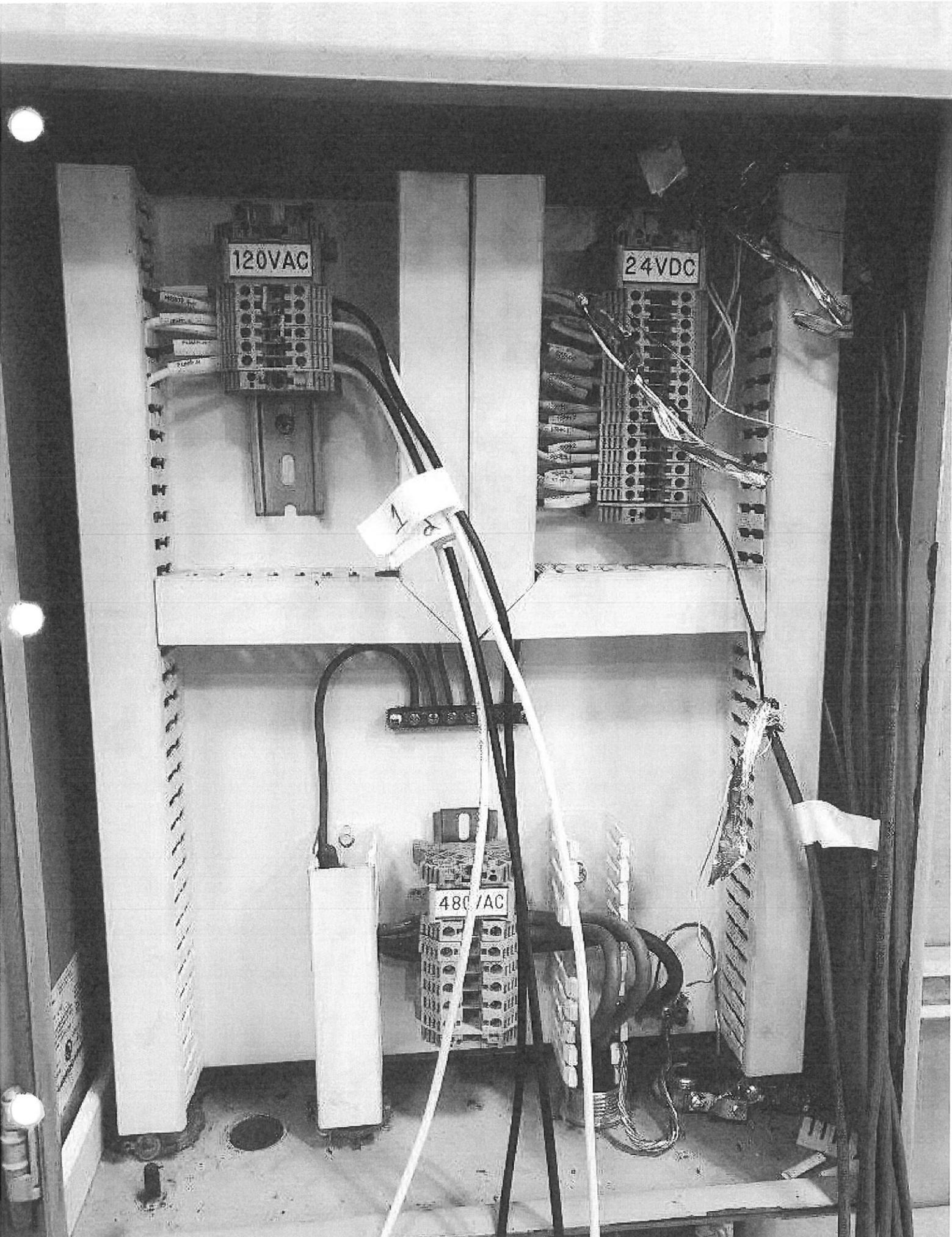


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## Section 8

### *Control Panel*

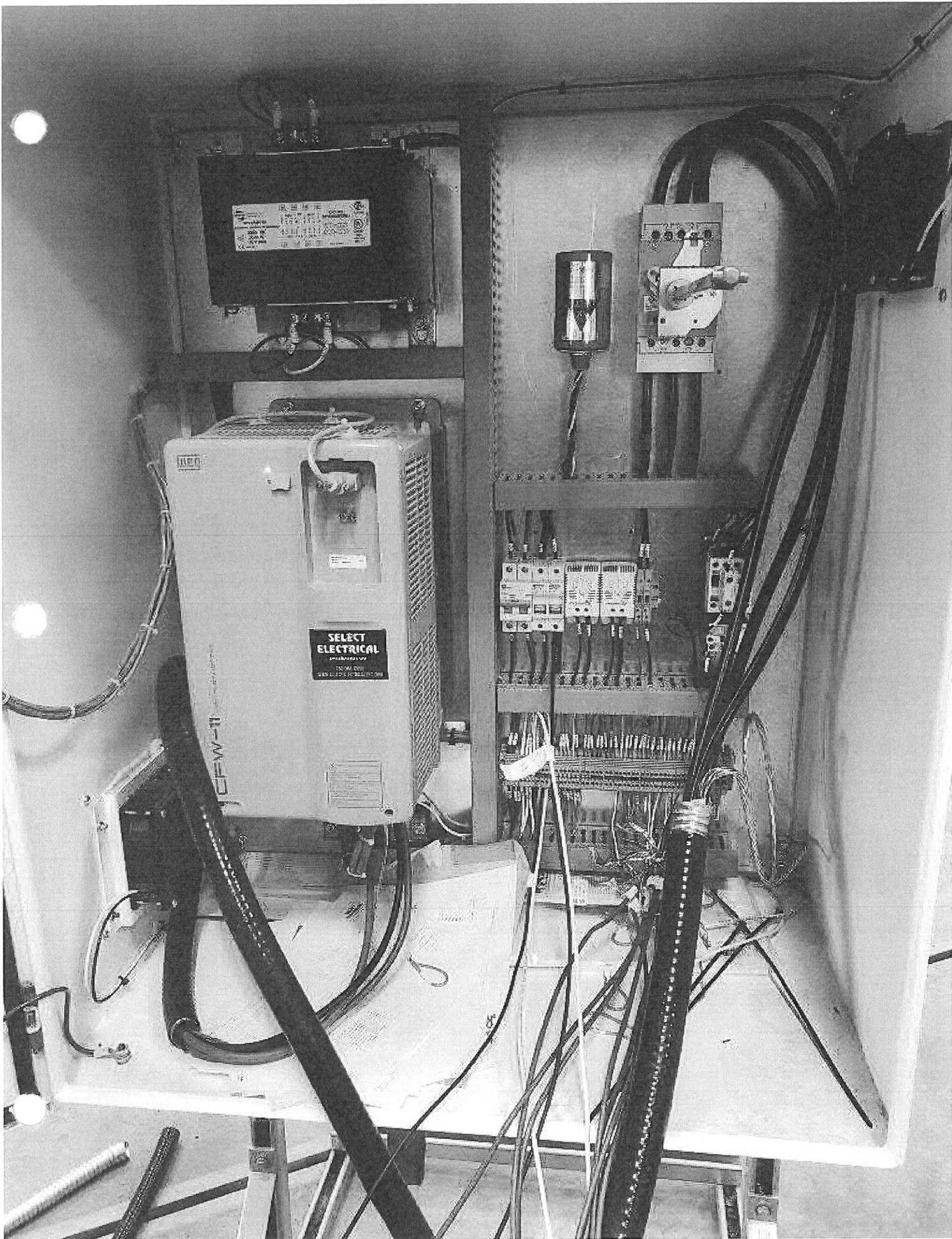


120VAC

24VDC

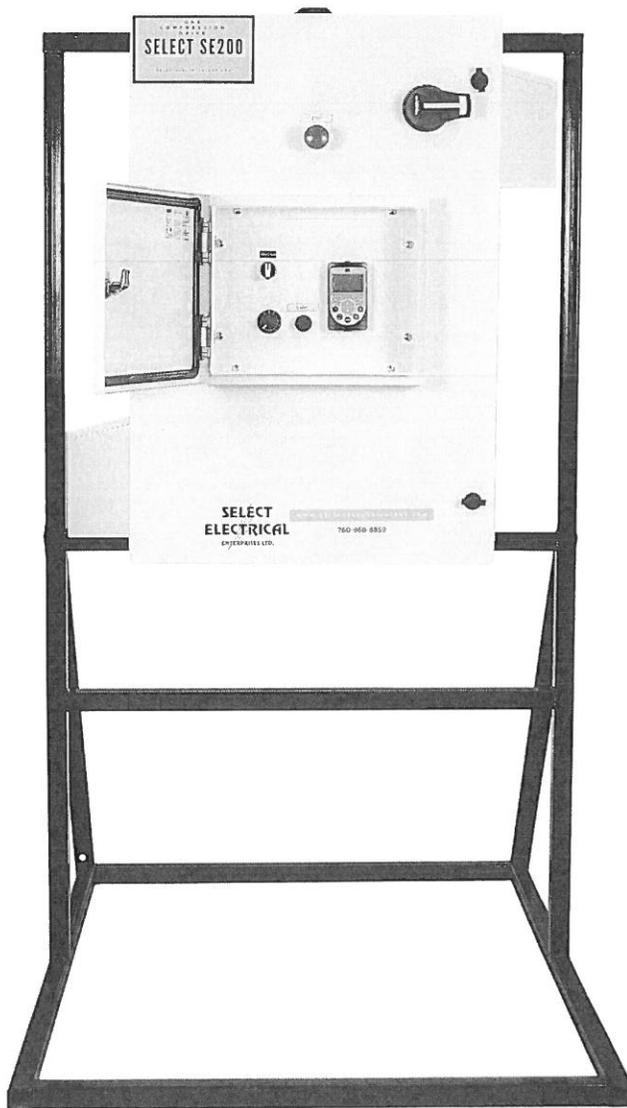
480VAC

12



# SELECT ELECTRICAL

ENTERPRISES LTD.



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SE200 GAS COMPRESSOR DRIVE

# PROUDLY MANUFACTURED IN



## SEEL SE200 SPECIFICATIONS

POWER RATING: 1-800HP

POWER SUPPLY: 230/460/600VAC

INPUT: 1 PHASE OR 3 PHASE

AMBIENT TEMP: -40 DEG C TO + 50 DEG C

RELATIVE HUMIDITY: 95%

ENCLOSURE: NEMA 4

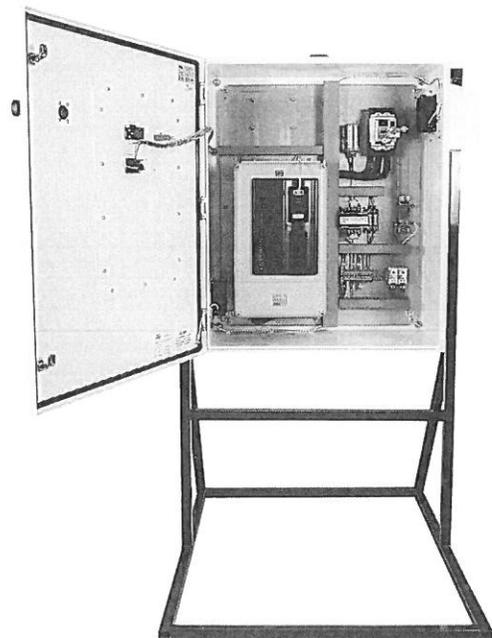
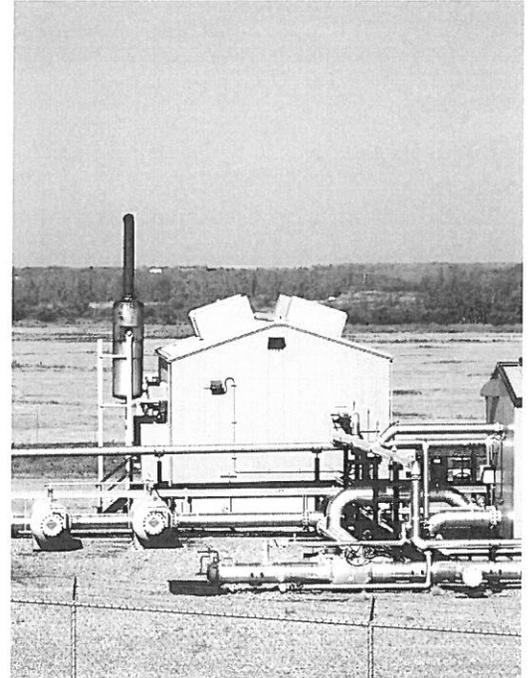
MOTOR CONTROL: V/Hz, SENSORLESS

