

Frequency Converter Fv vector control converters for universal applications



Our goal: To be world market leader in providing benefits to customers

With our broad portfolio of products and services we are geared to respond swiftly and flexibly to all your requirements – from development and production, right through to sales and service. Working in co-operation with you, we will come up with the perfect solution for every application. Our products, combined with our consulting expertise, will give you that decisive competitive edge, while minimizing your technical and financial outlay.



Rexroth offers everything that you need for drive, control and motion technology:

- ▶ **Electric Drives and Controls**
- ▶ **Industrial Hydraulics**
- ▶ **Mobile Hydraulics**
- ▶ **Linear Technology**
- ▶ **Assembly Technology**
- ▶ **Pneumatics**



Rexroth is unique. No other brand on the world market can offer its customers all drive and control technologies, both on a specialized and integrated basis. We are considered the worldwide benchmark when it comes to drives, controls and motion. Our technological leadership is continually setting us new challenges, with approximately 35,000 employees in more than 80 countries around the world. This is possible thanks to an infrastructure designed always with partnership and customer proximity in mind.

As a company, Bosch Rexroth can look back on more than 200 years of tradition. As a wholly-owned subsidiary of Robert Bosch GmbH, we are part of a globally-operating technology group. All this is both our drive and our commitment. And it's unique – just like Bosch Rexroth. The Drive & Control Company.

Frequency Converter Fv – Vector control converters for universal applications

Frequency Converter Fv is an innovative and optimized drive solution of Bosch Rexroth for the industrial market. Three control modes, Voltage/Frequency (V/F), sensorless vector control (SVC) and vector control with encoder (FOC) are available for a wide range of industrial applications. The advanced design of the LCD operating panel enables quick parameter settings, convenient copy function, easy diagnosis and many more functions. Frequency Converter Fv is the smart choice for stable performance and economical price.

Easy to change the fan

- ▶ The fan can be easily changed without additional tools from the top.

Multiple control modes (V/F, SVC, FOC)

- ▶ The application all-rounder.

Optional integrated C3 EMC filter

- ▶ International industry standard as build in option (EN 61800-3 C3).



Display with copy function

- ▶ Copy parameters from converter to converter using the display.
- ▶ Fast simple operation and monitoring of the status.

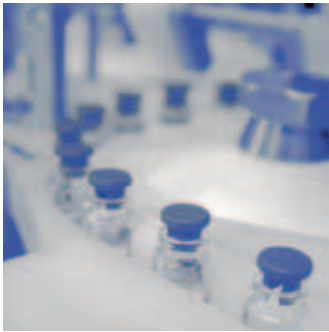
Optional embedded PROFIBUS DP

- ▶ Easily part of the automation industry.

Side by side mounting

- ▶ Smaller cabinets.

Frequency Converter Fv – The allrounder



Function Characteristics

LCD display

Multiple control modes
(V/F, SVC, FOC)

