7. Motor Start / Stop Operation



When Start/Stop button is pressed, Set value is seen on display, Start led lights on, selected digital output is being active and analogue output starts to increase from the set low limit value to set value during **Tup(sec)** time with ramp.
While the motor is running if Start/Stop button is pressed again set low limit value is seen on display, Start led lights off, analogue output starts to decrease from set value to set low limit value during **Tdown(sec)** time. When analogue output is equal to set low limit value selected digital output is being inactive.

(1) It is valid, if the device type 0/2...10V⎓ analogue output.
(2) It is valid, if the device type 0/4...20mA⎓ analogue output.
If no operation is performed in programming mode for 20 seconds, device turns to operation screen automatically.

8. Spesifications

Device Type	: Control Panel For V/F Speed Controller
Housing & Mounting	: 77mm x 35mm x 62.5mm Plastic housing for panel
Protection Against	Mounting. Panel cut-out is 71x29mm.
Mechanical Impacts	: 1Joule (IK06)
Protection Class	: NEMA 4X (IP65 at front, IP20 at rear).
Weight	: Approximately 200 grams
Environmental Rating	: Standard, indoor at an altitude of less than 2000 meters with none-condensing humidity.
Storage / Operating Temperature	: -40 C to +85 C / 0 C to +50 C
Storage / Operating Humidity	: 90 % max. (None condensing)
Installation	: Fixed Installation
Overvoltage Category	: II.
Pollution Degree	: II. Office or workplace, none conductive pollution
Scale	: Between -1999 and 9999
Analogue Output	: 0/2...10V⎓ Voltage Output (Max.10mA) or 0/4...20mA⎓ Current Output
Digital Output	: Forward Direction Output (Max. 5mA@30V) Reverse Direction Output (Max. 5mA@30V)
Digital Input	: Error Input (Max. 5mA@30VZ) Min. High Level 7V⎓) Max. Low Level 5V⎓)
Resolution	: 12 bits
Fluctuation	: 30 mV
Supply Voltage and Power	: 230V⏦(±%15) 50/60Hz - 2.5VA
	: 115V⏦(±%15) 50/60Hz - 2.5VA
	: 24V⏦(±%15) 50/60Hz - 2.5VA
	: 24V⎓(±%15) 50/60Hz - 2.5VA
	: 10 - 30V⎓ - 2.5W
Display	: 10 mm red 4 digits LED
LEDs	: I(red),↻(red),↺(red),I(red), S (green),P(green)
Compliances	: EAC , UK , CE

9. Ordering Information

EPM-3790N (77 x 35 DIN Size)	A	BC	D	E	/	FG	HI	/	U	V	W	Z
		0	0		/	00	00	/	1	0	0	0

A	Power Supply
1	100-240V ⏦ (±%15) 50/60Hz - 2.5VA
2	24V⏦ (±%15) 50/60Hz - 2.5VA
3	24V⏦ (+%10, -%15) 50/60Hz - 2.5VA
4	115V⏦ (+%10, -%15) 50/60Hz - 2.5VA
5	230V⏦ (+%10, -%15) 50/60Hz - 2.5VA
8	10 - 30V ⎓ - 2.5W
9	Customer Specified

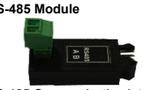
E	Output
4	Current Output (0/4...20mA ⎓)
5	Voltage Output (0/2...10V ⎓ max. 10 mA)

All order information of EPM-3790N units are given on the table above. User may form appropriate device configuration from information and codes that at the table and convert it to the ordering codes. Firstly, supply voltage then other specifications must be determined. Please fill the order code blanks according to your needs. Please contact us, if your needs are out of the standards.

Please set the parameters according to desired conditions before operating the device. Improperly configured device may cause hazard.

9. Optional Accessories

1.RS-485 Module



RS-485 Communication Interface

2. PROKEY Programming Module



Module for uploading and downloading the user parameters

⏦ Symbol means Vac,
⎓ Symbol means Vdc,

In accordance with the WEEE regulation.
Please don't dispose the device along with other waste at the end of its service life.
Please leave the device to a recycling point for electrical devices.

