

E-VS-100 VIBRATOR DRIVER USER MANUAL

1. DESCRIPTION:

E-VS-100 is a microcontroller based vibrator driver designed to drive solenoid type vibrators that are used batching, dosing, bagging and similar systems. Various application types and parameters depending on the application can be configured by means of the front panel buttons and display. The operation voltage of the device can be either 85-265 V AC / 85-365 V DC or 20-60 V AC / 20-85 V DC. The vibrator supply voltage can be configured between 100 and 450 V AC. The maximum load current is 32 amperes.

The driver can be controlled by the following methods to be configured by the user

1. Manual control by the front panel buttons.
2. Fast/Slow control by using the digital inputs. 24V DC is used to activate the digital inputs.
3. Control with externally connected potentiometer (1-50 kΩ).
4. Control with externally applied 0-20 mA or 4-20 mA control signal.
5. Control with Modbus RTU protocol over the RS-485 line.

The last method requires additional hardware, if this method will be used, the device must be ordered with RS-485 option. All other methods can be configured by the user in standard E-VS-100 device.

Expected use life of the device is 10 years.

1.1. Type Coding:

E-VS-100-Y-Z

Y	Communication	Z	Operation Voltage
0	None	0	85-265 V AC/85-375 V DC
1	RS-485	1	20-60 V AC/20-85 V DC

2. OPERATION:

In this section, connections of the device, normal operations and configuration operations are described and parameters are explained. Before commissioning, please read this section and understand very well and perform the operations described in section '3. ADJUSTMENTS'. Since voltages creating vital dangers exist in the connection terminals of the device, setting and commissioning processes must be performed by persons qualified in instrumentation.

The front panel view of E-VS-100 vibrator driver and the connection terminals are shown in Figure 2.1. A four-digit display, four buttons that are used for parameter selection and configuration operations and L1, L2 and L3 leds exist in the front panel. L1 led lights during configuration mode, L2 and L3 leds light when K and H digital inputs are activated respectively.

2.1. Connection Terminals:

Operation voltage and load connections are made to the terminals in the bottom row, external control connections are made to the terminals in the upper row.

The operating voltage of the driver is applied to the terminals L1 and L2. The protective earth connection must be made to the terminal PE. The vibrator supply is connected to the terminals LN1 and LN2. The leads of the vibrator coil are connected to the terminals LD1 and LD2.

The terminals A, B and C are connected to TRXA, TRXB and GND leads of the RS-485 line. These terminals are nonfunctional in devices without RS-485 communication option.

The terminals O, K, and H are used in Fast/Slow control mode ($C_{LYP} = 5\mu F$). When this mode is selected, digital input terminals K and H are used for Run/Stop and Fast/Slow operations respectively and O is the common terminals of the digital inputs. When 24 V DC is applied to both terminals K and L the vibrator will be driven in fast mode, when 24 V DC is applied only to the terminal K the vibrator will be driven in slow mode, when no voltage is applied to terminal K the vibrator will be stopped independent to the state of



Figure 2.1. Front Panel View of E-VS-100 and Connection Terminals.

terminal H. The fast and slow rates are determined by **FAST** and **SLOW** parameters.

When current control mode is selected and **dInP** parameter is set as **on**, the digital input terminal K is also used as Run/Stop control.

When potentiometer control mode is selected (**CTYP = Pot**), “-” and “R” terminals are shorted and the potentiometer is connected between these terminals and “+” terminal. While the resistance value of the potentiometer increasing the operation rate of the vibrator decreases. When these terminals are short circuited, maximum rate is reached. The potentiometer to be used must be linear and has a value between 1 kΩ and 50 kΩ. In this control mode the jumper located behind the terminal “R” must be removed. This jumper is accessible without removing the cover of the device.

When current control mode is selected (**CTYP = 0-20** or **CTYP = 4-20**), the control current is applied to the terminals “+” and “-”. Additionally, the jumper located behind the terminal “R” must be in its place. This jumper is accessible without removing the cover of the device.

When manual control mode is selected (**CTYP = nAnU**), no external connections is required in the upper terminal group. The output of the device is adjusted by ▼ and ▲ buttons.

