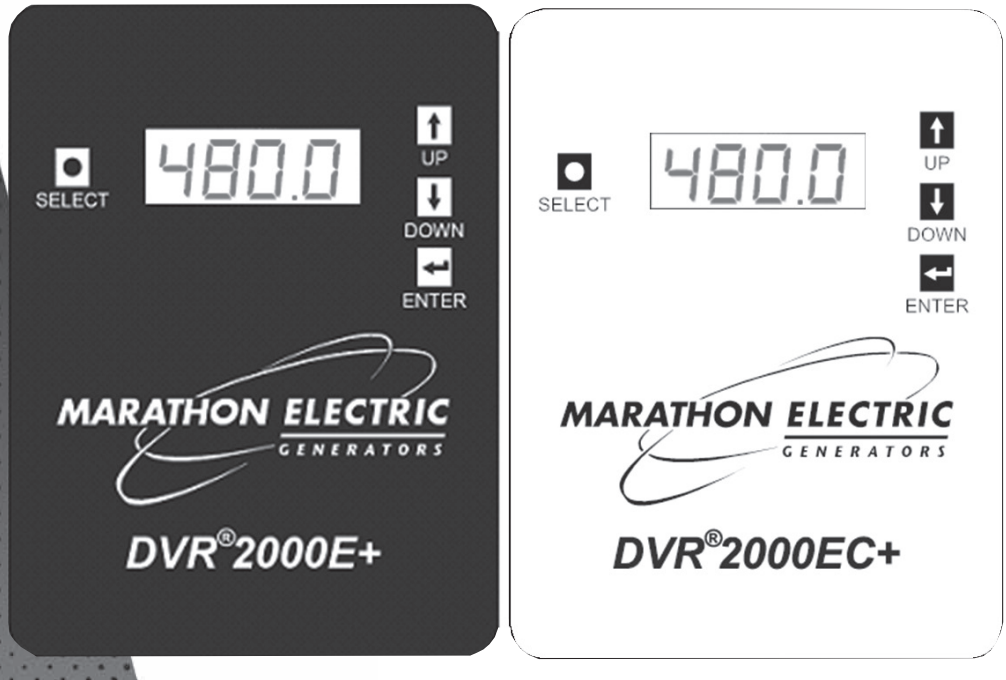
marathon™
Generators

DVR®2000E+/EC+

Quick Start Guide



A Regal Brand

REGAL

PRELIMINARY SETUP – SAFETY

WARNING ELECTRICAL SHOCK HAZARD

Failure to follow these instructions may result in serious personal injury, death, and/or property damage.

- **Installation and repair of electrical generators and voltage regulators should be attempted by qualified personnel only. Electrical connections shall be made by a qualified electrician in accordance with all local, national, international and/or other applicable codes, rules or regulations and sound practices.**
- **Do not touch electrically live parts. Disconnect, lockout and tag prime mover and input power supplies before installing or servicing voltage regulator. Use a voltmeter to verify that power is off before contacting conductors.**
- **Do not open terminal box or touch unprotected terminals while the generator shaft is rotating. Shaft rotation produces voltage in generators even when no excitation is applied. Residual voltage is present at the generator leads and regulator connections even when the regulator fuse is removed.**
- **Ground (earth) generators in accordance with local, national, international and/or other applicable codes, rules or regulations.**

WARNING Use caution when working around the component side of the DVR®. Voltage levels may be present at the exposed components when the unit is energized. The protective cover MUST be installed whenever the regulator is energized.

Note: Read and understand the operation of the individual adjustments before attempting any adjustments.

PRELIMINARY SETUP – ON GENERATOR

The DVR® may be configured on the generator using the following procedure:

1. Before starting the engine, remove the regulator's 4.0 A fuse. This will prevent the generator's PMG from energizing the regulator and prevent unintended operating functions from occurring.

2. Perform all preliminary engine governor adjustments with the regulator de-energized.

3. After initial governor adjustments are complete, shut down the prime mover. Reinstall the 4.0 A fuse. Disconnect the E3 and F+ terminal connectors from the regulator and temporarily insulate them to prevent accidental shorting.

4. Start and run the generator at rated speed. The regulator will enter a Loss of Sensing shutdown mode, indicated by **F011** on the display.

5. At this time, initial adjustments can be made. If adjusting via the HMI, see *Section 6 – Making Settings Changes*. If adjusting via DVRPortal™, see *Section 7*.

6. After the initial adjustments are made, shut down the generator and reconnect the regulator leads removed in Step 3. The generator may be started and final adjustments may be performed on the regulator.

PRELIMINARY SETUP – ON BENCH

The DVR® may be configured on a bench using the following procedure:

1. Connect a 100-120 Vac 50/60 Hz source to terminals 3, 4 and GND as follows:
   a. 120 V hot – terminal 3
   b. 120 V neutral – terminal 4
   c. 120 V ground – terminal GND

NOTICE **Applying voltage larger than 120 Vac without current in-rush limiting may damage the unit.**

2. If the regulator is in AVR1 or AVR3 regulation mode, the regulator will indicate **RUN** on the display. If the regulator is in FCR regulation mode, the regulator will indicate **F011** on the display.

