

Environmental conditions

Operation

Parameter	Normal operation
Nominal ambient temperature	0°C-40°C See table at page 14 for different conditions
Atmospheric pressure	86-106 kPa
Relative humidity, non-condensing	0-90%
Contamination, according to IEC 60721-3-3	No electrically conductive dust allowed. Cooling air must be clean and free from corro-sive materials. Chemical gases, class 3C2. Solid particles, class 3S2.
Vibrations	According to IEC 60068-2-6, Sinusoidal vibrations: <ul style="list-style-type: none"> • 10<f<57 Hz, 0.075 mm • 57<f<150 Hz, 1g
Altitude	0-1000 m, with derating 1%/100 m of rated current up to 2000 m.

Storage

Parameter	Storage condition
Temperature	-20 to +60°C
Atmospheric pressure	86-106 kPa
Relative humidity, non-condensing	0-90%

Model Number

JNVX	40	-	0006	-	20	C	E	B
Model	Mains supply voltage		Rated current (A)		Protection class	Control panel	EMC	Brake chopper
JNVX = V33 series	40 = 380~415V		3~1500A		20 = IP20	_ = Blank control panel	E = Standard EMC protection	_ = No brake chopper
	48 = 380~480V						F = Extended EMC protection	B = Brake chopper built-in
JNFX = F33 series	50 = 480~525V				54 = IP54	C = Standard control panel	I = IT-net	D = DC +/- terminals included
	69 = 480~690V							

Distributor



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TECO INVERTER

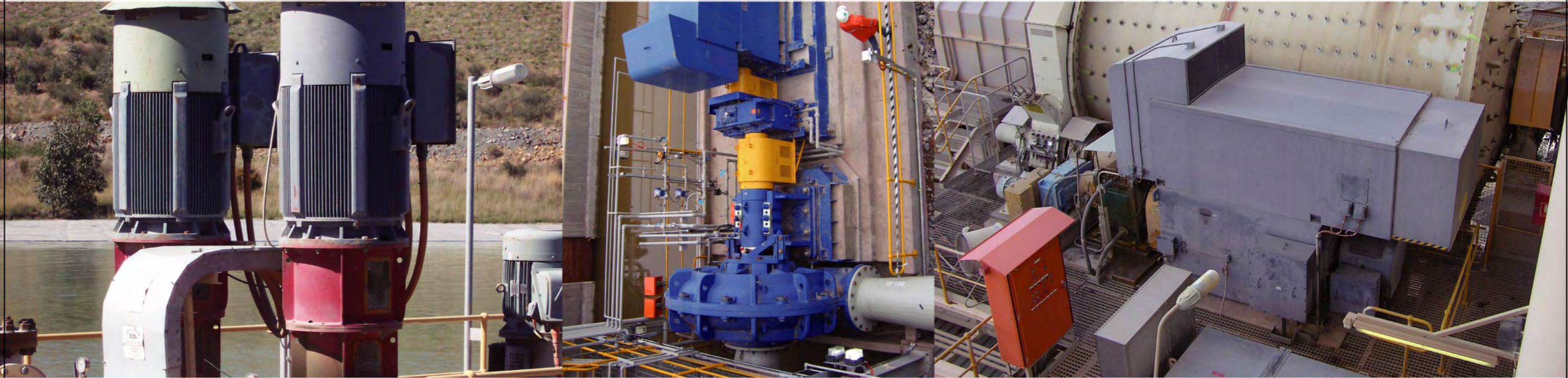


V33 Series

Full control of your power



Safe and efficient control of movements



TECO V33 variable speed drives ensure you get the most out of your applications, whether they are cranes, crushers, mills or mixers. With full control of the process you will benefit from reliable, cost-efficient and user-friendly operation, protected against damage and downtime.

The combination of direct torque control, accurate speed control and efficient vector braking makes TECO V33 the ideal alternative to costly servo systems and DC motor drives.

With all its functions included in a compact IP54 cabinet, the TECO V33 is cost-efficiently installed close to the application. An intuitive user and process interface makes it easy to communicate critical parameters to other parts of your process.

Fit-for-purpose is the key term for TECO V33.

