Bonfiglioli
Vectron

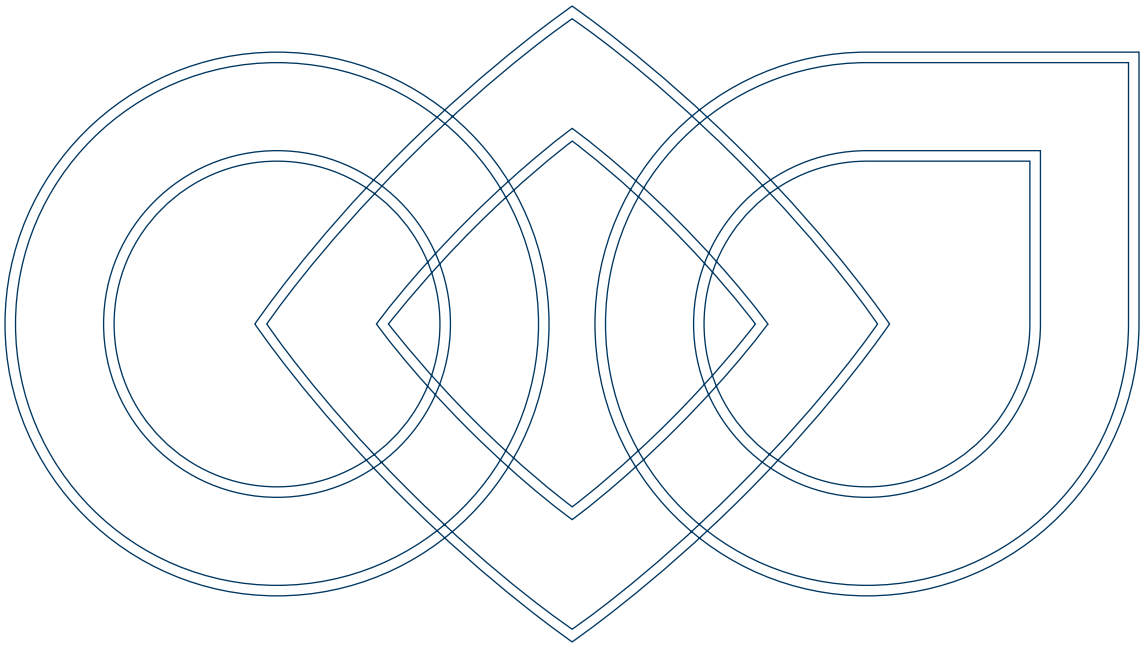
Active Next Generation

210/410/510/610 Series

Servo Drive Solutions

PRODUCT

Bonfiglioli
Forever Forward



The highest level of precision, efficiency and energy optimization.

With over 15 years of experience in creating dedicated motion control systems, Bonfiglioli has gained an enviable reputation in the world of industrial automation.
Bonfiglioli offers its customers the highest possible level of precision, efficiency and energy optimization for their machines.

Our solutions include low backlash planetary gearboxes, induction motors, servomotors and synchronous reluctance motors, open and closed loop inverters, servo inverters and regenerative inverters. A unique combination of mechatronic solutions plus a vast range of products for industry make Bonfiglioli a one-stop-shop for applications in many different sectors.

Our two centers of excellence develop breakthrough mechatronic innovations thanks to their deep expertise and strong synergy, to provide customers with a complete motion automation offer.
Bonfiglioli's team based in Krefeld, Germany, has the cutting-edge technical know-how and capacity to design and manufacture advanced electronic devices such as frequency inverters and servo drives.
Our team based in Rovereto, Italy, benefits from a pool of talents focused on the development and production of highly sophisticated mechatronics products such as servo motors and low backlash planetary gearboxes, with the additional capability to offer to customer complete motion control solutions and application software development services.

Bonfiglioli's mission is to improve the profitability of customers worldwide by acting as a risk-free partner. Our group's international capacity enables us to work alongside our customers as day-to-day partners, ensuring that their individual needs are satisfied and their full potential is realised.

Servo Drive Solutions

Bonfiglioli Active Next Generation: The drive designed for High Performance applications

With the inverter series ANG Active Next Generation, Bonfiglioli expands its drive portfolio with a drive designed for providing machine builders high performance for standard and servo applications.

The range includes:
- 1 phase 230 V: 0.25...4 kW
- 3 phase 230 V: 0.25...9.2 kW
- 3 phase 400/480 V: 0.25...400...1200 kW
- 3 phase 525 V: 160...400...1200 kW
- 3 phase 690 V: 160...400...1200 kW

Size 8 offers the opportunity as single device to power installations up to 400 kW and up to 1200 kW with parallel connection of two or three Active Next Generation.

Thanks to a high-performance micro controller, enhanced functionalities are embedded such as cyclic synchronous positioning mode (CSP) with cubic interpolation, brake control and evaluation of feedback contact.
A new positioning configuration is dedicated for travelling drives in crane applications.
Our new single axis for the control of servo motors and induction motors delivers high dynamic response, high performance and application versatility.
Bonfiglioli develops Active Next Generation to meet the specific requirements of special machinery in a large range of Industries.
Moreover, ANG series support many Ethernet Fieldbuses like, PROFINET, EtherCAT, EtherNet/IP and VARAN.
With this new servo inverter series, Bonfiglioli offers the broadest connectivity with the most advanced control technology and the highest power density.

Key Features
- Safety: STO (safe torque off, SIL 3)
- Communication protocols: CANopen, PROFINET, EtherCAT, EtherNet/IP, VARAN.
- Feedback sensors: Resolver, absolute encoder, incremental encoder
- Optional Keypad and PC-Service Interface available
- PLC functions
- Motion tasks
- Fast control loops
- Brake control

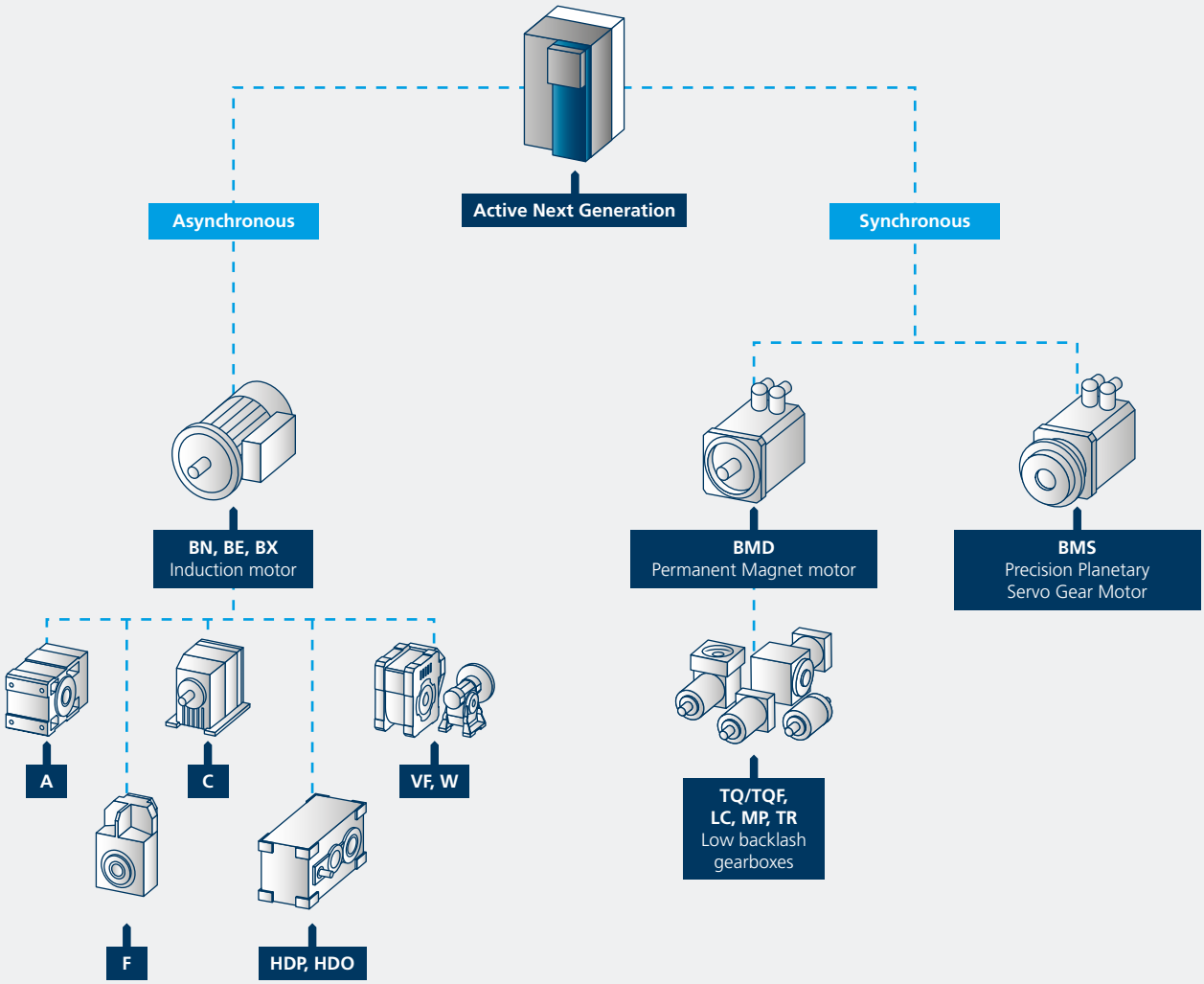
Customer Benefits
- PLC functions with graphical software tool
- Cubic interpolation for high dynamic interpolated axis
- 525V and 690V supply voltages for heavy and steel industry.
- High precision closed loop configuration.

Bonfiglioli always contributes to save energy and offering the most efficient solution.

Bonfiglioli drive power/control range

	**S2U**	Power range: 0.4...11 kW
	**S2U IP66**	Power range: 0.4 ...18.5 kW
	**Agile**	Power range: 0.25 ... 11 kW
	**Active**	Power range: 0.55 ... 132 kW
	**Active Cube**	Power range: 0.25 ... 1200 kW
	**ANG**	Power range: 0.25 ... 1200 kW
	**iBMD**	Torque range 2.7...36 Nm

Bonfiglioli system range ANG210/410/510/610



This catalogue concerns Active Next Generation series and Active Next Generation accessories.
For information about the other products showed in above overview, please refer to relevant catalogues.

The designation of ANGx10 series

ANG	410	-	07	1	F	A

Version
- **A** Standard
- **C** Coldplate
- **L** Liquid Cooling, stainless Steel, open cooling circuit
- **M** Liquid Cooling, Aluminium, closed cooling circuit

Filter
- **F** Integrated EMI-filter
- **-** Without EMI-filter

Mechanical Size
- **1** Frame Size 1
- ...
- **8** Frame Size 8

Power

01	0.25 kW	**18**	4.0 kW	**31**	30 kW	**49**	132 kW
03	0.37 kW	**19**	5.5 kW	**33**	37 kW	**51**	160 kW
05	0.55 kW	**21**	7.5 kW	**35**	45 kW	**53**	200 kW
07	0.75 kW	**22**	9.2 kW	**37**	55 kW	**55**	250 kW
09	1.1 kW	**23**	11 kW	**39**	65 kW	**57**	315 kW
11	1.5 kW	**25**	15 kW	**43**	75 kW	**59**	355 kW
13	2.2 kW	**27**	18.5 kW	**45**	90 kW	**61**	400 kW
15	3.0 kW	**29**	22 kW	**47**	110 kW		

Device
- **210** 1/3 x 230 V_{AC}
- **410** 3 x 400 V_{AC} / 480 V_{AC}
- **510** 3 x 525 V_{AC}
- **610** 3 x 690 V_{AC}

The order code of ANGx10 series

ANG	410	-	07	1	F	A	S	B	X	S	X	0

0 Reserved for future use

IT Bridge*
X Without IT Bridge
W With IT Bridge (Standard)

Safety
S STO (Safe Torque Off)

Communication ANG
A EtherCAT
D EtherCAT without Absolute Encoder
J PROFINET
R Ethernet/IP
V Varan

Coating
B With Coating

Brake Chopper
X Without BC (size 6, 7 and 8 only)
S BC included (standard)

Version
A Standard
C Coldplate (Size 1 to 5)
L Liquid Cooling, stainless Steel, open cooling circuit (Size 5 to 8)
M Liquid Cooling, Aluminium, closed cooling circuit (Size 8)

Filter
F Integrated EMI-filter
(blank) Without EMI-filter

Mechanical Size
1 Frame Size 1
...
8 Frame Size 8

Power

01	0.25 kW	**18**	4.0 kW	**31**	30 kW	**49**	132 kW
03	0.37 kW	**19**	5.5 kW	**33**	37 kW	**51**	160 kW
05	0.55 kW	**21**	7.5 kW	**35**	45 kW	**53**	200 kW
07	0.75 kW	**22**	9.2 kW	**37**	55 kW	**55**	250 kW
09	1.1 kW	**23**	11 kW	**39**	65 kW	**57**	315 kW
11	1.5 kW	**25**	15 kW	**43**	75 kW	**59**	355 kW
13	2.2 kW	**27**	18.5 kW	**45**	90 kW	**61**	400 kW
15	3.0 kW	**29**	22 kW	**47**	110 kW		

Drive Version
- Standard
P Synthetic Mains (in Progess)
S Spindle Drive (in Progress)
W Winding Drive (in Progress)

Device
210 1/3 x 230 V_{AC}
410 3 x 400 V_{AC} / 480 V_{AC}
510 3 x 525 V_{AC}
610 3 x 690 V_{AC}

Notes:
(*) In Sizes 1...4 the IT Bridge can be permanently removed by the user.
Sizes 5...8 have to be ordered according to the application requirements to receive the necessary modifications ex factory.

