Straightening Machine

Human Machine Interface Manual

Ver No 01 – 2023

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1. INTRODUCTION

Straightening machine, also known as ball screw straightening machine is a hydraulic press machine used to remove the bends along a metal rod.

The variations in the linearity of the ball screw is measured using a dial gauge in the front and the necessary parameters are entered in the screen so as to obtain a precise bend.

General workflow of the machine is such that the user actuates a foot switch while in auto mode after entering necessary parameters, the hydraulic press comes downwards to put a pressing force on the ball screw and goes back to its original position.

An HMI is provided for the interactions between the end user and the machine.

2. SPECIFICATIONS

The specifications of the machine are as follows:

HYDRAULIC CYLINDER SPECIFICATIONS	
TYPE	DOUBLE ACTING HYD CYLINDER
BORE	DIA – 160mm
ROD	DIA – 70mm
STROKE	120mm
WORKING PRESSURE	70 BAR
CUSHION	NON CUSHIONED
MOUNTING	FRONT FLANGE
WORKING TEMP.	AMBIENT TEMP

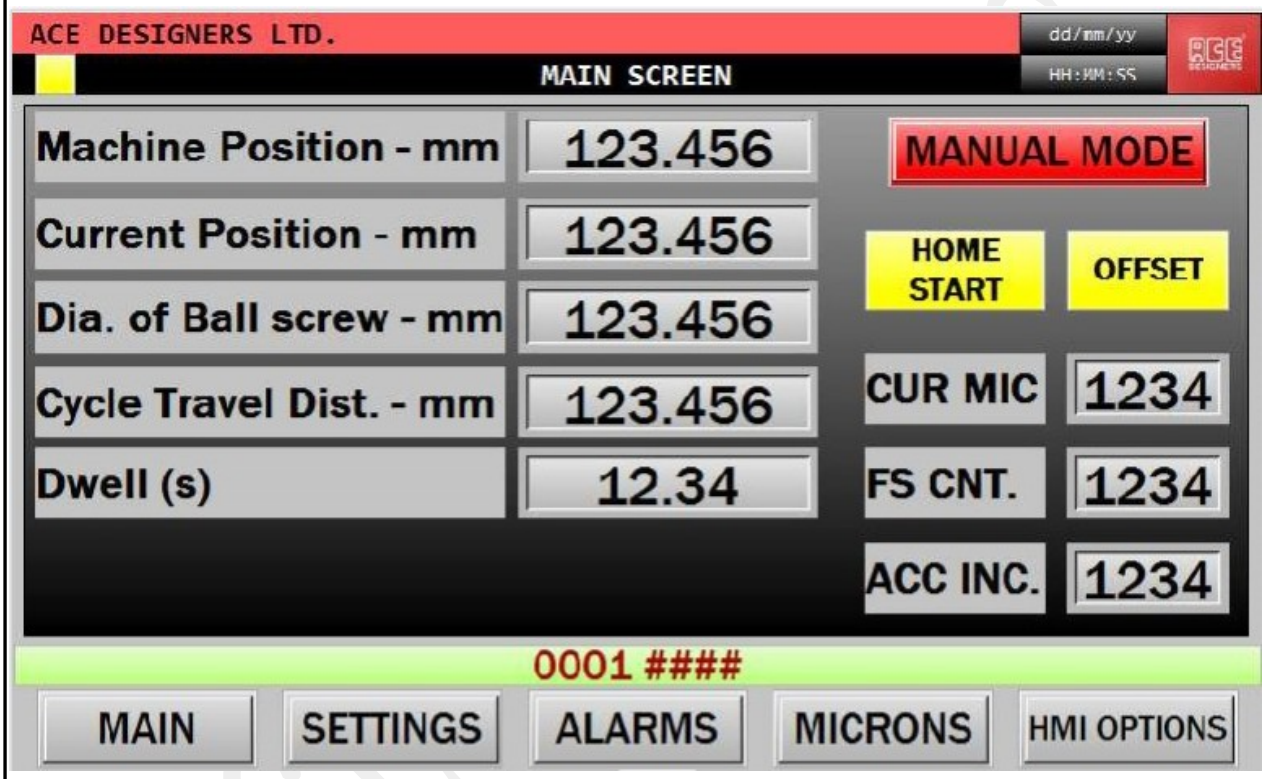
PROPORTIONAL VALVE SPECIFICATIONS	
MODEL	ELDFG-01-EH-10-3C2L-XY-C-D-10 (YUKEN)
TYPE	4 WAY FLOW CONTROL VALVE
INPUT SIGNAL	0~10V (+ or -)
OUTPUT FLOW	0~10L/MIN
MAX CURRENT CONSUMPTION	3A

HMI SPECIFICATIONS	
MODEL	DELTA DOP107 CV
TYPE	TOUCH INPUT HMI

3. HMI MANUAL

The HMI used in this machine is a touch input screen. User can touch the options available in the screen and hence there's no physical buttons for navigations.

When the machine is powered ON, the screen displayed is as below.

