

INTRODUCTION

The Human Machine Interface (HMI) is the screen that provides operator access to the parameters of the downhole equipment (pump/motor/sensor), such as live running data, protection settings, alarms and event logs.

HMI SPECIFICATIONS

With the look and the feel of a web page, navigating and programming the user interface is simple and intuitive. The sunlight readable, colour touch screen interface supports multiple communication options including remote access over cellular modem and direct Ethernet (Internet) connection.

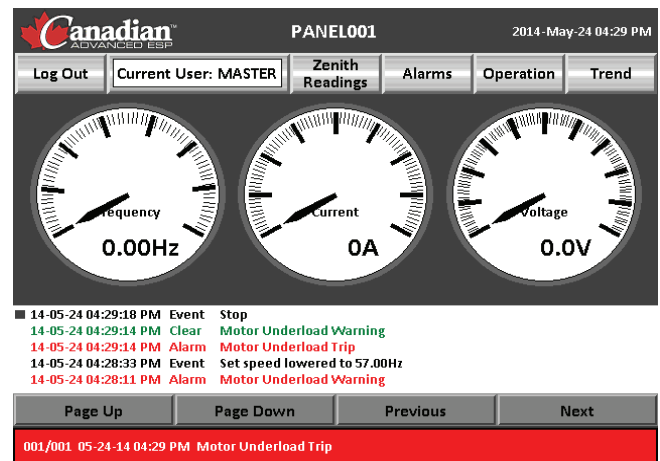
- 10" colour touchscreen operator interface, sunlight readable
- 24 VDC input power supply
- Connectivity for USB pen drive for easy data transfer from HMI
- Data/Event logging and trending information
- Ethernet connectivity, allowing remote browser support
- Modbus RTU communication protocol
- Stall prevention function
- Auto-restart after power failure function
- Provision for both full duplex and half duplex terminals for field SCADA connectivity

NEW ACT3 ESP HMI FEATURES

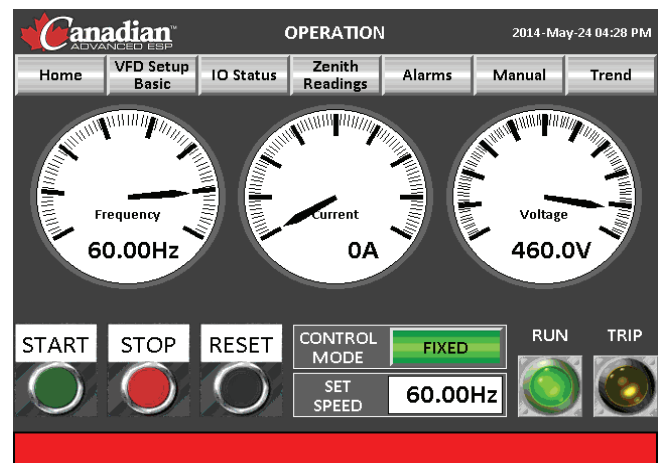
- Four control modes: Fixed, PID, Remote Terminal and Network
- PID function for analog input with pre-set units of scale for intake pressure, discharge pressure, wellhead pressure, flow or level. Includes high and low trip protection.
- I-limit function for gassy wells
- Downhole sensor interface with automatic model detection and scaling (Zenith and Oxford). Includes trip protections for intake pressure, motor temperature and vibration.
- PID function for DHT intake pressure.
- Pressure bypass mode for periodic testing/commissioning of well head pressure switch
- Password management for authorized users
- PDF viewer for operation manual



Human Machine Interface



HMI 'Home' Screen



HMI 'Operation' Screen

Please visit our website at www.cai-esp.com for more information.

FOUR CONTROL MODES

- Fixed** - VFD is controlled directly from the HMI operator screen e.g. stand-alone, local operations.
- Remote I/O** - VFD is controlled by external signals at a remote location e.g. typical plant installation, where there is a central control room.
- PID** - VFD is controlled by an algorithm e.g. speed is calculated to achieve a constant pressure or flow.
- Network** - VFD is controlled over a communication network e.g. serial interface or Ethernet network. Similar to remote I/O mode, except more information can be transmitted such as alarms and events.

I-LIMIT FUNCTION

This feature allows the pump speed to be controlled by limiting the load of the ESP motor. This is frequently used in gassy well applications. When gas is ingested into the pump, the load will decrease, allowing the pump speed to increase and expel the gas from the pump faster. When the gas has been expelled, the load will increase again and pump speed will reduce to compensate.

TRENDING

Important ESP parameters can be plotted live on the HMI trending screens, giving the operator a quick historical view of pump operation.

