
Variable Frequency Drives

Overview, Basic Operation, Setup Procedure, and Troubleshooting

Manufactured By  **Telemecanique**

a brand of  **Schneider
Electric**



Why Do Customer Want These?



- ★ Allows for full-torque startups with a controlled current and speed ramp.
- ★ Prevents “dimming the lights” and overloading the generator.
- ★ Runs any 3-phase 50Hz or 60Hz compressor with 50Hz or 60Hz, single or three-phase power supply (can be mixed).



Marine Air Models and Part Numbers

Dometic P/N	Description	Telemecanique Model #
263250104	5HP, 230VAC, 17.5A	ATV31HU40M3X
263250105	7.5HP, 230VAC, 27.5A	ATV31HU55M3X
263250106	10HP, 230VAC, 33A	ATV31HU75M3X
263250110	15HP, 230VAC, 54A	ATV31HD11M3X
263250111	20HP, 230VAC, 66A	ATV31HD15M3X
263250108	5HP, 460VAC, 9.5A	ATV31HU40N4
263250112	7.5HP, 460VAC, 14.3A	ATV31HU55N4
263250202	10HP, 460VAC, 17A	ATV31HU75N4
263250109	15HP, 460VAC, 27.7A	ATV31HD11N4
263250201	20HP, 460VAC, 33A	ATV31HD15N4

Note: Compressor voltage must be specified when placing order.

Cruisair Models and Part Numbers

Dometic P/N	Description	Telemecanique Model #
763300006	5HP, 230VAC, 17.5A	ATV31HU40M3X
763300007	7.5HP, 230VAC, 27.5A	ATV31HU55M3X
763300008	10HP, 230VAC, 33A	ATV31HU75M3X
763300009	15HP, 230VAC, 54A	ATV31HD11M3X
763300010	20HP, 230VAC, 66A	ATV31HD15M3X
763300011	5HP, 460VAC, 9.5A	ATV31HU40N4
763300012	7.5HP, 460VAC, 14.3A	ATV31HU55N4
763300013	10HP, 460VAC, 17A	ATV31HU75N4
763300016	7.5HP, 380VAC, 14.3A	ATV31HU55N4
763300018	10HP, 380VAC, 17A	ATV31HU75N4
763300019	15HP, 380VAC, 27.7A	ATV31HD11N4



Accessory Part Numbers

Dometic P/N	Description	Telemecanique Model #
5067548	Conduit Box Base for 5HP drives	N/A
5067549	Conduit Box Cover for 5HP drives	N/A
5067530	Conduit Box Base for 7.5-10HP drives	N/A
5067531	Conduit Box Cover for 7.5-10HP drives	N/A
4250203	Conduit Box Kit for 15-12HP drives	VW3A31817
763300002	RFI Filter for 230/460V 5HP drives	VW3A3406
763300003	RFI Filter for 230/460V 7.5-10HP drives	VW3A3407
763300004	RFI Filter for 230V 15-20HP drives	VW3A3408
763300005	RFI Filter for 460V 15-20HP drives	VW3A3409
4250301	AC Line Reactor for 230V 10HP drives	(MTE) RL03502
4250303	AC Line Reactor for 230V 15HP drives	(MTE) RL04502
4250304	AC Line Reactor for 230V 25HP drives	(MTE) RL08011
4250302	AC Line Reactor for 460V 15HP drives	(MTE) RL02503

Selecting the Proper Size

Nominal HP	Comp Voltage	Max AMP Rating	
		3-Ph In	1-Ph In
5HP	208-230V	17.5	10.1
7.5HP	208-230V	27.5	15.9
10HP	208-230V	33.0	19.1
15HP	208-230V	54.0	31.2
20HP	208-230V	66.0	38.1
5HP	380-460V	9.5	-
7.5HP	380-460V	14.3	-
10HP	380-460V	17.0	-
15HP	380-460V	27.7	-
20HP	380-460V	33.0	-

NOTES:

1. Compressor must be 3-phase.
2. Multiply the compressor's 3-phase reverse cycle amps by 1.1 (10% safety factor)

EXAMPLE:

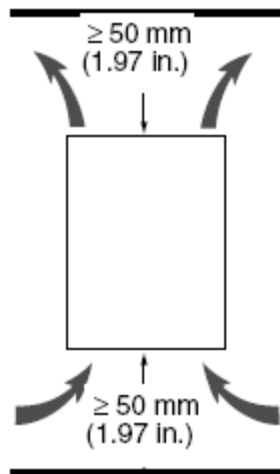
5 ton 230V/60Hz/3Φ Scroll Compressor draws 16.7 amps in heat mode

$16.7 \times 1.1 = 18.4$ amps. If input power to the VFD is 3-phase, use 7.5HP.

