ABB MEASUREMENT & ANALYTICS | DATA SHEET

ControlMaster CM15

Universal process indicator, ⅛ DIN

Measurement made easy
Making process control easy

Comprehensive display of process status
- Crystal-clear, full-color TFT display
- User customizable

Exceptionally easy to use
- Intuitive user interface and clear text prompts make installation, commissioning and operation quick and simple

Comprehensive I/O
- 2 universal inputs, 1 analog output and 1 relay fitted as standard

Frequency input
- Direct, high accuracy connection to electromagnetic flowmeters

Totalization and counter functions
- Calculation and display of flow total values
- Pulse counting capability

Problem-solving capability
- Flexible functionality including math and logic providing power to solve application requirements

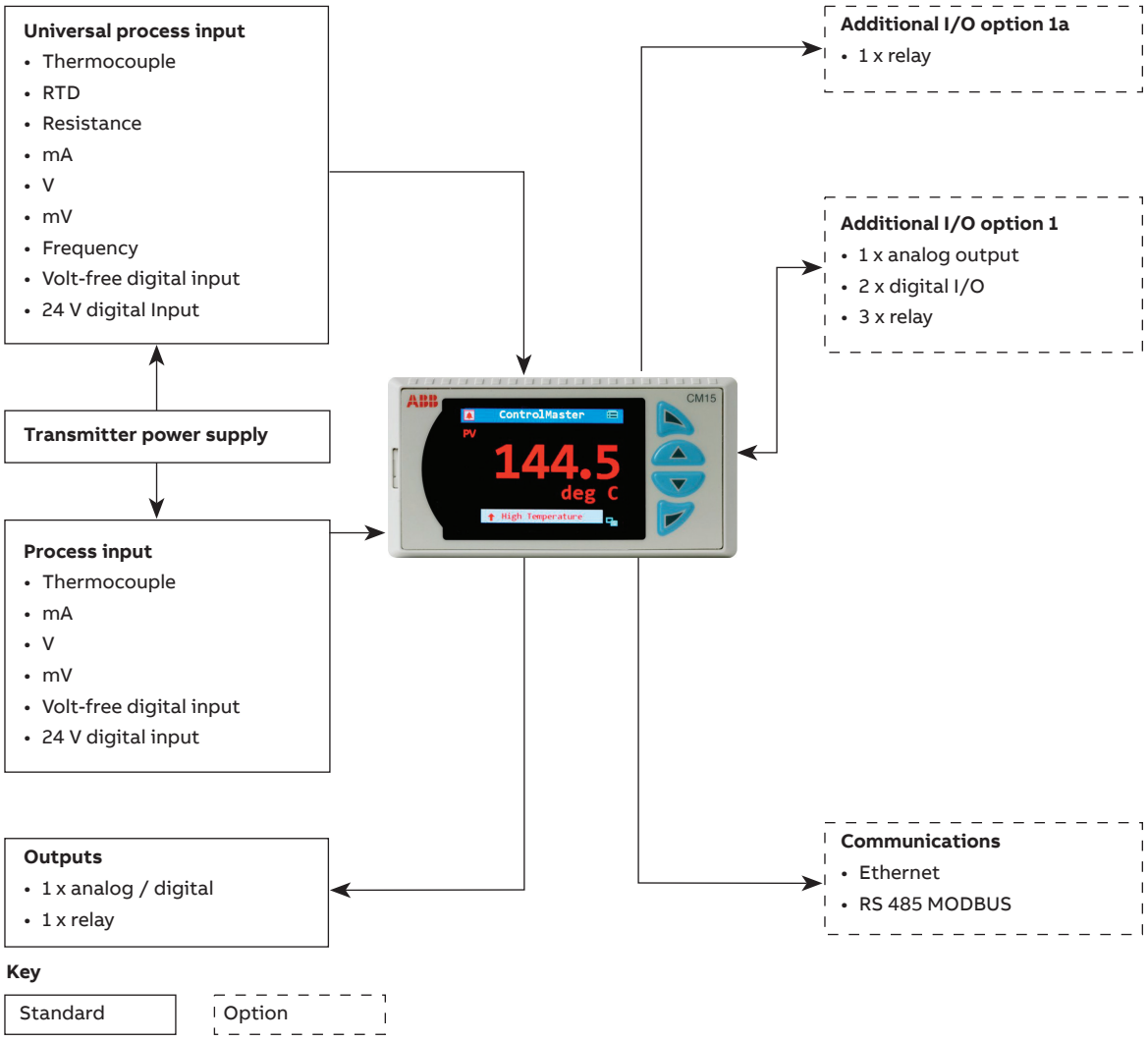
Duty / Assist pump control
- Control of up to 6 pumps

Overview

The ControlMaster CM15 is a feature-packed, ⅛ DIN, universal process indicator. A crystal-clear, full-color, TFT display shows operators exactly the information they need to know and provides operation and configuration menus in full text making the CM15 intuitive to use and very quick to install and commission.

Available as a basic indication-only model, or enhanced through plug and play function keys and I/O modules, the CM15 offers totalization, level, math, logic, counter and alarm functions making it extremely flexible and able to solve many demanding application requirements.

MODBUS and Ethernet communication options ensure easy integration and connectivity to supervisory or control systems.