DATA LOG

The data log records important information about the running condition of the ESP. Downhole parameters such as pump speed, motor load conditions, downhole sensor pressure, temperature and vibration are measured and stored continuously. Data logs can be retrieved by a USB Stick for viewing and manipulation in Excel. The HMI also supports a rapid log feature. When an alarm condition is present, a data log will be created from data sampled once per second.

PRESSURE BYPASS MODE

Pressure bypass allows the operator to perform periodic testing of the wellhead pressure switch without tripping or shutting down the pump. This feature was previously provided with hardware and can now be offered by software alone, providing a cost saving to the client.

DOWNHOLE SENSOR INTERFACE

Downhole Sensor information is displayed live on the HMI screen. The HMI supports Zenith and Oxford Sensors at this time. Setup and configuration is simplified: the HMI can automatically sense if a downhole sensor is connected and what model is connected. Scaling and logging is automatically configured with this plug-n-play feature.

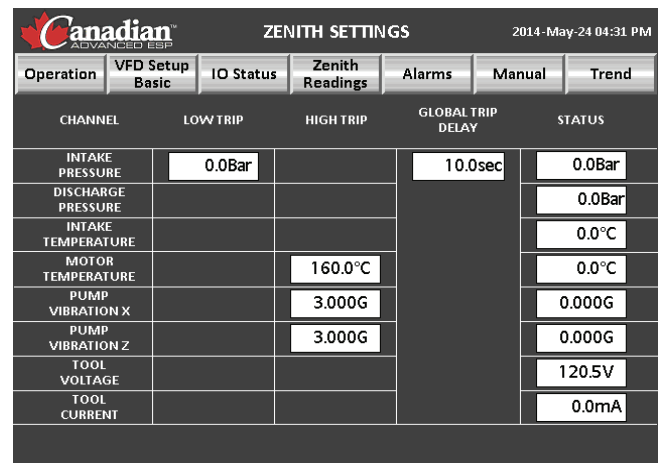
PID FUNCTION

This enables the ESP motor to be controlled by process variables such as wellhead pressure or tank level. The HMI comes pre-programmed with user selectable process variables and units of measure for customization by the client.



Operation	VFD Setup Basic	IO Status	Zenith Readings	Alarms	Manual	Trend
14-05-24 04:32:17 PM	Event	Start				
14-05-24 04:32:14 PM	Event	Set speed lowered to 30.00Hz				
14-05-24 04:32:11 PM	Event	Stop				
14-05-24 04:31:53 PM	Event	Set speed lowered to 45.00Hz				
14-05-24 04:31:48 PM	Clear	Motor Underload Warning				
14-05-24 04:31:35 PM	Alarm	Motor Underload Warning				
14-05-24 04:31:33 PM	Event	Set speed lowered to 55.00Hz				
14-05-24 04:31:29 PM	Event	Start				
14-05-24 04:31:27 PM	Clear	Motor Underload Trip				
14-05-24 04:31:26 PM	Event	Reset				
14-05-24 04:29:18 PM	Event	Stop				
14-05-24 04:29:14 PM	Clear	Motor Underload Warning				
14-05-24 04:29:14 PM	Alarm	Motor Underload Trip				
14-05-24 04:28:33 PM	Event	Set speed lowered to 57.00Hz				
14-05-24 04:28:11 PM	Alarm	Motor Underload Warning				
14-05-24 04:28:04 PM	Event	Start				
14-05-24 04:28:04 PM	Event	User Master logged on				
14-05-24 03:57:53 PM	Event	VFD in Local Operation Mode				
14-05-24 03:57:28 PM	Event	VFD in Remote Operation Mode				
14-05-24 03:57:18 PM	Event	Untitled Event				

HMI 'Event Log' Screen



Operation	VFD Setup Basic	IO Status	Zenith Readings	Alarms	Manual	Trend	
			CHANNEL	LOW TRIP	HIGH TRIP	GLOBAL TRIP DELAY	STATUS
			INTAKE PRESSURE	0.0Bar		10.0sec	0.0Bar
			DISCHARGE PRESSURE				0.0Bar
			INTAKE TEMPERATURE				0.0°C
			MOTOR TEMPERATURE		160.0°C		0.0°C
			PUMP VIBRATION X		3.000G		0.000G
			PUMP VIBRATION Z		3.000G		0.000G
			TOOL VOLTAGE				120.5V
			TOOL CURRENT				0.0mA

HMI 'Sensor Settings' Screen

Please visit our website at www.cai-esp.com for more information.