20 Programmable Resolution 1-Wire Digital Thermometer

Examples

```
data(ds18B20TemperatureData)
str(ds18B20TemperatureData)
```

---

recommendedLatentHeatOfVaporizationOfLiquidHe4

Recommended values of the latent heat of vaporization of liquid 4He as a function of temperature at the saturated vapor pressure

---

Description

`recommendedLatentHeatOfVaporizationOfLiquidHe4` is a table with the Recommended values of the latent heat of vaporization of liquid 4He as a function of temperature at the saturated vapor pressure

Usage

```
recommendedLatentHeatOfVaporizationOfLiquidHe4
```

Author(s)

Jose Gama

Source

Donnelly R J The Observed Properties of Liquid Helium at the Saturated Vapor Pressure http://pages.uoregon.edu/rjd/vapor17.htm

References

Donnelly R J The Observed Properties of Liquid Helium at the Saturated Vapor Pressure http://pages.uoregon.edu/rjd/vapor17.htm

Examples

```
data(recommendedLatentHeatOfVaporizationOfLiquidHe4)
str(recommendedLatentHeatOfVaporizationOfLiquidHe4)
```

RTDalpha *RTD alpha coefficient*

Description

RTDalpha calculates RTD alpha coefficient

Usage

```
RTDalpha(R0, R100)
```

Arguments

R0	resistance at 0C
R100	resistance at 100C

Value

alpha	RTD alpha coefficient

Author(s)

Jose Gama

Source

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

References

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

rtdAndThermistorStandardAccuracy
Standard Accuracy for Thermocouples

Description

rtdAndThermistorStandardAccuracy is a table with standard accuracy for thermocouples

Usage

```
rtdAndThermistorStandardAccuracy
```

Author(s)

Jose Gama

Source

Veris Industries, 2009 Resources, Build-A-Sensor, Temperature Sensors http://www.veris.com/

References

Veris Industries, 2009 Resources, Build-A-Sensor, Temperature Sensors http://www.veris.com/

Examples

```
data(rtdAndThermistorStandardAccuracy)
str(rtdAndThermistorStandardAccuracy)
```

rtdAndThermistorStandardValues
Standard Values for Thermocouples

Description

rtdAndThermistorStandardValues is a table with standard values for thermocouples

Usage

```
rtdAndThermistorStandardValues
```

Author(s)

Jose Gama

Source

Veris Industries, 2009 Resources, Build-A-Sensor, Temperature Sensors http://www.veris.com/

References

Veris Industries, 2009 Resources, Build-A-Sensor, Temperature Sensors http://www.veris.com/

Examples

```
data(rtdAndThermistorStandardValues)
str(rtdAndThermistorStandardValues)
```

RTDbeta *RTD beta coefficient*

Description

RTDbeta calculates RTD beta coefficient

Usage

```
RTDbeta(R0, Rtl, Tl, alpha, delta)
```

Arguments

R0	resistance at 0C
Rtl	resistance of the sensor at the lowest temperature
Tl	lowest temperature in the calibration range
alpha	RTD alpha coefficient
delta	RTD delta coefficient

Value

beta	RTD beta coefficient

Author(s)

Jose Gama

Source

John G. Webster and Halit Eren, 2014 Measurement, Instrumentation, and Sensors Handbook, Second Edition Spatial, Mechanical, Thermal, and Radiation Measurement CRC Press

References

John G. Webster and Halit Eren, 2014 Measurement, Instrumentation, and Sensors Handbook, Second Edition Spatial, Mechanical, Thermal, and Radiation Measurement CRC Press

RTDcoefficientA *RTD A coefficient*

Description

RTDcoefficientA calculates RTD A coefficient

RTDcoefficientB calculates RTD B coefficient

RTDcoefficientC calculates RTD C coefficient

Usage

```
RTDcoefficientA(alpha, delta)
```

Arguments

alpha	RTD alpha coefficient
delta	RTD delta coefficient

Value

A	RTD A coefficient

Author(s)

Jose Gama

Source

John G. Webster and Halit Eren, 2014 Measurement, Instrumentation, and Sensors Handbook, Second Edition Spatial, Mechanical, Thermal, and Radiation Measurement CRC Press

References

John G. Webster and Halit Eren, 2014 Measurement, Instrumentation, and Sensors Handbook, Second Edition Spatial, Mechanical, Thermal, and Radiation Measurement CRC Press

RTDdelta *RTD delta coefficient*

Description

RTDdelta calculates RTD delta coefficient

Usage

```
RTDdelta(R0, Rth, Th,alpha)
```

Arguments

R0	resistance at 0C
Rth	resistance of the sensor at the highest temperature
Th	highest temperature in the calibration range
alpha	RTD alpha coefficient

Value

delta	RTD delta coefficient

Author(s)

Jose Gama

Source

John G. Webster and Halit Eren, 2014 Measurement, Instrumentation, and Sensors Handbook, Second Edition Spatial, Mechanical, Thermal, and Radiation Measurement CRC Press

References

John G. Webster and Halit Eren, 2014 Measurement, Instrumentation, and Sensors Handbook, Second Edition Spatial, Mechanical, Thermal, and Radiation Measurement CRC Press

RTDequation *RTD equation with 3 constants*

Description

RTDequation calculates the RTD equation

Usage

```
RTDequation(R0, T, A, B, C=NA)
```

Arguments

R0	resistance at 0C
T	temperature in C
A	RTD constant
B	RTD constant
C	RTD constant

Value

R	resistance

Author(s)

Jose Gama

Source

John G. Webster and Halit Eren, 2014 Measurement, Instrumentation, and Sensors Handbook, Second Edition Spatial, Mechanical, Thermal, and Radiation Measurement CRC Press

References

John G. Webster and Halit Eren, 2014 Measurement, Instrumentation, and Sensors Handbook, Second Edition Spatial, Mechanical, Thermal, and Radiation Measurement CRC Press

`RTDmetalResistance` *Metal RTD resistance*

Description

`RTDmetalResistance` calculates Metal RTD resistance

Usage

```
RTDmetalResistance(R0, T, A, B, C, metal=NA)
```

Arguments

`R0`	resistance at 0C
`T`	temperature in C
`A`	specific constant A
`B`	specific constant B
`C`	specific constant C
`metal`	optional, if chosen then A, B and C are the ones for this metal

Value

`R`	RTD resistance

Author(s)

Jose Gama

Source

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

References

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

RTDmetalResistanceFromAlpha
Simplified Equation for Meta RTD Resistance

Description

RTDmetalResistanceFromAlpha calculates simplified equation for Meta RTD resistance

Usage

```
RTDmetalResistanceFromAlpha(R0, T, alpha=NA, metal='nickel')
```

Arguments

R0	resistance at 0C
T	temperature in C
alpha	optional resistance's temperature coefficient
metal	optional metal to get alpha

Value

R	RTD resistance

Author(s)

Jose Gama

Source

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

References

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

RTDmolybdenumResistanceFromAlpha
Simplified Equation for Molybdenum RTD Resistance

Description

RTDmolybdenumResistanceFromAlpha calculates simplified equation for Molybdenum RTD resistance

Usage

```
RTDmolybdenumResistanceFromAlpha(R0, T, alpha=NA)
```

Arguments

R0	resistance at 0C
T	temperature in C
alpha	optional resistance's temperature coefficient

Value

R	RTD resistance

Author(s)

Jose Gama

Source

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

References

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

RTDmolybdenumTemperatureFromAlpha
Simplified Equation for Molybdenum RTD temperature

Description

RTDmolybdenumTemperatureFromAlpha calculates simplified equation for Molybdenum RTD temperature

Usage

```
RTDmolybdenumTemperatureFromAlpha(R0, Rt, alpha=NA)
```

Arguments

R0	resistance at 0C
Rt	resistance at temperature T
alpha	optional resistance's temperature coefficient

Value

T	RTD temperature

Author(s)

Jose Gama

Source

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

References

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

`RTDnickelIronResistanceFromAlpha` *Simplified Equation for Nickel-Iron RTD Resistance*

Description

`RTDnickelIronResistanceFromAlpha` calculates simplified equation for Nickel-Iron RTD resistance

Usage

```
RTDnickelIronResistanceFromAlpha(R0, T, alpha=NA)
```

Arguments

`R0`	resistance at 0C
`T`	temperature in C
`alpha`	optional resistance's temperature coefficient

Value

`R`	RTD resistance

Author(s)

Jose Gama

Source

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

References

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

RTDnickelIronTemperatureFromAlpha
Simplified Equation for Nickel-Iron RTD temperature

Description

RTDnickelIronTemperatureFromAlpha calculates simplified equation for Nickel-Iron RTD temperature

Usage

```
RTDnickelIronTemperatureFromAlpha(R0, Rt, alpha=NA)
```

Arguments

R0	resistance at 0C
Rt	resistance at temperature T
alpha	optional resistance's temperature coefficient

Value

T	RTD temperature

Author(s)

Jose Gama

Source

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

References

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

`RTDnickelResistance` *Simplified Equation for Nickel-Iron RTD Resistance*

Description

`RTDnickelResistance` calculates simplified equation for Nickel-Iron RTD resistance