Highly scalable

The CM15 is highly scalable in terms of both hardware and software, enabling it to meet the demands of simple indication duties through to more complex applications. The basic CM15 provides basic indication, totalization and level functionality. Templates and functionality can be increased by adding function keys to the basic model as shown in Figure 1, while retaining previous templates and functionality.

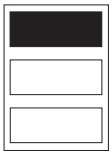
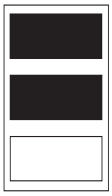
Level	Function keys	Template	Functionality
Base	0	Single PV indication Single PV with totalizer Single totalizer Single level with volume	Process alarms Totalization Volume computation • Specific gravity compensation Minimum, maximum and average calculation
Standard	1 		Logic Math Custom linearizers Delay timers Real time alarms Bank control Template customization
Dual	2 	Dual PV indication Dual PV with totalizer Dual totalizer Dual level with volume	Display customization

Figure 1 Overview of template options

Powerful operator display

The CM15 features a full-color 5.5 cm (2.2 in.) display for displaying detailed process information to the user. Process details such as alarm messages and diagnostic information are displayed clearly in full text without the need for difficult-to-read scrolling displays.

Example of an operator page

Automatic selection of standard display templates immediately makes best use of the CM15's display. Extensive customization features then enable the displayed information to be tailored to suit the process requirements.

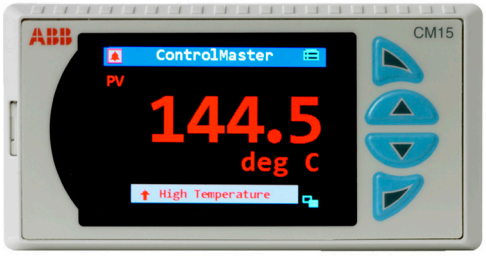


Figure 2 Single PV indication template display

Figure 3 Dual PV and totalization display

Diagnostics and alarm status display

The diagnostics and alarm status display provides detailed information on any active alarm or diagnostic condition. The operator can see, at-a-glance, the status of any alarm condition present within the process. Additionally, diagnostic messages are presented clearly to the operator, enabling rapid notification and simple diagnosis of any critical instrument status condition.

Historical information of diagnostic messages can also be viewed in the indicator's diagnostic log.

Figure 4 Alarm status display

Exceptionally easy to use

The CM15's full text display and simple-to-navigate, pop-up menu makes operation exceptionally easy.

A programmable soft key enables commonly used functions, such as alarm acknowledgement and display selection, to be accessed easily by the operator.

Figure 5 Pop-up menu

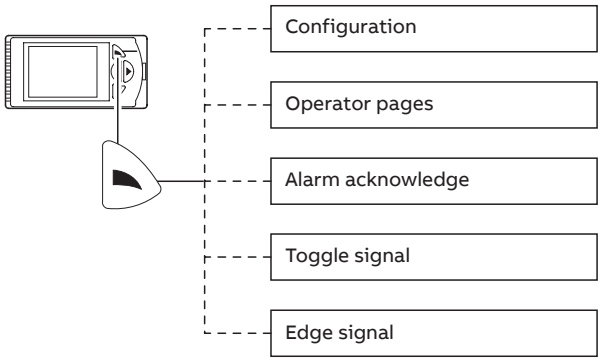


Figure 6 Programmable soft key

Problem solving flexibility

Extensive functionality is available to provide flexible problem-solving capability; making the CM15 much more than just a process indicator.

Process alarms

8 independent process alarms can monitor any analog signal within the CM15, enabling extensive process monitoring capability. Alarms can be used to drive physical outputs or soft-wired to other functions within the indicator.

Real-time alarms

The 'alarm clock' functionality provided by the CM15's real-time alarms enables time-of-day decisions to be introduced into the indicator's actions or specific functions to be triggered routinely at specified times.

Delay timers

Event sequencing is enabled through the use of the CM15's delay timers. A predetermined delay and output duration can be programmed into each delay timer and timers can be linked together.

Custom linearizers

The CM15 has 2 independent 20-point custom linearizers that can be applied to any analog signal within the indicator. These linearizers can be used in applications such as level-to-volume conversion of a non-linear tank level or to accommodate special input signals or output devices.

Math

8 math blocks provide arithmetic, averaging, min. / max. hold, square root and signal switching functionality. Simple equations can be performed in a single math block or multiple math blocks can be nested together to construct complex equations.

Signal switching 'multiplexing' math blocks switch between 2 analog signals based on a trigger signal. For example, a backup sensor could be selected automatically on failure of a primary sensor.

Logic

8 comprehensive logic equations provide powerful interlock functionality. Inputs and outputs of the logic equations can be soft-wired to any digital signal within the indicator to maximize flexibility.

Totalizer

2 totalizers are available on the CM15. The totalizers can configured to perform multiple functions:

- integration against an analog signal to totalize flow
- counting digital pulses
- totalization of flow based on a frequency signal from an electromagnetic flow meter

Frequency input

For maximum accuracy the CM15 can accept a frequency signal from an electromagnetic flow meter. The frequency signal can be totalized and displayed; an instantaneous flow rate can also be calculated and displayed on screen.

Communications

Extensive communication options enable the CM15 to be integrated into larger control systems easily or connected to other process instrumentation.

RS 485 MODBUS

Using RS 485 MODBUS, values and status can be communicated to and from the indicator in real-time via an RS 485 connection.