2.2. Normal Operation:

When the device is in normal operation mode, the output percentage (**oUt**) and the vibrator supply voltage between the terminals LN1 and LN2 (**LInE**) can be monitored on the display. The parameter to be monitored is selected by [Enter] button. Each time the [Enter] button is pressed, the name of the parameter (**oUt** or **LInE**) is displayed on the display for one second, and then the parameter value. **FAST** and **SLOW** parameters can also be monitored and modified by ▼ and ▲ buttons, if the selected control mode is **Su IC** (Fast/Slow). **FAST** parameter can be adjusted between **SLOW** and 100, **SLOW** parameter can adjusted between 0 and **FAST**. When the control mode is selected as **nAnU**, the output (**oUt**) can be adjusted between 0 and 100. The normal operation flow chart is show in Figure 2.2.

2.3. Configuration:

The configuration flow diagram is given in Figure 2.3. To enter into configuration mode, [Enter] and [X] buttons are pressed together. After this process L1 led lights, ‘Cod’ prompt is seen on the display for one second, following ‘0’ is written on the display as cod value. If the cod value is set to security code (**SCod**) by ▼ and ▲ buttons and press to [Enter] button by writing first ‘PAGE’ and later ‘GCnF’ on the display it is entered in GCnF page. Page can be changed by ▼ and ▲ buttons (Other page is CALb). After page selection, parameters in the page are accessed successively by pressing [Enter] button. Each time pressing [Enter] button the parameter name is monitored on the display for one second, following the parameter value is displayed. After the last parameter in the page, it is returned to page selection state. Explanations related to the parameters in the pages are given in ‘2.4. Explanations of the Parameters’ section.

When a parameter is accessed, the parameter value can be changed by ▼ and ▲ buttons. If the configuration mode is entered with incorrect security code, all the parameters except security code (**SCod**) parameter in GCnF page can be accessed, but no modification is allowed. Any where in the configuration pages, [X] button can be used to exit from configuration mode and return to normal operation state.

The factory setting of the security code is ‘10’. The user can adjust the security code (**SCod**) to any value between 0 and 9999. In case the security code is forgotten, the power supply of the device must be reapplied, within 30 seconds ▼, ▲ and [X] buttons must be pressed simultaneously. Later, configuration mode is entered with any security code to access the security code (**SCod**) parameter.