SOFTWARE: SEEL GAS COMPRESSOR SOFTWARE

### SOFTWARE FEATURES

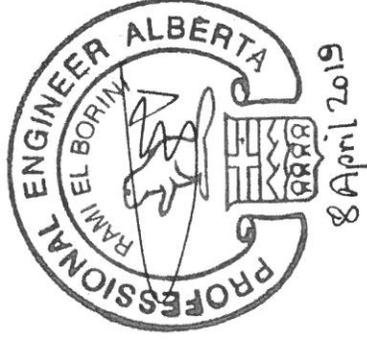
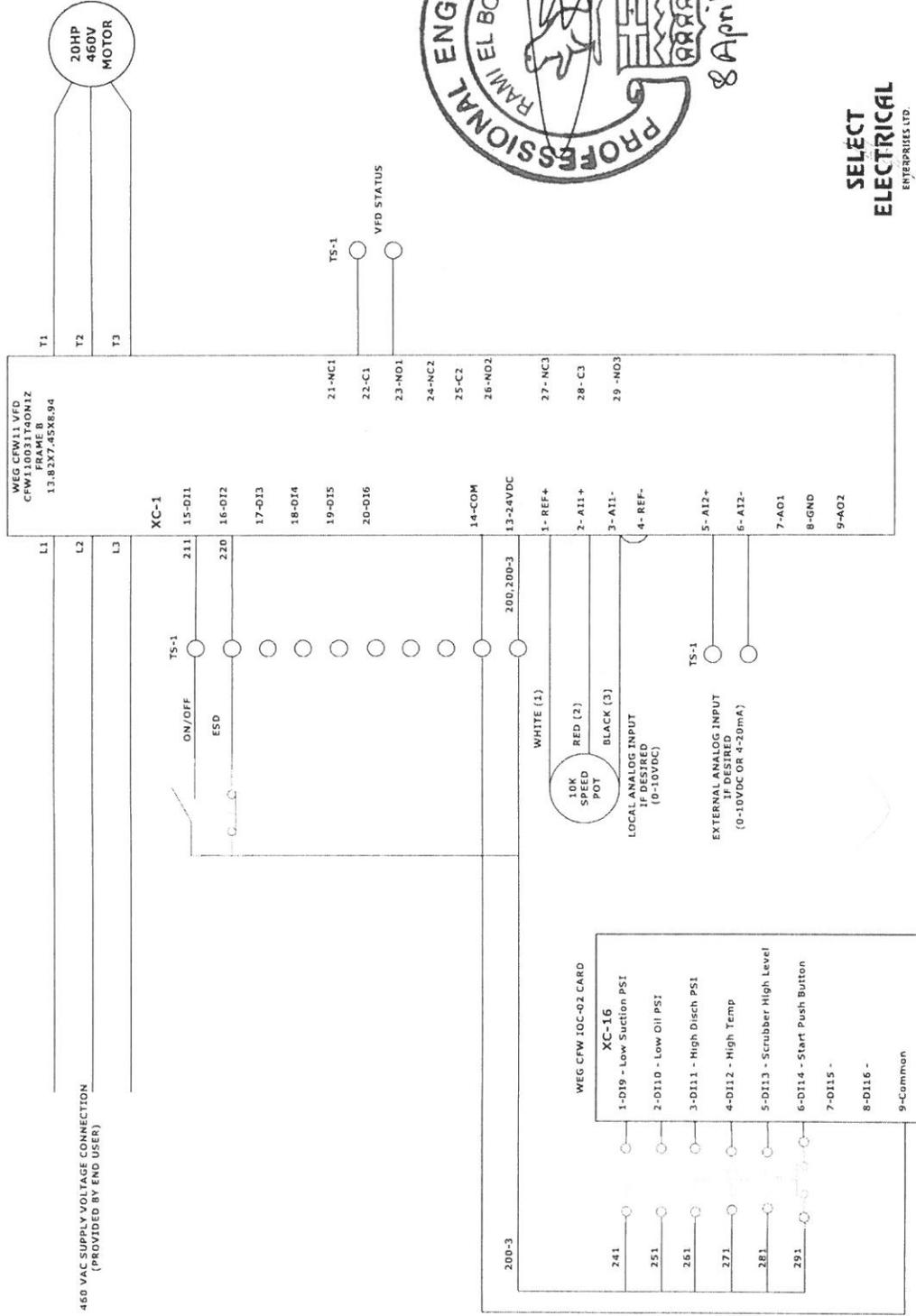
- CUSTOMIZABLE COMPRESSOR SHUTDOWN PANEL VIA ONBOARD PLC IN VFD
- COMPRESSOR ALARM / SHUTDOWN ANNUNCIATION DISPLAYED ON VFD HMI
- HAND OFF AUTO FOR LOCAL & REMOTE CONTROL
- CUSTOM PLC & TIMER FUNCTIONS AVAILABLE
- ADJUSTABLE PID CONTROL

CSA / ETL CERTIFICATION (C & US)



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# SE 200 GAS COMP PLC VFD SCHEMATIC

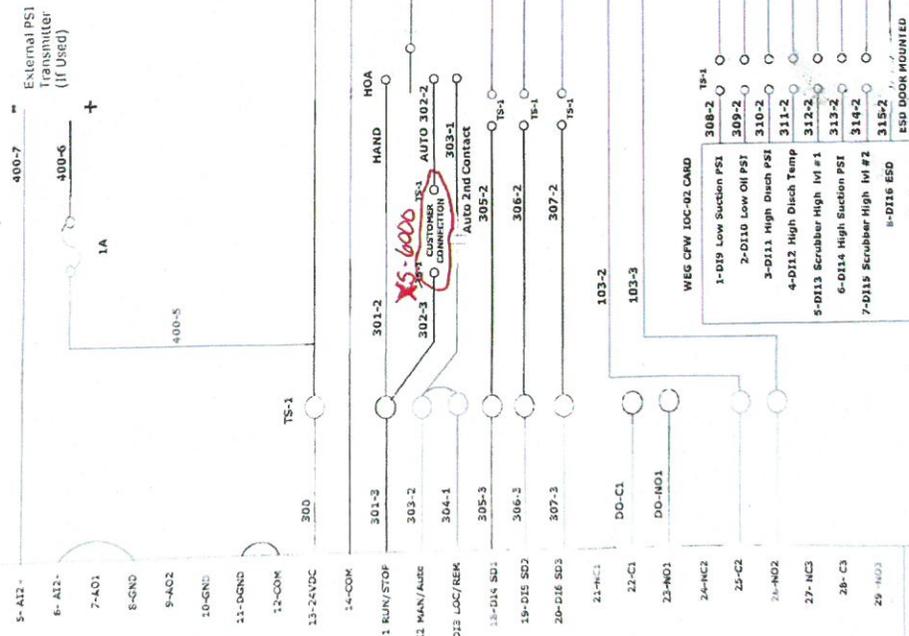
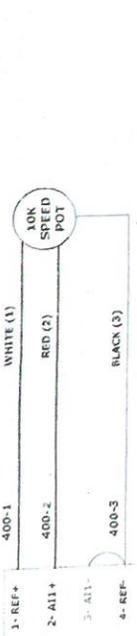


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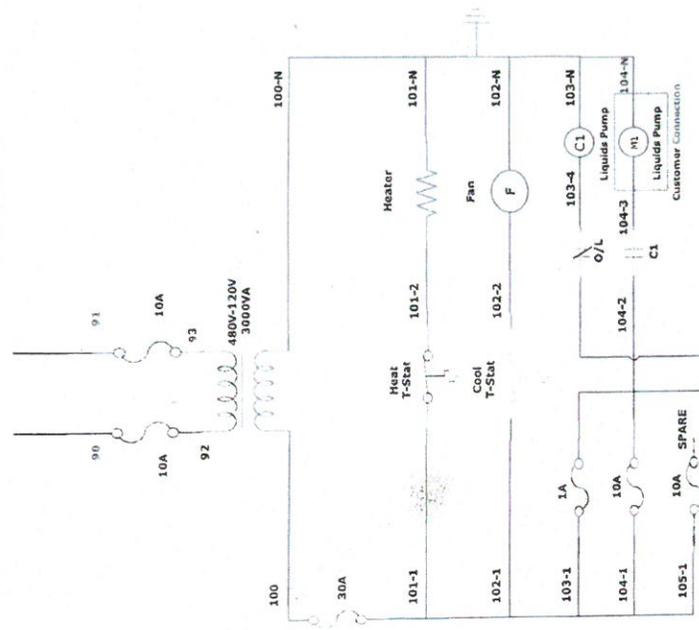
DATE: MARCH 28, 2019  
DRAWN: C WALKOM  
www.selectelectrical.com

TS-1 INDICATES FIELD CONNECTION TERMINAL STRIP  
XC-1 INDICATES VFD TERMINAL CONNECTION

**WEG CFW11 VFD**



**RS 485 MODBUS RTU (OPTIONAL)**  
 1- A-Line (+)  
 2- B-Line (+)  
 3- GND  
 4- Ground



Project: Optimized Oilfield  
 No: 3993  
 Date: 11/23/21  
 Rev: 1  
 Title: SE200-380-15/30-M-N3R -CFW11-GCD  
 Design: CORY WALKOM  
 Date: November 23, 2021  
 Name: Optimized\_GCD\_V1.0  
 Location:

SELECT SE200 GCU Optimized\_V1.5 STAKI UP GUIDE

Software#: GCD\_Optimized\_V1.5

Start Up Guide#: GCD\_Optimized\_V1.5

Drawing#: GCD\_Optimized\_V1.5

ALL HIGHLIGHTED COLUMNS TO BE SET BY FIELD PERSONNEL

(Steps #1 - step# 27 are completed at SEEL facility and do not need to be set in the field unless the VFD has been defaulted to factory defaults)

(Blue highlighted columns indicate parameters that are to be set by field personnel step#28 - step #57)

(Orange highlighted columns are optional parameters to be set by field personnel to enable PID control via Pressure Transmitter)

NOTE: ENSURE PARAMETERS ARE SET IN ASCENDING ORDER AS PER STARTUP GUIDE

**EXCEEDING CUSTOMERS EXPECTATIONS**

**PARAMETERS SET AT SEEL FACILITY (Steps #1-27)**

Step#	Parameter #	Parameter Description	Unit	Default Value	Set Value
1	P0000	Access to Parameters	0-9999	0000	0005
2	P0100	Acceleration Time	Sec	20.0	5.0
3	P0101	Deceleration Time	Sec	20.0	5.0
4	P0217	Zero Speed Disable	Disable Magnetization Current	0	1
5	P0220	LOC/REM Selection Source	Dix	2	4
6	P0221	LOC Reference Select	AI1	0	1
7	P0222	Remote Reference Select	Keypad	1	0
8	P0223	LOC FWD/REV	Always FWD	2	0
9	P0224	LOC Run/Stop Selection	Soft PLC	0	5
10	P0225	LOC Jog Selection	Disable	1	0
11	P0226	REM FWD/REV	Always FWD	4	0
12	P0227	REM Run/Stop Selection	Soft PLC	1	5
13	P0228	REM Jog Selection	Disable	2	0
14	P0229	Stop Mode Selection	Coast to Stop	0	1
15	P0233	AI1 Signal Type	0-10vdc (0) or 4-20mA (1)	0	0
16	P0238	AI2 Signal Type	0-10vdc (0) or 4-20mA (1)	0	Either 0 or 1
17	P0263	DI1 Function	Run/Stop	1	1
18	P0264	DI2 Function	Manual/Auto	8	22
19	P0265	DI3 Function	LOC/REM	0	9
20	P0266	DI4 Function	PLC Use	0	21
21	P0267	DI5 Function	PLC Use	10	21
22	P0268	DI6 Function	PLC Use	14	21
23	P0275	DO1 Function (RL1)	No Fault	13	13
24	P0276	DO2 Function (RL2)	Soft PLC	2	28
25	P0277	DO3 Function (RL3)	Not Used	1	0
26	P0320	Fly-Start/Ride-Through	Ride-Through	0	3
27	P0353	IGBT's / Air Overtemp Config	Under Temp Disable	0	4

SELECT SE200 GCD\_Optimized\_V1.5 STARTUP GUIDE

Software#: GCD\_Optimized\_V1.5

Start Up Guide#: GCD\_Optimized\_V1.5

Drawing#: GCD\_Optimized\_V1.5

ALL HIGHLIGHTED COLUMNS TO BE SET BY FIELD PERSONNEL

(Steps #1 - step# 27 are completed at SEEL facility and do not need to be set in the field unless the VFD has been defaulted to factory defaults)

(Blue highlighted columns indicate parameters that are to be set by field personnel step#28 - step #57)

(Orange highlighted columns are optional parameters to be set by field personnel to enable PID control via Pressure Transmitter)

NOTE: ENSURE PARAMETERS ARE SET IN ASCENDING ORDER AS PER STARTUP GUIDE

**EXCEEDING CUSTOMERS EXPECTATIONS**

**PARAMETERS TO BE SET BY FIELD PERSONNEL (Steps #28-57)**

Step#	Parameter #	Parameter Description	Unit	Default Value	Set Value
<b>In the Group Menu navigate to Group 2 (Oriented Start Up) &amp; Press select – follow directions below</b>					
28	P0317	Oriented Start Up	Yes	0	1
29	P0398	Motor Service Factor	As per motor nameplate		Motor SF
30	P0400	Motor Rated Voltage	As per motor nameplate		Motor Voltage
31	P0401	Motor Rated Current	As per motor nameplate		Motor Current
32	P0402	Motor Rated Speed	As per motor nameplate		Motor RPM
33	P0403	Motor Rated Frequency	As per motor nameplate		Motor Hz
34	P0404	Motor Rated Power	As per motor nameplate		Motor HP/KW
35	P0407	Rated Power Factor	0.5 to 0.99	0.68	Set as per nameplate
36	P0156	Overload Current 100% Speed	0.1 to 1.5 x Inom-ND Example: Motor FLA – 13.2A If SF is 1.0, P0156 should be set to 15.2A If SF is 1.15, P0156 should be set to 16.5A	1.05 x Inom-ND	As per motor service factor, adjust if required (SF=1.0 – 1.15 x Inom-ND) (SF=1.15 – 1.25 x Inom-ND)
37	P0157	Overload Current 50% Speed	0.1 to 1.5 x Inom-ND DO NOT ADJUST UNLESS REQUIRED	0.9 x Inom-ND	As per motor service factor, adjust if required

**ALL HIGHLIGHTED COLUMNS TO BE SET BY FIELD PERSONNEL**

(Steps #1 - step# 27 are completed at SEEL facility and do not need to be set in the field unless the VFD has been defaulted to factory defaults)

(Blue highlighted columns indicate parameters that are to be set by field personnel step#28 - step #57)

(Orange highlighted columns are optional parameters to be set by field personnel to enable PID control via Pressure Transmitter)

**NOTE: ENSURE PARAMETERS ARE SET IN ASCENDING ORDER AS PER STARTUP GUIDE****EXCEEDING CUSTOMERS EXPECTATIONS****PARAMETERS TO BE SET BY FIELD PERSONNEL (Steps #30-57)**

Step#	Parameter #	Parameter Description	Unit	Default Value	Set Value
38	P0158	Overload Current 5% Speed	0.1 to 1.5 x Inom-ND DO NOT ADJUST UNLESS REQUIRED	0.65 x Inom-ND	As per motor service factor, adjust if required
39	P0159	Motor Thermal Class	Class 5,10,15,20,25,30,35,40,45	1 – Class 10	3 – Class 20
40	P0296	Line Rated Voltage	0-6 (Can be adjusted if overvoltage or undervoltage trips occur)	4- (480)	Set as per input voltage
41	P0340	Auto Reset Time (VFD Faults)	0-3600s	0	Set to desired reset time
42	P0357	Line Phase Loss Time	0-60sec	3 sec	Set to 0 seconds
43	P1001	Soft PLC Command	Ensure this is set to "Run Program"	0	1
44	P1010	Low Oil Pressure Shutdown Start Delay	Sec	0	Set to desired time before shutdown is active, timer starts after the start pushbutton is pressed
45	P1011	Low Suction Pressure Shutdown Start Delay	Sec	0	Set to desired time before shutdown is active, timer starts after the start pushbutton is pressed
46	P1012	Shutdown #1 Debounce	Sec	0	Set to desired time that shutdown needs to be enabled before a VFD fault occurs

**ALL HIGHLIGHTED COLUMNS TO BE SET BY FIELD PERSONNEL**

(Steps #1 - step# 27 are completed at SEEL facility and do not need to be set in the field unless the VFD has been defaulted to factory defaults)

(Blue highlighted columns indicate parameters that are to be set by field personnel step#28 - step #57)

(Orange highlighted columns are optional parameters to be set by field personnel to enable PID control via Pressure Transmitter)

