rexroth
A Bosch Company

Catalog of Rexroth VFC & EFC Frequency Converters

Menu

Product Introduction

VFC 3210 Frequency Converter

Rexroth VFC 3210 with enhanced V/f control, covering the power range from 0.4...4 kW, is a multi-functional mini type frequency converter. It is widely used in the fields of woodworking machinery, packaging machinery, food processing and HVAC due to its characteristics like side by side mounting, smaller depth than VFC 3610, free cooling (up to 1.5 kW), built-in PID, multi-speed control and torque compensation etc.

VFC 3610 & 5610 Frequency Converter

Rexroth VFC 3610 & 5610 series has been especially developed to meet the requirements of emerging markets. VFC 3610 is an enhancement solution for small machinery application as well as other V/f application. With the power output range of 0.4...22 kW, start-up torque of 1.5 Hz/100 % and 3 Hz/150 %, Heavy-duty/ Normal duty etc. features, VFC 3610 is widely used in fan, water pump, materials transmission, mixing equipment, HVAC, textile and wooding machinery.

VFC 5610 is a high performance vector frequency converter for high end machinery applications. With the power range of 0.4...315 kW, start-up torque of 0.5 Hz/200 %, torque control or speed control options, high control accuracy and fast response etc. features, VFC 5610 serves for industry mixer, CNC machine, extruding equipment, machine tool, food packing and printing industries.

EFC 3610 & 5610 Frequency Converter

The Rexroth EFC 3610 & EFC 5610 are the series for the worldwide market. They comply with all major certification standards, such as CE, UL, cUL, RCM, EAC ,TÜV and RoHS. EFC 3610 & 5610 not only have VFC 3610 & 5610 Functions, but also have additional series of functions.

- ► Synchronous motor control(EFC5610), which improves accuracy and reduces energy consumption.
- ► Built-in EMC C3 mains filter to reduce EMI.
- ► Designed for up to 45 °C ambient temperature without derating.
- ► STO function reaching SIL3 level is realized in standard EFC 5610.
- ► Built-in DC reactor for EFC5610 30 kW and above.
- ► In addition to PROFIBUS DP and CANopen like VFC, EFC also supports ERCOS III, PROFINET IO, Ethernet IP, Modbus TCP, Ether-CAT. And the speed of its unique SERCOS III could reach microsecond.

Technical Details

				VFC 3210	VFC 3610	VFC 5610	VFC 5610wall through mounting
Input	1P 200 VAC	Rated output power		0.4...2.2 kW			-
		Mains voltage		200...240 V±10 %			-
		Supply frequency		50/60 Hz±5 %			-
	3P 380 VAC	Rated output power		Heavy-duty: 0.4...4 kW	Heavy-duty: 0.4...22 kW Normal-duty: 7.5...30 kW	Heavy-duty: 0.4...315 kW Normal-duty: 7.5...355 kW	Heavy-duty: 15...75 kW
		Mains voltage		-15 % 380 V...480 V+10 %			
		Supply frequency		50/60 Hz±5 %			
Output	Output frequency			0...400 Hz			
	Control technology			V/f		V/f, SVC	
	Motor type			Asynchronous motors			Asynchronous motors, Permanent magnet motors
Functions	Overload capacity			150 %, 60 s	Heavy-duty: 150 %, 60 s Normal-duty: 120 %, 60 s		Heavy-duty: 150 %, 60 s
	Mains filter			-		⩾110 kW C3	-
	built-in DC reactor			-		⩾110 kW	-
	Frequency resolution			2...12 kHz	1...15 kHz (0.4...22 kW); 1...12 kHz (30 kW and above)		
	Speed regulation range			1:50	1:50	1:200	
	Start-up torque			3 Hz 150 %	3 Hz 150 %	0.5 Hz 200 %	
				1.5 Hz 100 %	1.5 Hz 100 %		
	PID control			1			
	Control panel type			Fixed LED	Standard detachable LED and optional detachable LCD		
I/O terminals	Analog input	+10 V		√			
		+5 V		-	√		
		AI1		0(2)...10 V/0(4)...20 mA			
		AI2		-	0(2)...10 V/0(4)...20 mA		
	Analog output	AO1		0(2)...10 V	0(2)...10 V/0(4)...20 mA		
	Digital input	+24 V		50 mA	max. 100 mA		
		DI1...DI4		NPN terminal, 24 VDC, 8 mA/12 VDC, 4 mA	PNP/NPN terminal, 24 VDC, 8 mA/12 VDC, 4 mA		
		DI5 (Pulse input)		-	PNP/NPN terminal, 24 VDC, 8 mA/12 VDC, 4 mA; Maximum pulse input 50 kHz		
	Digital output	DO1	Open collector output	-	Pull-up/pull-down, 30 VDC, 50 mA		
			Pulse output	-	max. 32 kHz		
	Relay output	RO1 (Ta, Tb, Tc)		250 VAC, 3 A/30VDC, 3 A			
	Communication			Modbus RTU			
Extension Card	I/O card1			-	4DI, 1AI, 1AO, 1OC,1 relay output		
	I/O card2 (Relay Card)			-	4Relay outputs, 250 VAC, 3 A/30VDC, 3 A		
	I/O card3			5DI, 2AI, 1AO, 2OC, 1TSI			
	Communication card			-	PROFIBUS DP, CANopen		
Ambient conditions and certificates	Ambient temperature			-10...40 °C; 40...50 °C, derating 1.5 %/1 °C			
	Humidity			⩽90 %			
	Altitude			1000 m; 1000...2000 m, derating 1 %/100 m	1000 m; 1000...4000 m, derating 1 %/100 m		
	Protection category			IP20			
	STO			-			
	Certificate			CE	CE, EAC		

[1]: Supported temperature sensor type: KTY 84/130, PT100, PT1000, TDK G1551_8320 (NTC)

				EFC 3610	EFC 5610	EFC 5610 Cold Plate	EFC 5610 3P 200V
Input	1P 200 VAC	Rated output power		0.4...2.2 kW			-
		Mains voltage		200...240 V±10 %			-
		Supply frequency		50/60 Hz±5 %			-
	3P 380 VAC/ 3P 200 VAC	Rated output power		Heavy-duty：0.4...22 kW Normal-duty：7.5...30 kW	Heavy-duty：0.4...160 kW Normal-duty：7.5...200 kW	Heavy-duty：0.4...15 kW	Heavy-duty：0.4...11 kW
		Mains voltage		-15 % 380 V...480 V+10 %			-10 % 200 V...240 V+10 %
		Supply frequency		50/60 Hz±5 %			
Output	Output frequency			0...400 Hz			
	Control technology			V/f	V/f, SVC,FOC		
	Motor type			Asynchronous motors	Asynchronous motors, Permanent magnet motors		
Functions	Overload capacity			Heavy-duty：150 %, 60 s; 200 %, 1 s Normal-duty：120 %, 60 s		Heavy-duty：150 %, 60 s; 200 %, 1 s	
	Mains filter			C3			
	built-in DC reactor			-	⩾30 kW	-	-
	Frequency resolution			1...15 kHz (0.4...22 kW); 1...12 kHz (30 kW and above)			
	Speed regulation range			1:50	1:200		
	Start-up torque			3 Hz 150 %	0.5 Hz 200 %		
				1.5 Hz 100 %			
	PID control			1			
	Control panel type			Standard detachable LED and optional detachable LCD			
I/O terminals	Analog input	+10 V		✓			
		+5 V		✓			
		AI1		0(2)...10 V/0(4)...20 mA			
		AI2		0(2)...10 V/0(4)...20 mA			
	Analog output	AO1		0(2)...10 V/0(4)...20 mA			
	Digital input	+24 V		max. 100 mA			
		DI1...DI4		PNP/NPN terminal, 24 VDC, 8 mA/12 VDC, 4 mA			
		DI5 (Pulse input)		PNP/NPN terminal, 24 VDC, 8 mA/12 VDC, 4 mA; Maximum pulse input 50 kHz			
	Digital output	DO1	Open collector output	Pull-up/pull-down, 30 VDC, 50 mA			
			Pulse output	max. 32 kHz			
	Relay output	RO1 (Ta, Tb, Tc)		250 VAC, 3 A/30VDC, 3 A			
	Communication			Modbus RTU			
Extension Card	I/O card1			4DI, 1AI, 1AO, 1OC,1 relay output			
	I/O card2 (Relay Card)			4Relay outputs, 250 VAC, 3 A/30VDC, 3 A			
	I/O card3			5DI, 2AI, 1AO, 2OC, 1TSI			
	Communication card			PROFIBUS DP, CANopen, SERCOS III, PROFINET IO, Ethernet IP, Modbus TCP, EtherCAT			
	Encoder Card			-	ABZ incremental encoder card, Resolver Card		
Ambient conditions and certificates	Ambient temperature			-10...45 ˚C; 45...55 ˚C, derating 1.5 %/1 ˚C			
	Humidity			⩽90 %			
	Altitude			1000 m；1000...4000 m, derating 1 %/100 m			
	Protection category			IP20			
	STO			-	SIL3		
	Certificate			CE, UL, cUL, RCM, EAC, TÜV, RoHS			

