ENGINEERING TOMORROW



Selection Guide | VACON® 20 | VACON® 20 Cold Plate | 0.25 kW - 18.5 kW

Flexible and easy to use compact AC drives





VACON® 20 – possibilities and performance

The VACON® 20 AC drive comes packed with functionality and possibilities to bring any machine control to a completely new level. The compact size in combination with a wide power range is the base, but the VACON® 20's possibilities do not end there. A built-in PLC functionality, which is one of the most flexible on the market, makes this product adapt to every task and bring cost savings to the user.

In order for machine builders to be able to compete in an increasingly competitive market, it is important to continuously seek solutions to further improve performance and cost efficiency – VACON® 20 offers new possibilities here.

Wide power range

The VACON® 20 is available in all common voltages in the range of 105-600 V. Combined with a wide power range up to 18.5 kW /25 HP. The VACON® 20 has something for customers all over the globe. Customers can reduce costs by implementing our harmonized product range and increase efficiency in their manufacturing processes. In currents above 16A the drive is available with a built-in harmonic filtering choke for public networks according to IEC61000-3-12.

Cutting-edge performance

Machinery performance is very much dependent on the performance of the AC drive. In the VACON® 20 we have done our best to cut cycle times and maximize the control performance of the drive. The built-in RS485 interface offers a cost effective and simple serial control interface for the drive. With

optional modules, the VACON® 20 can be connected to almost any fieldbus system including CANOpen, DeviceNet and PROFIBUS DP.

Fast installation and set-up

The VACON® 20 is designed for efficient volume manufacturing where every second in installation and configuration time counts. Easy access terminals, built-in DIN rail mounting and the MCA parameter copying tool which can clone settings without main power in the drive are all examples of features that help reduce start-up time.

Built-in PLC functionality based on IEC61131-3

The built-in PLC functionality presents an opportunity to increase machine performance and save costs. The customer can build his own control logic in the drive and utilize unused I/O of the drive for performing other machine related tasks. Another unique feature of the VACON® 20 is that the parameter list can be freely modified and application specific parameter sets and default settings can be created. By utilizing the opportunities of optimizing the drive control VACON® 20 can help make better and more cost efficient machine designs.

Key benefits:

- Fieldbus connectivity
- Parameter copying without main power
- Custom-made software possible

Typical applications:

- Pumps and fans
- Conveyors
- Packaging, processing and washing machines

Technical highlights:

- Wide power range up to 18.5 kW
- High performance and functionality
- Full I/O + option board support
- Fast installation and setup
- Built-in choke as option in ≥16A types
- Induction and permanent magnet (PM) motor support











