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PRODUCT SPECIFICATIONS

Thermo Scientific HME900 and CM515

Density converter electronics

Users of Thermo Scientific density meters or specific gravity analyzers are offered the choice of a HART™ compatible, field-mounted density converter or a control room based unit, ensuring an optimum data processing solution. Both instruments provide high integrity calculations of density and density related variables which are critical for effective custody transfer and process optimization.

Features

- High accuracy calculations
- Choice of field or control room installation
- Flexible input into user DCS
- Extensive range of standard calculations
- Customer defined function (CDF) for non-standard calculation

Two Thermo Scientific density converter options are available that work in combination with Thermo Scientific liquid and gas density meters to ensure the optimum processing solution for the selected application. The Thermo Scientific HME900 head-mounted electronics option gives the user the power of control room electronics in the field with full HART compatibility. For applications requiring greater input/output flexibility or where the electronics are control room based, users may prefer the Thermo Scientific CM515 density converter.

The density converters accept the frequency and PT100 (RTD) temperature outputs from the density meter, together with a pressure input (if required), and calculate a selection of density and density derived parameters such as live density, specific gravity, molecular weight, °Brix, °Baume, °API, and gas compressibility (depending on fluid type). The customer defined function (CDF) facility allows non-standard calculations to be performed, such as percent concentration, percent solids, percent alcohol and percent fat using a look-up table derived from customer supplied data.

Thermo Scientific HME900

The HME900 head-mounted density converter option may be included with any Thermo Scientific liquid or gas density meter or specific gravity analyzer. The head-mounted electronics unit conditions the output signal to give a HART compatible 4-20 mA signal that can be used for indication or can be connected directly to the user's DCS. Alternatively, the output can be read digitally by a HART compatible control or data collection system. The local display allows thenprocess engineer to view the prime variable value either in engineering units alone or with an alternating display of percent of chosen span.

Thermo Scientific™ HME900

The selection of HME900 electronics is ideal in most general density measure-ment applications and is essential when HART communications are required. The Thermo Scientific density meter HME900 system is certified for use in flammable atmospheres.

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Thermo Scientific™ HME900

HME900 Ordering Information

The HME900 head-mounted electronics unit may only be specified as part of a Thermo Scientific density meter or specific gravity analyzer order by selecting the SIGNAL OUTPUT/'H' option. It is also possible to select the WinHME900 communications software and modem package by selecting the OPTIONS/'W' option.

HME900 Features

- Available on Thermo Scientific density meters/SG analyzers
- Field mounted, direct density output
- Gas density conversion based on general gas equations of state (Redlich-Kwong)
- Liquid calculation using ASTM D1250 (1980) for refined fluids and crude oils
- High accuracy calculations
- Local display
- HART compatible
- Hazardous area approvals
- WinHME900 PC configuration program
- Device description (DD) available for Emerson 375 field communicator

Table 1. Available calculations for Thermo Scientific Density Converter Electronics

Measurements /Calculations performed	HME900		CM515	
	Liquid	Gas	Liquid	Gas
Temperature	•	•	•	•
Pressure	•	•	•	•
Line Density	•	•	•	•
Reference Density (density at reference temperature and pressure)	•	•	•	•
Specific Gravity (SG) / Relative Density	•	•	•	•
°Brix	•	—	•	—
°Baume	•	—	•	—
°API	•	—	•	—
%solids	Via CDF	—	Via CDF	—
%alcohol	Via CDF	—	Via CDF	—
%fat	Via CDF	—	Via CDF	—
%mass	•	—	•	—
%volume	•	—	•	—
Molecular Weight (MW)	—	•	—	•
Gas Compressibility (Redlich-Kwong)	—	•	—	•
Liquid Density (Soave-Redlich-Kwong, Peng-Robinson)	—	—	•	—
Estimated Calorific Value (CV)	—	Via CDF	—	Via CDF
Estimated Wobbe Index	—	Via CDF	—	Via CDF