[1]: Supported temperature sensor type: KTY 84/130, PT100, PT1000, TDK G1551_8320 (NTC)

VFC 3210

Rexroth has always been paying great efforts in deeply understanding the Chinese demands and characteristics so as to keep up with the market development in China. Therefore, aiming at providing simple OEMs with simple, reliable and cost-effective solutions in drives and controls, VFC 3210, one multifunctional mini type frequency converter is designed specifically for Chinese users.

To supply with better products and services, VFC 3210 with V/f control in compact design, offers the output power from 0.4 to 4 kW, supports side by side mounting, and has removable fan and obtains CE certificate, which thus shows a powerful product with safety, reliability and easy operation.

Side by side mounting

Compact design

Smaller dimension

VFC 3210 0.4 kW VFC 3610 0.4 kW

Easy to commission

Smart & Delicate

- Nearly 30 % decrease in depth than 3610 to better adjust to customer installation requirements.
- A super mini type in compact design.
- Side by side mounting.

Superior performance

- The high starting torque of 150 % 3 Hz and 100 % Hz 1.5.
- Over-excitation control to reduce the braking time.
- The capacity overload of 150 % 60 s.
- Modbus RTU is standard.
- PC software and firmware updates (via Mini-USB port).

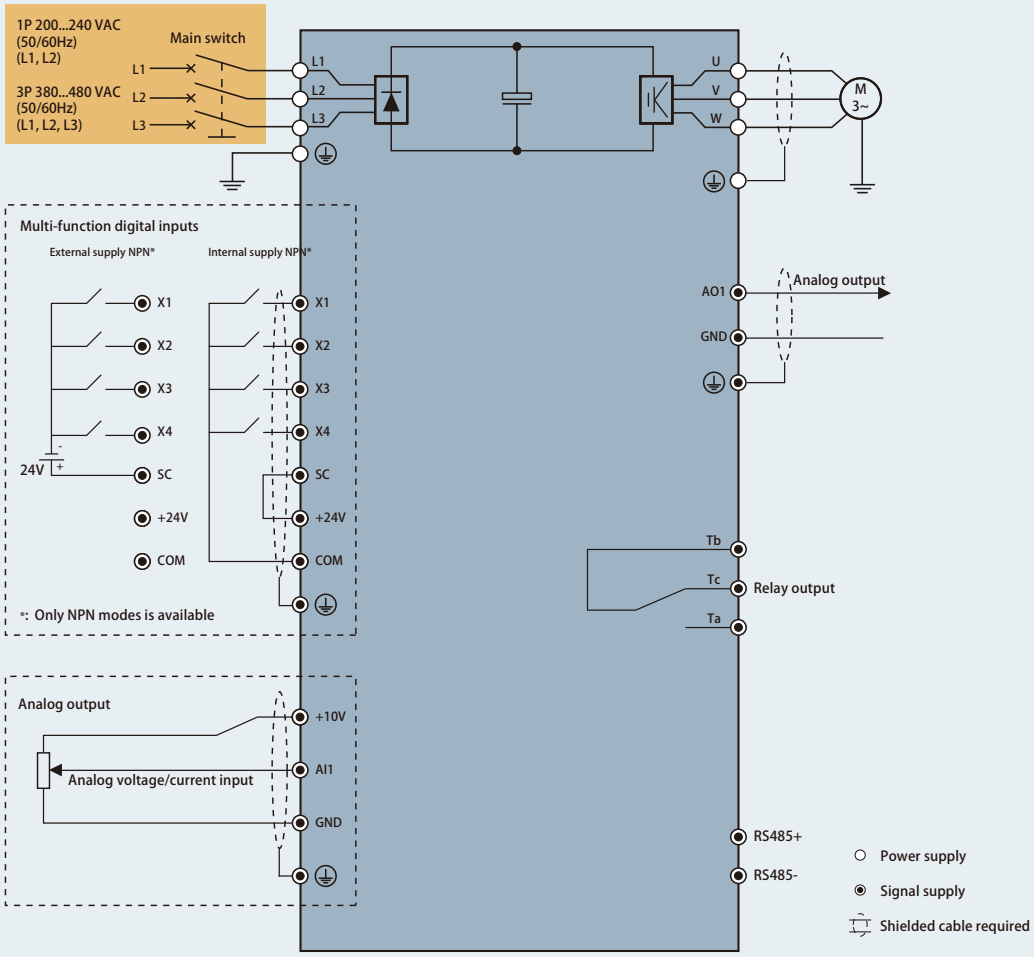
Easy to operate

- Built-in LED operating panel.
- Easy to operate and maintenance, removable fan, free cooling (not more than 1.5 kW).
- Structured parameter group for convenient commissioning.
- Automatic speed limiting and capture.

Stable & Reliable

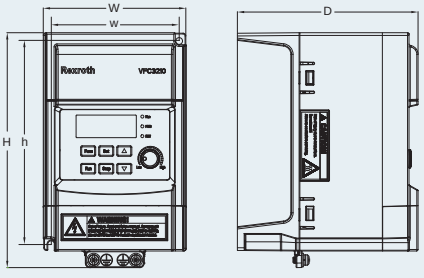
- Systematic safety standard and reliability test system.
- Complete converter protection (phase failure, interphase short circuit, the earthing short circuit, overcurrent, overvoltage, under-voltage, overload, overheat and overheating protection for motors).
- Reinforced coating of circuit boards for dust-proof and anti-corrosion.

VFC 3210 Block Diagram



Mechanical Data

	Type VFC & EFC	Rated motor power[kW]	Rated continuous current [A]	W [mm]	w [mm]	H [mm]	h [mm]	D [mm]
		Heavy duty	Heavy duty					
1P 200 VAC	0K40-1P2-MNA	0.4	2.4	90	80	146	125	105
	0K75-1P2-MNA	0.75	4.1	95	85	156	135	120
	1K50-1P2-MNA	1.5	7.3	95	85	196	175	125
	2K20-1P2-MNA	2.2	10.1	120	110	221	200	130
3P 380 VAC	0K40-3P4-MNA	0.4	1.3	95	85	156	135	120
	0K75-3P4-MNA	0.75	2.3					
	1K50-3P4-MNA	1.5	4.0	95	85	196	175	125
	2K20-3P4-MNA	2.2	5.6	120	110	221	200	130
	4K00-3P4-MNA	4.0	9.7					



MNA=No built-in EMC filter

VFC 3610 & 5610

Demands of emerging markets and especially focus on its market development and characteristics Rexroth VFC 3610 is an enhancement frequency converter for small machinery application as well as other V/f application, the power output range of 0.4...22 kW(Heavy-duty), and VFC 5610 is a high performance vector solution for machinery application with high demands, the power output range of 0.4...315 kW(Heavy-duty).

