Operating Unit for Passive Sensors

COMBIVAC CM 51/CM 52

Rear side of the COMBIVAC CM 51 (left) and CM 52 (right)

The COMBIVAC CM 51 covers the complete pressure range between 10^{-9} and 1000 mbar by combining two measurement principles - THERMOVAC and PENNINGVAC - providing both monitoring and control functions.

The COMBIVAC CM 52 offers by combining two UHV principles of measurement (THERMOVAC absolute pressure sensor and Bayard-Alpert measurement system IE 414 or extractor measurement system IE 514) measurements of vacuum pressures in the range between 10^{-12} and 1000 mbar.

Advantages to the User

- Compact 3 channel operating unit for a pressure range for passive sensors of
  - 10^{-9} to 1000 mbar (CM 51)
  - 10^{-12} to 1000 mbar (CM 52)
- Automatic switchover from THERMOVAC operation to
  - Penning (cold cathode) operation (CM 51)
  - UHV sensors (Bayard-Alpert measurement system IE 414 or extractor measurement system IE 514 (CM 52)
- Measurement cable lengths up to 100 meters are possible depending on the type of application
- Easy to operate
- Keyboard locking through SOFT-LOCK
- Two adjustable switching thresholds with a relay contact for each measurement channel
- Logarithmic chart recorder output 0 – 10 V or 2 – 10 V
- Wide range power supply 100 – 240 V
- Unit of pressure selectable between mbar, Torr und Pascal
- Compact, rugged Penning sensor insensitive to operation at high pressures (see para. “Sensors”)
- Aligned and temperature compensated THERMOVAC sensors (see para. “Sensors”)
- Cost-effective replacement sensors and electrodes
- Error message for each channel, for example in the case of broken filament, defective sensor line or failed plasma discharge
- Compact benchtop enclosure (1/4 19", 3 HU) made of metal for installation in front panel cut outs and 19" racks
- RS 232 C and Profibus interface
- CE mark
- RoHS-compliant

Typical Applications

- Universal monitoring the operation of high vacuum pump systems like:
  Turbomolecular pump systems
  Diffusion pump systems
  Cryogenic pump systems
- Annealing, melting, brazing and hardening furnaces
- Coating systems
- Analytical instrumentation
- Deployment in thermal radiation resistant and degassable systems is possible
- Particle accelerators

Connectable Sensors

THERMOVAC

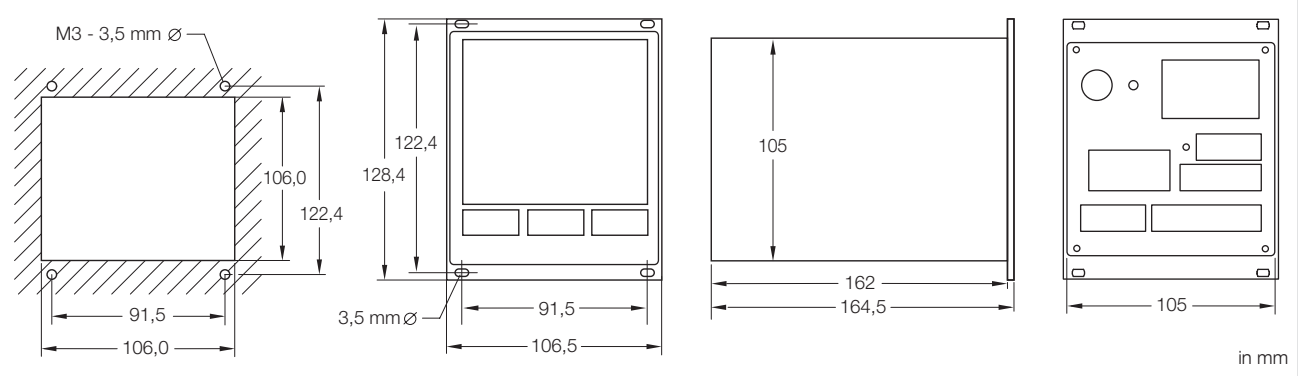
- TR 211
- TR 211 NPT
- TR 212
- TR 216

PENNINGVAC (only CM 51)

- PR 25
- PR 26
- PR 27
- PR 28

IONIVAC (only CM 52)

- IE 414
- IE 514



Front panel cut-out (left) and dimensional drawing (right) for the COMBIVAC CM 51 and CM 52