Ethernet

Optional Ethernet communications enable ControlMaster to be integrated in to an Ethernet network quickly. The following functionality is provided:

- Email
  - Notification of a critical process event or status can be made by email. Multiple events can trigger an email that can be sent to multiple recipients
- Webserver
  - ControlMaster's integrated webserver enables the current status of the process and indicator to be viewed remotely using a standard web browser

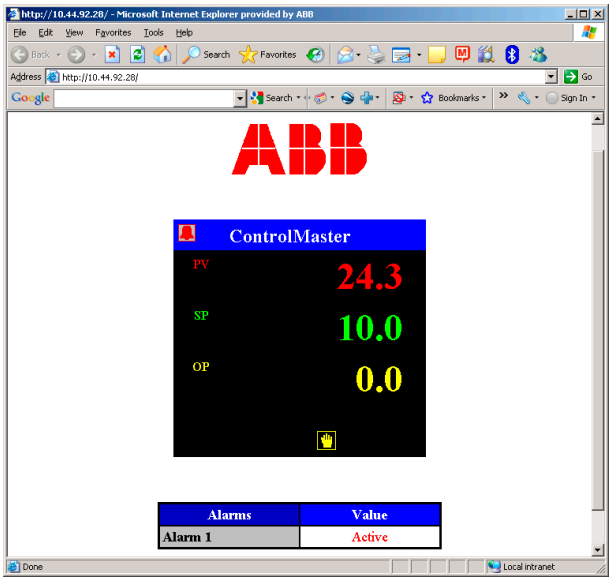


Figure 7 Webserver

- MODBUS TCP
  - Process values and status can be communicated to and from the CM15 in real-time using MODBUS TCP, enabling it to be integrated easily into larger control systems or connected to a data recorder.

PC Configuration

The CM15 can be fully configured using ABB's ConfigPilot software. Available free of charge, ConfigPilot enables off-line creation and editing of configuration files. Configurations are transferred to and from a controller via its standard IrDA port and a USB IrDA adapter.

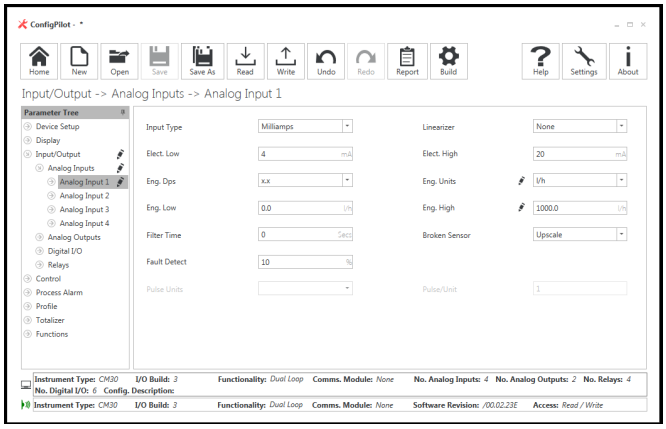


Figure 8 Analog input configuration

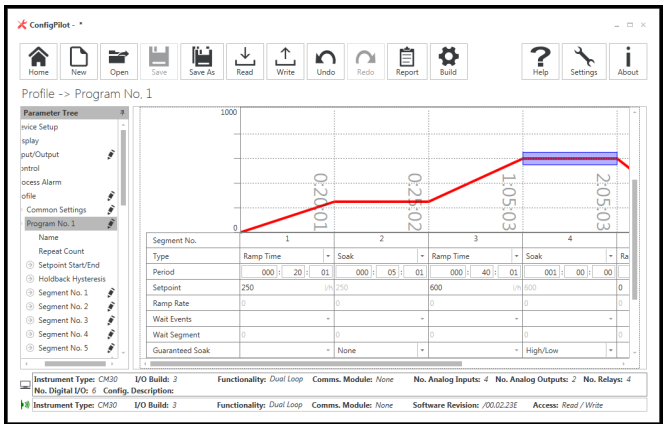


Figure 9 Profile configuration

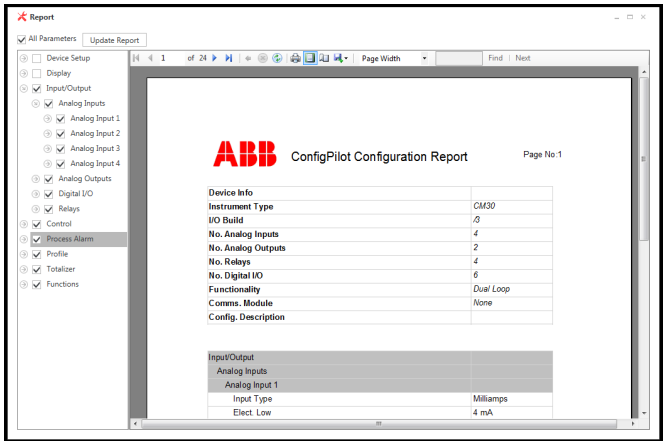


Figure 10 Configuration report generation

Bank control

Bank control enables improved control of multi-element output devices such as banks of heaters, pumps and fans. Aimed at minimizing wear caused by over-use of one specific 'duty' device, bank control enables wear to be levelled by sharing duty and assist handling between every device in the bank.