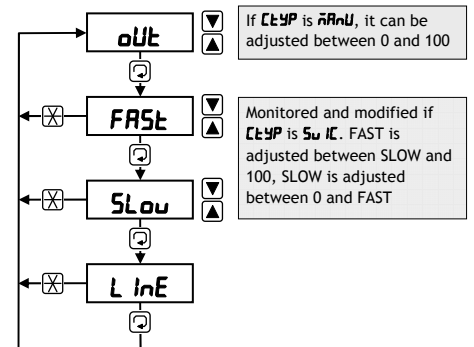


Figure 2.2. Normal Operation Flow Chart

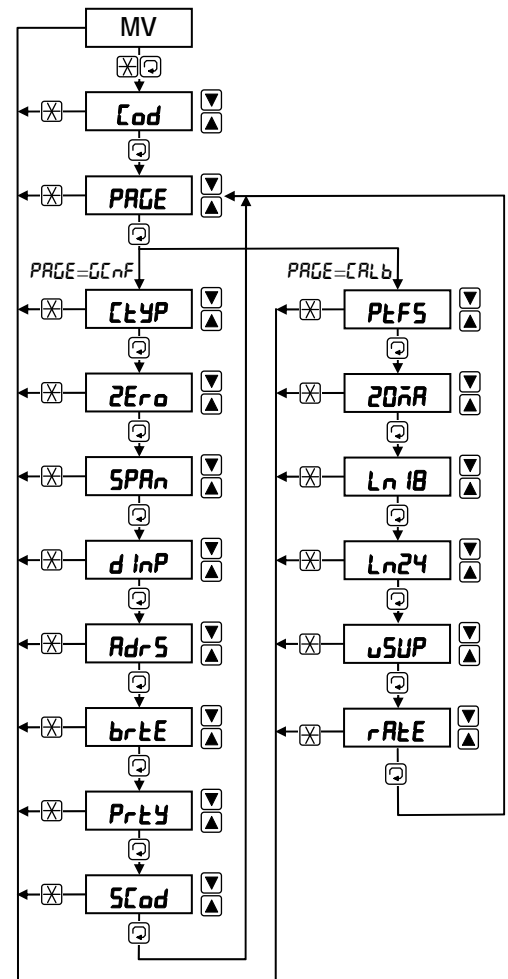


Figure 2.3. Configuration Flow Chart

2.4. Explanation of Parameters:

SCod: While entering into configuration mode, the security code is asked with this prompt. If the parameter value is set to security code (**SCod**) with \blacktriangledown and \blacktriangle buttons and \square button is pressed, configuration process is entered and every kind of setting processes can be made. If the parameter is set to a value different from the security code and entered in configuration process, all parameters other than SCod parameter in GCnF page can be monitored, but their values can not be changed.

2.4.1. GCnF page:

CLYP: This parameter determines the control type of the device. It can be set as **MANU**, **SU IC**, **Pot**, **0-20** and **4-20**. These values corresponds respectively to manual, fast/slow, potentiometer, 0-20 mA and 4-20 mA control modes.

ZERO: It is the parameter that determines minimum value of the output. Normally it is set as '0'. If power transmission to vibrator is required when the control signal is 1 % of its full scale, this parameter determines the level of the power to be transmitted. If \blacktriangledown and \blacktriangle buttons are pressed together when this parameter is selected, the vibrator is driven with the level on which the parameter is set.

SPAN: It is the parameter that determines the maximum value of output. Normally it is set as '9999'. If the power transferred to the vibrator is required to be limited when the control signal is in maximum value, power limiting can be made by decreasing the parameter value. If \blacktriangledown and \blacktriangle buttons are pressed together when this parameter is selected, the vibrator is run with the power level on which the parameter is set.

dirP: The parameter can be set as **OFF** or **on**. If the vibrator is required to be stopped independently from the input current when the control type is selected as current, this parameter must be set as on. In this case, if digital input K has no voltage, the vibrator is not driven regardless of what the control current is. If 24V DC is applied to K input, the vibrator rate is determined by the control current. If the parameter is set as **OFF**, the vibrator rate is directly controlled by the control current.

ADR5: It is the RS-484 communication address of the device. It can be set between 0 and 31. The devices connected to the same communication line must be addressed different from each other.

brtE: It is the parameter that determines the communication speed of the device. It can be set as 9.6, 19.2, 38.4 and 57.6 kbaud. These parameters of the devices that are connected to the same communication line must be adjusted in conformity with the master device.

Prty: It is the parameter determining the communication parity. It can be set as **nonE**, **odd** or **EuEn**. These parameters of the devices that are connected to the same communication line must be set as in conformity with the master device.

SCod: It is the value of the security code asked with 'Cod' prompt when entering in configuration mode. It can be set between 0 and 9999. The factory setting of the parameter is '10'. In case the security code is forgotten, the operating voltage of the driver must be reapplied, within 30 seconds, \blacktriangledown , \blacktriangle and \square buttons must be pressed simultaneously. Later, configuration mode is entered with any security code to access the security code (**SCod**) parameter.

2.4.2. CALb page:

In this page calibration parameters of the device are found. If it is not necessary, the parameters in this page should not be changed.

PtFS: The calibration parameter corresponding to the maximum value of the potentiometer to be used in the potentiometer control mode. To set the parameter, adjust the potentiometer for minimum rate (resistance value maximum). Remove the jumper behind the terminal R. If \blacktriangledown and \blacktriangle buttons kept pressed together while this parameter selected, the raw data corresponding to the maximum value of the potentiometer is written on the display. The parameter can be adjusted between 100 and 8191 with \blacktriangledown and \blacktriangle buttons, but this method is not advised other than fine tuning.

20mA: The calibration parameter corresponding to 20 mA control current. To set the parameter, 20.00 mA is applied, by paying attention to the polarity, to the current input ('+' and '-' terminals) of the device. The jumper behind the terminal R must be placed. If \blacktriangledown and \blacktriangle buttons kept pressed together when this parameter is selected, the raw data corresponding to the 20 mA current is written on the display. The parameter can be adjusted between 500 and 8191 with \blacktriangledown and \blacktriangle buttons, but this method is not advised other than fine tuning.