$16.8 \times 1.1 \times 1.73 = 31.8$ amps. If input power to VFD is single phase, use 10HP.



Proper Installation/Ventilation



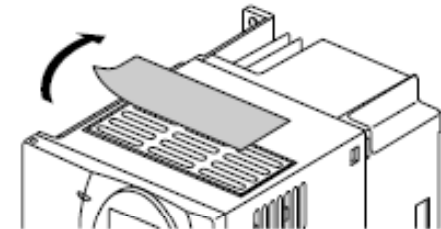
Install the drive controller vertically, $\pm 10^\circ$.

Do not place the drive controller close to heating sources.

Leave sufficient free space around the drive controller to ensure that air can circulate from the bottom to the top of the unit.

Leave a minimum of 10 mm (0.4 in.) of free space in front of the drive controller.

When IP20 protection is adequate, remove the protective cover on top of the drive controller as shown in the figure below. Consult "Mounting Methods" on page 17 to determine the type of mounting appropriate for your application before removing the protective cover from the drive controller. For UL Type 1 protection, the protective cover must remain installed on the top of the controller and a conduit entry kit must be installed.



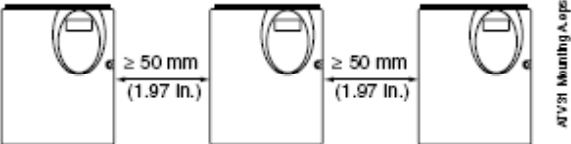
By default, Altivar 31s are IP21/NEMA 1 (>50mm) on the terminals and IP31/41 (>2.5/1mm) elsewhere



Proper Installation/Ventilation

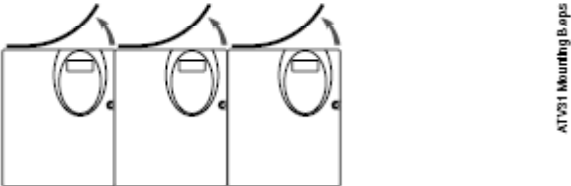
Type A Mounting

Free space ≥ 50 mm (1.97 in.) on each side, with the protective cover in place.



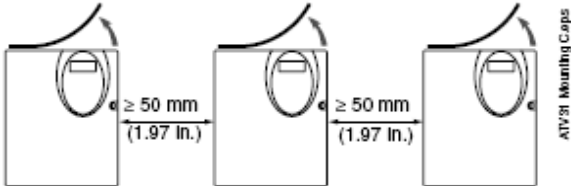
Type B Mounting

Drive controllers mounted side-by-side, with the protective cover removed (degree of protection becomes IP20).



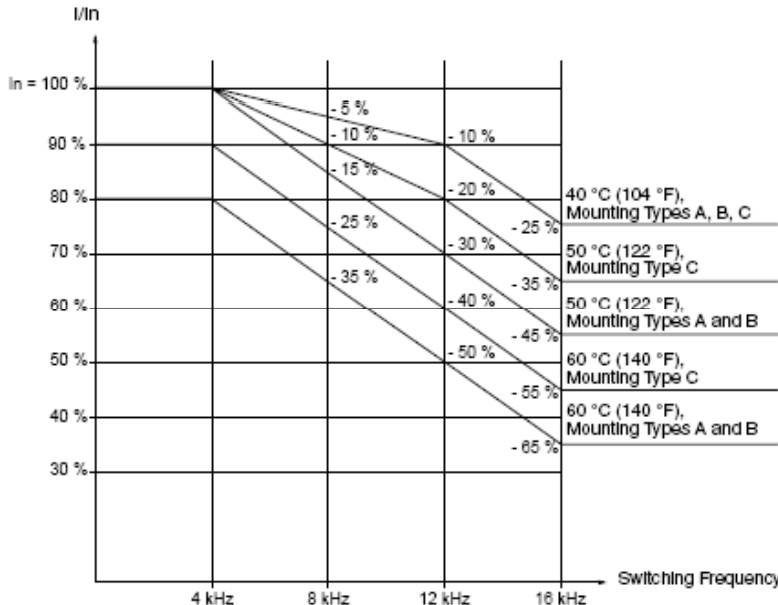
Type C Mounting

Free space ≥ 50 mm (1.97 in.) on each side, with the protective cover removed (degree of protection becomes IP20).

