DATALOGGER AI1

With single analog input

Manual provided by AP Engineering

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Rev	Date	Nature of Change	Approved By
0	**7/23/19**	Original Document	Cliff Laver, P.Eng
1	7/25/19	Added d**aily** peak flow feature	Cliff Laver, P.Eng

Introduction

 Horner HE-X4A is a multipurpose PLC with built in datalogger capabilities to an external SD card. The screen is touch capable.

Main menu

The main menu contains four navigation choices which will be discussed later: Flow Trend, Totals, Memory Car and Config Analog. Figure 1- Main Menu – shows the available selections.
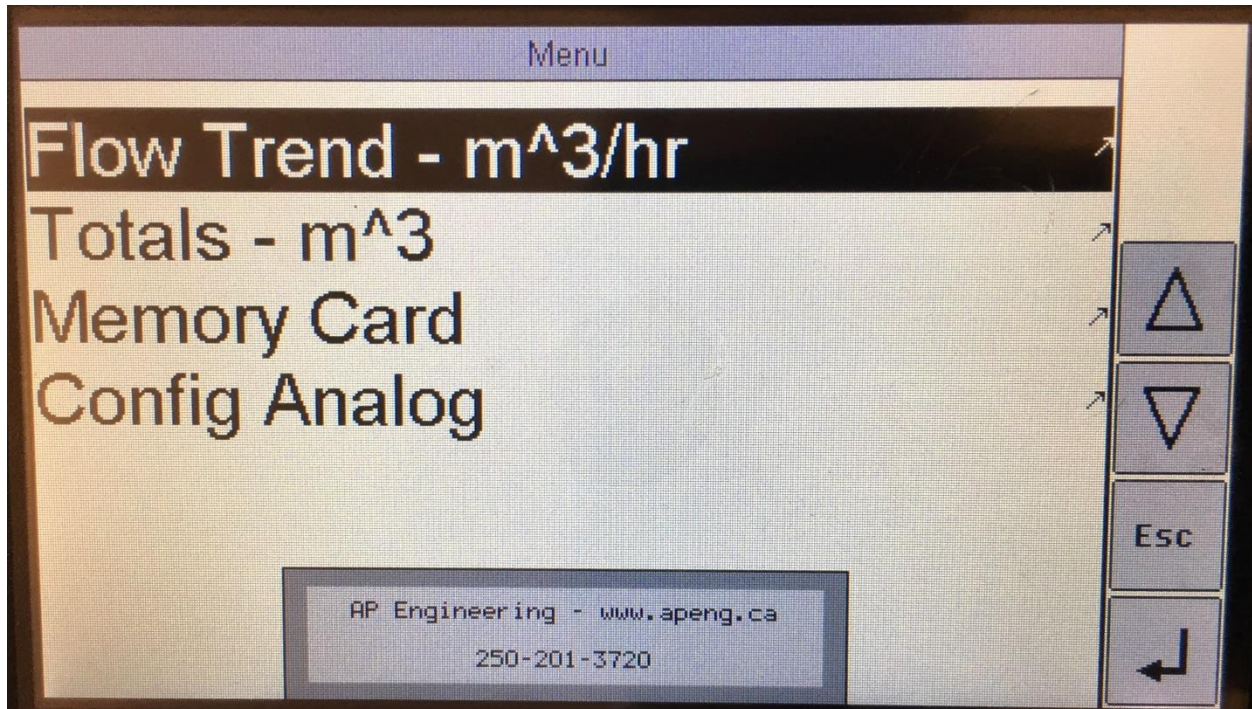

Figure 1- Main Menu

Navigation can be made by either pressing the desired choice and then the enter button (bottom right - Figure 1) or by using the up/down arrow keys.

Flow Trend

On the top-left hand side of the screen is the main menu navigation button; pressing this will take the user back to the main menu.

On the bottom-left hand side of the screen (see Figure 2- Flow Trend), the current flow will be indicated by a bar where the top is the max value of the flow.

