COMET

Vacuum Capacitors

Semiconductor, flat panel & Solar Applications

Overview

Semiconductor

Variable and Fixed Vacuum Capacitors

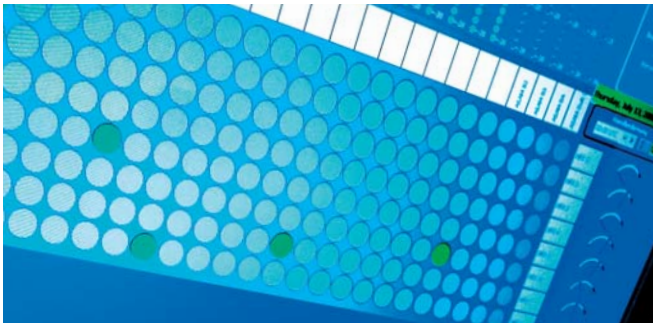
Applications and Solutions

Applications of Vacuum Capacitors

COMET has been manufacturing fixed and variable vacuum capacitors since 1965. Our excellent reputation for product quality has resulted in close cooperation with most leading international companies in the RF industry.

COMET Vacuum Capacitors, with their special capabilities, are used for many unique applications world-wide, e.g.

- Plasma deposition and etching equipment for semiconductor, flat panel display (LCD), data storage media (HDD, DVD) and photovoltaic (solar) manufacturing
- Plasma fusion and high energy particle accelerators
- Nuclear magnetic resonance imaging systems.



Fast forward to the future. COMET Vacuum Capacitors make the fabrication of computer chips and flat panel displays possible.

Integrated Drive Solution

The Integrated Drive is the ideal solution for today's match-box manufacturer. In addition to ensuring 100% accuracy in matching network design, the Integrated Drive Solution dramatically reduces procurement and assembly lead times, and replaces tedious and error-prone manual assembly with a standardized, easy to install subsystem. For further information, please refer to COMET's Integrated Drive Solution brochure, available on our website or at your local representative.

COMET's World Wide Customer Service

In order to facilitate service and communication with all customers, COMET has a highly professional and long time experienced representative base in place to provide local customer service world wide.
COMET also established service bulletins and technical data sheets to provide general and specific technical information.

Visit our website to download the most recent version of any service bulletin and/or data sheet.
COMET reserves the right to modify specifications in the course of later technical developments.

About the Business Unit Vacuum Capacitors

The design, construction and processing of COMET Vacuum Capacitors combined with decades of experience in precision manufacturing assure outstanding quality standards. The unique modular design of the capacitors allows a high degree of special types on very short notice. The superior performance and reliability of the products has been proven by hundreds of thousands of units in operation.
For performance reasons all capacitors are made with ceramic envelops, which enable the capacitors to withstand higher thermal and mechanical loads than glass. Most units fit sockets of competitive types and are electrically and mechanically compatible and interchangeable.

Variable and Fixed Vacuum Capacitors

Special Features and Services of COMET

Data Sheets, Curves, Various Technical Information

This catalogue shows only a limited amount of technical information and only fort he types most widely used and latest designed. For all these capacitors, outline drawings, C-curves, I-curves as well as inductance and in most cases self resonance curves can be sent to you within a very short time or downloaded from COMET's website. Please make sure that you are in the possession of the latest edition of the data sheets as they are subject to change without prior notice.

Analysis of Failed Vacuum Capacitors

COMET firmly believes that the ability to perform a prompt and thorough analysis of a failed unit constitutes an important tool both to improve our own products and to assist designers of RF equipment in improving their systems. A properly filled in Service Report form will enable us to determine the cause of failure in most cases. A Service Report form is shipped with every capacitor leaving the factory.

Service Bulletins

On special subjects, COMET is issuing Service Bulletins if and when appropriate that contain technical recommendations and technical information. Subjects covered so far typically include maintenance, testing and disposal of vacuum capacitors. These can be made available through your local representative or from COMET's website.

Special Versions of Vacuum Capacitors

Despite the high degree of standardisation in the product line, COMET tries to accommodate special requirements of its customers as much as possible. It is through such efforts that product improvements like the integral flange or the double flat shaft end can be accomplished. Other "specials" include spring loaded drive mechanisms for low torque actuation or low pull force or capacitors designed for low inductance. For special requirements, please contact your local representative or COMET directly.