Thermo Scientific HME900

Functional specifications	
Inputs	
Temperature (PT100 RTD)	Range: -200°C to + 200°C (-328°F to 392°F); Resolution: better than 0.0015%; Accuracy at +20°C (+68°F) reference: ±0.1°C (±0.18°F); -200°C to +200°C (-328°F to + 392°F) ±0.05°C (±0.09°F); 0°C to + 200°C (+32°F to + 392°F); Drift -20°C to + 50°C (-4°F to + 122°F): ±0.05°C (±0.09°F) typical, ±0.01°C (±0.018°F) max
Pressure (4-20 mA)	Resolution: better than 0.01%; Accuracy at 20°C (68°F) reference: better than 0.1% point; Drift -20°C to +50°C (-4°F to + 122°F): ±0.1% typical, ±0.2% max
Period (current pulse 6-18 mA)	Range: 10 ms to 250 µs (100 Hz to 4000 Hz); Standard range: 2500 µs to 250 µs (400 Hz to 4000 Hz); Resolution: ±2 ns; Accuracy at reference +20°C (+68°F): as resolution; Drift -20°C to +50°C (-4°F to + 122°F): ±25 ppm typical; ±50 ppm max
Outputs	
4-20 mA HART	Operating voltage: 8-28 VDC at terminals; Resolution: 0.015% span; Accuracy at reference +20°C (+68°F): ±0.1% of point; Drift -20°C to +50°C (-4°F to + 122°F): ±0.08% full scale typical; ±0.175% full scale max
Local display	Selection of engineering units only, or engineering units and percent full scale switching every 5 seconds
Other input/output	
Density supply	-Operating voltage: 10-28 VDC at terminals; Current: modulated at density meter frequency 6–18 mA
Enclosure temperature (PCB mounted 100 ohm PRT)	Accuracy: ±0.5% point; Range: -40°C to + 80°C (-40°F to + 176°F); Alarm points: -20°C to + 60°C (-4°F to + 140°F)
Compliance	
Quality assurance	ISO 9001:2000
CE Mark	Clean, dry and oil-free instrument air
Electromagnetic compatibility (EN61326:1997)	Compliant
Low voltage directive	Compliant
RFI-EMI effect	Less than ±1% effect on zero/span (26-1000 mHz @ 30V/m) when installed per product installation guidelines
Safe area use	As standard
ATEX conformance: Intrinsically safe (94/9/EC)	Ex II 1 G EEx ia IIC T4 (-20°C <_ Tamb <_ to + 60°C)
ATEX conformance: flameproof (94/9/EC)	Sarasota FD910 / Sarasota FD950 / Sarasota FD960 only: Ex II 2 G EEx d IIC T4 (Tamb = -20°C to + 60°C) or T3 (Tamb = -20°C to + 60°C) Temperature classification of T4 or T3 for use with maximum process fluid temperature of + 115°C or + 180°C respectively
Canadian Standards Association (CSA): flameproof	Class I Div 1 Groups B, C and D
Calibration certification	Calibration traceable to national standards. Calibration certificates supplied as standard. Optional traceable calibration equipment listing available
Physical specifications	
Dimensions/weight	Fits into the standard Thermo Scientific density meter terminal/amplifier enclosure
Local display (optional)	41/2 digit 7.6mm (0.3 in) 7-segment LCD display; Resolution 0.1% or 0.01% depending on display variable
Cable	Without pressure option: two pairs; With pressure option: three pairs
Environmental rating	As density meter: IP65 (NEMA 4X)
Ambient temperature range	-20°C to + 60°C (-4°F to + 140°F)
Ambient humidity	Up to 95% non-condensing
Data storage	Configurations settings and data retained in e^2 non-volatile storage
Connections	Screw terminals suitable for wire sizes to 1.5 mm^2 (0.06 in^2)
Communications	Uses HART communications protocol; WinHME900 PC configuration program; Handheld communicator (e.g. Emerson 375 Field Communicator)
Power	Without pressure option: two loops 24V 23 mA; With pressure option: maximum three loops 24V 23 mA

Thermo Scientific™ CM515

Thermo Scientific CM515

Designed to accept inputs from a Thermo Scientific density meter, the CM515 density converter offers a pressure input that allows a variety of density related variables to be calculated while the customer defined function (CDF) table allows a two dimensional look-up table to be entered, enabling variables with specific relationships to density and another variable to be estimated. The user input allows an external variable to be connected to the CDF and an output related to the external variable to be generated. Standard equations are used to calculate density related variables, including density at reference conditions, specific gravity, process gravity and molecular weight.

The backlit LCD display offers a wide viewing angle that ensures clear visibility in the field or control room with the front panel indicating the current input, output and some intermediate calculated values. Data transmission from the CM515 can be via alarm contacts, 4-20 mA loops or bi-directional serial communications (RS232 or RS485).

The CM515 density converter is best suited to applications that require a greater level of input/output flexibility than offered by the Thermo Scientific HME900 electronics and when HART compatibility is not required.