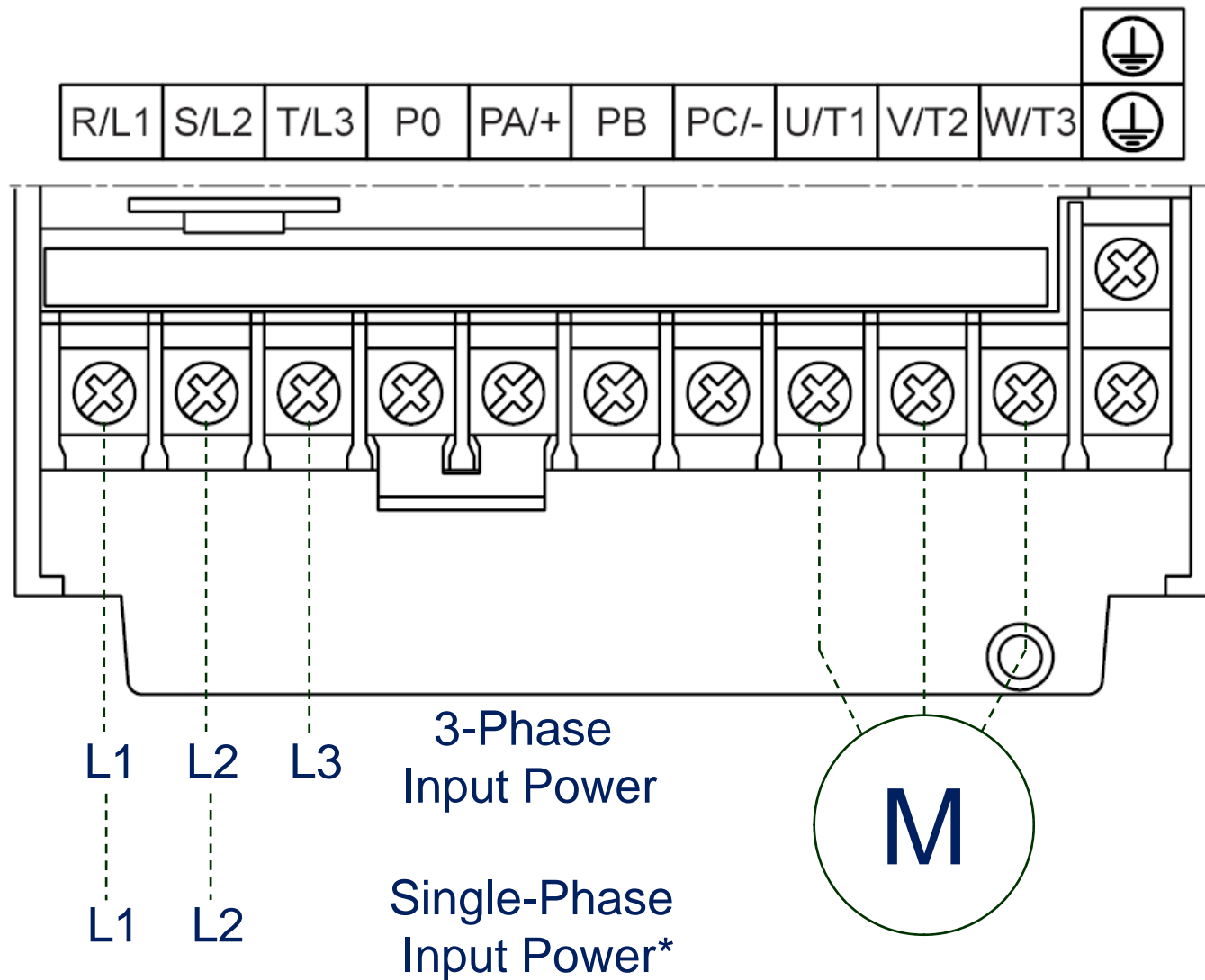


The following figure contains derating curves for the drive current (I_n) as a function of temperature, switching frequency, and type of mounting. For intermediate temperatures, such as 55 °C (131 °F), interpolate between two curves.

