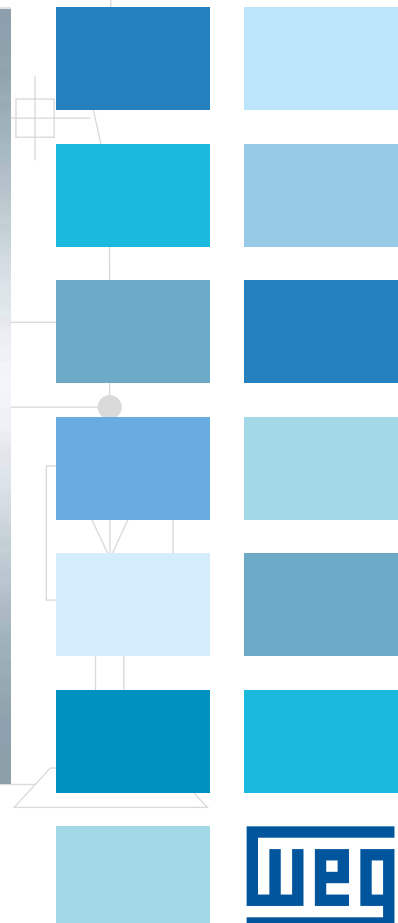
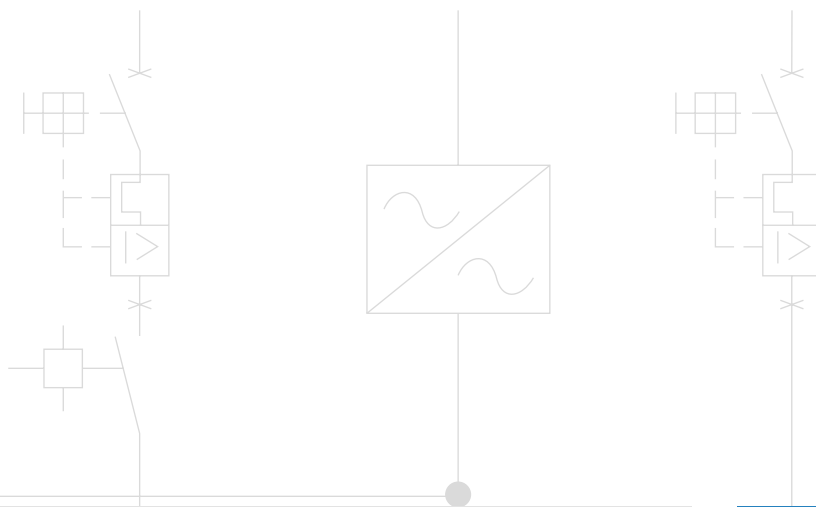


MVW01

Medium Voltage Variable Frequency Drive



MVW-01

WEG is a supplier of speed variation systems for Medium Voltage that can offer a complete package: Input Switchgear, Dry-type or Oil-type Phase-shifting Transformer, Variable Frequency Drive (VFD) and Medium Voltage Motor.

WEG Medium Voltage Variable Frequency Drives are designed with state of the art technology and use a multilevel structure with high voltage IGBTs (6,5kV) reducing the motor harmonic currents to extremely low levels.

The input rectifier configuration with 12-pulse or 18-pulse results in high power factor fully meeting IEEE-519 requirements.

The MVW-01 is designed with multiprocessing control architecture and uses a 32-bit high performance processor (64-bits bus) with floating-point capability, ensuring a high performance control of the drive and motor.

The MVW-01 follows the same programming philosophy of the LV WEG drive, resulting in a simple speed variation solution for MV applications.

The MVW-01 drives introduce remarkable innovation on the segment of medium voltage speed variation, combining robustness, simplicity, reliability and safety in a compact solution with the latest generation technology.



Main characteristics

- Totally digital with high performance 32-bits processor (64-bits bus)
- Smart keypad with dual display (LCD and LED)
- Motor voltages: 2.3, 3.3 or 4.16kV
- Power ratings up to 4500HP
- IP41/NEMA 1 Enclosure
- Air-cooled
- 12-pulse Input Rectifier (18-pulse as an option): high power factor (> 0.95)
- Multilevel topology (NPC - Neutral Point Clamp - 3/5 levels)
- Fiber optic insulation between the control section and the high voltage power section
- Voltage Source Inverter (VSI)
- Latest generation technology of High Voltage IGBT's (6.5kV) results in a reduced number of components, hence improving the system efficiency / reliability
- Ultra-reliable dry-type plastic film power capacitors
- Withdrawable power arms (easy and fast maintenance)
- High efficiency (> 98.5%)
- Low noise level (< 75dB)
- Low drive losses (low heat generation)