**NOTE: ENSURE PARAMETERS ARE SET IN ASCENDING ORDER AS PER STARTUP GUIDE**

**EXCEEDING CUSTOMERS EXPECTATIONS**

**PARAMETERS TO BE SET BY FIELD PERSONNEL (Steps #30-57)**

Step#	Parameter #	Parameter Description	Unit	Default Value	Set Value
47	P1013	Shutdown #2 Debounce	Sec	0	Set to desired time that shutdown needs to be enabled before a VFD fault occurs
48	P1014	Shutdown #3 Debounce	Sec	0	Set to desired time that shutdown needs to be enabled before a VFD fault occurs
49	P1015	Low Suction Shutdown Debounce	Sec	0	Set to desired time that shutdown needs to be enabled before a VFD fault occurs
50	P1016	Low Oil Pressure Shutdown Debounce	Sec	0	Set to desired time that shutdown needs to be enabled before a VFD fault occurs
51	P1017	High Discharge Pressure Shutdown Debounce	Sec	0	Set to desired time that shutdown needs to be enabled before a VFD fault occurs
52	P1018	High Discharge Temp Shutdown Debounce	Sec	0	Set to desired time that shutdown needs to be enabled before a VFD fault occurs

SELECT SEZUU GCD\_Optimized\_V1.5 STARTUP GUIDE

Software#: GCD\_Optimized\_V1.5

Start Up Guide#: GCD\_Optimized\_V1.5

Drawing#: GCD\_Optimized\_V1.5

ALL HIGHLIGHTED COLUMNS TO BE SET BY FIELD PERSONNEL

(Steps #1 - step# 27 are completed at SEEL facility and do not need to be set in the field unless the VFD has been defaulted to factory defaults)

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NOTE: ENSURE PARAMETERS ARE SET IN ASCENDING ORDER AS PER STARTUP GUIDE

**EXCEEDING CUSTOMERS EXPECTATIONS**

**PARAMETERS TO BE SET BY FIELD PERSONNEL (Steps #30-57)**

Step#	Parameter #	Parameter Description	Unit	Default Value	Set Value
53	P1019	Scrubber High Level #1 Shutdown Debounce	Sec	0	Set to desired time that shutdown needs to be enabled before a VFD fault occurs
54	P1020	High Suction Pressure Shutdown Debounce	Sec	0	Set to desired time that shutdown needs to be enabled before a VFD fault occurs
55	P1021	Scrubber High Level #2 Shutdown Debounce	Sec	0	Set to desired time that shutdown needs to be enabled before a VFD fault occurs
56	P1022	Shutdown #3 Start Delay	Sec	0	Set to desired time before shutdown is active, timer starts after the start pushbutton is pressed
57	P1023	Liquid Pump Run Time	Sec	0	Set to desired time for liquids pump to run, a run condition is initiated when Scrubber High Level #2 is triggered

**ALL HIGHLIGHTED COLUMNS TO BE SET BY FIELD PERSONNEL**

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**NOTE: ENSURE PARAMETERS ARE SET IN ASCENDING ORDER AS PER STARTUP GUIDE**

**EXCEEDING CUSTOMERS EXPECTATIONS**

**OPTIONAL PARAMETERS TO ENABLE PID CONTROL**

Step#	Parameter #	Parameter Description	Unit	Default Value	Set Value
	P0203	Special Function Select	PID Regulator	0	1
	P0222	Remote Reference Select	Keypad	0	1
	P0236	A12 Signal Function	Process Variable	0	3
	P0238	A12 Signal Type	4-20mA	0	1
DIP SWITCH #3 MUST BE SET TO ON TO ENABLE A12 FOR 4-20mA					
	P0524	PID Feedback Select	A12	1	1
	P0527	PID Action Type	Direct/Reverse (Direct speeds up when value is lower than setpoint, Reverse speeds up when higher than setpoint)	0	0 or 1
	P0528	Process Variable Scale Factor	1 to 9999	1000	1 to 9999
	P0529	Process Variable Decimal Point	0-4	1	0-4
	P0530	Process Variable Eng Unit 1	32-127	37	32-127
	P0531	Process Variable Eng Unit 2	32-127	37	32-127
	P0532	Process Variable Eng Unit 3	32-127	37	32-127
	P0536	P0525 Automatic Setting	Off/On	1	0

**ALL HIGHLIGHTED COLUMNS TO BE SET BY FIELD PERSONNEL**

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**NOTE: ENSURE PARAMETERS ARE SET IN ASCENDING ORDER AS PER STARTUP GUIDE**

**EXCEEDING CUSTOMERS EXPECTATIONS**

**To Backup & Load Program from VFD to HMI :**

Set Step	Parameter #	Parameter Description	Unit	Default Value	Set Value
n/a	P0319	Copy Function HMI	VFD to HMI	0	2

**For CFW11 Alarm & Fault List refer to page 6-2 of the CFW-11 User Manual Provided**

Alarms

- A750 – Panel ESD Shutdown
- A751 – High Discharge Pressure Shutdown
- A752 – High Discharge Temp Shutdown
- A753 – Scrubber High Level #1 Shutdown
- A754 – High Suction Pressure Shutdown
- A755 – Scrubber High Level #2 Shutdown
- A757 – Low Suction Pressure Shutdown
- A758 – Low Oil Pressure Shutdown
- A759 – Shutdown #1
- A760 – Shutdown #2
- A761 – Shutdown #3

SELECT1 SE200 GCD\_Optimized\_V1.5 STARTUP GUIDE

Software#: GCD\_Optimized\_V1.5

Start Up Guide#: GCD\_Optimized\_V1.5

Drawing#: GCD\_Optimized\_V1.5

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NOTE: ENSURE PARAMETERS ARE SET IN ASCENDING ORDER AS PER STARTUP GUIDE

EXCEEDING CUSTOMERS EXPECTATIONS

**NOTE:**

- Red Button on Keypad is utilized to stop VFD in local or reset alarms/faults
- Green Button on Keypad is utilized to start VFD in local

Digital Inputs

- DI1 – Run/Stop
- DI2 – Manual/Auto
- DI3 – Local/Remote
- DI4 – Shutdown#1
- DI5 – Shutdown #2
- DI6 – Shutdown #3
- DI9 – Low Suction Pressure
- DI10 – Low Oil Pressure
- DI11 – High Discharge Pressure
- DI12 – High Discharge Temp
- DI13 – Scrubber High Level#1
- DI14 – High Suction Pressure
- DI15 – Scrubber High Level #2
- DI16 – Panel ESD

SELECT SE200 GCD\_Optimized\_V1.5 STARTUP GUIDE

Software#: GCD\_Optimized\_V1.5

Start Up Guide#: GCD\_Optimized\_V1.5

Drawing#: GCD\_Optimized\_V1.5

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**NOTE: ENSURE PARAMETERS ARE SET IN ASCENDING ORDER AS PER STARTUP GUIDE**

**EXCEEDING CUSTOMERS EXPECTATIONS**

### **Analog Input / Output Configuration (Dipswitch's Located at top of control board)**

S1.1 (Analog Output 1) : Dip Switch Off - 4-20mA, Dip Switch On: 0-10vdc

S1.2 (Analog Output 2) : Dip Switch Off - 4-20A, Dip Switch On: 0-10vdc

S1.3 (Analog Input 2) : Dip Switch Off – 0-10vdc, Dip Switch On: 4-20mA

S1.4 (Analog Input 1) : Dip Switch Off – 0-10vdc, Dip Switch On: 4-20mA

### **Technical Support**

**Phone: 780-968-8859**

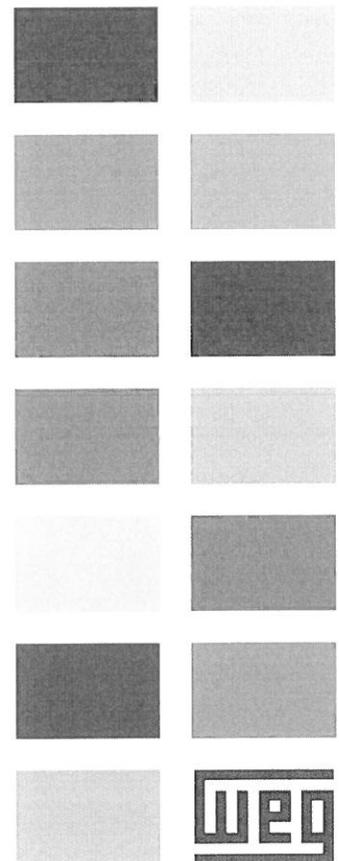
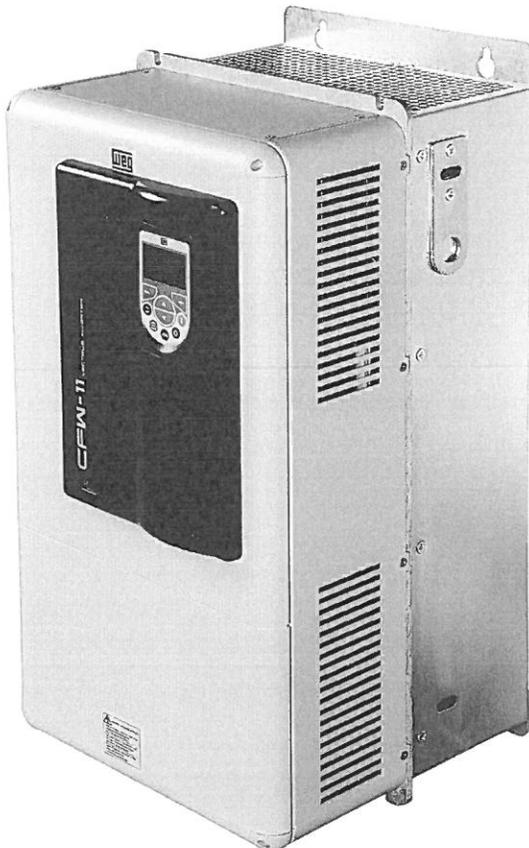
**Email: [info@selectelectricalent.com](mailto:info@selectelectricalent.com)**

**[www.selectelectricalent.com](http://www.selectelectricalent.com)**

# Frequency Inverter

## CFW-11

### User's Manual





CFW-11 VECTRUE INVERTER

# FREQUENCY INVERTER MANUAL

**Series:** CFW-11

**Language:** English

**Document:** 10000280997 / 04

Models: 142...211 A / 220...230 V

105...211 A / 380...480 V

Summary of Revisions

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Version	Review	Description
-	R01	First edition
-	R02	Setting in Table 3.6 on page 3-23
-	R03	General revision
-	R04	General revision

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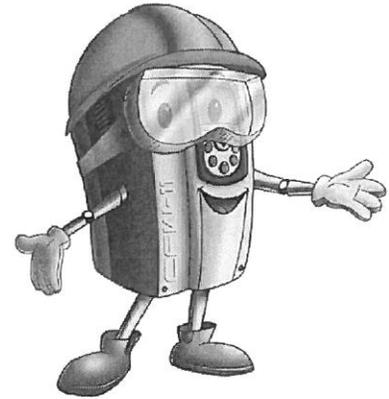
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## 1 SAFETY INSTRUCTIONS

This manual provides information for the proper installation and operation of the CFW-11 frequency inverter.

Only trained and qualified personnel should attempt to install, start-up, and troubleshoot this type of equipment.



1

### 1.1 SAFETY WARNINGS IN THE MANUAL

The following safety warnings are used in this manual:



#### **DANGER!**

Failure to follow the recommended procedures listed in this warning may result in death, serious injury, and equipment damage.



#### **DANGER!**

Les procédures concernées par cet avertissement sont destinées à protéger l'utilisateur contre des dangers mortels, des blessures et des détériorations matérielles importantes.



#### **ATTENTION!**

Failure to follow the recommended procedures listed in this warning may result in equipment damage.



#### **NOTE!**

This warning provides important information for the proper understanding and operation of the equipment.

### 1.2 SAFETY WARNINGS IN THE PRODUCT

The following symbols are attached to the product and require special attention:



Indicates a high voltage warning.



Electrostatic discharge sensitive components.  
Do not touch them.



Indicates that a ground (PE) must be connected securely.



Indicates that the cable shield must be grounded.



Indicates a hot surface warning.

### 1.3 PRELIMINARY RECOMMENDATIONS

1



#### **DANGER!**

Only trained personnel, with proper qualifications, and familiar with the CFW-11 and associated machinery shall plan and implement the installation, starting, operation, and maintenance of this equipment. The personnel shall follow all the safety instructions described in this manual and/or defined by the local regulations. Failure to comply with the safety instructions may result in death, serious injury, and equipment damage.



#### **DANGER!**

Seulement personnes avec la qualification adéquate et familiarisation avec le CFW-11 et équipements associés doivent planifier ou implémenter l'installation, mise en marche, opération et entretien de cet équipement. Ces personnes doivent suivre toutes les instructions de sécurité indiquées dans ce manuel, et/ou définies par normes locales. L'inobservance des instructions de sécurité peut résulter en risque de vie et/ou dommages de cet équipement.



#### **NOTE!**

For the purpose of this manual, qualified personnel are those trained and able to:

1. Install, ground, power-up, and operate the CFW-11 according to this manual and to the current legal safety procedures.
2. Use the protection equipment according to the established regulations.
3. Provide first aid.



#### **DANGER!**

Always disconnect the main power supply before touching any electrical device associated with the inverter. Several components may remain charged with high voltage and/or in movement (fans), even after the AC power supply has been disconnected or turned off. Wait at least 10 minutes to guarantee the fully discharge of capacitors. Always connect the equipment frame to the ground protection (PE).



#### **DANGER!**

Débranchez toujours l'alimentation principale avant d'entrer en contact avec un appareil électrique associé au variateur. Plusieurs composants peuvent rester chargés à un potentiel électrique élevé et/ou être en mouvement (ventilateurs), même après la déconnexion ou la coupure de l'alimentation en courant alternatif. Attendez au moins 10 minutes que les condensateurs se déchargent complètement. Raccordez toujours la masse de l'appareil à une terre protectrice (PE).



#### **ATTENTION!**

The electronic boards contain components sensitive to electrostatic discharges. Do not touch the components and terminals directly. If needed, touch first the grounded metal frame or wear an adequate ground strap.

**Do not perform a withstand voltage test on any part of the inverter!  
If needed, please, consult WEG.**



**NOTE!**

Frequency inverters may cause interference in other electronic devices. Follow the recommendations listed in Chapter 3 INSTALLATION AND CONNECTION on page 3-1, to minimize these effects.



**NOTE!**

Fully read this manual before installing or operating the inverter.



**DANGER!**

**Crushing Hazard**

In order to ensure safety in load lifting applications, electric and/or mechanical devices must be installed outside the inverter for protection against accidental fall of load.



**DANGER!**

This product was not designed to be used as a safety element. Additional measures must be taken so as to avoid material and personal damages.

The product was manufactured under strict quality control, however, if installed in systems where its failure causes risks of material or personal damages, additional external safety devices must ensure a safety condition in case of a product failure, preventing accidents.



**DANGER!**

**Risque d'écrasement**

Afin d'assurer la sécurité dans les applications de levage de charges, les équipements électriques et/ou mécaniques doivent être installés hors du variateur pour éviter une chute accidentelle des charges.