Ideal for pump control applications in the water and waste water industry. Up to six pumps can be controlled each with independent on and off trip points (see Figure 11). The CM15's universal process input, complete with transmitter power supply, makes it suitable for connection to many kinds of standard level transmitters.

Bank control provides users the choice of either 'Rotate' or 'First In, First Out (FIFO)' wear-levelling schedules. Rotate cycles which pump is the first to switch on during a pumping event. FIFO ensures that the last pump to switch of is the last pump to be called again. Figure 12 details Rotate and FIFO cycling for a 3-pump system.

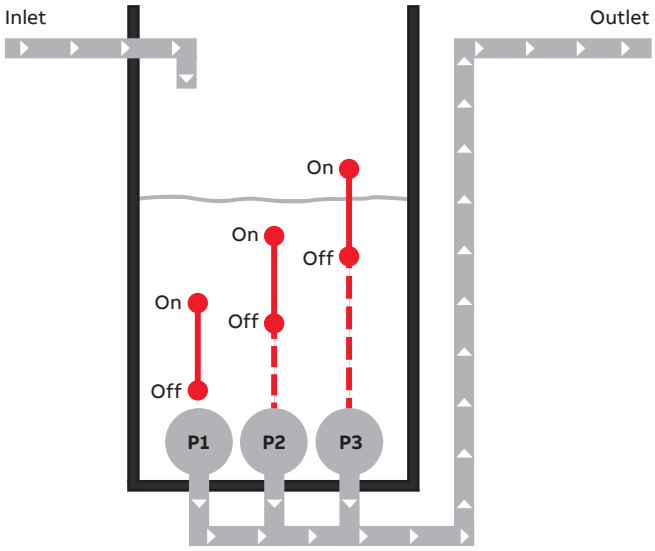


Figure 11 Independent on and off trip points

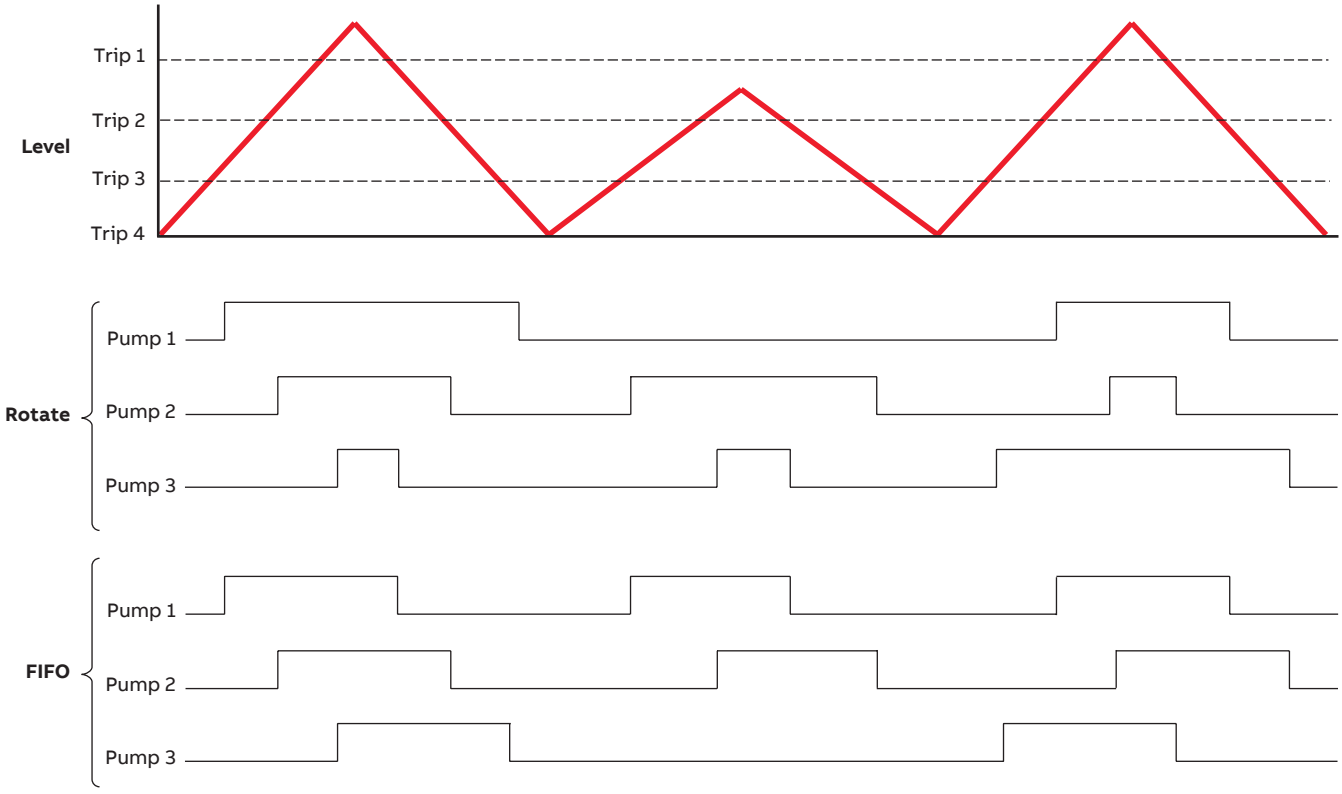


Figure 12 Rotate and FIFO cycling for a 3-pump system

Application templates

To minimize commissioning time, the CM15 features up to 8 preconfigured templates. Simply selecting the required template configures the CM15's function blocks and display automatically. Customization of the preconfigured templates is also possible, providing the flexibility to create customized solutions.