Applications

Chemical, Petrochemical, Oil and Gas Industries

- Pumps
- Fans / Exhausters
- Compressors
- Mixers/Agitators



Cement and Mining

- Pumps
- Fans / Exhausters
- Conveyors
- Cement Kilns



Steel and Metallurgy

- Pumps
- Fans / Exhausters
- Steel Mill
- Winders / Unwinders



Sugar and Alcohol

- Sugar Mill
- Fans
- Exhausters

Pulp and Paper

- Pumps
- Fans
- Exhausters
- Refiners

Plastic and Rubber

- Banburys
- Extruders

Waste Water

- Pumps

Pumps

The variable frequency drive can vary the pump flow by adjusting the motor speed. In such a way, not only the improvement on the process control is obtained (better precision, higher production) but also energy saving. The use of a variable frequency drive also introduces another advantage: smooth starting - electrical (reducing the starting impact to the network) and mechanical (reducing the impact for the load and for the coupling) - resulting in reduced maintenance.

Banbury®

The speed control flexibility as well as the capability of driving high torque applications, makes the variable frequency drive the ideal device for Banburys applications, ensuring a perfect and homogeneous mix and resulting in quality improvement for the final product.

Mills

The variable frequency drive can be used with high starting torque loads to control and limit the motor current. Energy saving is obtained with constant torque loads, since the absorbed power is directly proportional to the speed ($P \sim N$). Therefore, reduction on the speed results in reduction on the absorbed power. The drive can be used to run the cylinders independently, which improves the extraction process and renders the milling process much more flexible.



Technical Data

MAIN POWER SUPPLY	Voltage	2300, 3300 or 4160V (+ 10%, -20% with output power de-rating)	
	Frequency	50 or 60Hz (± 3%)	
	Phase Unbalance	Less than 3%	
	Cos j (Power Factor)	Greater than 0.97	
CONTROL POWER SUPPLY	Voltage	220V / 380V / 400V / 415V / 440V / 460V / 480V	
	Frequency	50 or 60Hz (± 3Hz)	
	Phase Unbalance	Less than 3%	
ENCLOSURE	Standard	NEMA 1 / IP41	
Control	Microprocessor	32 bits	
	Control Type	SVM Sinusoidal PWM (Space Vector Modulation) and optimal pulses (OPP) Fully Digital	
	Control Mode	V / Hz – Voltage Source	
	Switching Mode	High Voltage IGBT (HV – IGBT)	
	Frequency Range	0 ... 100 Hz	
	Overload Capacity	150% for 60 seconds, every 10 minutes (1,5 x I rated - CT)	
		115% for 60 seconds, every 10 minutes (1,15 x I rated - VT)	
Efficiency	Greater than 98.5%		
PERFORMANCE	Speed Control	Regulation (with Slip Compensation): 0,5% of Motor Rated Speed	
		V /Hz Resolution: 1 rpm (Keypad Reference)	
		Speed Regulation Range: 1:20	
CONTROL INPUTS	Analog	2 Programmable Differential Inputs (10 bits): 0...10V, 0...20mA or 4...20mA	
		1 Programmable Isolated Input (10 bits): 0...10V, 0...20mA or 4...20mA	
		1 Programmable Bipolar Input (14 bits): -10 ... +10 V, 0...20mA or 4...20mA *	
		1 Programmable Isolated Input (10 bits): 0...10V, 0...20mA or 4...20mA *	
	Digital	8 Programmable Isolated Inputs: 24Vdc	
		1 Programmable Isolated Input: 24Vdc *	
1 Programmable Isolated Input: 24Vdc (for Motor PTC Thermistor) *			
CONTROL OUTPUTS	Analog	2 Programmable Outputs (11 bits): 0...10V	
		2 Programmable Isolated Outputs (11 bits): 0 ... 20mA or 4 ... 20mA	
		2 Programmable Bipolar Outputs (14 bits): -10 ... +10V *	
		2 Programmable Isolated Outputs (11 bits): 0 ... 20mA or 4 ... 20mA *	
	Relay	5 Programmable Outputs, Form C Contacts (NO/NC): 240Vac, 1A	
Transistor	2 Programmable Isolated Outputs (Open Collector): 24Vdc, 50mA *		
COMMUNICATION	Serial Interface	RS-232 (point-to-point)	
		RS-485, Isolated, with EBA or EBB Expansion Boards (multi-point up to 30 drives) *	
	Fieldbus Communication	Modbus RTU (Built-in) via RS-485 serial Profibus DP or DeviceNet (via Communication Board)	
SAFETY	Protections (storage of the last 100 faults/ alarms with date and time)	DC Link Overvoltage	Output Short Circuit
		DC Link Undervoltage	Output Ground Fault
		Drive and Motor Overtemperature	External Fault
		Output Overcurrent	Self-diagnosis Fault and Programming Error
		Motor Overload (I x t)	Serial Communication Fault
		Dynamic Braking Resistor Overload	Power Supply Phase Loss
CPU / EPROM Error (Watchdog)	Keypad Connection Fault		
AMBIENT	Temperature	0 ... 104 °F (40 °C) (up to 122 °F (50 °C) with 2,5% Output Current De-rating / °C)	
	Humidity	5 ... 90% Non Condensing	
	Altitude	0 ... 3300 ft (1000 m) (up to 13100 ft (4000 m) with 10% output current derating / 1000m)	
FINISHING	Color	Munsell Gray 5PB7/4 (Doors)	
		Munsell Blue 5PB2/6 (Base, Roof and Shutter)	
CONFORMITIES/ STANDARDS	Electromagnetic Compatibility	EMC Directive 89 / 336 / EEC – Industrial Environment	
		CEI Standard – IEC 61800-3 (EMC – Emission and Immunity)	
	CEI – IEC 61800	Adjustable Speed Electrical Power Drive System	
		Part 4 – General Requirements	
		Part 5 – Safety Requirements	
UL (USA)	Underwriters Laboratories Inc. USA (File E253837)		