**DANGER!**

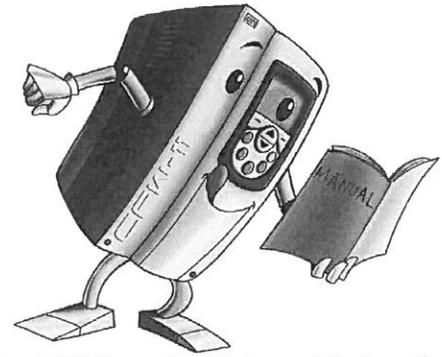
Ce produit n'est pas conçu pour être utilisé comme un élément de sécurité. Des précautions supplémentaires doivent être prises afin d'éviter des dommages matériels ou corporels. Ce produit a été fabriqué sous un contrôle de qualité conséquent, mais s'il est installé sur des systèmes où son dysfonctionnement entraîne des risques de dommages matériels ou corporels, alors des dispositifs de sécurité externes supplémentaires doivent assurer des conditions de sécurité en cas de défaillance du produit, afin d'éviter des accidents.

1

## 2 GENERAL INSTRUCTIONS

### 2.1 ABOUT THE MANUAL

This manual exposes how to install, to start-up in V/f (scalar) mode, the main characteristics and shows how to troubleshoot the most common problems of the CFW-11 inverter series frame size E models.



It is also possible to operate the CFW-11 in the following control modes: VVV, Sensorless Vector and Vector with Encoder. For further details on the inverter operation with other control modes, refer to the programming manual.



#### ATTENTION!

The operation of this equipment requires installation instructions and detailed operation provided in the user's manual, programming manual and manuals/guides for kits and accessories. The user's manual and the parameters quick reference are supplied in a hard copy together with the inverter. The user guides are also provided in a hard copy along with the kit/accessories. The other manuals are available at [www.weg.net](http://www.weg.net). A printed copy of the files available on WEG's website can be requested at your local WEG dealer.

For information on other functions, accessories, and communication, please refer to the following manuals:

- ☑ Programming manual, with a detailed description of the parameters and advanced functions of the CFW-11.
- ☑ Incremental encoder interface module manual.
- ☑ I/O expansion module manual.
- ☑ RS-232/RS-485 serial communication manual.
- ☑ CANopen slave communication manual.
- ☑ Anybus-CC communication manual.
- ☑ DeviceNet communication manual.
- ☑ Ethercat communication manual.
- ☑ Profibus DP communication manual.
- ☑ Symbinet communication manual.
- ☑ SoftPLC manual.

### 2.2 TERMS AND DEFINITIONS

**Normal Duty Cycle (ND):** inverter duty cycle that defines the maximum continuous operation current ( $I_{\text{nom-ND}}$ ) and the overload current (110 % for 1 minute). The ND cycle is selected by setting P0298 (Application) = 0 (Normal Duty (ND)). This duty cycle shall be used for the operation of motors that are not subjected to high torque loads (with respect to the motor rated torque) during its operation, starting, acceleration or deceleration.

$I_{\text{nom-ND}}$ : inverter rated current for use with the normal duty (ND) cycle.  
Overload:  $1.1 \times I_{\text{nom-ND}} / 1$  minute.

**Heavy Duty Cycle (HD):** inverter duty cycle that defines the maximum continuous operation current ( $I_{\text{nom-ND}}$ ) and the overload current (150 % for 1 minute). The HD cycle is selected by setting P0298 (Application) = 1 (Heavy Duty (HD)). This duty cycle shall be used for the operation of motors that are subjected to high torque (with respect to the motor rated torque) during its operation, starting, acceleration, or deceleration.

$I_{\text{nom-ND}}$ : inverter rated current for use with the heavy duty (HD) cycle.  
Overload:  $1.5 \times I_{\text{nom-ND}} / 1$  minute.

**Rectifier:** the input circuit of the inverters that converts the input AC voltage into DC; it is made of thyristors and power diodes.

**Pre-charge Circuit:** charges the DC Link capacitors with limited current, which avoids higher peak currents at the inverter power-up.

**DC Link:** inverter intermediate circuit; DC voltage obtained from the rectification of the AC input voltage or from an external power supply. It feeds the inverter output IGBTs bridge.

**U, V, W Arms:** set of two IGBTs of the inverter output phases U, V, and W.

**IGBT:** insulated Gate Bipolar Transistor; basic component of the output inverter bridge. The IGBT works as an electronic switch in the saturated (closed switch) and cut-off (open switch) modes.

**Braking IGBT:** works as a switch to activate the braking resistors; it is controlled by the DC Link voltage level.

**Gate Driver:** circuit used to turn-on and turn-off the IGBTs.

**PWM:** pulse width modulation; pulsed voltage that feeds the motor.

**Switching Frequency:** frequency of the IGBTs switching in the inverter bridge, normally expressed in kHz.

**Heatsink:** it is a metal part designed for dissipating the heat generated by the power semiconductors.

**PE:** protective earth.

**MOV:** metal oxide varistor.

**PTC:** resistor which resistance value in ohms increases proportionally to the temperature increase; used as a temperature sensor in electrical motors.

**NTC:** resistor which resistance value in ohms decreases proportionally to the temperature increase; used as a temperature sensor in power modules.

**HMI - Human Machine Interface:** it is a device that allows the motor control, and the visualization and modification of the inverter parameters. The CFW-11 HMI presents keys for the motor command, navigation keys and a graphic LCD display.

**FLASH Memory:** non-volatile memory that can be electronically written and erased.

**RAM Memory:** random access memory (volatile).

**USB:** universal serial bus; is a serial bus standard that allows devices to be connected using the "Plug and Play" concept.

**General Enable:** when activated, this function accelerates the motor via acceleration ramp set in the inverter. When deactivated, this function immediately blocks the PWM pulses. The general enable function may be controlled through a digital input set to this function or via serial communication.

**Start/Stop:** when enabled in the inverter (start), this function accelerates the motor via acceleration ramp up to the speed reference. When disabled (stop), this function decelerates the motor via deceleration ramp up to the complete motor stop; at this point, the PWM pulses are blocked. The start/stop function may be controlled through a digital input set for this function or via serial communication. The operator keys **I** (Start) and **O** (Stop) of the keypad work in a similar way.

**STO:** safe torque off; functional safety function available as an option in CFW-11 inverter series. When STO function is enabled the inverter guarantees that there is no movement of the motor shaft. It's also called safety stop function in CFW-11 documentation.

**PLC:** programmable logic controller.

**TBD:** value to be defined.

**AC:** alternated current.

**DC:** direct current.

**Amp, A:** ampères.

**°C:** celsius degree.

**CFM:** cubic feet per minute; unit of flow.

**cm:** centimeter.

**°F:** fahrenheit degree.

**Hz:** hertz.

**ft:** foot.

**hp:** horse power = 746 Watts; unit of power, used to indicate the mechanical power of electrical motors.

**in:** Inch.

**kg:** kilogram = 1000 grams.

**kHz:** kilohertz = 1000 Hertz.

**l/s:** liters per second.

**lb:** pound.

**m:** meter.

**mA:** miliampère = 0.001 Ampère.

**min:** minute.

**mm:** millimeter.

**ms:** millisecond = 0.001 seconds.

**Nm:** newton meter; unit of torque.

**rms:** "root mean square"; effective value.

**rpm:** revolutions per minute; unit of speed.

**s:** second.

**V:** volts.

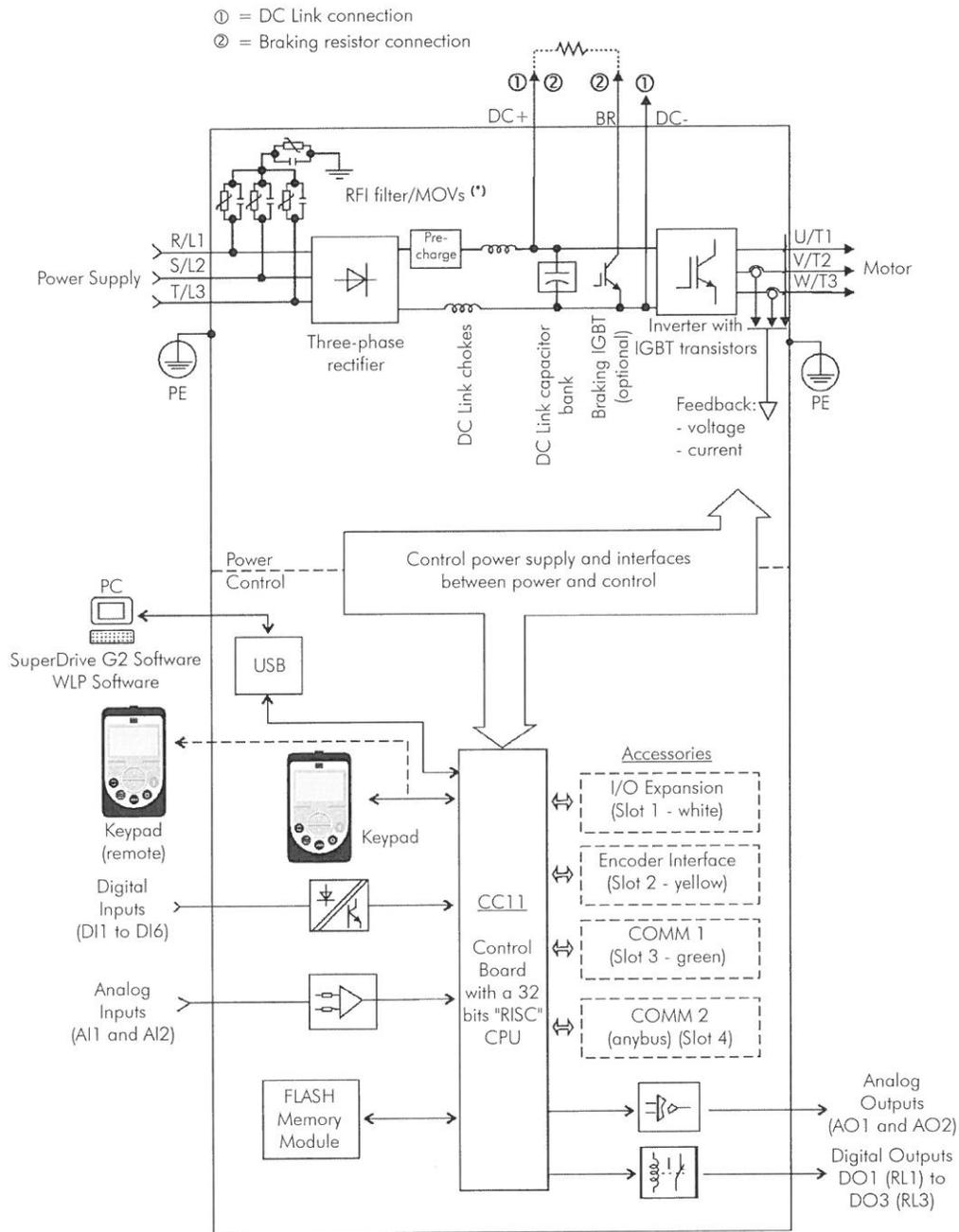
**Ω:** ohms.

2

### 2.3 ABOUT THE CFW-11

The CFW-11 frequency inverter is a high performance product designed for speed and torque control of three-phase induction motors. The main characteristic of this product is the "Vectrue" technology, which has the following advantages:

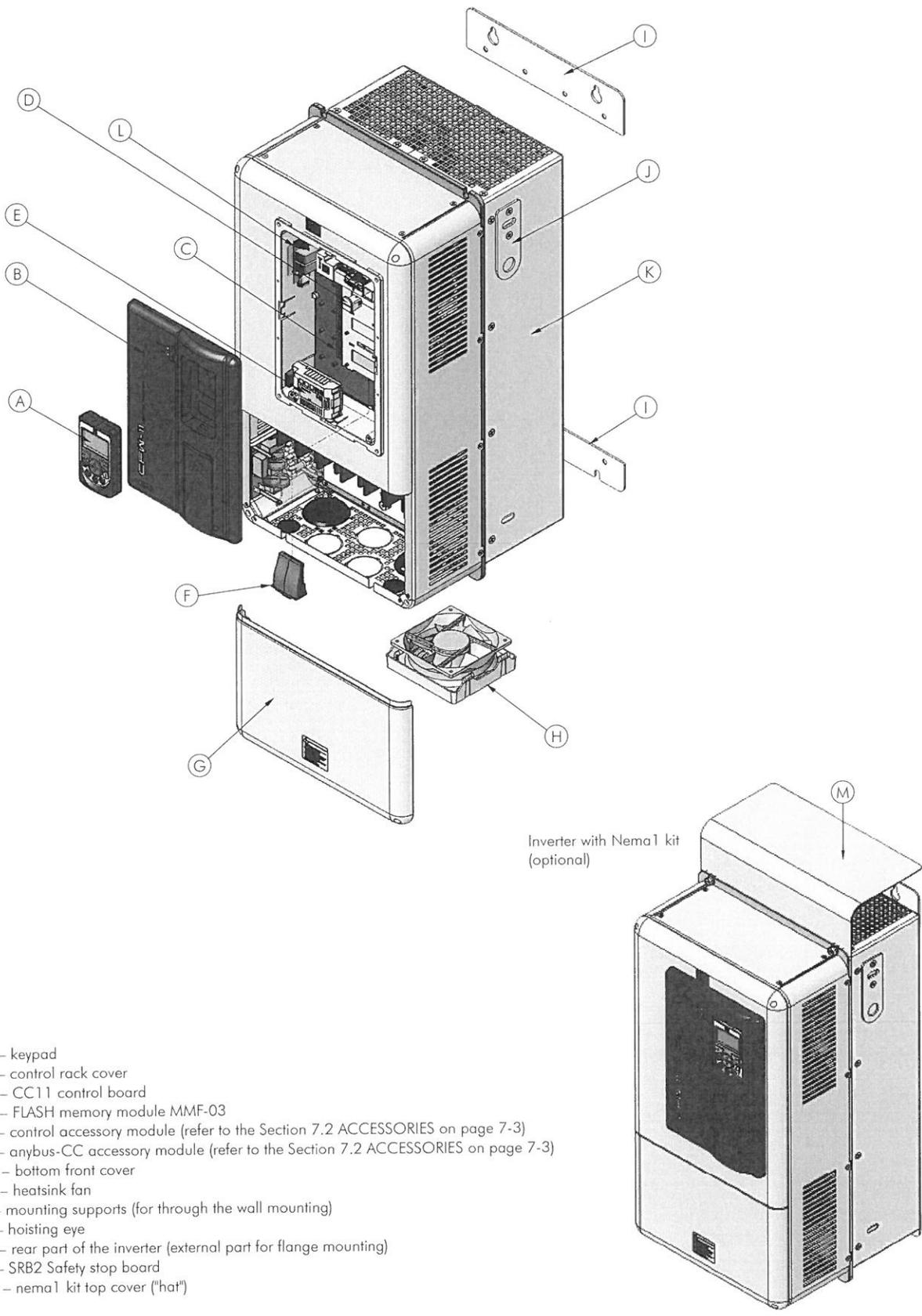
- Scalar control (V/f), VVW, or vector control programmable in the same product.
- The vector control may be programmed as "sensorless" (which means standard motors without using encoders) or as "vector control" with the use of an encoder.
- The "sensorless" control allows high torque and fast response, even in very low speeds or at the starting.
- The "vector with encoder" control allows high speed precision for the whole speed range (even with a standstill motor).
- "Optimal Braking" function for the vector control, allowing the controlled braking of the motor and avoiding the use of the braking resistor in some applications.
- "Self-Tuning" feature for vector control. It allows the automatic adjustment of the regulators and control parameters from the identification (also automatic) of the motor parameters and load.