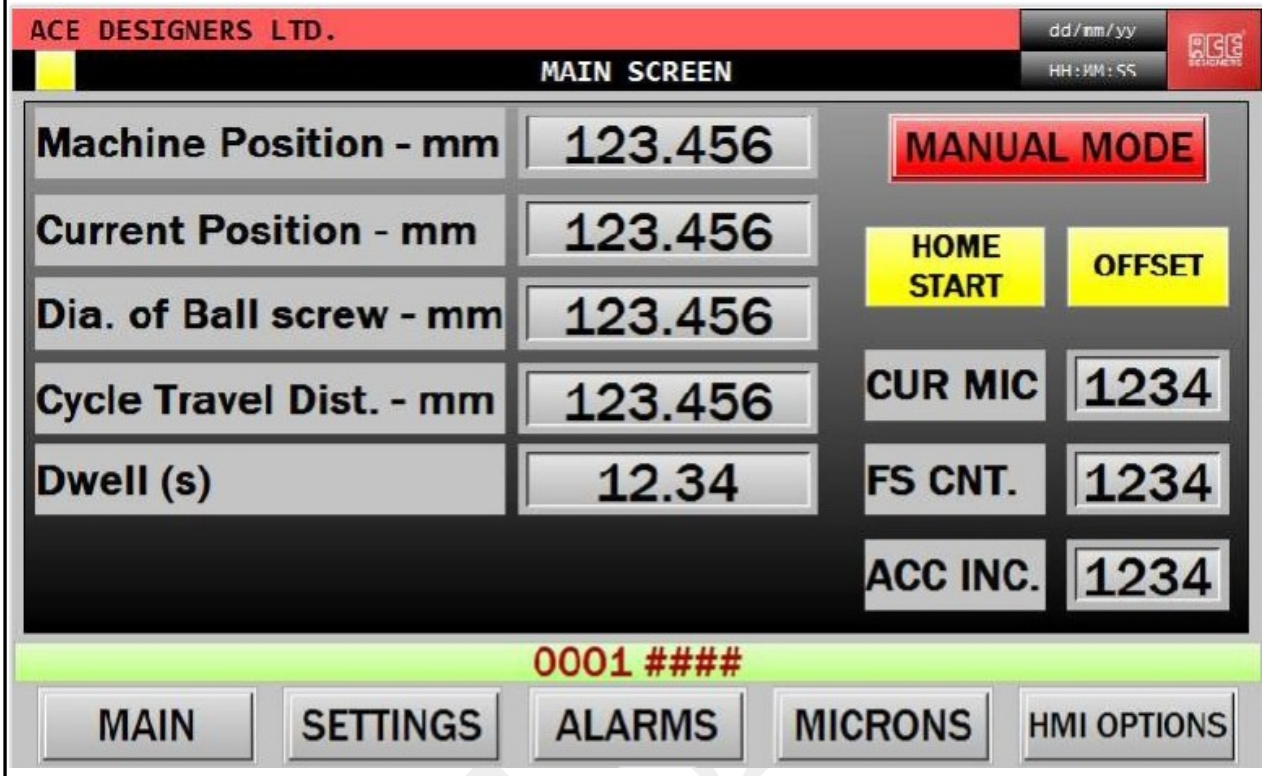


There are five menus available for the user. They are:

1. MAIN
2. SETTINGS
3. ALARMS
4. MICRONS
5. HMI SETTINGS

3.1 – MAIN

The MAIN menu contents are as follows:



- Machine position – The machine's i.e. the hydraulic cylinder's actual position from the top dead centre is shown in this field. The units is in millimeters.
- Current position – The machine's position with relation to the diameter of the ball screw is displayed in this field. As soon as the user enters the diameter of ball screw, the machine's home or '0' is shifted to the surface of the ball screw.
- Dia. Of Ball screw – The user has to enter the Dia. Of the ball screw in this field. The unit is mm.
- Cycle Travel dist. - The travel distance of the cylinder for the current cycle is displayed here. The user selection of microns using the selector switch is also displayed.
- Dwell – The user can enter the amount of dwell required after the cylinder comes down. The cylinder comes down and as soon

as it finishes the bending, it waits the amount of dwell given and then it goes up to its home. The unit is in seconds.