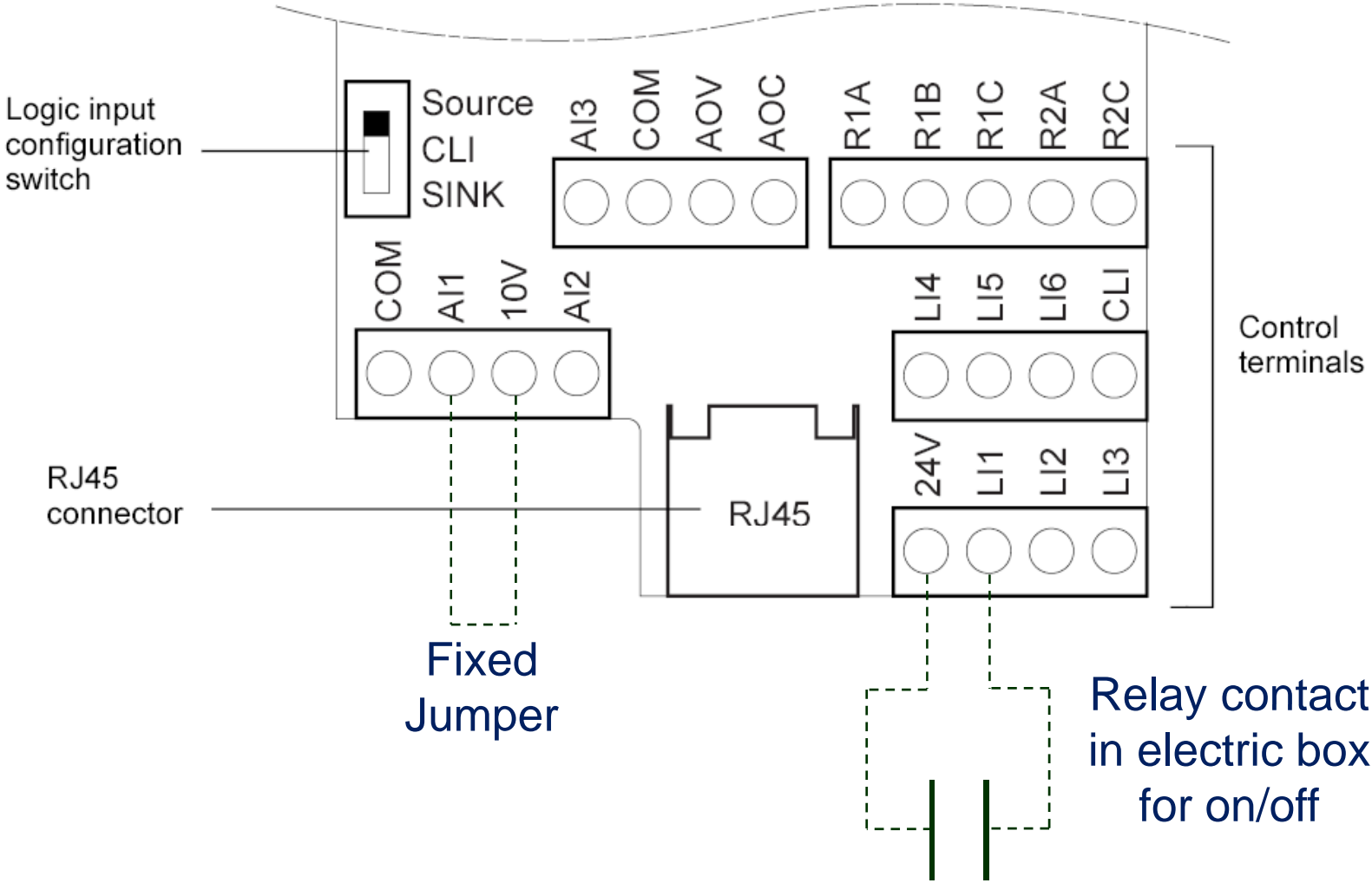
ATV31 drive controllers can be used at altitudes up to 3,300 ft. (1,000 m) without derating. Derate by 1% for each additional 330 ft. (100 m).



