

Operating Instructions
VAREOTRON NLR 7000
Servo regulator

REO UK LTD
Units 2-4 Callow Hill Road
Craven Arms, Shropshire
SY7 8NT
Tel. 01588 673 411
Fax 01588 672718
www.reo.co.uk
eMail: sales@reo.co.uk

VAREOTRON

Control units for Drive Engineering

Technical Safety Information for the User

This description contains the necessary information for the correct application of the products described below. It is intended for use by technically qualified personal.

Qualified personnel are persons who, because of their training, experience and position as well as their knowledge of appropriate standards, regulations, health and safety requirements and working conditions, are authorised to be responsible for the safety of the equipment, at all times, whilst carrying out their normal duties and are therefore aware of, and can report, possible hazards (Definition of qualified employees according to IEC 364).

Safety Instructions

The following instructions are provided for the personal safety of operators and also for the protection of the described product and connected equipment.



Warning!

Hazardous Voltage.

Failure to observe can kill, cause serious injury or damage.

- Isolate from mains before installation or dismantling work, as well as for fuse changes or post installation modifications.
- Observe the prescribed accident prevention and safety rules for the specific application.
- Before putting into operation check if the rated voltage for the unit conforms with the local supply voltage.
- Emergency stop devices must be provided for all applications. Operation of the emergency stop must inhibit any further uncontrolled operation.
- **The electric connections must be covered!**
- **Earth connection must be checked for safe function after assembly!**

Intended Use

The units described herein are electrical equipment for the use in industrial plants. They are designed for control of motors.

This unit conforms to the Directive 89/336/EWG EMC-Directive **CE**

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1.0 General

Control Unit for Motorised Variable Transformers

Variable power supplies for mains and medium voltage ranges, are often fitted with variable transformers. In general, in addition to controlling the voltage these are often required hold the output voltage constant. For this purpose, the variable transformer is driven by a motor which is controlled by a suitable electronic regulator. The unit described below, is such an electronic regulator for controlling three-phase AC motors.

2.0 Function Description

The unit is set up from a control panel mounted in the front of the unit (using keys and an LED-display). All settings can be made through the control panel, using a menu system. The various parameters are accessed by entering a user code. The function of the menu control will be explained in detail in the section on "Parameter Adjustment". Alternatively, output voltage, output current or power may also be adjusted from external potentiometers, an external control voltage 0...10 V,DC or a control current 0(4)...20 mA (must be selected in menu 003) A potential-free relay contact is provided for fault indication and connections to this are brought out to terminals. The "run" LED is illuminated during normal operation. In the programming mode the various settings are to be used in the manner described in these instructions. Setting adjustments are automatically saved upon leaving the programming mode or if no button is pressed for a period of 100 seconds.

There are two possible operating modes:

2.1 Voltage Stabiliser

This mode does not require external set points. The settings are made through touch panel and LED-display.

2.2 Current/Voltage Regulation

In this operating mode the regulator requires current and voltage set point values, which can be provided through the touch-panel or externally.

3.0 Technical data

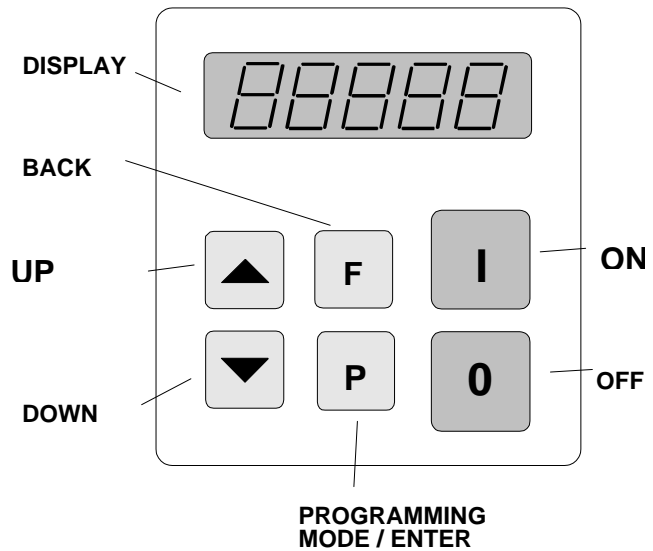
Unit Type	NLR 7000
Input voltage with neutral wire connected	Single-phase, 230V +/- 20% Three-Phase, 3x 400V +/-20%
Input Frequency	50 / 60 Hz
Motor Power	370W
Motor Capacity	Adjustable 0...100 %
Current Set-point	10k Potentiometer / 0...10VDC / 0(4)...20mADC
Voltage Set-point	10k Potentiometer / 0...10VDC / 0(4)...20mADC
Actual Current	3 x 0...4,5VAC or 0...5VDC
Actual Voltage	3 x 0...440VAC (3x 254VAC against N) or 0...5VDC
Protection	IP 20
Operating Temperature	0...+45 °C
Storage Temperature	-10...+80 °C
Relative Humidity	80% without dew
Degree of Pollution	2
Mounting Altitude	1000 m with 0,5 % current de-rating for each additional 100m
Mounting Orientation	Horizontal, Vertical
Standards	

4.0 Settings

The six buttons and a LED display found in the front-panel, are used for operating and setting up the unit. All operating methods and adjustable parameters can be set up through this panel.