Technical Data

COMBIVAC

		CM 51	CM 52
Number of measurement channels		3	3
Measurement range			
Channel 1, 2 (THERMOVAC)	mbar (Torr)	5 x 10^{-4} to 1000 (3.5 x 10^{-4} to 750)	5 x 10^{-4} to 1000 (3.5 x 10^{-4} to 750
Channel 3 (PENNINGVAC)	mbar (Torr)	10^{-9} to 10^{-2} (10^{-9} to 10^{-2})	–
Channel 3			
(IE 414 Bayard-Alpert)	mbar (Torr)	–	2 x 10^{-11} to 1 x 10^{-2} (1.5 x 10^{-11} to 0.75 x 10^{-2})
(IE 514 Extractor)	mbar (Torr)	–	2 x 10^{-12} to 1 x 10^{-4} (1.5 x 10^{-12} to 0.75 x 10^{-4})
Unit of measurement (selectable)		mbar, Torr, Pa	mbar, Torr, Pa
Measurement uncertainty			
THERMOVAC		≤ 20% of the measured value in the range 10^{-3} to 10^{-2} mbar (± 20%) in the range 10^{-2} to 10^{2} mbar (± 15%)	≤ 20% of the measured value in the range 10^{-3} to 10^{-2} mbar (± 20%) in the range 10^{-2} to 10^{2} mbar (± 15%)
PENNINGVAC		± 30% of the measured value in the range 10^{-8} to 10^{-4} mbar	–
IE 414/514		–	± 10% of the displayed value (however, this value may increase depending on the type of application)
Measurement cable	m	up to 100 (application dependent)	up to 100 (application dependent)
Display for measured values		digital, 7 segment LED, 4 digit mantissa and 2 digit exponent	digital, 7 segment LED 4 digit mantissa and 2 digit exponent
Type of gas (selectable)		factor adjustable	factor adjustable
Switching thresholds		2 per channel	2 per channel
Operating mode		single, interval-trigger	single, interval-trigger
Adjustable switching thresholds			
THERMOVAC	mbar (Torr)	5 x 10^{-3} to 500 (5 x 10^{-3} to 375)	5 x 10^{-3} to 500 (5 x 10^{-3} to 375)
PENNINGVAC	mbar (Torr)	1 x 10^{-8} to 9.9 x 10^{-3} (0.75 x 10^{-8} to 7.4 x 10^{-3})	–
Bayard-Alpert	mbar (Torr)	–	1 x 10^{-8} to 5 x 10^{-3} (0.75 x 10^{-8} to 3.75 x 10^{-3})
Extractor	mbar (Torr)	–	1 x 10^{-11} to 1 x 10^{-11} (0.75 x 10^{-11} to 0.75 x 10^{-11})
Switching relay hysteresis		10% of the trigger value (default), freely adjustable for THERMOVAC and PENNINGVAC	10% of the trigger value (default), freely adjustable for THERMOVAC and IE 414 or 514
Relay contact load rating		AC/DC, max. 30 V / 1 A	AC/DC, max. 30 V / 1 A
Chart recorder output (default)		0 to 10 V, log. divisions	0 to 10 V, log. divisions
THERMOVAC		linear: 3 decades, approximately 10.5 V in case of a failure, logarithmic: (1 x 10^{-3} mbar), 1.67 V/decade	linear: 3 decades, approximately 10.5 V in case of a failure logarithmic: (1 x 10^{-3} mbar), 1.67 V/decade
PENNINGVAC		logarithmic: (1 x 10^{-9} mbar), 1.43 V/decade	–
IE 414 or 514		–	logarithmic: (1 x 10^{-12} mbar), 1.00 V/decade
Interface		RS 232 C, RS 485 and Profibus	RS 232 C, RS 485 and Profibus
Mains connection 50/60 Hz	V AC	100 – 240	100 – 240
Power consumption	W	< 10	65
Storage temperature range	°C	-20 to +60	-20 to +65
Nominal temperature range	°C	+5 to +50	+5 to +50
Max. rel. humidity	% n.c.	80	80
Weight	kg (lbs)	1.4 (3.09)	1.4 (3.09)
Dimension (W x H x D)	mm	106.4 x 128.5 x 164.5	106.4 x 128.5 x 164.5
Installation depth	mm	approx. 220	approx. 220
Protection class	IP	40	40

Ordering Information

COMBIVAC

	CM 51	CM 52
	Part No.	**Part No.**
Operating unit COMBIVAC CM 51/52 including EURO and US mains cord, 2 m		
with RS 232 C / 485	**230 110**	**230 115**
with Profibus DB	**230 111**	**230 116**
Cable adapter CM 31 – CM 51	**230 112 V01**	**–**
Options		
19" installation frame	**161 00**	**161 00**
1/4 19" blank panel	**161 02**	**161 02**
THERMOVAC sensors for CM 51/52		
TR 211, DN 16 ISO-KF	**157 85**	**157 85**
TR 211, 1/8" NPT	**896 33**	**896 33**
TR 212, DN 16 ISO-KF	**158 52**	**158 52**
TR 212, DN 16 CF	**157 86**	**157 86**
TR 216, DN 16 ISO-KF	**157 87**	**157 87**
Gauge head cables for TR sensors		
5 m	**162 26**	**162 26**
10 m	**162 27**	**162 27**
15 m	**124 34**	**124 34**
20 m	**162 28**	**162 28**
30 m	**124 35**	**124 35**
50 m	**124 37**	**124 37**
75 m	**124 38**	**124 38**
100 m	**124 39**	**124 39**
PENNINGVAC sensors for CM 51		
PR 25, DN 25 ISO-KF	**157 52**	**–**
PR 26, DN 40 ISO-KF	**136 46**	**–**
PR 27, DN 40 CF	**136 47**	**–**
PR 28, DN 40 CF, bakeable	**136 48**	**–**
Gauge cables for PR sensors		
5 m	**162 88**	**–**
10 m	**162 89**	**–**
15 m	**124 49**	**–**
20 m	**157 56**	**–**
30 m	**124 50**	**–**
50 m	**124 52**	**–**
75 m	**124 53**	**–**
100 m	**124 54**	**–**
IONIVAC sensors for CM 52		
IE 414, DN 40 CF	**–**	**158 66**
IE 514, DN 40 CF	**–**	**158 67**
Mains cable		
3 m (US)	**800 102 V1002**	**800 102 V1002**
Gauge head cables for IE sensors		
5 m	**–**	**158 68**
10 m	**–**	**150 88**
15 m	**–**	**230 670 V01**
5 m, bakeable to 200 °C	**–**	**158 44**
10 m, bakeable to 200 °C	**–**	**230 671 V01**
Extension cables for IE 414/514		
10 m	**–**	**245 002**
20 m	**–**	**200 02 937**
30 m	**–**	**245 011 V01**
50 m	**–**	**245 010 V01**
up to 100 m (application dependent)	**–**	**upon request**