Storage

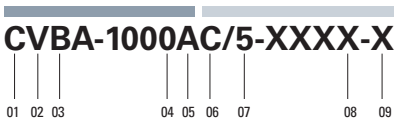
Shelf life can be extended substantially if the following storage recommendations are observed:

- Keep capacitors in a dry place
- Hold – off voltage test of water cooled capacitors prior to storage should be made without filling the cooling system with water
- Cooling systems should be kept dry during storage
- Vacuum capacitors should be handled with care in order to avoid all mechanical damage
- COMET recommends as good engineering practice to test capacitors with the High Voltage Test Unit periodically, about every 4 to 6 months
- For shipment, variable capacitors must be set to minimum capacitance.

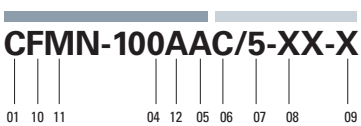
Type Designation System

Beginning 2004, COMET introduced a new Type Designation System to identify each type of capacitor unambiguously. The type designation is divided into two parts, the block and the variant. The block part shows which types are basically designed out of the same block, which makes any exchange of types within the same capacitance value much easier. The variant indicates on one hand the kind of mechanical interfaces like lead screw shaft and mounting flanges and on the other hand any options like optical sensors or tighter capacitance tolerance. The two tables below explain how to read the type designation for variable and fixed capacitors in general.

Variable Vacuum Capacitors



Fixed Vacuum Capacitors



Block
Variant

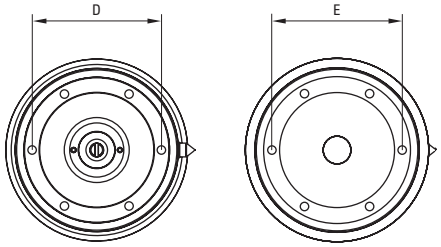
01 Capacitor
02 Variable
03 Product Family
04 Capacity pF $_{Cmax}$
05 Block No.
06 Cooling System
07 Voltage kV $_{Upt}$
08 Interface
09 Option
10 Fixed
11 Product Family
12 Geometry

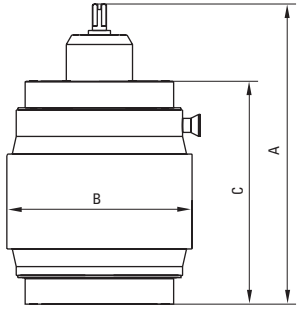
Hexa-Con

Designed for applications requiring frequencies of 60 MHz and higher – Special bellows provides high current, a long life and high self resonance frequency – High current and high voltage values – Available with water cooling for higher current capabilities – Rugged construction – Standardized mounting flanges – Very accurate C-Curve available – Mostly used for high power semiconductor applications.

Technical Features

Capacitance (Cmax)	80 pF to 500 pF
Voltage (peak test)	10 kV to 25 kV
Current (rms max)	72 A to 152 A
Diameter	85 mm
Overall length	132 mm to 196.5 mm
Inductance (@ Cmax)	≤ 6 nH