(\*) The capacitor of RFI filter and MOV connected to the ground must be disconnected with IT network, high impedance grounding network and corner-grounded delta networks. Refer to Item 3.2.3.2.1 IT Networks on page 3-17 for more details.

Figure 2.1 - Block diagram for the CFW-11

2



- A – keypad
- B – control rack cover
- C – CC11 control board
- D – FLASH memory module MMF-03
- E – control accessory module (refer to the Section 7.2 ACCESSORIES on page 7-3)
- F – anybus-CC accessory module (refer to the Section 7.2 ACCESSORIES on page 7-3)
- G – bottom front cover
- H – heatsink fan
- I – mounting supports (for through the wall mounting)
- J – hoisting eye
- K – rear part of the inverter (external part for flange mounting)
- L – SRB2 Safety stop board
- M – nema1 kit top cover ("hat")

Figure 2.2 - Main components of the CFW-11

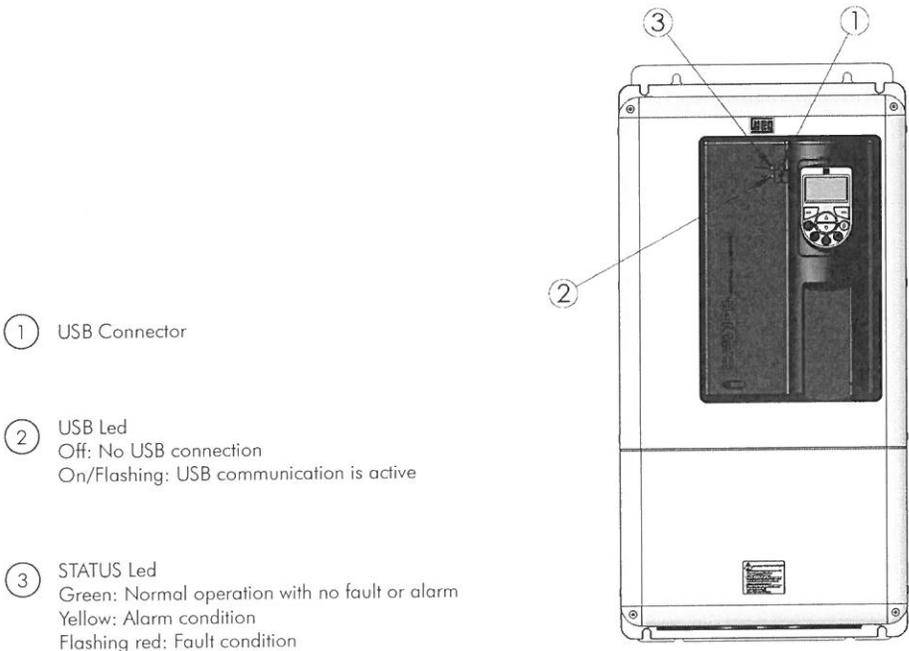


Figure 2.3 - LEDs and USB connector

2.4 IDENTIFICATION LABELS FOR THE CFW-11

There are two nameplates on the CFW-11: one complete nameplate is affixed to the side of the inverter and a simplified one is located under the keypad. The nameplate under the keypad allows the identification of the most important characteristics of the inverter even if they are mounted side-by-side.

CFW-11 model → MOD.: BRCFW110211T2SZ

WEG part number → MAT.: 10858753

Inverter net weight → PESO/WEIGHT: 65kg (143lb)

Input rated data (voltage, number of phases, rated currents for operation with ND and HD overload cycles, and frequency) →

	LINE LINEA REDE	OUTPUT SALIDA SAIDA
VAC	220-230V / 3~	0-REDE 3~
A (ND)	211A	211A
60s/3s		232A / 316A
A (HD)	180A	180A
60s/3s		270A / 360A
Hz	50/60Hz	0-300Hz

Current specifications for operation with normal overload cycle (ND) →

Current specifications for operation with heavy overload cycle (HD) →

Maximum surrounding air temperature → MAX. TA: 45°C(113°F)

Serial number → SERIAL#: 1111111111

Manufacturing date (17 corresponds to week and M to year) → 17M

Output rated data (voltage, number of phases, rated currents for operation with ND and HD overload cycles, overload currents for 1 min and 3 s, and frequency range) →

FABRICADO NO BRASIL  
HECHO EN BRASIL  
MADE IN BRAZIL

UL LISTED  
IND. CONT. EQ.  
2599

CE EAC

7 894 171 828 951

(a) Nameplate affixed to the side of the inverter

CFW-11 model → BRCFW110211T2SZ

WEG part number → 10858753

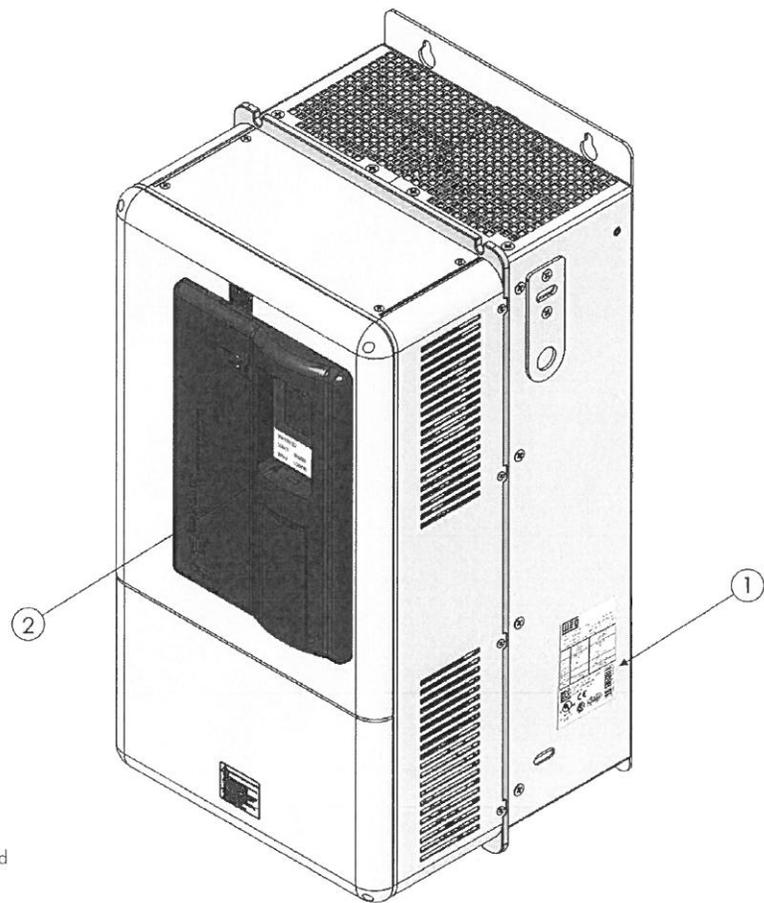
Manufacturing date (17 corresponds to week and M to year) → 17M

Serial number → SERIAL#: 1111111111

(b) Nameplate located under the keypad

Figure 2.4 - (a) and (b) - Nameplates

2



- ① Nameplate affixed to the side of the inverter
- ② Nameplate under the keypad

Figure 2.5 - Location of the nameplates

**HOW TO CODIFY THE CFW-11 MODEL (SMART CODE)**

		Inverter Model				Available Option Kits (can be installed in the product from the factory)										
Refer to Chapter 8 TECHNICAL SPECIFICATIONS on page 8-1, for a list of models for the CFW-11 series and for a complete inverter's technical specification		CFW-11	0211	T	4	S	Option kit	Enclosure type	Keypad	Braking	RFI filter	Safety stop	24 Vdc external power supply for control	Special hardware	Special software	Z
Field description	BR	WEG CFW-11 frequency inverter series	Rated output current for use with the Normal Duty (ND) cycle	Number of power phases	Power supply voltage	Option kit	Enclosure type	Keypad	Braking	RFI filter	Safety stop	24 Vdc external power supply for control	Special hardware	Special software	Z	
Available options	2 characters		220...230 V models: 0142 = 115 A (HD) / 142 A (ND) 0180 = 142 A (HD) / 180 A (ND) 0211 = 180 A (HD) / 211 A (ND)  380...480 V models: 0105 = 88 A (HD) / 105 A (ND) 0142 = 115 A (HD) / 142 A (ND) 0180 = 142 A (HD) / 180 A (ND) 0211 = 180 A (HD) / 211 A (ND)	T = three-phase power supply	2 = 220...230 V 4 = 380...480 V	S = standard product O = product with option kit 55 = IP55	Blank = standard (IP20) N1 = Nema1 55 = IP55	Blank = standard keypad IC = no keypad (blind cover)	Blank = standard (no braking IGBT) DB = with braking IGBT	Blank = standard (with internal RFI filter)	Blank = standard (Safety Stop function is not available) Y = with Safety Stop function according to EN-954-1 category 3	Blank = standard (not available) W = 24 Vdc external power supply for control	Blank = standard hardware H1 = special hardware #1	Blank = standard software S1 = special software #1		Character that identifies the code end

## 2.5 RECEIVING AND STORAGE

The CFW-11 frame size E models are supplied packed in wooden boxes.

There is an identification label affixed to the outside of this package, the same one that is affixed to the side of the inverter.

Follow the instructions below to remove the CFW-11 from the package:

- 1- Put the shipping container over a flat and stable area with the assistance of another two people.
- 2- Open the wood crate.
- 3- Remove all the packing material (the cardboard or styrofoam protection) before removing the inverter.

Check the following items once the inverter is delivered:

- Verify that the CFW-11 nameplate corresponds to the model number on your purchase order.
- Inspect the CFW-11 for external damage during transportation.

Report any damage immediately to the carrier that delivered your CFW-11 inverter.

If CFW-11 is to be stored for some time before use, be sure that it is stored in a clean and dry location that conforms to the storage temperature specification (between -25 °C and 60 °C (-13 °F and 140 °F)). Cover the inverter to prevent dust accumulation inside it.

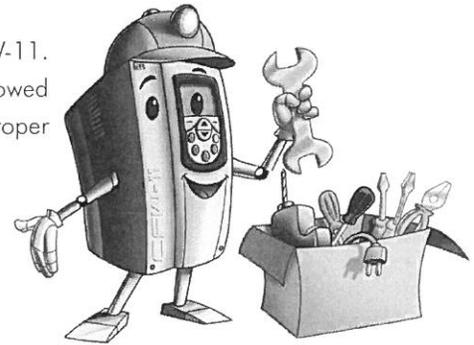


### **ATTENTION!**

Capacitor reforming is required if drives are stored for long periods of time without power. Refer to the procedures in Section 6.5 PREVENTIVE MAINTENANCE on page 6-9.

### 3 INSTALLATION AND CONNECTION

This chapter provides information on installing and wiring the CFW-11. The instructions and guidelines listed in this manual shall be followed to guarantee personnel and equipment safety, as well as the proper operation of the inverter.



#### 3.1 MECHANICAL INSTALLATION

##### 3.1.1 Installation Environment

Avoid:

- ☑ Direct exposure to sunlight, rain, high humidity, or sea-air.
- ☑ Inflammable or corrosive gases or liquids.
- ☑ Excessive vibration.
- ☑ Dust, metallic particles, and oil mist.

Environment conditions for the operation of the inverter:

- ☑ Temperature: -10 °C to 45 °C (14 °F to 113 °F) - standard conditions (surrounding the inverter).  
From 45 °C to 55 °C (113 °F to 131 °F) - current derating of 2 % each °C (or 1.11 % each °F) above 45 °C (113 °F).
- ☑ Inverters CFW-11 with IP55 degree protection: -10 °C to 40 °C (14 °F to 104 °F) - standard conditions (surrounding the inverter).  
From 40 °C to 50 °C (104 °F to 122 °F) - current derating of 2 % for each degree Celsius above 40 °C (104 °F).
- ☑ Humidity: from 5 % to 95 % non-condensing.
- ☑ Altitude: up to 1000 m (3,300 ft) - standard conditions (no derating required).
- ☑ From 1000 m to 4000 m (3,300 ft to 13,200 ft) - apply current derating of 1% for each 100 m (328 ft) above 1000 m (3,300 ft) of altitude.  
From 2000 m to 4000 m (6,600 ft to 13,200 ft) - apply maximum voltage derating (240 V for models 220...240 V, and 480 V for models 380...480 V) of 1.1 % for each 100 m (328 ft) above 2000 m (6,600 ft).
- ☑ Pollution degree: 2 (according to EN50178 and UL508C) with non-conductive pollution. Condensation shall not originate conduction through the accumulated residues.

### 3.1.2 Mounting Considerations

Consult the inverter weight at the Table 8.1 on page 8-2.

Mount the inverter in the upright position on a flat and vertical surface.

External dimensions and fixing holes position according to the Figure 3.1 on page 3-3. Refer to the Section 8.5 MECHANICAL DATA on page 8-9 for more details.

First put the screws on the surface where the inverter will be installed, install the inverter and then tighten the screws.

Minimum mounting clearances requirements for proper cooling air circulation are specified in Figure 3.2 on page 3-4.

Do not install heat sensitive components right above the inverter.



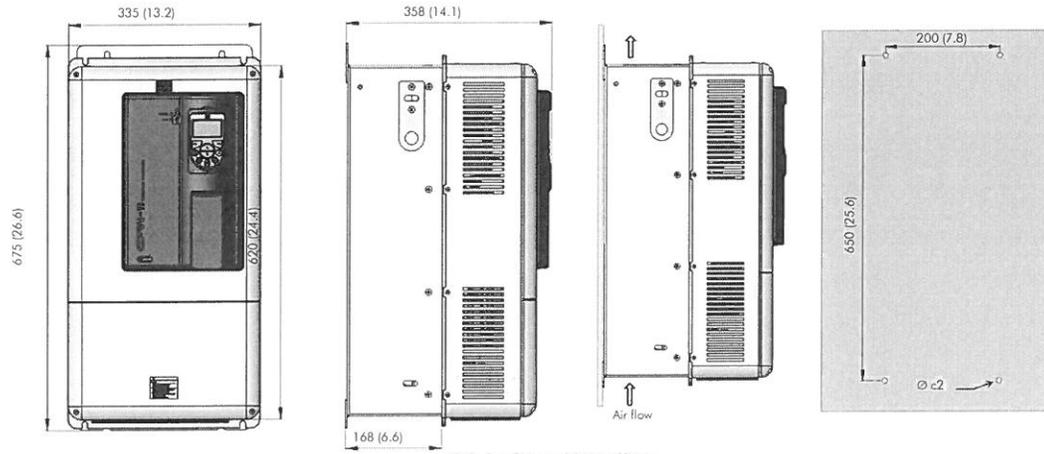
#### **ATTENTION!**

When arranging two or more inverters vertically, respect the minimum clearance A + B (Figure 3.2 on page 3-4) and provide an air deflecting plate so that the heat rising up from the bottom inverter does not affect the top inverter.