Usage

```
RTDnickelResistance(R0, T, A=NA, B=NA, D=NA, F=NA)
```

Arguments

`R0`	resistance at 0C
`T`	temperature in C
`A`	specific constant A (optional)
`B`	specific constant B (optional)
`D`	specific constant D (optional)
`F`	specific constant F (optional)

Value

`R`	RTD resistance

Author(s)

Jose Gama

Source

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

References

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

RTDnickelResistanceFromAlpha
Simplified Equation for Nickel RTD Resistance

Description

RTDnickelResistanceFromAlpha calculates simplified equation for Nickel RTD resistance

Usage

```
RTDnickelResistanceFromAlpha(R0, T, alpha=NA)
```

Arguments

R0	resistance at 0C
T	temperature in C
alpha	optional resistance's temperature coefficient

Value

R	RTD resistance

Author(s)

Jose Gama

Source

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

References

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

RTDnickelTemperatureFromAlpha
Simplified Equation for Nickel RTD temperature

Description

RTDnickelTemperatureFromAlpha calculates simplified equation for Nickel RTD temperature

Usage

```
RTDnickelTemperatureFromAlpha(R0, Rt, alpha=NA)
```

Arguments

R0	resistance at 0C
Rt	resistance at temperature T
alpha	optional resistance's temperature coefficient

Value

T	RTD temperature

Author(s)

Jose Gama

Source

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

References

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

RTDplatinumResistance *Metal RTD resistance*

Description

RTDplatinumResistance calculates Metal RTD resistance

Usage

```
RTDplatinumResistance(R0, T, A=NA, B=NA, C=NA, stdRTD='DIN43760')
```

Arguments

R0	resistance at 0C
T	temperature in C
A	specific constant A
B	specific constant B
C	specific constant C
stdRTD	standard, optional alternative to get A, B and C

Value

R	RTD resistance

Author(s)

Jose Gama

Source

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

References

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

RTDplatinumResistanceFromAlpha
Simplified Equation for Platinum RTD Resistance

Description

RTDplatinumResistanceFromAlpha calculates simplified equation for Platinum RTD resistance

Usage

```
RTDplatinumResistanceFromAlpha(R0, T, alpha=NA, stdRTD='DIN43760')
```

Arguments

R0	resistance at 0C
T	temperature in C
alpha	optional resistance's temperature coefficient
stdRTD	standard, optional alternative way to get alpha

Value

R	RTD resistance

Author(s)

Jose Gama

Source

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

References

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

RTDplatinumTemperature *Callendar-Van Dusen equation for platinum RTD temperature from resistance*

Description

RTDplatinumTemperature calculates the Callendar-Van Dusen equation for platinum RTD temperature from resistance

Usage

```
RTDplatinumTemperature(R0, R, alpha, beta, delta)
```

Arguments

R0	resistance at 0C
R	Measured resistance
alpha	specific constant A
beta	specific constant B
delta	specific constant C

Value

T	RTD temperature

Author(s)

Jose Gama

Source

John G. Webster, 1999 The Measurement, Instrumentation and Sensors Handbook CRC Press LLC

References

John G. Webster, 1999 The Measurement, Instrumentation and Sensors Handbook CRC Press LLC

rtdPlatinumToleranceValues *Platinum RTD Tolerance Values*

Description

rtdPlatinumToleranceValues is a table with Platinum RTD Tolerance Values

Usage

```
rtdPlatinumToleranceValues
```

Author(s)

Jose Gama

Source

Watlow Electric Manufacturing Company, 2014 Platinum RTD Tolerance Values https://www.watlow.com/reference/refdata/0315.cfm

References

Watlow Electric Manufacturing Company, 2014 Platinum RTD Tolerance Values https://www.watlow.com/reference/refdata/0315.cfm

Examples

```
data(rtdPlatinumToleranceValues)
str(rtdPlatinumToleranceValues)
```

rtdPT100 *rtdPT100 Resistance vs Temperature*

Description

rtdPT100 is a table with PT100 resistance vs temperature

rtdPT1000 is a table with PT1000 resistance vs temperature

Usage

```
rtdPT100
```

Author(s)

Jose Gama

Source

Pavitronic, 2014 pt100 resistance / temperature. http://pavitronic.dk/eng/pt100val.html

References

Pavitronic, 2014 pt100 resistance / temperature. http://pavitronic.dk/eng/pt100val.html

Examples

```
data(rtdPT100)
str(rtdPT100)
```

---

rtdResistanceWireComparison

RTD Resistance Wire Comparison

Description

rtdResistanceWireComparison is a table with RTD Resistance Wire Comparison

Usage

```
rtdResistanceWireComparison
```

Author(s)

Jose Gama

Source

Watlow Electric Manufacturing Company, 2014 RTD Resistance Wire Comparison https://www.watlow.com/reference/refdata/0315.cfm

References

Watlow Electric Manufacturing Company, 2014 RTD Resistance Wire Comparison https://www.watlow.com/reference/refdata/0315.cfm

Examples

```
data(rtdResistanceWireComparison)
str(rtdResistanceWireComparison)
```

rtdResistivityAlpha *Resistivity and Alpha Coefficients for RTDs*

Description

rtdResistivityAlpha is a table with Resistivity and Alpha Coefficients for RTDs

Usage

```
rtdResistivityAlpha
```

Author(s)

Jose Gama

Source

Madur Inc., 2014 Resistive temperature detectors PTxx www.madur.com

References

Madur Inc., 2014 Resistive temperature detectors PTxx www.madur.com

Examples

```
data(rtdResistivityAlpha)
str(rtdResistivityAlpha)
```

RTDtemperatureFit *RTD temperature Fit*

Description

RTDtemperatureFit RTD temperature Fit

Usage

```
RTDtemperatureFit(R, R0, fitRTD='linear', alpha=0.00385)
```

Arguments

R	resistance at temperature T
R0	resistance at 0C
fitRTD	type of fitting method (linear, quadratic, cubic, polynomial)
alpha	(optional) resistance's temperature coefficient

Value

T	temperature (C)

Author(s)

Jose Gama

Source

Mosaic Industries, Inc., 2014 Relating resistance to temperature http://www.mosaic-industries.com/embedded-systems/microcontroller-projects/temperature-measurement/platinum-rtd-sensors/resistance-calibration-table

References

Mosaic Industries, Inc., 2014 Relating resistance to temperature http://www.mosaic-industries.com/embedded-systems/microcontroller-projects/temperature-measurement/platinum-rtd-sensors/resistance-calibration-table

Examples

```
data(RTDtemperatureFit)
str(RTDtemperatureFit)
```

RTDtemperatureFromResistance

RTD Temperature from Resistance

Description

`RTDtemperatureFromResistance` calculates RTD Temperature from Resistance

Usage

```
RTDtemperatureFromResistance(R, R0)
```

Arguments

R	resistance measured
R0	resistance at 0C

Value

T	Temperature

Author(s)

Jose Gama

Source

Madur In., 2014 Resistive temperature detectors PTxx www.madur.com

References

Madur In., 2014 Resistive temperature detectors PTxx www.madur.com

---

`rtdTypes` *Types of RTDs*

Description

`rtdTypes` is a table with Types of RTDs

Usage

```
rtdTypes
```

Author(s)

Jose Gama

Source

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

References

Capgo Inc., 2014 Introduction to RTDs http://www.capgo.com/Resources/Temperature/RTDs/RTD.html

Examples

```
data(rtdTypes)
str(rtdTypes)
```

SelfHeatingError *self-heating error*

Description

SelfHeatingError calculates the self-heating error

Usage

```
SelfHeatingError(I, R, Ek)
```

Arguments

I	intensity (A)
R	resistance (ohm)
Ek	self-heating coefficient(mW/C)

Value

E	self-heating error

Author(s)

Jose Gama

Source

Gerd Scheller, 2003 Error Analysis of a Temperature Measurement System with worked examples JUMO, FAS 625, Edition 06.03

References

Gerd Scheller, 2003 Error Analysis of a Temperature Measurement System with worked examples JUMO, FAS 625, Edition 06.03

SensorSensitivity *Sensitivity of the sensor*

Description

SensorSensitivity calculates the Sensitivity of the sensor

Usage

```
SensorSensitivity(T1, E1, T2, E2)
```

Arguments

T1	measured temperature
E1	resistance (platinum sensor) or the thermoelectric emf (thermocouple) for T1
T2	measured temperature
E2	resistance (platinum sensor) or the thermoelectric emf (thermocouple) for T2

Value

Cs	Sensor Sensitivity

Author(s)

Jose Gama

Source

Gerd Scheller, 2003 Error Analysis of a Temperature Measurement System with worked examples JUMO, FAS 625, Edition 06.03

References

Gerd Scheller, 2003 Error Analysis of a Temperature Measurement System with worked examples JUMO, FAS 625, Edition 06.03

SplineEval — *Spline algorithm used in The Observed Properties of Liquid Helium at the Saturated Vapor Pressure*

Description

SplineEval Spline algorithm used in The Observed Properties of Liquid Helium at the Saturated Vapor Pressure