Protective and efficient starts

Protective starts are ensured with TECO V33. Reduced start currents result in smaller fuses, cables and energy bills. A crusher or a mill loaded with material can be difficult to start. This is dealt with efficiently by TECO V33 boosting the torque to overcome initial peak loads. Starting a heavily loaded crane without jerky movements is also critical. The TECO V33 gives an instant, yet soft, start by ensuring the pre-magnetized motor has enough power to deliver the torque needed to start the movement at the very moment the mechanical brake is released.

Controlled ramping for safe start-up

TECO V33 offers a unique function that protects your equipment by ensuring a controlled ramping up of the DC link voltage. This so called HCB ramping (Half Controlled Bridge) offers a safe start-up, and detects phase failure and asymmetries. As there are no built-in resistors or bulky contactors, both size and maintenance are reduced.

You can safely turn the variable speed drive on and off with an external contactor, as often as needed. In other drives this could cause breakdowns or serious damage.



Optimized operation and full control

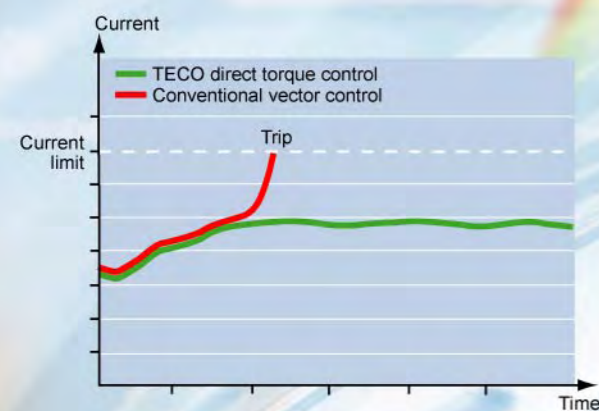


Direct torque control eliminates disturbances

With its direct torque and speed control, the TECO V33 is the choice for all dynamic applications. Operation is optimized and you are in full control of the process.

TECO V33 protects the operation from interruptions thanks to a very accurate and quick speed and torque control. The torque control reacts extremely quickly and eliminates disturbances due to peak loads, abrupt load changes or inaccurately set ramp times.

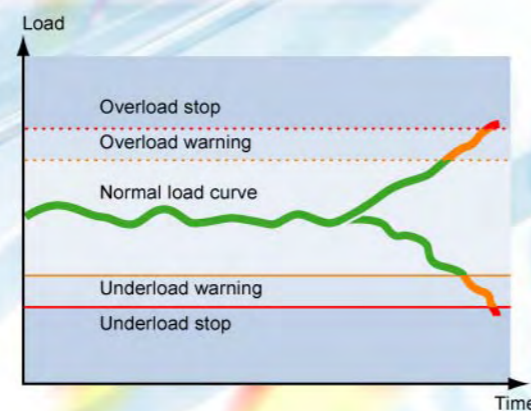
The fast torque response results in safer, more cost-effective operation, for example of a crane where frequent and critical starts and stops demand instant high torque, or of a crusher where speed quickly needs to be adjusted to changes in load or type of material.



Direct torque control means that abrupt load changes do not cause disturbances and downtime. The response time is extremely short since the TECO V33 compares actual and required torque 40,000 times a second.

Protection against damage and downtime

A built-in shaft power monitor and an unique load curve protection function protect your process against damage and downtime. The load curve of the controlled equipment is monitored across the entire speed range. Any over- or underload situation that could cause inefficiency or damage is detected immediately. You can easily set the warning and safety stop levels that allow you to take preventive action before damage is done. There is no need to worry about a crusher jamming or a mixer running with a broken blade. A warning is sent, or a safety stop activated, before any damage can occur. TECO V33 protects the process and makes sure it works as efficiently as possible.



The unique load curve protection detects any deviation from normal load across the whole speed range, and sends a warning or stops the process before any damage is done (patent pending EP 05109356).

Speed controller increases efficiency

TECO V33 has an internal speed controller that increases efficiency. It reacts immediately to load changes that cause deviation in motor speed, and quickly adjusts speed to the set reference value. The controller works without an external feedback and an autotune function reduces set-up time.