VFC 3610 & 5610 series frequency converters have outstanding features with compact size, widely voltage range, low voltage ride-through, side by side mounting, over-excitation brake, and also got CE certificates, provides best solution and service for Chinese customer.


Quick connectors


Bluetooth Adapter

Side by side mounting

DIN rail mounting

Compact design
- ► Modularized design
- ► Side by side mounting capability to save cabinet space.
- ► DIN rail mounting (up to 7.5 kW) for flexible installation.
- ► Up to 1.5 kw, no cooling fan; above 1.5 kw, a detachable cooling fan designed to improve the cooling efficiency.

Easy to use
- ► Standard equipped LED pluggable, optional equipped LCD pluggable.
- ► Bluetooth Adapter optional for easy connection by mobile.
- ► Quick Start Menu for easy commissioning.
- ► Removable panel, supports remote operation and parameter copy.
- ► Quick connectors for I/O terminals to easy installation and maintenance.
- ► Integrated brake chopper (up to 22 kW).
- ► Fans can be cooled down without removing.
- ► Wiring by PNP/NPN.

Powerful
- ► Normal duty/heavy duty operation.
- ► VFC 5610 110 kW and above have built-in DC reactor
- ► High performance vector and torque technology (VFC 5610).
- ► Low frequency oscillation suppression and start with speed capture.
- ► Inversion forbidden, low voltage ride-through and swing frequency function.
- ► Stand-by mode, counter function and energy savings calculator.
- ► Pulse input (50 kHz) and pulse output (32 kHz).
- ► Over-excitation braking, to reduce braking times up to 50 %.
- ► 24 V auxiliary power output for external devices, max. 100 mA (up to kW); max. 200 mA (30...90 kW).
- ► Build-in Modbus RTU, option cards for PROFIBUS DP, CANopen, I/O and relais terminal.
- ► ConverterWorks for fast commissioning and software update (via Mini USB).

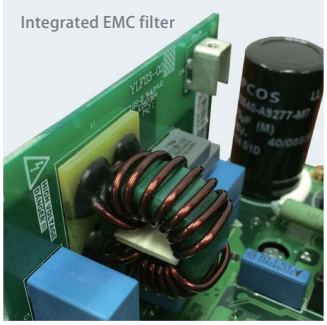
EFC 3610 & 5610

The Rexroth EFC 3610 & 5610 series has been developed for the worldwide market. With the relevant certifications of CE, UL, cUL, RCM, EAC TUV, RoHs, etc., consolidated sales and service is provided worldwide.

The power output range of EFC 3610 is 0.4...22 kW (Heavy duty), and the power range of EFC 5610 is 0.4...160 kW (Heavy duty). The EFC series shares the parameter structure, dimensions and connections with VFC series as well as many functions, EFC series contains several enhanced features such as synchronous motor control (EFC 5610), built-in EMC filter, and multi-Ethernet communication to satisfy worldwide customer more application demands.


STO


Certification


Integrated EMC filter

Synchronous Motor Drives

► Except asynchronous motor, EFC 5610 has the capability of synchronous motor drives to improve the control accuracy and reduce energy consume.

Built-in mains filter

► Complies with EN61800-3 category C3 requirements and reduces electromagnetic interference on the power grid.

► Shielding motor cable length: 15m (up to 4 kW), 30 m (5.5...18.5 kW), 50m (30...90 kW), 75 m (110...132 kW)

► EMC filter can be disconnected by EMC screw for use in environments that require especially low leakage currents.

Built-in DC Reactor

► Built-in DC reactor of EFC 5610 30 kW and above EFC 5610 30 kW.

Safety Torque off(STO)

► Class 0 cutoff refers to EN60204-1 standard, and got SIL3 certificate.

► Frequency converter false tripping prevent for operation and maintenance safety.

Up to 45 °C ambient temperature without derating

► The EFC series can be used in up to 45 °C ambient temperature (VFC 40 °C) without a reduction of output power.

Additional communication options

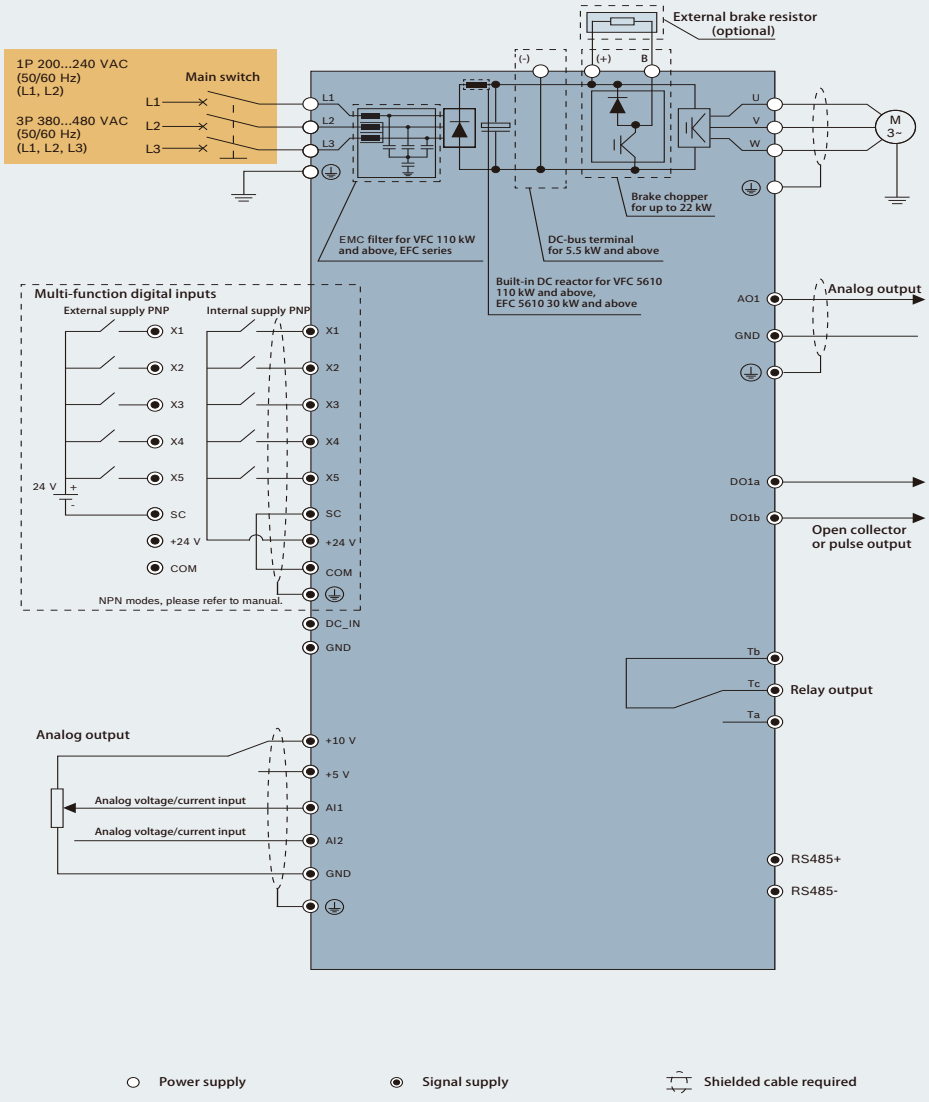
► In addition to PROFIBUS DP and CANopen also a SERCOS III, PROFINET IO, Ethernet IP, Modbus TCP, EtherCAT are available. Especially, the Rexroth exclusive SERCOS III communication function Communication rate could be microsecond level.