Single PV indication

This template provides indication of a single process value. The example in Figure 13 shows the CM15 being used to indicate the temperature of a heat treatment furnace.

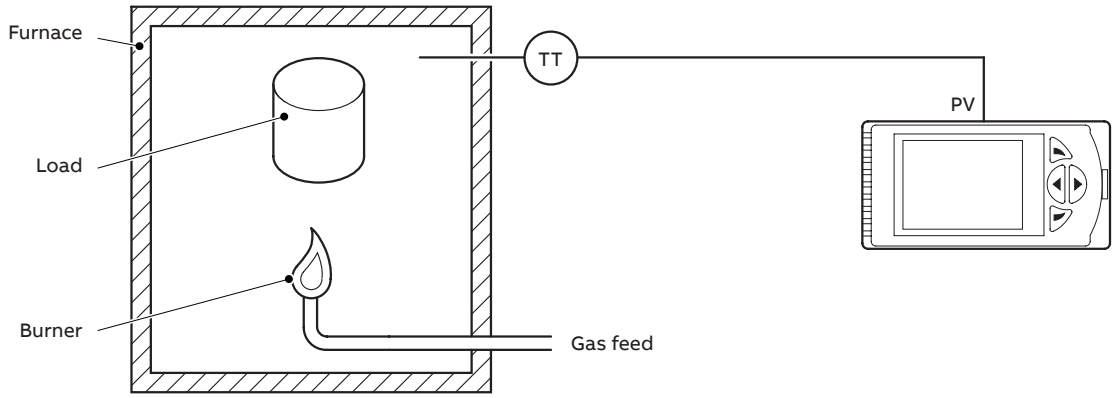


Figure 13 Single PV indication

Single PV with totalization

This template adds totalization to the single PV indication template. In the example in Figure 14, the CM15 is monitoring a pipeline to provide indication of instantaneous flow rate and totalization and could be connected to the flowmeter via an analog (for example 4 to 20 mA) or frequency signal.

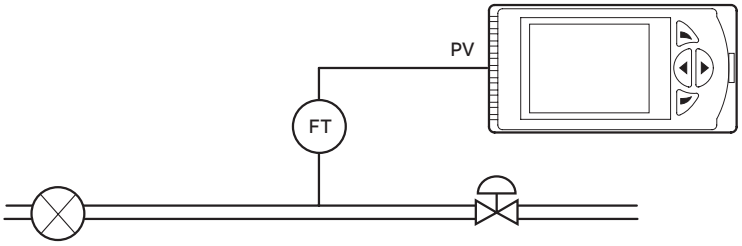


Figure 14 Single PV with totalization

Single totalizer

This template provides totalization only. Figure 15 shows the CM15 being used to count the number of products passing a specific point on a production line.

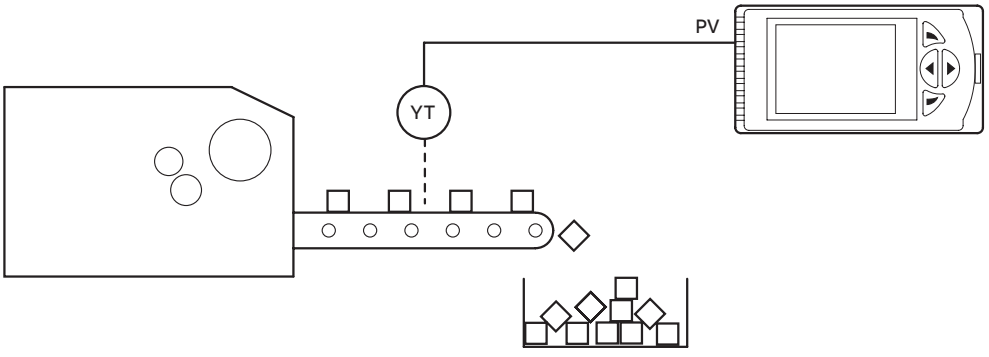


Figure 15 Single totalizer

…Application templates

Single level with volume

The single level with volume template adds level specific functions to the single PV indication template. The volume contained within a vessel can be calculated and indicated and products of varying specific gravity accounted for. In Figure 16, the CM15 is shown monitoring the level of product in a storage tank and calculating the associated volume.

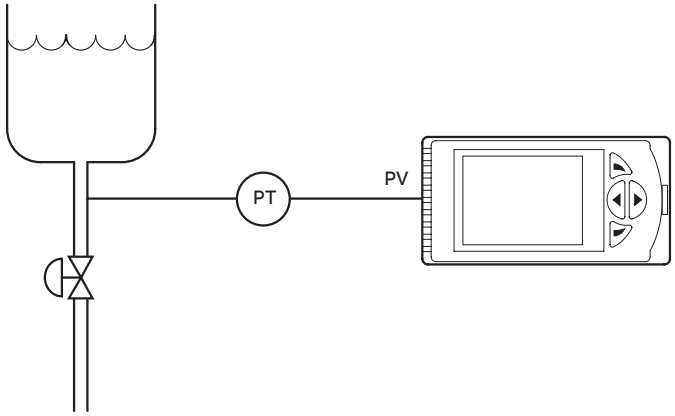


Figure 16 Single level with volume

Dual indication

This template provides indication of 2 process values. Variations of this template are available providing dual PV with totalization, dual totalization or dual level indication. The example in Figure 17 shows a single CM15 providing indication of both the flow through, and temperature of, a heat exchanger.