3. At this time, initial adjustments can be made. If adjusting via the HMI, see *Section 6 – Making Settings Changes*. If adjusting via the Windows® communication software, see *Section 7*.

After the initial adjustments are made, disconnect the 120 Vac source and install the regulator onto the generator. The generator may be started and final adjustments may be performed on the regulator.

Human-Machine Interface (HMI)

GENERAL

The DVR® HMI consists of four buttons and a four-character LED display as illustrated in Figure 6-1. The display indicates status conditions and parameter settings. Button function descriptions are given in Table 6-1.

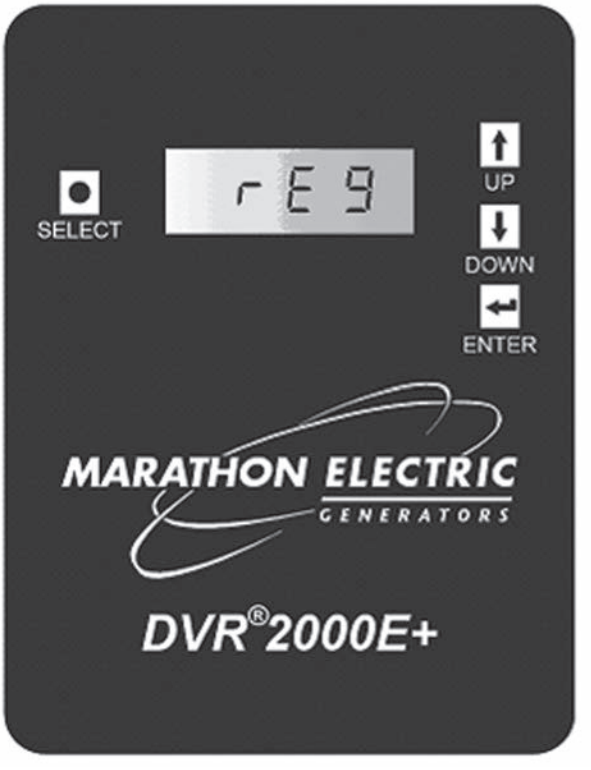


Figure 6-1. DVR®2000E+ HMI shown

Button	Description
SELECT	This button steps the user through a menu list of editable parameters. It also serves as an escape key in EDIT mode.
UP	This button increases the setting level of the parameter being adjusted.
DOWN	This button decreases the setting level of the parameter being adjusted.
ENTER	This button stores the current value of the parameter being adjusted and returns the user to the main menu list.

Table 6-1. DVR® HMI Button Function Descriptions

FRONT PANEL DISPLAY

The HMI display has three display modes:

1. **STATUS mode** – the HMI displays the non-editable operating state of the DVR® as described in Table 6-2. The display flashes while in STATUS mode.
2. **EDIT mode** - The HMI displays a multi-layer menu for reading and editing operating parameters of the DVR® as described in Table 6-3. The display is steady-on while in *EDIT* mode.
3. **SLEEP mode** – The HMI turns off the display after a period of button-press inactivity.

Display	Description
(no display)	No display is the default mode of the HMI. No display indicates that the regulator is operating normally, but operating in a sleep mode.
RUN	This display indicates that the regulator is operating normally with excitation
OFF	This display indicates that the regulator is operating normally and excitation is disabled.
AXXX (where xxx indicates a three-digit alarm code)	This display indicates that the regulator is in an alarm state. During this state, the regulator continues to provide excitation if excitation is enabled. See Appendix for description of Alarm Codes.
FXXX (where xxx indicates a three-digit alarm code)	This display indicates that the regulator is in a fault state. During this state, the regulator ceases to provide excitation. See Appendix for description of Fault Codes.

*Table 6-2. DVR® HMI **STATUS** Mode Display Descriptions*

Parameter Name	Parameter Value	Description
SIZE	281 to 1040	Frame size of generator
REG	AVR3	AVR3 – Voltage regulator with three-phase sensing
	AVR1	AVR1 – Voltage regulator with single-phase sensing
	FCR	FCR – Field current regulator
	VAR	VAR – Reactive VAR regulation (EC+ only)
	PF	PF – Power Factor regulation (EC+ only)
STPT	100.0 to 630.0	Voltage set point (Vrms) in AVR3 and AVR1 mode
	0.000 to 3.000	Field current set point (Adc) in FCR mode
	0.0% to 10.0%	VAR set point (% of rated VAR) in VAR mode. (EC+ only)
	0.000 to 0.999	PF set point (PU) in PF mode (EC+ only)
UFRQ	40.0H to 70.0H	Under frequency knee (Hz)
DROP	0.0% to 10.0%	Voltage droop (%) at rated reactive power
AU	OFF	Auxiliary Off – Auxiliary input is disabled
	CNT1	Auxiliary Control-1 – Auxiliary input modifies regulation set point (-3 to +3 Vdc input)
	SCLF	Auxiliary Meter – Auxiliary input is used as a meter with user-defined scale factor
	CNT2	Auxiliary Control-2 – Auxiliary input modifies regulation set point (4 to 20 mA input)