Ratings and dimensions

Complements of	A.C. aluit va Avus a	Power		Motor	Motor current		Dimensio	Dimensions W x H x D		Weight	
Supply voltage	AC drive type	kW	HP	I _N [A]	1.5 x I _N [A]	size	mm	inches	kg	lb	
	VACON0020-1L-0001-1	0.25	0.35	1.7	2.6						
105-120 VAC,	VACON0020-1L-0002-1	0.37	0.5	2.4	3.6	MI2	90 x 195 x 102	3.54 x 7.68 x 4.02	0.7	1.54	
1-phase	VACON0020-1L-0003-1	0.55	0.75	2.8	4.2	IVIIZ	90 X 195 X 102		0.7	1.54	
(North America only)	VACON0020-1L-0004-1	0.75	1	3.7	5.6						
Offiy)	VACON0020-1L-0005-1	1.1	1.5	4.8	7.2	MI3	100 x 255 x 109	3.94 x 10.04 x 4.29	1.0	2.18	
	VACON0020-1L-0001-2	0.25	0.35	1.7	2.6						
	VACON0020-1L-0002-2	0.37	0.5	2.4	3.6	MI1	66 x 160 x 98	2.60 x 6.30 x 3.90	0.5	1.21	
208-240 VAC.	VACON0020-1L-0003-2	0.55	0.75	2.8	4.2						
1-phase	VACON0020-1L-0004-2	0.75	1	3.7	5.6						
т-рпазе	VACON0020-1L-0005-2	1.1	1.5	4.8	7.2	MI2	90 x 195 x 102	3.54 x 7.68 x 4.02	0.7	1.54	
	VACON0020-1L-0007-2	1.5	2	7	10.5						
	VACON0020-1L-0009-2	2.2	3	9.6	14.4	MI3	100 x 255 x 109	3.94 x 10.04 x 4.29	1.0	2.18	
	VACON0020-3L-0001-2	0.25	0.35	1.7	2.6			2.60 x 6.30 x 3.90	0.5	1.21	
	VACON0020-3L-0002-2	0.37	0.5	2.4	3.6	MI1	66 x 160 x 98				
	VACON0020-3L-0003-2	0.55	0.75	2.8	4.2						
	VACON0020-3L-0004-2	0.75	1	3.7	5.6		90 x 195 x 102	3.54 x 7.68 x 4.02	0.7	1.54	
	VACON0020-3L-0005-2	1.1	1.5	4.8	7.2	MI2					
208-240 VAC,	VACON0020-3L-0007-2	1.5	2	7	10.5		400 055 400		4.0	0.44	
3-phase	VACON0020-3L-0011-2	2.2	3	11	16.5	MI3	100 x 255 x 109	3.94 x 10.04 x 4.29	1.0	2.18	
	VACON0020-3L-0012-2	3	4	12.5	18.8		165 x 370 x 165	6.5 x 14.6 x 6.5	8	18	
	VACON0020-3L-0017-2	4	5	17.5	26.3	MI4					
	VACON0020-3L-0025-2	5.5	7.5	25	37.5						
	VACON0020-3L-0031-2 VACON0020-3L-0038-2	7.5 11	10 15	31 38	46.5 57	MI5	165 x 414 x 202	6.5 x 16.3 x 8	10	22	
	VACON0020-3L-0038-2	0.37	0.5	1.3	2.0						
	VACON0020-3L-0001-4	0.57	0.75	1.9	2.0	MI1	66 x 160 x 98	2.60 x 6.30 x 3.90	0.5	1.21	
	VACON0020-3L-0002-4	0.75	1	2.4	3.6	77111					
	VACON0020-3L-0004-4	1.1	1.5	3.3	5.0		90 x 195 x 102	3.54 x 7.68 x 4.02	0.7	1.54	
	VACON0020-3L-0005-4	1.5	2	4.3	6.5	MI2					
200 4001/46	VACON0020-3L-0006-4	2.2	3	5.6	8.4						
380-480 VAC, 3-phase	VACON0020-3L-0008-4	3	4	7.6	11.4		100 x 255 x 109	3.94 x 10.04 x 4.29		2.18	
5-pnase	VACON0020-3L-0009-4	4	5	9	13.5	MI3			1.0		
	VACON0020-3L-0012-4	5.5	7.5	12	18.0						
	VACON0020-3L-0016-4	7.5	10	16	24	MI4	165 x 370 x 165	6.5 x 14.6 x 6.5	8	18	
	VACON0020-3L-0023-4	11	15	23	34.5	1711-1		0.0 14.0 10.0	0	10	
	VACON0020-3L-0031-4	15	20	31	46.5	MI5	165 x 414 x 202	6.5 x 16.3 x 8	10	22	
	VACON0020-3L-0038-4	18.5	25	38	57	14113	100 / 11 1 / 202	3.5 X 10.5 X 0	10		
520-600 VAC,	VACON0020-3L-0002-7	0.75	1	1.7	2.6			3.94 x 10.04 x 4.29		2.18	
3-phase	VACON0020-3L-0003-7	1.5	2	2.7	4.1	1.412					
(North America	VACON0020-3L-0004-7	2.2	3	3.9	5.9	MI3	100 x 255 x 109		1.0		
only)	VACON0020-3L-0006-7	4	5	6.1	9.2						
7.	VACON0020-3L-0009-7	5.5	7.5	9	13.5						



VACON® 20 Cold Plate – flexibility in cooling

When the environment is more demanding or there is a cooling media such as liquid already available, the AC drive cooling can also be optimized further. The VACON® 20 Cold Plate shares the control and power topology with the standard VACON® 20 drive, but offers completely new possibilities for creating unique and efficient cooling solutions.