EMKO *Your technology partner*

Thank you for your interest in EMKO Elektronik products. In order to download a more detailed version of this manual, please visit us at our website.
www.emkoelektronik.com.tr

EMKO

EPM-3790N 77x35 DIN Size Control Panel For V/F Speed Controller



EPM-3790N 77x35 DIN Size Control Panel For V/F Speed Controller

- ***4 Digits Display***
- ***Adjustable decimal point***
- ***Set value low limit and set value high limit boundaries***
- ***Adjustable ramp up and ramp down time***
- ***Easily adjustable set value from front panel***
- ***Configurable display scale between -1999 and 9999***
- ***Forward, Reverse direction outputs and error input for V/F Speed Controller***
- ***0/2...10V ⎓ Voltage output or 0/4...20mA ⎓ Current output (It must be specified in order.)***
- ***Password protection for programming and settings sections***

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1.3 Installation

Before beginning installation of this product, please read the instruction manual and warnings below carefully.

This package contains
- A device unit
- Two pieces of mounting clamps
- An instruction manual

A visual inspection of this product for possible damage occured during shipment is recommended before installation. It is your responsibility to ensure that qualified mechanical and electrical technicians install this product.

If there is danger of serious accident resulting from a failure or defect in this unit, power off the system and the electrical connection of the device from the system.

The unit is normally supplied without a power supply switch or a fuse. Use power switch and fuse as required.

Be sure to use the rated power supply voltage to protect the unit against damage and to prevent failure.

Keep the power off until all of the wiring is completed so that electric shock and trouble with the unit can be prevented.

Never attempt to disassemble, modify or repair this unit. Tampering with the unit may results in malfunction, electric shock or fire.

Do not use the unit in combustible or explosive gaseous atmospheres.

During the equipment is putted in hole on the metal panel while mechanical installation some metal burrs can cause injury on hands, you must be careful.

Installation of the product on a system must be done with the provided fixing clamps. Do not attempt to install the device with inappropriate fixing clamps. Make sure to keep the device steady during the installation.

It is your responsibility if this equipment is used in a manner not specified in this instruction manual.

1.4 Warranty

EMKO Elektronik warrants that the equipment delivered is free from defects in material and workmanship. This warranty is provided for a period of two years. The warranty period starts from the delivery date. This warranty is in force if duty and responsibilities which are determined in warranty document and instruction manual performs by the customer completely.

1.5 Maintenance

Repairs should only be performed by trained and specialized personnel. Cut power to the device before accessing internal parts. Do not clean the case with hydrocarbon-based solvents (Petrol, Trichlorethylene etc.). Use of these solvents can reduce the mechanical reliability of the device. Use a cloth dampened in ethyl alcohol or water to clean the external plastic case.

1.6 Manufacturer

Manufacturer Information:
Emko Elektronik Sanayi ve Ticaret A.Ş.
Bursa Organize Sanayi Bölgesi, (Fethiye OSB Mah.)
Turkuaz Cd. No:15 16215
BURSA/TÜRKİYE
Phone : +90 224 261 1900
Fax : +90 224 261 1912

Repair and Maintenance Service Information:
Emko Elektronik Sanayi ve Ticaret A.Ş.
Bursa Organize Sanayi Bölgesi, (Fethiye OSB Mah.)
Turkuaz Cd. No:15 16215
BURSA/TÜRKİYE
Phone : +90 224 261 1900
Fax : +90 224 261 1912

1 Preface

EPM-3790-N series units are designed for controlling the speed and direction of the motor as a control panel for V/F Speed Controllers in industry. They can be used in many applications with their easy use and operation with their ramp properties.

1.1 Operating Conditions

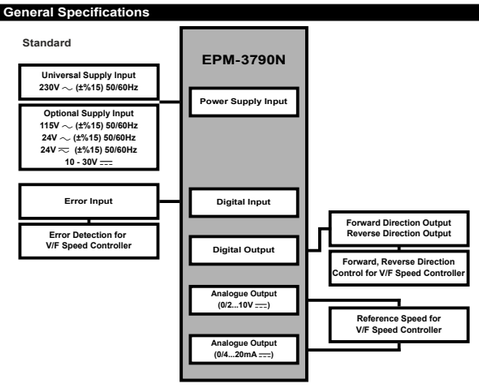
Operating Temperature : 0 to 50 °C

Max. Operating Humidity : 90 Rh (non-condensing)

