Fuji Electric

MULTI-CHANNEL STEAM FLOW AND ENERGY CALCULATOR

DATA SHEET

COF-CMV

The COF-CMV is a multi-channel steam flow and energy calculator designed for energy metering in water and steam systems.

It can centralise up to 8 water and steam metering points.

Based on differential pressure, pressure and temperature measurements, it determines the main parameters required for monitoring the energy performance of an installation: volumetric flow rate, mass flow rate, volume, mass, power and energy.

The system can centralise up to 8 measurement channels within a single enclosure, bringing together multiple metering points in an industrial installation. It is suitable for cold and hot water systems, as well as saturated and superheated steam systems.

The COF-CMV features a 7-inch graphical touchscreen for displaying measured and calculated values and configuring measurements, ranges, outputs and differential pressure primary elements. Modbus TCP/IP communication facilitates integration into a supervisory control system.

APPLICATION AREAS

Steam flow and energy metering:
Measurement and calculation of flow rate, mass, volume, power and energy in steam systems.

Water energy metering:
Applications for cold and hot water systems.

Industrial boiler houses:
Centralisation of multiple measurement and metering points within a single system.

District heating networks, industrial utilities and waste-to-energy plants:
Monitoring of consumption and key energy parameters.

Installations with multiple metering points:
Centralisation of up to 8 measurement channels.



MAIN BENEFITS

1. **Multi-channel:**
   Up to 8 measurement channels.
   Centralisation of multiple metering points.
2. **Fluids:**
   Flow rate and energy calculation for water, saturated and superheated steam, water-glycol mixtures and compressed air.
3. **Calculations:**
   Volumetric flow rate, mass flow rate, volume, mass, power and energy.
4. **Flow/return energy balance:**
   Calculations based on flow rate, pressure and temperature measurements on the flow and return circuits.
5. **Installation**
   Suitable for boiler rooms, district heating networks and industrial utilities.
6. **Transmitter:**
   Flexible configuration with various pressure, differential pressure and temperature sensors.
7. **DP flow measurement:**
   Compatible with various differential pressure primary elements.
8. **Interface:**
   7-inch graphical touchscreen for display and configuration.
9. **Communication:**
   Modbus TCP/IP for integration into a supervisory control system.

SPECIFICATIONS

Reference	COF-CMV multi-channel steam flow and energy calculator
Number of channels	Up to 8 measurement channels
Fluids	Cold water Hot water Saturated steam Superheated steam Glycol-water mixture Compressed air
Storage temperature	-10 to 45°C
Operating temperature	5 to 40°C
Humidity	< 85%, condensation not permitted
Enclosure dimensions*	1 to 4 channels: 400 × 400 × 200 mm
	5 to 8 channels: 600 × 600 × 200 mm
Weight	18 kg
Supply voltage	230 VAC ±5% (50–60 Hz)
Power consumption	50 W
Short-circuit current (Icc)	6 kA
Degree of protection	IP 55
Colour	RAL 7035 grey
Enclosure material	Painted steel
Protection class	Class I
Instrument/signal cable entry/exit	PG09 cable gland
Power supply cable entry	PG11 cable gland
Installation environment	Indoor installation
Communication	TCP/IP Modbus

*The enclosure size may vary depending on the output options.

INPUTS / OUTPUTS

Measurement inputs:

Température	Pt100 / Pt500 / Pt1000
Type	Specified range
Pt100	-200 to +650 °C
Pt500	-200 to +750 °C
Pt1000	-200 to +210 °C
Connections	2, 3 or 4 wires
ESD protection	Up to 4 kV
Stabilité thermique	< 50 ppm/K
Entrées analogiques	4…20 mA
Protection ESD	Up to 4 kV
Thermal stability	< 50 ppm/K
Accuracy	0.05% of 350 Ω (Pt100 maximum range), 0.05% of 1850 Ω (Pt500 and Pt1000 maximum range)
Resolution	16-bit resolution
Sampling rate	120 ms
Protection	±30 VDC and 25 mA
Thermal stability	100 ppm/K
Bipolarity	Configurable from -20 to +20 mA
Type	Active input
Pulse inputs	TOR
Polarity	SINK (PNP)
Current consumption	3 mA par input
Minimum pulse width	250 µs
Maximum frequency	10 kHz
ON/OFF delay	1,2 ms, max. 3 ms

Outputs:

Analogue outputs	4…20 mA
Resolution	12 bits
Response time	< 50 ms
Range	0-20 mA
Output impedance	< 600 Ω
TOR outputs	Mosfet
	Response time: 1,2 ms
	Maximum current: 2 A

MEASUREMENT CHANNEL CONFIGURATION

Fluids:

Cold and hot water
Superheated steam
Saturated steam
Glycol-water mixture
Compressed air

Configurable input parameters:

Temperature
Pressure
Differential pressure
Mass or volumetric flow rate

Configurable output parameters:

Temperature
Pressure
Differential pressure
Mass or volumetric flow rate
Volume
Mass
Energy

DIFFERENTIAL PRESSURE FLOW MEASUREMENT

The COF-CMV can be configured with various differential pressure primary elements:

Orifice plate with corner pressure tappings
Orifice plate with D and D/2 pressure tappings
Orifice plate with flange pressure tappings
Flow measurement cone (V-cone type)
ISA 1932 nozzle

FLOW AND ENERGY MEASUREMENT AND CALCULATION PRINCIPLE

Standards and calculation methods:

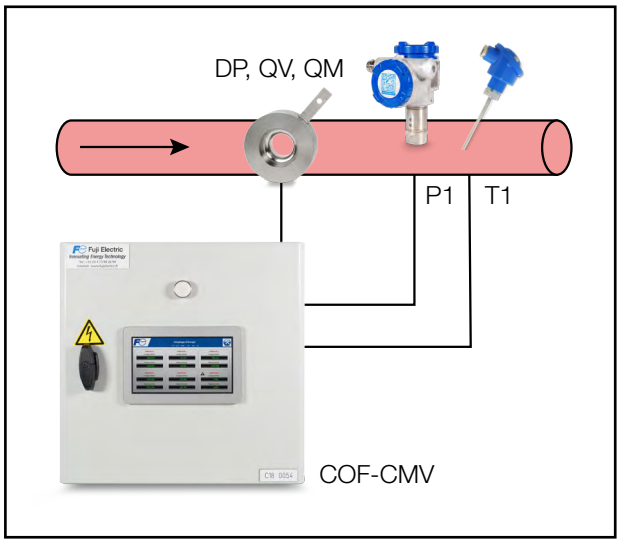
- IAPWS-IF97
  Calculation of the thermodynamic properties of water and steam.

- ISO 5167
  Flow rate calculation using differential pressure primary elements.
- AGA calculation methods
  American Gas Association.

Measurement configurations:

Single circuit:

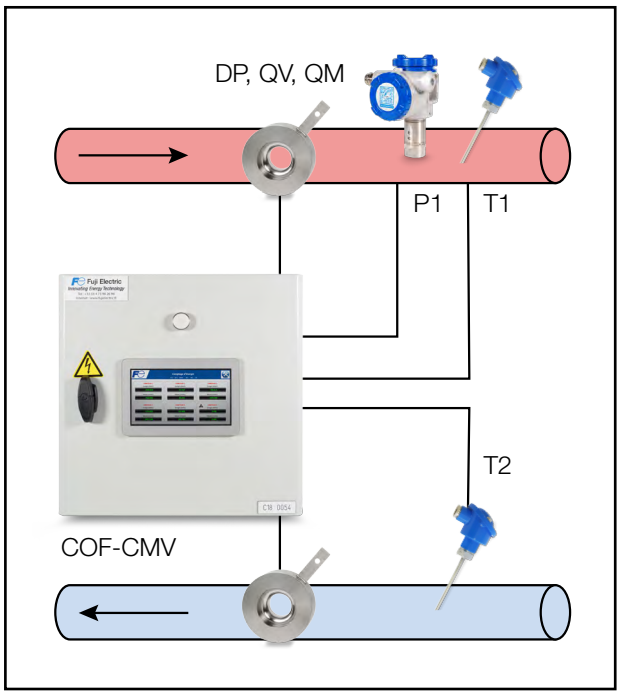
One measurement point.