Usage

```
SplineEval(x, knotsK, coeffsC)
```

Arguments

x	Temperature vector
knotsK	knots, internal and external, vector
coeffsC	coefficients vector

Value

S	Spline result

Author(s)

Jose Gama

Source

Donnelly, Donnelly and Hills [J. Low Temp. Phys. 44, 471 (1981)]

References

Donnelly, Donnelly and Hills [J. Low Temp. Phys. 44, 471 (1981)]

---

tableAWGCuWire *AWG Wire Sizes with Resistance and More*

Description

`tableAWGCuWire` is a table with AWG Wire sizes with resistance and more

Usage

```
tableAWGCuWire
```

Author(s)

Jose Gama

Source

Lund Instrument Engineering, Inc., 2014 Wire Gauge and Current Limits Including Skin Depth and Strength http://www.powerstream.com/Wire_Size.htm

References

Lund Instrument Engineering, Inc., 2014 Wire Gauge and Current Limits Including Skin Depth and Strength http://www.powerstream.com/Wire_Size.htm

Examples

```
data(tableAWGCuWire)
str(tableAWGCuWire)
```

`temperatureMeasurementDifficulty`
temperature Measurement Difficulty

Description

`temperatureMeasurementDifficulty` is a table with the current state of difficulties with temperature measurements

Usage

```
temperatureMeasurementDifficulty
```

Author(s)

Jose Gama

Source

CapGo, 2013 Is temperature measurement difficult? http://www.capgo.com/Resources/Temperature/Thermocouple/Thermocouple.html

References

CapGo, 2013 Is temperature measurement difficult? http://www.capgo.com/Resources/Temperature/Thermocouple/Thermocouple.html

Examples

```
data(temperatureMeasurementDifficulty)
str(temperatureMeasurementDifficulty)
```

`temperatureSensorTypes`
Temperature Sensor Types

Description

`temperatureSensorTypes` is a table with Temperature Sensor Types

Usage

```
temperatureSensorTypes
```

Author(s)

Jose Gama

Source

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

References

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

Examples

```
data(temperatureSensorTypes)
str(temperatureSensorTypes)
```

`ThermistorAlphaApproximatedFromBeta`
Thermistor Alpha Approximated From Beta

Description

`ThermistorAlphaApproximatedFromBeta` Thermistor alpha approximated from beta

Usage

```
ThermistorAlphaApproximatedFromBeta(T, betaTH)
```

Arguments

`T`	temperature
`betaTH`	Beta parameter of the thermistor (calculated or from the data sheet)

Value

`a`	parameter of the thermistor

Author(s)

Jose Gama

Source

Daycounter, Inc. Engineering Services, 2014 Steinhart-Hart Thermistor Calculator http://www.daycounter.com/Calculators/Steinhart-Hart-Thermistor-Calculator.phtml

References

Daycounter, Inc. Engineering Services, 2014 Steinhart-Hart Thermistor Calculator http://www.daycounter.com/Calculators/Steinhart-Hart-Thermistor-Calculator.phtml

Examples

```
data(ThermistorAlphaApproximatedFromBeta)
str(ThermistorAlphaApproximatedFromBeta)
```

`ThermistorApproxDriftResistance`
Approximation of Drift Resistance of NTC Thermistors

Description

`ThermistorApproxDriftResistance` Estimates the Drift Resistance of NTC Thermistors

Usage

```
ThermistorApproxDriftResistance(Ri, T, a, b)
```

Arguments

`Ri`	initial resistance
`T`	aging time
`a`	intercept at T=1
`b`	slope (%deltaR per decade of time T)

Value

`Rt`	resistance at time T

Author(s)

Jose Gama

Source

Quality Thermistor, Inc. 2108 http://www.cornerstonesensors.com/About.asp?PageCode=Stability&Print=Page

References

Quality Thermistor, Inc. 2108 http://www.cornerstonesensors.com/About.asp?PageCode=Stability&Print=Page

ThermistorApproxDriftTime
Approximation of Drift Time of NTC Thermistors

Description

ThermistorApproxDriftTime Estimates the Drift Time of NTC Thermistors

Usage

```
ThermistorApproxDriftTime(Ri, Rt, a, b)
```

Arguments

Ri	initial resistance
Rt	resistance at time T
a	intercept at T=1
b	slope (%deltaR per decade of time T)

Value

T	aging time

Author(s)

Jose Gama

Source

Quality Thermistor, Inc. 2108 http://www.cornerstonesensors.com/About.asp?PageCode=Stability&Print=Page

References

Quality Thermistor, Inc. 2108 http://www.cornerstonesensors.com/About.asp?PageCode=Stability&Print=Page

`ThermistorCalculateBeta` *Estimate thermistor beta coefficient from two known resistance/temperature values*

Description

`ThermistorCalculateBeta` Estimates thermistor beta coefficient from two known resistance/temperature values

Usage

```
ThermistorCalculateBeta(R0, T0, R1, T1)
```

Arguments

`R0`	resistance measurement 1
`T0`	temperature measurement 1
`R1`	resistance measurement 2
`T1`	temperature measurement 2

Value

`b`	beta coefficient

Author(s)

Jose Gama

Source

RepRap wiki, 2014 Measuring Thermistor Beta `http://reprap.org/wiki/MeasuringThermistorBeta`

References

RepRap wiki, 2014 Measuring Thermistor Beta `http://reprap.org/wiki/MeasuringThermistorBeta`

ThermistorCalibrationEquation
Thermistor calibration equation

Description

ThermistorCalibrationEquation Thermistor calibration equation

Usage

```
ThermistorCalibrationEquation(R, R0, thCoeffs)
```

Arguments

R	resistance measurement for temperature T
R0	resistance measurement for temperature T0
thCoeffs	Thermistor coefficient

Value

T	temperature

Author(s)

Jose Gama

Source

John G. Webster and Halit Eren, 2014 Measurement, Instrumentation, and Sensors Handbook, Second Edition Spatial, Mechanical, Thermal, and Radiation Measurement CRC Press

References

John G. Webster and Halit Eren, 2014 Measurement, Instrumentation, and Sensors Handbook, Second Edition Spatial, Mechanical, Thermal, and Radiation Measurement CRC Press

`ThermistorCalibrationEquationHoge1` *Resistance–temperature calibration equation Hoge 1*

Description

`ThermistorCalibrationEquationHoge1` Resistance–temperature calibration equation Hoge 1

Usage

```
ThermistorCalibrationEquationHoge1(Rt, A0, A1, A2)
```

Arguments

`Rt`	resistance measurement for temperature T
`A0`	equation coefficient A0
`A1`	equation coefficient A1
`A2`	equation coefficient A2

Value

`T`	temperature

Author(s)

Jose Gama

Source

Chiachung Chen, 2009 Evaluation of resistance–temperature calibration equations for NTC thermistors Measurement 42, Elsevier

References

Chiachung Chen, 2009 Evaluation of resistance–temperature calibration equations for NTC thermistors Measurement 42, Elsevier

`ThermistorCalibrationEquationHoge2` *Resistance–temperature calibration equation Hoge 1*

Description

`ThermistorCalibrationEquationHoge2` Resistance–temperature calibration equation Hoge 2

Usage

```
ThermistorCalibrationEquationHoge2(Rt, A0, A1, A2, A3)
```

Arguments

`Rt`	resistance measurement for temperature T
`A0`	equation coefficient A0
`A1`	equation coefficient A1
`A2`	equation coefficient A2
`A3`	equation coefficient A3

Value

`T`	temperature

Author(s)

Jose Gama

Source

Chiachung Chen, 2009 Evaluation of resistance–temperature calibration equations for NTC thermistors Measurement 42, Elsevier

References

Chiachung Chen, 2009 Evaluation of resistance–temperature calibration equations for NTC thermistors Measurement 42, Elsevier

`ThermistorCalibrationEquationHoge3`
Resistance–temperature calibration equation Hoge 1

Description

`ThermistorCalibrationEquationHoge3` Resistance–temperature calibration equation Hoge 3

Usage

```
ThermistorCalibrationEquationHoge3(Rt, A0, A1, A2, A3, A4)
```

Arguments

`Rt`	resistance measurement for temperature T
`A0`	equation coefficient A0
`A1`	equation coefficient A1
`A2`	equation coefficient A2
`A3`	equation coefficient A3
`A4`	equation coefficient A4

Value

`T`	temperature

Author(s)

Jose Gama

Source

Chiachung Chen, 2009 Evaluation of resistance–temperature calibration equations for NTC thermistors Measurement 42, Elsevier

References

Chiachung Chen, 2009 Evaluation of resistance–temperature calibration equations for NTC thermistors Measurement 42, Elsevier

`ThermistorCalibrationEquationHoge4` *Resistance–temperature calibration equation Hoge 1*

Description

`ThermistorCalibrationEquationHoge4` Resistance–temperature calibration equation Hoge 4

Usage

```
ThermistorCalibrationEquationHoge4(Rt, A0, A1, A2, A5)
```

Arguments

`Rt`	resistance measurement for temperature T
`A0`	equation coefficient A0
`A1`	equation coefficient A1
`A2`	equation coefficient A2
`A5`	equation coefficient A5