VFC 3610 & 5610, EFC 3610 & 5610 Type Code

VFC 3610-0K40-1P2-MNA-7P-NNNNN-NNNN

- **Series**
  E.G: VFC3610 or 5610
  EFC 3610 or 5610
- **Max. Power**
  E.G: 0K40=0.4 kW
- **Power Input**
  1P2=1P200 V
  3P4=3P400 V
  3P2=3P200 V
- **Communication**
  M=ModBus
- **Other Design**
  NNNN=None
  L1NN=STO
- **Firmware**
  NNNNN=Standard,00002=1000HzOutput
- **Display**
  7P=7 segment LED
  NN=Dust Cover
  LP=Text LCD
- **Protection Class**
  A=IP20
  B=Cold Plate C=Wall Through
- **D=EMC Filter**
  N=No EMC Filter

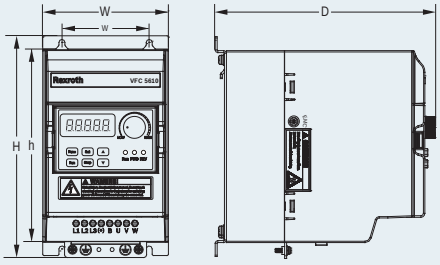
VFC 3610 & 5610, EFC 3610 & 5610 Block Diagram



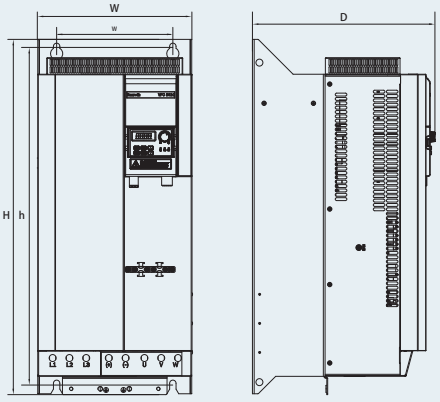
VFC 3610 & 5610, EFC 3610 & 5610 Mechanical Data

	Type VFC & EFC	Rated motor power[kW]		Rated continuous current [A]		W [mm]	w [mm]	H [mm]	h [mm]	D [mm]
		Heavy duty	Normal duty	Heavy duty	Normal duty					
1P 200 VAC	0K40-1P2-MxA-xx	0.4	-	2.4	-	95	66	166	156	167
	0K75-1P2-MxA-xx	0.75	-	4.1	-					
	1K50-1P2-MxA-xx	1.5	-	7.3	-	95	66	206	196	170
	2K20-1P2-MxA-xx	2.2	-	10.1	-	120	80	231	221	175
3P 380 VAC	0K40-3P4-MxA-xx	0.4	-	1.3	-	95	66	166	156	167
	0K75-3P4-MxA-xx	0.75	-	2.3	-					
	1K50-3P4-MxA-xx	1.5	-	4.0	-	95	66	206	196	170
	2K20-3P4-MxA-xx	2.2	-	5.6	-					
	3K00-3P4-MxA-xx	3.0	-	7.4	-	120	80	231	221	175
	4K00-3P4-MxA-xx	4.0	-	9.7	-					
	5K50-3P4-MxA-xx	5.5	7.5	12.7	16.8	130	106	243	228	233
	7K50-3P4-MxA-xx	7.5	11	16.8	24.3					
	11K0-3P4-MxA-xx	11	15	24.3	32.4	150	125	283	265	233
	15K0-3P4-MxA-xx	15	18.5	32.4	39.2					
	18K5-3P4-MxA-xx	18.5	22	39.2	45.0	165	140	315	300	241
	22K0-3P4-MxA-xx	22	30	45.0	60.8					
	30K0-3P4-MxA-xx	30	37	60.8	73.7	250	200	510	492	272
	37K0-3P4-MxA-xx	37	45	73.7	89.1					
	45K0-3P4-MxA-xx	45	55	89.0	108	265	200	585	555	325
	55K0-3P4-MxA-xx	55	75	108	147					
	75K0-3P4-MxA-xx	75	90	147	176	325	200	760	727	342
	90K0-3P4-MxA-xx	90	110	176	212					
	110K0-3P4-MxA-xx	110	132	212	253	385	250	923	893	350
	132K0-3P4-MxA-xx	132	160	253	303					
	160K0-3P4-MxA-xx	160	185[1]	303	351[1]	480	400	1030	995	360
			200[2]		379[2]					
	185K0-3P4-MxA-xx[3]	185	200	351	380					
	200K0-3P4-MxA-xx[3]	200	220	380	411	595	425	1337	1300	386
	220K0-3P4-MxA-xx[3]	220	250	411	467					
	250K0-3P4-MxA-xx[3]	250	280	467	532					
	280K0-3P4-MxA-xx[3]	280	315	522	588	650	450	1458	1417	412
	315K0-3P4-MxA-xx[3]	315	355	588	659					

► 0.4...37 kW



► 45...315 kW



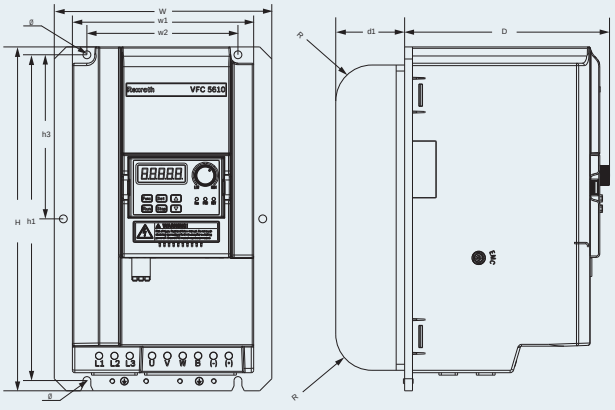
x: MNA= No built-in EMC filter (only apply to VFC) MDA= Built-in EMC filter (only apply to EFC) xx: 7P=Operating panel NN=No operating panel (with Dust cover)

[1]: Only apply to VFC, VFC 160 Kw (Heavy-duty) equals 185 Kw (Normal duty) with 351 A output current (Normal duty)

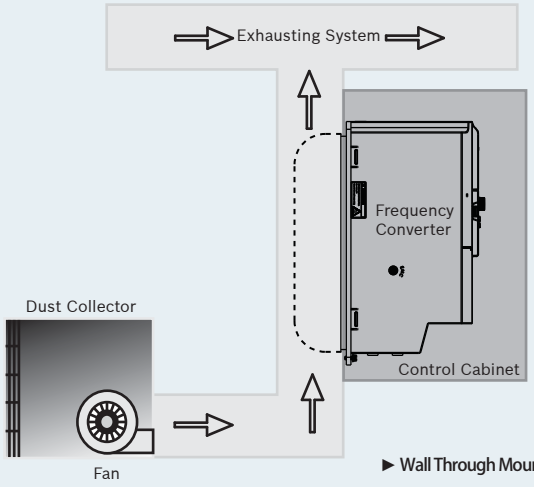
[2]: Only apply to EFC, EFC 160 Kw (Heavy-duty) equals 200 Kw (Normal duty) with 379 A output current (Normal duty)

[3]: Only apply to VFC 5610

VFC 5610 Wall Through Mechanical Data													
Type	W	w1	w2	H	h1	h2	h3	h4	h5	D	d1	Ø	R
15K0	180	150	125	285	270	-	136	253	-	170	57	6.5	30
22K0	195	180	140	315	300	150	76	282	-	180	67	6.5	40
45K0	315	290	260	570	550	250	150	520	534.5	200	76	11	40
55K0	315	290	260	570	550	250	150	520	534.5	200	106	11	40
75K0	375	350	300	760	730	250	141.5	690	705	217	119	11	40