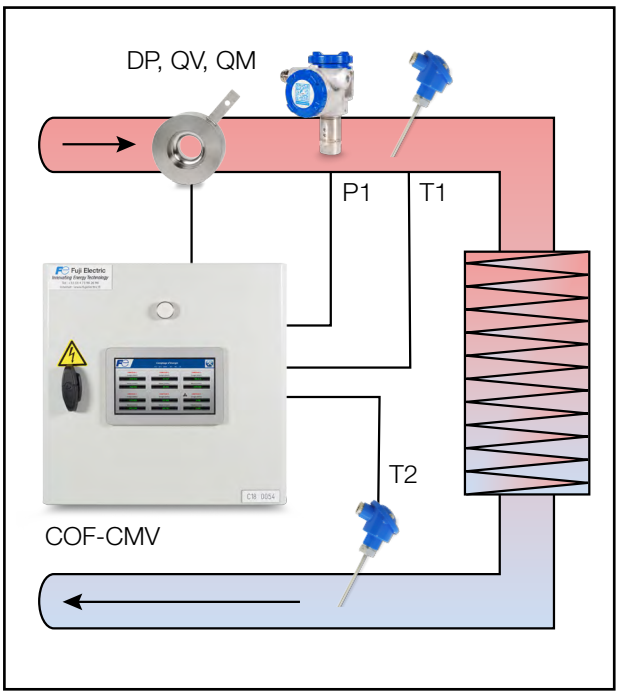


Configuration using a single measurement point, including, depending on the application:
Differential pressure, pressure and/or temperature.

Flow and return circuit:

Two measurement points are used to take into account the operating conditions in the flow and return circuits in order to calculate power and determine the installation's energy balance.





Flow circuit:

Temperature and/or pressure, and differential pressure.

Return circuit:

Temperature and/or differential pressure.

AVAILABLE CALCULATIONS

Calculated parameters:

- Pressure and temperature corrected volumetric flow rate
- Mass flow rate
- Volume
- Mass
- Density
- Enthalpy
- Power
- Energy

Functions applied to flow rate calculation:

Correction of the pipe diameter and differential pressure primary element diameter according to temperature and thermal expansion.

- Dynamic viscosity calculation
- Expansion factor calculation
- Reynolds number calculation
- Discharge coefficient calculation.

TOUCHSCREEN AND DISPLAY

The COF-CMV steam flow and energy calculator features a 7-inch graphical touchscreen for:

- Displaying measured and calculated values
- Configuring measurements
- Setting measurement ranges
- Configuring outputs
- Configuring differential pressure primary elements



Display specification:

Display	LCD 7”
Resolution	800 × 480
Interface	Resistive touchscreen
Power supply	12 - 24 VDC
Memory	1 GB RAM
CPU	Quad-core ARM Cortex-A53, 64-bit, 1.2 GHz
Ethernet	1 port
Serial	2 RS232/RS485 ports
USB	3 ports
I2C	1 port
External memory	MicroSD

COMMUNICATION AND SUPERVISORY SYSTEM INTEGRATION

MODBUS TCP/IP:

The COF-CMV features Modbus TCP/IP communication, enabling integration into a supervisory control system.

Protocol:

MODBUS TCP/IP

Data available via MODBUS TCP/IP:

- Energy
- Mass
- Temperature
- Pressure
- Flow rate
- Density
- Power

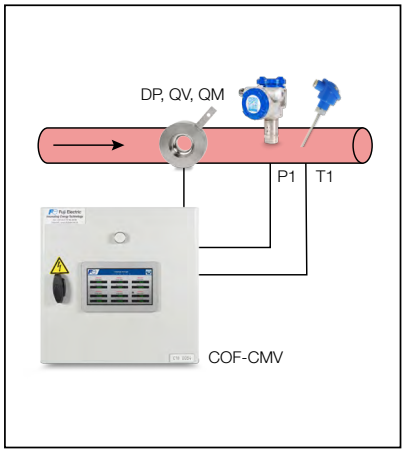
MULTI-CHANNEL STEAM FLOW AND ENERGY CALCULATOR CODING

1	2	3		4	5	6	7	8	9	10	11	12	13	14	15	16	17	DESCRIPTION
C	O	F	-	C	M	V												
																		Type
																		Multi-channel flow and energy calculator
																		Enclosure option
							A											With terminal blocks
							B											Without connection terminals
																		Circuit 1
								0 to Q										Code according to the mapping table
																		Circuit 2
									0 to Q									Code according to the mapping table
																		Circuit 3
										0 to Q								Code according to the mapping table
																		Circuit 4
											0 to Q							Code according to the mapping table
																		Circuit 5
												0 to Q						Code according to the mapping table
																		Circuit 6
													0 to Q					Code according to the mapping table
																		Circuit 7
														0 to Q				Code according to the mapping table
																		Circuit 8
															0 to Q			Code according to the mapping table
																		Pulse Outputs (Copy, Volume, Mass, Energy)
																0		Sum of the flow/return digital outputs for the different channels
																1		1 to 24
																2		25 to 32
																		Analog outputs (Flow Rate, Power and Temperature Retransmission)
																	0	Total Number of 4–20 mA Outputs
																	1	1 to 8
																	2	9 to 16
																	3	17 to 24
																	4	25 to 32