Value

`T`	temperature

Author(s)

Jose Gama

Source

Chiachung Chen, 2009 Evaluation of resistance–temperature calibration equations for NTC thermistors Measurement 42, Elsevier

References

Chiachung Chen, 2009 Evaluation of resistance–temperature calibration equations for NTC thermistors Measurement 42, Elsevier

`ThermistorCalibrationEquationHoge5`
Resistance–temperature calibration equation Hoge 1

Description

`ThermistorCalibrationEquationHoge5` Resistance–temperature calibration equation Hoge 5

Usage

```
ThermistorCalibrationEquationHoge5(Rt, C1, C2, C3)
```

Arguments

`Rt`	resistance measurement for temperature T
`C1`	equation coefficient C1
`C2`	equation coefficient C2
`C3`	equation coefficient C3

Value

`T`	temperature

Author(s)

Jose Gama

Source

Chiachung Chen, 2009 Evaluation of resistance–temperature calibration equations for NTC thermistors Measurement 42, Elsevier

References

Chiachung Chen, 2009 Evaluation of resistance–temperature calibration equations for NTC thermistors Measurement 42, Elsevier

ThermistorConvertADCreadingToTemperatureC *Convert ADC reading into a temperature in Celcius by using two resistors*

Description

ThermistorConvertADCreadingToTemperatureC Converts ADC reading into a temperature in Celcius by using two resistors values

Usage

```
ThermistorConvertADCreadingToTemperatureC(adc, R0, T0, betaTH,
R1, R2, vadc = 5.0, vcc = 5.0, ADCbits=10)
```

Arguments

adc	ADC reading
R0	resistance measurement 1
T0	resistance temperature 1
betaTH	beta coefficient
R1	resistor value 1
R2	resistor value 2
vadc	ADC reference
vcc	supply voltage to potential divider
ADCbits	ADC bit resolution

Value

C	Temperature in Celsius

Author(s)

Jose Gama

Source

Chris Palmer, 2007 Measuring temperature the easy way http://hydraraptor.blogspot.co.uk/2007/10/measuring-temperature-easy-way.html

References

Chris Palmer, 2007 Measuring temperature the easy way http://hydraraptor.blogspot.co.uk/2007/10/measuring-temperature-easy-way.html

`ThermistorConvertTemperatureCtoADCreading` *Convert temperature in Celcius into ADC reading, with two resistors*

Description

`ThermistorConvertTemperatureCtoADCreading` Converts temperature in Celcius into ADC reading, with two resistors

Usage

```
ThermistorConvertTemperatureCtoADCreading(T, R0, T0, R1, R2,
betaTH, vadc = 5.0, vcc = 5.0, ADCbits=10)
```

Arguments

`T`	Temperature in Celsius
`R0`	resistance measurement 1
`T0`	resistance temperature 1
`R1`	resistor value 1
`R2`	resistor value 2
`betaTH`	beta coefficient
`vadc`	ADC reference
`vcc`	supply voltage to potential divider
`ADCbits`	ADC bit resolution

Value

`adc`	ADC value

Author(s)

Jose Gama

Source

Chris Palmer, 2007 Measuring temperature the easy way http://hydraraptor.blogspot.co.uk/2007/10/measuring-temperature-easy-way.html

References

Chris Palmer, 2007 Measuring temperature the easy way http://hydraraptor.blogspot.co.uk/2007/10/measuring-temperature-easy-way.html

ThermistorHoge1CoeffFromMeasurements

Calculate Hoge1 coefficients from measurements

Description

`ThermistorHoge1CoeffFromMeasurements` Calculate Hoge1 coefficients from measurements

Usage

```
ThermistorHoge1CoeffFromMeasurements(resAndTemp)
```

Arguments

`resAndTemp`	matrix with temperatures (C) in column 1 and resistance (ohm) in column 2

Value

`b`	beta coefficient

Author(s)

Jose Gama

thermistorMaximumMeasuringVoltage

NTC thermistor Nominal Resistance and Maximum measuring voltage

Description

`thermistorMaximumMeasuringVoltage` is a table with NTC thermistor Nominal Resistance (Rn) and Maximum measuring voltage (V)

Usage

```
thermistorMaximumMeasuringVoltage
```

Author(s)

Jose Gama

Source

AVX Corporation, 2014 AVX NTC Thermistors v11.4 http://www.avx.com

References

AVX Corporation, 2014 AVX NTC Thermistors v11.4 http://www.avx.com

Examples

```
data(thermistorMaximumMeasuringVoltage)
str(thermistorMaximumMeasuringVoltage)
```

ThermistorResistance *Estimate thermistor resistance from temperature*

Description

ThermistorResistance Estimates thermistor resistance from temperature

Usage

```
ThermistorResistance(Tx, R0, betaTH, T0)
```

Arguments

Tx	measured temperature
R0	R0 resistance at temperature To (25C, expressed in Kelvin)
betaTH	Beta parameter of the thermistor (calculated or from the data sheet)
T0	resistance temperature

Value

R	resistance in ohms

Author(s)

Jose Gama

Source

Chris Palmer, 2007 Measuring temperature the easy way http://hydraraptor.blogspot.co.uk/2007/10/measuring-temperature-easy-way.html

References

Chris Palmer, 2007 Measuring temperature the easy way http://hydraraptor.blogspot.co.uk/2007/10/measuring-temperature-easy-way.html

ThermistorResistanceDeviation
Thermistor Resistance Deviation

Description

ThermistorResistanceDeviation Thermistor Resistance Deviation

Usage

```
ThermistorResistanceDeviation(deltaBetaTH, deltaR25)
```

Arguments

deltaBetaTH	delta(beta)
deltaR25	delta(R25)

Value

R	Resistance (ohm)

Author(s)

Jose Gama

Source

Daycounter, Inc. Engineering Services, 2014 Steinhart-Hart Thermistor Calculator http://www.daycounter.com/Calculators/Steinhart-Hart-Thermistor-Calculator.phtml

References

Daycounter, Inc. Engineering Services, 2014 Steinhart-Hart Thermistor Calculator http://www.daycounter.com/Calculators/Steinhart-Hart-Thermistor-Calculator.phtml

Examples

```
data(ThermistorResistanceDeviation)
str(ThermistorResistanceDeviation)
```

`ThermistorResistanceSteinhartHart` *Steinhart-Hart Equation for Thermistor Resistance*

Description

`ThermistorResistanceSteinhartHart` Estimates the thermistor resistance using the Steinhart-Hart equation

Usage

```
ThermistorResistanceSteinhartHart(T, A, B, C)
```

Arguments

`T`	measured temperature for resistance R
`A`	Steinhart-Hart Coefficient A (K^0)
`B`	Steinhart-Hart Coefficient B (K^1)
`C`	Steinhart-Hart Coefficient C (K^2)

Value

`R`	resistance

Author(s)

Jose Gama

Source

Daycounter, Inc. Engineering Services, 2014 Steinhart-Hart Thermistor Calculator http://www.daycounter.com/Calculators/Steinhart-Hart-Thermistor-Calculator.phtml

References

Daycounter, Inc. Engineering Services, 2014 Steinhart-Hart Thermistor Calculator http://www.daycounter.com/Calculators/Steinhart-Hart-Thermistor-Calculator.phtml

ThermistorResistanceSteinhartHart2 *Steinhart-Hart equation for thermistor resistance, calculated with Maxima*

Description

ThermistorResistanceSteinhartHart2 Steinhart-Hart equation for thermistor resistance, calculated with Maxima

Usage

```
ThermistorResistanceSteinhartHart2(T, A, B, C)
```

Arguments

T	measured temperature for resistance R
A	Steinhart-Hart Coefficient A (K^0)
B	Steinhart-Hart Coefficient B (K^1)
C	Steinhart-Hart Coefficient C (K^2)

Value

R	resistance

Author(s)

Jose Gama

ThermistorResistanceSteinhartHartUsing3T *Steinhart-Hart equation for thermistor resistance using 3 temperature points*

Description

ThermistorResistanceSteinhartHartUsing3T Steinhart-Hart equation for thermistor resistance using 3 temperature points

Usage

```
ThermistorResistanceSteinhartHartUsing3T(T, T2, T3, R0, A1, B1, C1=0, D1)
```

Arguments

T	measured temperature for resistance R
T2	2nd measured temperature for resistance R
T3	3rd measured temperature for resistance R
R0	measured resistance
A1	Steinhart-Hart Coefficient A (K^0)
B1	Steinhart-Hart Coefficient B (K^1)
C1	Steinhart-Hart Coefficient C (K^2)
D1	Steinhart-Hart Coefficient D (K^3)

Value

R	resistance

Author(s)

Jose Gama

Source

Daycounter, Inc. Engineering Services Steinhart-Hart Thermistor Calculator http://www.daycounter.com/Calculators/Steinhart-Hart-Thermistor-Calculator.phtml