Optional embedded communication modules

Optional embedded C3 EMC filter

Integrated braking chopper up to 15 kW

Operating panel with parameter copy function

Benefits

Fast simple operation

One drive for various applications

No extra space needed – no cables

Can meet the industrial C3 requirement

No extra cost

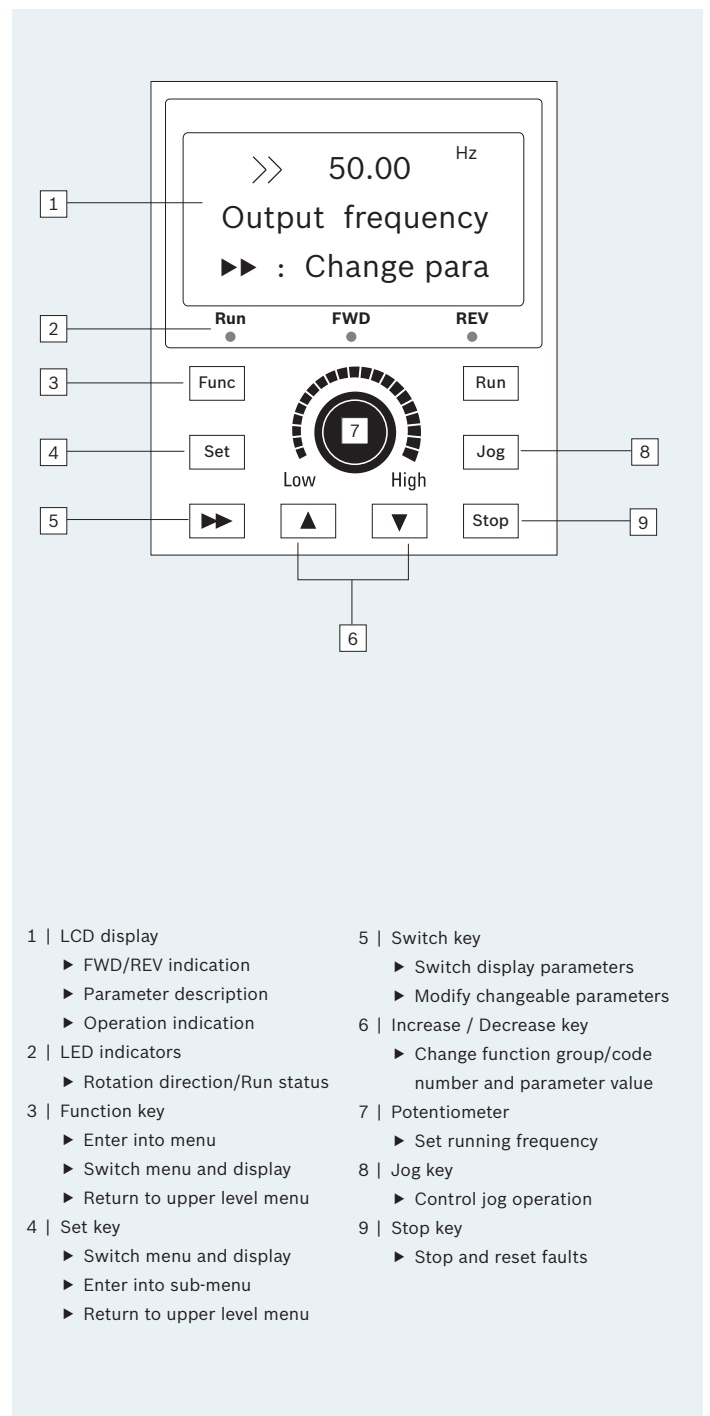
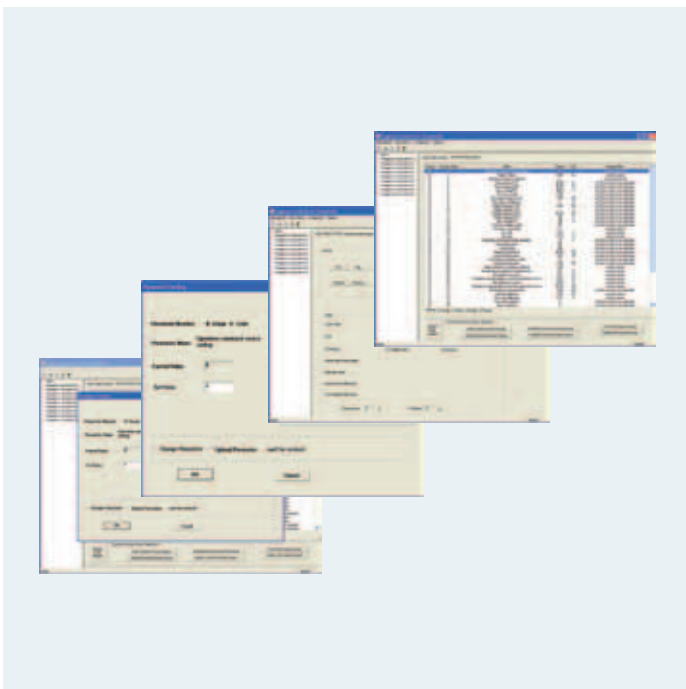
Easy and simple to parameterize more than one

Frequency Converter Fv – Easy to use

The days of complicated commissioning are over! No need for a PC or an additional programming unit, the integrated LCD operating panel is all you need to quickly operate Frequency Converter Fv. All parameters can be easily set via keys on the panel and displayed in an easy-to-read format.

A standard RS485 communication port supports the communication via ModBus protocol. With the help of PC/PLC and the engineering software ConverterPC, remote control and monitoring can be easily realized. Simply create the preferred settings through ConverterPC and upload it to a number of Fv frequency converters.

The primary goal of all these intelligent designs is to simplify the application and accelerate the engineering process.