* Optional

Technical Data

KEYPAD	Commands	Start / Stop, General Functions Programming	
		Increase / Decrease Speed	
		JOG, FWD/VER and Local/Remote	
	Monitoring	Speed Reference (rpm)	Output Current (A)
		Motor Speed (rpm)	Output Voltage (V)
		Speed Proportional Value (Ex: ft/min)	Drive Status
		Output Frequency (Hz)	Status of Digital Inputs
		DC Link Voltage (V)	Status of Digital Outputs
		Motor Torque (%)	Status of Relay Outputs
		Output Power (kW)	Analog Inputs Value
		Hours Powered Up (h)	100 Last Faults with Date and Time
Hours Enabled (h)		Fault / Alert Messages	
CONTROL FEATURES	Standard	Keypad with LCD + LED displays	
		Password to protect drive programming	
		LCD display language selection: English, Spanish and Portuguese	
		Fault auto-diagnosis and auto-reset	
		Parameters reset to factory or user default	
		Inverter Self-tuning to motor and load (Vector Modes)	
		Specific unit indication (Ex: l/s, t/h, %, etc.)	
		Slip compensation (V / Hz Mode)	
		Manual and Automatic Torque Boost – I x R (V / Hz Mode)	
		Adjustable V / Hz Curve (V / Hz Mode)	
		Minimum and maximum speed limits	
		Maximum current limit	
		Adjustable motor overload protection	
		Adjustable digital gain and offset for the analog inputs	
		Adjustable digital gain for the analog outputs	
		JOG function	
		JOG + / JOG – Function (momentary speed increase/decrease)	
		COPY Function (Drive Keypad or Keypad Drive)	
		Comparison functions for the digital outputs:	
		N* > Nx; N > Nx; N < Nx ; N = 0; N = N*; Is > Ix ; Is < Ix; T > Tx and T < Tx	
		Where: N = Motor speed; N* = Speed reference; Is = Output Current and T = Motor torque	
		Linear and “S type” ramps / double ramp	
		Independent acceleration and deceleration ramps	
		Multi-speed function (up to 8 preset speeds)	
		Special resources (Hour meter and Wattmeter)	
		Overlapped PID Regulator (for automatic level, flow, pressure, and weight control)	
		Direction of Rotation selection (FWD/REV)	
		Local / Remote Operation selection	
	Flying Start function (restart with a spinning load)		
	Critical Speed Avoidance (Skip Speed)		
	Ride-Through function (operation during momentary power loss)		
	Built-in Modbus RTU (needs the RS-232 or RS-485 interface)		
	Options	NEMA 4 Remote Keypad (LCD display)	
Remote Keypad cable (3.3, 6.6, 10, 16, 25 and 35 ft)			
Remote Keypad frame kit			
Expansion Boards with special functions			
Profibus-DP			
DeviceNet			
SUPERDRIVE Kit with RS-232 Serial Interface Communication (Drive PC)			

These data is subject to changewithout previous notice



12-pulse or 18-pulse Input Rectifier

- Low harmonic distortion
- High power factor (> 0.95)

Withdrawable IGBT Arms

- Withdrawable Power Arms
- Gate-drives / feedbacks / monitoring – optic fiber
- Simple control connections
- Stabs for power connections
- Simple and fast maintenance