---

ThermistorResistanceTolerance

Thermistor relationship resistance tolerance

Description

ThermistorResistanceTolerance Thermistor relationship resistance tolerance

Usage

```
ThermistorResistanceTolerance(TempAccy, alpha)
```

Arguments

TempAccy	Temperature Accuracy
alpha	Thermistor alpha constant

Value

t	Tolerance

Author(s)

Jose Gama

Source

Spectrum Sensors & Controls Inc., 2014 NTC Thermistors Engineering Notes http://www.SpecSensors.com

References

Spectrum Sensors & Controls Inc., 2014 NTC Thermistors Engineering Notes http://www.SpecSensors.com

---

ThermistorSensitivity *Thermistor Sensitivity*

Description

ThermistorSensitivity Thermistor Sensitivity (relative change in resistance for a change in temperature)

Usage

```
ThermistorSensitivity(T, beta)
```

Arguments

T	measured temperature for resistance R
beta	beta Coefficient

Value

S	Sensitivity

Author(s)

Jose Gama

Source

John G. Webster and Halit Eren, 2014 Measurement, Instrumentation, and Sensors Handbook, Second Edition Spatial, Mechanical, Thermal, and Radiation Measurement CRC Press

References

John G. Webster and Halit Eren, 2014 Measurement, Instrumentation, and Sensors Handbook, Second Edition Spatial, Mechanical, Thermal, and Radiation Measurement CRC Press

ThermistorSlope *Thermistor Slope (Resistance Ratio)*

Description

ThermistorSlope Thermistor Slope (Resistance Ratio)

Usage

```
ThermistorSlope(R0, R70)
```

Arguments

R0	resistance at temperature To (0C, expressed in Kelvin)
R70	resistance at temperature To (70C, expressed in Kelvin)

Value

R	resistance in ohms

Author(s)

Jose Gama

Source

NTC Thermistor theory BetaTHERM sensors www.betatherm.com

References

NTC Thermistor theory BetaTHERM sensors www.betatherm.com

ThermistorSteinhartHartCoeffFromMeasurements *Steinhart-Hart coefficients A, B, C from measurements*

Description

ThermistorSteinhartHartCoeffFromMeasurements Steinhart-Hart coefficients A, B, C from measurements

Usage

```
ThermistorSteinhartHartCoeffFromMeasurements(resAndTemp)
```

Arguments

resAndTemp	matrix with temperatures (C) in column 1 and resistance (ohm) in column 2

Value

A	coefficient A
B	coefficient B
C	coefficient C

Author(s)

Jose Gama

Source

NTC Thermistor theory BetaTHERM sensors www.betatherm.com

References

NTC Thermistor theory BetaTHERM sensors www.betatherm.com

ThermistorTemperature *RTD temperature Fit*

Description

ThermistorTemperature RTD temperature Fit

Usage

```
ThermistorTemperature(R, R0, betaTH, T0)
```

Arguments

R0	resistance at 0C
R	resistance measured
betaTH	beta parameter of the thermistor (calculated or from the data sheet)
T0	temperature at resistance R0

Value

T	temperature (C)

Author(s)

Jose Gama

Source

Mosaic Industries, Inc., 2014 ntc-thermistors http://www.mosaic-industries.com/embedded-systems/microcontroller-projects/temperature-measurement/ntc-thermistors/resistance-equation

References

Mosaic Industries, Inc., 2014 ntc-thermistors http://www.mosaic-industries.com/embedded-systems/microcontroller-projects/temperature-measurement/ntc-thermistors/resistance-equation

Examples

```
data(ThermistorTemperature)
str(ThermistorTemperature)
```

`ThermistorTemperatureAccuracy`

Thermistor relationship temperature accuracy

Description

`ThermistorTemperatureAccuracy` Thermistor relationship temperature accuracy

Usage

```
ThermistorTemperatureAccuracy(ResTol, alpha)
```

Arguments

`ResTol`	Thermistor resistance tolerance
`alpha`	Thermistor alpha constant

Value

`a`	Accuracy

Author(s)

Jose Gama

Source

Spectrum Sensors & Controls Inc., 2014 NTC Thermistors Engineering Notes http://www.SpecSensors.com

References

Spectrum Sensors & Controls Inc., 2014 NTC Thermistors Engineering Notes http://www.SpecSensors.com

ThermistorTemperatureDeviation
Thermistor temperature Deviation

Description

ThermistorTemperatureDeviation Thermistor temperature Deviation

Usage

```
ThermistorTemperatureDeviation(deltaBetaTH, deltaR25, alpha)
```

Arguments

deltaBetaTH	delta(beta)
deltaR25	delta(R25)
alpha	Thermistor alpha coefficient

Value

T	temperature (C)

Author(s)

Jose Gama

Source

Daycounter, Inc. Engineering Services, 2014 Steinhart-Hart Thermistor Calculator http://www.daycounter.com/Calculators/Steinhart-Hart-Thermistor-Calculator.phtml

References

Daycounter, Inc. Engineering Services, 2014 Steinhart-Hart Thermistor Calculator http://www.daycounter.com/Calculators/Steinhart-Hart-Thermistor-Calculator.phtml

Examples

```
data(ThermistorTemperatureDeviation)
str(ThermistorTemperatureDeviation)
```

`ThermistorTemperatureFitPolynomial` *RTD temperature Fit Polynomial*

Description

`ThermistorTemperatureFitPolynomial` RTD temperature Fit Polynomial

Usage

```
ThermistorTemperatureFitPolynomial(R, R0, A, B, C, D)
```

Arguments

`R`	resistance measured
`R0`	resistance at 0C
`A`	Coefficient A
`B`	Coefficient B
`C`	Coefficient C
`D`	Coefficient D

Value

`T`	temperature (C)

Author(s)

Jose Gama

Source

Mosaic Industries, Inc., 2014 ntc-thermistors http://www.mosaic-industries.com/embedded-systems/microcontroller-projects/temperature-measurement/ntc-thermistors/resistance-equation

References

Mosaic Industries, Inc., 2014 ntc-thermistors http://www.mosaic-industries.com/embedded-systems/microcontroller-projects/temperature-measurement/ntc-thermistors/resistance-equation

Examples

```
data(ThermistorTemperatureFitPolynomial)
str(ThermistorTemperatureFitPolynomial)
```

`ThermistorTemperatureSteinhartHart`
Steinhart-Hart Equation for Thermistor Temperature

Description

`ThermistorTemperatureSteinhartHart` Estimates the thermistor temperature using the Steinhart-Hart equation

Usage

```
ThermistorTemperatureSteinhartHart(R, R0, A, B, C=0, D)
```

Arguments

`R`	measured resistance for temperature T
`R0`	resistance at temperature To (25°C, expressed in ohms)
`A`	Steinhart-Hart Coefficient A1 (K^0)
`B`	Steinhart-Hart Coefficient B1 (K^-1)
`C`	Steinhart-Hart Coefficient C1 (K^-2)
`D`	Steinhart-Hart Coefficient D1 (K^-3)

Value

`R`	resistance

Note

Equation `ThermistorCalibrationEquation` should be used instead of the Steinhart and Hart equation because the performance of this equation is affected by: 1. the thermistor's R(25 C) value 2. the unit of measurement 3. R0 5. the thermistors being connected in series or parallel

Source: John G. Webster and Halit Eren, 2014, Measurement, Instrumentation, and Sensors Handbook, Second Edition, CRC Press

Bennett, A. S., 1971, The calibration of thermistors over the range 0-30 C Deep Sea Research, 19, 157-163.

Author(s)

Jose Gama

Source

Daycounter, Inc. Engineering Services, 2014 Steinhart-Hart Thermistor Calculator http://www.daycounter.com/Calculators/Steinhart-Hart-Thermistor-Calculator.phtml

References

Daycounter, Inc. Engineering Services, 2014 Steinhart-Hart Thermistor Calculator http://www.daycounter.com/Calculators/Steinhart-Hart-Thermistor-Calculator.phtml

---

`ThermistorVolumeResistivityFromR25`

Thermistor Volume Resistivity at 25C

Description

`ThermistorVolumeResistivityFromR25` Estimates thermistor Volume Resistivity at 25C

Usage

```
ThermistorVolumeResistivityFromR25(R25, Thck, L, W)
```

Arguments

`R25`	measured resistance 25C (ohms)
`Thck`	thickness of the conductor (chip) (cm)
`L`	length of the conductor (chip) (cm)
`W`	width of the conductor (chip) (cm)

Value

`r`	Resistivity

Author(s)

Jose Gama

Source

BetaTHERM sensors, 2014 NTC Thermistor theory www.betatherm.com

References

BetaTHERM sensors, 2014 NTC Thermistor theory www.betatherm.com

ThermistorVolumeResistivityFromRho
Thermistor Volume Resistivity at 25C

Description

ThermistorVolumeResistivityFromRho Estimates thermistor Volume Resistivity at 25C

Usage

```
ThermistorVolumeResistivityFromRho(Rho, Thck, L, W)
```

Arguments

Rho	material resistivity in ohm/cm
Thck	thickness of the conductor (chip) (cm)
L	length of the conductor (chip) (cm)
W	width of the conductor (chip) (cm)