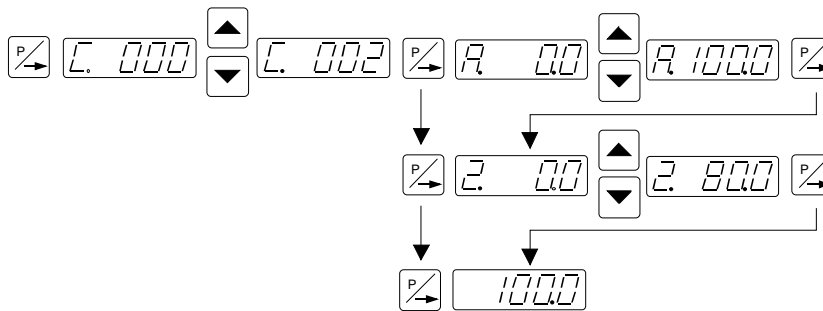
The “I” and “O” buttons are used for switching the unit ON and OFF, however, **these do not provide mains isolation**, they simply inhibit the controller. The “P”, “F” and “Cursor Buttons” are used for parameter adjustment. Parameters are set by using menu controls which are called up by entering operator codes. A capital letter is used to indicate the selected function.

The display value can be increased or decreased by units, or tens of units, by a short press of the cursor buttons. Holding the buttons down will cause the display to change in units of ten.



The user menus are protected against accidental or unauthorized adjustment of parameters; a code must be entered to open the user menus and there are different pass codes for each function group. **Setting adjustments are automatically saved upon leaving the programming mode if no button is pressed for a period of 100 seconds.**

All settings routines are initiated by pressing the programming button “P”. The following diagram should clarify the sequence in which the keys are pressed.:-



1. Press the “P” key.
2. Select the code number with the cursor keys.
3. Press the “P” key. This displays the first menu point. The required menu point can be found by repeatedly pressing the “P” key (scrolling).
4. The value in the menu point can be changed with the cursor keys.
5. Scroll to the next menu point or to the end of the menu, which returns the display to the set point value, by pressing the “P” key. To exit the menu and return back to the normal display. Quickly, depress the “P” key for 5 seconds.
6. To return back to the previous position in the menu, press the “F” key.

5.0 Adjustment parameters

Parameters:		Code	Factory settings:	Pass code:
Set points, with internal set points selected!				
• Voltage set point	0...100 %	U.	0 %	002
• Current set point	0...100 %	I.	0 %	002
• Power set point	0...100 %	P.	100 %	002
Change-Over				
• External set point OFF	0 / 1	E.S.P.	0	003
• 4...20 mA (only if E.S.P. = 1)	0 / 1	4.20	0	003
• Actual External Voltage	0 / 1	E.F.U.	0	003
• Actual External Current	0 / 1	E.F.I.	0	003
Parameters				
• Minimum output voltage (without set point)	0...100 %	U.	0 %	020
• Minimum output current (without set point)	0...100 %	I.	0 %	020
• Minimum output power (without set point)	0...100 %	P.	100 %	020
• Maximum output power (limitation)	25...100 %	<u>u</u>	100 %	020
• Maximum output voltage(limitation)	25...100 %	<u>i</u>	100 %	020
• Maximum output current (limitation)	12,5... 100%	<u>p</u>	100 %	020
• Voltage regulation P- characteristic	1...100	P.U.	20	020
• Current regulation P- characteristic	1...100	P.I.	15	020
• Power regulation P- characteristic	1...100	P.P.	15	020
• Soft start	0...10 Sec.	/.	0,1	020
• Soft stop	0...10 Sec.	\	0,1	020
Service				
• Display actual motor current		i.		40
• Display actual motor frequency		F.		40
•				
• Save user parameter		PUSH		143
• Restore factory settings		FAC.		210
• Display software version number				001

6.0 Adjustment Voltage Stabilizer

This regulation mode does not require an external set point. All adjustments are made from the display.

For voltage regulation the set points for current and power are set at 100 %.

The voltage set point is set to 90 % to enable later correction of the output voltage (+/- 10 %).

The desired output voltage is adjusted with the adjustment of voltage limitation.

Upon locking the regulating parameters the output voltage (parameter "U" under Code C 020) can still be adjusted.

Parameter settings

Parameters	Code	Adjustment from display
Output Power „P”	C 020	100%
Output current „I”	C 020	100%
Output Voltage „U.”	C 020	90%,
Maximum Output Voltage „U _{max} ”	C 020	Output current adjustment

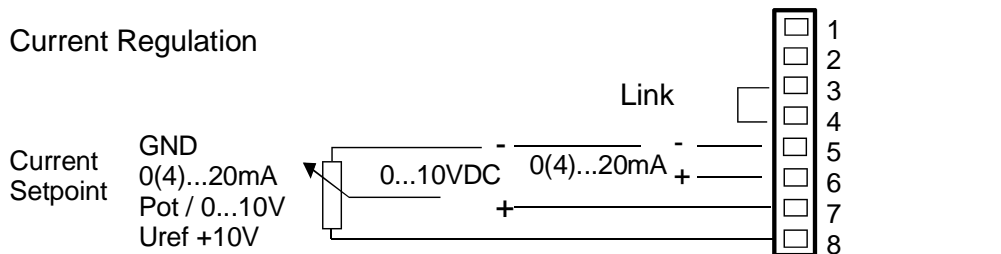
7.0 Setting Current/Voltage Regulation

Two set points, one for current and the other for voltage are required by the regulator for this regulating method.