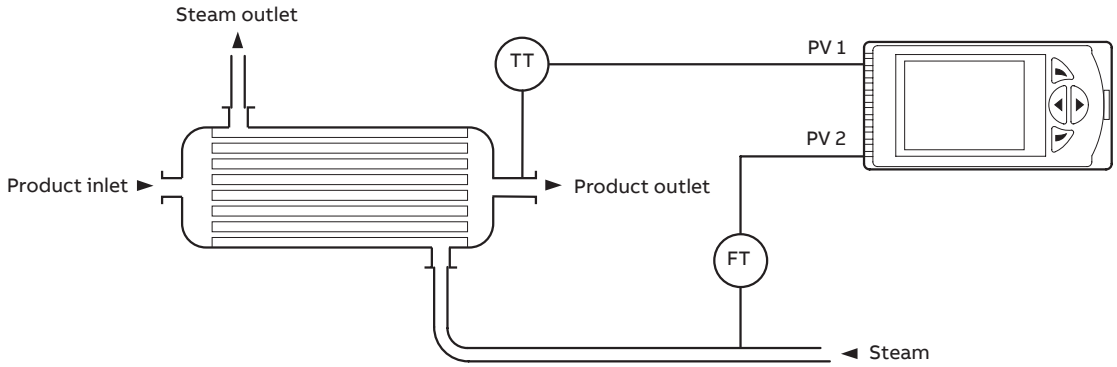


Figure 17 Dual indication

Specification

Operation

Display
Color, ¼ VGA TFT, liquid crystal display (LCD) with built-in backlight

Language
English, German, French, Italian and Spanish

Operator keypad
4 tactile membrane keys

Security

Password protection
Basic / Advanced – user-assigned password protection (not set at factory)

Standard functions

Base templates
Single PV indication
Single PV indication + totalizer
Counter
Single PV indication + level

Dual templates
Dual PV indication
Dual PV indication + totalizer
Dual counter
Dual PV indication + level

Process alarms

Number
8

Types
High / Low process
High / Low latch

Source
Fully configurable (for example – PV, Analog input, Math block inbuilt)

Hysteresis
Level and time

Alarm enable
Enable / Disable individual alarms via a digital signal

Acknowledgement
Via front panel keys or digital signals

Real-time alarms*

Number
2

Programmable
Time
Day
Duration

Math blocks*

Number
8

Operators
+, –, x, /
Average, Maximum, Minimum
High / Low / Median select
Square root
Multiplexer

Delay timers*

Number
2

Programmable
Delay
Duration

Logic equations*

Number
8

Elements
15 per equation

Operators
OR, AND, NOR, NAND, NOT, EXOR

Custom linearizer*

Number
2

Elements
20 breakpoints

Bank control*

Number of outputs
6

Wear levelling
Rotate or FIFO

Totalizer

Number **
Up to 2

Type
Analog, digital, frequency or pulse

Statistical calculations
Average, maximum, minimum (for analog signals)

Update rate
125 ms

* Functionality level ‘Standard’ and above only

** Single totalizer available with base functionality, dual totalizers available with dual functionality

...Specification

Analog inputs

Universal process inputs

Number

1 standard

Type

Voltage
Current
Resistance (Ω)
3-Wire RTD
Thermocouple
Digital volt-free
Digital 24 V
Frequency

Non-universal process inputs

Number

1 standard

Type

Voltage
Current
Thermocouple *
Digital volt-free
Digital 24 V

Thermocouple types

B, E, J, K, L, N, R, S, T

Resistance thermometer

Pt100

Other linearizations

√x, $x^{3/2}$, $x^{5/2}$, custom linearization

Digital filter

Programmable 0 to 60 s

Display range

–9999 to 99999

Update rate

125 ms

Common mode noise rejection

> 120 dB at 50 / 60 Hz with 300 Ω imbalance resistance

Normal (series) mode noise rejection

> 60 dB at 50 / 60 Hz

CJC rejection ratio

Stability

0.05 °C/°C change in ambient temperature

Temperature stability

0.02 %/°C or 2 µV/°C (1 µV/°F)

* Only if universal process input is configured as 'Thermocouple'

Long term (input) drift

< 0.1 % of reading or 10 µV annually

Input impedance

> 10 MΩ (mV input)
10 Ω (mA input)

Inputs

Thermocouple	Maximum range °C (°F)	Accuracy (% of reading)
B	–18 to 1800 (0 to 3270)	0.1 % or ±2 °C (3.6 °F) (above 200 °C [392 °F]) *
E	–100 to 900 (–140 to 1650)	0.1 % or ±0.5 °C (0.9 °F)
J	–100 to 900 (–140 to 1650)	0.1 % or ±0.5 °C (0.9 °F)
K	–100 to 1300 (–140 to 2350)	0.1 % or ±0.5 °C (0.9 °F)
L	–100 to 900 (–140 to 1650)	0.1 % or ±1.5 °C (2.7 °F)
N	–200 to 1300 (–325 to 2350)	0.1 % or ±0.5 °C (0.9 °F)
R	–18 to 1700 (0 to 3000)	0.1 % or ±1 °C (1.8 °F) (above 300 °C [540 °F]) *
S	–18 to 1700 (0 to 3000)	0.1 % or ±1 °C (1.8 °F) (above 200 °C [392 °F]) *
T	–250 to 300 (–400 to 550)	0.1 % or ±0.5 °C (0.9 °F) (above –150 °C [–238 °F]) *