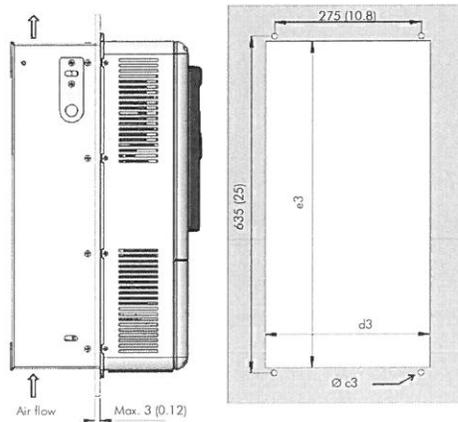


#### **ATTENTION!**

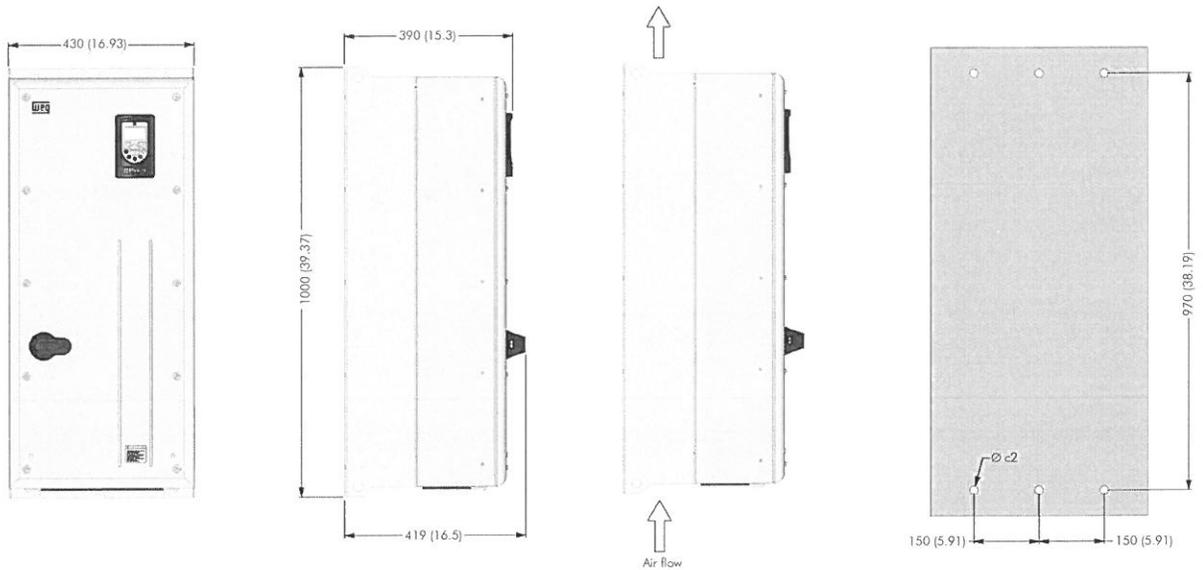
Provide conduit for physical separation of the signal, control, and power conductors (refer to Section 3.2 ELECTRICAL INSTALLATION on page 3-10).



(a) Surface Mounting



(b) Flange Mounting



(c) Surface Mounting for Models with Optional Protection IP55

Model	c2	c3	d3	e3	Torque (*)
	M	M	mm (in)	mm (in)	N.m (lbf.in)
IP20/ Nema1	M8	M8	315 (12.40)	615 (24.21)	20,0 (177,0)
IP55	M8	-	-	-	20,0 (177,0)

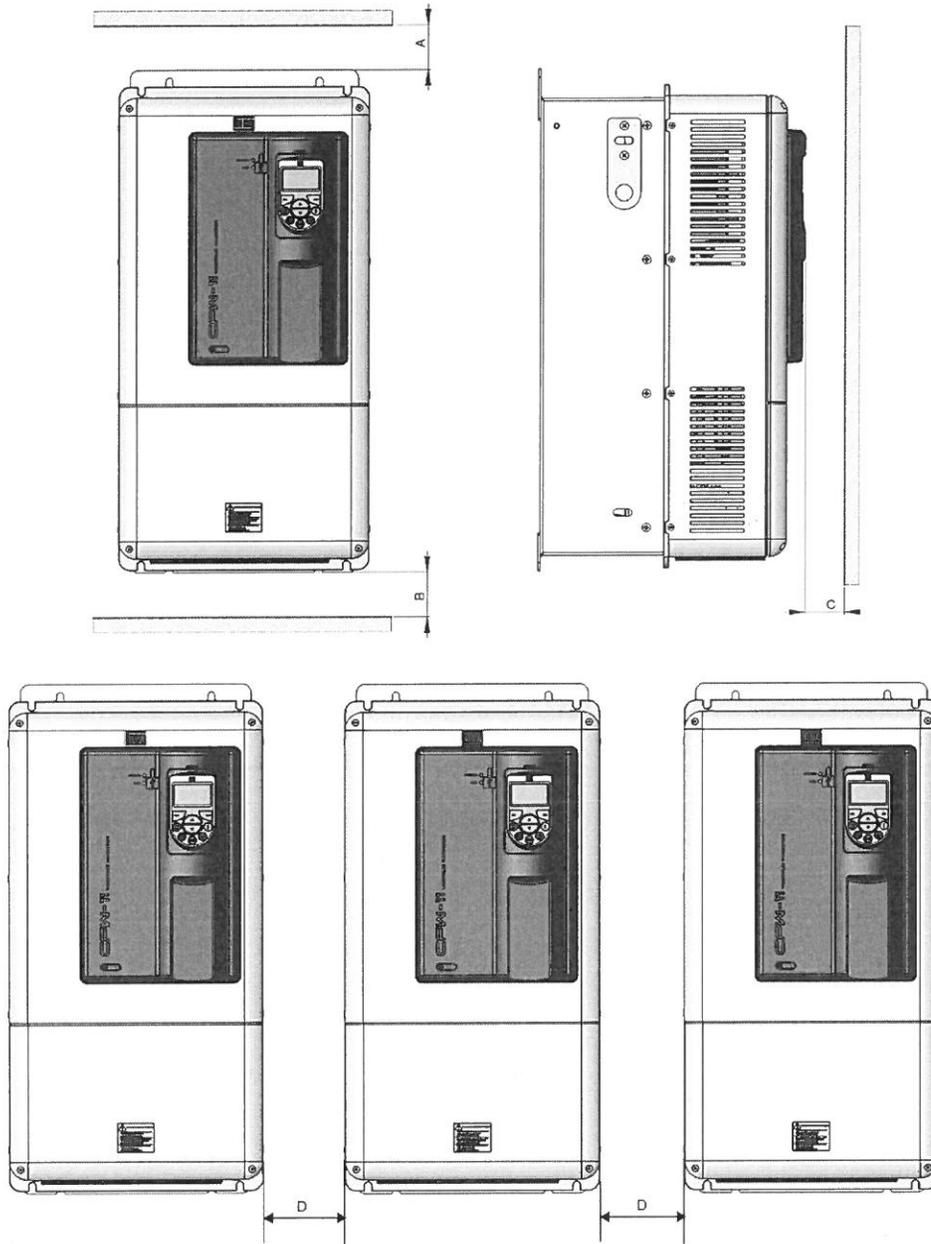
Tolerances for dimensions d3 and e3: +1.0 mm (+0.039 in)

Tolerances for remaining dimensions: ±1.0 mm (±0.039 in)

(\*) Recommended torque for the inverter mounting (valid for c2 and c3)

Figure 3.1 - (a) to (c) - Mechanical installation details - mm (in)

3



Model	A	B	C	D
	mm (in)	mm (in)	mm (in)	mm (in)
CFW11 0142 T 2	100 (3.94)	130 (5.12)	20 (0.78)	40 (1.57)
CFW11 0180 T 2	150 (5.91)	250 (9.84)		80 (3.15)
CFW11 0211 T 2				
CFW11 0105 T 4	100 (3.94)	130 (5.12)		40 (1.57)
CFW11 0142 T 4	150 (5.91)	250 (9.84)		80 (3.15)
CFW11 0180 T 4				
CFW11 0211 T 4				

Tolerance: ±1.0 mm (±0.039 in)

Figure 3.2 - Free spaces for ventilation, above, below, at the front and at the sides of the inverter

### 3.1.3 Cabinet Mounting

There are two possibilities for mounting the inverter: through the wall mounting or flange mounting (the heatsink is mounted outside the cabinet and the cooling air of the power module is kept outside the enclosure). The following information shall be considered in these cases:

#### Surface assembly:

- ☑ Provide adequate exhaustion so that the internal cabinet temperature is kept within the allowable operating range of the inverter.
- ☑ The power dissipated by the inverter at its rated condition, as specified in Table 8.1 on page 8-2 to Table 8.5 on page 8-4 "Dissipated power in Watts - Through the wall mounting".
- ☑ The cooling air flow requirements, as shown in Table 3.1 on page 3-5.
- ☑ The position and diameter of the mounting holes, according to Figure 3.1 on page 3-3.

#### Flange assembly:

- ☑ The power specified in Table 8.1 on page 8-2 to Table 8.5 on page 8-4 "Dissipated power in Watts - Flange mounting" will be dissipated inside the cabinet. The other losses (power modules) will be dissipated at the external ventilation duct.
- ☑ The inverter securing supports (position I of Figure 2.2 on page 2-6) and the hoisting eyes (position J of Figure 2.2 on page 2-6) must be removed and repositioned according to the Figure 3.3 on page 3-6 and Figure 3.4 on page 3-6.
- ☑ The portion of the inverter that is located outside the cabinet has protection degree IP54. Provide an adequate gasket for the cabinet opening to ensure that the enclosure rating is maintained. Example: silicone gasket.
- ☑ Mounting surface opening dimensions and position/diameter of the mounting holes, as shown in Figure 3.1 on page 3-3.

**Table 3.1 - Cooling air flow for frame size E models**

Model	CFM	l/s	m <sup>3</sup> /min
CFW11 0142 T 2	180	95	5.1
CFW11 0180 T 2	265	125	7.5
CFW11 0211 T 2	367(*)	174(*)	10.4(*)
CFW11 0105 T 4	138	65	3.9
CFW11 0142 T 4	180	95	5.1
CFW11 0180 T 4	265	125	7.5
CFW11 0211 T 4	367(*)	174(*)	10.4(*)

(\*) With optional degree of protection IP55.

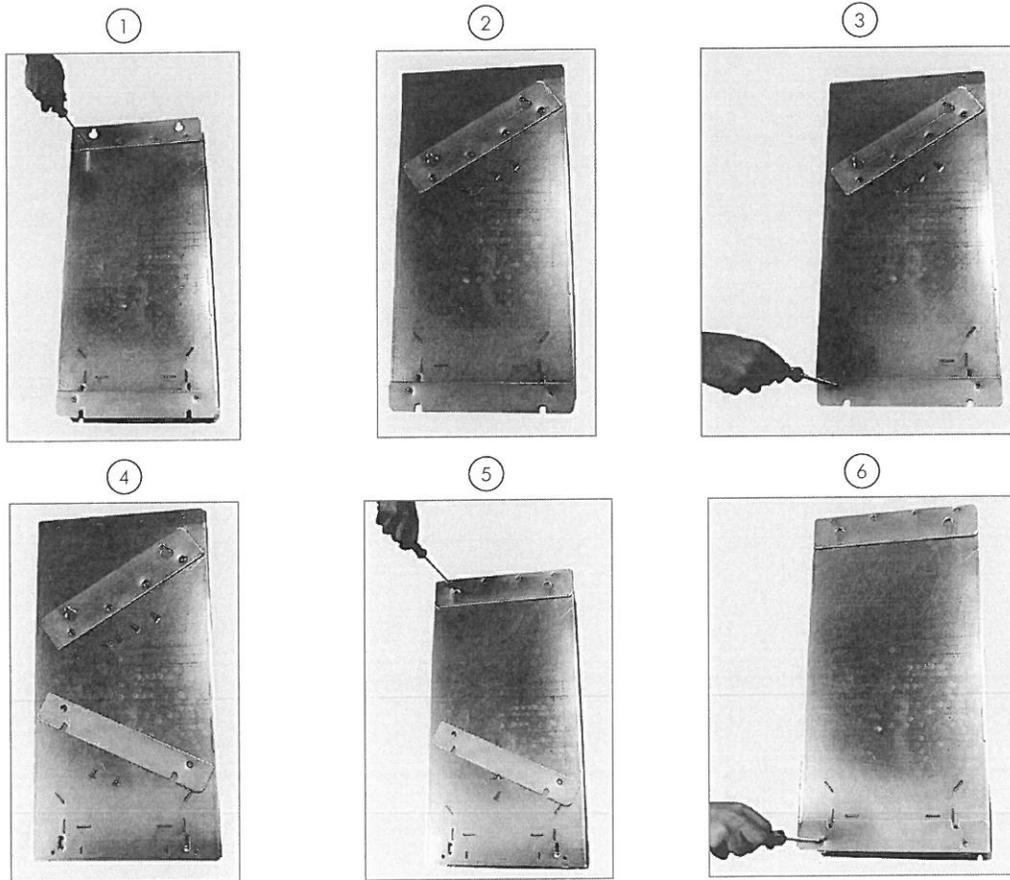


Figure 3.3 - Repositioning the mounting supports

3

### 3.1.4 Installation of the Inverter Hoisting Eyes

Two hoisting eyes for the inverter lifting, which are mounted at the inverter sides (rear part), are supplied. By inverting their position, as shown in the Figure 3.4 on page 3-6, two points for hoisting the inverter, which are very useful during the mechanical installation of the inverter, are obtained.