Ln1B: The calibration parameter for 180V. For the setting of the parameter LN1 and LN2 terminals of the device are connected to an adjustable AC source and the source voltage is set to 180V. If \blacktriangledown and \blacktriangle buttons kept pressed together when this parameter is selected, the raw data corresponding to the 180V voltage is written on the display. The parameter can be adjusted between 500 and 8191 with \blacktriangledown and \blacktriangle buttons, but this method is not advised other than fine tuning.

Ln24: The calibration parameter for 240V. For the setting of the parameter, the LN1 and LN2 terminals of the device are connected to an adjustable AC source and the source voltage is set to 240V. If \blacktriangledown and \blacktriangle buttons kept pressed together when this parameter is selected, the raw data corresponding to the 240V is written on the display. The parameter can be adjusted between 500 and 8191 with \blacktriangledown and \blacktriangle buttons, but this method is not advised other than fine tuning.

USUP: This parameter should be adjusted to the nominal value of vibrator supply voltage. The parameter value can be adjusted between 100.0 and 450.0 volts. The driver regulates its output against vibrator supply variations to some extent. If the difference between nominal voltage and this parameter is too high, regulation performance will be degraded.

rRtE : This parameter defines how fast the output will reach its final value when it is set to a higher value at its current level. It has no effect when the output is set to a lower value and immediately settles without any delay. This parameter is adjusted in terms of targeted total time period which the controller takes when reaching from %0 to %100 output value. The unit is in milliseconds and the adjustable range spans from 100 ms to 2000 ms with a factory default value of 100 ms.

3. ADJUSTMENTS:

Before all adjustments, make sure that **USUP** parameter in the **CALb** page is adjusted to the nominal value of vibrator supply voltage.

If the device is commissioning for the first time, if a modification has been made in the vibrator used with the device, or a change is required in maximum and minimum vibration rates set beforehand, **ZERO** and **SPAn** settings described in 3.1 section must be performed.

If the control of the driver is made by potentiometer, before first use and potentiometer replacement, the potentiometer settings described in 3.2. Section must be performed.

If the driver is used in Fast/Slow control mode, if a change will be made before use and in fast and slow levels, Fast/Slow settings in section 3.3 must be performed.

3.1. ZERO and SPAn Adjustments:

If the device is commissioned first time, or **ZERO** and **SPAn** values will be revised, please make the operating voltage and vibrator supply connections of the vibrator driver. Do not connect the vibrator leads. Apply operation voltage to the device and monitor if the display is working.

1. Enter into configuration mode, set **CLYP** parameter in **GCnF** page as 'nAnU' and **ZERO** and **SPAn** parameters as '1000' and exit from configuration mode by pressing **⊗** button.
2. When returned to normal operation state, if **oUt** parameter is not '0', set it to 0 with **▼** button.
3. Turn off both operating and vibrator supplies and connect the vibrator leads to the terminals LD1 and LD2. Reapply voltages to the system.
4. Enter into configuration mode and access to **SPAn** parameter in **GCnF** page.
5. When **SPAn** parameter is selected, press **▼** and **▲** buttons together. When the buttons are pressed, monitor the operation of the vibrator. If it does not reach to the required maximum rate, increase the parameter value by using **▼** and **▲** buttons in steps of 500 or 1000. Again, by pressing **▼** and **▲** buttons together, monitor the operation of the vibrator. By repeating the same processes continue increasing the parameter value until it reaches to the required maximum speed. When it reaches to the required maximum speed, store the parameter value by pressing **⊗** button.
6. Access **ZERO** parameter in **GCnF** page.
7. Press **▼** and **▲** buttons together while **ZERO** parameter is selected. While the buttons are pressed, monitor the operation of the vibrator. Normally this parameter must be set to maximum value before the vibration start. By changing the parameter value with **▼** and **▲** buttons (by increasing or decreasing) try to find this value. After changing the parameter value, press **▼** and **▲** buttons simultaneously. The new vibration rate can be monitored from the vibrator. After determining the parameter value, exit from configuration mode by pressing **⊗** button.
8. When returning to normal operation state, monitor the operation rates of the vibrator by changing the **oUt** parameter between 0 and 100 with **▼** and **▲** buttons. When **oUt** parameter is '0', the vibrator will not operate, when it is between 1 and 5 the vibrator should be stimulated, when it is 100 the maximum rate should be reached.
9. Reenter into configuration mode and modify the **CLYP** parameter in **GCnF** page according to the required control type (**nAnU** = Manual, **SuIL** = Fast/Slow, **Pot** = Potentiometer, **0-20** = 0-20 mA, **4-20** = 4-20 mA) and exit from configuration mode.