* Accuracy is not guaranteed at temperatures below this value

RTD	Maximum range °C (°F)	Accuracy (% of reading)
Pt100	–200 to 600 (–325 to 1100)	0.1 % or ±0.5 °C (0.9 °F)

Linear inputs	Standard analog input	Accuracy (% of reading)
Millivolts	0 to 150 mV	0.1 % or ±20 µV
Milliamps	0 to 45 mA	0.2 % or ±4 µA
Volts	0 to 25 V	0.2 % or ±20 mV
Resistance (low)	0 to 550 Ω	0.2 % or ±0.1 Ω
Resistance (high)	0 to 10 kΩ	0.5 % or ±10 Ω
Sample Interval		125 ms per sample

Digital inputs	
Type	Volt-free or 24 V
Minimum pulse duration	Single input configured – 250 ms Both inputs configured as analog or digital – 500 ms

Frequency input*	
Frequency range	0 to 6000 Hz
1-signal	15 to 30 V
0-signal	–3 to 5 V

*For use with devices with open collector outputs

Outputs

Retransmission outputs

Number

2 (1 standard, 1 optional)

Isolation

Galvanically isolated from the rest of the circuitry, 500 V for 1 minute

Analog range

0 to 20 mA programmable

Load

750 Ω max.

Accuracy

0.25 % of output or ±10 µA

Relays

Number

4 (1 standard, 3 optional)

Type

Standard with changeover contacts

Optional contacts selectable as NO or NC (by jumper)

Relay 1 contact rating

5 A, 240 V

Relay 2, 3 and 4 contact ratings at maximum ambient temperature of 40 °C (104 °F)

5 A, 240 V

Relay 2, 3 and 4 contact ratings at maximum ambient temperature of 55 °C (131 °F)

2 A, 240 V

Update rate

125 ms

Digital I/O

Number

2 (optional)

Type

User-programmable as input or output

Minimum input pulse duration – 125 ms

Input

Volt-free or 24 V DC

1-signal 15 to 30 V

0-signal –3 to 5 V

Conforms to IEC 61131-2

Output

Open collector output

30 V, 100 mA max. switched

Conforms to IEC 61131-2

Update rate

125 ms

2-Wire transmitter power supply

Number

1 standard

Voltage

24 V DC

Drive

2 loops, 45 mA max.

Communications

Note. Only one communications option can be fitted per indicator.

IrDA configuration port (standard)

Baud rate

Up to 115 kBaud

Distance

Up to 1 m (3 ft)

Functions

Firmware upgrade

Configuration upload / download

Ethernet (optional)

Type

10BaseT

Connector

RJ 45

Protocols

TCP/IP

HTTP

MODBUS TCP (Slave)

Web server

Built-in – enables remote monitoring using standard web browsers

Email

- Can be configured to be sent on the occurrence of a specified event
- Up to 3 recipients
- Up to 4 trigger sources with configurable tag

MODBUS* RTU (optional)

Baud rate

Up to 115 kBaud

Isolation

Galvanically isolated from the rest of the circuitry, 500 V DC for 1 minute

EMC

Emissions & immunity

Meets requirements of IEC 61326 for an industrial environment

* MODBUS is a registered trademark of the MODBUS-IDA organization

...Specification

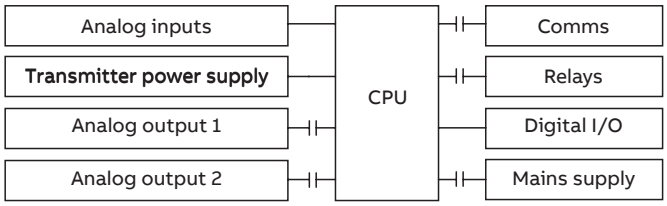
Environmental

Operating temperature range
0 to 55 °C (32 to 131 °F) *
Operating humidity range
5 to 95 % RH (non-condensing)
Storage temperature range
–20 to 70 °C (–4 to 158 °F)
Enclosure sealing
Front face
IP 66 & NEMA 4X
Rest of enclosure
IP 20
Vibration
Conforms to EN60068–2–6
Altitude
2000 m (6562 ft) max. above sea level

Safety

Approvals and certifications
EN 61010-1
cULus
General safety
- Overvoltage Class III on mains, Class II on inputs and outputs
- Pollution category 2
- Insulation category 2

Isolation



Key
⊣⊢ = Isolation

Electrical

Supply ranges
- 100 to 240 V AC ±10 % (90 V min. to 264 V max.) 50 / 60 Hz
- 10 to 36 V DC (optional)