CM515 Features

- Pulse input suitable for all Thermo Scientific density meters and SG analyzers
- Temperature and pressure inputs for density conversion to reference conditions
- Liquid density conversion based on ASTM D1250-04 for crude oils, lube oils and refined products
- Gas density conversion based on general gas equations of state (Ideal Gas, Redlich-Kwong, Soave-Redlich-Kwong, Peng-Robinson)
- Customer defined function (look-up table)
- Two 4-20 mA current loops
- RS232, RS485 and infrared serial ports
- ASCII Modbus, RTU Modbus and printer port protocols
- Backlit display for high visibility
- CSA and ATEX XP enclosures available

Thermo Scientific CM515

Functional specifications	
Frequency inputs	
Range	0 kHz to 10 kHz
Overvoltage	30 V maximum
Update time	0.3 sec
Cutoff frequency	Programmable
Configuration	Pulse, coil or NPS input
Analog input	
Overcurrent	100 mA absolute maximum rating
Update time	<1.0 sec
Configuration	4-wire RTD, 4-20 mA, 0-5 V and 1-5 V input
Non-linearity	Up to 20 correction points (flow inputs)
RTD Input	Sensor type:PT100 & PT500 to IEC 75; Connection: four-wire; Range:-200°C to +350°C (-328°C to +662°F); Accuracy: 0.1°C typical
4-20 mA Input	Impedance:100 Ohms (to common signal ground); Accuracy:0.05% full scale (+20°C), 0.1% (full temperature range, typical)
0-5 or 1-5 Volts Input	Impedance: 10 MOhms (to common signal ground); Accuracy:0.05% full scale (+20°C), 0.1% (full temperature range, typical)
Logic inputs	
Signal type	CMOS, TTL, open collector, reed switch
Overvoltage	30 V maximum
Relay output	
Number of outputs	8 to 24 volts DC, programmable
Voltage	250 volts AC, 30 volts DC maximum (solid state relays use AC only)
Current	3 A maximum
Transducer supply	
Voltage	2 relays plus 2 optional relays
Current	70 mA @ 24 V, 120 mA @ 12 V maximum
Protection	Power limited output
Isolated output	
Number of outputs	1 configurable output (plus 1 optional)
Configuration	Pulse/digital or 4-20 mA output
Pulse/Digital output	Signal type: open collector; Switching: 200 mA, 30 volts DC maximum; Saturation: 0.8 volts maximum
4-20 mA Output	Supply: 9 to 30 volts DC external; Resolution: 0.05% full scale; Accuracy: 0.05% full scale (+20°C), 0.1% (full temperature range, typical)
Compliance	
Quality assurance	ISO 9001:2000
CE mark	Compliant
Electromagnetic compatibility (EN61326:1997)	Compliant
Low voltage directive	Compliant
Approvals	ATEX, FM, CSA and SAA approved enclosures available for hazardous areas
Physical specifications	
CM515 Unit Dimensions	147 mm × 74 mm × 167 mm (5.8 in × 2.9 in × 6.6 in) (width × height × depth)
Net weight	Typically 2.7 kg (6 lb)
Display	Backlit LCD with 7-digit numeric display and 11-character alphanumeric display; update rate of 0.3 seconds
Environmental rating	IP65 (NEMA 4X) when panel mounted
Ambient Temperature Range	-20°C to +60°C (-4°F to +140°F) conformal coating; +5°C to +40°C (+41°F to +104°F)
Ambient Humidity	Up to 95% non-condensing
Data Storage	Configuration settings and data retained in non-volatile storage
Communications	Infrared RS232 & DB9 RS232 ports standard; RS485; 2400 to 19200 baud rate; protocols: ASCII, Modbus RTU, printer
Power	95-135 VAC; 190-260 VAC; 12-28 VDC