Product Overview

Capacitance Cmin pF	Capacitance Cmax pF	Voltage Upt kV	Current @13.56 MHz Arms	Inductance @Cmax nH	Cooling System	Mounting Dimensions in mm A	B	C	D	E	Slope pF/Turn pF/mm	Max. Torque Nm	Pull Force N	Optional Features	Type Designation System Part No.
8.6	**80**	25	72	≤ 5	C	132.0	85.0	101.0	Ø 59.7 6x M4	Ø 59.7 6x M4	6.5	0.4	–	A	**CVHE-80AC/25-AAAB-A1**
8.6	**80**	25	72	≤ 5	W	155.0	85.0	113.0	Ø 59.7 3x M4	Ø 59.7 6x M4	6.5	0.4	–	A	**CVHE-80AW/25-AAAA-A**
12.8	**200**	15	108	≤ 5	C	132.0	85.0	101.0	Ø 59.7 6x M4	Ø 59.7 6x M4	23.5	0.4	–	A	**CVHE-200AC/15-AAAB-A1**
13.3	**200**	15	108	≤ 5	C	196.5	85.0	101.0	Ø 59.7 6x M4	Ø 59.7 6x M4	23.6	0.4	–	A, H	**CVHE-200AC/15-GJAA-AH**
12.8	**200**	15	108	≤ 5	W	155.0	85.0	113.0	Ø 59.7 4x M4	Ø 59.7 6x M4	23.5	0.4	–	A	**CVHE-200AW/15-AAAA-A**
25.0	**330**	10	119	≤ 6	C	136.0	85.0	101.0	Ø 59.7 6x M4	Ø 59.7 6x M4	29.7	0.4	–	–	**CVHE-330AC/10-BEAA**
25.0	**330**	10	119	≤ 6	C	132.0	85.0	101.0	Ø 59.7 6x M4	Ø 59.7 6x M4	29.7	0.4	–	A	**CVHE-330AC/10-AAAB-A**
25.0	**330**	10	119	≤ 6	C	136.0	85.0	101.0	Ø 59.7 6x M4	Ø 59.7 6x M4	29.7	0.4	–	C, F	**CVHE-330AC/10-BEAA-CF**
50.0	**500**	15	152	≤ 6	C	146.0	85.0	111.0	Ø 59.7 6x M4	Ø 59.7 6x M4	23.3	0.4	–	A	**CVHE-500AC/15-BEAA-A**

C: Convection, W: Water

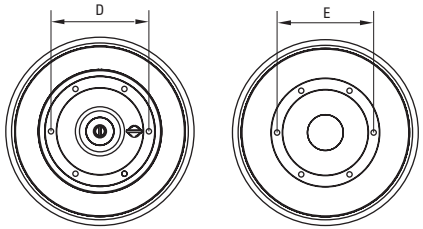
The information above is not to be used for design purpose. For detailed information refer to the individual data sheet.

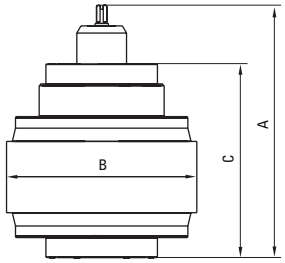
Maxi-Con

Designed for high power flat panel applications over 20 kW – High voltage and high current capabilities – Typical frequency range between 2 MHz and 27 MHz – Available with water cooling for high power applications – Standardized mounting flanges – Mostly used in the semiconductor industry, especially in the display technology (LCD, FPD).

Technical Features

Capacitance (Cmax)	500 pF to 2000 pF
Voltage (peak test)	8 kV to 25 kV
Current (rms max)	123 A to 182 A
Diameter	117 mm
Overall length	152 mm to 165 mm
Inductance (@ Cmax)	≤ 10 nH





Product Overview

Capacitance Cmin pF	Capacitance Cmax pF	Voltage Upt kV	Current @13.56 MHz Arms	Inductance @Cmax nH	Cooling System	Mounting Dimensions in mm A	B	C	D	E	Slope pF/Turn pF/mm	Max. Torque Nm	Pull Force N	Optional Features	Type Designation System Part No.
50	**500**	25	170	≤ 7	C	164.7	117	116.7	Ø 59.7 6x M4	Ø 59.7 6x M4	23.4	0.6	–	J	**CVMX-500AC/25-BUAA-J**
50	**500**	25	170	≤ 7	C	164.7	117	116.7	Ø 59.7 6x M4	Ø 59.7 6x M4	23.4	0.6	–	J	**CVMX-500AC/25-BEAA-J1**
50	**500**	25	182	≤ 7	W	158.7	117	128.7	Ø 59.7 4x M4	Ø 59.7 6x M4	23.4	0.6	–	J	**CVMX-500AW/25-BEAA-J**
50	**500**	25	182	≤ 7	W	164.7	117	128.7	Ø 59.7 4x M4	Ø 59.7 6x M4	23.4	0.6	–	J	**CVMX-500AW/25-BEAA-J1**
100	**1000**	15	175	≤ 9	C	151.8	117	116.3	Ø 59.7 4x M4	Ø 59.7 6x M4	64.7	0.6	–	–	**CVMX-1000AC/15-BEAA**
100	**1000**	15	175	≤ 9	C	152.2	117	116.7	Ø 59.7 6x M4	Ø 59.7 6x M4	64.7	0.6	–	–	**CVMX-1000AC/15-BEKA**
150	**1500**	8	182	≤ 10	W	158.7	117	128.7	Ø 59.7 4x M4	Ø 59.7 6x M4	70.7	0.6	–	J	**CVMX-1500BW/8-BEAA-J**
150	**1500**	8	182	≤ 10	W	164.7	117	128.7	Ø 59.7 4x M4	Ø 59.7 6x M4	70.7	0.6	–	J	**CVMX-1500BW/8-BEAA-J1**
200	**2000**	8	123	≤ 10	C	152.2	117	116.7	Ø 59.7 6x M4	Ø 59.7 6x M4	94.2	0.6	–	–	**CVMX-2000AC/8-BEAA**