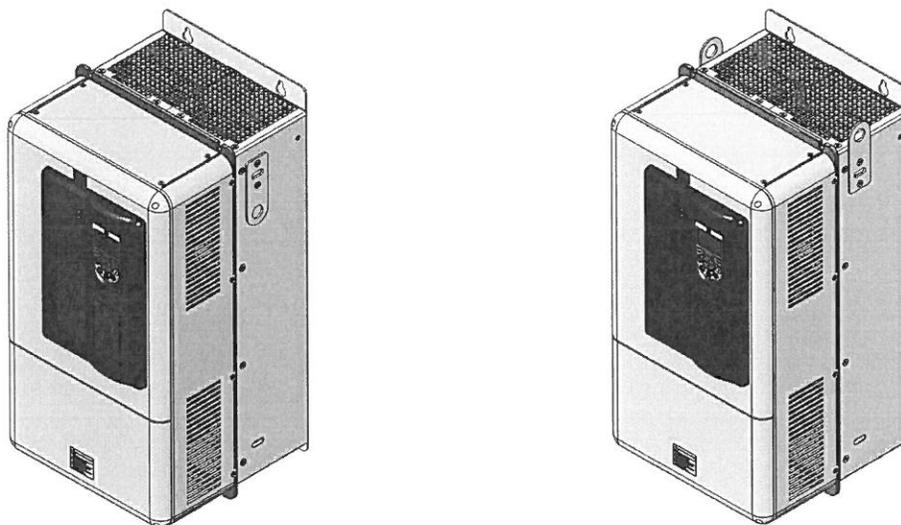


Figure 3.4 - Installation of the inverter hoisting eyes

### 3.1.5 Installation of the Inverter with Nema1 Kit (Option, CFW11....T...ON1...) on a Wall

- ☑ Fixing holes position and diameter according to the Figure 3.1 on page 3-3.
- ☑ External dimensions of the inverter with Nema1 kit according to the Section 8.6 NEMA1 KIT on page 8-11.
- ☑ Fasten the inverter.
- ☑ Install the Nema1 kit top on the inverter as showed in the Figure 3.5 on page 3-7 using the 2 M8 screws supplied with the product.

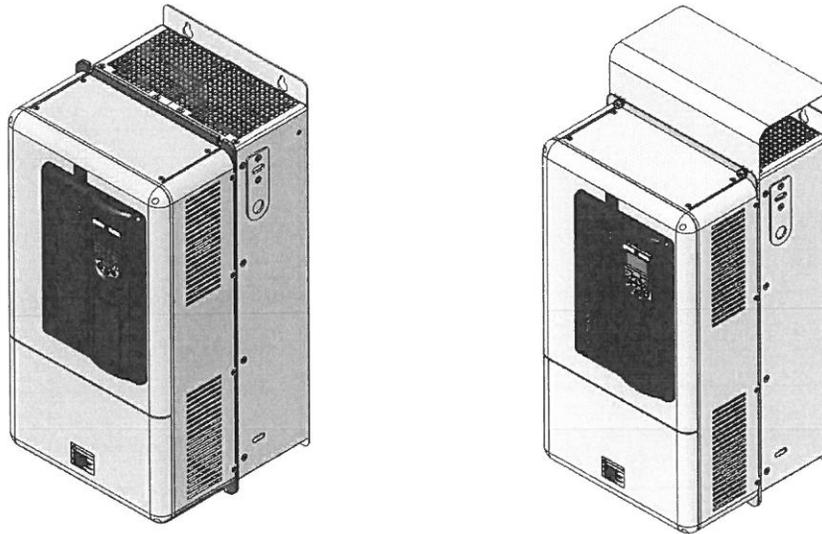


Figure 3.5 - Installation of the Nema1 kit top ("hat")

### 3.1.6 Access to the Control and Power Terminal Strips

It is necessary to remove the keypad (HMI) and the control rack cover in order to get access to the control terminal strip (see Figure 3.6 on page 3-7). In order to get access to the power terminal strip, remove the bottom front cover (see Figure 3.7 on page 3-8).

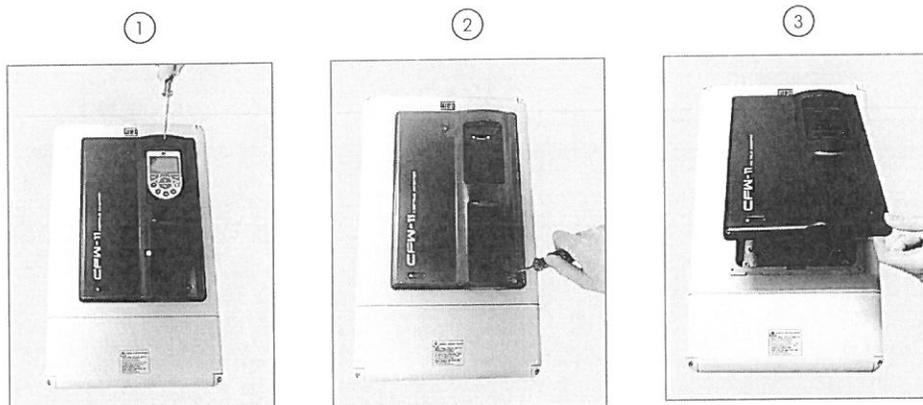


Figure 3.6 - HMI and control rack cover removal

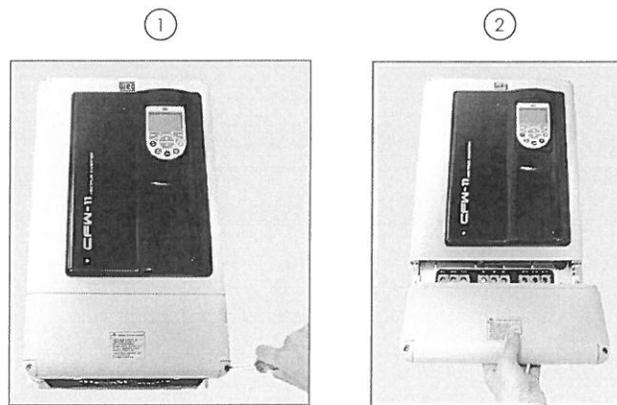


Figure 3.7 - Bottom front cover removal

3

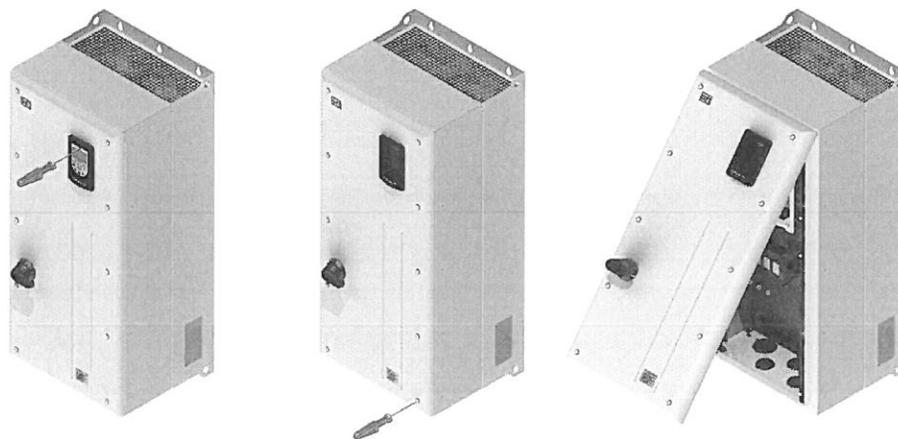


Figure 3.8 - Bottom front cover removal for models with optional IP55

At the CFW11 0180 T 2 O N1, CFW11 0211 T 2 O N1, CFW11 0180 T 4 O N1 and CFW11 0211 T 4 O N1 inverters (supplied with Nema1 kit), it is also necessary to remove the front cover of the Nema1 kit bottom part in order to be able to execute the electrical installation of power - see the Figure 3.9 on page 3-9.

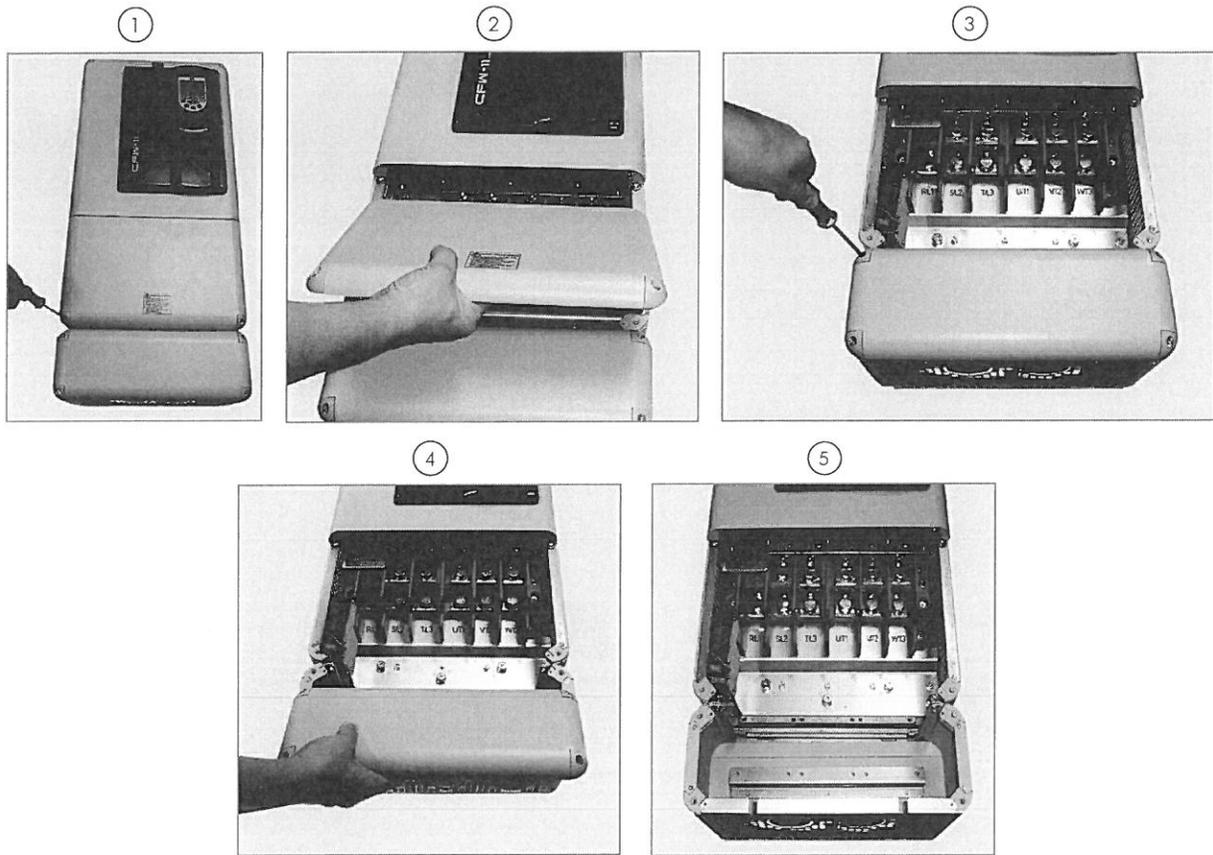


Figure 3.9 - Removal of the Nema1 kit bottom front cover at the CFW11 0180 T 2 O N1, CFW11 0211 T 2 O N1, CFW11 0180 T 4 O N1 and CFW11 0211 T 4 O N1 inverters in order to get access to the power terminal block

### 3.1.7 Removal of the Cable Passage Plate

When it is not necessary neither IP20 nor Nema1 protection degree, the cable passage plate may be removed in order to make the inverter electric installation easier. Remove the 4 M4 screws, according to the procedure presented in the Figure 3.10 on page 3-9.

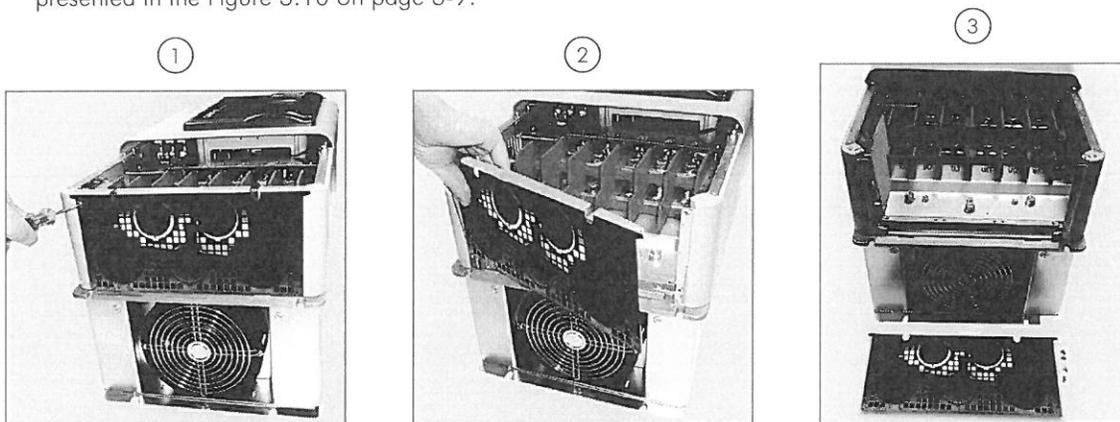


Figure 3.10 - Removal of the cable passage plate

### 3.1.8 HMI Installation at the Cabinet Door or Command Panel (Remote HMI)

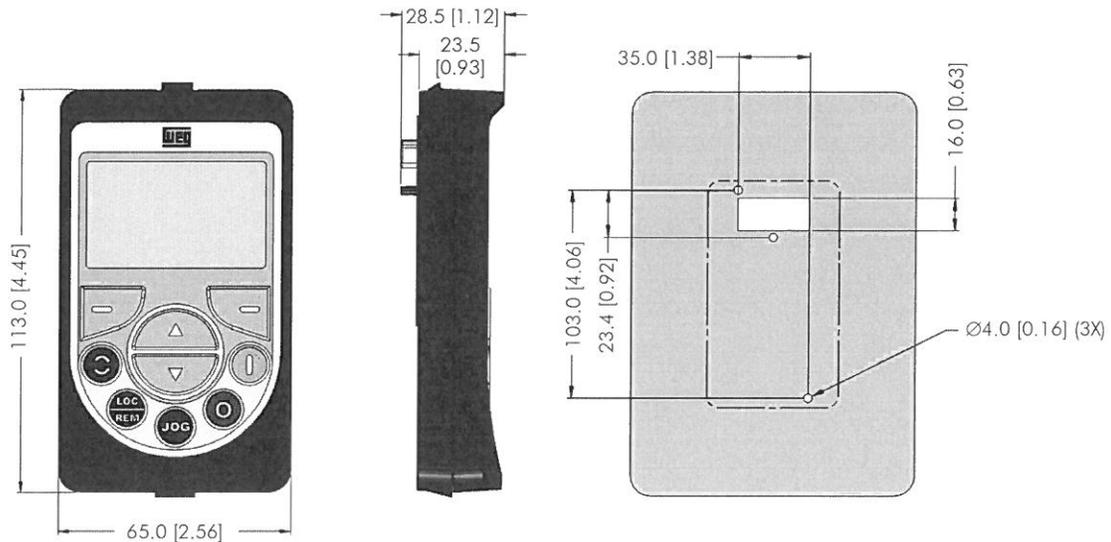


Figure 3.11 - Data for the HMI installation at the cabinet door or command panel – mm [in]

The keypad frame accessory can also be used to fix the HMI, as mentioned in the Table 7.1 on page 7-4 of models of the accessories.