Hardware

Mounting and Cooling
- Standard Cabinet Mounting with Air Cooling (all mechanical sizes)
- ColdPlate Mounting (mechanical sizes 1...5)
- Liquid Cooling (mechanical sizes 5...8)
- DIN Rail mounting (mechanical sizes 1 & 2)
- Vibration resilient mounting kit for Air Cooling devices (mechanical sizes 1...6)

Performance
- Very high performance for speed, position and current control
- Both "system drive" and "servo drive" focusing on applications where Ethernet-based communication and Absolute encoder is used at the same time
- Optimized combination with Bonfiglioli BMD and BCR servomotor motor series
- Integration of Ethernet based Communication and encoder evaluation ex factory

Automation
- Small dimensions and high power density in all sizes
- "Book shape" in smaller sizes for easy integration in automation cabinets
- External $24V_{DC}$ supply input for control board supply from backup systems
- Motor thermal evaluation
- Position and speed feedback input (encoder/resolver)
- Isolated CAN terminals (usable for either CANopen or Bonfiglioli Vectron System bus for fast communication among Bonfiglioli ANG drives
- Encoder support: TTL, HTL, Resolver, SinCos, Hiperface, EnDat 2.1, EnDat 2.2, SSI

Electrical
- Plug in control terminals for easy and fast connection
- Plug in power terminals up to 4 kW
- DC link bus for "energy sharing" in multidrive system architectures
- Integral EMI filters (EN 61800-3) up to 9.2 kW
- Integrated brake transistor on all sizes by default, sizes 6...8 available without brake transistor as option

Options and accessories
- Multifunction keypad with monitoring and programming functions
- Drive-PC connection kit for advanced configuration with engineering software VPlus
- Comprehensive power and control cable packs for fast and easy connection to Bonfiglioli BMD and BCR servomotors

Functional Safety
- Safe Torque Off (STO)
- Safe Stop 1 (SS1 c) with Safety Switch
- SIL3 (EN61800-5-2) and PL e (EN ISO13849-1)

Robustness
- Coated boards to enhance the device resilience
- Vibration robustness according to DIN EN 60068-2-6: Test Fc and DIN EN 60068-2-27: Test Ea

Software

Flexibility
- Control of asynchronous motors and synchronous motors (all without or with encoder feedback)
- Preset values for Bonfiglioli motors to decrease commissioning times
- Full set of operation modes, freely selectable:
  - Servo synchronous control with Resolver or Absolute encoder feedback
  - Field oriented (vector) control with Absolute encoder
  - Sensorless field oriented (vector) control for all suppoprted motor types
- Flexible assignment of digital inputs and outputs to interface with software and hardware functions
- "Motor chopper" function to increase braking power without brake resistors
- 4 independent data sets
- Flying restart

Automation
- Easy and powerful engineering software for parameter setting, diagnostic and aided commissioning
- Integrated powerful logic functions
- Speed and position synchronization between drives through Systembus
- Master/Slave operation
- Electronic gear with optional Phasing
- PI control with advanced derivative control
- Intelligent current limits
- Motor potentiometer control via digital input, control unit and communication interface

Servo
- Configurable position control and speed control via parameters
- Integrated motion software including homing functions and flying homing, units converter, programmable motion blocks to design and test even complex motion profiles
- Cyclic Synchronous Velocity and Cyclic Synchronous Positioning Mode including Cubic Interpolation.
- Rotary table function
- S-ramps selection with separate adjustable acceleration/deceleration and jerk limitation
- Easy integration with CiA402 objects and functionality
- Auto-Tuning for angle determination (Resolver or absolute encoder) for Synchronous motors

Safety
- Mains voltage monitoring and buffering function to overcome short time power failures
- Adjustable Motor protection functions
- Overload protection and automatic best switching frequency adjustment

Diagnosis
- Phase monitoring
- Mean and peak values storage
- Fault register (application and device)
- Optional Extension with Keypad and PC connection

Advanced application functions
- Power failure regulation to ramp down in a controlled way
- Spindle control with "tool change" positioning
- "Traverse" function for winders
- "Index" function for enhanced sensorless synchronization
- Advanced brake release control (lifting applications)
- Load detection function

Engineering software
- Extended Brake Control
- Easy programming interface
- Real time oscilloscope and variable values monitor for enhanced troubleshooting analysis
- Effective and easy management of motion block parameters
- A simple and guided procedure for set up with Bonfiglioli motors (asynchronous, synchronous)
- Logic function programming section with 64 functions

General technical data

Environment

Operating conditions
- 0°C - 40°C (40°C - 55°C with derating)
- Pollution Degree 2
- Overvoltage Category III

Environment class
- Operation 3K3 (EN60721-3-3)
- Relative humidity 15% ... 85%, no moisture condensation

Altitude of installation
- Up to 1000m (up to 4000 with derating)

Storage conditions
- According to EN50178

Protection degree (EN 60529)
- IP20 with correctly mounted covers and connection terminals

Environmental operation conditions according to DIN EN 60721-3-3:
- 3Z1 (negligible thermal radiation)
- 3B1 (no biological impact)
- 3C1 (chemically active substances, limits as per standard)
- 3S1 (mechanically active substances, no sand in air, limits as per standard)
- 3M4 (mechanical vibration and shocks, limits as per standard)

Electrical

Rated mains voltage
- ANG 210 in the range 184-0% ... 264 V+0%
- ANG 410 in the range 320-0% ... 528 V+0%
- ANG 510 with 525 V
- ANG 610 with 690 V

Rated mains frequency
- 45 ... 66 Hz

Overload current / Peak current
- 150 % Rated current for 60 s (200 % for 0.25 and 0.37 kW)
- 200 % Rated Current for 1 s for most ratings

Electric protection
- Short circuit / Earth fault proof

Braking transistor
- Built-in by default, optionally available without in mechanical 6,7 & 8

Standards

CE conformity:
- 2014/35/EU (Low voltage directive)
- 2014/30/EU (Electromagnetic Compatibility Directive)
- 2011/65/EU (RoHS Directive)
- EN61800-5-1:2007 (Adjustable speed electrical power drive systems - Safety requirements - Electrical, thermal and energy)
- EN61800-3:2004 + A1:2012 (Adjustable speed electrical power drive systems - EMC requirements and specific test methods)

Interference immunity
- According to EN 61800-3 for use in industrial environments

UL approval
- UL/CSA approval, according to ul508c/CSA 22.2-No.14

ANG210 - Technical data (from 0.25 to 3.0 kW)

ANG210-			01	03	05	07	09	11	13	15
			Size 1 (F, A or C)					Size 2 (F, A or C)		
Output, motor side (1)										
Recommended rated motor power	P_n	kW	0.25	0.37	0.55	0.75	1.1	1.5	2.2	3.0
Rated motor current output	I_n	A	1.6	2.5	3.0	4.0	5.4	7.0	9.5	12.5 (1)
Rated motor voltage output	U_n	V	3 x (from 0 to mains voltage)							
Overload current (60 s)	I_{oc}	A	3.2	5.0	5.4	6.0	7.3	10.5	14.3	16.2
Peak current (1 s)	I_{pk}	A	3.2	5.0	6.0	8.0	8.0	14.0	19.0	19.0
Switching frequency	f_c	kHz	From 2 to 16 kHz (Default: 4 kHz)							
Output frequency	f_n	Hz	0 ... 599 Hz (2)							
Input, mains side										
Rated mains voltage	U	V	230 (184 ... 264)							
Rated current 3 ph	I	A	1.6	2.5	3.0	4.0	5.5 (4)	7.0	9.5	10.5 (4)
Recommended Mains fuses 3ph	I	A	6	6	6	6	10	10	16	16
Rated current 1 ph/N; 2 ph	I	A	2.9	4.5	5.4	7.2	9.5 (4)	13.2	16.5 (4)	16.5 (4)
Recommended Mains fuses 1 ph/N; 2ph	I	A	6	10	10	10	16	16	20	20
General										
Connection Signal terminals (1)	A	mm^2	0.2 ... 1.5 (detachable terminals)							
Connection Power terminals (1)	A	mm^2	0.2 ... 1.5 (detachable terminals)							
Short circuit / ground fault protection	-	-	Yes							
Mounting position	-	-	Vertical							
Dimensions Standard Device	HxWxD	mm	190 x 60 x 175					250 x 60 x 175		
Dimensions ColdPlate Device	HxWxD	mm	190 x 82 x 140					250 x 85 x 140		
Weight (approx.)	m	kg	1.2					1.6		
Brake chopper	-	-	Internal brake chopper							
UL/CSA approval	-	-	ul508c/CSA 22.2-No.14							
Environment										
Cooling temperature	T_n	°C	From 0 to 40							
Relative air humidity	-	%	From 15 to 85, non-condensing							
Options & accessories										
Screen sheet for cable screens	-	-	SCR1-2							
Pass through mounting kit	-	-	MPVS1					MPVS2		
Increased Vibration mounting kit	-	-	MNVIB1					MNVIB2		
DIN rail mounting kit	-	-	MDIN1					MDIN2		
Input line choke	-	-	External (depending on mains supply)							
EMI filter	-	-	Internal Filter: Class A2 / External Filter or external choke: Class A1 / B (3)							

Notes:
(1) Please check the Operating Instructions for additional data
(2) Higher frequencies available on request
(3) For more details, please check the Input filter table in this catalogue
(4) Continous operation with rated current requires a line choke

ANG210 - Technical data (from 4.0 to 9.2 kW)

ANG210-			18	19	21	22
			Size 3 (- or F, A or C)		Size 4 (-, A or C)	
Output, motor side [1]						
Recommended rated motor power	P_n	kW	4.0	5.5	7.5	9.2
Rated motor current output	I_n	A	18.0	22.0	32.0	35.0
Rated motor voltage output	U_n	V	3 x (from 0 to mains voltage)			
Overload current (60 s)	I_{oc}	A	26.3	30.3	44.5	51.5
Peak current (1 s)	I_{pk}	A	33.0	33.0	64.0	64.0
Switching frequency	f_c	kHz	From 2 to 16 kHz (Default: 4 kHz)			
Output frequency	f_n	Hz	0 ... 599 Hz [2]			
Input, mains side						
Rated mains voltage	U	V	230 (184 ... 264)			
Rated current 3 ph	I	A	18	20 [3]	28.2 [3]	35.6 [3]
Recommended Mains fuses	I	A	25		35	50
General						
Connection Signal terminals [1]	A	mm^2	0.2 ... 1.5 (detachable terminals)			
Connection Power terminals [1]	A	mm^2	0.2 ... 6		0.2 ... 16	
Short circuit / ground fault protection	-	-	Yes			
Mounting position	-	-	Vertical			
Dimensions Standard Device	HxWxD	mm	250 x 100 x 200		250 x 125 x 200	
Dimensions ColdPlate Device	HxWxD	mm	250 x 125 x 144		250 x 150 x 144	
Weight (approx.)	m	kg	3.0		3.7	
Brake chopper	-	-	Internal brake chopper			
UL/CSA approval	-	-	-			
Environment						
Cooling temperature	T_n	°C	From 0 to 40			
Relative air humidity	-	%	From 15 to 85, non-condensing			
Options & accessories						
Screen sheet for cable screens	-	-	SCR3		SCR4	
Pass through mounting kit	-	-	MPVS3		MPVS4	
Increased Vibration mounting kit	-	-	MNVIB3		MNVIB4	
Input line choke	-	-	External (depending on mains supply)			
EMI filter	-	-	For selection of EMI related components, please check the Input filter table in this catalogue			

Notes:
(1) Please check the Operating Instructions for additional data
(2) Higher frequencies available on request
(3) Continous operation with rated current requires a line choke

ANG410 - Technical data (from 0.25 to 3.0 kW)

ANG410-			01	03	05	07	09	11	12	13	15
			Size 1 (F, A or C)						Size 2 (F, A or C)		
Output, motor side (1)											
Recommended rated motor power	P_n	kW	0.25	0.37	0.55	0.75	1.1	1.5	1.85	2.2	3.0
Rated motor current output	I_n	A	1.0	1.6	1.8	2.4	3.2	3.8	4.2	5.8	7.8
Rated motor voltage output	U_n	V	3 x (from 0 to mains voltage)								
Overload current (60 s)	I_{oc}	A	2.0	3.2	2.7	3.6	4.8	5.7	6.3	8.7	11.7
Peak current (1 s)	I_{pk}	A	2.0	3.2	3.6	4.8	6.4	7.6	8.4	11.6	15.6
Switching frequency	f_c	kHz	From 2 to 16 kHz (Default: 4 kHz)								
Output frequency	f_n	Hz	0 ... 599 Hz (1)								
Input, mains side											
Rated mains voltage	U	V	400 (320 ... 528)								
Rated current 3 ph	I	A	1.0	1.6	1.8	2.4	2.8 (3)	3.3 (3)	4.2	5.8	6.8 (3)
Recommended Mains fuses	I	A	6						6	10	
General											
Connection Signal terminals (1)	A	mm^2	0.2 ... 1.5 (detachable terminals)								
Connection Power terminals (1)	A	mm^2	0.2 ... 1.5 (detachable terminals)								
Short circuit / ground fault protection	-	-	Yes								
Mounting position	-	-	Vertical								
Dimensions Standard Device	HxWxD	mm	190 x 60 x 175						250 x 60 x 175		
Dimensions ColdPlate Device	HxWxD	mm	190 x 82 x 140						250 x 85 x 140		
Weight (approx.)	m	kg	1.2						1.6		
Brake chopper	-	-	Internal brake chopper								
UL/CSA approval	-	-	ul508c/CSA 22.2-No.14								
Environment											
Cooling temperature	T_n	°C	From 0 to 40								
Relative air humidity	-	%	From 15 to 85, non-condensing								
Options & accessories											
Screen sheet for cable screens	-	-	SCR1-2								
Pass through mounting kit	-	-	MPVS1						MPVS2		
Increased Vibration mounting kit	-	-	MNVIB1						MNVIB2		
DIN rail mounting kit	-	-	MDIN1						MDIN2		
Input line choke	-	-	External (depending on mains supply)								
EMI filter	-	-	Internal Filter: Class A2 / External Filter or external choke: Class A1 / B (4)								

Notes:
(1) Please check the Operating Instructions for additional data
(2) Higher frequencies available on request
(3) Continous operation with rated current requires a line choke
(4) For more details, please check the Input filter table in this catalogue

ANG410 - Technical data (from 4.0 to 15 kW)

