HY-VECTOR

Hydraulic Pump

Description, Operation & Safety

BOSS Training Series

The Basic Operation and Safety School (BOSS) series is designed for use by HYTORC sales agents and others involved in customer training, service and support and contains basic information on product features, benefits, installation, operation, safety and application.

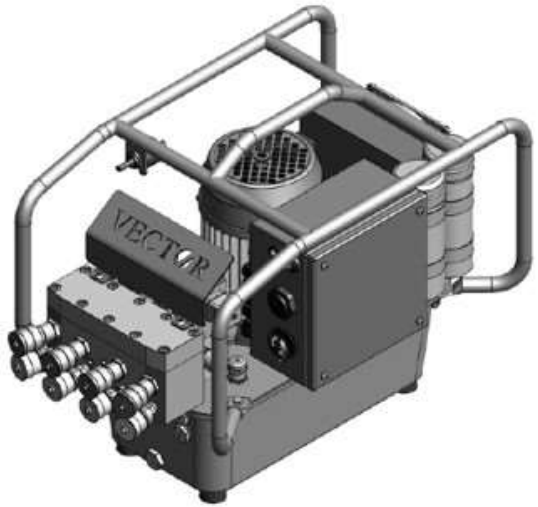
March 28, 2017

Description

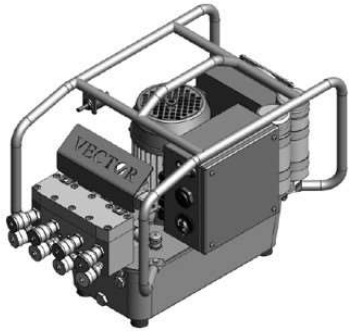
Features & Benefits

HY-VECTOR Pump Feature Summary

The HY-VECTOR Pump has the following key features:



- Manual and Fully Automatic (FA) versions available with either 1 or 4 ports.
- Ergonomic Hand-held Remote Control with push-button setup and trigger control for all functions.
- Clear LCD display on the hand held controller communicates all setup instructions and torque control information.
- Torque charts for HYTORC hydraulic tools are preloaded in the factory, other tool charts can be loaded by the customer as needed.
- Friendly Graphical User Interface guides the user through the setup and operation.
- Fully automated version provides programmed tightening to desired torque, just keep holding the trigger until complete.
- Highly reliable 3-stage pump provides uniform pressure across a wide range; to 10K psi.
- Provides documentation capture of bolting job data with export capability.
- Electronic Control functions are easily updated, firmware through USB port, controller hardware settings through the removable side panel.