3

## 3.2 ELECTRICAL INSTALLATION



### DANGER

The following information is merely a guide for proper installation. Comply with applicable local regulations for electrical installations.



### DANGER

Les informations suivantes constituent uniquement un guide pour une installation correcte. Respectez les réglementations locales en vigueur pour les installations électriques.



### DANGER

Make sure the AC power supply is disconnected before starting the installation.



### DANGER

Vérifiez que l'alimentation secteur CA est débranchée avant de commencer l'installation.



### ATTENTION!

Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with applicable local codes.

### 3.2.1 Identification of the Power and Grounding Terminals

R/L1, S/L2, T/L3: AC power supply.

U/T1, V/T2, W/T3: motor connection.

DC+: this is the positive potential terminal in the DC Link circuit.

BR: braking resistor connection.

DC-: this is the negative potential terminal in the DC Link circuit.

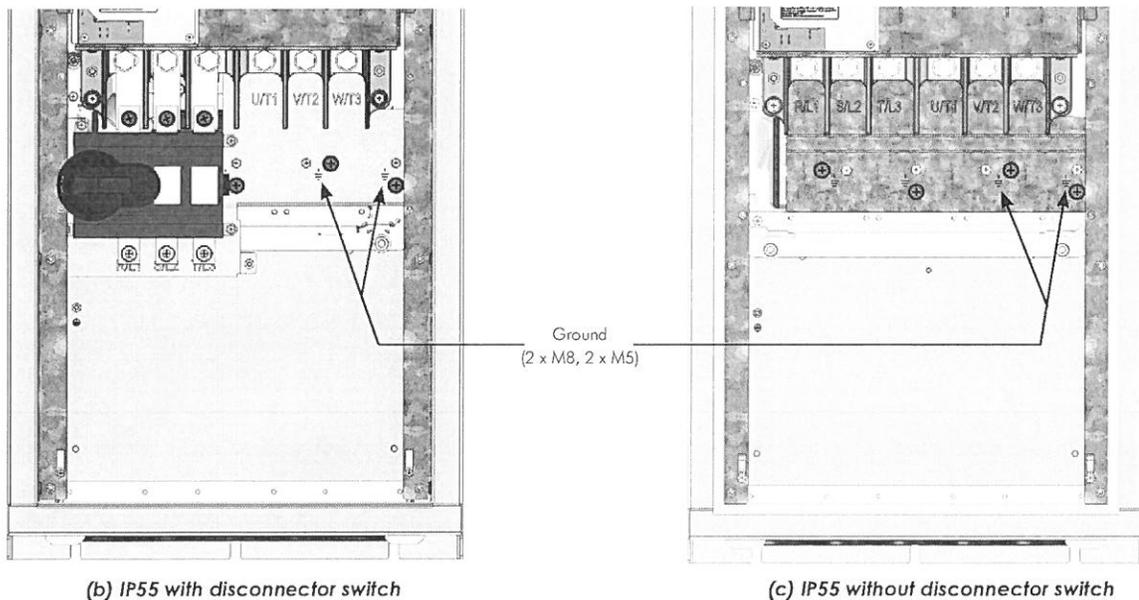
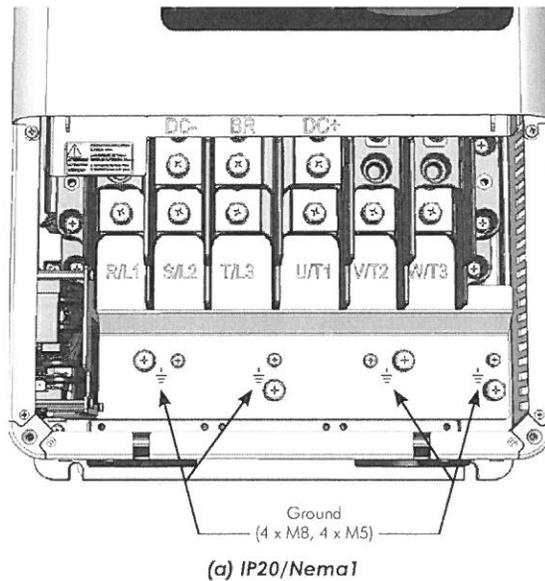


Figure 3.12 - Grounding and power terminals

### 3.2.2 Power/Grounding Wiring and Fuses

**ATTENTION!** Use proper cable lugs for the power and grounding connection cables.



**ATTENTION!**

Sensitive equipment such as PLCs, temperature controllers, and thermal couples shall be kept at a minimum distance of 0.25 m (9.84 in) from the frequency inverter and from the cables that connect the inverter to the motor.



**DANGER!**

Wrong cable connection:

- The inverter will be damaged in case the input power supply is connected to the output terminals (U/T1, V/T2, or W/T3).
- Check all the connections before powering up the inverter.
- In case of replacing an existing inverter by a CFW-11, check if the installation and wiring is according to the instructions listed in this manual.



**DANGER!**

Mauvaise connexion des câbles:

- Le variateur sera endommagé si l'alimentation d'entrée est connectée aux bornes de sortie (U/T1, V/T2 ou W/T3).
- Vérifier toutes les connexions avant de mettre le variateur sous tension
- En cas de remplacement d'un variateur existant par un CFW-11, vérifier si l'installation et le câblage sont conformes aux instructions figurant dans ce manuel.



**ATTENTION!**

Residual Current Device (RCD):

- When installing an RCD to guard against electrical shock, only devices with a trip current of 300 mA should be used on the supply side of the inverter.
- Depending on the installation (motor cable length, cable type, multimotor configuration, etc.), RCD nuisance trips may occur. Contact the RCD manufacturer for selecting the most appropriate device to be used with inverters.



**NOTE!**

The wire gauge values listed in Table 3.2 on page 3-13 are orientative values. Installation conditions and the maximum permitted voltage drop shall be considered for the proper wiring sizing.

**Input fuses:**

- ☑ Use High Speed Fuses at the input for the protection of the inverter rectifier and wiring refer to Table 3.2 on page 3-13 for selecting the appropriate fuse rating (consider the cold current extinction value (not the melting value)) to protect the input rectifier diodes of the inverter and wiring.
- ☑ In order to meet UL requirements, use class **J** fuses at the inverter supply with a current not higher than the values of Table 3.4 on page 3-17.
- ☑ Optionally, slow blow fuses can be used at the input they must be sized for 1.2 x the inverter rated input current. In this case, the installation is protected against short-circuit, but not the inverter input rectifier. This may result in major damage to the inverter in the event of an internal component failure.

Table 3.2 - Recommended wire size/fuses - use only copper wire [75 °C (167 °F)]

Model	Frame Size	Power Terminal			Over-load Class	Wire Size			Fuse [A]	Fuse I <sup>2</sup> t [A <sup>2</sup> s]
		Terminals	Bolt (Wrench/Screw Head Type)	Recommended Torque N.m (lbf.in)		mm <sup>2</sup>	AWG	Terminals		
CFW11 0142 T 2		R/L1,S/L2,T/L3, U/T1,V/T2,W/T3, DC+,DC-, DCL+,DCL-	M8 (Phillips hex head)	15 (132.75)	HD	50	1/0	Ring tongue terminal	250	39200
					ND	70	2/0			
			M5 and M8 (Phillips hex head)	M5: 3.5 (31.0); M8: 10 (88.5)	HD/ND	35	2			
CFW11 0180 T 2		R/L1,S/L2,T/L3, U/T1,V/T2,W/T3, DC+,DC-, DCL+,DCL-	M10 (hexagonal screw) <sup>(1)</sup>	30 (265.5)	HD	70 (or 2 x 25)	2/0 (or 2 x 4)	Ring tongue terminal	350	218000
					ND	120 (or 2 x 35)	4/0 (or 2 x 2)			
			M5 and M8 (Phillips hex head)	M5: 3.5 (31.0); M8: 10 (88.5)	HD/ND	50	1			
CFW11 0211 T 2		R/L1,S/L2,T/L3, U/T1,V/T2,W/T3, DC+,DC-, DCL+,DCL-	M10 (hexagonal screw) <sup>(1)</sup>	30 (265.5)	HD	120 (or 2 x 35)	4/0 (or 2 x 2)	Ring tongue terminal	400	218000
					ND	150 (or 2 x 50)	300 (or 2 x 1)			
			M5 and M8 (Phillips hex head)	M5: 3.5 (31.0); M8: 10 (88.5)	HD/ND	70	2/0			
CFW11 0105 T 4	E	R/L1,S/L2,T/L3, U/T1,V/T2,W/T3, DC+,DC-, DCL+,DCL-	M8 (Phillips hex head)	15 (132.75)	HD	35	2	Ring tongue terminal	160	39200
					ND	50	1			
			M5 and M8 (Phillips hex head)	M5: 3.5 (31.0); M8: 10 (88.5)	HD/ND	25	4			
CFW11 0142 T 4		R/L1,S/L2,T/L3, U/T1,V/T2,W/T3, DC+,DC-, DCL+,DCL-	M8 (Phillips hex head)	15 (132.75)	HD	50	1/0	Ring tongue terminal	250	39200
					ND	70	2/0			
			M5 and M8 (Phillips hex head)	M5: 3.5 (31.0); M8: 10 (88.5)	HD/ND	35	2			
CFW11 0180 T 4		R/L1,S/L2,T/L3, U/T1,V/T2,W/T3, DC+,DC-, DCL+,DCL-	M10 (hexagonal screw) <sup>(1)</sup>	30 (265.5)	HD	70 (or 2 x 25)	2/0 (or 2 x 4)	Ring tongue terminal	350	218000
					ND	120 (or 2 x 35)	4/0 (or 2 x 2)			
			M5 and M8 (Phillips hex head)	M5: 3.5 (31.0); M8: 10 (88.5)	HD/ND	50	1			
CFW11 0211 T 4		R/L1,S/L2,T/L3, U/T1,V/T2,W/T3, DC+,DC-, DCL+,DCL-	M10 (hexagonal screw) <sup>(1)</sup>	30 (265.5)	HD	120 (or 2 x 35)	4/0 (or 2 x 2)	Ring tongue terminal	400	218000
					ND	150 (or 2 x 50)	300 (or 2 x 1)			
			M5 and M8 (Phillips hex head)	M5: 3.5 (31.0); M8: 10 (88.5)	HD/ND	70	2/0			

(1) IP55 models: R/L1,S/L2,T/L3 using hexagonal screw M8 (Phillips hex head).

Table 3.3 - (a) and (b) - Recommended terminals for power connections  
(a) Cables with size in mm<sup>2</sup>

Wire Size [mm <sup>2</sup> ]	Screw	Manufacturer	Lug Terminal, Code	Crimping Tool Code	Number of Crimps
25	M5	Hollingsworth	RM 25 -5	H 6.500	1
		Tyco	33468	59975-1	1
	M8	Hollingsworth	RM 25-8	H 6.500	1
		Burndy (FCI)	YA3CL	Tool without die: MY29-3 or Y644 or Y81 Tool+die: Y46 or Y35 or Y750 / U3CRT	1
	M10	Tyco	33470	59975-1	1
		Hollingsworth	RM 25-10	H 6.500	1
35	M5	Tyco	33471	59975-1	1
		Hollingsworth	RM 35-5	H 6.500	1
	M8	Burndy (FCI)	YA2CL2	Tool without die: MY29-3 or Y644 or Y81 Tool+die: Y46 or Y35 or Y750 / U2CRT	1
		Tyco	330301	59975-1	1
	M10	Hollingsworth	RM 35-8	H 6.500	1
		Burndy (FCI)	YAC2CL	Tool without die: MY29-3 or Y644 or Y81 Tool Tool+die: Y46 or Y35 or Y750 / U2CRT	1
50	M5	Tyco	322870	59975-1	1
		Hollingsworth	RM 50-5	H 6.500	1
	M8	Burndy (FCI)	YA1CL2	Tool without die: MY29-3 or Y644 or Y81 Tool+die: Y46 or Y35 or Y750 / U1CRT	1
		Tyco	36915	Manual tool: 1490748-1, Jaw: 1490413-5 + 1490414-3	1
	M10	Hollingsworth	RM 50-8	H 6.500	1
		Burndy (FCI)	YA1CL	Tool without die: MY29-3 or Y644 or Y81 Tool+die: Y46 or Y35 or Y750 / U1CRT	1
70	M5	Tyco	36916	Manual tool: 1490748-1, Jaw: 1490413-5 + 1490414-3	1
		Hollingsworth	RM 50-10	H 6.500	1
	M8	Burndy (FCI)	YA1CL4	Tool without die: MY29-3 or Y644 or Y81 Tool+die: Y46 or Y35 or Y750 / U1CRT	1
		Tyco	36917	Manual tool: 1490748-1, Jaw: 1490413-5 + 1490414-3	1
	M10	Hollingsworth	RM 70-5	H 6.500	1
		Burndy (FCI)	YA26L2	Tool without die: MY29-3 or Y644 or Y81 Tool+die: Y46 or Y35 or Y750 / U26RT	1
120	M5	Tyco	321869	Manual tool: 1490748-1, Jaw: 1490413-6 + 1490414-3	1
		Hollingsworth	RM 70-8	H 6.500	1
	M8	Burndy (FCI)	YA26L	Tool without die: MY29-3 or Y644 or Y81 Tool+die: Y46 or Y35 or Y750 / U26RT	1
		Tyco	321870	Manual tool: 1490748-1, Jaw: 1490413-6 + 1490414-3	1
	M10	Hollingsworth	RM 70-10	H 6.500	1
		Burndy (FCI)	YA26L4	Tool without die: MY29-3 or Y644 or Y81 Tool+die: Y46 or Y35 or Y750 / U26RT	1
150	M10	Tyco	321871	Manual tool: 1490748-1, Jaw: 1490413-6 + 1490414-3	1
		Hollingsworth	RM120-10	H 6.500	1
	M10	Burndy (FCI)	YA29L4	Tool without die: MY29-3 or Y644 or Y81 Tool+die: Y46 or Y35 or Y750 / U29RT	1
Tyco		322252	Hydraulic pump: 1804700-1 (electric) or 1583659-1 (foot pump), 1583662-1 -2 or -3 (1.8 m, 3 m or 6 m)	1	
150	M10	Hollingsworth	RM150-10	H 6.500	1
		Burndy (FCI)	YA30L24	Tool without die: MY29-3 or Y644 or Y81 Tool+die: Y46 or Y35 or Y750 / U30RT	1
150	M10	Tyco	322252	Hydraulic pump: 1804700-1 (electric) or 1583659-1 (foot pump), 1583662-1 -2 or -3 (1.8 m, 3 m or 6 m)	1

3