CM515 dimensional drawing

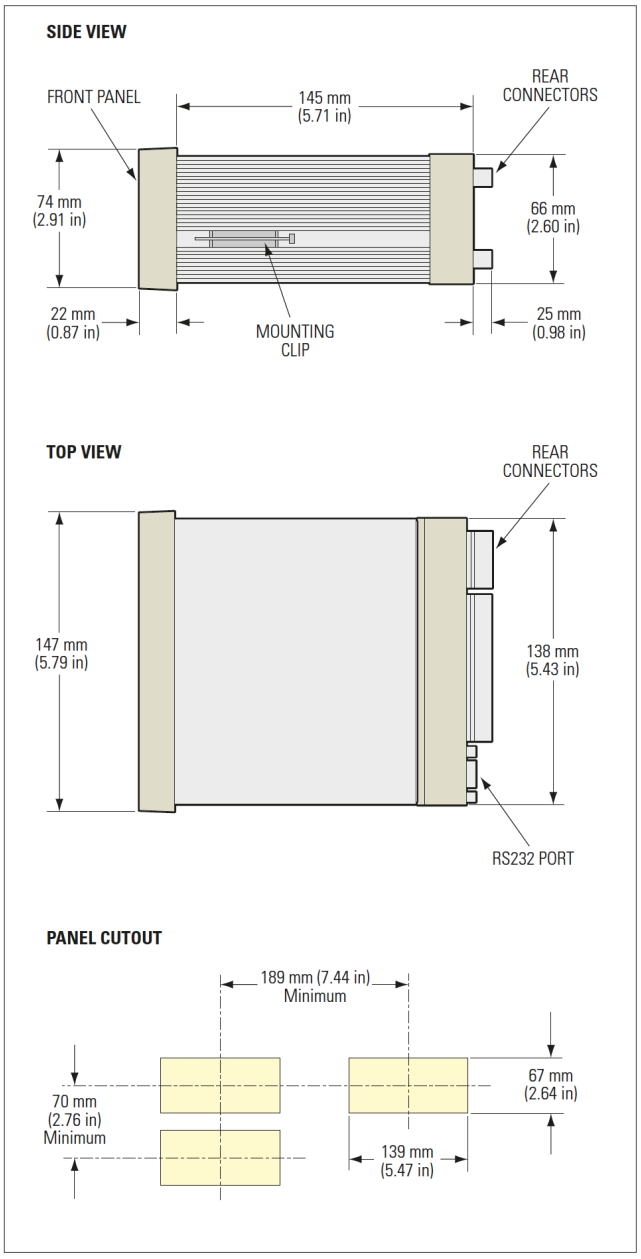

Table 1. CM515 Basic terminal designation legend

Terminal label		Designation	Comment
FINP	1+	Frequency Input 1+ (liquid) Pulse Input 1+ (gas)	Density input (Pulse for liquid)
SG	–	Signal ground	
EXC V	2+	Excitation Term 2+	For AINP1 RTD input
AINP1	+	Analog input ch 1 (+)	Temperature input
	–	Analog input ch 1 (–)	
AINP2	+	Analog input ch 2 (+)	Pressure input
	–	Analog input ch 2 (–)	
AINP3	+	Analog input ch 3 (+)	User input
	–	Analog input ch 3 (–)	
Vo	+	8-24 volts DC output	Overload protected
G	–	DC ground	
Vi	+	DC power input	DC power in 12-28 V
SH	E	Shield terminal	
RS485	+	RS485 (+)	
	–	RS485 (–)	
	G	RS485 ground	
Input logics	1+	Switch 1	
	2+	Switch 2	
	3+	Switch 3	
	4+	Switch 4	
	C–	Signal ground	
Out 1	—	Via CDF	—
Out 2	—	Via CDF	—
Relays	RC	Relay common	Optional relays
	R1	Relay 1	
	R2	Relay 2	
	R3	Relay 3	
	R4	Relay 4	
AC mains	E	Mains ground	AC power in 95-135 V or 190-260 V
	N	Mains neutral	
	A	Mains active	
RS232 port		9-pin serial port	

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Ordering information

Model number
CM515-110: CM515 Density Converter (configured for 110VAC) **CM515-220:** CM515 Density Converter (configured for 220VAC) *Must be located in a non-hazardous area, 95-135 VAC/190-260 VAC, 50/60 Hz single phase (voltage switchable); 12-28 VDC power terminal connections included as standard (includes 4 inputs); one density meter frequency input; 3 analog inputs for temperature, pressure and misc. user; backlit display panel, LCD backup; and infrared communication port, RS232, RS485, clock and logging, 4 electromechanical output relays*
A. ENCLOSURE
1 = Panel mount (standard)
2 = NEMA 4X
3 = Explosion proof, metric glands, ATEX/SSA
4 = Explosion proof, NPT glands, CSA
5 = Heater 110VAC/40W for CSA & ATEX enclosure
6 = Heater 220VAC/40W for CSA & ATEX enclosure

Your Order Code: CM515

CM515	

NOTE: Consult Thermo Fisher Scientific for details of maintenance contracts and additional services including installation, commissioning, re-calibration, service or repair.

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