*Table 6-3. DVR® HMI **EDIT** Mode Parameters*

QUICK START PROGRAMMING GUIDE

As the DVR® is designed to work on many Marathon Electric generators in many different applications, it is necessary to program the regulator prior to putting it in service. Please observe the following procedure to program the regulator through the Human-Machine Interface or HMI:

1. Disconnect all connections to the regulator.

2. Apply power to terminals 3 and 4 of the regulator. There are two acceptable ways to power the regulator for programming:

   a. Reconnect the ground lead and the leads from the capacitor in the PMG circuit to regulator terminals 3 and 4. This is how the regulator receives power for normal operation. If using this method, be sure the generator RPM is between 1500 and 1800 RPM to provide proper input power to the regulator.

   b. Connect a 120 Volt AC source to regulator terminals 3 and 4. This will provide the regulator with enough power to accept programming, but not enough power for normal operation.

3. Press SELECT. The word **SIZE** will appear in the display. Press ENTER. Use the UP and DOWN arrows to select the appropriate generator frame size and then press ENTER. The entered value will flash 3 times to indicate that your selection has been saved. The display will again read **SIZE**.

4. Press SELECT. The word **REG** will appear in the display. Press ENTER.

   Use the UP and DOWN arrows to select the appropriate regulation mode (**AVR3** for 3 phase Automatic Voltage Regulation; **AVR1** for single phase Automatic Voltage Regulation or **FCR** for Field Current Regulation) and then press ENTER. The entered value will flash 3 times to indicate that your selection has been saved. The display will again read **REG**.

5. Press SELECT. The word **STPT** will appear in the display. Press ENTER. Use the UP and DOWN arrows to select the appropriate set point (Sensed Voltage for AVR3 and AVR1 regulation modes; Field Current level for FCR regulation mode) and then press ENTER. The entered value will flash 3 times to indicate that your selection has been saved. The display will again read **STPT**.

6. Press SELECT. The word **UFRQ** will appear in the display. Press ENTER. Use the UP and DOWN arrows to select the appropriate Under-frequency threshold and then press ENTER. The entered value will flash 3 times to indicate that your selection has been saved. The display will again read **UFRQ**.

7. Press SELECT. The word **DROP** will appear in the display. Press ENTER. Use the UP and DOWN arrows to select the appropriate level of droop as a percentage of desired sensed voltage and then press ENTER. The entered value will flash 3 times to indicate that your selection has been saved. The display will again read **DROP**.

8. Press SELECT. The word **AU** will appear in the display. Press ENTER.

   Use the UP and DOWN arrows to select the appropriate auxiliary input mode and then press ENTER. The entered value will flash 3 times to indicate that your selection has been saved. The display will again read **AU**.

9. Remove power from the regulator.

10. Completely reconnect the regulator to the generator.

The regulator is now ready to be placed in service.

Appendix B

The following table should be used when making connections via quick disconnect terminals to the regulator.

Terminal Name	Description
GND	Protective earth ground
4	PMG – terminal 1
3	PMG – terminal 2 (Fused)
E1	Generator armature – Phase A
E2	Generator armature – Phase B
E3	Generator armature – Phase C
F-	Exciter stator field (-)
F+	Exciter stator field (+)
CT1	Generator Phase B CT (X1)
CT2	Generator Phase B CT (X2)

Table B-1. Quick Disconnect Terminals

The following table should be used when making current transformer connections to the regulator.

Sensing	Phase	CT "X1" Terminal	CT "X2" Terminal
3-Phase	A	J2-1	J2-12
	B	J2-2	J2-11
	C	J2-3	J2-10
1-Phase	B	CT1	CT2

Table B-2. CT Connection Terminals

The following table should be used when making system connections to the regulator.

Pin Number	Name	Description
1	AUX IN (+)	Auxiliary input positive
2	UP	UP contact input (active low)
3	DOWN	DOWN contact input (active low)
4	CGND	Input common
5	AUX_LOOP	Auxiliary current loop jumper
6	CONTACT1	Contact output
7	CONTACT2	Contact output
8	AUX_LOOP	Auxiliary current loop jumper
9	VAR/PF_OFF	VAR/PF regulation modes disable contact input (EC+ only, active low)
10	DROOP_OFF	Droop disable contact input (active low)
11	EXCITATION_OFF	Excitation disable contact input (active low)
12	AUX IN (-)	Auxiliary input negative

Table B-3. Connector J1 System Connections