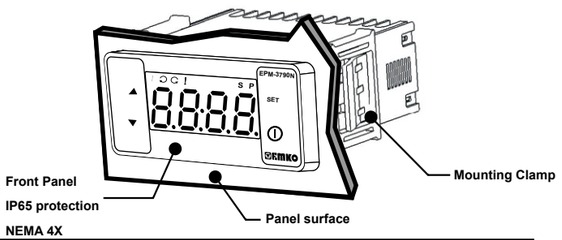
Altitude : Up to 2000m

Forbidden Conditions:
Corrosive atmosphere
Explosive atmosphere
Home applications (The unit is only for industrial applications)

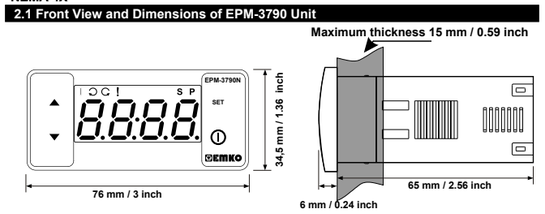
1.2 General Specifications



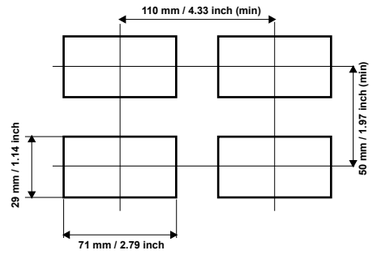
2. General Description



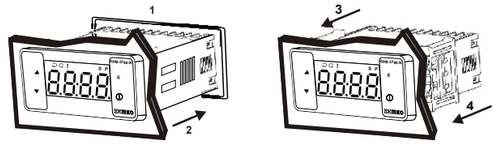
2.1 Front View and Dimensions of EPM-3790 Unit



2.2 Panel Cut-Out



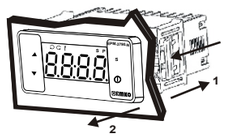
2.3 Panel Mounting



1- Before mounting the device in your panel, make sure that the cut-out is of the right size.
2- Insert the device through the cut-out. If the mounting clamps are on the unit, put out them before inserting the unit to the panel.

3- Insert the unit in the panel cut-out from the front side.
4- Insert the mounting clamps to the holes that located left and right sides of the device and make the unit completely immobile within the panel.

2.4 Removing from the Panel



Loosen the screws
1-Pull mounting clamps from left and right fixing sockets.
2-Pull the unit through the front side of the panel

Before starting to remove the unit from panel, power off the unit and the related system.

3. Using PROKEY

TO USE PROKEY, VALUE OF THE PrC PARAMETER MUST BE '0'.
IF PrC=1 AND ▼BUTTON IS PRESSED Err MESSAGE WILL BE SHOWN. 10s. LATER DEVICE TURNS BACK TO THE MAIN OPERATION SCREEN OR YOU CAN PRESS SET BUTTON TO TURN BACK TO MAIN OPERATION SCREEN.

DOWNLOADING FROM DEVICE TO PROKEY

1.The device is programmed by using the parameters.
2. Energize the device then put in PROKEY and press ▼button.
uPL Message is shown on the display.When the loading has finished, End message is shown.
3. Press any button to turn back to main operation screen.
4. Remove the PROKEY.

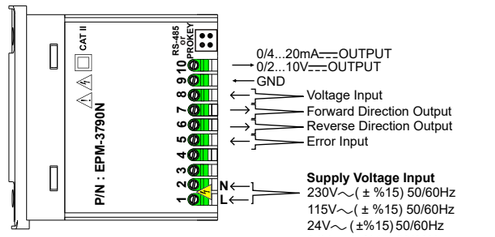
NOTE: Err message is shown when an error occurs while programming. If you want to reload, put in PROKEY and press ▼button. If you want to quit, remove PROKEY and press ▼ button.The device will turn back to main operation screen.

DOWNLOADING FROM PROKEY TO DEVICE

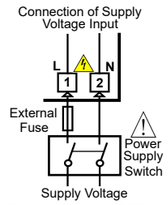
1.Switch off the device.
2.Put in PROKEY then energize the device.
3.When the device is energized, the parameter values in PROKEY, start downloading to the device automatically. At first, dOL message is shown on the display, when loading has finished, End message is shown.
4.After 10 seconds device starts to operate with new parameter values.
5.Remove the PROKEY.

NOTE: Err message is shown when an error occurs while programming. If you want to reload, switch off the device and put in PROKEY then energize the device. If you want to quit remove PROKEY and press ▼button. The device will turn back to main operation screen.