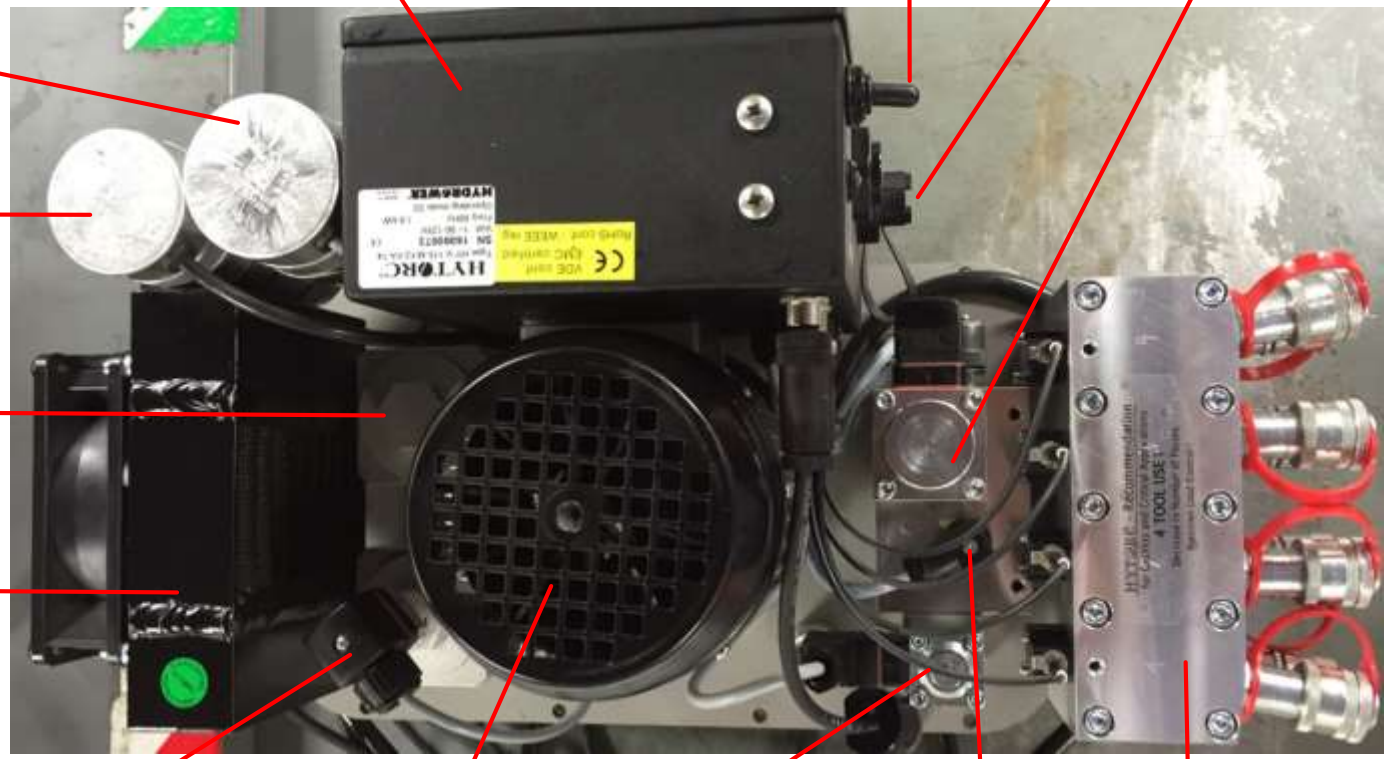
HY-VECTOR Pump Benefits

The HY-VECTOR Pump has the following key benefits.

Advantage	Benefit
Manual and automated versions available with either 1 or 4 ports, users have flexible feature selection and price points, upgradability.	User has flexibility in choice of options, safeguards investment by allowing user to upgrade at a later date from manual to automatic or from 1 to 4 ports.
Ergonomic Hand-held Remote Control with push-button menu and trigger operation provides users with greater control and flexibility in field configuration and settings.	Eliminates potential human error from interpolation of torque tables, simplifies set-up, easily adjust settings in the field to optimize bolting quality and safety.
Clear LCD display presents all torque parameters so that they are easily viewed and monitored by the user during operation.	LCD display allows operator to carefully monitor and control torque, hand-held screen allows user to safely view the screen while applying torque.
Factory loaded torque charts into the pump memory for HYTORC tools eliminates the need for separate charts or tool parameters, allows provisioning other tools as well.	Reduces error in interpolating torque charts, improves accuracy of bolting operation, allows the customer flexibility in using the pump with existing tools.
User friendly firmware guides the user through the safe tool setup and operation, reducing the chance of error during bolting.	Improves controlled application of torque while reducing operator error; results in higher quality, productivity and more reliable bolted joints, improves safety.
Fully automated version eliminates the need to manually cycle the pump, reduces operator sensitivity and takes the guess work out of the operation.	Improves overall uniformity and quality of bolting operations, improves safety.
Highly reliable 3-stage pump design delivers faster and smoother torque application vs. pumps with fewer stages.	Faster, more accurate and more repeatable in achieving torque requirements on all bolted joints in the specified torque range, accuracy ± 3%.
Documentation allows the user to automatically collect a complete job data record including torque parameters for all events, data easily transferred to a USB/PC.	Allows job data to be easily analyzed as part of the quality assurance and to be stored as a part of the permeant job record.
Control functions are easily updated, firmware through USB port, controller settings through the removable side panel, allow easy service and feature upgrades.	Protects investment, provides user with a cost effective platform that is easily upgraded to include new functionality to improve efficiency and reduce operating cost.