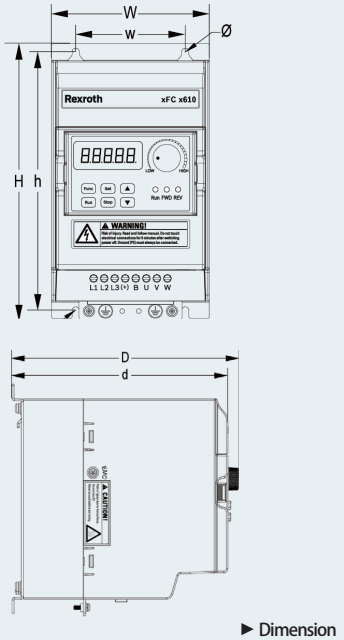


► Dimension



► Wall Through Mounting

EFC 5610 Cold Plate Mechanical Data										
	Housing	Type	Size [mm]							
			W	H	D	w1	w2	h	d	Ø
1P 200V	B	0K40	95	166	124	60	66	156	116	4.5
	B	0K75	95	166	124	60	66	156	116	4.5
	C	1K50	95	206	124	60	66	196	116	4.5
	D	2K20	120	231	124	60	66	221	116	4.5
3P 380V	B	0K40	95	166	124	60	66	156	116	4.5
	B	0K75	95	166	124	60	66	156	116	4.5
	C	1K50	95	206	124	60	66	196	116	4.5
	C	2K20	95	206	124	60	66	196	116	4.5
	D	3K00	120	231	124	60	66	221	116	4.5
	D	4K00	120	231	124	60	66	221	116	4.5
	E	5K50	130	245	175	106	106	230	167	6.5
	E	7K50	130	245	175	106	106	230	167	6.5
	F	11K0	150	285	175	125	125	270	167	6.5
	F	15K0	150	285	175	125	125	270	167	6.5



► Dimension

VFC & EFC 3610 Applications

HVAC

Fans, pumps, air conditioning

Energy savings calculator

► Keeps track of the achieved energy savings.

Life time reminder

► Reduces downtime by helping to organize the maintenance schedule.

Speed tracing

► For smooth catching and restarting of a running fan.

Dry pump protection

► Automatically detects a dry running pump to protect the equipment.

Pump cascading

► Use Application Specific Firmware and relay card, 4 maximum pumps could be circularly controlled by frequency converter.

Textile and Dyeing

Heat setting stenter, twister, air-flow spinning

Smart cooling concept

► Double duct design isolates heat sink and semiconductor to prevent semiconductor from pollution.

► No cooling fan up to 1.5 kW and detachable cooling fan above 1.5 kW for cotton fiber easy clean.

Import PCBA coating

► Coating materials is made in Germany, enhanced anticorrosion in high temperature and humidity.

Low voltage ride-through

► Derating output when voltage reduced on power grid.

DC generatrix[1]

► DC generatrix operation to reduce the technical influence from instable power supply, and save energy through load sharing.

Woodworking machinery

Welt fitting machine, Tenoning machin, Grooving machine, Carving machine, Sanding machine, CNC machine

Compact Size

► Subminiature compact design.

► Side by Side mounting.

Easy Operation

► LEC panel with same parameter structure, Parameter copy function of 3610 series, easy to use.

► Structuring parameter convenient to commissioning.Cost-performance function design

► 60 seconds last of 150 % rated torque output.

► Over excitation control to reduce stop time.

► Standard equipped Modbus RTU.

► Built-in Mini USB connected with computer for commissioning, parameter copy and software updating.

is the applicable frequency converter type commonly. Please inquire application engineer for details. [1]: Available for 5.5 kW and above.

VFC & EFC 5610 Applications

Metal processing machinery

Lathe, grinder, drill, planer, boring, cold forging

Compact design

► DIN rail and side by side mounting to save space.

High start torque

► To meet the process demand of high strength metal cutting, avoid overcurrent and overload during low speed operation .

Quick and dynamic response

► Accurate speed control for highly smoothness and quality especially for concavo-convex workpiece surface.

Over excitation braking

► Can help to reduce braking times up to 50 %, without an external break resistor.

Safety Torque off(STO)[2]

► Frequency converter false tripping prevent for operation and maintenance safety.

Food and packaging

Conveyor, blow molding, blender, cutter, labeling machines

Quick connectors and DIN rail mounting (up to 7.5 kW)

► Quick and easy installation and maintenance.

Counter function

► Built-in Counter to realize the classification and packing of food & drink industry.

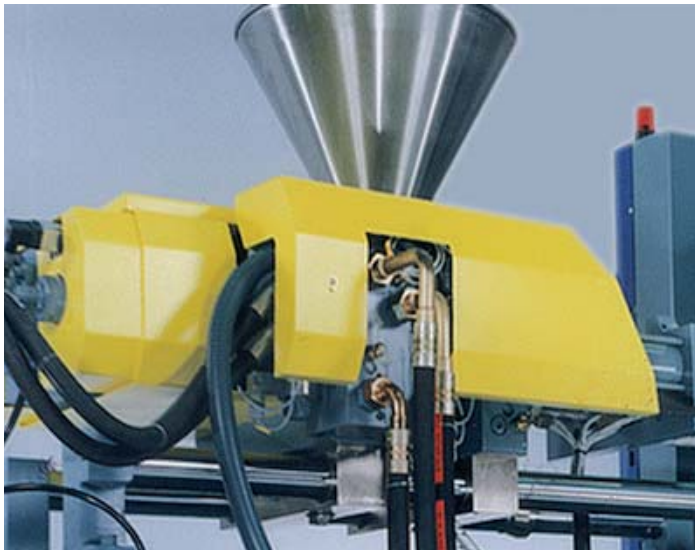
Removable control panel

► Parameter copy function for efficient commissioning of multiple drives.

► Remote panel support for convenient and safe monitoring and operation.

Integrated sequence control (16 steps)

► Multi-stage speed control without an additional PLC.



Rubber and plastic machinery

Scroll extruder, pelletizer, bagging machine

Compact design

► DIN rail mounting (up to 7.5 kW) and side by side mounting (up to 22 kW), to save cabinet space.

High start torque, 200 % at 0.5 Hz

► To ensure the extruder can start up and operate during the uneven heating temperature environment.

High control accuracy, fast dynamic response

► Precise control is to ensure the material thickness evenly, in order to save cost and ensure the quality of products.

Torque limit and slip compensation

► Especially used for constant output torque. Minimize the torque fluctuation and improve the extrusion process quality.

[1]: Available up to 22 kW. [2]: Available for EFC 5610 30kW and above.

Accessories[1]

R912006011

R912005787

2m: R912007623

3m: R912007624

5m: R912007625

Mounting plates and panel extension cables[2]
Mounting plates are used for installing the panel in order to operate and monitor frequency converter without opening control cabinet.

- ► Make the hole 85mm(horizontal) * 75mm (vertical) on cabinet door.
- ► Remove the panel to install in the mounting plates. Then connect the panel with frequency converter via panel extension cables.
- ► Extension cables 2m, 3m, and 5m are available, and the longest operation distance is 5m.

R912005784

R912005783

R912006376

R912006375

LED/LCD panel[2]
LED and LCD Panel options of VFC & EFC series.
LED panel

- ► Parameter edit and commissioning via LED panel.
- ► Real-time display of operating data, fault display and diagnosis maintenance.
- ► Parameter copy.