7.1 Current regulation

The voltage set point must be set to 100% either by using the display (E.S.P. = 0) or terminals 3 and 4 (E.S.P. = 1).

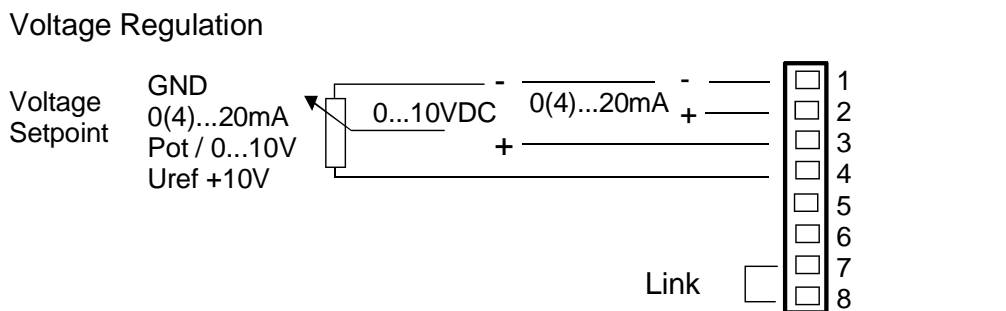
The output current can now be set by using display code 002 (I) or terminals 5-6 (E.S.P = 1)



7.2 Voltage Regulation

The current set point must be set to 100% either by using the display (E.S.P. = 0) or terminals 7 and 8 (E.S.P. = 1).

The output voltage can now be set by using display code 002 (U) or terminals 1-4 (E.S.P. = 1).

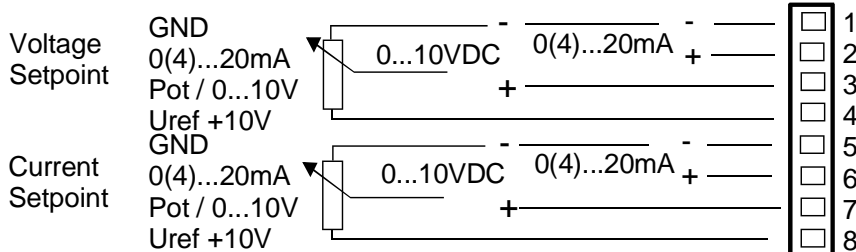


7.3 Current/Voltage Regulation

The current and voltage set points can be provided separately. The regulator switches automatically between current and voltage regulation depending on which actual value matches the set point.

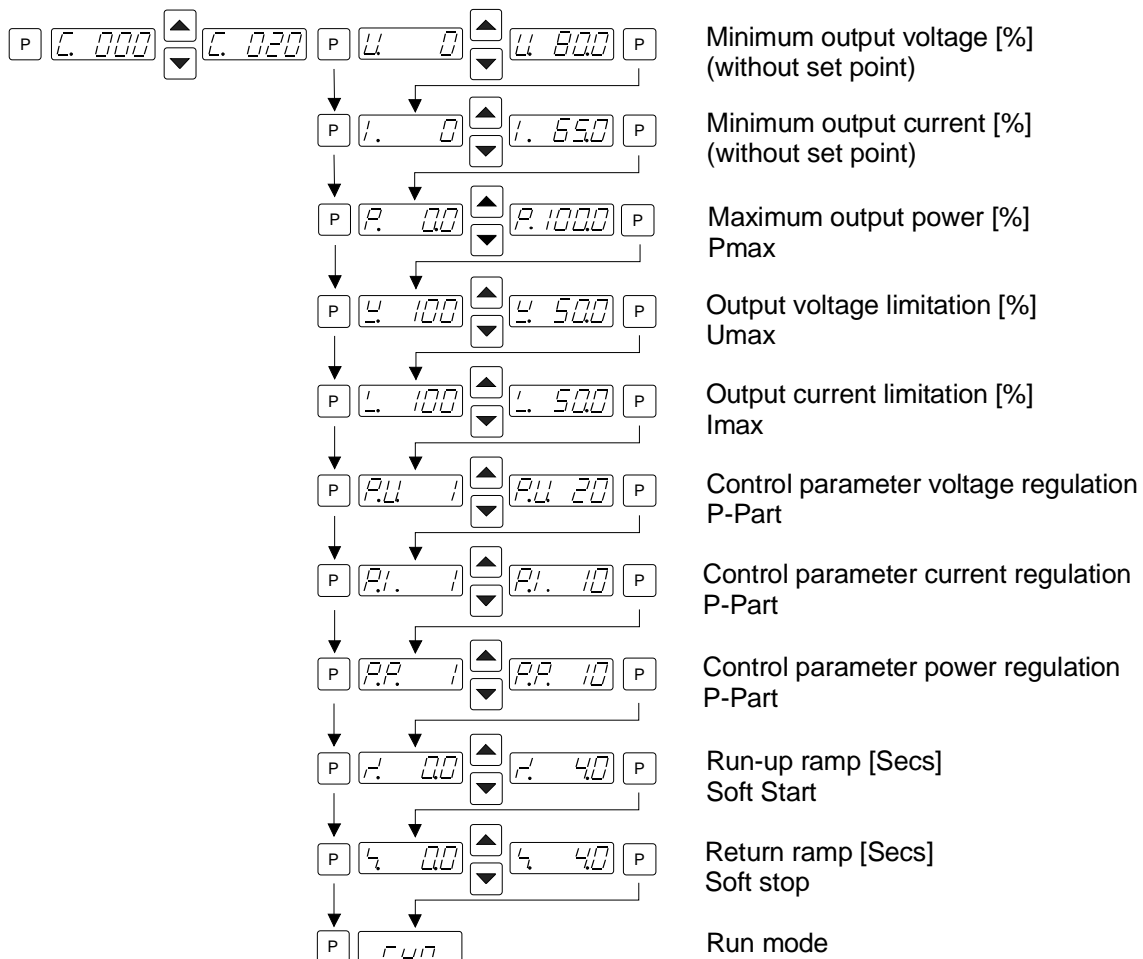
Parameter ESP under code C002 must be set to “1” for external set point source.