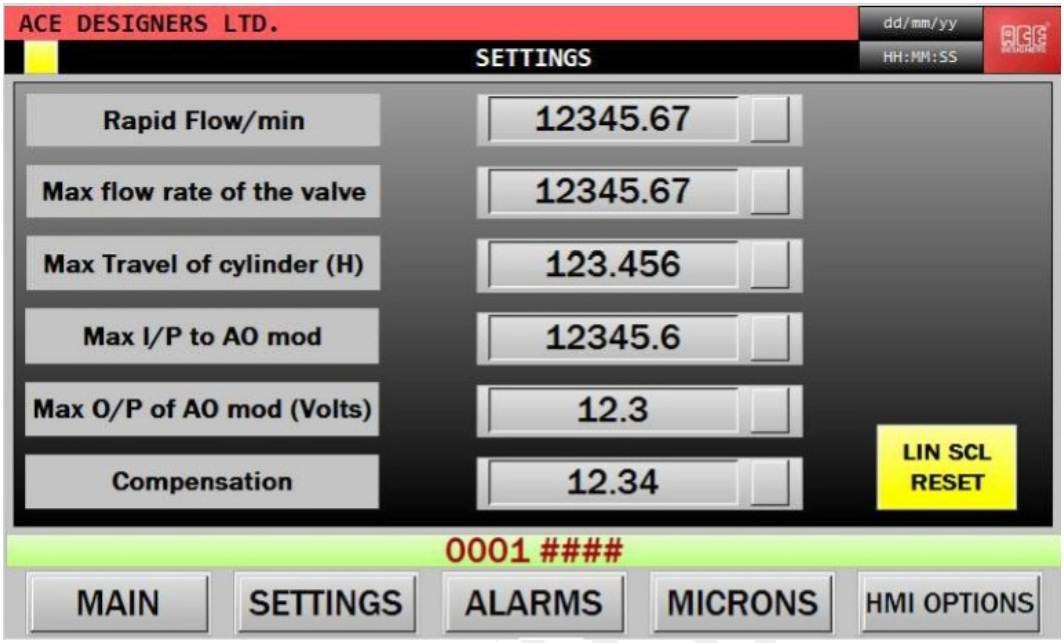
Apart from these, the main screen also displays the status of the mode selected.

Press the Home start button to start the homing of the cylinder.

Offset button is used to set the offset value from the home to the face of the ball screw. User has to bring the cylinder down till the surface of the ball screw and enter the ball screw diameter. After entering the diameter, the offset button has to be pressed. Necessary offset value is input to the total travel distance.

3.2 – SETTINGS

As soon as the settings is selected, the following menu is displayed.



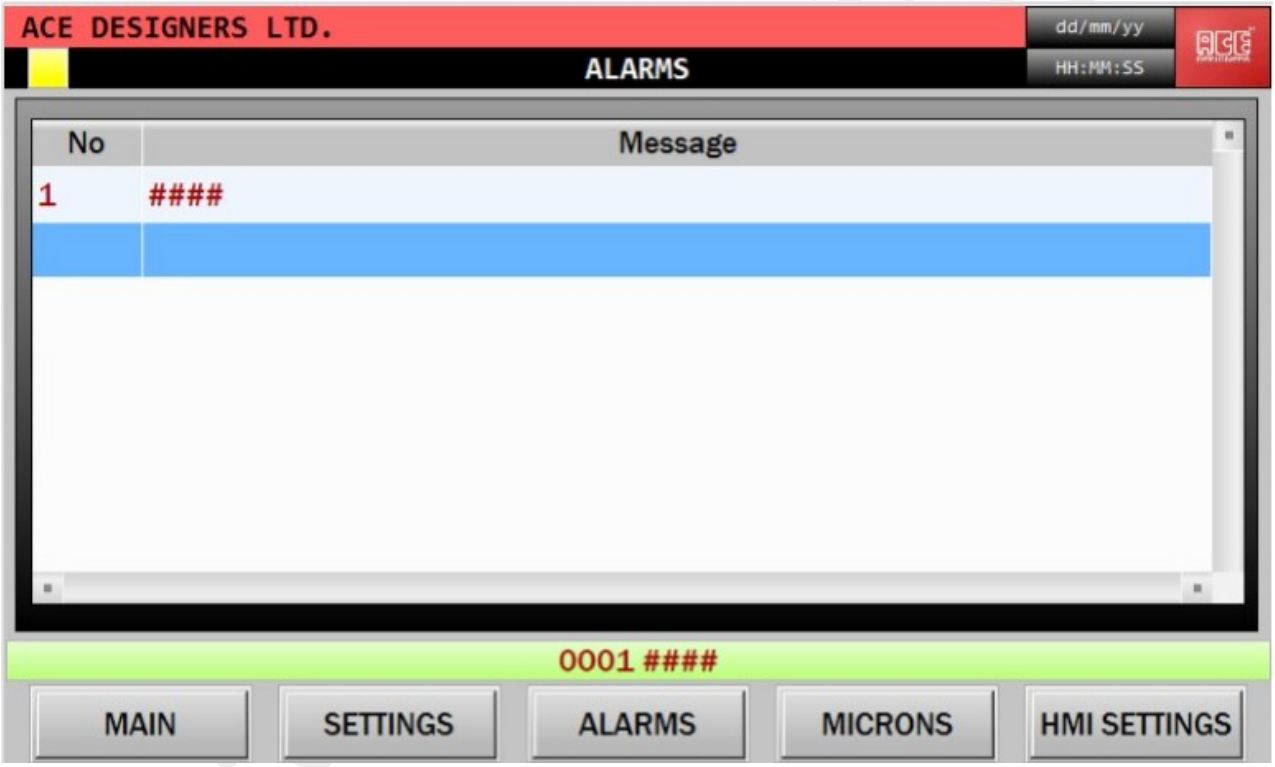
The following parameters can be set in the settings menu:

- Rapid flow/min – This parameter sets the amount of oil flow into the hydraulic cylinder. The setting range is from 0 to the value set in the Max flow rate of the valve. The unit is in ml/min. Anything set beyond this limit displays an alarm.
- Max flow rate of the valve – This parameter has to be set with the maximum flow rate of the proportional valve. The unit is in ml/min.
- Max I/P to AO mod – This parameter is used to set the maximum input value that can be provided to the digital to analog converter. Please refer to the DAC data sheet for input value.
- Max O/P of AO mod – This parameter sets the output value of the digital to analog converter. Please refer to the DAC data sheet for input value. This unit is in volts.
- Compensation – This is the value used for fine tuning the position of the cylinder. For getting the accurate positions from the cylinder, enter values in this field and check the cycle once for a finalized compensation value.