The flow trend is spread over a 0.95-hour graph that is continuous and retentive. More flow details are available on the microSD card (see Flow) as this is a short term graphical representation for quick troubleshooting.
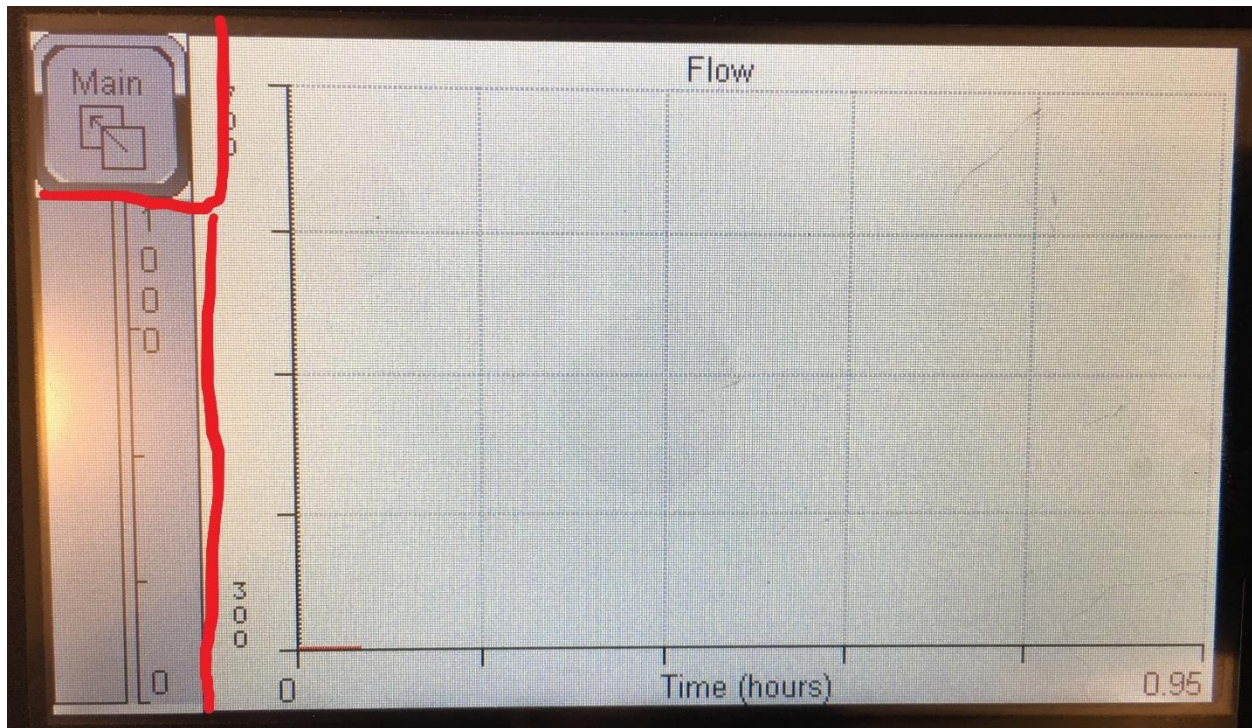
Figure 2- Flow Trend

Totals

The totals are recorded in the PLC and displayed on both the screens and on the memory card (see Data for more details).

Screens

On the top-left hand side of the screen is the main menu navigation button; pressing this will take the user back to the main menu.

The flow totals are sampled once every second and added to a running total. A day starts and ends at midnight. Throughout the day a running total is displayed on Figure 3, on the left under the sub-heading 'Daily Total'. When midnight is reached the values that were displayed in 'Daily Total' are moved to the sub-heading 'Yesterday' and the 'Daily Total' is zeroed and the count start again. Reverse flows are not subtracted from the daily running total.