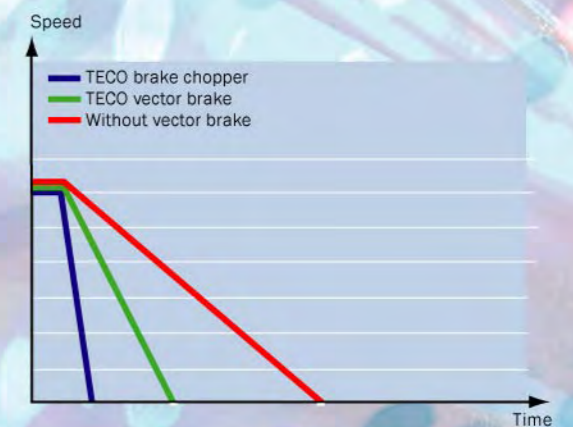


A speed controller ensures efficient operation by immediately adapting speed to meet load changes.

Safe and efficient braking

An integrated vector brake function offers rapid and protective braking. No mechanical brakes are required. The braking energy is dissipated through the motor itself, which helps avoid interruptions due to excessive brake voltage.

In mill applications quick and secure stops are often needed for safety or productivity reasons. These are ensured by using the vector brake. For a heavily loaded crane a brake chopper, available as an option, guarantees very rapid but soft braking without any jerky movements.



An integrated vector brake function halves the braking time. A brake chopper is available as an option when extremely short braking time is required. The example shown is true when full braking power is used.

Cranes

Challenge	TECO V33 solution	Value
Starting with a heavy load is difficult and risky. Can lead to hoist load dips or jerks causing swinging load in travel motions.	Direct torque control, motor pre-magnetization and precise brake control gives instant yet soft start with heavy load.	Shortened cycle time and increased safety. Less stress on equipment reduces maintenance costs and downtime.
Unsynchronized travel motions of a rail-mounted crane cause noisy operation and stress on wheels.	Speed and position of wheels are fully synchronized. Crane rides parallel to the rail.	Less maintenance and downtime. Less noise improves working conditions.
Crane is driven slowly when returning empty or with a light load. Valuable time is lost.	Speed can be increased by operating the motor in the field weakening area.	Reduced cycle times and optimized operation.
Hoisting and grabbing cannot be controlled independently. Stress on ropes and longer cycle times.	Hoisting and grabbing can be operated simultaneously. Grab can be opened and closed while being hoisted.	Reduced cycle times. Hoisting while closing grab puts less stress on ropes, reducing maintenance costs and downtime.
Braking with heavy load is difficult and risky. Can lead to jerks causing swinging load.	Direct torque control and brake chopper smoothly reduce speed to zero before mechanical brake is activated.	Increased safety. Less stress on equipment reduces maintenance costs and downtime.
Operator starts braking earlier than necessary to stop the crane at end position. Increases cycle times and can lead to jerky movements.	System automatically stops crane at end position. Operator can safely drive at full speed.	Reduced cycle times and increased safety.

Crushers

Challenge	TECO V33 solution	Value
High start currents require larger fuses and cables, or for mobile crushers larger diesel generators. Causes stress on equipment and higher energy costs.	Speed control reduces start current. Same fuses can be used as those required for the nominal motor current, or a smaller generator.	Lower investment and energy costs, extended equipment lifetime.
Abrupt load change or torque peak when starting heavily loaded crusher. Causes mechanical stress and false trips.	Direct torque control adjusts the torque to handle load changes and overcome initial peak loads.	Reliable operation without interruptions. Reduced mechanical stress and less downtime.
Material that could cause damage gets into the crusher.	Load curve protection function quickly detects deviation. Warning is sent or safety stop activated.	Early warning allows preventive action before damage or breakdown.
Motor runs at same speed despite varying demands.	Motor speed is continuously adapted to the amount and size of rock. Speed of feeder is adapted to load variations.	Increased efficiency. Reduced maintenance costs.
Process inefficiency due to e.g. broken feeder or worn jaw. Energy wasted, mechanical stress and risk of process failure.	Load curve protection function quickly detects deviation from normal load. Warning is sent or safety stop activated.	Preventive action before damage or breakdown. No energy is lost and downtime is reduced.