- Max travel of the cylinder – Enter this value to store the maximum travel of the cylinder in mm.
- Lin scl reset – Press this button to reset the machine position to '0'.

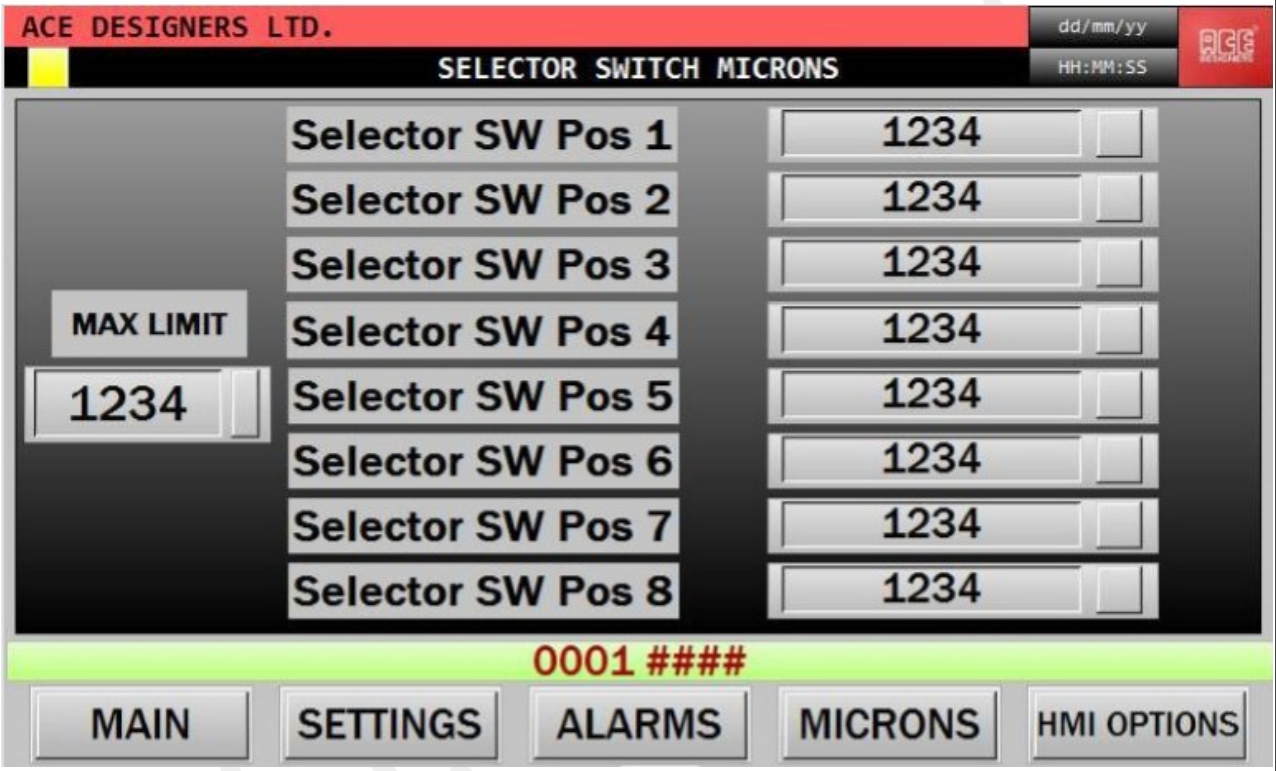
3.3 – ALARMS

Alarms screen is used to display the various alarms in the machine. The alarm display is accompanied with an alarm number. The alarm number and the alarm description is displayed in each screen above the menu softkeys.