During the month, a running monthly total is displayed in the sub-heading 'Current Month'. At the start of each new month, this value is moved into it's respective month and displayed on the screen there. IE during the month of December the running total is displayed in 'Current Month'; when the month turns to January, the running total moves into 'December' and the 'Current Month' is zeroed to start collecting new Data. The values in 'December' will remain there for one year, until the next January, when they will be overwritten.

Figure 3 - Totals

Memory Card

There is a memory card screen which is visible from the HMI and then the Data which is stored. The below sections will discuss in more detail

Screen

On the top-left hand side of the screen is the main menu navigation button; pressing this will take the user back to the main menu.

On the bottom-left hand side of the screen (see Figure 4 - Memory Card) is the legend which describes the colour scheme of the status of the microSD card.

- Where green means the card is OK
- Where yellow means the card is Full
- Where red means there is an issue with the card

The bulk of the screen (right-hand side) is displaying the status of the card. Look here to troubleshoot issue or just view the status of the microSD card. Clicking this display will display more menu item relating to the microSD card. Clicking 'esc' in this menu item will return the user back to the screen 'Memory Card'
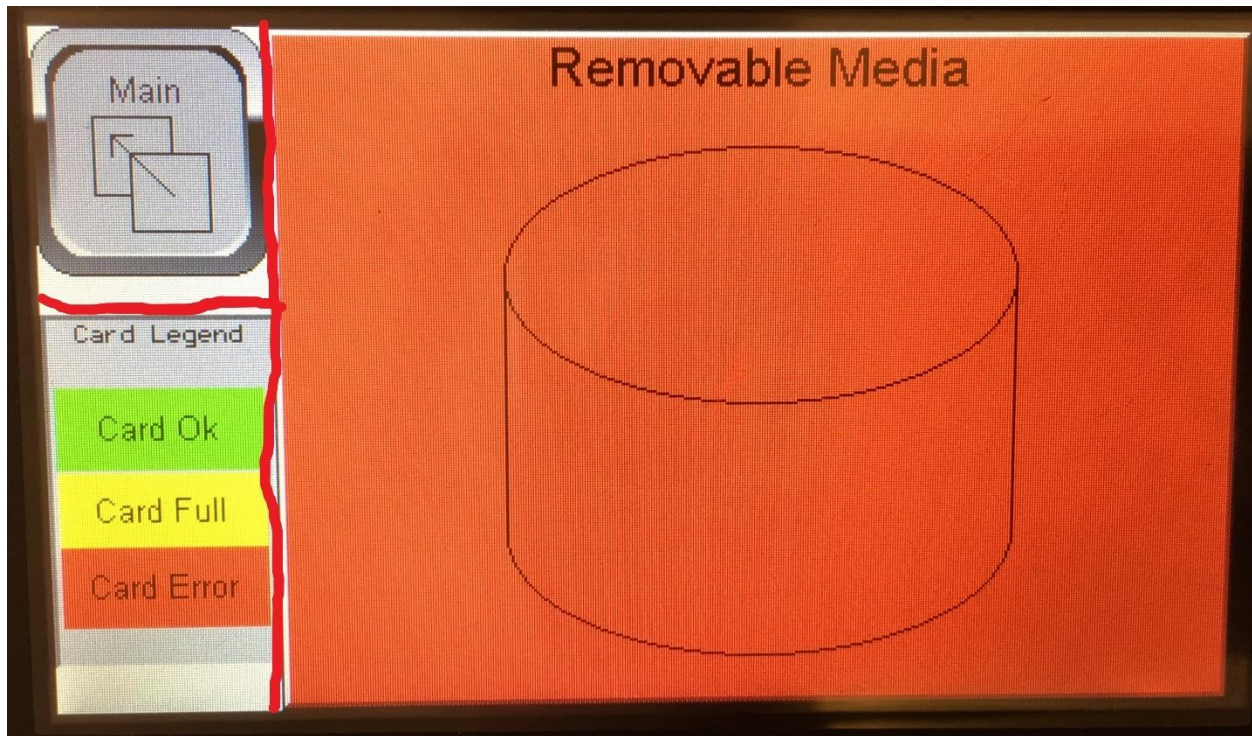
Figure 4 - Memory Card

Data

Formatting and Insertion

The memory card is a microSD card and must be formatted in the FAT32 file structure in order to work with the datalogger. This formatting limits the useable size of the microSD card to 32GB. A larger card can be purchased but only 32GB will be usable.