C: Convection, W: Water

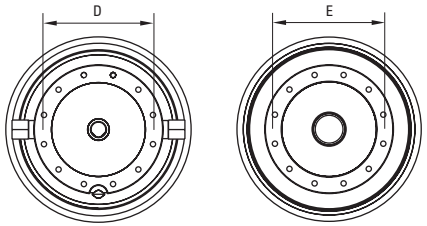
The information above is not to be used for design purpose. For detailed information refer to the individual data sheet.

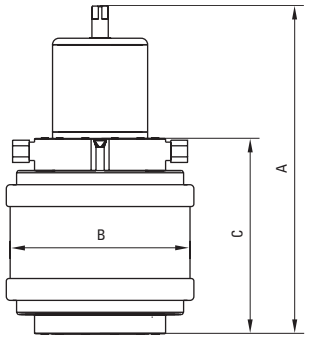
Hiper-Con

Designed for highest power FPD applications over 50 kW – High voltage and highest current capabilities – Enhanced water cooling system allows industry water with pressure up to 6 bars – Typical frequency range between 2 MHz and 40 MHz – Standardized mounting flanges – Long bellows lifetime – Improved drive system with lead-screw-coating 2003 for long lifetime over 1 million cycles – Mostly used in the semiconductor industry, especially in the display technology.

Technical Features

Capacitance (Cmax)	350 pF to 2500 pF
Voltage (peak test)	15 kV to 40 kV
Current (rms max)	300 A
Diameter	143 mm
Overall length	255 mm
Inductance (@ Cmax)	≤ 15 nH





Product Overview

Capacitance Cmin pF	Capacitance Cmax pF	Voltage Upt kV	Current @13.56 MHz Arms	Inductance @Cmax nH	Cooling System	Mounting Dimensions in mm A	B	C	D	E	Slope pF/Turn pF/mm	Max. Torque Nm	Pull Force N	Optional Features	Type Designation System Part No.
20	**350**	40	300	≤ 15	W	255	143	152	Ø 88.9 6x M6/ 1/4"-20 UNC	Ø 88.9 6x M6/ 1/4"-20 UNC	23.9	0.8	–	–	**CVHI-350AW/40-ADUB**
50	**500**	40	300	≤ 15	W	255	143	152	Ø 88.9 6x M6/ 1/4"-20 UNC	Ø 88.9 6x M6/ 1/4"-20 UNC	23.3	0.8	–	–	**CVHI-500AW/40-ADUB**
100	**1000**	20	300	≤ 15	W	255	143	152	Ø 88.9 6x M6/ 1/4"-20 UNC	Ø 88.9 6x M6/ 1/4"-20 UNC	50.0	0.8	–	–	**CVHI-1000AW/20-ADUB**
150	**1500**	15	300	≤ 15	W	255	143	152	Ø 88.9 6x M6/ 1/4"-20 UNC	Ø 88.9 6x M6/ 1/4"-20 UNC	73.8	0.8	–	–	**CVHI-1500AW/15-ADUB**
200	**2500**	15	300	≤ 15	W	255	143	152	Ø 88.9 6x M6/ 1/4"-20 UNC	Ø 88.9 6x M6/ 1/4"-20 UNC	125.7	0.8	–	–	**CVHI-2500AW/15-ADUB**