ANG410-			18	19	21	22	23	25
			Size 2 (F, A or C)	Size 3 (- or F, A or C)			Size 4 (-, A or C)	
Output, motor side (1)								
Recommended rated motor power	P_n	kW	4.0	5.5	7.5	9.2	11.0	15.0
Rated motor current output	I_n	A	9.0	14.0	18.0	22.0	25.0	32.0
Rated motor voltage output	U_n	V	3 x (from 0 to mains voltage)					
Overload current (60 s)	I_{oc}	A	13.5	21.0	26.3	30.3	37.5	44.5
Peak current (1 s)	I_{pk}	A	18.0	28.0	33.0	33.0	50.0	64.0
Switching frequency	f_c	kHz	From 2 to 16 kHz (Default: 4 kHz)					
Output frequency	f_n	Hz	0 ... 599 Hz (2)					
Input, mains side								
Rated mains voltage	U	V	400 (320 ... 528)					
Rated current 3 ph	I	A	7.8 (3)	14.2	15.8 (3)	20.0 (3)	26.0	28.2 (3)
Recommended Mains fuses	I	A	10.0	16.0	25.0		35.0	
General								
Connection Signal terminals (1)	A	mm^2	0. 2... 1.5 (detachable terminals)					
Connection Power terminals (1)	A	mm^2	0.2 ... 1.5 (detachable terminals)	0.2 ... 6			0.2 ... 16	
Short circuit / ground fault protection	-	-	Yes					
Mounting position	-	-	Vertical					
Dimensions Standard Device	HxWxD	mm	250 x 60 x 175	250 x 100 x 200			250 x 125 x 200	
Dimensions ColdPlate Device	HxWxD	mm	250 x 85 x 144	250 x 125 x 144			250 x 150 x 144	
Weight (approx.)	m	kg	1.6	3.0			3.7	
Brake chopper	-	-	Internal brake chopper					
UL/CSA approval	-	-	ul508c/CSA 22.2-No.14					
Environment								
Cooling temperature	T_n	°C	From 0 to 40					
Relative air humidity	-	%	From 15 to 85, non-condensing					
Options & accessories								
Screen sheet for cable screens	-	-	SCR1-2	SCR3			SCR4	
Pass through mounting kit	-	-	MPVS2	MPVS3			MPVS4	
Increased Vibration mounting kit	-	-	MNVIB2	MNVIB3			MNVIB4	
DIN rail mounting kit	-	-	MDIN2	-			-	
Input line choke	-	-	External (depending on mains supply)					
EMI filter	-	-	For selection of EMI related components, please check the Input filter table in this catalogue					

Notes:
(1) Please check the Operating Instructions for additional data
(2) Higher frequencies available on request
(3) Continous operation with rated current requires a line choke

ANG410 - Technical data (from 18.5 to 65 kW)

ANG410-			27	29	31	33	35	37	39
			Size 5 (A or C or L)			Size 6 (- or N, A or L)			
Output, motor side [1]									
Recommended rated motor power	P_n	kW	18.5	22.0	30.0	37.0	45.0	55.0	65.0
Rated motor current output	I_n	A	40.0	45.0	60.0	75.0	90.0	110.0	125.0
Rated motor voltage output	U_n	V	3 x (from 0 to mains voltage)						
Overload current (60 s)	I_{oc}	A	60.0	67.5	90.0	112.5	135.0	165.0	187.5
Peak current (1 s)	I_{pk}	A	80.0	90.0	120.0	150.0	180.0	220.0	250.0
Switching frequency	f_c	kHz	From 2 to 8 kHz (Default: 4 kHz)						
Output frequency	f_n	Hz	0 ... 599 Hz [2]						
Input, mains side									
Rated mains voltage	U	V	400 (320 ... 528)						
Rated current 3 ph	I	A	42.0	50.0	58.0 [3]	87.0	104.0	105.0 [3]	120.0 [3]
Recommended Mains fuses	I	A	50.0		63.0	100.0	125.0	125.0	
General									
Connection Signal terminals [1]	A	mm^2	0.2 ... 1.5 (detachable terminals)						
Connection Power terminals [1]	A	mm^2	... 25			... 70			
Short circuit / ground fault protection	-	-	Yes						
Mounting position	-	-	Vertical						
Dimensions Standard Device	HxWxD	mm	250 x 200 x 260			400 x 275 x 260			
Dimensions ColdPlate Device	HxWxD	mm	250 x 225 x 171			-			
Dimensions Liquid Cooling Device	HxWxD	mm	480 x 300 x 220			480 x 300 x 208			
Weight Standard Device (approx.)	m	kg	8.0			20.0			
Weight ColdPlate Device (approx.)	m	kg	6.0			-			
Weight Liquid Cooling Device (approx.)	m	kg	22.0			25.0			
Brake chopper	-	-	Internal brake chopper			Internal brake chopper, optionally available without			
UL/CSA approval: Device series "A" & "C"	-	-	ul508c/CSA 22.2-No.14						
UL/CSA approval: Device series "L"	-	-	-						
Environment									
Cooling temperature [4]	T_n	°C	From 0 to 40						
Relative air humidity	-	%	From 15 to 85, non-condensing						
Options & accessories									
Screen sheet for cable screens	-	-	SCR5			-			
Pass through mounting kit	-	-	MPVS5			MPVS6			
Increased Vibration mounting kit	-	-	MNVIB5			MNVIB6			
Input line choke	-	-	External (depending on mains supply)						
EMI filter	-	-	For selection of EMI related components, please check the Input filter table in this catalogue						

Notes:
(1) Please check the Operating Instructions for additional data
(2) Higher frequencies available on request
(3) Continous operation with rated current requires a line choke
(4) When using Liquid Cooling devices, please check the Additional Operating Instructions for Liquid Cooling

ANG410 - Technical data (from 75 to 132 kW)

ANG410-			43	45	47	49
			Size 7 (- or N, A or L)			
Output, motor side (1)						
Recommended rated motor power	P_n	kW	75	90	110	132
Rated motor current output	I_n	A	150	180	210	250
Rated motor voltage output	U_n	V	3 x (from 0 to mains voltage)			
Overload current (60 s)	I_{oc}	A	225	270	315	332
Peak current (1 s)	I_{pk}	A	270	325	375	375
Switching frequency	f_c	kHz	From 2 to 8 kHz (Default: 4 kHz)			
Output frequency	f_n	Hz	0 ... 599 Hz (2)			
Input, mains side						
Rated mains voltage	U	V	400 (320 ... 528)			
Rated current 3 ph	I	A	143 (4)	172 (4)	208 (4)	249 (4)
Recommended Mains fuses	I	A	160	200	250	315
General						
Connection Signal terminals (1)	A	mm^2	0.2 ... 1.5 (detachable terminals)			
Connection Power terminals (1)	A	mm^2	... 2x95			
Short circuit / ground fault protection	-	-	Yes			
Mounting position	-	-	Vertical			
Dimensions (3)	HxWxD	mm	510 x 412 x 351			
Weight (approx.)	m	kg	48		48	
Brake chopper	-	-	Internal brake chopper, optionally available without			
UL/CSA approval: Device series "A"	-	-	ul508c/CSA 22.2-No.14			
UL/CSA approval: Device series "L"	-	-	-			
Environment						
Cooling temperature (5)	T_n	°C	From 0 to 40			
Relative air humidity	-	%	From 15 to 85, non-condensing			
Options & accessories						
Pass through mounting kit			MPVS7			
Input line choke	-	-	External (depending on mains supply)			
EMI filter	-	-	For selection of EMI related components, please check the Input filter table in this catalogue			

Notes:
(1) Please check the Operating Instructions for additional data
(2) Higher frequencies available on request
(3) Dimensions are the same for Standard and Liquid
(4) Operation requires a line choke
(5) When using Liquid Cooling devices, please check the Additional Operating Instructions for Liquid Cooling

ANGx10 - Technical data (from 160 to 400 kW)

ANG410-/510-/610-				51	53	55	57	59	61
						Size 8 (- or N, A or L or M)			
Output, motor side (1)									
Recommended rated motor power		P_n	kW	160	200	250	315	355	400
ANG410	Rated motor current output	I_n	A	305	380	475	595	645	735
	Long-term overload current (60s)	I_{oc}	A	460	570	715	895	970	1100
	Short-term overload current (1s)	I_{pk}	A	550	685	855	1070	1160	1330
ANG510	Rated motor current output	I_n	A	230	290	360	450	490	560
	Long-term overload current (60s)	I_{oc}	A	345	435	540	675	735	840
	Short-term overload current (1s)	I_{pk}	A	420	520	650	810	880	1000
ANG610	Rated motor current output	I_n	A	180	230	280	350	400	450
	Long-term overload current (60s)	I_{oc}	A	270	350	420	530	600	675
	Short-term overload current (1s)	I_{pk}	A	330	420	510	630	720	810
Rated motor voltage output		U_n	V	Maximum input voltage, three-phase					
Switching frequency		f_c	kHz	From 2 to 8 kHz (Default: 4 kHz)					
Output frequency		f_n	Hz	0 ... 500 Hz					
Input, mains side									
ANG410	Rated mains voltage	U	V	400 (320 ... 528)					
	Rated current 3 ph (2)	I	A	280 (4)	350 (4)	440 (4)	550 (4)	620 (4)	690 (4)
	Recommended Mains fuses 3 ph (3)	I	A	400	500	630	700	800	900
ANG510	Rated mains voltage	U	V	525					
	Rated current 3 ph (2)	I	A	215 (4)	270 (4)	335 (4)	420 (4)	470 (4)	525 (4)
	Recommended Mains fuses 3 ph (3)	I	A	315	350	450	550	630	700
ANG610	Rated mains voltage	U	V	690 (reduced for UL: 600)					
	Rated current 3 ph (2)	I	A	160 (4)	200 (4)	250 (4)	320 (4)	360 (4)	410 (4)
	Recommended Mains fuses 3 ph (3)	I	A	252	315	350	450	500	550
General									
Connection Signal terminals (1)		A	mm^2	0.2 ... 1.5 (detachable terminals)					
Connection Power terminals (1)		A	mm^2	... 2x240					
Short circuit / ground fault protection (3)		-	-	Yes					
Mounting position		-	-	Vertical					
Dimensions		HxWxD	mm	1063 x 439 x 375					
Weight (approx.)		m	kg	120	120	120	140	140	140
Brake chopper		-	-	Internal brake chopper, optionally available without					
UL/CSA approval		-	-	Available on request					
Environment									
Cooling temperature (5)		T_n	°C	-25 ... 45					
Relative air humidity		-	%	From 15 to 85, non-condensing					
Options & accessories									
Input line choke		-	-	External (depending on mains supply)					
EMI filter		-	-	For selection of EMI related components, please check the Input filter table in this catalogue					

Notes:
(1) Please check the Operating Instructions for additional data
(2) Related value with recommended motor power, rated mains voltage and mains inductance Uk=4%
(3) Semiconductor fuses recommended (in example Bussmann Type 170M)
(4) Operation requires a line choke
(5) When using Liquid Cooling devices, please check the Additional Operating Instructions for Liquid Cooling

Automation modules

Variants

With ordering the ANG device the Communication version has to be selected.

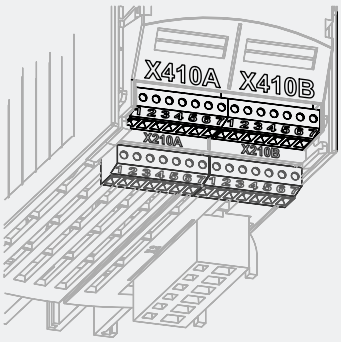
VARIANT					
Device Designation part	A	D	J	R	V
Module name	EM-AUT-01	EM-AUT-04	EM-AUT-11	EM-AUT-21	EM-AUT-31
Protocol					
Ethernet	EtherCAT	EtherCAT	PROFINET	Ethernet/IP	Varan
CAN (1)	Yes (2)	Yes (2)	Yes	Yes	Yes
Encoder Interface X412					
Hiperface	Yes	No	Yes	Yes	Yes
EnDat 2.1	Yes	No	Yes	Yes	Yes
EnDat 2.2	Yes	No	Yes	Yes	Yes
SSI	Yes	No	Yes	Yes	Yes
SinCos	Yes	No	Yes	Yes	Yes
TTL	Yes	No	Yes	Yes	Yes
Encoder Interface X410					
Resolver	Yes	Yes	Yes	Yes	Yes
TTL	Yes	Yes	Yes	Yes	Yes
Analogue Multifunctions IO Functions					
0….+10 V Input	Yes	No	Yes	Yes	Yes
-10….+10 V Input	Yes	No	Yes	Yes	Yes
0…20 mA Input	Yes	No	Yes	Yes	Yes
PTC Input (KTY, PT1000, PT100)	Yes	No	Yes	Yes	Yes
0…10 V Output	Yes	Yes	Yes	Yes	Yes

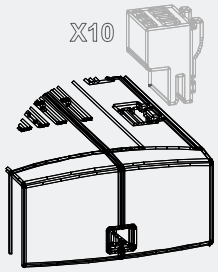
(1) CAN Interface can be used for CANopen or Systembus
(2) CANopen and EtherCAT cannot be used at the same time.

EtherCAT | PROFINET | VARAN

Automation modules

Control terminals





CONTROL TERMINAL X210A		
X210A.1	Voltage output DC +20 V or input for external power supply DC 24 V ±10%	
X210A.2	GND 20 V/ GND 24 V (ext.)	
X210A.3	Digital Input STOA (first shut-down path)	
X210A.4	Digital input (1)	Start Clockwise (default setting)
X210A.5	Digital input (1)	Start Anticlockwise (default setting)
X210A.6	Digital input (1)	Data Set Changeover 1 (default setting)
X210A.7	Digital input (1)	Data Set Changeover 2 (default setting)

CONTROL TERMINAL X210B	
X210B.1	Digital input (1)
X210B.2	Digital input STOB (second shut-down path)
X210B.3	MF3: Digital input / digital output (1)
X210B.4	MF2: Multifunction input/output (1) (voltage signal, proportional actual frequency, default setting), digital input
X210B.5	Supply voltage DC +10 V for reference value potentiometer, (I_{max}=4 mA)
X210B.6	MF1: Multifunction input (1) 0V … +10V, ±10V, PT1000/KTY, 0 … 20 mA
X210B.7	Ground 10 V

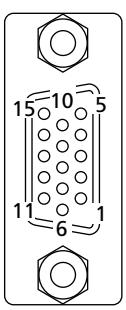
RELAY OUTPUT X10	
S3OUT	Parameterizable relay output

(1) Control terminals are freely configurable.