To insert the microSD card into the datalogger, (see Figure 5 - Insertion/Removal of microSD card), look on the back of the datalogger for the caption 'Memory Card'. Ensure that the gold strips are facing away from you. Push the card in until it clicks into place. When removing the card, push it in and it will click/pop out.

Note: when removing the microSD card, values that would be written to the card are temporary stored in the PLC until the card is re-inserted. At this point the stored values will be written, and logging will continue as normal.

Figure 5 - Insertion/Removal of microSD card

Flows and Totals

The memory card contains CSV files which are stored in the folders 'Totals' and 'Flow'. CSV files are easily read from within the Microsoft excel program.

Totals

	A	B	C	D	E	
1	Date	Time	Tot_Daily	Tot_Week	Tot_Monthly	
2	7/11/2019	23:59	55.8255	62.0319	62.0319	
3						

Figure 6 - MicroSD Totals

The sampling rate for the totals are every one second, this helps to ensure accurate totals. The daily totals (Tot_Daily) are recorded from midnight to midnight every day. The Weekly totals (Tot_Week) are recorded from the start of every Sunday till the end of Saturday. The total monthly (Tot_Monthly) values are recoded from the start of each month until the end of it.

When opening the folder 'Totals', there will be CSV files with the naming structure yymmdd.csv.

- Where yy is the year the file was recorded
- Where mm is the month the file was recorded
- Where dd is the day the file was recorded

An example of the contents from these files are displayed in Figure 6 - MicroSD Totals

Flow

	A	B	C	D
1	Date	Time	Flow_Scaled	
2	7/15/2019	0:00:43	0	
3	7/15/2019	0:01:43	0	
4	7/15/2019	0:02:43	0	
5	7/15/2019	0:03:43	0	

The sampling rate for the flows are every single minute, this rate helps to make the data more readable when displaying on a Microsoft excel trend. The date column displays the current date of the trend. The Time column displays the hour, minute and second that the sample was taken; note the one-minute sampling time. The Flow_scaled column displays the flow rate in Engineering Units.

When opening the folder 'Flow', there will be CSV files with the naming structure yymmdd.csv.

- Where yy is the year the file was recorded
- Where mm is the month the files was recorded
- Where dd is the day the file was recorded

Daily Peak Flow

	A	B	C	D	E
1	11	17	42	42	150
2					
3					

Figure 7- Daily Peak Flow

At midnight on day 1, the daily peak flow will be recoded on the microSD card for day 1. This will be repeated every day of each month and placed in a folder 'PEAKFLOWS' along with a CSV file that will be named 'Month_XX', where XX is the number of the month.

As seen from Figure 7- Daily Peak Flow, the data is laid out in the following arrangement:

- Column 'A' contains the Day
- Column 'B' contains the Hour
- Column 'C' contains the Minute
- Column 'D' contains the Second
- Column 'E' contains the Daily Peak flow in m^3/hr

IE assuming the above data in Figure 7 came from the CSV file 'Month_07' then on July 11 at 17:42:42 the daily peak flow was 150m^3

The data on the SD card will be stored for one year. At that point, 'Month_07' CSV file will be overwritten with new data. It is therefore recommended to copy the data from the SD card, to a more permanent storage location, before a years worth of data is accumulated

Config Analog

WARNING! This screen is used for scaling of the Engineering Units (EU) and adjustments here will affect all other aspects of the program including: flow rates and daily totals. AI4 (Analog Input 4) is programmed with m^3/hr units in mind; convert to m^3/hr to ensure correct functionality.