LCD panel

- ► Available in Chinese, English, Germany, and other 9 languages.
- ► Six line big display screen with backlight, easy to commissioning.
- ► Parameter copy.

R912006856

Bluetooth Adapter[2]

- ► Wireless operation.
- ► ConverterWorks APP on Cell or Pad to connect frequency converter for commissioning, firmware update, parameter copy; easy to long-distance commissioning or fault handling directed by experts[3].
- ► Apply to Android System 4.2 and above.

[1]: Only apply to VFC 3610/5610 & EFC 3610/5610 [2]: All the accessories need to be purchased individually, please inquire Rexroth distributer for details [3]: Available for 03V12 version and above, and the firmware version can be checked via parameter d0.99

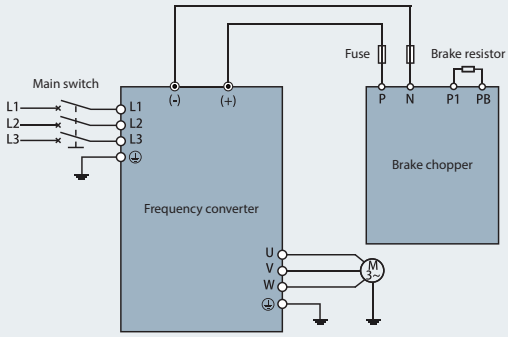
Brake Chopper[1]

The brake chopper is used for consuming electric energy transmitted from external motor to frequency converter and limiting bus voltage within a reasonable range to improve its braking performance and fast stop of the motor.

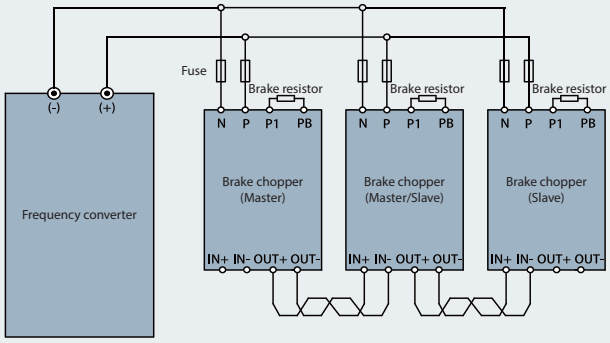
The brake chopper has standard dust cover, but you can also set the parameters with the use of LED and LCD operating panel of VFC & EFC1 series. It supports the linkage input and linkage output with paralleling up to 3 braking units in maximum. And it also has overvoltage, overcurrent, overheating, short circuit resistance, overheating protection.

- ▶ Operation voltage: 600...785 V, parameter adjusting step size: 0.01 V
- ▶ The length between brake chopper and frequency converter plus the length between brake chopper and brake resistor should not be more than 5m.

Basic wiring mode



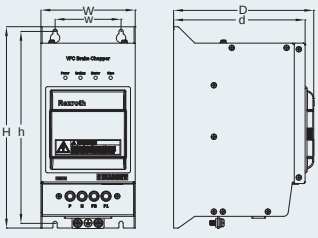
Brake chopper in paralleling wiring mode[1]



[1]: Paralleling wiring mode applies when the capacity of a single brake chopper could not meet the requirement

Brake chopper dimensions

Material Number	Type code	Applicable FC type	W (mm)	H (mm)	D (mm)	w (mm)	h (mm)	d (mm)
R912007179	FEAE07.1-VA1-NNNN	VFC 5610 30...55 kW	100	215	149	70	205	140
R912007180	FEAE07.1-VA2-NNNN	VFC 5610 75...90 kW						
R912007181	FEAE07.1-EA1-NNNN	EFC 5610 30...55 kW						
R912007182	FEAE07.1-EA2-NNNN	EFC 5610 75...90 kW						



[1]: Only apply to VFC 5610 & EFC 5610

Extension card module

As part of the modular design concept for the VFC & EFC series, the separately available Option Card Module offers the user a variety of customization options, which benefits for operation cost reducing.

The extension card module provides two slots that can be used for a range of extension card module. Cards include an I/O extension card, a multi relay card and various communication extension card module, such as Profibus DP and CANopen.

VFC: R912006053
EFC: R912006052

▶ Extension Module

I/O1: R912006050
I/O2: R912006051
I/O3: R912007257

▶ I/O Card

R912006133

▶ CANopen Card

R912006134

▶ Multi Ethernet Card

R912006414

▶ ABZ Incremental Encoder Card

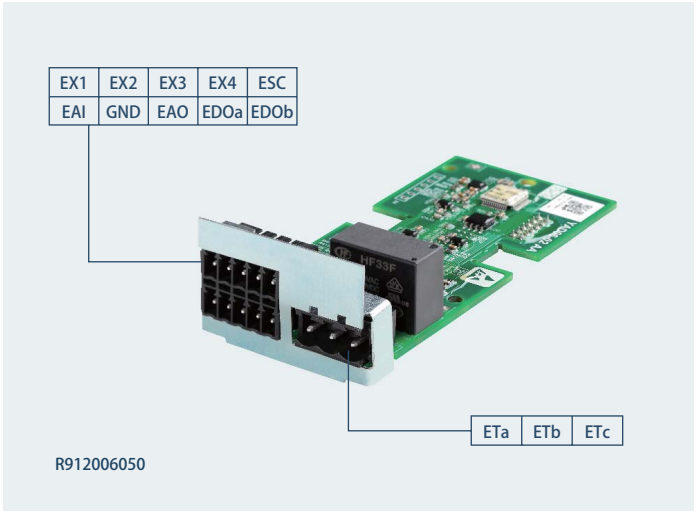
R912006415

▶ Resolver Card

R912006132

▶ PROFIBUS DP Card

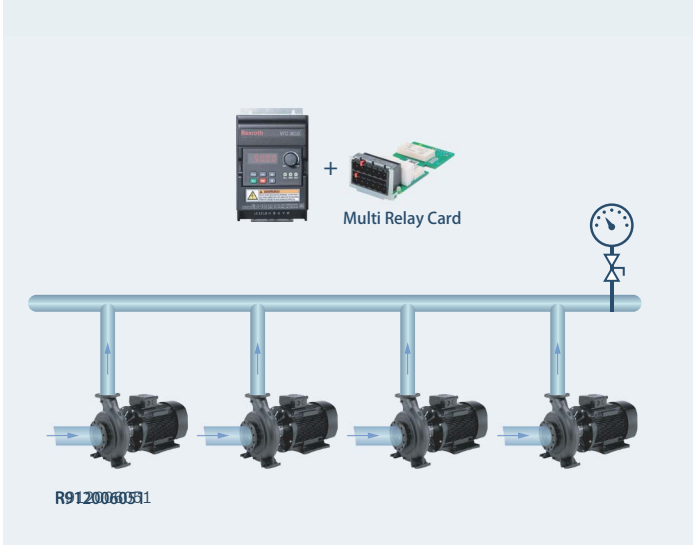
*: It is not possible to combine 2 extension card modules.