W: Water

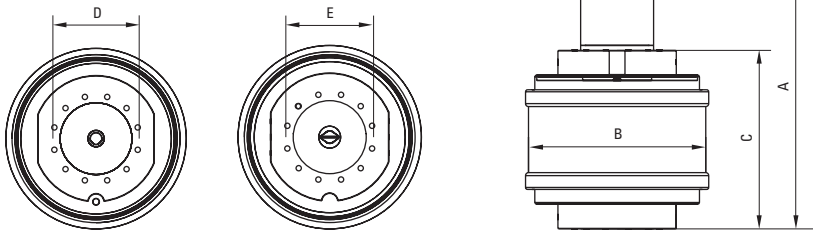
The information above is not to be used for design purpose. For detailed information refer to the individual data sheet.

Supra-Con

Designed for highest power application in any RF industry up to over 100 kW – Dedicated for a wide frequency range from below 1 MHz up to over 40 MHz due to low self inductance – Surpassing new triplex-water-cooling allows industry water up to 6 bars without compromising the bellows – Improved and latest lead-free drive system for long lifetime over 1 million cycles – Mostly used in the semiconductor, display and solar technology.

Technical Features

Capacitance (Cmax)	250 pF to 5000 pF
Voltage (peak test)	10 kV to 60 kV
Current (rms max)	450 A
Diameter	183 mm
Overall length	295 mm
Inductance (@ Cmax)	≤ 15 nH



Product Overview

Capacitance Cmin pF	Capacitance Cmax pF	Voltage Upt kV	Current @13.56 MHz Arms	Inductance @Cmax nH	Cooling System	Mounting Dimensions in mm A	B	C	D	E	Slope pF/Turn pF/mm	Max. Torque Nm	Pull Force N	Optional Features	Type Designation System Part No.
25	**250**	60	450	≤ 15	W	295	183	187	Ø 88.9 12x M6	Ø 88.9 12x M6	9.4	0.8	–	–	**CVSU-250AW/65-ADUD**
50	**500**	55	450	≤ 15	W	295	183	187	Ø 88.9 12x M6	Ø 88.9 12x M6	19.5	0.8	–	–	**CVSU-500AW/55-ADUD**
75	**750**	40	450	≤ 15	W	295	183	187	Ø 88.9 12x M6	Ø 88.9 12x M6	28.3	0.8	–	–	**CVSU-750AW/40-ADUD**
100	**1000**	25	450	≤ 15	W	295	183	187	Ø 88.9 12x M6	Ø 88.9 12x M6	37.6	0.8	–	–	**CVSU-1000AW/25-ADUD**
200	**2000**	25	450	≤ 15	W	295	183	187	Ø 88.9 12x M6	Ø 88.9 12x M6	75.4	0.8	–	–	**CVSU-2000AW/25-ADUD**
250	**2500**	20	450	≤ 15	W	295	183	187	Ø 88.9 12x M6	Ø 88.9 12x M6	97.8	0.8	–	–	**CVSU-2500AW/20-ADUD**
300	**3000**	15	450	≤ 15	W	295	183	187	Ø 88.9 12x M6	Ø 88.9 12x M6	111.1	0.8	–	–	**CVSU-3000AW/15-ADUD**
500	**5000**	10	450	≤ 15	W	295	183	187	Ø 88.9 12x M6	Ø 88.9 12x M6	213.3	0.8	–	–	**CVSU-5000AW/10-ADUD**

W: Water

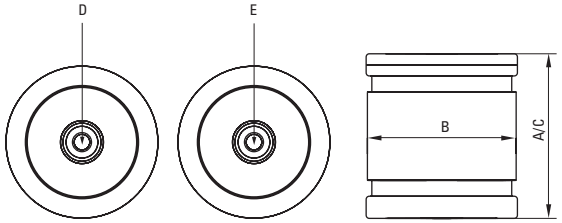
The information above is not to be used for design purpose. For detailed information refer to the individual data sheet.