Air-cooling

- Simple maintenance
- Low drive losses (low heat generation)
- Low noise level



DC Link Monitoring

- Visual indication of the voltage presence on the DC Link





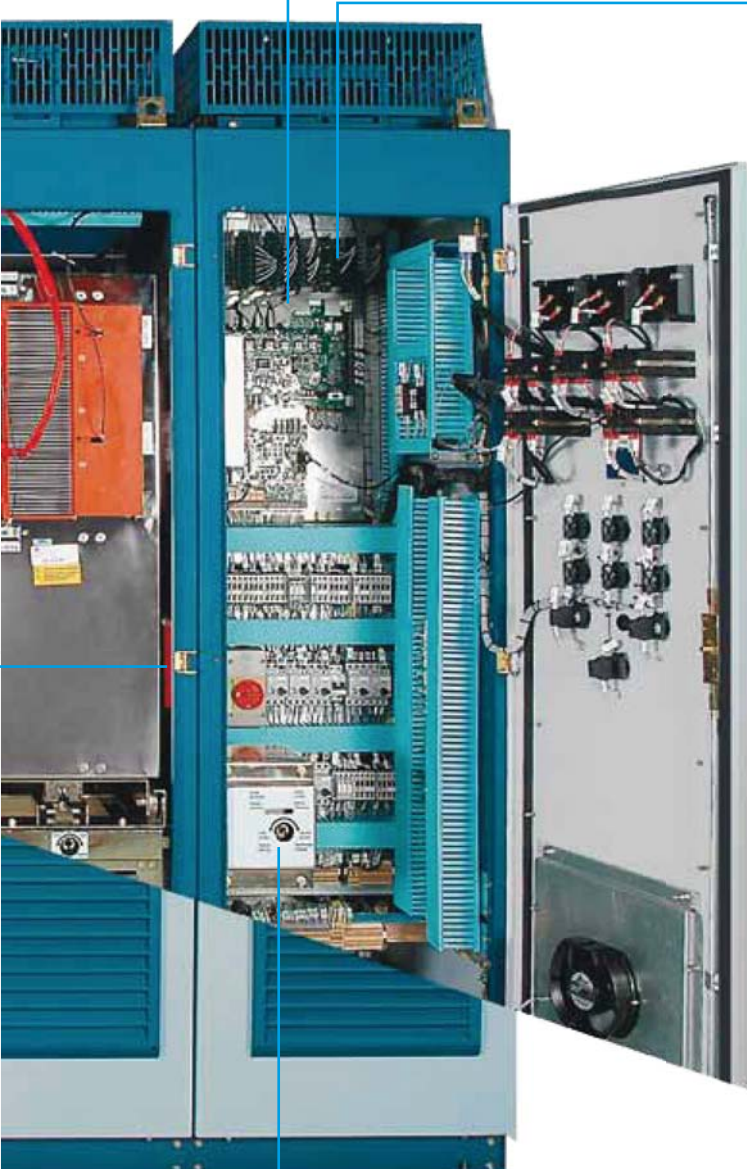
Monitoring and Protections

- Arc detection for the power section
- Temperature monitoring
- Ventilation monitoring through pressure sensor



Fiber Optic Interface

- Noise immunity
- High Voltage insulation
- Fiber optic for the power and control interconnection: gate drives, feedbacks, temperature monitoring, voltage.



Simple Keypad

- Double display (LED and LCD) for easy visualization and programming
- Uses the same keypad of the low voltage drives (graphical keypad as an option)
- MV Drive programming follows the same philosophy of the LV drives

Safety Operation

- Mechanical interlocking for the power sections
- Electro-mechanical interlocking with the main input circuit breaker, which does not allow the doors opening when the circuit breaker is on.