VECTOR Pump Key Features

Top View



Electronic Control Unit

On/Off Toggle Switch

USB Port

Proportional Relief Valve

Start Capacitor

Operating Capacitor

Coarse Oil Filters

Oil Cooler with fan

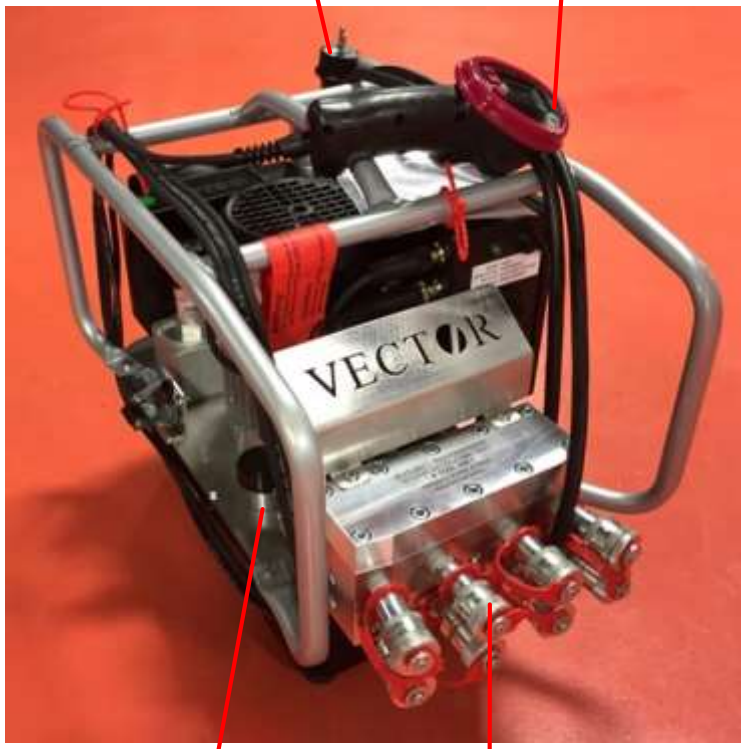
Fine Oil filter
With pressure monitor for clogging detection

AC Motor with Cooling Fan

Solenoid Valve

Pressure Sensor

Manifold
Fully Automated version shown with integrated flow meters



AC Power Plug & Cable

Hand-Held Remote Control & Cable

Oil Filler Port
Cap contains ventilator and bleed valve

Hydraulic Couplings
Top – return stoke
Bottom – forward stroke

Manual & Fully Automatic Versions

The HY-VECTOR Pump series has two primary versions; either manual or fully automatic, both are operated by the hand-held control and available in either 1 or 4 ports