If the device is commissioned first time, make the input circuit connections that will ensure the required control type. If the potentiometer control type is selected, perform the potentiometer adjustments described in 3.2. Section; if Fast/Slow control is selected, make the Fast/Slow adjustments described in 3.3. Section.

3.2. Potentiometer Adjustments:

If the operation of the vibrator is not desired during the adjustments, turn off the operation voltages and disconnect the vibrator leads from LD1 and LD2 terminals. Reapply operation voltages to the device.

1. Remove the jumper behind the terminal R that can be accessed without opening the cover of the device.
2. Enter into configuration mode and access **PtFS** parameter in **CALb** page.
3. Set the potentiometer to minimum speed position (resistance value maximum).

4. While **PEFS** parameter is selected, press **▼** and **▲** buttons together. When two keys are pressed together, the raw data corresponding to maximum value of the potentiometer is written on the display.
5. Select **CLYP** parameter in **CLnF** page. Set the parameter as '**Pat**' and exit from configuration mode by pressing **⊞** button.
6. When returned to normal operation state, select **oUt** parameter.
7. Change the potentiometer position between minimum and maximum speed state. Observe that **oUt** output percentage that is monitored on the display changes between 0 and 100.

3.3. Fast/Slow Adjustments:

In order for the Fast/Slow settings to be made, the **CLYP** parameter in the **CLnF** page should have been adjusted as **Sw IC**.

1. While in the normal operating mode, reach the FAST parameter by intermittently pressing the **⊞** button.
2. Apply 24 V DC to both K and H terminals and observe the vibration speed.
3. Adjust the parameter value by means of **▼** and **▲** buttons until the vibration speed reaches the desired fast level.
4. Reach the **SLow** parameter by intermittently pressing the **⊞** button.
5. Apply 24 V DC to K terminal and observe the vibration speed.
6. Adjust the parameter value by means of **▼** and **▲** buttons until the vibration speed reaches the desired slow level.

4. MODBUS REGISTER ADDRESSES:

E-VS-100 Vibrator Drivers with RS-485 communication option can be controlled and monitored through a central system according to the Modbus rtu protocol on the RS-485 communication line. Function codes 03, 06 and 16 are supported. Parameter addresses are given in the table below. Parameters, the properties of which are R are read-only; parameters which are R/W are both readable and writeable.

Table of Modbus Registers

PARAMETER	ADDRESS	PROPERTY	RANGE
Analog Control Raw Data	1	R	-
Mains Voltage Raw Data	2	R	-
Mains Voltage (L inE)	3	R	-
Output Percentage (oUt)	4	R	-
Fast Operation Level (FRSt)	5	R/W	0-100
Slow Operation Level (SLow)	6	R/W	0-100
Manual Output Level	7	R/W	0-100

5. PARAMETER VALUES:

The factory setting parameter values of the E-VS-100 Vibrator Driver are given in the table below. Changing of the parameters **nR20**, **Ln 18** and **Ln24** in the **CLb** page by the user is not suggested. **ZEro**, **SPAn** and **PEFS** parameters should be adjusted by the user according to the application requirements.

SERIAL NUMBER:					
Page	Parameter	Factory Set	Rev I	Rev II	Rev III
CLnF	CLYP	nRnU			
	ZEro	0			
	SPAn	9999			
	d inP	oFF			
	RdrS	0			
	brtE	38.4			
	PrtY	EuEn			
	SCod	10			
CLb	PEFS				
	nR20				
	Ln 18				
	Ln24				
	uSUP	230.0			
	rRtE	100			
Input Type	Parameter	Factory Set	Rev I	Rev II	Rev III
Sw IC	FRSt				
	SLow				

Manufacturer / Technical Support: Elimko Co. Ltd. www.elimko.com.tr