Mills

Challenge	TECO V33 solution	Value
High start currents require larger fuses and cables. Causes stress on equipment and higher energy costs.	Speed control reduces start current. Same fuses can be used as those required for the nominal motor current.	Lower investment and energy costs, extended equipment lifetime.
Abrupt load change or torque peak when starting heavily loaded mill. Causes mechanical stress and false trips.	Direct torque control adjusts the torque to handle load changes and overcome initial peak loads.	Reliable operation without interruptions. Reduced mechanical stress and less downtime.
Material that could cause damage gets into the mill.	Load curve protection function quickly detects deviation. Warning is sent or safety stop activated.	Early warning allows preventive action before damage or breakdown.
Motor runs at same speed despite varying demands.	Motor speed is continuously adapted to the amount and size of material. Speed of feeder is adapted to load variations.	Increased efficiency. Reduced maintenance costs.
Process inefficiency due to broken or worn equipment. Energy wasted, mechanical stress and risk of process failure.	Load curve protection function quickly detects deviation from normal load. Warning is sent or safety stop activated.	Preventive action before damage or breakdown. No energy is lost and downtime is reduced.

Mixers

Challenge	TECO V33 solution	Value
High start currents require larger fuses and cables. Causes stress on equipment and higher energy costs.	Speed control reduces start current. Same fuses can be used as those required for the nominal motor current.	Lower investment and energy costs, extended equipment lifetime.
Difficult to determine when mixing process is ready.	Built-in shaft power monitor determines when viscosity is right.	Optimized operation and higher product quality.
Motor runs at same speed despite varying demands.	Speed is continuously adapted to viscosity level.	Reduced mixing time and improved product quality. Reduced maintenance costs.
Process inefficiency due to e.g. a damaged or broken blade. Energy wasted, mechanical stress and risk of process failure.	Load curve protection function quickly detects deviation from normal load. Warning is sent or safety stop activated.	Preventive action before damage or breakdown. No energy is lost and downtime is reduced.

Many other features



User-friendly and reliable operation

- Your own specific process in the units
- Virtual connection of logical functions
- User-friendly PC software
- Local or remote control
- Concise manuals help you achieve optimal use
- Easy copying of settings

Cost-efficient and flexible installation

- Compact IP54 for cost-efficient installation
- High power units are also compact
- Flexible cable connections

Options add functionality

- Combine more options
- Safe and efficient crane control
- Shortened braking time
- Versatile communication options
- Efficient motor protection
- Encoder for higher speed accuracy
- Safe stop without a contactor
- Liquid cooling saves energy and space
- Extended EMC protection
- Reduced harmonic distortions
- Standby supply

A complete series

- Rated power: 0.75-1,500 kW
- Supply voltage: 380-690 V, 3-phase
- Rated current: 2.5-1,500 A
- Protection class: IP54
- Approvals: Global standards



Simplified maintenance

- Detailed alarm codes simplify troubleshooting
- Fan control extends equipment lifetime
- Fold out for easy access

Electrical specifications related to model

Typical motor power at mains voltage 400 V

Model	Max. output current [A]*	Normal duty (120%, 1 min every 10 min)		Heavy duty (150%, 1 min every 10 min)		Frame size
		Power @400V [kW]	Rated current [A]	Power @400V [kW]	Rated current [A]	
JNVX48-0003	3.8	0.75	2.5	0.55	2.0	B
JNVX48-0004	6.0	1.5	4.0	1.1	3.2	
JNVX48-0006	9.0	2.2	6.0	1.5	4.8	
JNVX48-0008	11.3	3	7.5	2.2	6.0	
JNVX48-0010	14.3	4	9.5	3	7.6	
JNVX48-0013	19.5	5.5	13.0	4	10.4	
JNVX48-0018	27.0	7.5	18.0	5.5	14.4	C
JNVX48-0026	39	11	26	7.5	21	
JNVX48-0031	46	15	31	11	25	
JNVX48-0037	55	18.5	37	15	29.6	
JNVX48-0046	69	22	46	18.5	37	X2
JNVX40-0060	92	-	-	30	61	
JNVX40-0073	111	-	-	37	74	E
JNVX48-0090	108	45	90	37	72	
JNVX48-0109	131	55	109	45	87	
JNVX48-0146	175	75	146	55	117	
JNVX48-0175	210	90	175	75	140	F
JNVX48-0210	252	110	210	90	168	
JNVX48-0250	300	132	250	110	200	G
JNVX48-0300	360	160	300	132	240	
JNVX48-0375	450	200	375	160	300	H
JNVX48-0430	516	220	430	200	344	
JNVX48-0500	600	250	500	220	400	I
JNVX48-0600	720	315	600	250	480	
JNVX48-0650	780	355	650	315	520	J
JNVX48-0750	900	400	750	355	600	
JNVX48-0860	1032	450	860	400	688	K
JNVX48-1000	1200	500	1000	450	800	
JNVX48-1200	1440	630	1200	500	960	K
JNVX48-1500	1800	800	1500	630	1200	

