

Package ‘thermocouple’

July 19, 2015

Type Package

Title Temperature Measurement with Thermocouples, RTD and IC Sensors

Version 1.0.2

Encoding UTF-8

Description Temperature measurement data, equations and methods for thermocouples, wire RTD, thermistors, IC thermometers, bimetallic strips and the ITS-90.

License GPL (>= 3)

LazyData yes

LazyLoad yes

Depends R (>= 2.7.0)

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Repository CRAN

Repository/R-Forge/Project thermocouple

Repository/R-Forge/Revision 4

Repository/R-Forge/DateTimeStamp 2015-07-18 23:20:17

Date/Publication 2015-07-19 19:44:31

NeedsCompilation no

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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)
```

AWGT0mm

Convert American wire gauge (SWG) to mm

Description

AWGT0mm converts American wire gauge (SWG) to mm

Usage

AWGT0mm(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	<i>RTD beta coefficient</i>
---------	-----------------------------

Description

RTDbeta calculates RTD beta coefficient

Usage

RTDbeta(R_0 , R_{t1} , T_1 , alpha, delta)

Arguments

R_0	resistance at 0C
R_{t1}	resistance of the sensor at the lowest temperature
T_1	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	<i>RTD A coefficient</i>
-----------------	--------------------------

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	<i>RTD delta coefficient</i>
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Description

RTDdelta calculates RTD delta coefficient

Usage

RTDdelta(R_0 , R_{th} , T_h , α)

Arguments

R_0	resistance at 0C
R_{th}	resistance of the sensor at the highest temperature
T_h	highest temperature in the calibration range
α	RTD alpha coefficient

Value

delta	RTD delta coefficient
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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	<i>RTD equation with 3 constants</i>
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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	<i>self-heating error</i>
------------------	---------------------------

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	<i>Sensitivity of the sensor</i>
-------------------	----------------------------------

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	<i>Spline algorithm used in The Observed Properties of Liquid Helium at the Saturated Vapor Pressure</i>
------------	--

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
NA

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
NA

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
NA

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
NA

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
NA

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

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

Value

<i>C</i>	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)

ThermocoupleEquationTypeK Rational Polynomial

Thermocouple polynomial function approximation

Description

ThermocoupleEquationTypeK Rational Polynomial Thermocouple polynomial function approximation

Usage

```
ThermocoupleEquationTypeK Rational Polynomial(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(ThermocoupleEquationTypeK Rational Polynomial)  
str(ThermocoupleEquationTypeK Rational Polynomial)
```

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.cm ² C)
k	thermal conductivity of sheath material (watts.cm C)
r _o	sheath outer radius
r _i	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.tempcoco.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.tempcoco.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)

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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

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References

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