I/O Extension Card

To extend the I/O terminals on VFC & EFC frequency converter, an I/O extension card is available. The maximized I/O points of frequency converter with I/O extension card could be: 9DI, 3AI, 2AO, 2OC, 2 relay output

Terminal	Function	Description
EX1...EX4	4 multi-function digital inputs	24 VDC, 8 mA/12 VDC, 4 mA
EAI1	Analog input	-10...10 V/0(2)...10 V/0(4)...20 mA
EAO1	Analog output	0(2)...10 V/0(4)...20 mA
EDO1	Open collector output	30 VDC, 50 mA
ETa, ETb, ETc	Relay	250 VAC, 3 A/30 VDC, 3 A

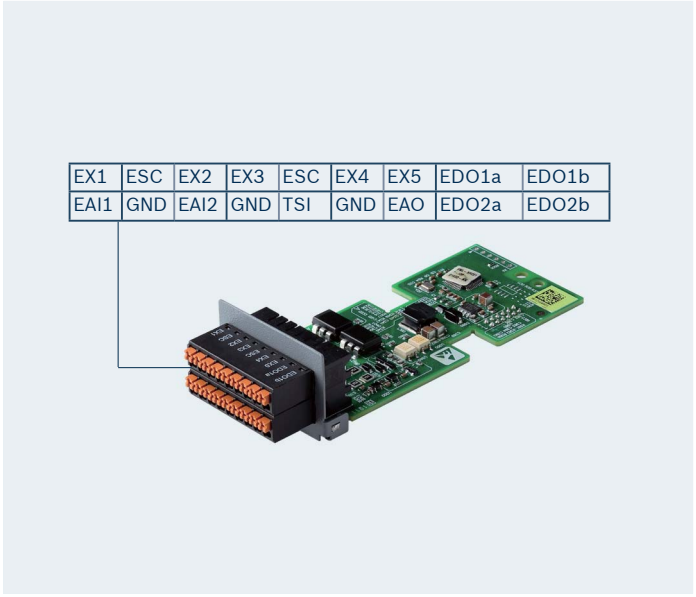


Multi Relay Card

The Multi Relay Card offers 4 programmable relay outputs, that can be especially useful in pump and fan control, drive status monitoring or water supply applications.

By combining the Multi Relay Card and the I/O Extension Card it is possible to take advantage of up to 6 relays at the same time and save extra wiring cost and installing space.

Terminal	Signal requirement	Description
R1a, R1c, R1b	Rated capacity: 250 VAC, 3 A 30 VDC, 3 A	R1b, R2b, R3b, R4b are relay outputs shared connections
R2a, R2c, R2b		
R3a, R3c, R3b		
R4a, R4c, R4b		



I/O Extension Card 3

To extend the I/O terminals on VFC & EFC frequency converter, an I/O3 extension card is available, it include 5DI, 2AI, 1AO, 2OC and 1 TSI

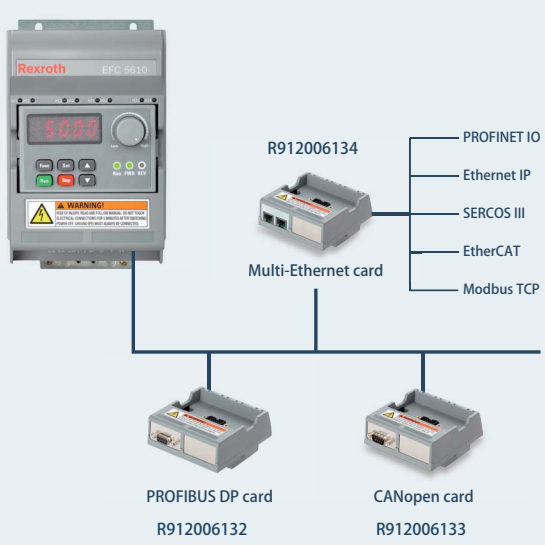
Terminal	Function	Description
EX1...EX5	5 multi-function digital inputs	24 VDC, 8 mA / 12 VDC, 4 mA
EAI1/EAI2	2 Analog input	-10...10 V/0(2)...10 V/0(4)...20 mA
EAO	1 Analog output	0(2)...10 V/0(4)...20 mA
EDO1/EDO2	2 Open collector output	30 VDC, 500 mA
TSI	1 Temperature sensor input	Supported temperature sensor type: KTY 84/130, PT100, PT1000, TDK G1551_8320 (NTC)

PROFIBUS DP Card[1]

- Easy connection
- Wide application scenarios, good compatibility
- Maximum 127 slaves supported

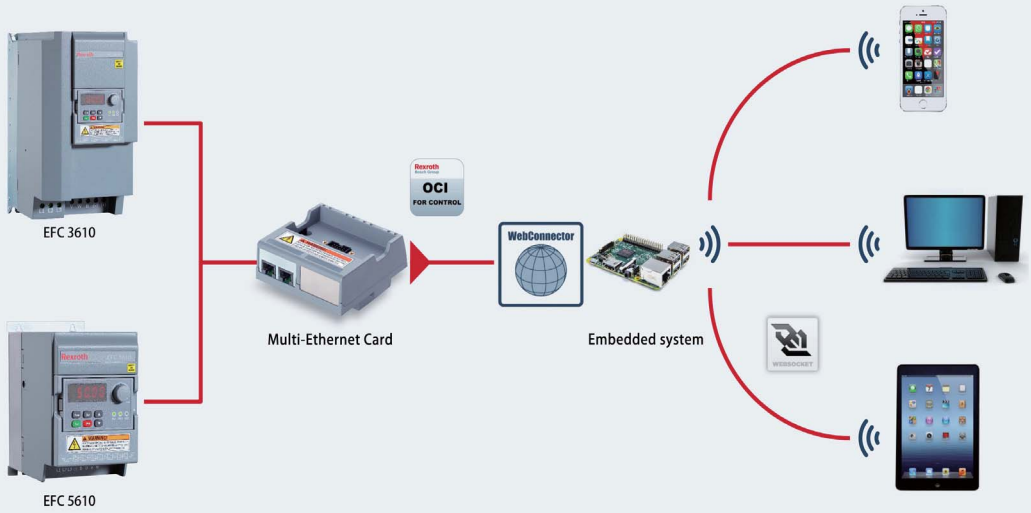
CANopen Card

- Very short response time
- High data transfer efficiency and performance
- Standard terminal resistor

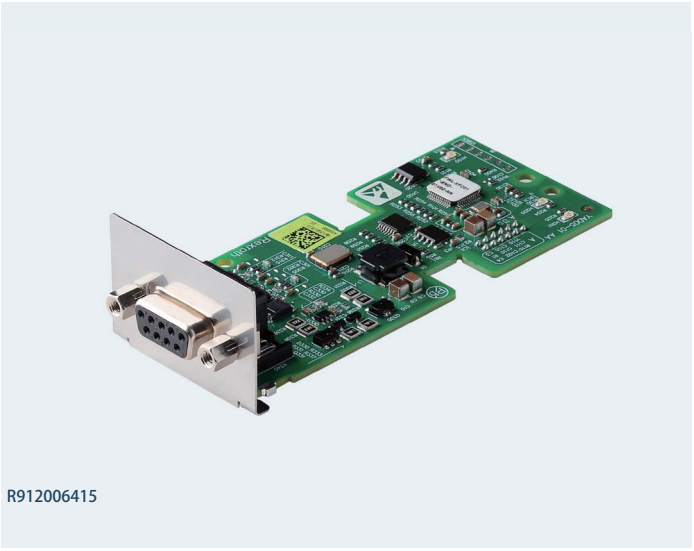


Multi-Ethernet Card[1]

- Below communication protocols are supported by Multi-Ethernet Card, which only needs Exchange parameters in frequency converter. PROFINET IO, Ethernet IP, SERCOS III, EtherCAT, Modbus TCP
- One hardware for multi-application, with which users need only communication protocol switching by setting parameters
- EFC series of multifunctional unique options through Ethernet, with greater flexibility and adaptability in the Internet of things. With the BOSCH Rexroth WebConnector[2] technology. In the near future, the customer to sit in the office or home, intelligent mobile phone monitoring from the inverter operation, storage and analysis of data acquisition, will become a reality



[1]: Only apply to EFC series [2]: Java based network applications



R912006415

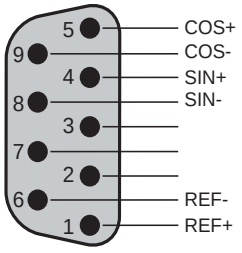
Resolver Card

▶ Resolver card is a standard extension card of EFC5610 series frequency converter, which receives the resolver signal as feedback. It is to be installed together with the extension module