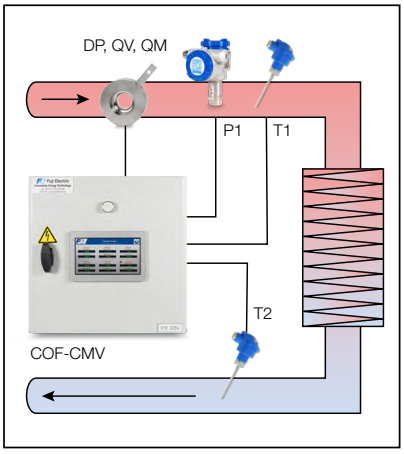
Code	Circuit type	Flow Circuit						Return Circuit					
		Analogue flow rate	Dual-range flow rate	Pulse flow input (TOR)	Fixed pressure	Analogue pressure	Temperature	Analogue flow rate	Pulse flow input (TOR)	Return flow rate = flow rate	Fixed pressure	Analog pressure (Contact us for details)	Temperature
0	None												
1	Flow only	●			●		●						
2		●				●	●						
3			●		●		●						
4			●			●	●						
5				●	●		●						
6				●		●	●						
7	Flow + Return	●			●		●	●			●		●
8		●				●	●	●			●		●
9			●		●		●	●			●		●
A			●			●	●	●			●		●
B				●	●		●	●			●		●
C				●		●	●	●			●		●
D		●			●		●		●		●		●
E		●				●	●		●		●		●
F			●		●		●		●		●		●
G			●			●	●		●		●		●
H				●	●		●		●		●		●
J				●		●	●		●		●		●
K		●			●		●			●	●		●
L		●				●	●			●	●		●
M			●		●		●			●	●		●
N			●			●	●			●	●		●
P				●	●		●			●	●		●
Q				●		●	●			●	●		●