4. Electrical Wiring



4.1 Supply Voltage Input Connection of the Device



Make sure that the power supply voltage is same indicated on the instrument. Switch on the power supply only after that all the electrical connection have been completed.
Supply voltage range must be determined in order. While installing the unit, supply voltage range must be controlled and appropriate supply voltage must be applied to the unit. Controlling prevents damages in unit and system and possible accidents as a result of incorrect supply voltage.

There is no power supply switch or fuse on the device. So a power supply switch and a fuse must be added to the supply voltage input. Power supply switch and fuse must be put to a place where user can reach easily. Power supply switch must be two poled for seperating phase and neutral.
On/Off condition of power supply switch is very important in electrical connection. On/Off condition of power supply switch must be signed for preventing the wrong connection.

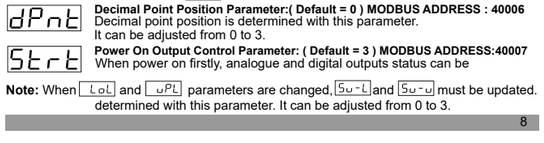
External fuse must be on phase connection in ~ supply input.
External fuse must be on (+) line connection in ⎓ supply input.

230 V~ (± %15) 50/60 Hz ,
115 V~ (± %15) 50/60 Hz,
24 V~ (± %15) 50/60 Hz ,
24 V⎓ (-%15,+%10) 50/60 Hz

Note-1 : External fuse is recommended.
Note-2 : Stranded cable cross section: 1,5mm², Solid cable cross-section: 2,5mm²
The stripping length is 7 to 9 mm.
Note-3 : Supply cables must comply with the requirements of IEC 60277 or IEC 60245.

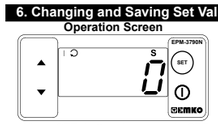
3.2 View of the Device Label

230V~ WIRING DIAGRAM



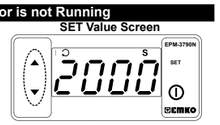
6. Changing and Saving Set Value While the Motor is not Running

Operation Screen



When SET button is pressed, SET value is shown on the display, and display starts to blink

SET Value Screen



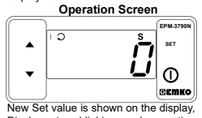
When SET button is pressed, SET value is shown on the display, and display starts to blink

SET Value Screen



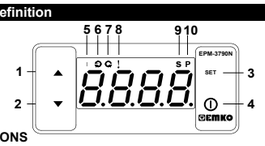
Press SET button to save the SET value

Operation Screen



New Set value is shown on the display, Display stop blinking and operation screen is shown

5. Front Panel Definition



BUTTON DEFINITIONS

1. Increment Button
** It is used to increase the value and access to the parameter in programming mode
2. Decrement Button
** It is used to decrease the value and access to the parameter in programming mode
3. Set Button
** It is used to enter to the SET value changing mode, programming mode and used as OK button
4. Start/Stop Button
** When pressed at Set Screen, current value is saved and Operating Screen is activated.

LED DEFINITIONS

5. Start / Stop LED
** Activates at the system start-up
6. Forward Direction LED
** Activates when forward direction is selected
7. Reverse Direction LED
** Activates when reverse direction is selected
8. Error LED
** Activates when error input is active
9. Programming Mode LED
** Blinks when programming screen is accessed
10. Set LED
** Activates when SET button is pressed

6.1. Changing and Saving Set Value While the Motor is Running

Operation Screen

When SET button is pressed SET value is shown on the display, and display starts to blink

SET Value Screen

Change the SET value with increment and decrement buttons.

SET Value Screen

Press SET button for saving the SET value

Operation Screen

New Set value is shown, display stops blinking and operation screen is shown

Error Set Parameter (Default=2000) MODBUS ADDRESS:40001

If Set value is changed while the motor is running, analogue output is affected simultaneously by change on the set value. Analogue output is increase or decrease to the new value according to the rut and rdt parameters.

6.2. Programming Mode Parameters List

LoL **Scale LowLimit Parameter (Default = 0) MODBUS ADDRESS: 40002**
It can be adjusted from -1999 to (uPL -1).
oAt = 0, according to the device type 0V⎓ or 0mA⎓
At this value analogue output becomes;
oAt = 1, according to the device type 2V⎓ or 4mA⎓

uPL **Scale High Limit Parameter:(Default = 4000) MODBUS ADDRESS:40003**
It can be adjusted from -1999 to (LoL -1).
According to the device type, 0V⎓or 0mA⎓
At this value analogue output becomes;

Su-L **Set Low Limit Parameter (Default = 0) MODBUS ADDRESS:40004**
Set value can not be defined less than this value.
It can be adjusted from scale low limit parameter LoL value to set high limit parameter Su-u value.