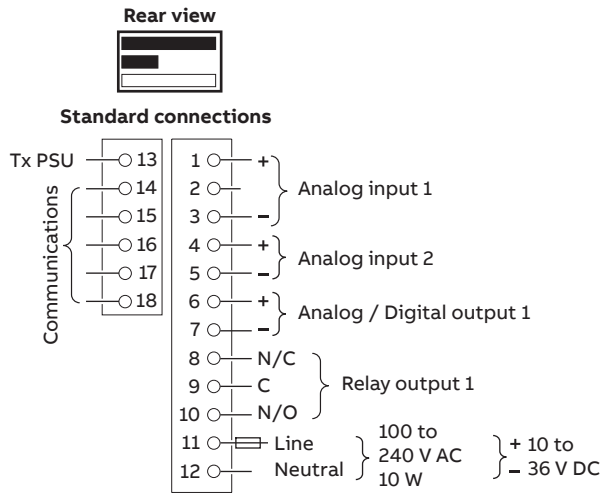
Power consumption
10 W max.
Power interruption protection
No effect for interrupts of up to 60 ms

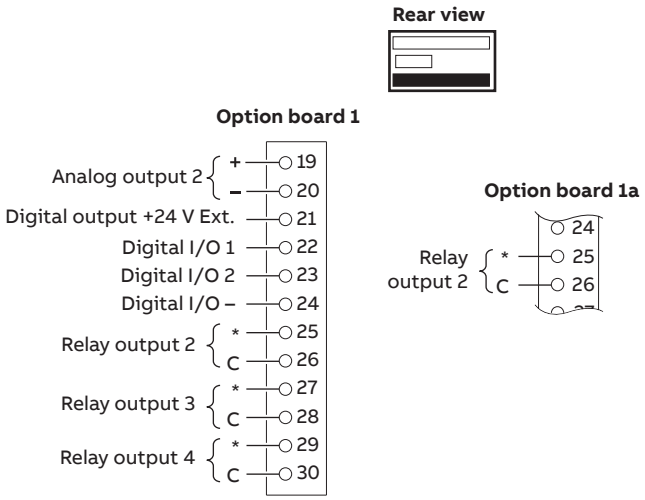
Physical

Size
50 x 97 x 141 mm (2.0 x 3.8 x 5.5 in.)
Weight
0.38 kg (0.84 lb) approx. (unpacked)
Panel cutout
45 x 92 (1.8 x 3.6 in.), 121 mm (4.8 in.) behind panel
Case material
Glass-filled polycarbonate

* Restrictions may apply – refer to ‘Relays’ on page 13

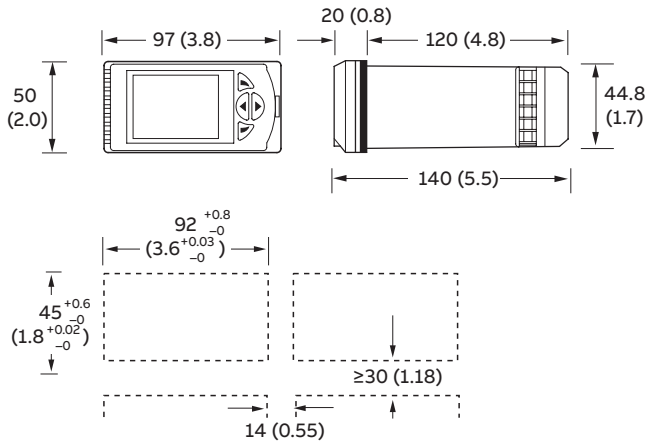
Electrical connections





Overall dimensions

Dimensions in mm (in.)



Standard accessories

Included with each controller:

- Panel mounting clamps
- Instruction manual
- Bezel release tool
- Cold junction thermistor

Optional accessories

- ConfigPilot PC configuration kit CM30/0715
- DIN rail mounting kit CM10/0715
- After-sales engineered configuration service ENG/IND

Ordering information

Controlmaster CM15 universal process indicator, 1/8 DIN	**CM15/**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**/XXX**	**OPT**
I/O build										
2 analog inputs, 1 analog O/P and 1 relay (Basic)		0								
2 analog inputs, 1 analog output and 2 relays (Basic + option board 1a)		1								
2 analog inputs, 2 analog outputs, 2 digital I/O and 4 relays (Basic + option board 1)		2								
Template / Functionality level										
Base			0							
Standard			S							
Dual point indication			D							
Communications										
None				0						
Ethernet				E						
RS 485 MODBUS				M						
Approval										
Standard CE					S					
cULus approval					U					
Power supply										
100 to 240 V AC						0				
10 to 36 V DC						1				
Language										
English							E			
German							G			
French							F			
Italian							I			
Spanish							S			
Special features										
None								0		
Unbranded front panel *								B		
Configuration										
Standard									STD	
Custom configuration (customer to complete and supply CM15 custom configuration sheet – INF11/089–EN)									CUS	
Engineered configuration (customer to supply configuration details required)									ENG	
Calibration certificate **										C1
Printed instruction manual										
English										M5
German										M1
Spanish										M3
French										M4
Italian										M2

* Not available in conjunction with cULus approval.

** When a calibration certificate is ordered it is performed according to the specified configuration type:
CUS/ENG – Inputs and outputs calibrated according to the customer supplied configuration details and ranges.
STD – Inputs and outputs calibrated according to the instrument factory standard configuration and ranges.

Notes

Notes

Sales

Service

Software

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