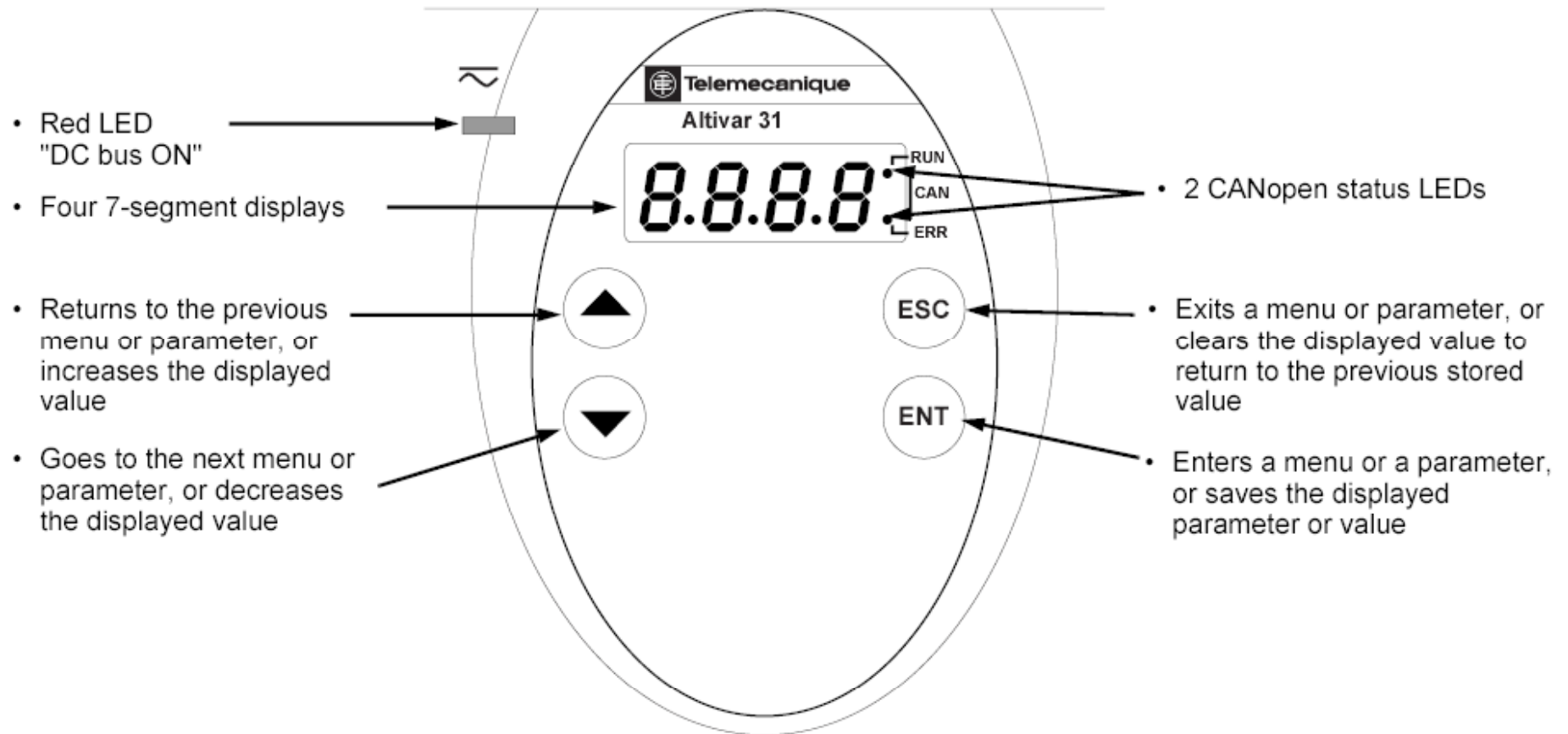
AC Electrical Connections



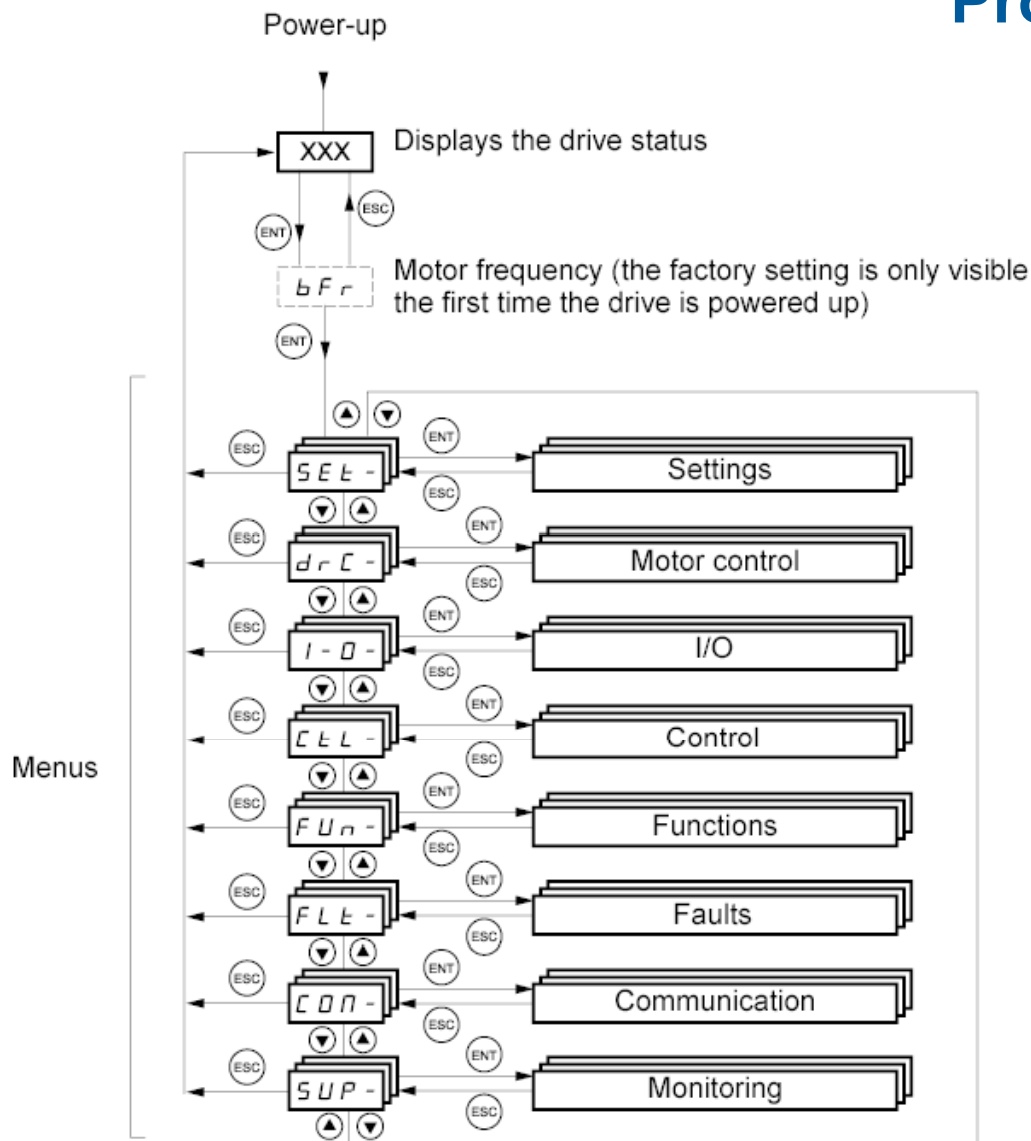
Low Voltage DC Connections



Operator Interface



Programming Menu Structure



- ★ All the programming parameters are setup in a hierarchy.
 - ★ The programming procedure navigates you up and down through this scheme in order to visit all the required parameters.
 - ★ All drives come programmed from the factory.
- Therefore, we recommend that you do not reprogram the drive unless advised to do so by a Dometic service representative!



Dometic Factory Setup Procedure

Variable Frequency Drive Telemecanique Altivar 31 Programming Procedure (revised 8/06)