* Available during limited time and as long as allowed by drive temperature.

Electrical specifications related to model

Typical motor power at mains voltage 460 V

Model	Max. output current [A]*	Normal duty (120%, 1 min every 10 min)		Heavy duty (150%, 1 min every 10 min)		Frame size	
		Power @460V [hp]	Rated current [A]	Power @460V [hp]	Rated current [A]		
JNVX48-0003	3.8	1	2.5	1	2.0	B	
JNVX48-0004	6.0	2	4.0	1.5	3.2		
JNVX48-0006	9.0	3	6.0	2	4.8		
JNVX48-0008	11.3	3	7.5	3	6.0		
JNVX48-0010	14.3	5	9.5	3	7.6		
JNVX48-0013	19.5	7.5	13.0	5	10.4		
JNVX48-0018	27.0	10	18.0	7.5	14.4		
JNVX48-0026	39	15	26	10	21		C
JNVX48-0031	46	20	31	15	25		
JNVX48-0037	55	25	37	20	29.6		
JNVX48-0046	69	30	46	25	37		
JNVX50-0060	92	-	-	40	61	X2	
JNVX48-0090	108	60	90	50	72	E	
JNVX48-0109	131	75	109	60	87		
JNVX48-0146	175	100	146	75	117		
JNVX48-0175	210	125	175	100	140	F	
JNVX48-0210	252	150	210	125	168		
JNVX48-0250	300	200	250	150	200	G	
JNVX48-0300	360	250	300	200	240		
JNVX48-0375	450	300	375	250	300	H	
JNVX48-0430	516	350	430	250	344		
JNVX48-0500	600	400	500	350	400	I	
JNVX48-0600	720	500	600	400	480		
JNVX48-0650	780	550	650	400	520	J	
JNVX48-0750	900	600	750	500	600		
JNVX48-0860	1032	650	860	550	688	K	
JNVX48-1000	1200	700	1000	600	800		
JNVX48-1200	1440	750	1200	700	960	K	
JNVX48-1500	1800	800	1500	750	1200		

* Available during limited time and as long as allowed by drive temperature.

Typical motor power at mains voltage 525 V

Model	Max. output current [A]*	Normal duty (120%, 1 min every 10 min)		Heavy duty (150%, 1 min every 10 min)		Frame size	
		Power @525V [kW]	Rated current [A]	Power @525V [kW]	Rated current [A]		
JNVX52-0003	3.8	1.1	2.5	1.1	2.0	B	
JNVX52-0004	6.0	2.2	4.0	1.5	3.2		
JNVX52-0006	9.0	3	6.0	2.2	4.8		
JNVX52-0008	11.3	4	7.5	3	6.0		
JNVX52-0010	14.3	5.5	9.5	4	7.6		
JNVX52-0013	19.5	7.5	13.0	5.5	10.4		
JNVX52-0018	27.0	11	18.0	7.5	14.4		C
JNVX52-0026	39	15	26	11	21		
JNVX52-0031	46	18.5	31	15	25		
JNVX52-0037	55	22	37	18.5	29.6		
JNVX52-0046	69	30	46	22	37	X2	
JNVX50-0060	92	-	-	37	61		
JNVX69-0090	108	55	90	45	72	F69	
JNVX69-0109	131	75	109	55	87		
JNVX69-0146	175	90	146	75	117		
JNVX69-0175	210	110	175	90	140	H69	
JNVX69-0210	252	132	210	110	168		
JNVX69-0250	300	160	250	132	200	I69	
JNVX69-0300	360	200	300	160	240		
JNVX69-0375	450	250	375	200	300	J69	
JNVX69-0430	516	300	430	250	344		
JNVX69-0500	600	315	500	300	400	K69	
JNVX69-0600	720	400	600	315	480		
JNVX69-0650	780	450	650	355	520	K69	
JNVX69-0750	900	500	750	400	600		
JNVX69-0860	1032	560	860	450	688	K69	
JNVX69-1000	1200	630	1000	500	800		

* Available during limited time and as long as allowed by drive temperature.