Value

r	Resistivity

Author(s)

Jose Gama

Source

BetaTHERM sensors, 2014 NTC Thermistor theory www.betatherm.com

References

BetaTHERM sensors, 2014 NTC Thermistor theory www.betatherm.com

---

`thermocoupleCables` *Thermocouple Cables*

Description

`thermocoupleCables` is a table with Thermocouple Cables

Usage

```
thermocoupleCables
```

Author(s)

Jose Gama

Source

Labfacility Limited, 2014 Thermocouple Cables https://www.labfacility.com/thermocouple-cables/

References

Labfacility Limited, 2014 Thermocouple Cables https://www.labfacility.com/thermocouple-cables/

`thermocoupleCoefficientsTypeB`
Polynomial Equation Coefficients for Voltage to Temperature for Thermocouple Type B

Description

`thermocoupleCoefficientsTypeB` Coefficients for Voltage to Temperature for Thermocouple Type B

Usage

```
thermocoupleCoefficientsTypeB
```

Author(s)

Jose Gama

Source

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

References

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

Examples

```
data(thermocoupleCoefficientsTypeB)
str(thermocoupleCoefficientsTypeB)
```

---

thermocoupleCoefficientsTypeBrationalPolynomial

Polynomial Equation Coefficients for Voltage to Temperature for Thermocouple Type B

Description

`thermocoupleCoefficientsTypeBrationalPolynomial` Polynomial Equation Coefficients for Voltage to Temperature for Thermocouple Type B

Usage

```
thermocoupleCoefficientsTypeBrationalPolynomial
```

Author(s)

Jose Gama

Source

Mosaic Industries, Inc., 2014 rational polynomial function approximation for Type K thermocouples http://www.mosaic-industries.com/embedded-systems/microcontroller-projects/temperature-measurement/thermocouple/calibration-table#computing-cold-junction-voltages

References

Mosaic Industries, Inc., 2014 rational polynomial function approximation for Type K thermocouples http://www.mosaic-industries.com/embedded-systems/microcontroller-projects/temperature-measurement/thermocouple/calibration-table#computing-cold-junction-voltages

Examples

```
data(thermocoupleCoefficientsTypeBrationalPolynomial)
str(thermocoupleCoefficientsTypeBrationalPolynomial)
```

`thermocoupleColdJunctionVoltageCoeff`
Thermocouple Cold Junction Voltage Coefficients

Description

`thermocoupleColdJunctionVoltageCoeff` is a table with Thermocouple Cold Junction Voltage Coefficients

Usage

```
thermocoupleColdJunctionVoltageCoeff
```

Author(s)

Jose Gama

Source

Capgo Pty Ltd, 2013 Computing cold junction voltages http://www.capgo.com/Resources/Temperature/Thermocouple/Thermocouple.html

References

Capgo Pty Ltd, 2013 Computing cold junction voltages http://www.capgo.com/Resources/Temperature/Thermocouple/Thermocouple.html

---

`thermocoupleDefinitionTypes`
Thermocouple Types Definitions

Description

`thermocoupleDefinitionTypes` is a table with Thermocouple Types Definitions

Usage

```
thermocoupleDefinitionTypes
```

Author(s)

Jose Gama

Source

CapGo, 2013 Types of thermocouples http://www.capgo.com/Resources/Temperature/Thermocouple/Thermocouple.html

References

CapGo, 2013 Types of thermocouples http://www.capgo.com/Resources/Temperature/Thermocouple/Thermocouple.html

Examples

```
data(thermocoupleDefinitionTypes)
str(thermocoupleDefinitionTypes)
```

ThermocoupleEquationTemperatureToVoltage

Thermocouple cold junction voltages

Description

ThermocoupleEquationTemperatureToVoltage Thermocouple cold junction voltages

Usage

```
ThermocoupleEquationTemperatureToVoltage(vT, thermocoupleType='k')
```

Arguments

vT	vector with temperatures
thermocoupleType	Thermocouple type

Value

V	voltage (V)

Author(s)

Jose Gama

Source

Mosaic Industries, Inc., 2014 Computing cold junction voltages http://www.mosaic-industries.com/embedded-systems/microcontroller-projects/temperature-measurement/thermocouple/calibration-table#computing-cold-junction-voltages

References

Mosaic Industries, Inc., 2014 Computing cold junction voltages http://www.mosaic-industries.com/embedded-systems/microcontroller-projects/temperature-measurement/thermocouple/calibration-table#computing-cold-junction-voltages

Examples

```
data(ThermocoupleEquationTemperatureToVoltage)
str(ThermocoupleEquationTemperatureToVoltage)
```

ThermocoupleEquationTypeB

Equation for Calculating Voltage from Temperature for Thermocouples Type B

Description

ThermocoupleEquationTypeB Calculates Voltage from Temperature for Thermocouples Type B

ThermocoupleEquationTypeB Calculates Voltage from Temperature for Thermocouples Type E

ThermocoupleEquationTypeB Calculates Voltage from Temperature for Thermocouples Type J

ThermocoupleEquationTypeB Calculates Voltage from Temperature for Thermocouples Type K

ThermocoupleEquationTypeB Calculates Voltage from Temperature for Thermocouples Type N

ThermocoupleEquationTypeB Calculates Voltage from Temperature for Thermocouples Type R

ThermocoupleEquationTypeB Calculates Voltage from Temperature for Thermocouples Type S

ThermocoupleEquationTypeB Calculates Voltage from Temperature for Thermocouples Type T

Usage

```
ThermocoupleEquationTypeB(vT)
```

Arguments

vT	Vector with temperatures (C)

Value

V	Voltage (mV)

Author(s)

Jose Gama

Source

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

References

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

ThermocoupleEquationTypeKrationalPolynomial
Thermocouple polynomial function approximation

Description

ThermocoupleEquationTypeKrationalPolynomial Thermocouple polynomial function approximation

Usage

```
ThermocoupleEquationTypeKrationalPolynomial(vV, thermocoupleType='k')
```

Arguments

vV	vector with voltages
thermocoupleType	Thermocouple type

Value

T	temperature (C)

Author(s)

Jose Gama

Source

Mosaic Industries, Inc., 2014 Rational polynomial function approximation for Type K thermocouples http://www.mosaic-industries.com/embedded-systems/microcontroller-projects/temperature-measurement/thermocouple/calibration-table#computing-cold-junction-voltages

References

Mosaic Industries, Inc., 2014 Rational polynomial function approximation for Type K thermocouples http://www.mosaic-industries.com/embedded-systems/microcontroller-projects/temperature-measurement/thermocouple/calibration-table#computing-cold-junction-voltages

Examples

```
data(ThermocoupleEquationTypeKrationalPolynomial)
str(ThermocoupleEquationTypeKrationalPolynomial)
```

thermocoupleErrorLimits

Limits of Error for Thermocouples

Description

thermocoupleErrorLimits is a table with Limits of Error for Thermocouples

Usage

```
thermocoupleErrorLimits
```

Author(s)

Jose Gama

Source

Jim Strothman, 2006 ISA Handbook of Measurement Equations and Tables, 2nd Edition The International Society of Automation

References

Jim Strothman, 2006 ISA Handbook of Measurement Equations and Tables, 2nd Edition The International Society of Automation

Examples

```
data(thermocoupleErrorLimits)
str(thermocoupleErrorLimits)
```

thermocoupleExtensionCables

Thermocouple Extension Cables

Description

thermocoupleExtensionCables is a table with Thermocouple Extension Cables

Usage

```
thermocoupleExtensionCables
```

Author(s)

Jose Gama

Source

Mike Nager, 2014 Designing with Thermocouples: Get the Most from Your Measurements www.phoenixcontact.com

References

Mike Nager, 2014 Designing with Thermocouples: Get the Most from Your Measurements www.phoenixcontact.com

---

`thermocoupleFixedPointsITS90`
fixed Points ITS90

Description

`thermocoupleFixedPointsITS90` is a table with the fixed Points of ITS90

Usage

```
thermocoupleFixedPointsITS90
```

Author(s)

Jose Gama

Source

National Institute of Standards and Technology (NIST), 2014 Table I Thermocouple Types Definitions http://srdata.nist.gov/its90/tables/table_iii.html

References

National Institute of Standards and Technology (NIST), 2014 Table I Thermocouple Types Definitions http://srdata.nist.gov/its90/tables/table_iii.html

Examples

```
data(thermocoupleFixedPointsITS90)
str(thermocoupleFixedPointsITS90)
```

ThermocoupleFundamentalRelation
Thermocouple Fundamental Relation

Description

ThermocoupleFundamentalRelation Thermocouple Fundamental Relation

Usage

```
ThermocoupleFundamentalRelation(S, T0, T1)
```

Arguments

S	Seebeck coefficient (uV/C) or Sab Seebeck coefficient between material a and b
T0	temperatures at T0 end
T1	temperatures at T1 end

Value

V	voltage (V)

Author(s)

Jose Gama

Source

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

References

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

Examples

```
data(ThermocoupleFundamentalRelation)
str(ThermocoupleFundamentalRelation)
```