Technical Data

Rated Voltage (V)	MVW01 Basic Model	Rated Drive Current (A)		Motor				Size
				Constant Torque		Variable Torque		
		CT	VT	HP	kW	HP	kW	
2300	0120 T 2300 ESZ	120	137	500	400	600	450	
	0140 T 2300 ESZ	140	160	600	450	700	500	
	0165 T 2300 ESZ	165	175	700	500	750	560	
	0175 T 2300 ESZ	175	200	750	560	900	710	A
	0210 T 2300 ESZ	210	240	900	710	1000	750	
	0250 T 2300 ESZ	250	280	1000	800	1250	900	
	0280 T 2300 ESZ	280	320	1250	900	1500	1120	
	0386 T 2300 ESZ	386	440	1750	1250	2000	1400	
	0450 T 2300 ESZ	450	490	2000	1400	2250	1600	B
	0490 T 2300 ESZ	490	560	2250	1600	2500	1800	
0560 T 2300 ESZ	560	640	2500	1800	3000	2200		
3300	0085 T 3300 ESZ	85	97	500	400	600	450	
	0100 T 3300 ESZ	100	112	600	450	700	500	
	0112 T 3300 ESZ	112	128	700	500	800	630	
	0138 T 3300 ESZ	138	150	800	630	900	710	
	0150 T 3300 ESZ	150	160	900	710	1000	800	A
	0160 T 3300 ESZ	160	182	1000	800	1250	900	
	0186 T 3300 ESZ	186	212	1250	900	1500	1120	
	0235 T 3300 ESZ	235	265	1500	1120	1750	1250	
	0265 T 3300 ESZ	265	302	1750	1250	2000	1400	
	0310 T 3300 ESZ	310	354	2000	1400	2250	1600	
	0375 T 3300 ESZ	375	428	2500	1800	2750	2000	
0500 T 3300 ESZ	500	571	3000	2200	3750	2800	C	
0580 T 3300 ESZ	580	650	3750	2800	4000	3000		
4160	0070 T 4160 ESZ	70	80	500	400	600	450	
	0080 T 4160 ESZ	80	91	600	450	700	500	
	0094 T 4160 ESZ	94	107	700	500	800	630	
	0110 T 4160 ESZ	110	120	800	630	900	710	
	0120 T 4160 ESZ	120	130	900	710	1000	800	A
	0130 T 4160 ESZ	130	148	1000	800	1250	900	
	0162 T 4160 ESZ	162	170	1250	900	1350	1000	
	0170 T 4160 ESZ	170	188	1350	1000	1500	1120	
	0188 T 4160 ESZ	188	214	1500	1120	1750	1300	
	0250 T 4160 ESZ	250	286	2000	1400	2250	1600	
	0300 T 4160 ESZ	300	342	2250	1600	2750	2000	
	0357 T 4160 ESZ	357	408	3000	2200	3500	2600	C
0475 T 4160 ESZ	475	542	4000	2900	4500	3300		

Note: 1- Suggested ratings. Size the drive based on the motor current and on the load duty cycle.

2- CT = Constant Torque - 150% overload for 60 seconds every 10 minutes.

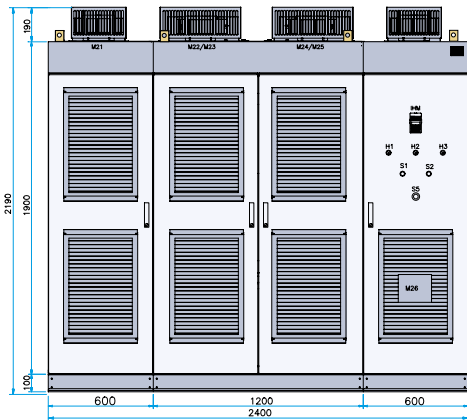
VT= Variable Torque - 115 % overload for 60 seconds every 10 minutes



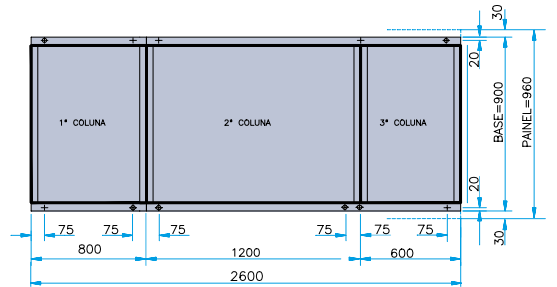
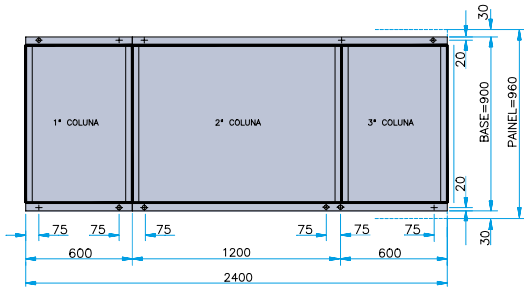
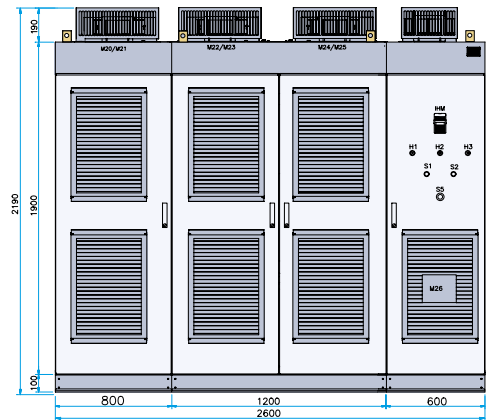
Dimensions and Weight

Size	Width in (mm)	Height in (mm)	Depth in (mm)	Weight (Kg)
A	95 (2400)	87 (2190)	38 (980)	1560
B	103 (2600)			1700
C	158 (4000)			2700