AC drives are extremely energy efficient products; they do however, still generate some heat. The heat loss can sometimes limit the density of the machine design, especially if mounted in a sealed enclosure simply because there is no air circulation. The VACON® 20 Cold Plate design is based around a flat surface of the drive onto which the majority of the heat losses are concentrated. By attaching this surface to a cooling element, i.e. to the "cold plate", the cooling of the drive can work even under the most demanding circumstances.

Use any cooling media

As the cooling is done through a clear cooling interface, it is possible to use different cooling media depending on the situation. By attaching the drive to a heat sink with large cooling ribs, a fully passively cooled drive is created. As an alternative, the drive can be mounted on a plate, which is cooled by liquid in order to create a liquid cooled drive solution. Other possible cooling media include different types of refrigerants or metal constructions with a high heat energy conducting mass.

Compact sealed enclosures

If the heat transport from the drive is not handled through air circulation, but through the heat being conducted out of the enclosure through a flat metal surface, the sealing of the enclosure is no longer a factor that significantly affects the cooling performance. It is thus possible to create and install the drive enclosure in environments with high amounts of dust and moisture. The VACON® 20 has a unique form that is designed to allow slim and flat enclosure solutions that can be highly integrated in the machine construction to be created.

Built-in PLC functionality according to IEC61131-3

The VACON® 20 Cold Plate utilizes the advanced control concept of the VACON® 20 product family, offering full control performance and functionality. It also supports the built-in PLC functionality that allows the creation of application-specific software and solutions.

Key benefits:

- Highest cooling flexibility
- Fast plugging of I/O wiring
- Custom-made software possible

Typical applications:

- Textile machinery
- Hoists and cranes
- Conveyors in demanding environment
- Compressors and heat pumps

Technical highlights:

- Cold plate cooling
- Unique low depth design
- STO Safe Torque Off according to SIL3
- High performance and functionality
- High ambient temperature rating up to 70 ℃
- Induction and permanent magnet (PM) motor
- Integrated brake resistor for MS2 frame size
- Status LED lights on drive
- Expansion slot for I/O or fieldbus
- Handheld text keypad with copy function
- Single plug I/O connector for OEMs





Ratings and dimensions

Cumply voltage	AC drive type	Power		Motor current		Enclosure	Dimensions W x H x D		Weight	
Supply voltage	AC drive type	kW	HP	I _N [A]	1.5 x I _N [A]	size	mm	inches	kg	lb
200 240144.5	VACON0020-1L-0004-2-CP	0,75	1	3,7	5,6	MS2	133 x 164.5 x 79.5	5.23 x 6.43 x 3.13	2	
208-240 VAC, 1-phase	VACON0020-1L-0005-2-CP	1,1	1,5	4,8	7,2					4,4
1-рназе	VACON0020-1L-0007-2-CP	1,5	2	7	10,5					
	VACON0020-3L-0004-2-CP	0,75	1	3,7	5,6	MS2	133 x 164.5 x 79.5	5.23 x 6.43 x 3.13	2	4,4
	VACON0020-3L-0005-2-CP	1,1	1,5	4,8	7,2					
208-240 VAC,	VACON0020-3L-0007-2-CP	1,5	2	7	10,5					
3-phase	VACON0020-3L-0011-2-CP	2,2	3	11	16,5	MS3	161 x 246 x 83	6.34 x 9.69 x 3.27	3	6,6
	VACON0020-3L-0012-2-CP	3	4	12	18,0					
	VACON0020-3L-0017-2-CP	4	5	17,5	26,3					
	VACON0020-3L-0003-4-CP	0.75	1	2.4	3.6	MS2	133 x 164.5 x 79.5	5.23 x 6.43 x 3.13	2	4.4
	VACON0020-3L-0004-4-CP	1.1	1.5	3.3	5.0					
	VACON0020-3L-0005-4-CP	1.5	2	4.3	6.5					
380-480 VAC,	VACON0020-3L-0006-4-CP	2.2	3	5.6	8.4					
3-phase	VACON0020-3L-0008-4-CP	3	5	7.6	11.4					
	VACON0020-3L-0009-4-CP	4	6	9.0	13.5	MS3	161 x 246 x 83	6.34 x 9.69 x 3.27	3	6.6
	VACON0020-3L-0012-4-CP	5.5	7.5	12.0	18.0					
	VACON0020-3L-0016-4-CP	7.5	10	16.0	24.0					