ThermocoupleFundamentalRelation2
Thermocouple Fundamental Relation

Description

ThermocoupleFundamentalRelation2 Thermocouple Fundamental Relation

Usage

```
ThermocoupleFundamentalRelation2(Sa, Sb, T0, T1)
```

Arguments

Sa	Seebeck coefficient for material a
Sb	Seebeck coefficient for material b
T0	temperatures at T0 end
T1	temperatures at T1 end

Value

V	voltage (V)

Author(s)

Jose Gama

Source

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

References

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

Examples

```
data(ThermocoupleFundamentalRelation2)
str(ThermocoupleFundamentalRelation2)
```

thermocoupleInsulatingMaterialsCeramicPackedStock

Insulating Materials for Ceramic Packed Thermocouple Stock

Description

thermocoupleInsulatingMaterialsCeramicPackedStock is a table with Insulating Materials for Ceramic Packed Thermocouple Stock

Usage

```
thermocoupleInsulatingMaterialsCeramicPackedStock
```

Author(s)

Jose Gama

Source

American Society for Testing and Materials, 1981 Manual on the Use of Thermocouples in Temperature Measurement Committee E20 on Temperature Measurement and Subcommittee E20.04 on Thermocouples

References

American Society for Testing and Materials, 1981 Manual on the Use of Thermocouples in Temperature Measurement Committee E20 on Temperature Measurement and Subcommittee E20.04 on Thermocouples

Examples

```
data(thermocoupleInsulatingMaterialsCeramicPackedStock)
str(thermocoupleInsulatingMaterialsCeramicPackedStock)
```

thermocoupleInverseCoefficientsTypeB

Polynomial Equation Coefficients for Voltage to Temperature for Thermocouple Type B

Description

thermocoupleInverseCoefficientsTypeB Coefficients for Voltage to Temperature for Thermocouple Type B

Usage

```
thermocoupleInverseCoefficientsTypeB
```

Author(s)

Jose Gama

Source

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

References

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

Examples

```
data(thermocoupleInverseCoefficientsTypeB)
str(thermocoupleInverseCoefficientsTypeB)
```

ThermocoupleInverseEquationTypeB

Equation for Calculating Temperature from Voltage for Thermocouples Type B

Description

`ThermocoupleInverseEquationTypeB` Calculates Voltage from Temperature for Thermocouples Type B

`ThermocoupleInverseEquationTypeB` Calculates Voltage from Temperature for Thermocouples Type E

`ThermocoupleInverseEquationTypeB` Calculates Voltage from Temperature for Thermocouples Type J

`ThermocoupleInverseEquationTypeB` Calculates Voltage from Temperature for Thermocouples Type K

`ThermocoupleInverseEquationTypeB` Calculates Voltage from Temperature for Thermocouples Type N

`ThermocoupleInverseEquationTypeB` Calculates Voltage from Temperature for Thermocouples Type R

`ThermocoupleInverseEquationTypeB` Calculates Voltage from Temperature for Thermocouples Type S

`ThermocoupleInverseEquationTypeB` Calculates Voltage from Temperature for Thermocouples Type T

Usage

```
ThermocoupleInverseEquationTypeB(vV)
```

Arguments

vV	Vector with voltages (C)

Value

T	Temperature (C)

Author(s)

Jose Gama

Source

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

References

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

---

thermocoupleInverseFunctionsRange

Error range for Polynomial inverse functions for Thermocouples

---

Description

thermocoupleInverseFunctionsRange Error range for Polynomial inverse functions for Thermocouples

Usage

```
thermocoupleInverseFunctionsRange
```

Author(s)

Jose Gama

Source

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

References

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

Examples

```
data(thermocoupleInverseFunctionsRange)
str(thermocoupleInverseFunctionsRange)
```

ThermocoupleLeadWireExternalResistanceUS
Calculate the external resistance to an instrument

Description

ThermocoupleLeadWireExternalResistanceUS Calculates the external resistance to an instrument

Usage

```
ThermocoupleLeadWireExternalResistanceUS(thermocoupleType, thermocoupleLength,
thermocoupleGauge, leadWireType, leadWireLength, leadWireGauge)
```

Arguments

thermocoupleType	Type of thermocouple wire
thermocoupleLength	Length of thermocouple wire (feet)
thermocoupleGauge	Gauge of thermocouple wire (AWG)
leadWireType	Type of lead wire
leadWireLength	Length of lead wire (feet)
leadWireGauge	Gauge of lead wire (AWG)

Value

R	resistance (ohms)

Author(s)

Jose Gama

Source

Conax(TM) Buffalo, 2014 thermocouple wire size and resistance table www.conaxbuffalo.com

References

Conax(TM) Buffalo, 2014 thermocouple wire size and resistance table www.conaxbuffalo.com

Examples

```
# What is external resistance to my instrument if I use a 20 gauge Chromel/Alumel
# thermocouple 3 feet long and 14 gauge Chromel/Alumel lead wire 20 feet in length?
# Answer: 4.7002 ohms
ThermocoupleLeadWireExternalResistanceUS('k',3,20,'k',20,14)
```

thermocoupleMineralInsulated *Mineral Insulated Thermocouples*

Description

thermocoupleMineralInsulated is a table with Mineral Insulated Thermocouples

Usage

```
thermocoupleMineralInsulated
```

Author(s)

Jose Gama

Source

Watlow(R), 2014 Mineral Insulated Sensors by Diameter and Sheath https://www.watlow.com/downloads/en/catalogs/thermocouples.pdf

References

Watlow(R), 2014 Mineral Insulated Sensors by Diameter and Sheath https://www.watlow.com/downloads/en/catalogs/thermocouples.pdf

thermocoupleMounting *Thermocouple Mounting*

Description

thermocoupleMounting is a table with Thermocouple Mounting data

Usage

```
thermocoupleMounting
```

Author(s)

Jose Gama

Source

Capgo Pty Ltd, 2013 Thermocouple mounting http://www.capgo.com/Resources/Temperature/Thermocouple/Thermocouple.html Watlow(R), 2014 Junction Types https://www.watlow.com/downloads/en/catalogs/thermocouples.pdf

References

Capgo Pty Ltd, 2013 Thermocouple mounting http://www.capgo.com/Resources/Temperature/Thermocouple/Thermocouple.html Watlow(R), 2014 Junction Types https://www.watlow.com/downloads/en/catalogs/thermocouples.pdf

---

`thermocoupleNominalSeebeckCoefficients`
Nominal Seebeck Coefficients

Description

`thermocoupleNominalSeebeckCoefficients` is a table with Nominal Seebeck Coefficients

Usage

```
thermocoupleNominalSeebeckCoefficients
```

Author(s)

Jose Gama

Source

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

References

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

Examples

```
data(thermocoupleNominalSeebeckCoefficients)
str(thermocoupleNominalSeebeckCoefficients)
```

`thermocoupleRecommendedUpperTempLimitsProtected`
Recommended Upper Temperature Limits for Protected Thermocouples

---

Description

`thermocoupleRecommendedUpperTempLimitsProtected` is a table with Recommended Upper Temperature Limits for Protected Thermocouples

Usage

```
thermocoupleRecommendedUpperTempLimitsProtected
```

Author(s)

Jose Gama

Source

CapGo, 2013 Recommended upper temperature limits http://www.capgo.com/Resources/Temperature/Thermocouple/Thermocouple.html

References

CapGo, 2013 Recommended upper temperature limits http://www.capgo.com/Resources/Temperature/Thermocouple/Thermocouple.html

Examples

```
data(thermocoupleRecommendedUpperTempLimitsProtected)
str(thermocoupleRecommendedUpperTempLimitsProtected)
```

---

thermocoupleResponseTime

Thermocouple Response Times

Description

thermocoupleResponseTime is a table with Thermocouple Response Times

Usage

```
thermocoupleResponseTime
```

Author(s)

Jose Gama

Source

Industrial Temperature Sensors Ltd., 2014 Typical Thermocouple Response Times in seconds http://www.itsirl.com/tcresp.php

References

Industrial Temperature Sensors Ltd., 2014 Typical Thermocouple Response Times in seconds http://www.itsirl.com/tcresp.php

thermocoupleSingleLegThermoelements

Letter designations, compositions, and trade names of single-leg thermoelements

Description

thermocoupleSingleLegThermoelements is a table with the Letter designations, compositions, and trade names of single-leg thermoelements

Usage

```
thermocoupleSingleLegThermoelements
```

Author(s)

Jose Gama

Source

National Institute of Standards and Technology (NIST), 2014 Table I Thermocouple Types Definitions http://srdata.nist.gov/its90/tables/table_ii.html

References

National Institute of Standards and Technology (NIST), 2014 Table I Thermocouple Types Definitions http://srdata.nist.gov/its90/tables/table_ii.html

Examples

```
data(thermocoupleSingleLegThermoelements)
str(thermocoupleSingleLegThermoelements)
```