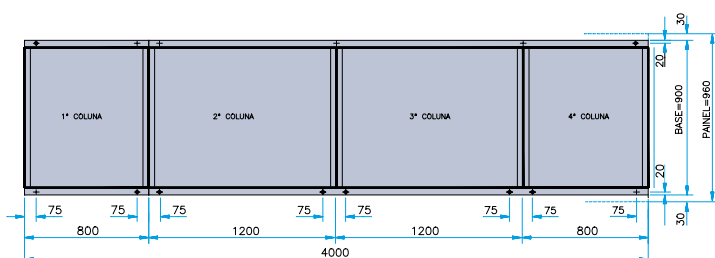
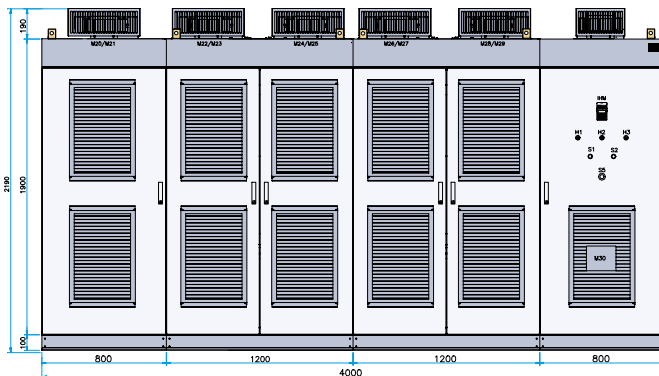
SIZE A



SIZE B











SIZE C

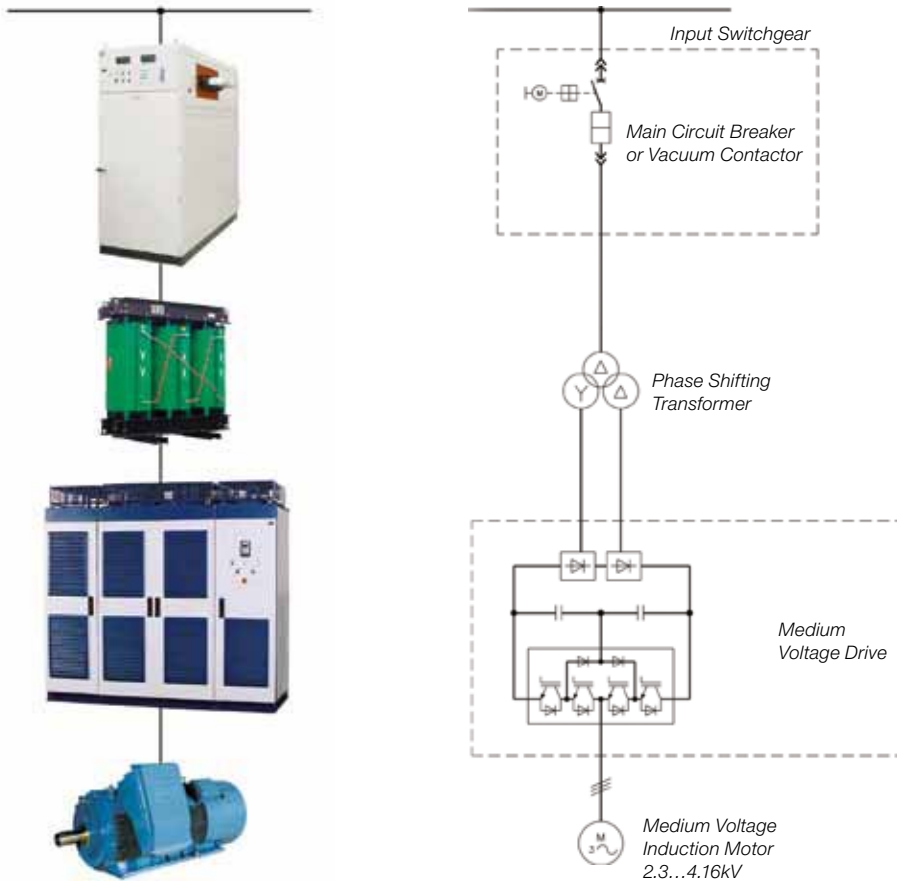


Keypad Functions



-  Starts the drive through a controlled acceleration ramp. The display shows alternately the following data when this key is pressed: rpm – Volts – Status – Torque – Hz – Amps
-  Stops the drive through a controlled deceleration ramp. Resets the drive after a fault event.
-  Increases the drive speed or parameter number/setting
-  Decreases the drive speed or parameter number/setting
-  Shows on the display the parameter number or its content (for programming purposes)
-  Runs the JOG function (momentary speed impulse) while pressed.
-  Changes the motor direction of rotation (Forward/Reverse)
-  Selects the drive operation mode (Local or Remote)

Configuration



Superdrive

Software for Drives Programming

SuperDrive is a programming software for the MVW-01 drives. The software incorporates functions such as: parameters upload and download, drive operation and monitoring, off-line programming, and trace function. SuperDrive is a Windows compatible software (Windows 95, Windows 98, Windows ME, Windows NT Workstation 4.0, Windows 2000 Professional, Windows XP). The Drive-PC communication uses a RS-232 or a RS-485 interface.