Tailoring the software

VACON® Programming

The VACON® 20 product's built-in PLC functionality and programming is in accordance with IEC611131-3. The optional tool enables the user to modify the drive software by editing the existing application logic or by creating completely new software. The parameter list and default settings are edited with a separate tool.

PC interface and parameter copying

The MCA (Micro Communications Adapter) is a snap-on and intelligent copying unit for VACON® 10 and VACON® 20 products.

- Parameter copying without main power in the drive
- Download settings directly to the MCA from PC without a drive
- HW interface for PC connection to the drive

The VACON® 20 Cold Plate drive parameter copying is done with the handheld keypad.



MCA adapter

I/O Configuration

	Terminal	Description	VACON® 20	VACON® 20 CP	
1	+10 V _{ref}	Maximum load 10 mA	•	•	
2	Al1	0-10V	•	0-10V / 0(4)-20mA*	
3	GND		•	•	
4	Al2	0-10V / 0(4)-20mA*	•	•	
5	GND		•	•	
6	24 V _{out}	Max. 50 mA / CP 100 mA	•	•	
_ 7	GND/DIC*		•	•	
8	DI1	0 . 20 \ / D	•	•	
9	DI2	0-+30 V R _i = 12 kΩ Cold Plate R _i = 4 kΩ	•	•	
10	DI3	2014 1142 11	•	•	
13	DOC	Digital output common	•	•	
14	DI4	0 . 20 \ / D	•	•	
15	DI5	0-+30 V R _i = 12 kΩ Cold Plate R _i = 4 kΩ	•	•	
16	DI6	2014 1142 11	•	•	
18	AO	Analogue output	0-10V / 0(4)-20mA*	0-10V	
20	DO	Open collector, max. load 48 V/50 mA	•	•	
22	RO 13-CM	Delevievitevit 1	•	•	
23	RO 14-NO	Relay output 1	•	•	
24	RO 22 - NC		•	•	
25	RO 21 - CM	Relay output 2	•	•	
26	RO 24 - NO		•	•	
Α	A-RS485	Modbus RTU	•	•	
В	B-RS485	Modbus RTU	•	•	
	STO	Inputs S1, G1, S2, G2 Feedback F+/F-		•	