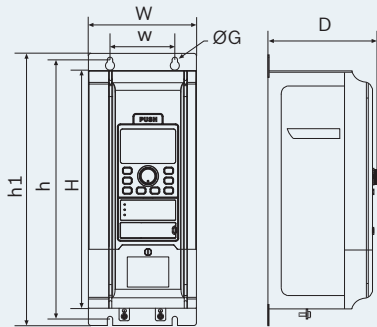
Frequency Converter Fv – Technical data

Type	FVCA01.1-0K40-3P4-MDA-LP-NNNN-01V01	FVCA01.1-0K75-3P4-MDA-LP-NNNN-01V01	FVCA01.1-1K50-3P4-MDA-LP-NNNN-01V01	FVCA01.1-2K20-3P4-MDA-LP-NNNN-01V01	FVCA01.1-4K00-3P4-MDA-LP-NNNN-01V01	FVCA01.1-5K50-3P4-MDA-LP-NNNN-01V01	FVCA01.1-7K50-3P4-MDA-LP-NNNN-01V01	FVCA01.1-11K0-3P4-MDA-LP-NNNN-01V01	FVCA01.1-15K0-3P4-MDA-LP-NNNN-01V01	FVCA01.1-18K5-3P4-MDA-LP-NNNN-01V01	FVCA01.1-22K0-3P4-MDA-LP-NNNN-01V01	FVCA01.1-30K0-3P4-MDA-LP-NNNN-01V01	FVCA01.1-37K0-3P4-MDA-LP-NNNN-01V01	FVCA01.1-45K0-3P4-MDA-LP-NNNN-01V01	FVCA01.1-55K0-3P4-MDA-LP-NNNN-01V01	FVCA01.1-75K0-3P4-MDA-LP-NNNN-01V01	FVCA01.1-90K0-3P4-MDA-LP-NNNN-01V01
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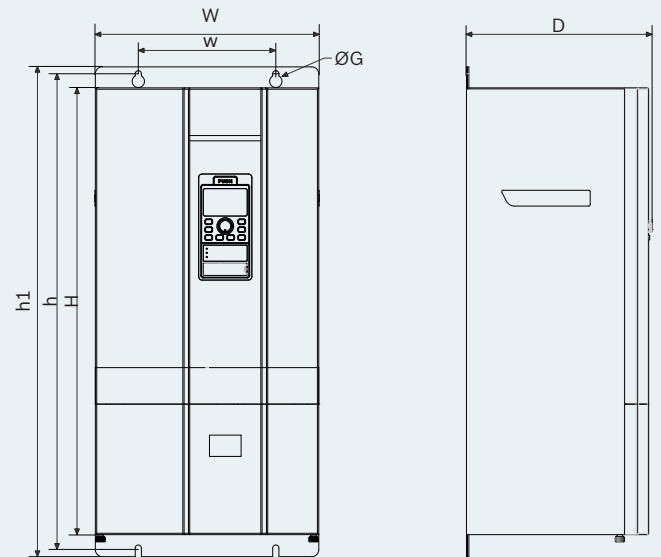
Performance data																							
Power supply voltage	V	3 AC 380 to 480 V (-15 %/+10 %)																					
Supply frequency	Hz	50 to 60 (±5 %)																					
Rated motor output	kW	0.4	0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90					
Continuous rated current	A	1.3	2.5	4.0	5.5	10	13	17	24	33	39	44	60	75	95	110	152	183					
Output voltage	V	0 to power supply voltage																					
Output frequency	Hz	0 to 400																					
Overload capacity		2 x I _N for 1 sec. or 1.5 x I _N for 1 min.																					
Brake																							
Brake chopper		internal									external												
Braking resistor		external																					
Mechanical data																							
Size		1			2			3			4			5			6			7			
Width	W	mm	125			150			175			225			250			325			450		
	w	mm	75			100			100			125			150			200			300		
Height	H	mm	275			330			398			440			525			650			700		
	h	mm	300			365			432			482			567			690			754		
	h ₁	mm	315			380			448			500			585			712.5			779		
Depth	D	mm	127			162			204			232			256.5			270			307		
Mounting hole	G	mm	5.5			6.5			6.5			8.5			8.5			9			11		
Mass	kg	2.7	2.7	2.7	2.8	4.8	4.9	4.9	8.8	9.0	16.5	16.5	22.0	22.0	37.0	39.0	56.7	58.0					