Ordering Code

MVW-01	0070	T	4160	P	O	00	00	00	00	DN	00	00	Z
01	02	03	04	05	06	07	08	09	10	11	12	13	14

01 - Medium Voltage Variable Frequency Drive MVW-01 Series	2300V	3300V	4160V
02 - Output Rated Current for Constant Torque (CT)	0120 = 120 A	0085=85 A	0070=70 A
03 - Three-phase Power Supply	0140 = 140 A	0100=100 A	0080=80 A
04 - Rated Voltage:	0165 = 165 A	0112=112 A	0094=94 A
2300=2,3kV	0175 = 175 A	0138=138 A	0110=110 A
3300=3,3kV	0210 = 210 A	0150=150 A	0120=120 A
4160=4,16kV	0250 = 250 A	0160=160 A	0130=130 A
05 - Manual Language:	0250 = 280 A	0186=186 A	0162=162 A
P = Portuguese	0386 = 386 A	0235=235 A	0170=170 A
E = English	0450 = 450 A	0265=265 A	0188=188 A
G = Germany	0490 = 490 A	0310=310 A	0250=250 A
S = Spanish	0560 = 560 A	0375=375 A	0300=300 A
06 - Product Version:		0500=500 A	0375=375 A
S = Standard		0580=580 A	0475=475 A
O = Optional			
07 - Enclosure:			
00 = Standard (IP41/NEMA 1)			
08 - Keypad:			
00 = Standard			
09 - Dynamic Braking:			
00 = Standard (without dynamic braking)			
DB = Dynamic Braking			
10 - Expansion Board:			
00 = none			
A1 = complete EBA board			
B1 = complete EBB board			
C1 = complete EBC board			
11- Fieldbus Communication Board:			
00 = none			
DN = DeviceNet			
PD = Profibus DP			
12 - Special Hardware:			
00 = none			
H1 = special door and special mounting plate			
13 - Special Software:			
00 = none			
14 - End of code:			
Z			

WEG Worldwide Operations

ARGENTINA

WEG EQUIPAMIENTOS
ELECTRICOS S.A.
(Headquarters San
Francisco-Cordoba)
Sgo. Pampiglione 4849
Parque Industrial San Francisco
2400 - San Francisco
Phone(s): +54 (3564) 421484
Fax: +54 (3564) 421459
info-ar@weg.net
www.weg.net/ar

AUSTRALIA

WEG AUSTRALIA PTY. LTD.
3 Dalmore Drive
Carribean Park Industrial Estate
Scoresby VIC 3179 - Melbourne
Phone(s): 61 (3) 9765 4600
Fax: 61 (3) 9753 2088
info-au@weg.net
www.weg.net/au

BELGIUM

WEG BENELUX S.A.
Rue de l'Industrie 30 D,
1400 Nivelles
Phone(s): + 32 (67) 88-8420
Fax: + 32 (67) 84-1748
info-be@weg.net
www.weg.net/be

CHILE

WEG CHILE S.A.
Los Canteros 8600
La Reina - Santiago
Phone(s): (56-2) 784 8900
Fax: (56-2) 784 8950
info-cl@weg.net
www.weg.net/cl

CHINA

WEG (NANTONG) ELECTRIC
MOTOR MANUFACTURING CO.,
LTD.
No. 128# - Xinkai South Road,
Nantong Economic &
Technical Development Zone,
Nantong, Jiangsu Province.
Phone(s): (86) 0513-85989333
Fax: (86) 0513-85922161
info-cn@weg.net
www.weg.net/cn

COLOMBIA

WEG COLOMBIA LTDA
Calle 46A N82 - 54
Porteria II - Bodega 7 - San
Cayetano II - Bogotá
Phone(s): (57 1) 416 0166
Fax: (57 1) 416 2077
info-co@weg.net
www.weg.net/co

FRANCE

WEG FRANCE SAS
ZI de Chenes - Le Loup
13 Rue du Morellon - BP 738
38297 Saint Quentin Fallavier
Phone(s): +33 (0) 4 74 99 11 35
Fax: +33 (0) 4 74 99 11 44
info-fr@weg.net
www.weg.net/fr