Hand Held Remote Control

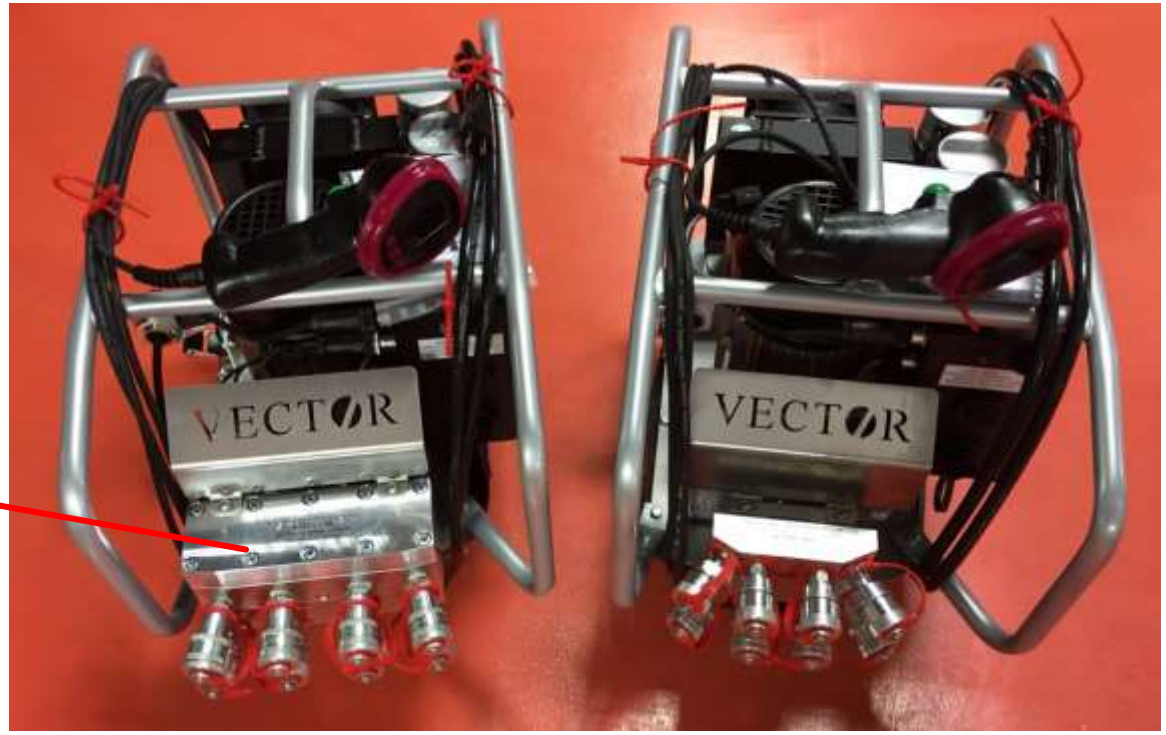
No Manual Pressure Control

HY-Vector pumps do not have a manual torque valve or an external analog pressure gauge, instead the torque is controlled automatically and viewed via the **hand-held remote control.**

Fully Automatic (FA)

The automatic pump is distinguished by a larger manifold for the couplers – the manifold contains integrated flow meters used to measure flow applied to each tool in order to guide the automated bolt tightening.

Fully Automatic (FA) **Manual**



4 Port Shown (with 8 Couplings)
Also available with 1 Port (2 Couplings)

Up to four bolting tools of the same type can be connected simultaneously to 4 Port pump.

Factory Upgrades:

A 1 port pump can be upgraded to a 4 port pump.
A manual pump can be upgraded to a fully automatic pump.

Hand-Held Remote Control

Ergonomic Hand-held Remote Control with push-button and trigger operation.

LCD Screen

Control Buttons
Three momentary push buttons for selection and control are located on the front of the hand-held controller.

Trigger Button
Green button located on the rear of the remote control is used to confirm entries and apply pressure during bolting operation.

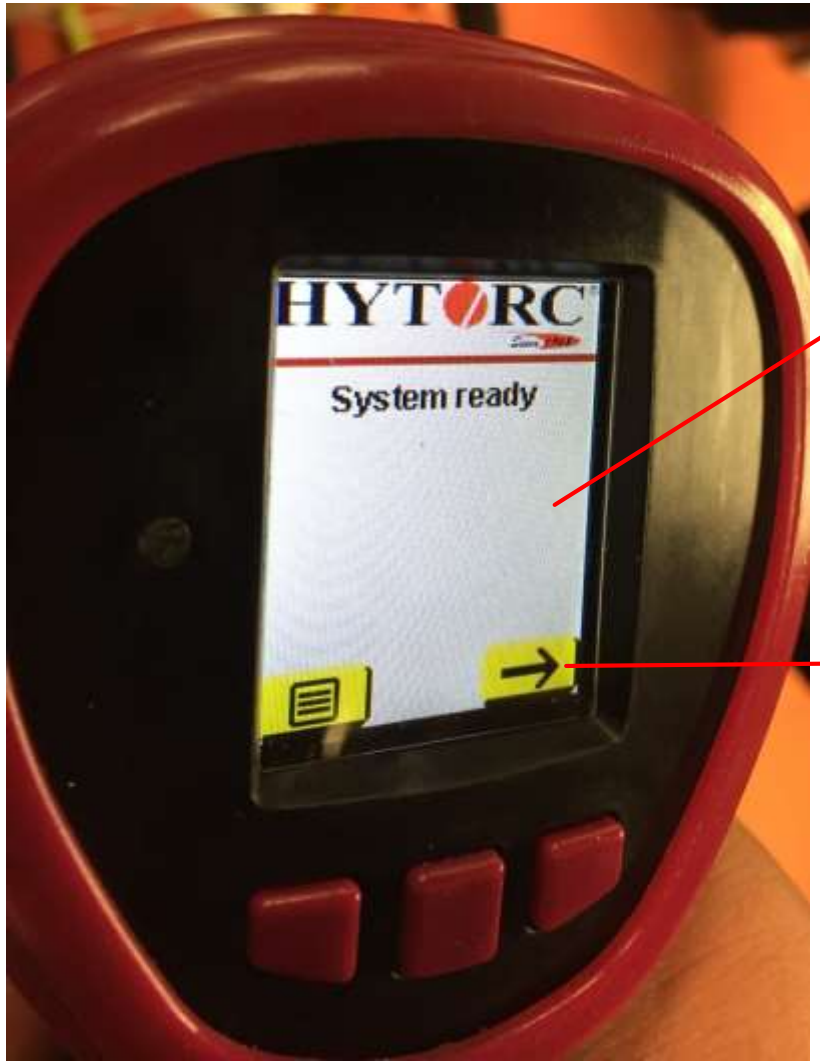
Selection
The trigger is the primary button pushed for confirming menu selections during setup and operation.