CONTROL TERMINAL X410A	
X410A.1	REF+
X410A.2	REF-
X410A.3	SIN- / Encoder B+
X410A.4	SIN+ / Encoder B-
X410A.5	COS- / Encoder A+
X410A.6	COS+ / Encoder A-
X410A.7	Earth (GND)

CONTROL TERMINAL X410B	
X410B.1	V_{ENC}: Sensor supply 5 V_{DC}
X410B.2	Encoder Z-
X410B.3	Encoder Z+
X410B.4	Analogue in/out MF4
X410B.5	CAN low (CANopen or System Bus)
X410B.6	CAN high (CANopen or System Bus)
X410B.7	Earth (GND_{CAN})

Sensor and PTC input X412 (HD-Sub-D socket)

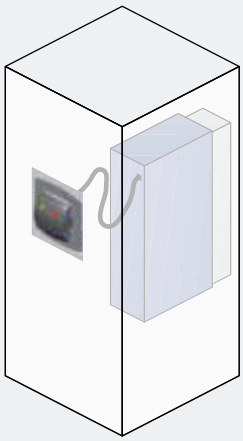
CONTACT		FUNCTION				
		Sin/Cos / TTL	HIPERFACE	ENDAT 2.1	ENDAT 2.2	SSI
	Housing	PE	PE	PE	PE	PE
	1	D-		Clock-	Clock-	Clock-
	2	D+		Clock+	Clock+	Clock+
	3	Cos- / B-	Cos-	B- / Cos-		(optionally B- / Cos-)
	4	Cos+ / B+	Cos+	B+ / Cos+		(optionally B+ / Cos+)
	5	TM_{PTC} –	TM_{PTC} –	TM_{PTC} –	TM_{PTC} –	TM_{PTC} –
	6	V_{Enc}	V_{Enc}	V_{Enc}	V_{Enc}	V_{Enc}
	7					
	8	- / R- (1)	Data -	Data -	Data -	Data -
	9	Sin- / A-	Sin-	Sin-		(optionally A- / Sin-)
	10	TM_{PTC} +	TM_{PTC} +	TM_{PTC} +	TM_{PTC} +	TM_{PTC} +
	11	$V_{Enc.Sense}$		$V_{Enc.Sense}$	$V_{Enc.Sense}$	$V_{Enc.Sense}$
	12					
	13	- / R+ (1)	Data +	Data +	Data +	Data +
	14	Sin+ / A+	Sin+	Sin+		(optionally A+ / Sin+)
	15	GND	GND	GND	GND	GND

Control unit / KP500

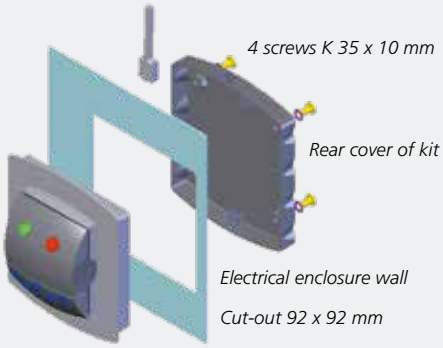
Active Next Generation is designed to give the highest flexibility in drive hardware to suit every control requirement. Machine designers can select an optional Keypad for diagnosis or parameterization independent from a Personal Computer.
An optional remote unit gives the possibility to mount the keypad on a cabinet door or convert a keypead into a handheld.

Control unit remote installation kit / KPCMK
The KPCMK kit is used to remotely control the inverter from the KP500 unit.

Handheld remote control unit



Remote installation on exterior of enclosure



Fixing to enclosure

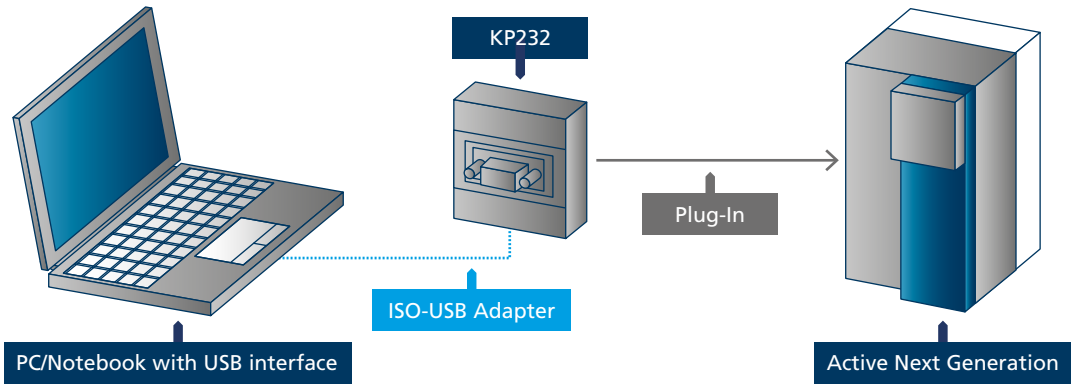
Interface / KP-232

Serial interface KP232 can be used as an alternative to control unit KP500. This connection enables parameterisation, monitoring, setting management, inverter control and even commissioning from a PC or laptop computer. The serial point-to-point connection between inverter and PC complies with specifications for transmission between data terminals (DTE) and data communication equipment (DCE), requiring, in this mode, a serial pin-to-pin cable with SUBD-9 male connector on the inverter side.
The KP232 interface is compatible with lines up to 15 metres. The serial transmission protocol ensures high data security and does not require handshake signals between computer and inverter.

TECHNICAL DATA	
Baud rate (kBaud)	Up to 115.2 kb

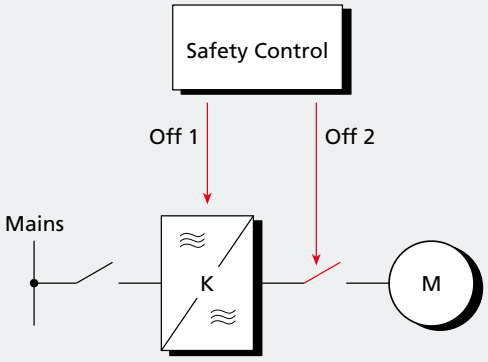
ISO-USB Interface
The ISO-USB Interface links the KP232 or CM-232 to a USB port of your PC. This interface uses an isolated USB/RS232 converter to improve the robustness against possible EMC disturbances. This Interface can be used with PCs using Windows 10, Windows 8/8.1, Windows Vista and Windows XP with FTDI drivers provided with the VPlus installation package. The Interface uses USB serial numbers and therefore the PC is able to assign uniquely the COM port.

The USB side is compatible with USB1.1 and USB2.0.

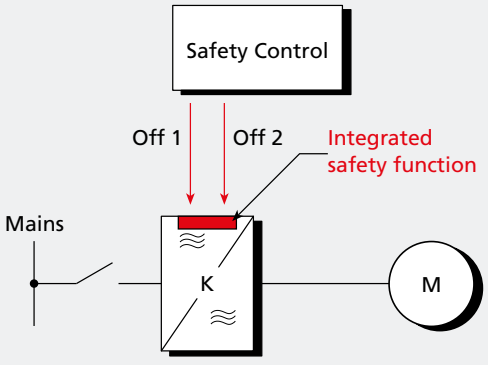


Safe Torque Off (STO)

The Functional Safety Function "Safe Torque Off" (STO) with the safety integrity level SIL 3 (EN 61508 and DIN IEC 61800-5-2) and Performance level PL e (EN 13849-1) is implemented into standard Active Next Generation inverter range.
When triggering the STO function the frequency inverter switches off the rotating field to the motor.
Deactivation of the inverter supply is carried out via two switch off paths in no-signal current mode, thus performing redundant switch off control.
Continuous monitoring tests are done by the inverter to detect possible control failures.
"Safe Torque Off" function greatly improves safety level of your automation system without the need of additional components.



Without STO



With STO

Mounting of Standard devices

A wide range of mechanical accessories is available for Active Next Generation Series frequency inverters, to make installation as easy as possible in all sorts of applications.
In standard mountings the unit can be installed directly on the mounting plate or through-the-wall with optional mounting equipment. A vibration-proof mounting variant and a standard DIN bar mounting variant are also available. The range of mounting variants also includes an optional support with shielded brackets, so that the right solution for all possible needs can always be found.
Installations are almost identical for all sizes, so the examples shown below can be taken as representative solutions and ideal for all installers seeking a mechanically simple, compact installation solution.

Types of mounting kits

The drive is supplied complete for fixing to an electrical cabinet mounting panel.
3 optional installation kits are additionally available.

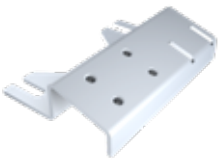
MSTD (Standard Mounting Kit)
The Standard Mounting Kit is always included for devices for mounting version "A"

MPSV
Thru-type assembly for higher protection classes or enhanced cooling characteristics

MNVIB
Anti-vibration mounting for installations on machines that generate significant vibrational stress

MDIN
DIN rail assembly for fast and modular installation / coupling

SCR1-2, SCR3, SCR4, SCR5
For the mechanical sizes 1 to 5 screen plates are available for the mounting of electrical cable screens.



SCR1-2

SCR3

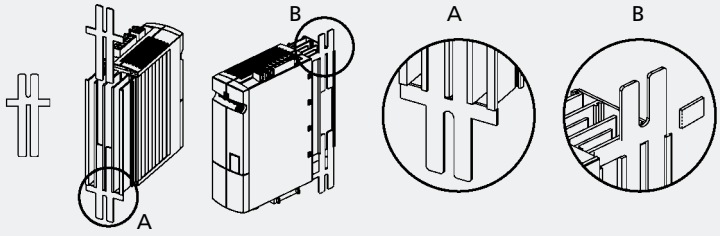
SCR4

SCR5

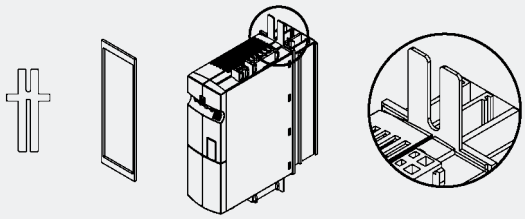
Size 1

INVERTER BONFIGLIOLI	MOUNTING	DESCRIPTION
210-xx 1 ... 410-xx 1 ...	Standard	Standard mounting
	MPSV1	Thru-type mounting
	MNVIB1	Antivibration mounting
	MDIN1	DIN rail mounting

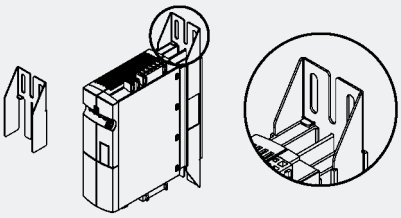
MSTD1-2
(STANDARD MOUNTING)



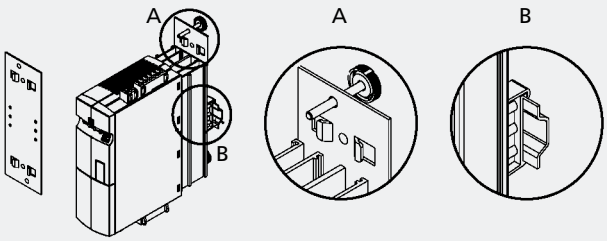
MPSV1



MNVIB1



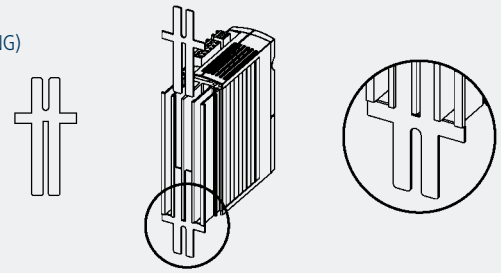
MDIN1



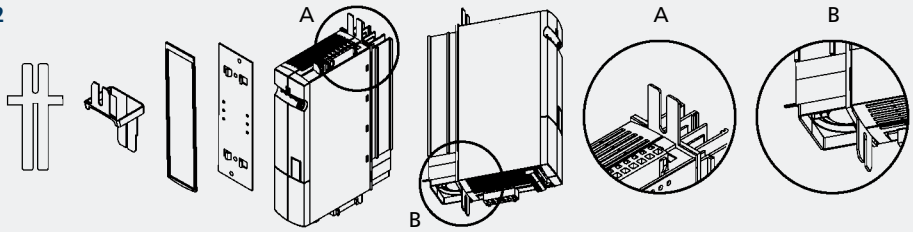
Size 2

INVERTER BONFIGLIOLI	MOUNTING	DESCRIPTION
210-xx 2 ... 410-xx 2 ...	Standard	Standard mounting
	MPSV2	Thru-type mounting
	MNVIB2	Antivibration mounting
	MDIN2	DIN rail mounting

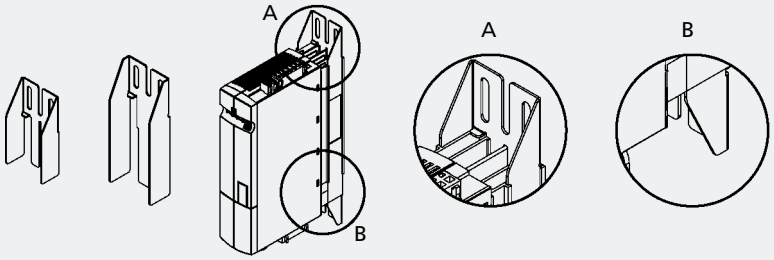
MSTD1-2
(STANDARD MOUNTING)



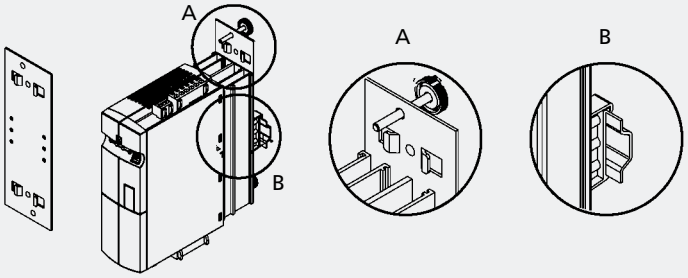
MPSV2



MNVIB2



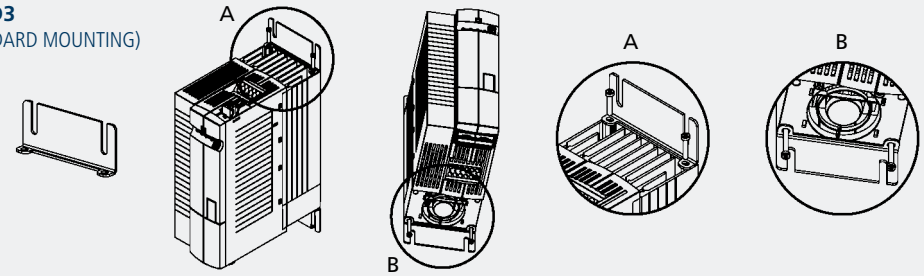
MDIN2



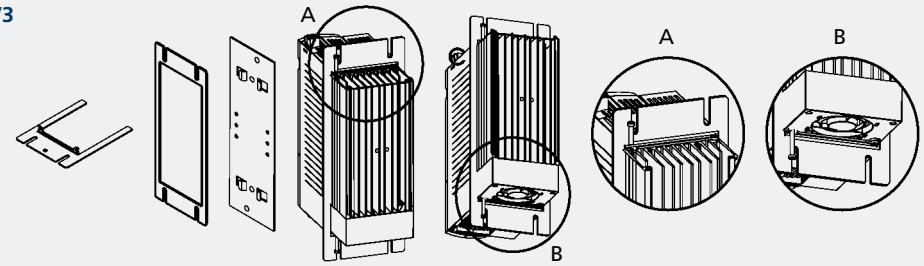
Size 3

INVERTER BONFIGLIOLI	MOUNTING	DESCRIPTION
210-xx 3 ... 410-xx 3 ...	Standard	Standard mounting
	MPSV3	Thru-type mounting
	MNVIB3	Antivibration mounting