Mini-Cap

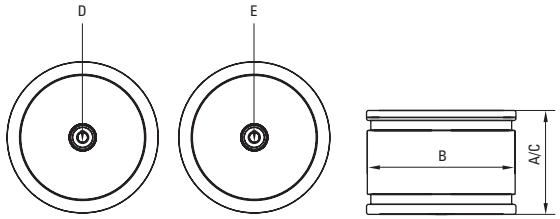
High quality capacitor for high current applications – Replacement for low current applications with long life time – Low internal inductance for operation in excess of 100 MHz – Very compact and uniform size – Unique rugged and cost effective design – Widely used in different applications like matching networks, DC blocking and RF sealing – All Mini-Caps delivered with mounting-kit for easy installation – Optional extension rods for easy replacement.

Technical Features

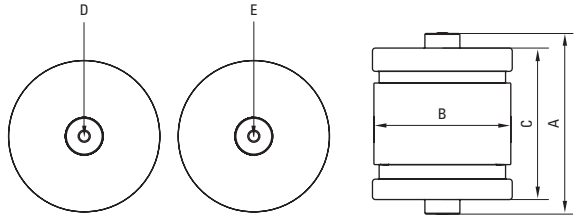
Capacitance (Cmax)	50 pF to 4000 pF
Voltage (peak test)	3 kV to 35 kV
Current (rms max)	27 A to 168 A
Diameter	49 mm to 74 mm
Overall length	52 mm to 87 mm