Su-u **Set High Limit Parameter (Default = 4000) MODBUS ADDRESS:40005**
Set value can not be defined greater than this value.
It can be adjusted from set low limit parameter Su-L value to scale high limit parameter uPL value.

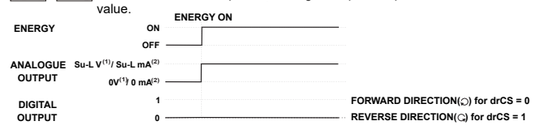
dPnt **Decimal Point Position Parameter:(Default = 0) MODBUS ADDRESS : 40006**
Decimal point position is determined with this parameter.
It can be adjusted from 0 to 3.

Strt **Power On Output Control Parameter: (Default = 3) MODBUS ADDRESS:40007**
When power on firstly, analogue and digital outputs status can be

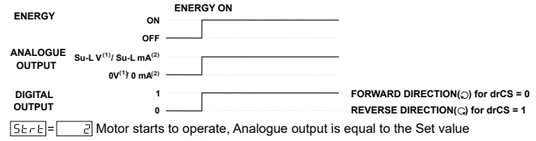
Note: When LoL and uPL parameters are changed, Su-L and Su-u must be updated. determined with this parameter. It can be adjusted from 0 to 3.

Programming Mode Parameters List (cont.)

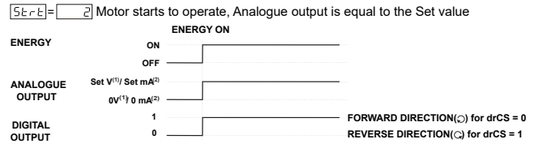
Strt = 0 Motor doesn't start to operate, Analogue output is equal to the Set low limit value.



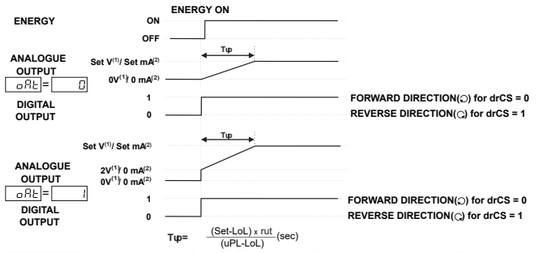
Strt = 1 Motor starts to operate, Analogue output is equal to the Set low limit value



Strt = 2 Motor starts to operate, Analogue output is equal to the Set value



Strt = 3 Motor starts to operate, Analogue output is increase from the Scale low limit to Set value according to the ramp up time.



drCS **Direction Selection:(Default = 0)MODBUS ADDRESS : 40008**
Direction of movement is determined by this parameter.
0 Forward Direction(↻)
1 Reverse Direction(↺)

PASS **Programming Section Accessing Password:**
(Default =0)
It is used for entering to the programming section. It can be adjusted from 0 to 9999.
If this password is 0, programming section can be accessed without entering the password.

drCt **Direction Change Delay Time Parameter:**
(Default = 200msec)
In direction changes, after motor stop, this duration must pass to operate again in other direction. It can be adjusted from 1 to 9999 msec.

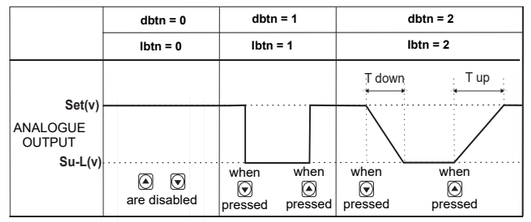
rut **Ramp Up Time Parameter:(Default = 10sec)**
Increasing time of the analogue output from 0V to 10V or 0mA to 20mA is determined with this parameter. It can be adjusted from 1 to 999 sec.

rdt **Ramp Down Time Parameter:(Default = 10sec)**
Decreasing time of the analogue output from 10V to 0V or 20mA to 0mA is determined with this parameter. It can be adjusted from 1 to 999 sec.