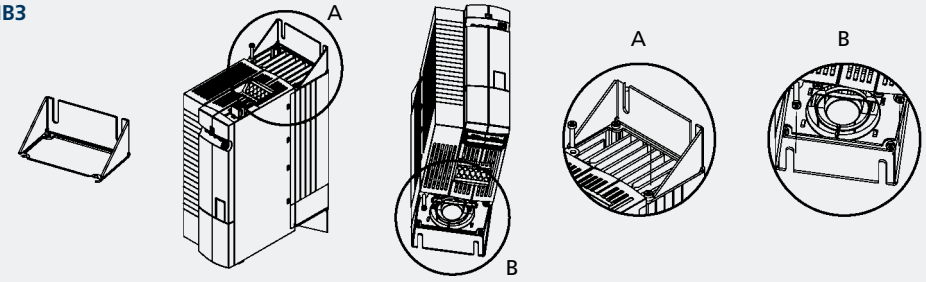
MSTD3
(STANDARD MOUNTING)



MPSV3



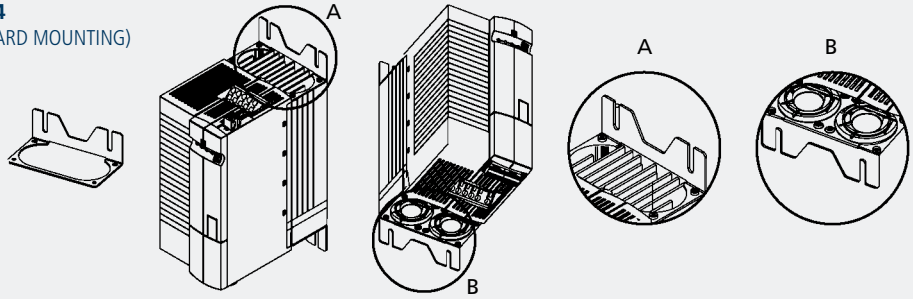
MNVIB3



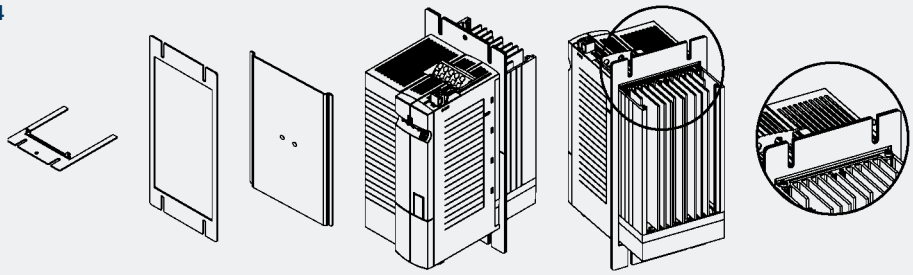
Size 4

INVERTER BONFIGLIOLI	MOUNTING	DESCRIPTION
210-xx 4 ... 410-xx 4 ...	Standard	Standard mounting
	MPSV4	Thru-type mounting
	MNVIB4	Antivibration mounting

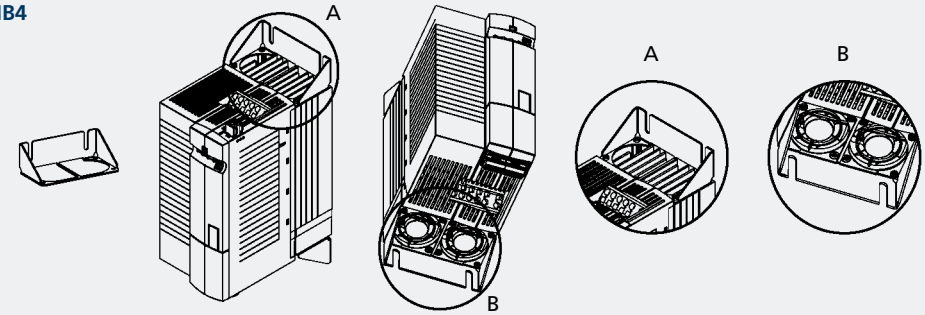
MSTD4
(STANDARD MOUNTING)



MPSV4



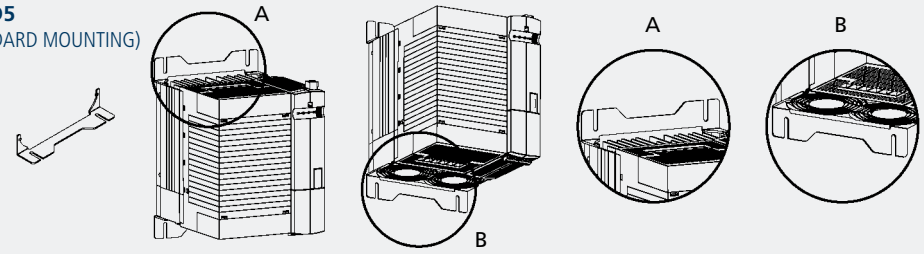
MNVIB4



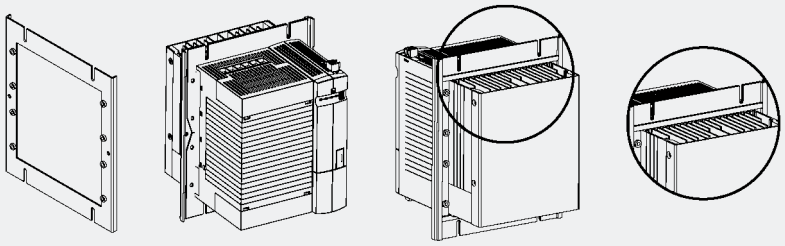
Size 5

INVERTER BONFIGLIOLI	MOUNTING	DESCRIPTION
410-xx 5 ...	Standard	Standard mounting
	MPSV5	Thru-type mounting
	MNVIB5	Antivibration mounting

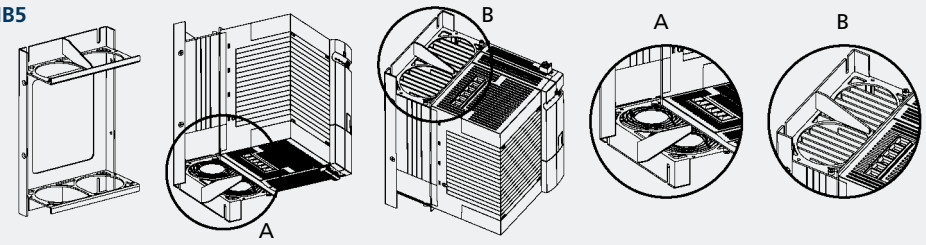
MSTD5
(STANDARD MOUNTING)



MPSV5



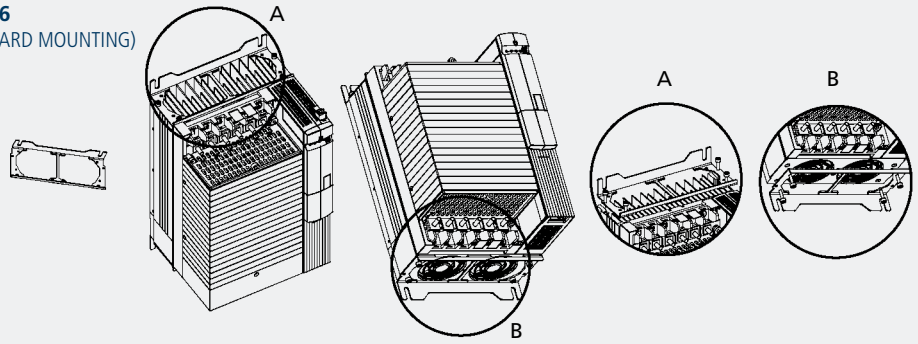
MNVIB5



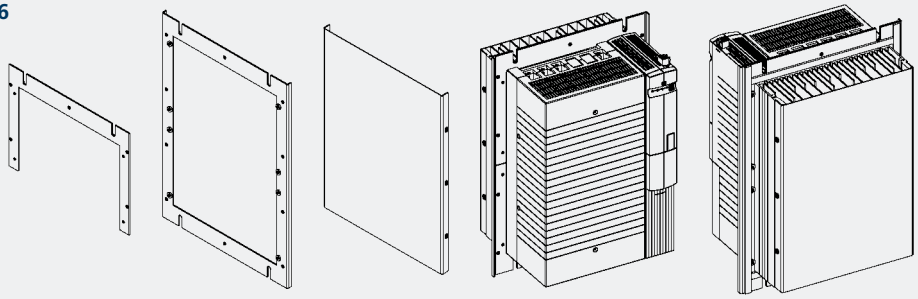
Size 6

INVERTER BONFIGLIOLI	MOUNTING	DESCRIPTION
410-xx 6 ...	Standard	Standard mounting
	MPSV6	Thru-type mounting
	MNVIB6	Antivibration mounting

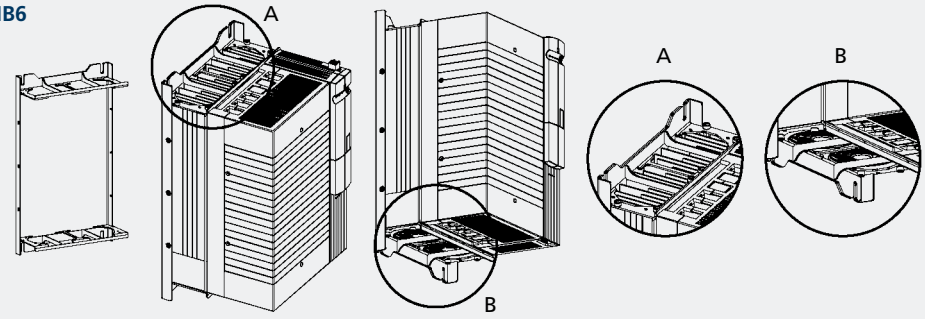
MSTD6
(STANDARD MOUNTING)



MPSV6



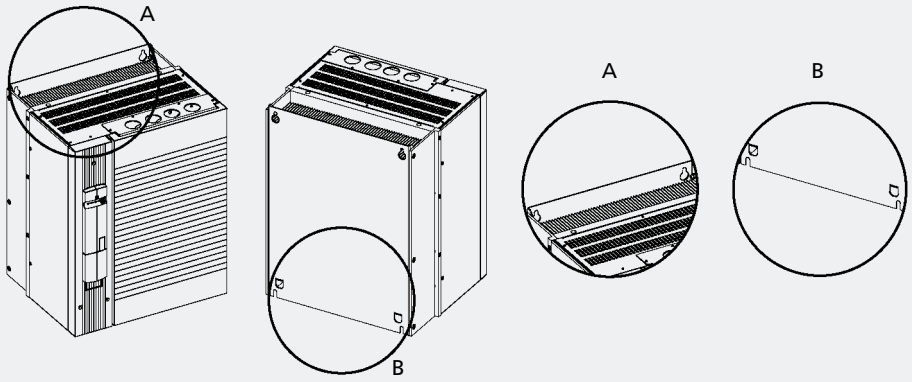
MNVIB6



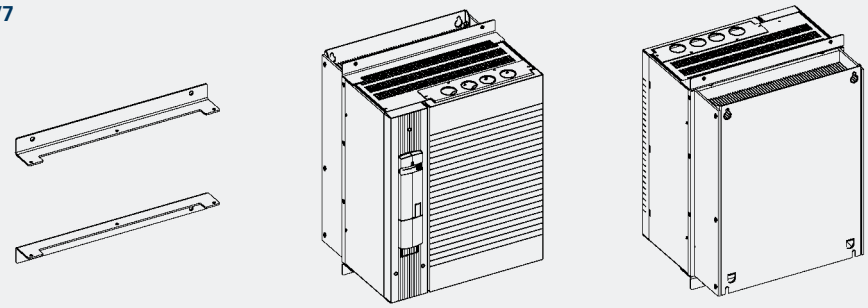
Size 7

INVERTER BONFIGLIOLI	MOUNTING	DESCRIPTION
410-xx 7 ...	Standard	Standard mounting
	MPSV7	Thru-type mounting

STANDARD MOUNTING



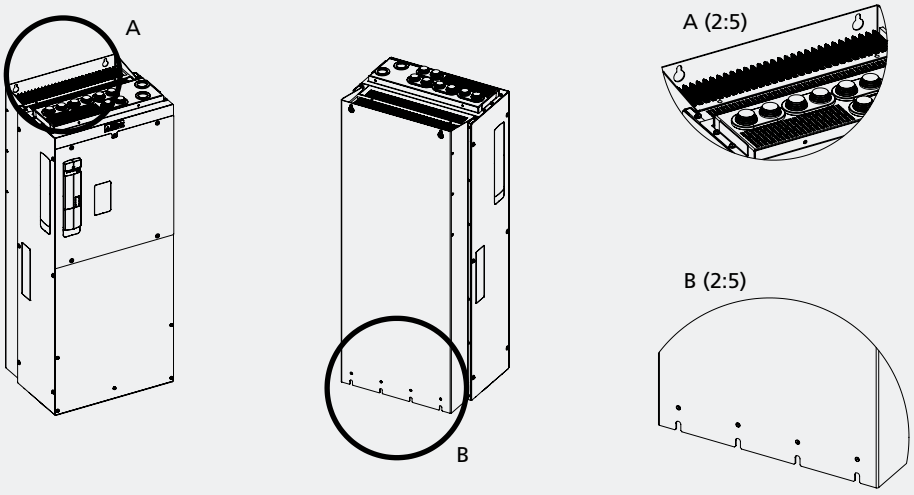
MPSV7



Size 8

INVERTER BONFIGLIOLI	MOUNTING	DESCRIPTION
410-xx 8 ... 510-xx 8 ... 610-xx 8 ...	Standard	Standard mounting

STANDARD MOUNTING



Input filter

Why an input filter?
An Input Filter is a filtration device to be installed up-line from the frequency inverter and down-line from the power feeding contactor.
The AC/DC rectifier at the inverter input generates harmonic disturbance on the absorbed current and emits disturbance generated by switching components towards the mains.
This harmonic current causes voltage distortions on the mains resulting in electromagnetic interference phenomena.
This harmonic distortion is reduced by means of line chokes, while disturbance is countered with EMI filters (attenuation of EMI voltages) such as those described below.