^{*} Selectable



Option board mounting kit



Keypad door mounting kit

Type code key





IP21/NEMA1 kit

Technical data

Mains connection	Input voltage U _{in}	105120 V, -15 %+10 % 1-phase (not for VACON 20CP) 208240 V, -15 %+10 % 1-phase 208240 V, -15 %+10 % 3-phase 380480 V, -15 %+10 % 3-phase 520600 V, -15 %+10 % 3-phase (not for VACON 20CP)		
	Input frequency	4566 Hz		
	Connection to mains	Once per minute or less (normal case)		
Motor connection	Output voltage	0U _{in} (2 x U _{in} with 105120 V drives)		
	Output current	Continuous rated current I _N at rated ambient temperature overload 1.5 x I _N max. 1 min/10 min		
	Starting current / Torque	Current 2 x I_N for 2 secs in every 20 sec period Torque depends on motor		
	Output frequency	0320 Hz		
	Frequency resolution	0.01 Hz		
Control	Control method	Frequency control U/f. Open loop sensorless vector control		
characteristics	Switching frequency	1.516 kHz; Factory default 4 kHz, (520600 V model default 2 kHz) Cold Plate models 6 kHz		
	Braking torque	100% x T_N with brake chopper in 3-phase version sizes MS2-3, MI2-5 30% x T_N with DC-braking. Dynamic flux braking available in all types		
Ambient conditions	Ambient operating temperature	-10°C (no frost)+50 °C: rated loadability I_{N} (1L-0009-2, 3L-0007-2, 3L-0011-2 and with options ENC-IP21-MIx and ENC-IN01-MIx ambient max +40 °C) Cold Plate models -10 °C+70 °C		
	Storage temperature	-40 °C+70 °C		
	Altitude	100 % load capacity (no derating) up to 1000 m 1 % derating for each 100 m above 1000 m; max. 2000 m Cold Plate max 3000 m		
	Enclosure class	MI1-3: IP20, MI4-5: IP21, Cold Plate: IP00		
EMC	Immunity	Complies with EN61800-3 (2004)		
	Emissions	208-240 V: EMC level C2: with an internal +EMC2 option (not needed for VACON 20CP) 380-480 V: EMC level C2: with an internal +EMC2 option (not needed for VACON 20CP)		
Approvals	EN61800, C-Tick, Gost R, CB, CE, UL, cUL, KC (not all versions, see unit nameplate for more detailed approvals)			

Constitution to the state of	No. of the control of	Suitability		
Separately delivered options code	Description	VACON® 20	VACON® 20 CP	
ENC-SLOT-MC03-13	Option board mounting kit VACON® 20 MI1-MI3	•		
ENC-SLOT-MC03-45	Option board mounting kit VACON® 20 MI4-MI5			
ENC-IP21-MIx	IP21 cover MI1-MI3. x=1,2,3	•		
ENC-IN01-MIx	NEMA 1 Kit MI1-MI5. x=1,2,3,4,5			
ENC-QPES-MIx-10	10pcs PE kit MI1-MI5. x=1,2,3,4,5			
VACON-ADP-MCAA	MCA RS422 adapter w/ parameter copy			
CAB-USB/RS-485	USB to RS485 cable for PC			
VACON-ADP-MCAA-KIT	Kit with VACON-ADP-MCAA and CAB-USB/RS485			
VACON-ADP-PASSIVE	Passive RS422 adapter			
VACON-PAN-HMDR-TMX-MC03	VACON® 20 door mounting kit with text keypad and VACON-ADP-PASSIVE			
CAB-RJ45P-2M	2m RJ45 cable for door mounting kit			
CAB-RJ45P-3M	3m RJ45 cable for door mounting kit			
CAB-RJ45P-6M	6m RJ45 cable for door mounting kit	•		
CAB-RJ45P-15M	15m RJ45 cable for door mounting kit			
VACON-PAN-HMDR-TMX-MC03-2M	VACON® 20 door mounting kit with VACON-PAN-HMDR-TMX-MC03 and CAB-RJ45P-2M			
VACON-PAN-HMDR-TMX-MC03-3M	VACON® 20 door mounting kit with VACON-PAN-HMDR-TMX-MC03 and CAB-RJ45P-3M			
VACON-PAN-HMDR-TMX-MC03-6M	VACON® 20 door mounting kit with VACON-PAN-HMDR-TMX-MC03 and CAB-RJ45P-6M			
VACON-PAN-HMDR-TMX-MC03-15M	VACON® 20 door mounting kit with VACON-PAN-HMDR-TMX-MC03 and CAB-RJ45P-15M			
CAB-HMI2M-MC05-X	MC05 IP66 HMI cable I=2m for -X keypads option			
CAB-HMI5M-MC05-X	MC05 IP66 HMI cable I=5m for -X keypads option			
VACON-PAN-HMDR-MC03	Complete IP54 keypad door kit+3m cable+adapater	•	•	
VACON-PAN-HMTX-MC06-CP	Handheld/magnetic fixing IP66 text keypad w/ cable, I=1m/39,37 inches			
PAN-HMWM-MK02	Keypad wall-mounting kit	•		