Frequency Converter Fv – Dimensions

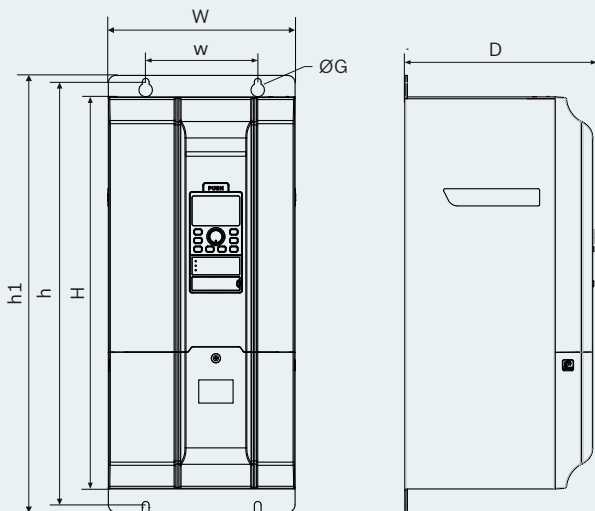
0.4kW to 15kW (Housing 1 to 3)



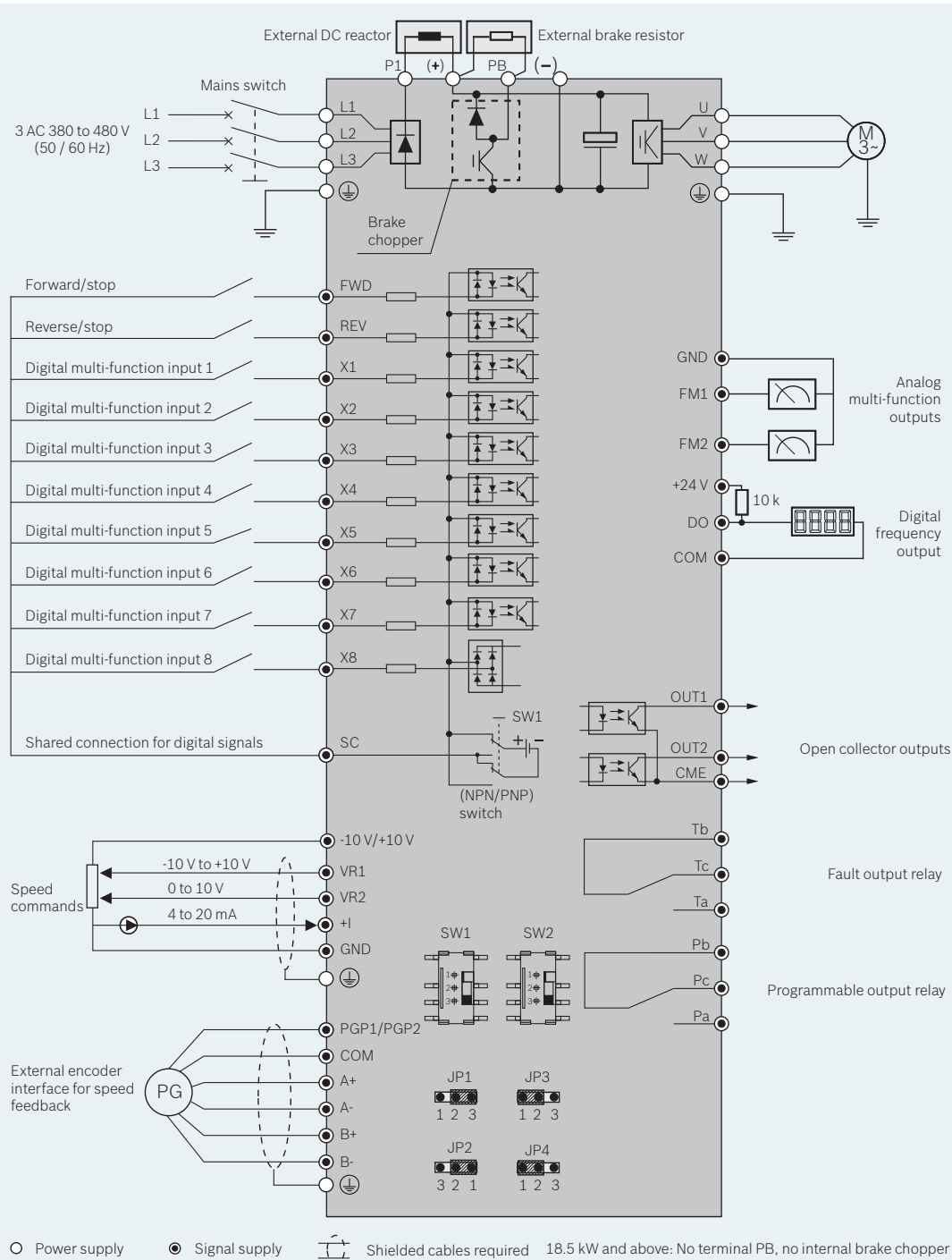
45 kW to 90 kW (Housing 6 to 7)