GERMANY

WEG GERMANY GmbH
Alfred-Nobel-Str. 7-9
D-50226 Frechen
Phone(s): +49 (2234) 9 5353-0
Fax: +49 (2234) 9 5353-10
info-de@weg.net
www.weg.net/de

INDIA

WEG Electric (India) Pvt. Ltd.
#38, Ground Floor, 1st Main
Road, Lower Palace Orchards,
Bangalore - 560 003
Phone(s): +91-80-4128 2007
+91-80-4128 2006
Fax: +91-80-2336 7624
info-in@weg.net
www.weg.net/in

ITALY

WEG ITALIA S.R.L.
V.le Brianza 20 - 20092 - Cinisello
Balsamo - Milano
Phone(s): (39) 02 6129-3535
Fax: (39) 02 6601-3738
info-it@weg.net
www.weg.net/it

JAPAN

WEG ELECTRIC MOTORS
JAPAN CO., LTD.
Matsumoto Bldg. 2F, 3-23-7
Kamata, Ohta-ku,
Tokyo, Japan 144-0052
Phone(s): (81) 3 3736-2998
Fax: (81) 3 3736-2995
info-jp@weg.net
www.weg.net/jp

MEXICO

WEG MEXICO, S.A. DE C.V.
Carretera Jorobas-Tula Km. 3.5,
Manzana 5, Lote 1
Fraccionamiento Parque
Industrial - Huehuetoca,
Estado de México - C.P. 54680
Phone(s): + 52 (55) 5321 4275
Fax: + 52 (55) 5321 4262
info-mx@weg.net
www.weg.net/mx

NETHERLANDS

WEG NETHERLANDS
Sales Office of
WEG Benelux S.A.
Hanzepoort 23C
7575 DB Oldenzaal
Phone(s): +31 (0) 541-571080
Fax: +31 (0) 541-571090
info-nl@weg.net
www.weg.net/nl

PORTUGAL

WEG EURO - INDÚSTRIA
ELÉCTRICA, S.A.
Rua Eng. Frederico Ulrich
Apartado 6074
4476-908 - Maia
Phone(s): +351 229 477 705
Fax: +351 229 477 792
info-pt@weg.net
www.weg.net/pt

RUSSIA

WEG RUSSIA
Pochainskaya Str. 17
Nizhny Novgorod
603001 - Russia
Phone(s): +7-831-2780425
Fax: +7-831-2780424
info-ru@weg.net
www.weg.net/ru

SPAIN

WEG IBERIA S.L.
Avenida de la Industria, 25
28823 Coslada - Madrid
Phone(s): (34) 916 553 008
Fax: (34) 916 553 058
info-es@weg.net
www.weg.net/es

SINGAPORE

WEG SINGAPORE PTE LTD
159, Kampong Ampat,
#06-02A KA PLACE.
Singapore 368328.
Phone(s): +65 6858 9081
Fax: +65 6858 1081
info-sg@weg.net
www.weg.net/sg

SWEDEN

WEG SCANDINAVIA AB
Box 10196
Verkstadgatan 9
434 22 Kungsbacka
Phone(s): (46) 300 73400
Fax: (46) 300 70264
info-se@weg.net
www.weg.net/se

UK

WEG ELECTRIC
MOTORS (U.K.) LTD.
28/29 Walkers Road
Manorside Industrial Estate
North Moons Moat - Redditch
Worcestershire B98 9HE
Phone(s): 44 (0)1527 596-748
Fax: 44 (0)1527 591-133
info-uk@weg.net
www.weg.net/uk

UNITED ARAB EMIRATES

WEG MIDDLE EAST FZE
JAFZA - JEBEL ALI FREE ZONE
Tower 18, 19th Floor,
Office LB181905
Dubai - United Arab Emirates
info-ae@weg.net
www.weg.net/ae

USA

WEG ELECTRIC CORP.
1327 Northbrook Parkway,
Suite 490
Suwanee 30024
Phone(s): 1-770-338-5656
Fax: 1-770-338-1632
info-us@weg.net
www.weg.net/us

VENEZUELA

WEG INDUSTRIAS VENEZUELA C.A.
Avenida 138-A
Edificio Torre Banco Occidental de
Descuento, Piso 6 Oficina 6-12
Urbanizacion San Jose de Tarbes
Zona Postal 2001
Valencia, Edo. Carabobo
Phone(s): (58) 241 8210582
(58) 241 8210799
(58) 241 8211457
Fax: (58) 241 8210966
info-ve@weg.net
www.weg.net/ve



WEG Equipamentos Elétricos S.A.
International Division
Av. Prefeito Waldemar Grubba, 3000
89256-900 - Jaraguá do Sul - SC - Brazil
Phone: 55 (47) 3276-4002
Fax: 55 (47) 3276-4060
www.weg.net