Option boards	Description					
I/O boards D- and E-slot compatible						
OPT-B1-V	6 x DI / DO, programmable					
OPT-B2-V	2 x relay output + thermistor					
OPT-B4-V	1 x AI, 2 x AO (isolated)					
OPT-B5-V	3 x relay output					
OPT-B9-V	1x RO, 5x DI (42-240VAC)					
OPT-BF-V	1 x AO, 1 x DO, 1 x RO					
OPT-BH-V	3 x temp sensors (PT100, PT1000, NI1000, KTY84-130, KTY84-150, KTY84-131)					
OPT-BK-V	AS-interface option board					
Fieldbus boards						
OPT-E3-V	PROFIBUS DP, screw terminals					
OPT-E5-V	PROFIBUS DP, sub-D9 connector					
OPT-E6-V	CANopen					
OPT-E7-V	DeviceNet					
OPT-E9-V	2-port Ethernet (Modbus TCP, PROFINET RT)					
OPT-EC-V	EtherCAT					
OPT-C3-V	PROFIBUS DP					
OPT-C5-V	PROFIBUS DP (D9 type connector)					
OPT-C6-V	CANopen					
OPT-C7-V	DeviceNet					
OPT-CI-V	Modbus TCP/IP					
OPT-CJ-V	BACnet MS/TP					
OPT-CP-V	PROFINET I/O					
OPT-CQ-V	EtherNet/IP					

Factory installed	Description	Suitability		
options code	2 cscpaio	VACON® 20	VACON® 20 CP	
+EMC2	C2-Level EMC filter (includes +QPES)			
+QPES	Cable shield grounding kit			
+QFLG	Flange mounting kit for MI4 and MI5			
+DBIR	Integrated cold plate brake resistor		•	
+LS60	60 Hz defaults on motor control		•	
Application software				
=+A1051	VACON® 20 PFC Application	•	•	





A better tomorrow is driven by drives

Danfoss Drives is a world leader in variable speed control of electric motors.

We offer you unparalleled competitive edge through quality, application-optimized products and a comprehensive range of product lifecycle services.

You can rely on us to share your goals. Striving for the best possible performance in your applications is our focus. We achieve this by providing the innovative products and application know-how required to optimize efficiency, enhance usability, and reduce complexity.

From supplying individual drive components to planning and delivering complete drive systems; our experts are ready to support you all the way.

You will find it easy to do business with us. Online, and locally in more than 50 countries, our experts are never far away, reacting fast when you need them.

You gain the benefit of decades of experience, since 1968. Our low voltage and medium voltage AC drives are used with all major motor brands and technologies in power sizes from small to large.

VACON® drives combine innovation and high durability for the sustainable industries of tomorrow

For long lifetime, top performance, and full-throttle process throughput, equip your demanding process industries and marine applications with VACON® single or system drives.

- Marine and Offshore
- Oil and Gas
- Metals
- Mining and Minerals
- Pulp and Paper

- Energy
- **Elevators and Escalators**
- Chemical
- Other heavy-duty industries

VLT® drives play a key role in rapid urbanization through an uninterrupted cold chain, fresh food supply, building comfort, clean water and environmental protection.

Outmaneuvering other precision drives, they excel, with remarkable fit, functionality and diverse connectivity.

- Food and Beverage
- Water and Wastewater
- Refrigeration
- Material Handling
- Textile

Distribution Partner

1300 36 26 26 www.colterlec.com.au





Danfoss can accept no responsibility for possible errors in catalogues, brochures and other printed material. Danfoss reserves the right to alter its products without notice. This also applies to products already on order provided that such alterations can be made without subsequential changes being necessary in specifications already agreed.

All trademarks in this material are property of the respective companies. Danfoss and the Danfoss logotype are trademarks of Danfoss A/S. All rights reserved.