Note: the use of input filters reduces the inverter input voltage. If required, these filters should be installed up-line from the inverter in the following order:
1. Mains supply
2. Line choke
3. EMI filter
4. Inverter

Line choke
- The use of Line chokes depends on the system engineer's need to reduce harmonic distortion in the short circuit point and the need to reinforce the action of the EMI filter. A line choke is normally used if the mains short circuit power is lower than 1%.
- A line choke is recommended for the ANG210 and ANG410 frequency inverter series in the presence of high continuous input current required by the application, in order to increase the lifetime of the electrolytic capacitors.
- A line choke is always required in single and two-phase operation of the ANG210 frequency inverters and in sizes 7 and 8 for all supported voltage ranges. For other devices please check the markings in the technical data tables.

EMI filter
- An EMI filter can be used in order to achieve Class "A" (groups 1, 2) or Class "B" interference suppression
- The EMI filter is available in a low leakage current version for special applications.
- The EMI - filter is part of the standard outfit in mechanical sizes 1 & 2 and it is supplied as an internal option in mechanical size 3 and external option in size 3 and bigger.

Active Next Generation inverter - Line choke / EMI filter combination

	COMPLIANCE WITH CLASS A (GROUP 2)		COMPLIANCE WITH CLASS A (GROUP 1)		COMPLIANCE WITH CLASS B	
Motor cable length	< 10 m	< max*	< 10 m	< max*	< 10 m	< max*
ANG 1 (standard internal filter)	Standard	external choke	external choke	external filter	external choke	external filter
ANG 2 (standard internal filter)	Standard	external choke	external choke	external filter	external choke	external filter
ANG 3	internal filter or external choke	internal filter or external choke	internal filter + external choke	internal filter + external choke	internal filter + external choke	external filter
ANG 4	external choke	external choke	external filter	external filter	external filter	external filter + external choke
ANG 5	external choke	external choke	external filter	external filter	external filter	external filter + external choke
ANG 6	external choke	external choke	external filter	external filter	external filter	external filter
ANG 7	external choke	external filter	external filter	external filter	—	—
ANG 8	external choke	external choke	external filter + external choke	external filter + external choke	—	—

** See the operation manual*

Line choke

The line choke must be installed between the mains connection point and the EMI filter. Both the line choke and inverter should be installed on a common metal baseplate and each should be connected to the metal mounting plate and earthed by means of a large contact area copper braid.

The simplest way of reducing high harmonic components and hence reactive power is connecting a choke in series on the mains side of the inverter. Depending on the system, reactive power consumption can be reduced by approximately 20% of the figure without line choke.
The line choke increases inductance towards the mains. Mains feed line choke can be regarded as sufficient if short-circuit power is from 20 to 40 times higher than the inverter nominal output.
The inverter is suitable for connection to public or industrial mains supplies in compliance with technical data. If the supply mains transformer output is ≤ 500 kVA, the optional mains choke is needed only if specified in the inverter technical data. The other inverters are suitable for the connection to the mains without a mains choke with relative impedance ≥ 1%. If it is desired to connect more than one inverter, use the sum of the nominal outputs as a basis.
Since experience has shown that the nominal short circuit power on the inverter connection point is often unknown, BONFIGLIOLI recommends the use of mains chokes with 4% relative short circuit voltage.

The relative short circuit voltage equivalent to a 4% voltage drop represents the percentage of the nominal voltage at which a current equal to rated current flows in the case of a short circuit.

Technical data

Nominal voltages
- 230V +/- 10%
- 400V +/- 10%

Frequencies
- 50/60 Hz
- uk (a IN / 50 Hz) 4%

Insulating material class
- T40/F

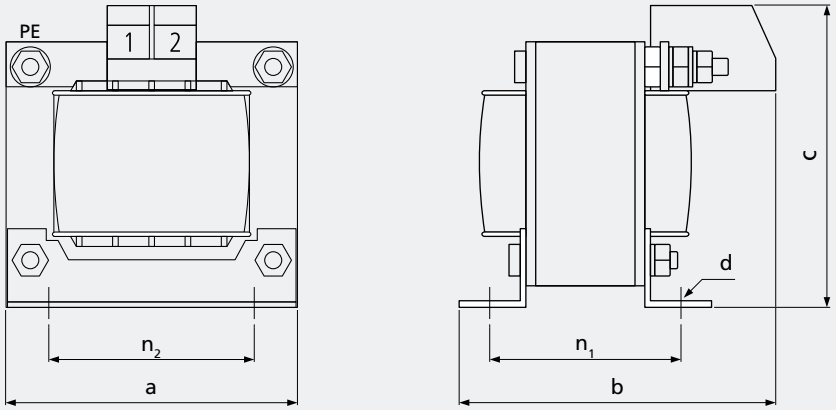
Ambient temperature
- 40°C

Protection degree (EN 60529)
- IP00

Connection type
- Contact-protected terminals

Line choke

LCVS006 ... LCVS018



TECHNICAL DATA

Bonfiglioli frequency inverter - Line choke combination, **1x230V~**

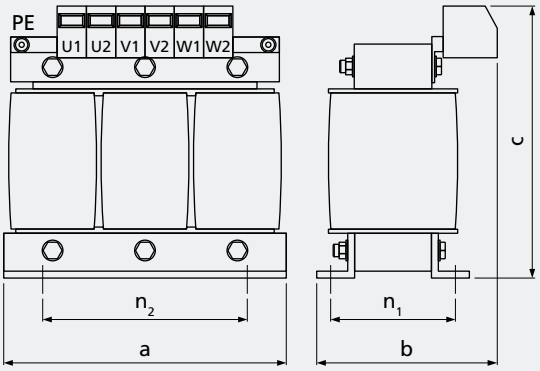
BONFIGLIOLI INVERTER	BONFIGLIOLI CHOKE	NOMINAL CURRENT	POWER DISSIPATION
		[A]	[W]
ANG 210-01	LCVS006	6	8.0
ANG 210-03			
ANG 210-05			
ANG 210-07	LCVS008	8	8.0
ANG 210-09	LCVS010	10	10.0
ANG 210-11	LCVS015	15	12.0
ANG 210-13	LCVS018	18	15.0

TECHNICAL ASSEMBLY DATA

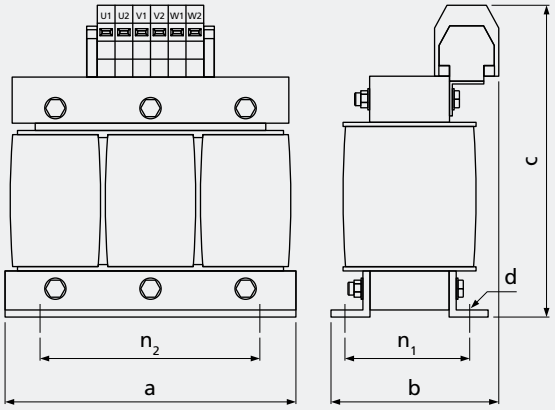
BONFIGLIOLI CHOKE	DIMENSIONS			ASSEMBLY			WEIGHT	CONNECTION TERMINAL		
	a [mm]	b [mm]	c [mm]	n_2 [mm]	n_1 [mm]	d [mm]	[kg]	[mm]	[Nm]	PE
LCVS006	60	62	75	44	38	3.6	0.5	0.75-2.5	1.0-1.2	2.5 mm^2
LCVS008	60	67	75	44	43	3.6	0.6	0.75-2.5	1.0-1.2	2.5 mm^2
LCVS010	66	80	70	50	51	4.8	0.8	0.75-2.5	1.0-1.2	M4
LCVS015	78	78	80	56	49	4.8	1.1	0.75-4.0	1.5-1.8	M4
LCVS018	85	85	95	64	50	4.8	1.8	0.75-4.0	1.5-1.8	M4

Line choke

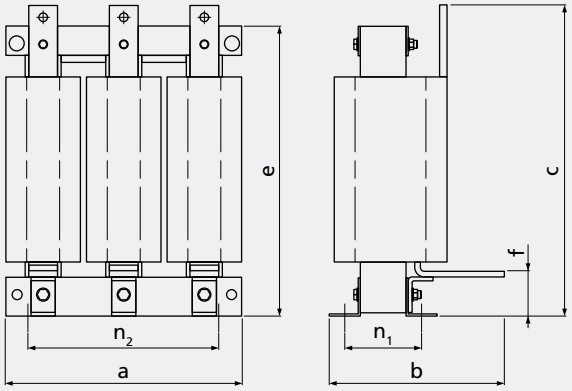
LCVT004 ... LCVT025



LCVT034 ... LCVT250



LCVT280AL-xxx ... LCVT690AL-xxx



TECHNICAL DATA

Bonfiglioli frequency inverter – Line choke combination, **3x230V~**

BONFIGLIOLI INVERTER	BONFIGLIOLI CHOKE	NOMINAL CURRENT	CHOKE	POWER DISSIPATION
		[A]	[mH]	[W]
ANG 210-01	LCVT004	4	7.32	20
ANG 210-03				
ANG 210-05				
ANG 210-07				
ANG 210-09	LCVT006	6	4.88	25
ANG 210-11	LCVT008	8	3.66	30
ANG 210-13	LCVT010	10	2.93	30
ANG 210-15	LCVT015	15	1.95	45
ANG 210-18	LCVT018	18	1.63	70
ANG 210-19	LCVT025	25	1.17	70
ANG 210-21	LCVT034	34	0.86	85
ANG 210-22				

Line choke

TECHNICAL DATA

Bonfiglioli frequency inverter – Line choke combination, **3x400V~, 3x525V~, 3x690V**

BONFIGLIOLI INVERTER	BONFIGLIOLI CHOKE	NOMINAL CURRENT	CHOKE	POWER DISSIPATION
		[A]	[mH]	[W]
ANG 410-01	LCVT004	4	7.32	20
ANG 410-03				
ANG 410-05				
ANG 410-07				
ANG 410-09				
ANG 410-11				
ANG 410-12				
ANG 410-13	LCVT006	6	4.88	25
ANG 410-15	LCVT008	8	3.66	30
ANG 410-18	LCVT010	10	2.93	30
ANG 410-19	LCVT015	15	1.95	45
ANG 410-21	LCVT018	18	1.63	70
ANG 410-22	LCVT025	25	1.17	70
ANG 410-23	LCVT025	25	0.86	85
ANG 410-25	LCVT034	34	0.86	85
ANG 410-27	LCVT050	50	0.59	100
ANG 410-29	LCVT060	60	0.49	100
ANG 410-31				
ANG 410-33	LCVT075	75	0.37	110
ANG 410-35	LCVT090	90	0.33	120
ANG 410-37	LCVT115	115	0.25	140
ANG 410-39	LCVT135	135	0.22	180
ANG 410-43	LCVT160	160	0.18	180
ANG 410-45	LCVT180	180	0.16	185
ANG 410-47	LCVT210	210	0.14	200
ANG 410-49	LCVT250	250	0.12	210
ANG 410-51	LCVT280AL-525	280	0.105	460
ANG 410-53	LCVT350AL-525	350	0.084	500
ANG 410-55	LCVT440AL-525	440	0.068	630
ANG 410-57	LCVT550AL-525	550	0.052	680
ANG 410-59	LCVT690AL-400	620	0.046	640
ANG 410-61	LCVT690AL-400	690	0.046	790
ANG 510-51	LCVT215AL-525	215	0.13	370
ANG 510-53	LCVT280AL-525	270	0.105	430
ANG 510-55	LCVT350AL-525	335	0.084	460
ANG 510-57	LCVT440AL-525	420	0.068	575
ANG 510-59	LCVT470AL-525	470	0.06	610
ANG 510-61	LCVT550AL-525	525	0.052	620
ANG 610-51	LCVT160AL-690	160	0.33	350
ANG 610-53	LCVT200AL-690	200	0.27	420
ANG 610-55	LCVT250AL-690	250	0.21	480
ANG 610-57	LCVT320AL-690	320	0.18	570
ANG 610-59	LCVT360AL-690	360	0.15	630
ANG 610-61	LCVT410AL-690	410	0.13	660