General electrical specifications

Typical motor power at mains voltage 575 V

Model	Max. output current [A]*	Normal duty (120%, 1 min every 10 min)		Heavy duty (150%, 1 min every 10 min)		Frame size
		Power @575V [hp]	Rated current [A]	Power @575V [hp]	Rated current [A]	
JNVX69-0090	108	75	90	60	72	F69
JNVX69-0109	131	100	109	75	87	
JNVX69-0146	175	125	146	100	117	
JNVX69-0175	210	150	175	125	140	
JNVX69-0210	252	200	210	150	168	H69
JNVX69-0250	300	250	250	200	200	
JNVX69-0300	360	300	300	250	240	
JNVX69-0375	450	350	375	300	300	
JNVX69-0430	516	400	430	350	344	I69
JNVX69-0500	600	500	500	400	400	
JNVX69-0600	720	600	600	500	480	J69
JNVX69-0650	780	650	650	550	520	
JNVX69-0750	900	750	750	600	600	K69
JNVX69-0860	1032	850	860	700	688	
JNVX69-1000	1200	1000	1000	850	800	

* Available during limited time and as long as allowed by drive temperature.

Typical motor power at mains voltage 690 V

Model	Max. output current [A]*	Normal duty (120%, 1 min every 10 min)		Heavy duty (150%, 1 min every 10 min)		Frame size
		Power @690V [kw]	Rated current [A]	Power @690V [kw]	Rated current [A]	
JNVX69-0090	108	90	90	75	72	F69
JNVX69-0109	131	110	109	90	87	
JNVX69-0146	175	132	146	110	117	
JNVX69-0175	210	160	175	132	140	
JNVX69-0210	252	200	210	160	168	H69
JNVX69-0250	300	250	250	200	200	
JNVX69-0300	360	315	300	250	240	
JNVX69-0375	450	355	375	315	300	
JNVX69-0430	516	450	430	315	344	I69
JNVX69-0500	600	500	500	355	400	
JNVX69-0600	720	600	600	450	480	J69
JNVX69-0650	780	630	650	500	520	
JNVX69-0750	900	710	750	600	600	K69
JNVX69-0860	1032	800	860	650	688	
JNVX69-0900	1080	900	900	710	720	
JNVX69-1000	1200	1000	1000	800	800	

* Available during limited time and as long as allowed by drive temperature.

General electrical specifications

General

Mains voltage:	JNVX40 JNVX48 JNVX50/52 JNVX69	380-415V +10%/-15% 380-480V +10%/-15% 460-525V +10%/-15% 500-690V +10%/-15%
Mains frequency:		45 to 65 Hz
Input power factor:		0.95
Output voltage:		0-Mains supply voltage:
Output frequency:		0-400 Hz
Output switching frequency:		3 kHz
Efficiency at nominal load:		97% for models 0003 to 0018 98% for models 0026 to 0046 97.5% for models 0060 to 0073 98% for models 0090 to 1500

Control signal inputs:

Analogue (differential)

Analogue Voltage/current:	0-±10 V/0-20 mA via software setting
Max. input voltage:	+30 V
Input impedance:	20 kΩ (voltage) 250 Ω (current)
Resolution:	10 bits
Hardware accuracy:	0.5% type + 1 ½ LSB fsd
Non-linearity:	1½ LSB

Digital:

Input voltage:	High>7 VDC Low<4 VDC
Max. input voltage:	+30 VDC
Input impedance:	<3.3 VDC: 4.7 kΩ ≥ 3.3 VDC: 3.6 kΩ
Signal delay:	≤ 8 ms