ThermocoupleStemLossErrorEstimate

Stem Loss Error Estimate for Thermocouple

Description

ThermocoupleStemLossErrorEstimate Stem Loss Error Estimate for Thermocouple

Usage

```
ThermocoupleStemLossErrorEstimate(L, h, k, r0, ri)
```

Arguments

L	sensor insertion depth (cm)
h	surface heat transfer coefficient (watts.cm2 C)
k	thermal conductivity of sheath material (watts.cm C)
r0	sheath outer radius
ri	sheath inner radius

Value

E	error (percent of difference between tip temperature and back-end temperature)

Author(s)

Jose Gama

Source

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

References

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

Examples

```
data(ThermocoupleStemLossErrorEstimate)
str(ThermocoupleStemLossErrorEstimate)
```

ThermocoupleTable10colsTo2

Convert the thermocouple table for easier use

Description

ThermocoupleTable10colsTo2 converts the thermocouple table from n X 12 to m X 2

Usage

```
ThermocoupleTable10colsTo2(thermocoupleTable)
```

Arguments

thermocoupleTable	thermocouple table to be resized n X 12

Value

table thermocouple table m X 2

Author(s)

Jose Gama

---

thermocoupleTypeBthermoelectricVoltage
Thermoelectric Voltage for Thermocouple Type B

Description

thermocoupleTypeBthermoelectricVoltage Thermoelectric Voltage for Thermocouple Type B

thermocoupleTypeEthermoelectricVoltage Thermoelectric Voltage for Thermocouple Type E

thermocoupleTypeJthermoelectricVoltage Thermoelectric Voltage for Thermocouple Type J

thermocoupleTypeKthermoelectricVoltage Thermoelectric Voltage for Thermocouple Type K

thermocoupleTypeNthermoelectricVoltage Thermoelectric Voltage for Thermocouple Type N

thermocoupleTypeSthermoelectricVoltage Thermoelectric Voltage for Thermocouple Type R

thermocoupleTypeBthermoelectricVoltage Thermoelectric Voltage for Thermocouple Type S

thermocoupleTypeTthermoelectricVoltage Thermoelectric Voltage for Thermocouple Type T

Usage

```
thermocoupleTypeBthermoelectricVoltage
```

Author(s)

Jose Gama

Source

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

References

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

Examples

```
data(thermocoupleTypeBthermoelectricVoltage)
str(thermocoupleTypeBthermoelectricVoltage)
```

thermocoupleTypesASTM *Thermocouple Wire Constituents*

Description

thermocoupleTypesASTM is a table with Thermocouple Wire Constituents according to the ASTM

Usage

```
thermocoupleTypesASTM
```

Author(s)

Jose Gama

Source

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

References

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

Examples

```
data(thermocoupleTypesASTM)
str(thermocoupleTypesASTM)
```

ThermocoupleVoltageContributionTwoHomogeneousWires *Voltage Contribution of Two Homogeneous Wires*

Description

ThermocoupleVoltageContributionTwoHomogeneousWires Voltage Contribution of Two Homogeneous Wires

Usage

```
ThermocoupleVoltageContributionTwoHomogeneousWires(Sab, T0, T1, T2)
```

Arguments

Sab	Seebeck coefficient between material a and b
T0	temperatures at T0 end
T1	temperatures at T1 end
T2	temperatures at T2 end

Value

V voltage (V)

Author(s)

Jose Gama

Source

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

References

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

Examples

```
data(ThermocoupleVoltageContributionTwoHomogeneousWires)
str(ThermocoupleVoltageContributionTwoHomogeneousWires)
```

---

thermocoupleWireColorUnitedStatesCanadaMexico

Wire Color for Thermocouples and Lead Wires

Description

`thermocoupleWireColorUnitedStatesCanadaMexico` Wire Color for Thermocouples and Lead Wires for the United States, Canada and Mexico

`thermocoupleCompensatingExtensionWireColorUnitedStatesCanadaMexico` Wire Color for Compensating Extension Wire for the United States, Canada and Mexico

`thermocoupleExtensionWireColorUnitedStatesCanadaMexico` Wire Color for Extension Wire for the United States, Canada and Mexico

`thermocoupleAndExtensionWiresInternationalColorCodes` Wire Color for Thermocouples and Extension Wires with international codes

Usage

```
thermocoupleWireColorUnitedStatesCanadaMexico
```

Author(s)

Jose Gama

Source

TEMPCO Electric Heater Corporation, 2014 Temperature Sensing www.tempco.com

American Society for Testing and Materials, 1993 Manual on the Use of Thermocouples in Temperature Measurement Committee E20 on Temperature Measurement and Subcommittee E20.04 on Thermocouples

References

TEMPCO Electric Heater Corporation, 2014 Temperature Sensing www.tempco.com

American Society for Testing and Materials, 1993 Manual on the Use of Thermocouples in Temperature Measurement Committee E20 on Temperature Measurement and Subcommittee E20.04 on Thermocouples

Examples

```
data(thermocoupleWireColorUnitedStatesCanadaMexico)
str(thermocoupleWireColorUnitedStatesCanadaMexico)
```

---

thermocoupleWireSizeResistanceImperial

thermocouple wire size and resistance table

Description

thermocoupleWireSizeResistanceImperial is a table with thermocouple wire size and resistance

Usage

```
thermocoupleWireSizeResistanceImperial
```

Author(s)

Jose Gama

Source

Conax(TM) Buffalo, 2014 thermocouple wire size and resistance table www.conaxbuffalo.com

References

Conax(TM) Buffalo, 2014 thermocouple wire size and resistance table www.conaxbuffalo.com

Examples

```
data(thermocoupleWireSizeResistanceImperial)
str(thermocoupleWireSizeResistanceImperial)
```

ThermocoupleWithReference
Thermocouple with Reference

Description

ThermocoupleWithReference Thermocouple with Reference

Usage

```
ThermocoupleWithReference(Sa, Sb, T0, T1, T2)
```

Arguments

Sa	Seebeck coefficient for material a
Sb	Seebeck coefficient for material b
T0	temperatures at T0 end
T1	temperatures at T1 end
T2	temperatures at T3 end

Value

V	voltage (V)

Author(s)

Jose Gama

Source

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

References

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

Examples

```
data(ThermocoupleWithReference)
str(ThermocoupleWithReference)
```

ThermocoupleWithReference2 *Thermocouple with Reference*

Description

ThermocoupleWithReference2 Thermocouple with Reference

Usage

```
ThermocoupleWithReference2(Sab, T1, T2)
```

Arguments

Sab	Seebeck coefficient between material a and b
T1	temperatures at T1 end
T2	temperatures at T2 end

Value

V	voltage (V)

Author(s)

Jose Gama

Source

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

References

Kerlin, T.W., 1999 Practical Thermocouple Thermometry International Society of Automation (ISA)

Examples

```
data(ThermocoupleWithReference2)
str(ThermocoupleWithReference2)
```

TminusT90CCT2008 *T - T90 computed by a polynomial*

Description

TminusT90CCT2008 Thermodynamic Temperature minus the ITS-90, computed by a polynomial (CCT WG4 2008)

Usage

```
TminusT90CCT2008(T90K)
```

Arguments

T90K	ITS-90

Value

T - T90	Thermodynamic Temperature minus ITS-90

Author(s)

Jose Gama

Source

Franco Pavese and Gianfranco Molinar Min Beciet, 2013 Modern Gas-Based Temperature and Pressure Measurements Springer Science + Business Media pp. 42

References

Franco Pavese and Gianfranco Molinar Min Beciet, 2013 Modern Gas-Based Temperature and Pressure Measurements Springer Science + Business Media pp. 42

TminusT90Pavese4CubicPolynomials
T - T90 computed by 4 cubic polynomials

Description

TminusT90Pavese4CubicPolynomials Thermodynamic Temperature minus the ITS-90, computed by 4 cubic polynomials (CCT WG4 2008)

Usage

```
TminusT90Pavese4CubicPolynomials(T90K)
```

Arguments

T90K	ITS-90

Value

T - T90	Thermodynamic Temperature minus ITS-90

Author(s)

Jose Gama

Source

Franco Pavese and Gianfranco Molinar Min Beciet, 2013 Modern Gas-Based Temperature and Pressure Measurements Springer Science + Business Media pp. 42

References

Franco Pavese and Gianfranco Molinar Min Beciet, 2013 Modern Gas-Based Temperature and Pressure Measurements Springer Science + Business Media pp. 42

TminusT90Pavese6CubicPolynomials

T - T90 computed by 6 cubic polynomials

Description

TminusT90Pavese6CubicPolynomials Thermodynamic Temperature minus the ITS-90, computed by 6 cubic polynomials (CCT WG4 2008)

Usage

```
TminusT90Pavese6CubicPolynomials(T90K)
```

Arguments

T90K	ITS-90

Value

T - T90	Thermodynamic Temperature minus ITS-90

Author(s)

Jose Gama

Source

Franco Pavese and Gianfranco Molinar Min Beciet, 2013 Modern Gas-Based Temperature and Pressure Measurements Springer Science + Business Media pp. 42

References

Franco Pavese and Gianfranco Molinar Min Beciet, 2013 Modern Gas-Based Temperature and Pressure Measurements Springer Science + Business Media pp. 42

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