Example of 3 metering points with product code: COF-CMVA**2L8**0000012

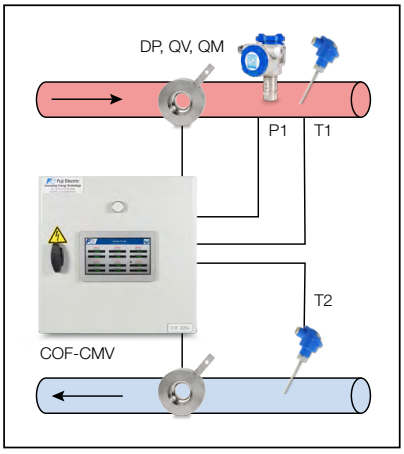
Circuit 1 : Digit 8, **Code 2**



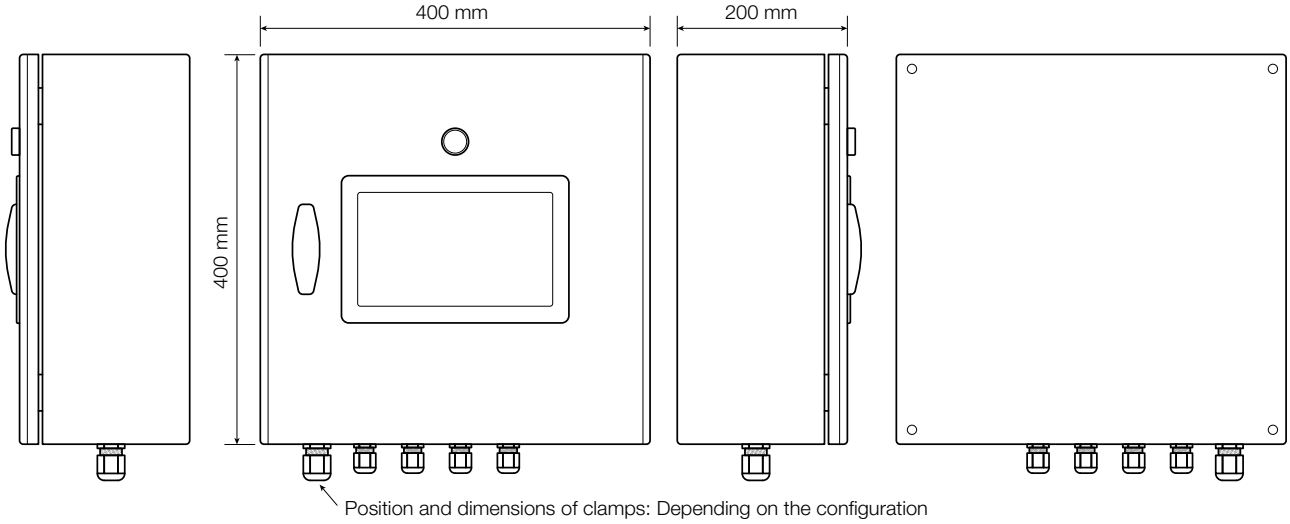
Circuit 2 : Digit 9, **Code L**

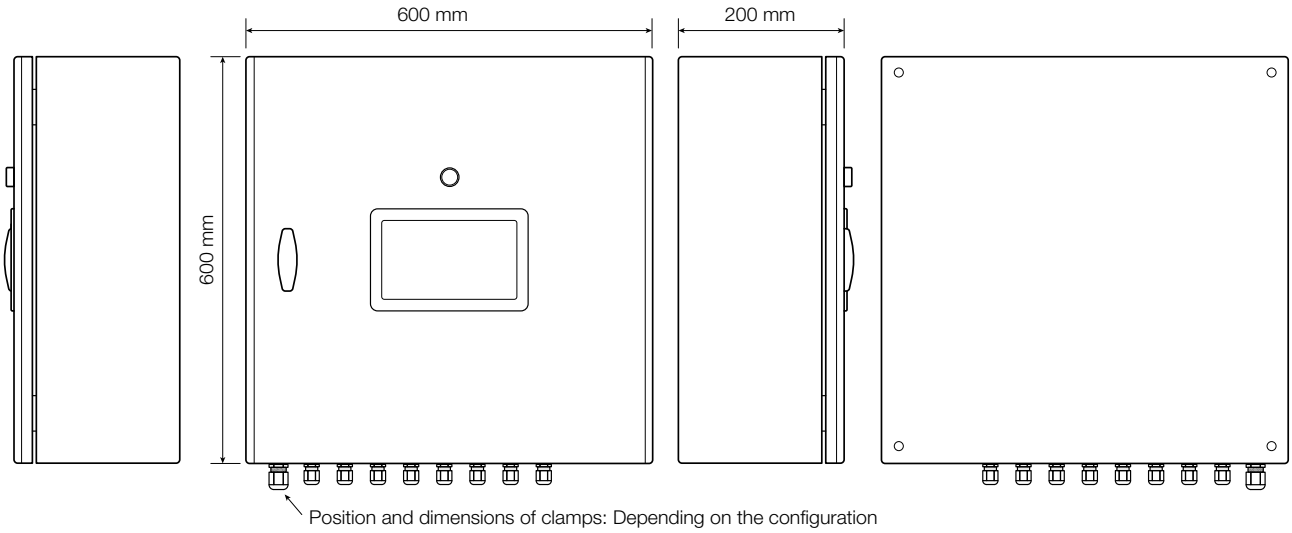


Circuit 3 : Digit 10, **Code 8**

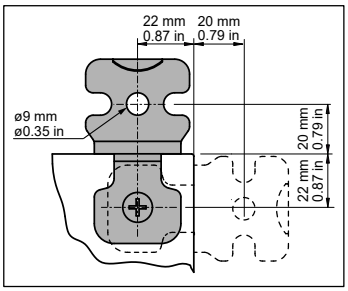


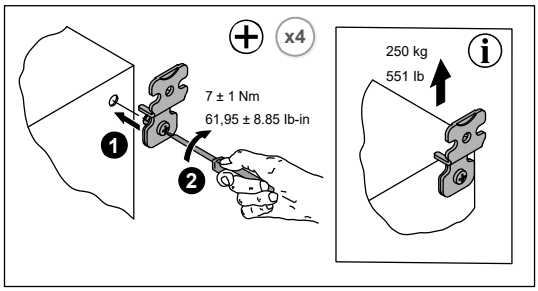
OVERALL DIMENSIONS (Unit : mm)





WALL MOUNT COF-CMV





Fuji Electric

FUJI ELECTRIC FRANCE S.A.S.

46, rue Georges Besse - ZI du Brézet - 63 039 Clermont-Ferrand Cedex 2 - France
Téléphone: +33 (0)4 73 98 26 98
Email : sales.dpt@fujielectric.fr
Site internet : http://www.fujielectric.fr/en/

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