3.4 MICRONS

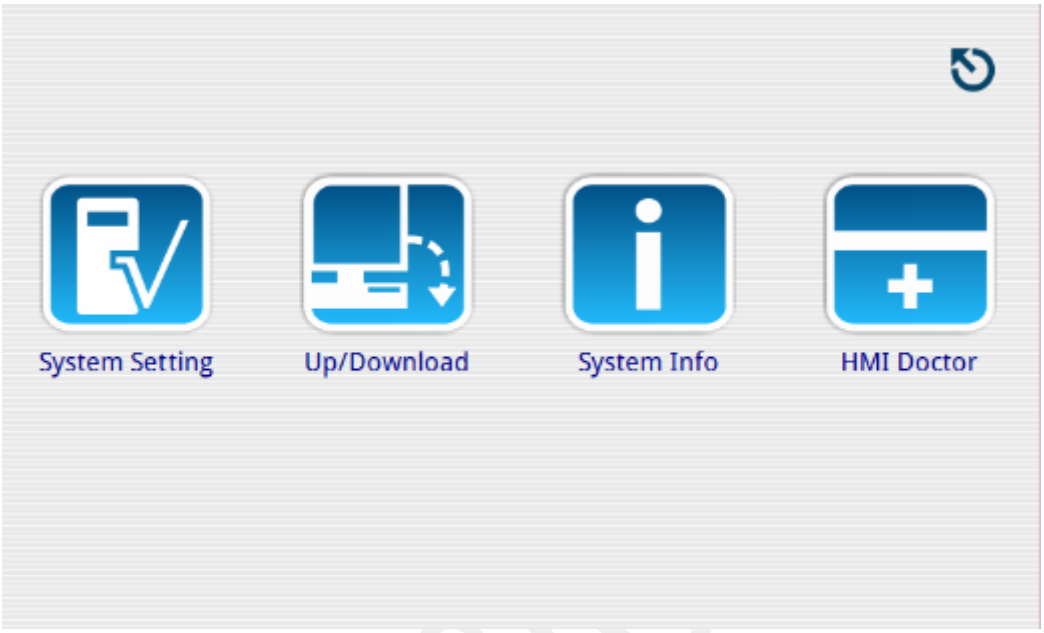
This setting is used to configure the data for the microns selector switch. Each position's data is to be entered here. For the position selected, this microns would be added to the travel distance so as to obtain the bending. This data would be the bending distance. The unit is in microns.



The positional values are added to the travel distance according to the position on the rotary switch.
The max limit field limits the value entered in the position field. The max limit is set here.

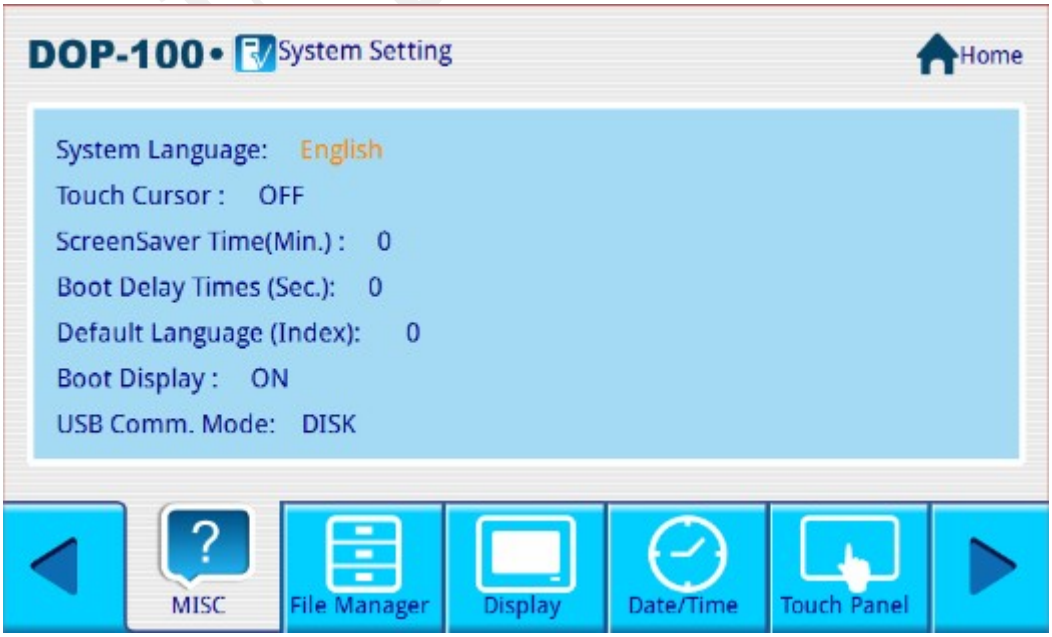
3.5 HMI SETTINGS

HMI settings refer to the default settings of the HMI. When clicking this menu, the following screen is displayed.