On the top-left hand side of the screen is the main menu navigation button; pressing this will take the user back to the main menu. AI4 (Analog Input 4) is the only active and enabled input. Changing values in any other AI will have no effect.
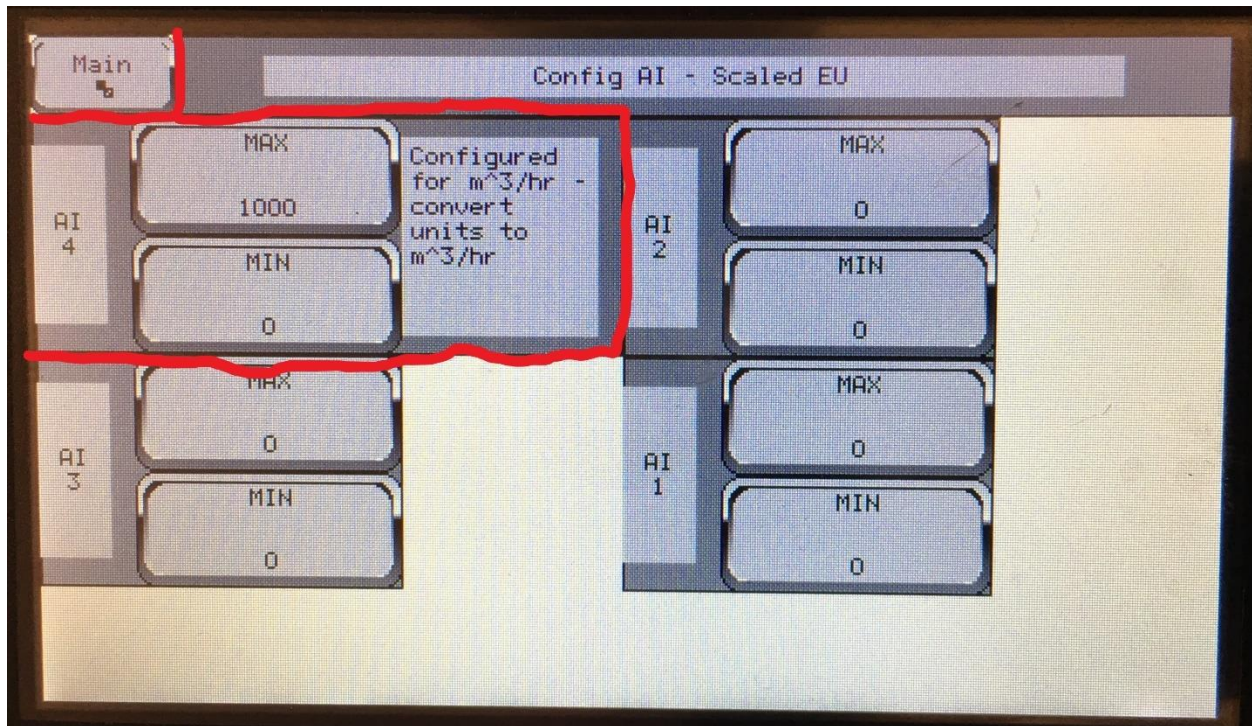
Figure 8 - Config Analog

In the sub-heading AI4 (top-left Figure 8) there are two buttons Max and Min. The Max button adjusts the maximum EU and the Min button adjust the minimum EU. The register accepts a 16bit integer value. Once either button is pushed the data entry (Figure 9) window appears. Enter the desired value and press enter to accept the change. Press 'esc' at any time to return to the screen 'Config Analog'

Figure 9 - Data Entry

Feature Request

This datalogger is highly configurable which means that new features can easily be added upon request. Feel free to request them via email cliff.laver@apeng.ca or phone 250-201-3720. Our website www.apeng.ca will contain this manual as well as any updated revisions.