18.5kW to 37kW (Housing 4 to 5)



Frequency Converter Fv – Block diagram



○ Power supply ● Signal supply Shielded cables required 18.5 kW and above: No terminal PB, no internal brake chopper

Frequency Converter Fv – Function

Power connections	
Power supply voltage	3 AC 380 to 480 V (-15 % / +10 %)
Supply frequency	50 to 60 Hz (±5 %)
Rated motor output	0.4 to 90 kW
Motor connections	
Rated motor voltage	3-phase, 0 V to power supply voltage
Output frequency	0 to 400 Hz
Functions	
Control mode	V/F, SVC, FOC
Overload capacity	2 x I _N for 1 sec.
	1.5 x I _N for 60 sec.
Speed regulation range	Vector control without pulse encoder: 100:1
	Vector control with pulse encoder: 1000:1
Start-up torque	SVC Maximum start-up torque 150 % at 0.5 Hz
	FOC Maximum start-up torque 200 % at 0 Hz
Frequency resolution	Analog setting: Maximum frequency x 1/2048
	Digital setting: 0.01 Hz
Frequency setting accuracy	Analog setting: 0.05 %
	Digital setting: 0.01 %
Frequency control accuracy	SVC: 0.5 % x maximum frequency
	FOC: 0.05 % x maximum frequency
Multiple speed control	Via Integrated PLC or control terminals
Status messages via multi-function output signal	Outputs of Run, frequency level detection signal, frequency arrival signal, faults, etc.
Automatic PWM frequency adaptation	Load-dependent adaptation of PWM frequency
LCD display	Displaying of set frequency, output frequency, output voltage, output current, etc.
LED indicator	Showing setting direction, Run status.
Ambient conditions	
Ambient temperature	-10 to +40 °C (output must be reduced from 40 to 50 °C)
Max. installation height	To 1,000 m w/o derating, max. 4,000 m above sea level with reduced output of -20 %
Relative humidity	< 90 %
Degrees of protection	IP20

Frequency Converter Fv – Accessories



Communication adapter

Frequency Converter Fv provides a standard RS485 port to support the communication between frequency converter and PC or other control units via ModBus protocol. The optional PROFIBUS DP adapter enables data exchange among various control devices.



LCD panel mounting plate

The optional mounting plate for the LCD operating panel allows the user to directly mount the LCD panel on the control cabinet. Simply mount the LCD panel with the mounting plate directly in a 80mm×135mm opening on the control cabinet and connect the panel to the frequency converter with the optional cable (1 m or 3 m).



Brake chopper

Brake chopper are available with 30 kW and 45 kW, used to dissipate the energy via brake resistors (brake resistors must be selected separately), resulting in an increased brake capability and faster deceleration of the load without overvoltage trips.

Dimensions: Width = 103 mm Height = 185 mm
 Depth = 158 mm Mass = 2.5 kg



Brake resistor

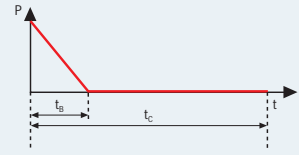
Brake resistors with different power ratings are available to dissipate braking energy when the frequency converter is in generator mode. Based on different On Times (OT), different combinations of frequency converter, brake chopper and resistors shall be selected. Please find the cross recommendation on the next page.

Frequency Converter Fv – Accessories cross reference

The table lists the recommended combination of frequency converter, brake chopper and brake resistor and the number of components required to operate one frequency converter with respect to a given moderating ratio OT.