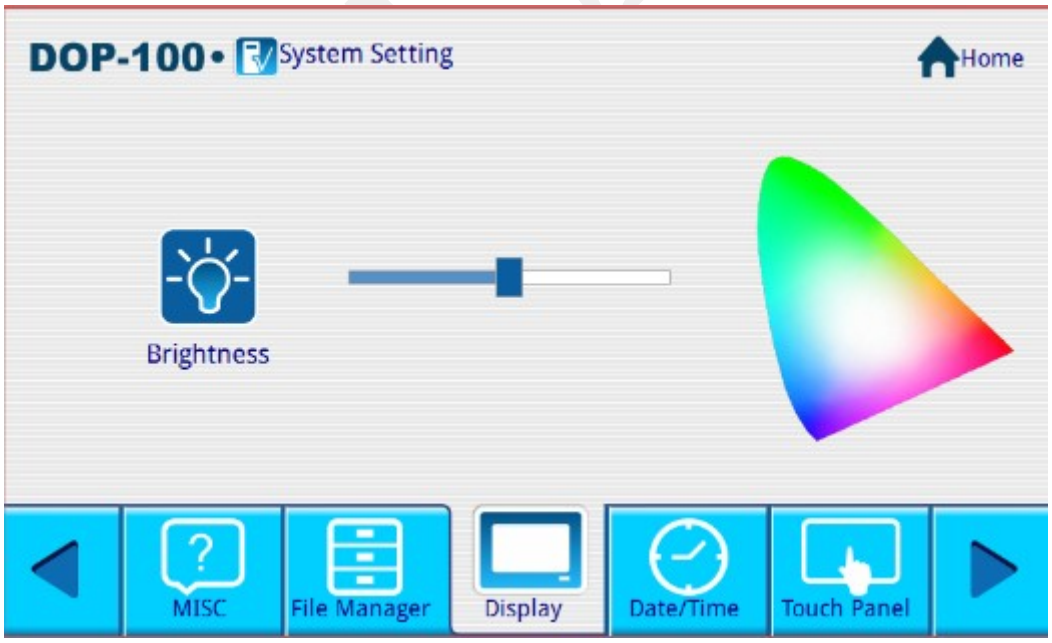


3.5.1 System Settings

System settings refer to the default settings of the HMI. In this screen various parameters of the HMI can be configured such as display, date time, touch panel calibration, audio settings and communication parameters.

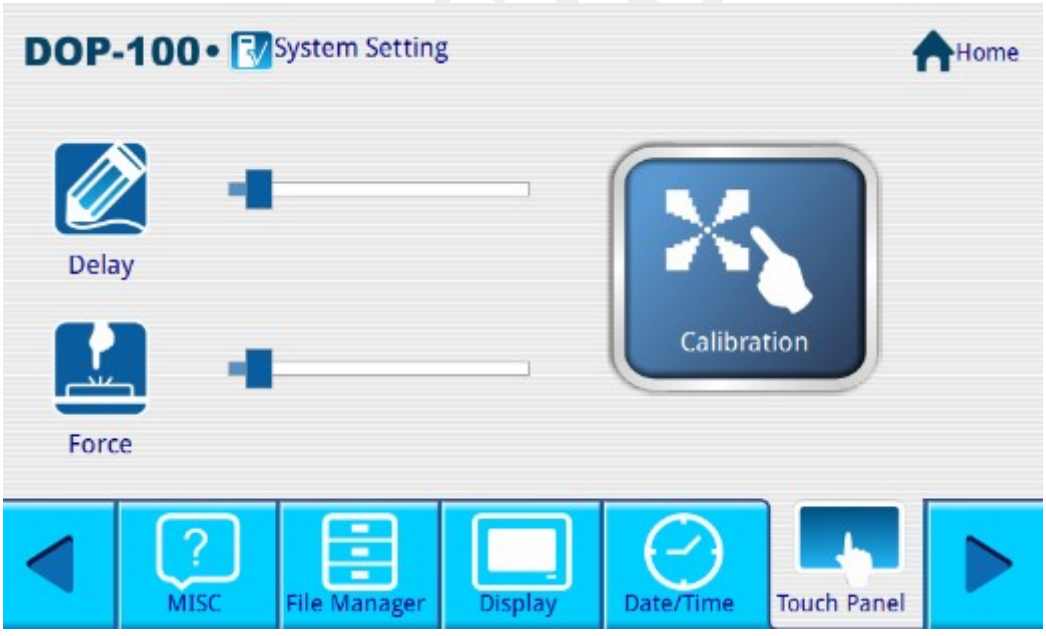


Through the file manager sub menu, we can format the HMI or the USB disk connected to the HMI, we can also do file transfers from the USB disk to the HMI and vice versa. Firmware updates can be done from the USB to the HMI and also file encryptions can be done.