Current/Voltage Regulation



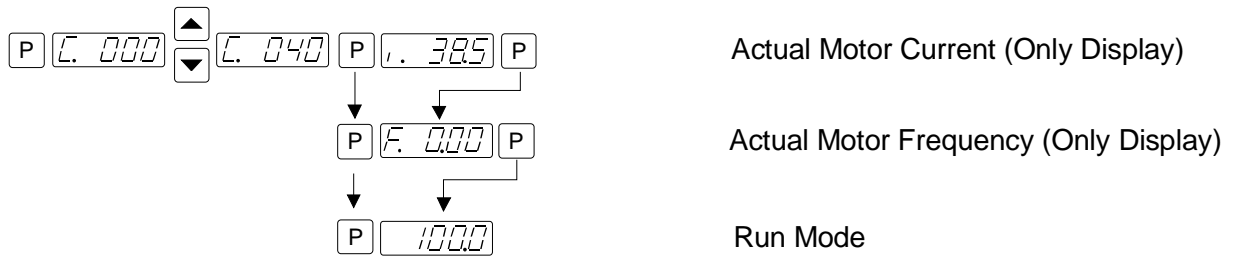
8.0 Settings

Code 020



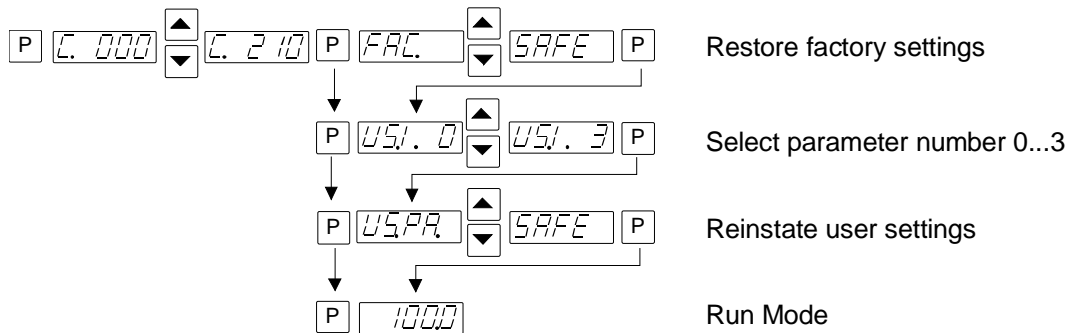
8.1 Display Motor Voltage and Frequency

Code 040



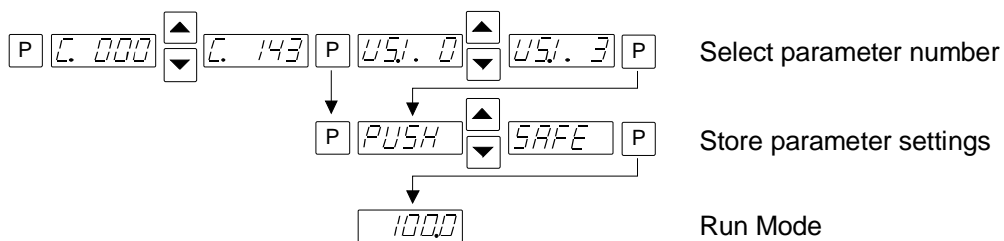
8.2 Recalling Factory Or User Settings

Code C. 210



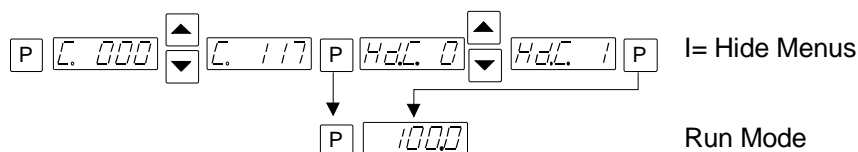
8.3 Saving User Settings

Code C. 143



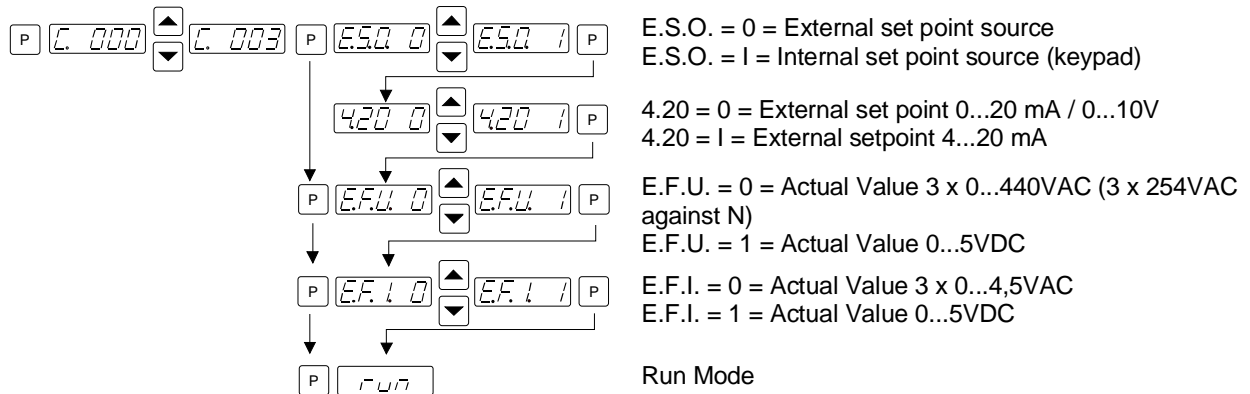
8.4 Protect From Unauthorized Adjustment Of Settings