The three digits (x/x/x) indicate a particular moderating ratio:
 Digit 1 ~ OT = 10 % Digit 2 ~ OT = 20 % Digit 3 ~ OT = 40 %

The digits value (1, 2, 3 or 4) corresponds to the number of components required to operate a frequency converter.



$$\text{On time (OT)} = \frac{\text{Braking time (t}_b\text{)}}{\text{Cycle time (t}_c\text{)}} \times 100 \%$$

Frequency converters	FVCA01.1-															
	0K40	0K75	1K50	2K20	4K00	5K50	7K50	11K0	15K0	18K5	22K0	30K0	37K0	45K0	55K0	75K0

Brake choppers																		
R912001499	FELB02.1N-30K0-NNONE-A-560-NNNN	internal								1/1/-	1/1/-	1/-/2	-/-/-	-/2/-	2/-/-	-/-/-	-/-/-	-/-/-
R912001500	FELB02.1N-45K0-NNONE-A-560-NNNN	internal								-/-/1	-/-/1	-/1/-	1/1/2	1/-/2	-/2/3	2/3/4	3/3/4	

Brake resistors																		
R912001618	FELR01.1N-0080-N750R-D-560-NNNN	1/-/-	1/-/-															
R912001619	FELR01.1N-0150-N700R-D-560-NNNN		-/1/-															
R912003281	FELR01.1N-0150-N750R-D-560-NNNN	-/1/-																
R912003282	FELR01.1N-0240-N750R-D-560-NNNN	-/-/1																
R912001623	FELR01.1N-0260-N250R-D-560-NNNN				1/-/-													
R912001624	FELR01.1N-0260-N400R-D-560-NNNN			1/-/-														
R912001627	FELR01.1N-0390-N150R-D-560-NNNN					1/-/-												
R912001631	FELR01.1N-0500-N550R-D-560-NNNN		-/-/1															
R912001632	FELR01.1N-0520-N100R-D-560-NNNN						1/-/-											
R912001633	FELR01.1N-0520-N230R-D-560-NNNN				-/1/-													
R912001634	FELR01.1N-0520-N350R-D-560-NNNN			-/1/-														
R912001637	FELR01.1N-0780-N075R-D-560-NNNN							1/-/-										
R912001638	FELR01.1N-0780-N140R-D-560-NNNN					-/1/-												
R912001639	FELR01.1N-0800-N275R-D-560-NNNN		-/-/1															
R912001652	FELR01.1N-1K04-N050R-D-560-NNNN								1/-/-									
R912001653	FELR01.1N-1K04-N090R-D-560-NNNN						-/1/-											
R912001620	FELR01.1N-01K2-N180R-D-560-NNNN				-/-/1													
R912001621	FELR01.1N-01K5-N068R-D-560-NNNN									-/2/-								
R912001622	FELR01.1N-01K5-N150R-D-560-NNNN						-/1/-											
R912001654	FELR01.1N-1K56-N040R-D-560-NNNN									1/-/-								
R912001655	FELR01.1N-1K56-N070R-D-560-NNNN							-/1/-										
R912001625	FELR01.1N-02K0-N047R-D-560-NNNN								-/1/-									
R912001626	FELR01.1N-02K0-N110R-D-560-NNNN				-/1/-													
R912001628	FELR01.1N-04K5-N055R-A-560-NNNN							-/1/-										
R912001630	FELR01.1N-04K8-N27R2-A-560-NNNN										1/-/-							
R912001629	FELR01.1N-04K8-N032R-A-560-NNNN									1/-/-								
R912001635	FELR01.1N-06K0-N020R-A-560-NNNN										1/-/-				2/-/-		3/-/-	
R912001636	FELR01.1N-06K0-N040R-A-560-NNNN								-/1/-									
R912001640	FELR01.1N-08K0-N027R-A-560-NNNN									-/1/-								
R912001642	FELR01.1N-09K6-N13R6-A-560-NNNN													1/-/-		2/-/-		
R912001641	FELR01.1N-09K6-N016R-A-560-NNNN												1/-/-					
R912001643	FELR01.1N-10K0-N022R-A-560-NNNN									-/1/-	-/1/-		-/1/-			-/1/-	-/1/-	
R912001644	FELR01.1N-10K0-N024R-A-560-NNNN													-/2/-				
R912001647	FELR01.1N-10K0-N27R2-A-560-NNNN											-/1/-						
R912001645	FELR01.1N-10K0-N028R-A-560-NNNN									-/1/-								
R912001646	FELR01.1N-10K0-N032R-A-560-NNNN												-/2/-					
R912001648	FELR01.1N-12K5-N017R-A-560-NNNN											-/1/-						
R912001649	FELR01.1N-12K5-N018R-A-560-NNNN										-/1/-			-/1/-	-/2/-			
R912001650	FELR01.1N-12K5-N020R-A-560-NNNN															-/3/-	-/3/-	
R912001651	FELR01.1N-12K5-N022R-A-560-NNNN														-/1/-			

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