Line choke

TECHNICAL ASSEMBLY DATA

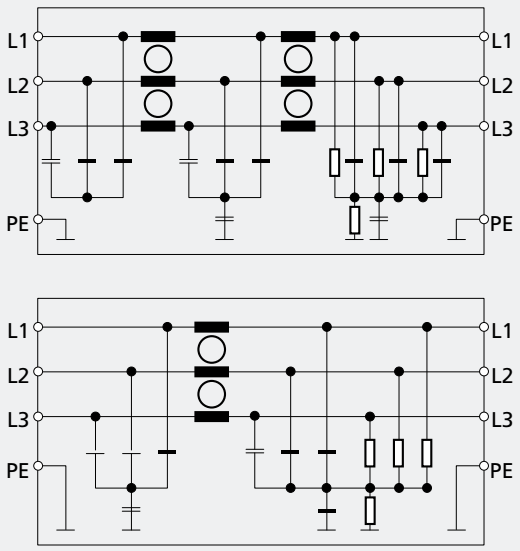
BONFIGLIOLI CHOKE	DIMENSIONS				ASSEMBLY		WEIGHT	CONNECTION TERMINAL		
	a [mm]	b [mm]	c [mm]	n_2 [mm]	n_1 [mm]	d [mm]	[kg]	[mm]	[Nm]	PE
LCVT004	80	65	95	55	37	4	0.8	0.75-2.5	1.0-1.2	4 mm^2
LCVT006	100	65	115	60	39	4	1.0	0.75-2.5	1.0-1.2	4 mm^2
LCVT008	100	75	115	60	48	4	1.5	0.75-2.5	1.0-1.2	4 mm^2
LCVT010	100	75	115	60	48	4	1.5	0.75-2.5	1.0-1.2	4 mm^2
LCVT015	125	85	135	100	55	5	3.0	0.75-4.0	1.5-1.8	4 mm^2
LCVT018	155	90	135	130	57	8	4.0	0.75-4.0	1.5-1.8	4 mm^2
LCVT025	155	100	160	130	57	8	4.0	0.75-10	4.0-4.5	4 mm^2
LCVT034	155	100	190	130	57	8	4.5	2.5-16	2.0-4.0	M5
LCVT050	155	115	190	130	72	8	4.5	2.5-16	2.0-4.0	M5
LCVT060	190	110	220	170	58	8	9.0	2.5-35	2.5-5.0	M5
LCVT075	190	120	250	170	68	8	12	25-50	3.0-6.0	M6
LCVT090	190	130	250	170	78	8	12	25-50	3.0-6.0	M6
LCVT115	210	140	270	180	82	8	14	25-50	3.0-6.0	M6
LCVT135	240	160	300	190	100	11	20	16-70	6.0-7.0	M8
LCVT160	240	160	310	190	100	11	20	50-95	6.0-12.0	M8
LCVT180	240	175	320	190	106	11	22	50-95	6.0-12.0	M8
LCVT210	240	200	335	190	121	11	26	95-150	10.0-20.0	M8
LCVT250	240	210	350	190	126	11	28	95-150	10.0-20.0	M8

BONFIGLIOLI CHOKE	DIMENSIONS					ASSEMBLY		WEIGHT	CONNECTION TERMINAL			
ANG410	a [mm]	b [mm]	c [mm]	e [mm]	f [mm]	n_2 [mm]	n_1 [mm]	[kg]	Phases	[Nm]	PE	[Nm]
LCVT280AL-525	360	213	335	362	65	325	112	47	M10	25-30	M8	20-25
LCVT350AL-525	360	225	335	361	65	325	124	55	M10	25-30	M10	40-50
LCVT440AL-525	394	266	450	434	74	325	127	70	2xM12	25-30	M10	40-50
LCVT550AL-525	394	291	470	435	75	325	142	83	2xM12	25-30	M10	40-50
LCVT690AL-400	394	291	520	485	75	325	142	85	2xM12	25-30	M12	75-85
ANG510												
LCVT215AL-525	360	195	285	311	65	325	99	35	M10	25-30	M8	20-25
LCVT280AL-525	360	213	335	362	65	325	112	47	M10	25-30	M8	20-25
LCVT350AL-525	360	225	335	361	65	325	124	55	M10	25-30	M10	40-50
LCVT440AL-525	394	266	450	434	74	325	127	70	2xM12	25-30	M10	40-50
LCVT470AL-525	394	325	449	433	74	325	127	72	2xM12	25-30	M10	40-50
LCVT550AL-525	394	291	470	435	75	325	142	83	2xM12	25-30	M10	40-50
ANG610												
LCVT160AL-690	360	220	284	310	65	325	124	50	M8	15-20	M8	20-25
LCVT200AL-690	394	221	343	381	74	325	127	65	M10	25-30	M8	20-25
LCVT250AL-690	394	221	394	433	74	325	126	73	M10	25-30	M8	20-25
LCVT320AL-690	465	291	517	515	87	400	143	110	2xM12	25-30	M10	40-50
LCVT360AL-690	465	291	517	515	86	400	143	105	2xM12	25-30	M10	40-50
LCVT410AL-690	465	291	517	515	87	400	143	112	2xM12	25-30	M10	40-50

EMI filters

Because of their intrinsic characteristics, all frequency inverters often generate undesired high frequency voltages generally referred to as "interference". Mains filters are installed to reduce this interference.
The reference standard EN EN61800-3 defines the thresholds for electromagnetic interference for different classes of equipment.
Active Next Generation series frequency inverters up to size 9.2 kW can be ordered with a built-in EMI filter conforming to the requirements of the standard for "class A – group 2" environments.
Two series of external interference filters are available for larger size Active Next Generation frequency inverters and for installations where conformity to the stricter requirements of class B is necessary. The two series differ both in construction and power range.
The first set of filters are "backplate filters or foot print". They are available in sizes 7 to 40 A (suitable for Active Next Generation frequency inverters up to size 4), and allow the frequency inverter to be installed on board the filter itself.
The second series of filters are "book filters". They cover all other Active Next Generation sizes up to 630 A and are designed for installation on the same mounting panel alongside the drive.
Mains filters with very low dispersion currents are available upon request for specific applications.

Basic circuit diagram



Backplate EMI filters

Mains voltage
- 3 x 480V~ maximum +10%

Nominal current
- 8A ... 40A

Frequency
- 50/60 Hz

Operating and storage temperature
- -25 °C ... +100 °C (climate class acc. to EN60721-3-3)

Ambient temperature
- +40°C maximum

Protection degree (EN 60529)
- IP00

Connection type
- Contact-protected terminals
- Strand connection on load side (only up to ANG 410-18)
- Metal fasteners are included in the supply

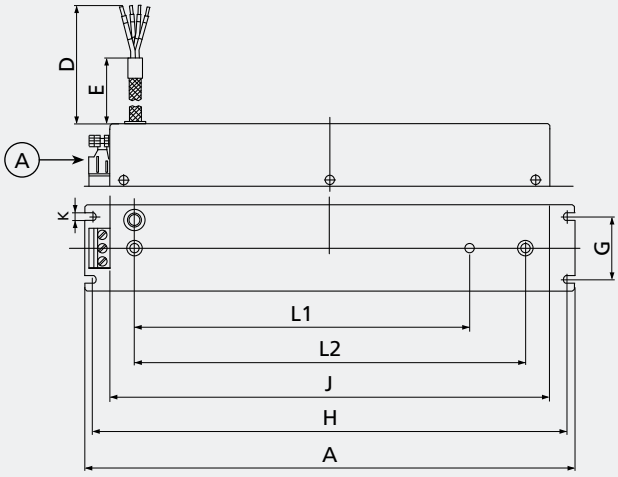
Note

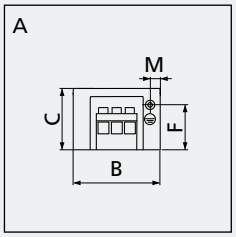
These mains filters are installed between the line choke and the frequency inverter. The frequency inverter installed on the EMI filter must be connected to the metal baseplate with a short, large section earth connection.
Overload capacity is 1.5 times rated current for 1 minute, every 30 minutes.

BONFIGLIOLI INVERTER		BONFIGLIOLI EMI FILTER	RATED CURRENT	LEAKAGE CURRENT	POWER DISSIPATION	WEIGHT
Size	Type		[A]	[mA]	[W]	[kg]
1	ANG 210-01	FTV007B	8	5	10	1.5
	ANG 210-03					
	ANG 210-05					
	ANG 210-07					
	ANG 210-09					
	ANG 410-01					
	ANG 410-03					
	ANG 410-05					
	ANG 410-07					
	ANG 410-09					
	ANG 410-11					
2	ANG 210-11					
	ANG 410-12					
	ANG 410-13					
	ANG 410-15					
	ANG 410-18					
3	ANG 410-19	FTV018B	18	1.5	20	3.5
	ANG 410-21					
4	ANG 410-23	FTV040B	40	1.2	35	3.5
	ANG 410-25					

Backplate EMI filters

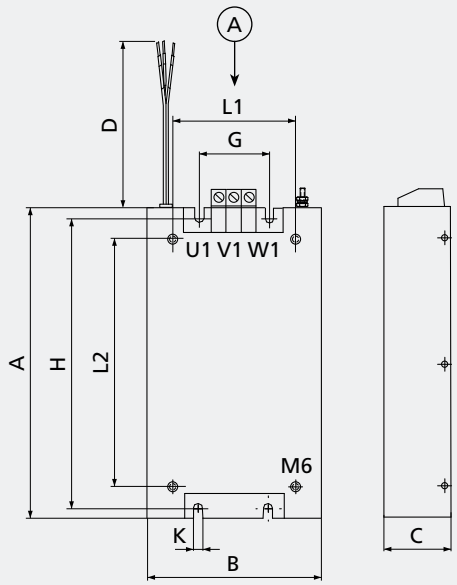
Dimensions FTV007B

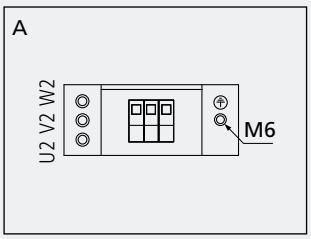




EMI FILTER	A	B	C	D	E	F	G	H	J	K	L1	L2	M
						[mm]							
FTV007B	351	62	45	200±10	160±10	33	45±0.2	340±0.3	315	5.5	240±0.2	280±0.2	7

Dimensions FTV018B - FTV040B





EMI FILTER	A	B	C	D	G	H	K	L1	L2
					[mm]				
FTV018B	315	100	65	300	35	300	6.3	76	270
FTV040B	315	125	65	300	60	300	6.3	125	270

Book type EMI filters

Mains voltage
- 3 x 480 VAC

Rated current
- 7 A … 630 A

Frequency
- up to 60 Hz

Operating and storage temperature
- -25 °C … +80 °C (climate class acc. to EN60721-3-3)

Protection degree (EN 60529)
- IP20

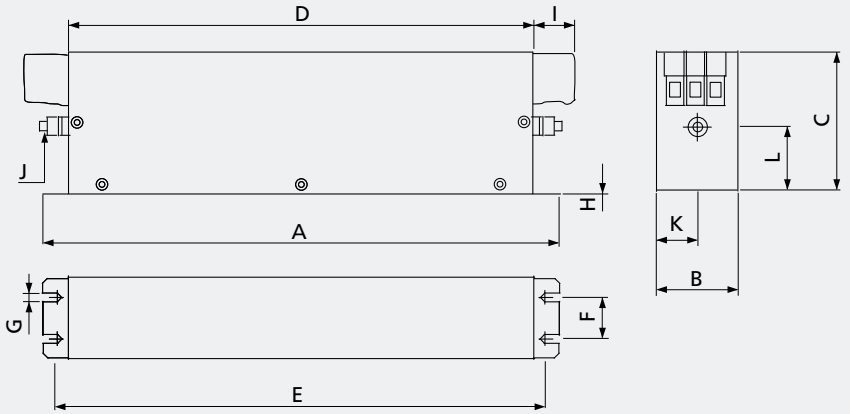
Maximum length of motor cables:
- ANG 410-01 to -15: 25 m class B
- ANG 410-18 to -25: 50 m class B
- ANG 410-27 to -39: 10 m class B, 100 m class A group 1
- ANG 410-43 to -49: 10 m class B, 100 m class A group 1

Note
Overload capacity is 4 times rated current at switch-on; 1.5 times rated current for 1 minute, once per hour.

BONFIGLIOLI INVERTER		BONFIGLIOLI EMI FILTER	RATED CURRENT	LEAKAGE CURRENT	POWER DISSIPATION	WEIGHT
Size	Type		[A]	[mA]	[W]	[kg]
1	ANG 210-01	FTV007A	7	33	3.8	0.5
	ANG 210-03					
	ANG 210-05					
	ANG 210-07					
	ANG 210-09					
	ANG 410-01					
	ANG 410-03					
	ANG 410-05					
	ANG 410-07					
	ANG 410-09					
	ANG 410-11					
2	ANG 210-11					
	ANG 410-12					
	ANG 410-13					
	ANG 410-15					
2	ANG 210-13	FTV016A	16		6.1	0.8
	ANG 210-15					
	ANG 410-18					
3	ANG 410-19					
	ANG 410-21					
3	ANG 210-18	FTV030A	30		11.8	1.2
	ANG 210-19					
	ANG 410-22					
4	ANG 210-21					
	ANG 410-23					
	ANG 410-25					
5	ANG 210-22	FTV055A	55		25.9	2.0
	ANG 410-27					
	ANG 410-29					
	ANG 410-31	FTV075A	75		32.2	2.7
6	ANG 410-33	FTV100A	100		34.5	4.3
	ANG 410-35					
6	ANG 410-37	FTV130A	130		43.1	4.5
	ANG 410-39					
7	ANG 410-43	FTV180A	180	33	58.3	6.0
	ANG 410-45					
7	ANG 410-47	FTV250A	250	98	90	12.4
	ANG 410-49					
8	ANG410-51	FTV401A	400	42	55	15.2
	ANG410-53					
	ANG410-55					
	ANG410-57	FTV630A	630		65	17.8
	ANG410-59					
	ANG410-61					
	ANG510-51	FTV401A	400		55	15.2
	ANG510-53					
	ANG510-55					
	ANG510-57	FTV630A	630		65	17.8
	ANG510-59					
	ANG510-61					
	ANG610-51	FTV400A-690	400	17	55	11.0
	ANG610-53					
	ANG610-55					
	ANG610-57					
	ANG610-59					
	ANG610-61					