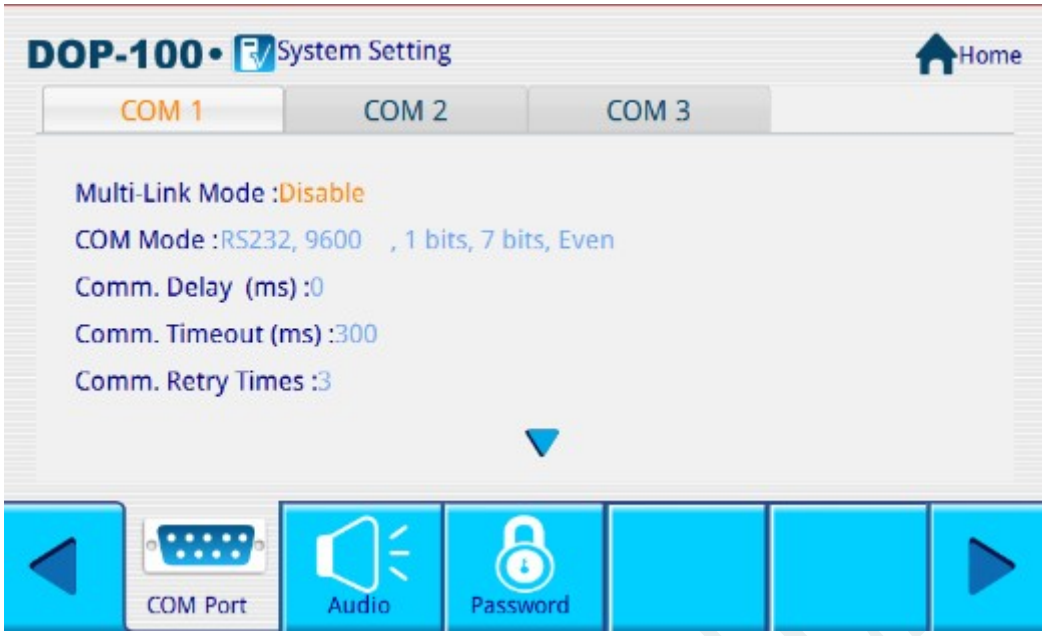


Display refers to the setting of the brightness levels of the HMI display. Using the slider the user can configure the amount of brightness required for the HMI.

The date and time submenu is used to change the date and time settings of the HMI.

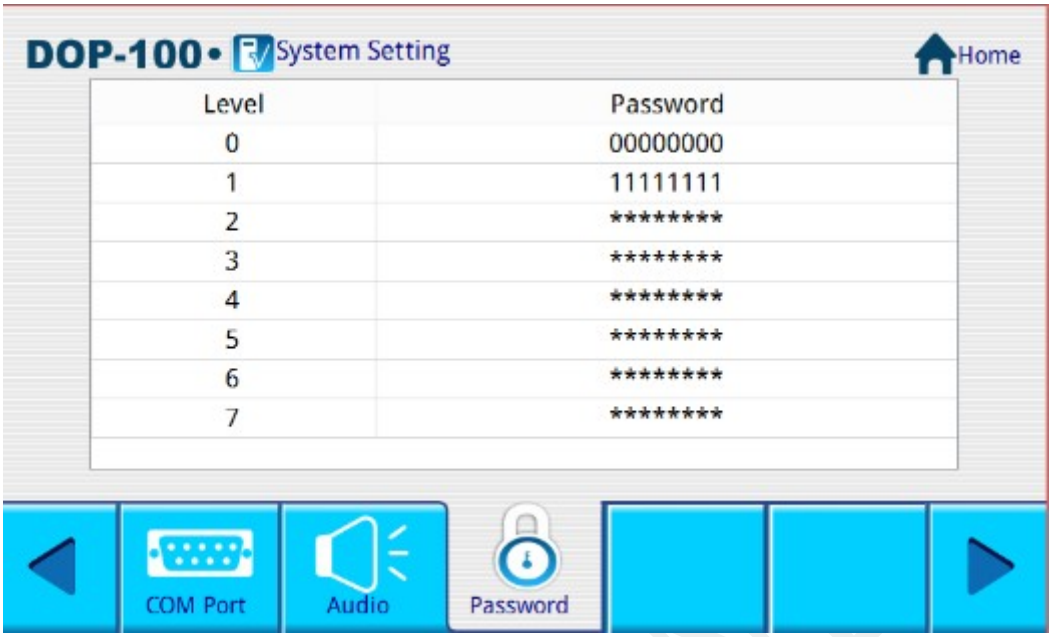


Using the touch panel settings, the user can set the touch delay response of the HMI as well the amount of pressing force required to sense the touch input.