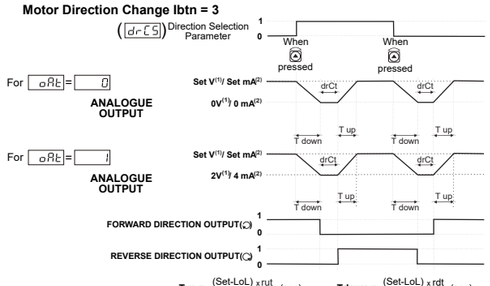
Ibtn **Increment Button Parameter for Functional Usage: (Default=3)**
Usage of the Increment button while the motor is running and the unit is on operation screen
0 Increment button is disable
1 Analogue output is directly adjusted to Set value when increment button is pressed.
2 Analogue output is increased to Set value according to the ramp up time when increment button is pressed.
3 Direction of the movement is changed when increment button is pressed.

dbtn **Decrement Button Parameter for Functional Usage: (Default=2)**
Usage of the Decrement button while the motor is running and the unit is on operation screen
0 Decrement button is disabled
1 Analogue output is directly adjusted to minimum Set value when decrement button is pressed.
2 Analogue output is decreased to minimum Set value according to the ramp down time when decrement button is pressed.

Decrement Button Functional Usage



Motor Direction Change Ibtn = 3



Tup = (Set-LoL) x rut / (uPL-LoL) (sec) Tdown = (Set-LoL) x rdt / (uPL-LoL) (sec)

SidE **Set Changing Value Parameter:(Default = 3)MODBUS ADDRESS : 40014**
Changing value for Set value is determined with this parameter.
1 Set changing value become one(1)
2 Set changing value become ten(10)
3 Set changing value become hundred(100)
4 Set changing value become incremental. (Note-1)

oAt **Analogue Output Range Selection Parameter: (Default = 0)MODBUS ADRES: 40015**
Analogue output range is determined with this parameter.
0 0 ... 10V⎓ or 0 ... 20mA⎓
1 2 ... 10V⎓ or 4 ... 20mA⎓

APAS **Adjustment Section Accessing Password: MODBUS ADDRESS:40016**
Required password is entered via this parameter for accessing to the adjustment section. If the parameter value is entered as 3083, AUAL screen is accessed, otherwise PASS parameter is seen.

AUAL **Adjustment Value Parameter: MODBUS ADDRESS:40017**
Adjustment value for Analogue output. It can be adjusted from 0 to 4095.
When ▲ is pressed on AUAL screen, adjustment value is seen on screen. The value on the screen should be adjusted with Increment and Decrement button until 10.00V or 20.00mA is obtained from the analogue output. After getting the 10.00V or 20.00mA on analogue output, press button for saving this value as an adjustment value.

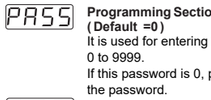
PrC **Communication Mode Selection Parameter (Default = 0) MODBUS ADDRESS:40018**
0 PROKEY communication is selected.
1 RS485 communication is selected.

SAd **Slave ID Parameter (Default = 1) MODBUS Address: 40019**
Communication address parameter can be any value between 1 and 247.

Note-1 If increment or decrement button is pressed for 2 seconds continuously, increment and decrement number become 10, if pressed for 4 seconds continuously, increment and decrement number become 100, if pressed for 6 seconds continuously, increment and decrement number become 1000.

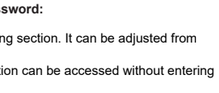
6.4 Entering Programming Mode, Changing and Saving Parameters

Operation Screen



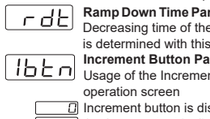
When SET button is pressed for 5 seconds, "P" led starts to blink. If programming section access password is different from 0, programming section access screen PrOG is observed.

Programming Mode Access Screen

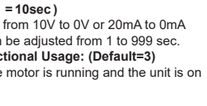


Press Increment button to access password entering screen

Note-1 If programming section accessing password is=0, scale low limit parameter screen is observed instead of programming section accessing screen.

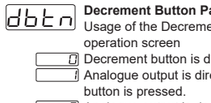


Password Entering Screen
Enter programming section accessing password with Increment and Decrement buttons



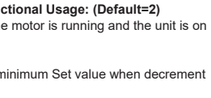
Password Entering Screen
Password is accepted by pressing SET button.

Scale Low Limit Parameter



Parameter is accessed by pressing Increment button. If set button is pressed, next parameter is shown.

Scale Low Limit Value



Change the value with Increment and Decrement buttons.

Scale Low Limit Value

Scale High Limit Parameter