Code C. 117

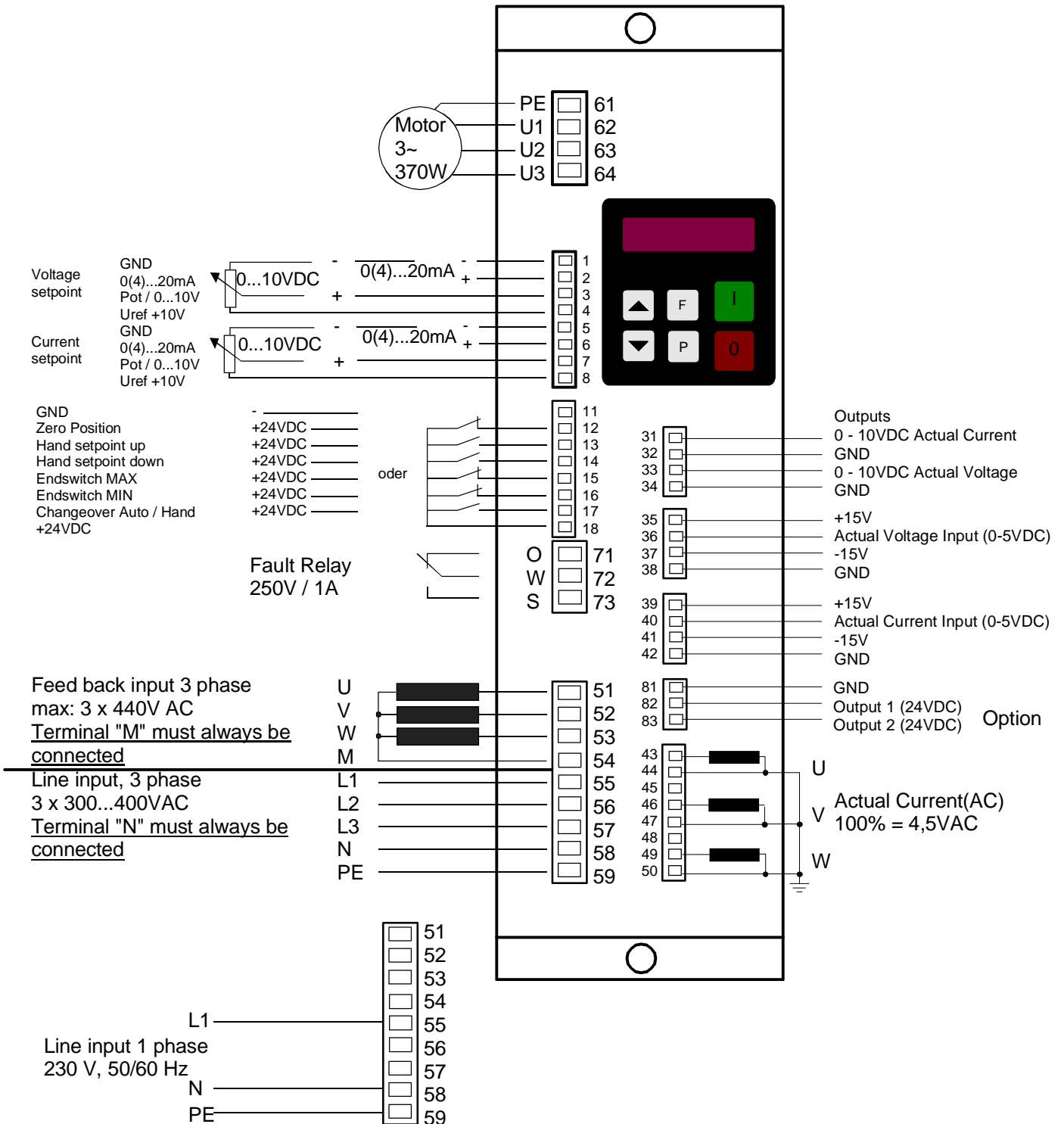


8.5 Set Point And Actual Value Sources

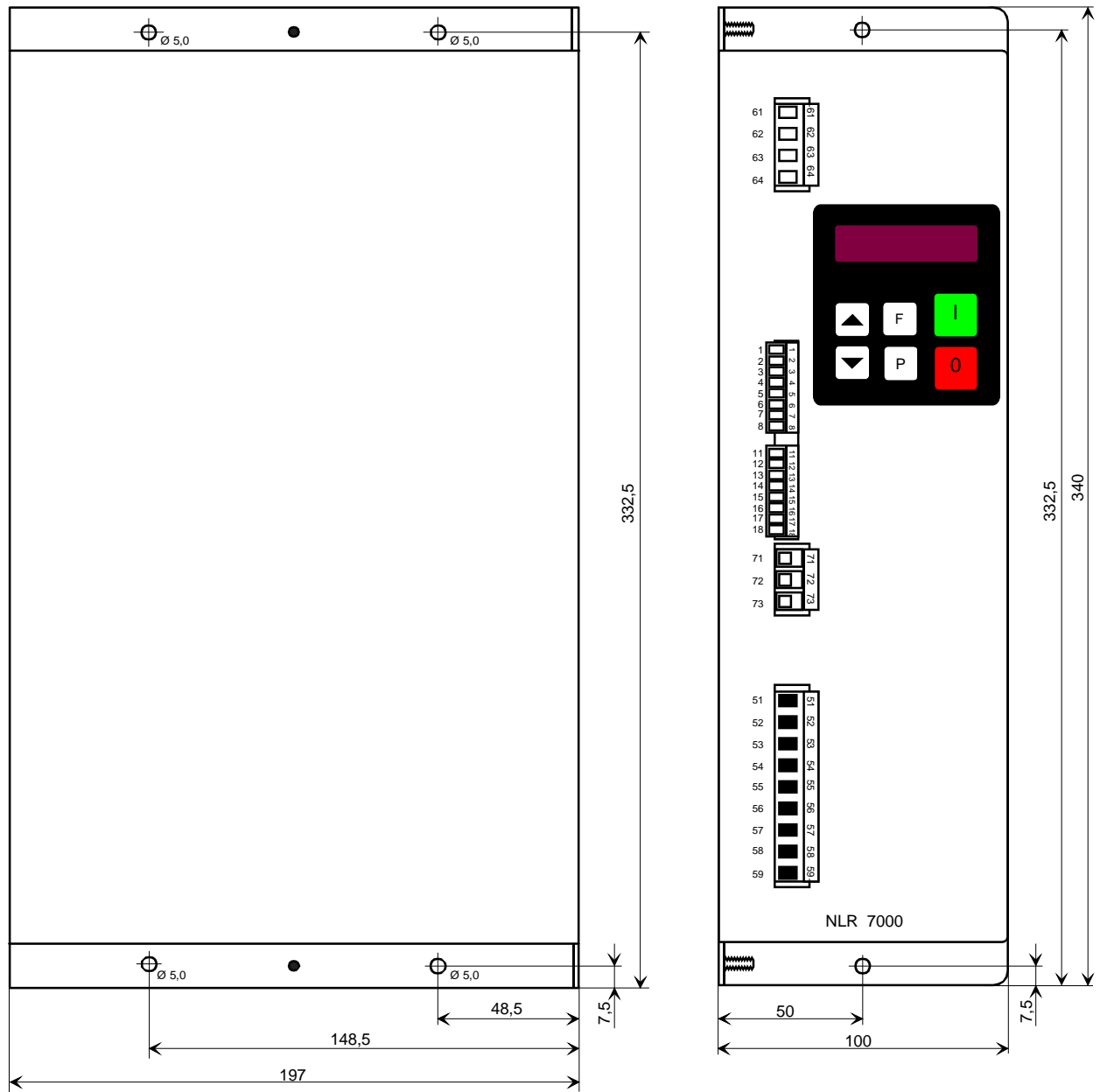
Code 003



9.0 Front view



10.0 Dimensions



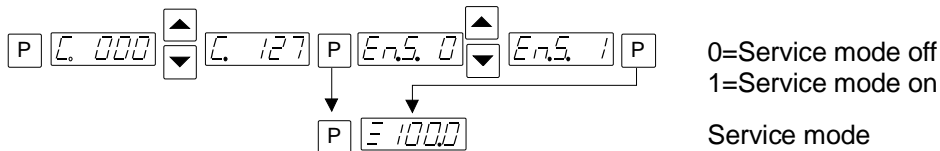
11.0 Annex Service

The service Code must be activated through C127 to enable adjustment of parameter settings.