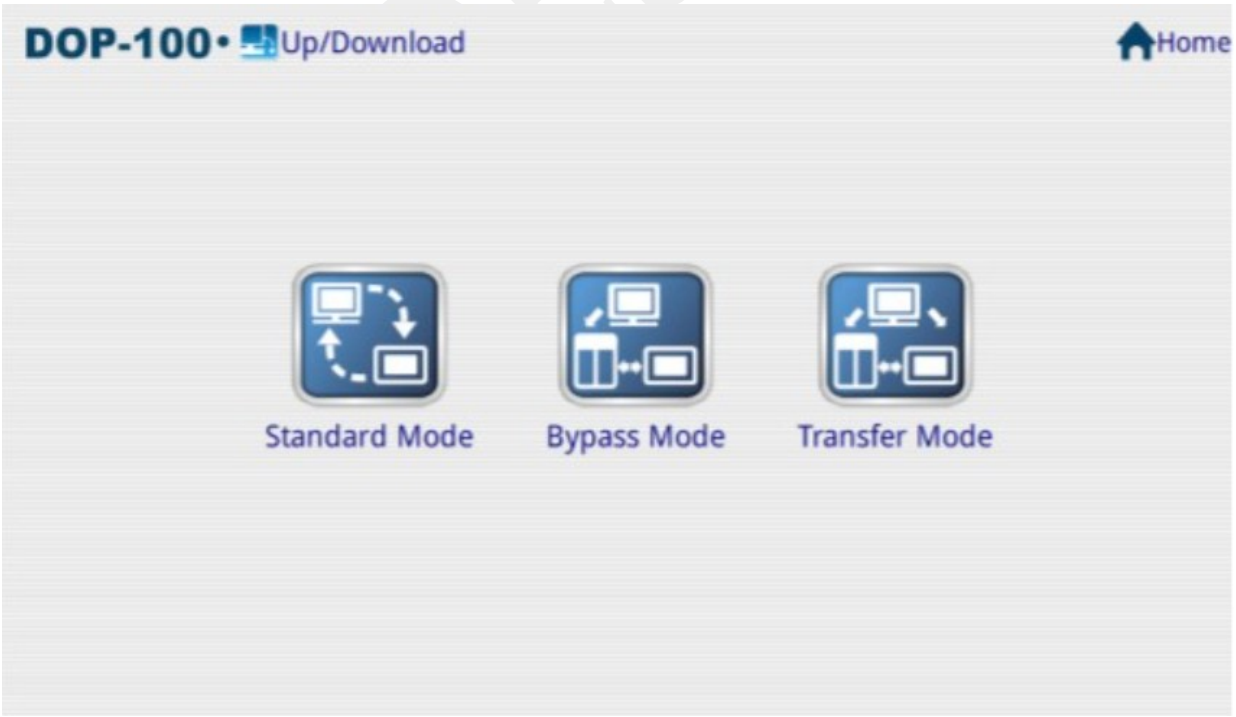
COM port settings enables the user to set the COM mode, BAUD rate, stop bits, data bits, parity bits, communication delay, communication timeout, and communication retry times.

Audio settings can configure the volume for the buzzer in the HMI. Using the slider, one can increase or decrease the volume.



The password settings refer to the setting of password for the different levels of security set in the HMI screen.

3.5.2 Up/Download



This menu is used to set the way of communication for the uploads and downloads of various files to HMI.

3.5.2.1 Standard mode

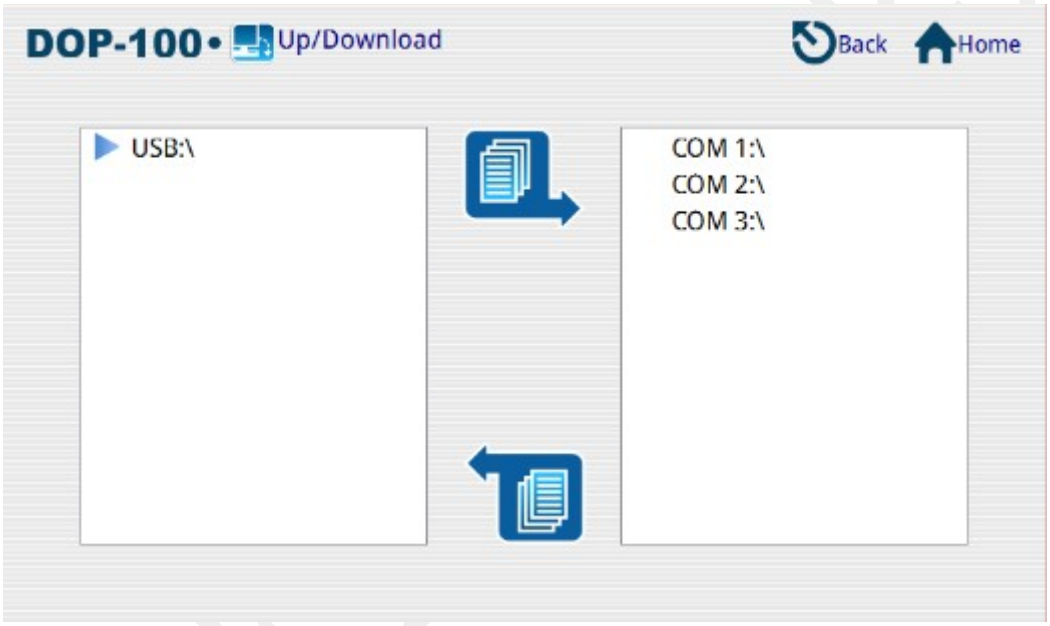
The standard mode enables two options, COM1 and COM2. User has to select the communication port connected from the PC to the HMI and then has to select the corresponding option in this settings. Once the user selects download or upload data in the DOPsoft software, the operation begins.

3.5.2.2 Bypass mode

In this mode, the HMI will transmit the data from the source port to the destination port.

COM1>2 = COM1 is source port and COM2 is destination port, the data is received to COM1 and transmitted to COM2.
COM2>1 = COM2 is source port and COM1 is destination port, the data is received to COM2 and transmitted to COM1.

3.5.2.3 Transfer mode



With transfer mode, the communication can be done to the PLC connected to the HMI. The user has to select a COM port connected to the delta plc. Then the HMI auto detects the DVP or ISP file and then the upload to the USB disk or the download to the PLC can be done.

3.5.3 HMI doctor

HMI doctor refers to the trouble shooting of the HMI screen. The HMI screen can be troubleshooted through this setting if any malfunction occurs.

THANK YOU