- Apply power to the VFD, press ENT, **SEt** is displayed, press ↓, **drC** is displayed, press ENT, **bFr** is displayed, press ↑, **FCS** is displayed, press ENT, **nO** is displayed, press ↓ twice to change to **InI**, press and hold ENT for 3 seconds, display should flash, press ESC twice.
- Press ↑, **SEt** is displayed, press ENT, **ACC** is displayed, press ENT and press ↑ to change to **5**, press ENT, it should flash, press ESC
- Press ↓, **dEC** is displayed, press ENT, press ↑ to change to **5**, press ENT, it should flash, press ESC
- Press ESC, **SEt** is displayed, press ↓, **drC** is displayed, press ENT, **bFr** is displayed, press ENT, press ↓ to change to **60**, press ENT, it should flash, press ESC
- Press ↓, **UnS** is displayed, press ENT, press ↑ to change to <compressor voltage>, press ENT, it should flash, press ESC
- Press ↓, **nCr** is displayed, press ENT, press ↑ or ↓ to change to <compressor FLA in heat>, press ENT, it should flash, press ESC
- Press ESC, **drC** is displayed, press ↓ until **SUP** is displayed, press ENT, **FrH** is displayed, press ↓ to change to **rFr**, press ENT, **0.0** is displayed. Press ENT again and hold for 2 seconds. **0.0** display will flash. Press ESC
- Press ESC, **SUP** is displayed, press ↓ until **FLt** is displayed, press ENT, **Atr** is displayed, press ENT, press ↓ to change to **YES**, press ENT, it should flash, press ESC
- Press ↓, until **IPL** is displayed, press ENT, press ↑ to change to **nO** if single-phase power or **yES** if three-phase power, press ENT, it should flash, press ESC
- Press ESC, **FLt** is displayed, press ↑ until **I_O** - is displayed, press ENT, **tCC** is displayed, press ↓, **tCt** is displayed, press ENT, press ↑, **LEL** is displayed, press ENT, it should flash, press ESC
- Press ESC, **I_O** - is displayed, press ↑ until **drC** is displayed, press ENT, **bFr** is displayed, press ↑ until **SCS** is displayed, press ENT, press down to change to **Str 1**, press and hold ENT until it flashes and displays **nO**, press ESC three times, **rdy** is displayed



Dometic Factory Setup Procedure

Parameter	Description
<i>FCS</i>	Restore Factory Defaults
<i>ACC</i>	Acceleration time = 5 seconds
<i>dEC</i>	Deceleration time = 5 seconds
<i>bFr</i>	Compressor Motor Frequency (50 or 60Hz)
<i>nCr</i>	Compressor Motor FLA (amps)
<i>UnS</i>	Compressor Motor Voltage (208, 230, 380, 460)
<i>rFr</i>	Set display to show output frequency to motor
<i>Atr</i>	Allow automatic restarts after fault clears (only for certain faults)
<i>IPL</i>	Line phase loss/reversal detection (yes for 3 Φ , no for single Φ)
<i>tCt</i>	2-wire operation signal behavior (shorted=on, open=off)
<i>SCS</i>	Save the configuration



VFD Fault Codes

Fault Code	Description
<i>bLF</i>	Brake Sequence
<i>CrF</i>	Capacitor Load Circuit
<i>EEF</i>	EEPROM Fault
<i>InF</i>	Internal Fault
<i>OCF</i>	Overcurrent
<i>SCF</i>	Motor short-circuit
<i>SOF</i>	Overspeed
<i>tnF</i>	Auto-tuning fault
<i>COF</i>	CAnopen fault
<i>EPF</i>	External Fault

Fault Code	Description
<i>LFF</i>	Loss of 4-20mA
<i>ObF</i>	Overvoltage during deceleration
<i>OHF</i>	Drive overheated
<i>OLF</i>	Motor overload
<i>OPF</i>	Motor phase loss
<i>OSF</i>	Overvoltage
<i>PHF</i>	Line phase failure
<i>SLF</i>	Modbus fault
<i>CFE</i>	Configuration fault
<i>USF</i>	Undervoltage



Recovering VFD From a Fault

★ Lookup fault in Programming Manual on pages 88-89 to determine the root cause.

★ **You can get a copy of this manual (PDF) directly from the Square D/Telemecanique website:**

http://ecatalog.squared.com/pubs/Motor%20Control/AC%20Drives/Altivar%2031/ATV31%20Drives/VVDED303042NA_Eng.pdf

★ Clear the fault on the VFD:

★ Some faults will clear automatically once the cause has been removed.

★ For all others, turn the power off until the display turns off completely (there will be a short delay).



Troubleshooting Tips

- ★ Double check all of the parameter settings per the factory setup procedure.
- ★ If you are not sure if the chiller electric box is sending the command to the VFD to start the compressor, you can temporarily connect a jumper between LI1 and +24 on the low-voltage terminal block to see if the compressor will run.



Questions?