11.1 Activate Service Mode

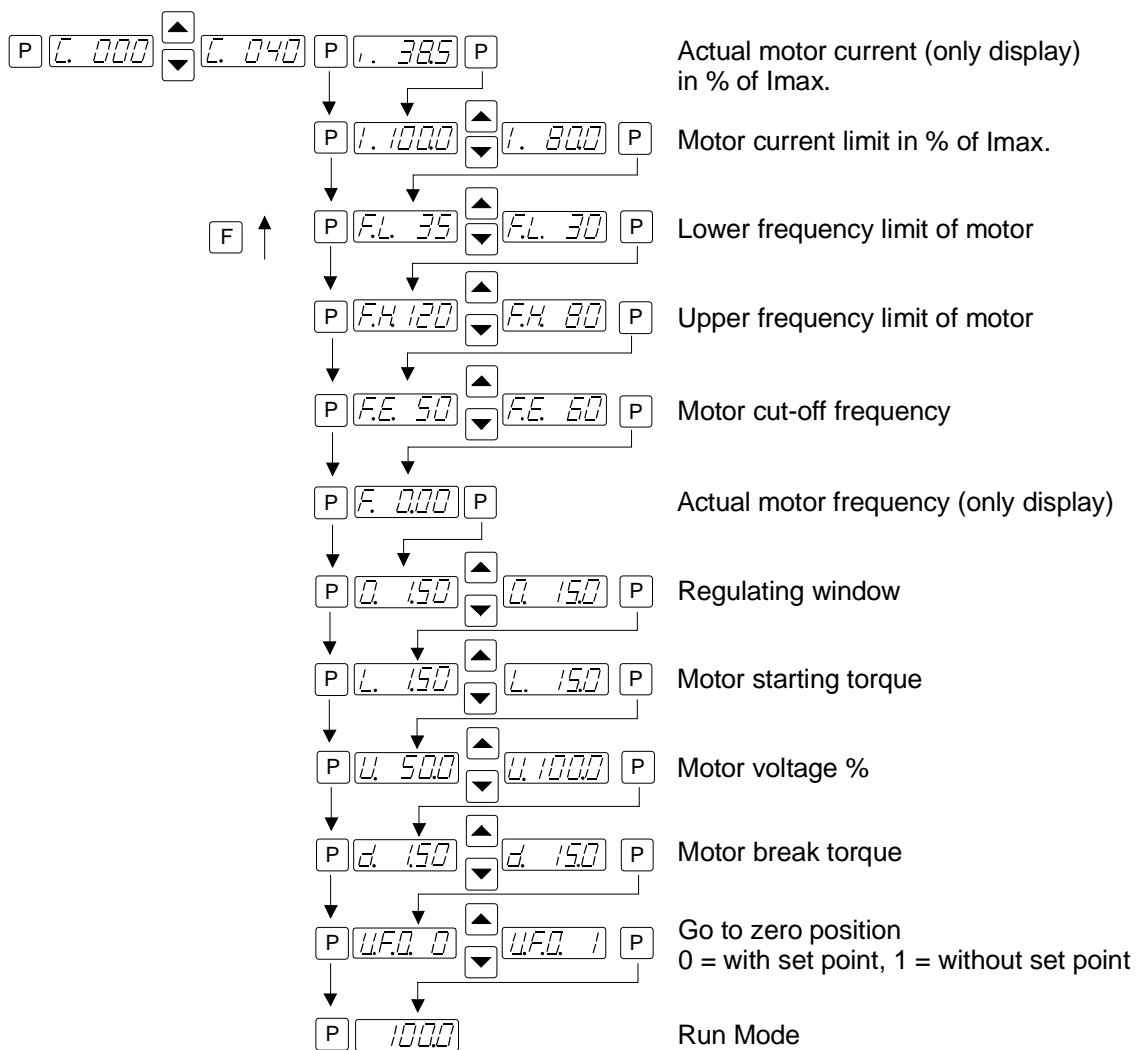
With service mode activated the service menu can now be set:

Code 127



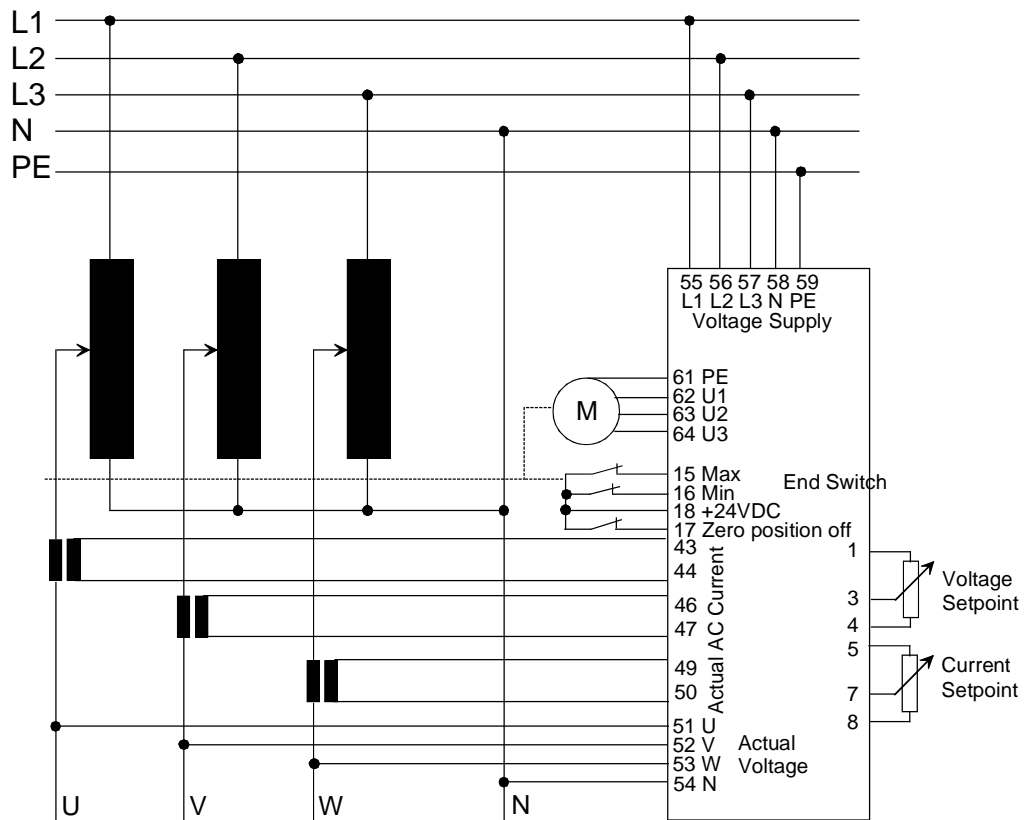
11.2 Control Parameter Settings

Code 040



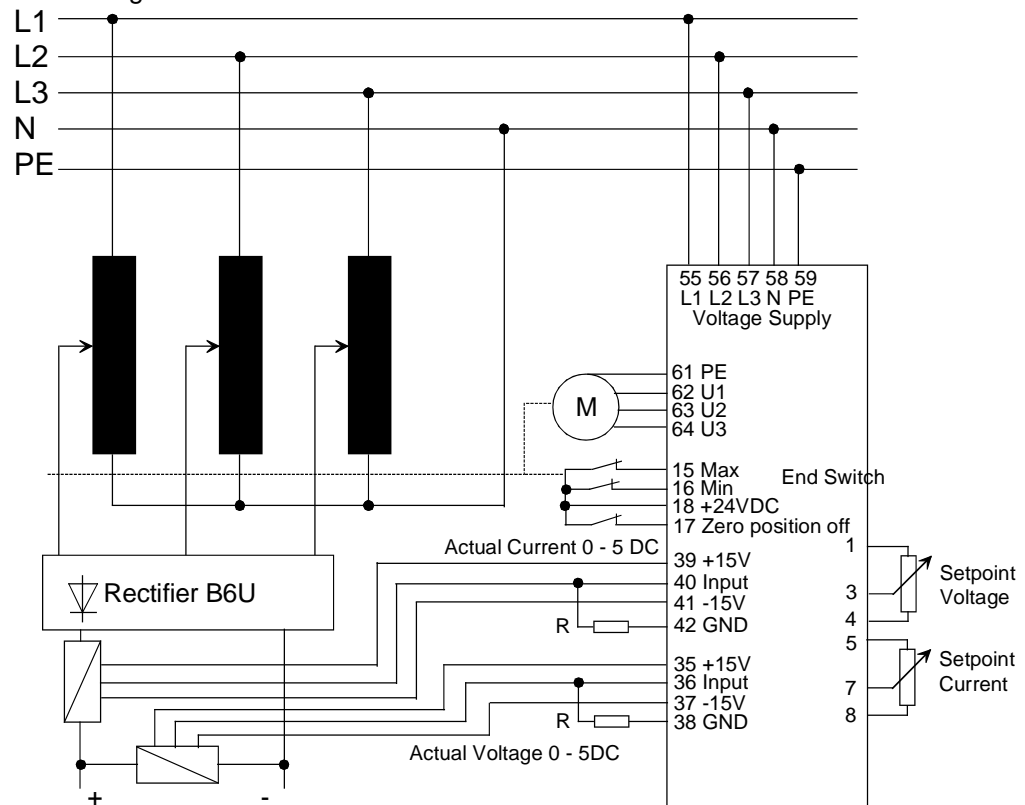
12.0 Connections Examples

12.1 Current/Voltage Regulation using a Potentiometer for AC Set Point



12.2 Current/Voltage Regulation using a Potentiometer for DC Set Point

Active Current/Voltage DC Transducer



12.3 Voltage Stabiliser