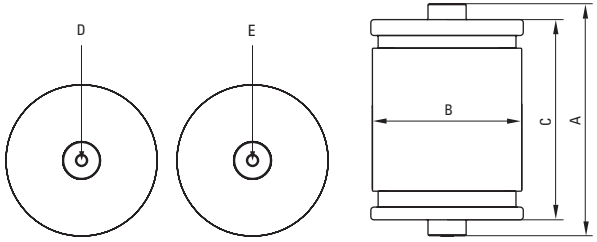
Outline A



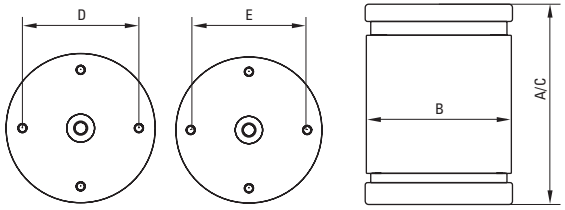
Outline B



Outline C



Outline D



Outline E

Product Overview

Capacitance		Voltage	Current @13.56	Inductance @Cmax	Cooling System	Mounting Dimensions in mm					Slope pF/Turn	Max. Torque	Pull Force	Optional Features	Type Designation System
Cmin pF	Cmax pF	Upt kV	MHz Arms	nH		A	B	C	D	E	pF/mm	Nm	N		Part No.
–	**50**	15	27	–	C	62	49	52	Ø 1x M4	Ø 1x M4	–	–	–	H	**CFMN-50CAC/15-AF-H**
–	**50**	15	27	–	C	62	49	52	Ø 1x M4	Ø 1x M4	–	–	–	–	**CFMN-50CAC/15-AF**
–	**50**	30	54	–	C	73	47	63	Ø 1x M4	Ø 1x M4	–	–	–	–	**CFMN-50DAC/30-AF**
–	**80**	15	43	–	C	62	49	52	Ø 1x M4	Ø 1x M4	–	–	–	G	**CFMN-80CAC/15-AF-G**
–	**100**	15	54	–	C	62	49	52	Ø 1x M4	Ø 1x M4	–	–	–	E	**CFMN-100CAC/15-AF-E**
–	**100**	15	54	–	C	62	49	52	Ø 1x M4	Ø 1x M4	–	–	–	G	**CFMN-100CAC/15-AF-G**
–	**100**	30	108	–	C	73	47	63	Ø 1x M4	Ø 1x M4	–	–	–	G	**CFMN-100DAC/30-AF-G**
–	**100**	35	126	–	C	87	64	–	Ø 1x M6/ Ø 4x M4	Ø 1x M6/ Ø 4x M4	–	–	–	G	**CFMN-100EAC/35-DH-G**
–	**110**	15	59	–	C	62	49	52	Ø 1x M4	Ø 1x M4	–	–	–	E	**CFMN-110CAC/15-AF-E**
–	**120**	15	65	–	C	62	49	52	Ø 1x M4	Ø 1x M4	–	–	–	G	**CFMN-120CAC/15-AF-G**
–	**130**	15	70	–	C	62	49	52	Ø 1x M4	Ø 1x M4	–	–	–	E	**CFMN-130CAC/15-AF-E**
–	**150**	15	81	–	C	62	49	52	Ø 1x M4	Ø 1x M4	–	–	–	E	**CFMN-150CAC/15-AF-E**
–	**150**	15	81	–	C	62	49	52	Ø 1x M4	Ø 1x M4	–	–	–	G	**CFMN-150CAC/15-AF-G**
–	**175**	35	168	–	C	87	64	–	Ø 1x M6/ Ø 4x M4	Ø 1x M6/ Ø 4x M4	–	–	–	G	**CFMN-175EAC/35-DH-G**
–	**180**	15	97	–	C	62	49	52	Ø 1x M4	Ø 1x M4	–	–	–	G	**CFMN-180CAC/15-AF-G**
–	**200**	15	107	–	C	62	49	52	Ø 1x M4	Ø 1x M4	–	–	–	G	**CFMN-200CAC/15-AF-G**
–	**200**	25	143	–	C	73	47	63	Ø 1x M4	Ø 1x M4	–	–	–	G	**CFMN-200DAC/25-AF-G**
–	**210**	15	113	–	C	62	49	52	Ø 1x M4	Ø 1x M4	–	–	–	G	**CFMN-210CAC/15-AF-G**
–	**250**	15	134	–	C	52	49	–	Ø 1x M6	Ø 1x M6	–	–	–	E	**CFMN-250AAC/15-DE-E**
–	**250**	15	134	–	C	52	47	–	Ø 1x M6	Ø 1x M6	–	–	–	G	**CFMN-250AAC/15-DE-G**
–	**350**	15	132	–	C	52	47	–	Ø 1x M6	Ø 1x M6	–	–	–	G	**CFMN-350AAC/15-DE-G**
–	**500**	12	126	–	C	52	47	–	Ø 1x M6	Ø 1x M6	–	–	–	G	**CFMN-500AAC/12-DE-G**
–	**750**	10	116	–	C	52	47	–	Ø 1x M6	Ø 1x M6	–	–	–	G	**CFMN-750AAC/10-DE-G**
–	**1000**	8	115	–	C	52	47	–	Ø 1x M6	Ø 1x M6	–	–	–	G	**CFMN-1000AAC/8-DE-G**
–	**2000**	3	121	–	C	52	74	–	Ø 1x M6	Ø 1x M6	–	–	–	G	**CFMN-2000BAC/5-DE-G**
–	**2000**	3	105	–	C	52	47	–	Ø 1x M6	Ø 1x M6	–	–	–	G	**CFMN-2000AAC/3-DE-G**
–	**4000**	5	121	–	C	52	74	–	Ø 1x M6	Ø 1x M6	–	–	–	G	**CFMN-4000BAC/5-DE-G**

C: Convection

The information above is not to be used for design purpose. For detailed information refer to the individual data sheet.

COMET is a successful international technology company in the growth markets of security, inspection, electronics and communication. As an expert in the field of applied physics, COMET provides a complete and highly flexible portfolio of components, modules, systems and services from a single source.

COMET's Vacuum Capacitors are vital components in the majority of all short-, medium- and long-wave broadcasting stations as well as in plasma coating and etching equipment for the semiconductor and flat panel industries.

COMET – The X-perts for security, inspection, electronics and communication

November 2007
Specifications subject to change without notice

COMET AG
Herrengasse 10
3175 Flamatt
Switzerland
T +41 31 744 9000
F +41 31 744 9590
vc@comet.ch

COMET North America Inc.
2343 Bering Drive
San Jose, CA 95131
USA
T +1 408 325 8770
F +1 408 325 8773
usa@comet.ch

COMET China
1201 Guiqiao Road
Building 10, 1st floor
Pudong, Shanghai 201206
P.R. China
T +86 21 6879 9000
F +86 21 6879 9009
china@comet.ch

www.comet.ch