Control signal outputs

Analogue

Output voltage/current:	0-10 V/0-20 mA via switch
Max. output voltage:	+15 V @5 mA cont.
Short-circuit current (∞):	+15 mA (voltage) +140 mA (current)
Output impedance:	10 Ω (voltage)
Resolution:	10 bit
Maximum load impedance for current	500 Ω
Hardware accuracy:	1.9% type fsd (voltage), 2.4% type fsd (current)
Offset:	3 LSB
Non-linearity:	2 LSB

Digital

Output voltage:	High>20 VDC @50 mA, >23 VDC open Low<1 VDC @50 mA
Shortcircuit current (∞):	100 mA max (together with +24 VDC)

Relays

Contacts	2 A/250 VAC or 2 A/42 VDC
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References

+10VDC	+10 VDC @10 mA Shortcircuit current +30 mA max
-10VDC	-10 VDC @10 mA
+24VDC	+24 VDC Short-circuit current +100 mA max (together with Digital Outputs)

Operation at higher temperatures

Most variable speed drives are made for operation at maximum of 40°C ambient temperature. However, for most models, it is possible to use the VSD at higher temperatures with little loss in performance. The table below shows ambient temperatures as well as derating for higher temperatures.

Ambient temperature and derating 400-690V types

Model	IP20		IP23/IP54	
	Max temp.	Derating: possible	Max temp.	Derating: possible
JNVX **-0003 to JNVX **-0046	–	–	40°C	Yes, -2.5%/°C to max +10°C
NVX **-0060 to JNVX40-0073	40°C	Yes, -2.5%/°C to max +10°C	35°C	Yes, -2.5%/°C to max +10°C
JNVX **-0090 to JNVX **-1500	–	–	40°C	-2.5%/°C to max +5°C

Example

In this example we have a motor with the following data that we want to run at the ambient temperature of 45°C:

Voltage 400 V
Current 68 A
Power 37 kW

Select variable speed drive

The ambient temperature is 5°C higher than the maximum ambient temperature. The following calculation is made to select the correct VSD model.

Derating is possible with loss in performance of 2.5%/°C.

Derating will be: $5 \times 2.5\% = 12.5\%$

Calculation for model JNVX40-0073

73 A - (12.5% X 73) = 63.875A; this is not enough.

Calculation for model JNVX48-0090

90 A - (12.5% X 90) = 78.75 A

In this example we select the JNVX48-0090.

Dimensions and Weights

The table below gives an overview of the dimensions and weights. The models 0300 to 1500 consist of 2, 3, 4, 5 or 6 paralleled modules built into a standard cabinet.

Mechanical specifications, JNVX40, JNVX48, JNVX50, JNVX52

Models	Frame size	Dim. H x W x D [mm] IP20	Dim. H x W x D [mm] IP23/IP54	Weight IP20 [kg]	Weight IP23/IP54 [kg]
0003 to 0018	B	–	350(416)x 203 x 200	–	12.5
0026 to 0046	C	–	440(512) x 178 x 292	–	24
0060 to 0073	X2	530(590) x 220 x 270	530(590) x 220 x 270	26	26
0090 to 0109	E	–	950 x 285 x 314	–	56
0146 to 0175	E	–	950 x 285 x 314	–	60
0210 to 0250	F	–	950 x 345 x 314	–	74
0300 to 0375	G	1036 x 500 x 390	2320 x 600 x 500	140	270
0430 to 0500	H	1036 x 500 x 450	2320 x 600 x 600	170	305
0600 to 0750	I	1036 x 730 x 450	2320 x 1000 x 600	248	440
0860 to 1000	J	1036 x 1100 x 450	2320 x 1200 x 600	340	580
1200 to 1500	K	1036 x 1560 x 450	2320 x 2000 x 600	496	860

Mechanical specifications, JNVX69

Models	Frame size	Dim. H x W x D [mm] IP20	Dim. H x W x D [mm] IP23/IP54	Weight IP20 [kg]	Weight IP23/IP54 [kg]
0090 to 0175	F69	–	1090 x 345 x 314	–	77
0210 to 0375	H69	1176 x 500 x 450	2320 x 600 x 600	176	311
0430 to 0500	I69	1176 x 730 x 450	2320 x 1000 x 600	257	449
0600 to 0650	J69	1176 x 1100 x 450	2320 x 1200 x 600	352	592
0750 to 1000	K69	1176 x 1560 x 450	2320 x 2000 x 600	514	878

Dimensions and Weights