Terminals Description

Pin number	Terminal	Signal function
Pin 1	REF+	Resolver excitation +
Pin 6	REF-	Resolver excitation -
Pin 4	SIN+	Resolver feedback SIN+
Pin 8	SIN-	Resolver feedback SIN-
Pin 5	COS+	Resolver feedback COS+
Pin 9	COS-	Resolver feedback COS-

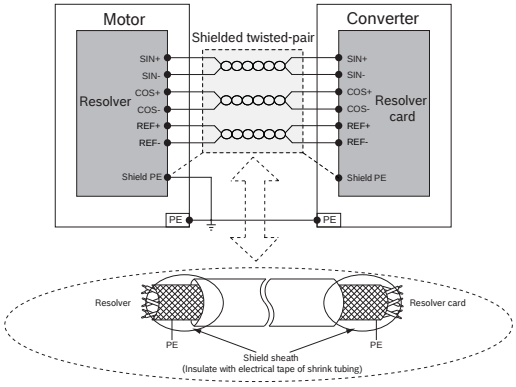
Terminals Mapping



Technical Data

Resolver power supply	Voltage	7 Vrms
	Frequency	10 kHz
Resolver card in-put signal	Voltage	1.5...4 Vrms
	Frequency	10 kHz
Connector type		DB9（Female）

Wiring



Parameter

Code	Name	Setting range	Min.	Default	Attri.
H7.01	Encoder direction	0：Forward 1：Reverse	1	0	-

Parameter H7.01 is used to change the phase sequence, if the encoder phases are reversely connected.

Code	Name	Setting range	Min.	Default	Attri.
H7.05	Encoder wiring break detection level	0.0 (No protection) 0.1...1,000.0rpm	0.1 rpm	0.0 rpm	-
H7.06	Encoder wiring break detection time	0.1...10.0s	0.1s	1.0s	-

If measured speed is smaller than encoder wiring break de-tection level [H7.05] and keeps for more than encoder wir-ing break detection time [H7.06], wiring break error "ElbE" is detected.
This function can be disabled by setting [H7.05] = 0.0.

Code	Name	Setting range	Min.	Default	Attri.
H7.07	Encoder phase order error detection time	0.0 (No protection) 0.1...100.0s	0.1s	1.0s	-

If measured speed direction is different from running direc-tion and keeps for more than encoder phase order error de-tection time [H7.07], phase order error "EPOE" is detected. This function can be disabled by setting [H7.07] = 0.0.

Code	Name	Setting range	Min.	Default	Attri.
H7.31	Resolver poles	2...32	1	2	-

Parameter H7.31 is used to set the poles of resolver. Please correctly set this parameter before power on. For synchronous motor, resolver card supports resolver with two poles or with the same poles as motor. For asyn-chronous motor, resolver card supports resolver with any poles.

R912006414

ABZ Incremental encoder card

- It is a standard extension card of Rexroth EFC 5610 series product and should be used together with extension card box
- It has a variety of voltage levels, which could match the common 5 V encoder and 9...30 V wide voltage encoders in market
- It supports various encoders, covering the difference, open collector and push-pull type
- It includes frequency output interface of encoder signal, supporting NPN and PNP output
- It is extended in the same way like other option cards. And its mounting position is optional

Terminal Description

Interface	Terminal	Signal function	Description ECOM	Signal requirements
Encoder interface	E5V	Encoder power supply 5V	Refer to ECOM	Maximum output current: 200 mA
	E12V	Encoder power supply12V		Maximum output current: 150 mA
	ECOM	Common port of encoder power supply	GND Isolation	-
	A+	Encoder output signal A+	Refer to ECOM	Input voltage: 5⋯24 V Maximum input pulse frequency: 300 kHz
	A-	Encoder output signal A-		
	B+	Encoder output signal B+		
	B-	Encoder output signal B-		
	Z+	Encoder output signal Z+		
	Z-	Encoder output signal Z-		
	PE	Shielding terminal	Ground radiator terminal connected inside	-
Pulse output interface	OA	Pulse output A	Refer to GND	Output pulse voltage : 24V Maximum output current: 50 mA
	OB	Pulse output B		
	OZ	Pulse output Z		
	IN24V	External power supply	24V External power supply(non-24V FC terminal power supply) input to OA, OB &OZ	-
	GND	Common port of output pulse	Isolate from ECOM	-
	PE	Shielding terminal	Ground radiator terminal connected inside	-

Cable length

Cable length and section		
Cable length(m)	Cable section	
	AWG	mm^2
10	⩽ 24	⩾ 0.205
20		
30		
40		
50		
60		
70	⩽ 23	⩾ 0.258
80		
90	⩽ 22	⩾ 0.326
100		

Terminal diagram

A+	A-	B+	B-	Z+
PE	E5V	ECOM	E12V	Z-

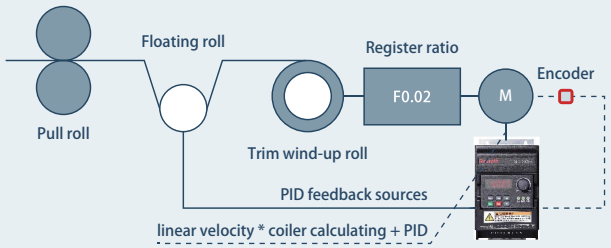
OA	OB	OZ
GND	IN24V	PE

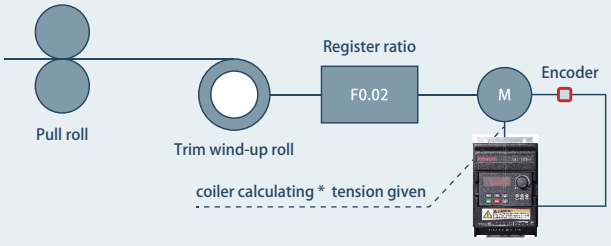
Technical Data

Encoder power supply	5 V ± 5 % (200 mA) 12 V ± 5 % (150 mA)
Maximum input pulse frequency	300 kHz
Pulse input voltage	5...24 V
Terminal type	Quick connector
Pulse output	1:1 push-pull output

Application Specific Firmware ASF

1





Application Specific Firmware[2] – Download firmware for different specific applications

- ▶ Different application specific firmware easy for different application demands. (textile, printing, water supply, etc.)
- ▶ Download ASF to frequency converter through USB and ConverterWorks software.
- ▶ Each standard frequency converter could be updated to application specific firmware product via installing ASF.
- ▶ Reducing customer and partner's stock, only standard equipment is fine.

[1]: Available in 2017. [2]: Please download latest ASF software via www.boschrexroth.com.cn/fc.

PC Software

PC Software[1] - easy commissioning

The Rexroth VFC and EFC frequency converters can be commissioned and operated remotely with the free PC software. The connection to the PC is established via a standard Mini-USB interface.

Parameter Comparison Function

- Compared adjusted parameter with default parameter, comparison between 2 parameter groups.

Online Commissioning

- Connected with PC, it is easy to online start-up and stop, parameter revise, and back-up.

Online Monitor Signal

- Real time monitoring signal data for fast diagnosis and monitoring.

Core Firmware Update[1]

- Core firmware updated via Convcerterworks software, easy and convenient to get latest function.

Open Platform for flexible applications

According to various of special application demand, and based on standard software of frequency converter, Application Specific Firmware(e.g. water supply ASF) could be downloaded to frequency converter via commissioning software.

- ASF via frequency converter commissioning software, your frequency converter now available for serving special function request.

[1]: Please download latest PC software via www.boschrexroth.com.cn/fc.

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