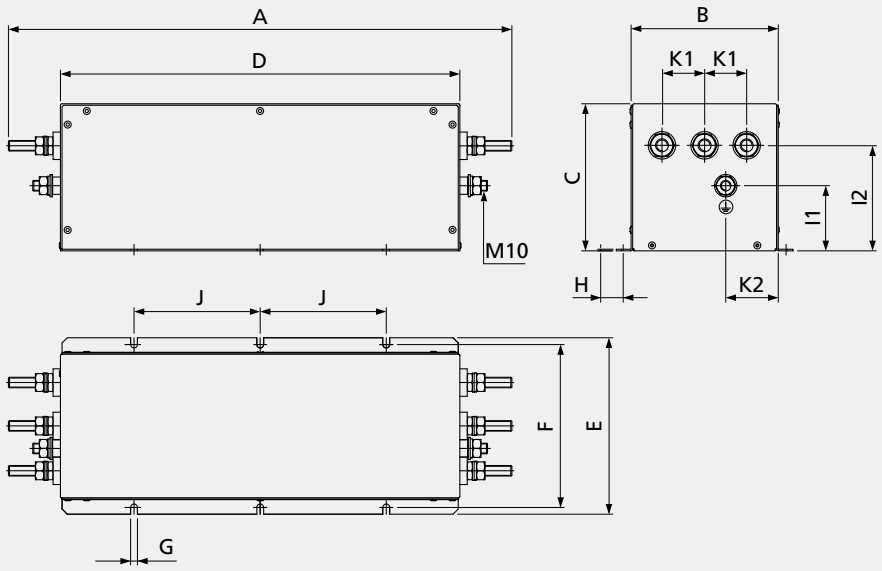
Book type EMI filters

Dimensions FTV007A ... FTV180A



EMI FILTER	A	B	C	D	E	F	G	H	I	J	K	L
						[mm]						
FTV007A	190	40	70	160	180	20	4.5	1	22	M5	20	29.5
FTV016A	250	45	70	220	235	25	5.4	1	22	M5	22.5	29.5
FTV030A	270	50	85	240	255	30	5.4	1	25	M5	25	39.5
FTV055A	250	85	90	220	235	60	5.4	1	39	M6	42.5	26.5
FTV075A	270	80	135	240	255	60	6.5	1.5	39	M6	40	70.5
FTV100A	270	90	150	240	255	65	6.5	1.5	45	M10	45	64
FTV130A	270	90	150	240	255	65	6.5	1.5	45	M10	45	64
FTV180A	380	120	170	350	365	102	6.5	1.5	49.5	M10	60	47

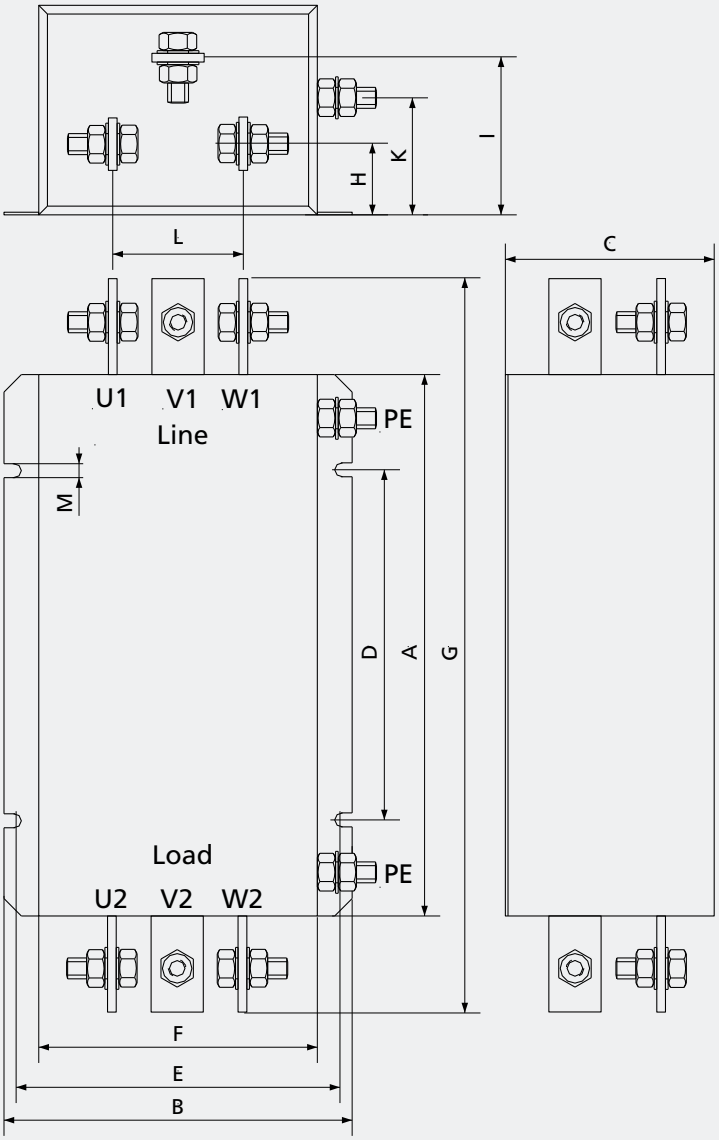
Dimensions FTV250A



EMI FILTER	A	B	C	D	E	F	G	H	I1	I2	J	K1	K2
							[mm]						
FTV250A	482	140	140	380	168	155	6.5	1.5	62	100	120	40	50

Book type EMI filters

Dimensions FTV401A ... FTV630A

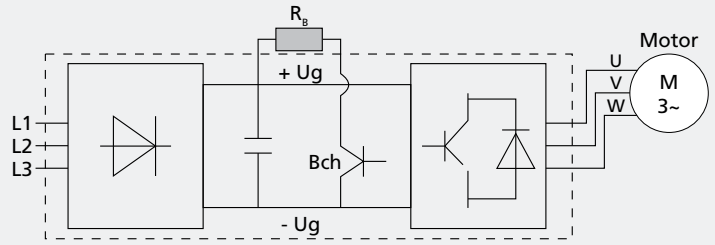


EMI FILTER	A	B	C	D	E	M ø	F	G	PE	H	I	K	L	Bus Bar
								[mm]						
FTV401A	350	240	150	200	220	M8	200	480	M12	69	110	30	128	8x25 M10
FTV400A-690	350	240	150	200	220	M8	200	480	M12	69	110	30	128	8x25 M10
FTV630A	350	240	150	200	220	M8	200	480	M12	69	110	30	128	8x25 M10

Braking resistors

When speed of an inverter-controlled ac motor is reduced, the motor acts as a generator, feeding back energy to the frequency inverter. As a result, voltage in the intermediate circuit of the inverter increases. When a specific threshold is exceeded, the energy must flow to an external braking system in order to avoid drive failures. Braking resistors are designed to absorb such energy and to dissipate it into heating. The use of brake resistors allows drives to fulfil the requirements of particularly severe duty cycles, for example those featured by frequent braking, long lasting braking or impulsive braking.
Bonfiglioli Vectron offers a wide range of safe and compact braking resistors with IP20 degree of protection: "BR series".
BR series are designed for panel mounting.
Mostly, they are equipped with built-in thermal protection.

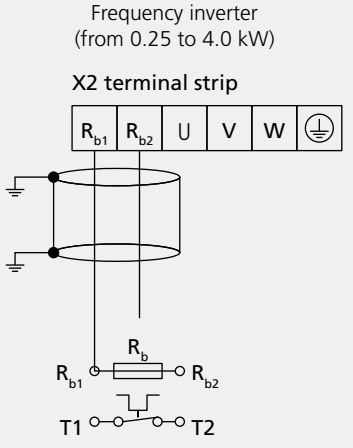
Connection diagram

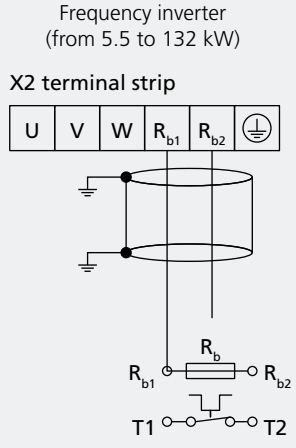


R_B = external braking resistor
Bch= brake chopper integrated in standard Active Next Generation inverter

Connection terminals

The R_{b1} and R_{b2} braking resistor terminals on Active Next Generation frequency inverters are located on the X2 power output terminal strip. Access to these terminals on size 1 and 2 units is made even easier by the use of disconnectable power terminal strips. Refer to the manual provided with your frequency inverter for further details on materials and connection methods.





Braking resistors

Active Next Generation drive combination chart

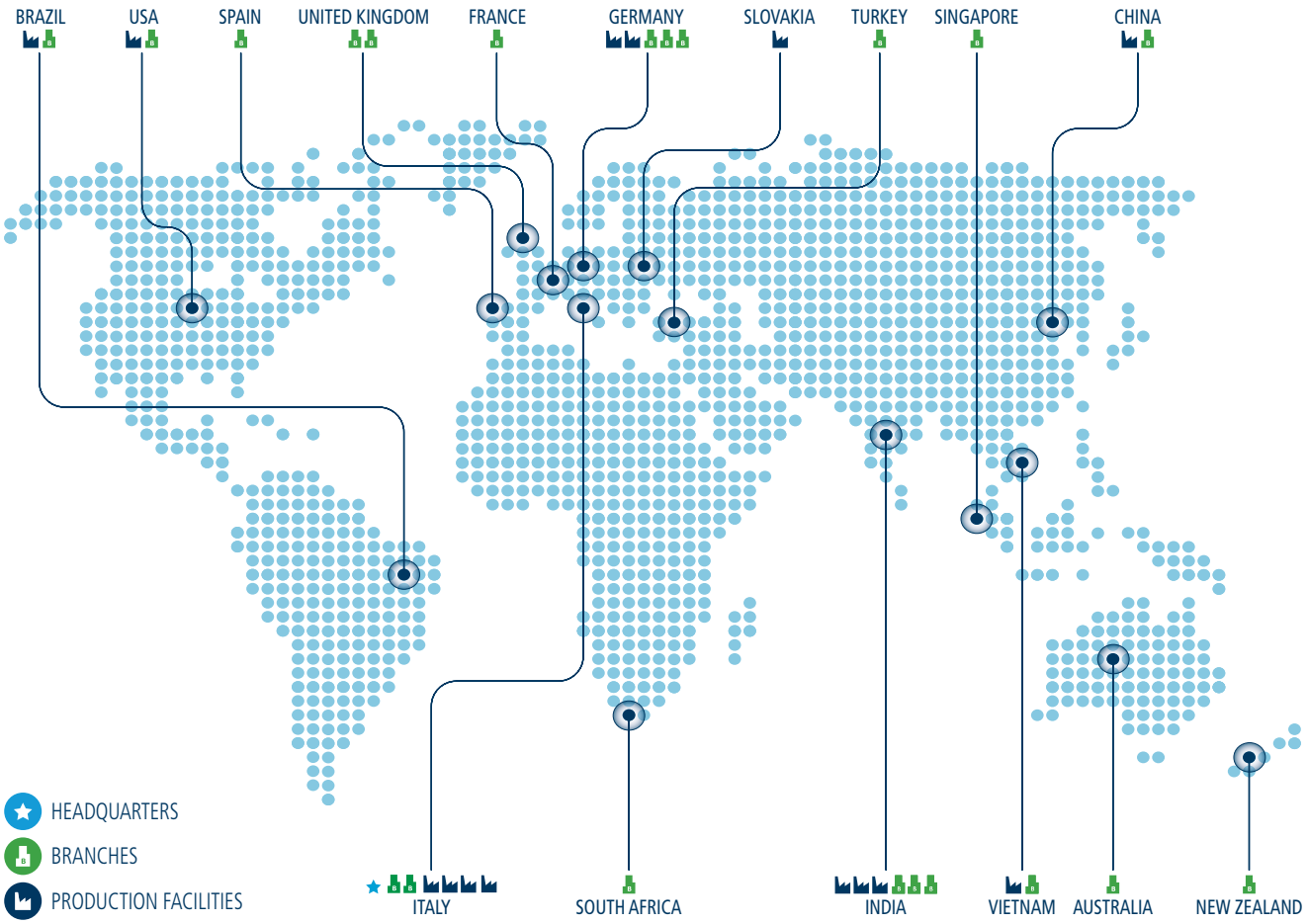
These charts show recommended combinations for each model in the Active Next Generation range, and specify the corresponding duty cycles on the basis of rated drive power. Contact your nearest Bonfiglioli Drive Centre for particularly heavy-duty braking applications or if you need to customise a product.

ANG SERIES		BONFIGLIOLI BRAKING RESISTOR	RESISTANCE	CONTINUOUS RATED POWER	DUTY CYCLE AT THE DRIVE'S RATED POWER
	kW		Ohm		[W]
ANG 210-01	0.25	BR 160/100	100	160	64%
ANG 210-03	0.37	BR 160/100	100	160	43%
ANG 210-05	0.55	BR 160/100	100	160	29%
ANG 210-07	0.75	BR 160/100	100	160	21%
ANG 210-09	1.1	BR 160/100	100	160	15%
ANG 210-11	1.5	BR 432/37	37	432	29%
ANG 210-13	2.2	BR 432/37	37	432	20%
ANG 210-15	3	BR 432/37	37	432	14%
ANG 210-18	4	BR 667/24	24	667	17%
ANG 210-19	5.5	BR 667/24	24	667	12%
ANG 210-21	7.5	BR 1333/12	12	1333	18%
ANG 210-22	9.2	BR 1333/12	12	1333	14%
ANG 410-01	0.25	BR 213/300	300	213	85%
ANG 410-03	0.37	BR 213/300	300	213	57%
ANG 410-05	0.55	BR 213/300	300	213	39%
ANG 410-07	0.75	BR 213/300	300	213	28%
ANG 410-09	1.1	BR 213/300	300	213	19%
ANG 410-11	1.5	BR 213/300	300	213	14%
ANG 410-12	1.85	BR 471/136	136	471	25%
ANG 410-13	2.2	BR 471/136	136	471	21%
ANG 410-15	3	BR 471/136	136	471	16%
ANG 410-18	4	BR 696/92	92	696	17%
ANG 410-19	5.5	BR 1330/48	48	1330	24%
ANG 410-21	7.5	BR 1330/48	48	1330	18%
ANG 410-22	9.2	BR 1330/48	48	1330	14%
ANG 410-23	11	BR 2000/32	32	2000	18%
ANG 410-25	15	BR 2000/32	32	2000	13%
ANG 410-27	18.5	BR 4000/16	16	4000	22%
ANG 410-29	22	BR 4000/16	16	4000	18%
ANG 410-31	30	BR 4000/16	16	4000	13%
ANG 410-33	37	BR 8000/7	7.5	8000	22%
ANG 410-35	45	BR 8000/7	7.5	8000	18%
ANG 410-37	55	BR 8000/7	7.5	8000	15%
ANG 410-39	65	BR 8000/7	7.5	8000	12%
ANG 410-43	75	BR8000/7	7.5	8000	11%
ANG 410-45	90	BR8000/7	7.5	8000	9%
ANG 410-47	110	2xBR8000/7	3.75	16000	15%
ANG 410-49	132	2xBR8000/7	3.75	16000	12%

For further information refer to the Bonfiglioli braking resistor catalogue.

Bonfiglioli worldwide presence

Bonfiglioli is located in regions and countries around the world that enable us to provide faster sales and service to customers.
We are around the world, and around the corner.



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