Torque Application
The trigger is also depressed to apply pressure during torque operation; either cycled for manual torque or held continuously for fully automatic torque application.

Ergonomic Grip with Single Finger Operation
Once the tool has been initialized torque operation can be controlled with single-finger push button operation.

LCD Display

Bolting control information is easily viewed and monitored by the user during operation.



Hand-Held LCD Display

Allows the operator to safely and clearly view all program instructions and status feedback during the bolting operation.

Control Symbols

Symbols/Icons at the base of the screen correspond to the 3 buttons located just beneath them – allowing functions to be performed by simply pushing the button for the desired action. This provides a simplified graphical user interface for setup and control of bolting operations.

Factory Loaded Torque Table

The HY-VECTOR Pump comes pre-loaded with Torque Charts relating pressure to torque for each tool, upon initialization just select the desired tool and when the bolting operation starts the correct pressure is automatically applied for the specified torque, no separate torque charts are required.

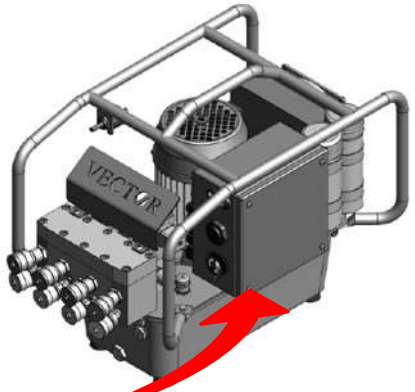
For example AVANTI 1

The Torque tables are pre-loaded into the pump so there is no need for separate paper Torque tables.

TOOL MODEL: HY-AVANTI 1
PRESSURE/TORQUE CONVERSION CHART

Standard Torque Chart

PRESSURE IN	TORQUE IN			PRESSURE IN
PSI	FT. LBS.	KGM	NM	BAR
1500	196	27	266	104
1600	209	29	283	110
1800	235	33	319	124
2000	261	36	354	138
2200	288	40	390	152
2400	315	44	[illegible]	165
2600	341	47	463	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]



Easy setup and torque/pressure application

Super easy screen entry sequence to select the tool and the tool size. Once the torque is set the Torque table is loaded and the correct pump pressure is automatically applied to the tool.

Select AVANTI

Select Model AVANTI 1

Set Torque

Other Tool Torque Tables

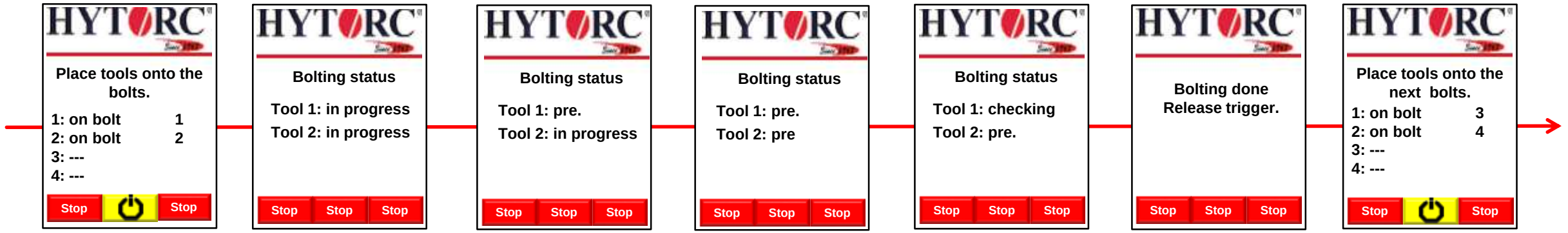
Other HYTORC tools (and non HYTORC tools) having dedicated torque tables can be input manually to the pump firmware – this is essential if a tool is to be used with the HY Vector pump in fully automatic or documentation mode.

Friendly Graphical User Interface (GUI)

The HY-VECTOR pump has an user friendly interface, allows the user to implement automatic bolting, monitors the progress and informs the user on the status, directs the user to take tools on/off the bolt or move tool to the next bolt.

Automatically Tighten Bolts – provide status information

Place tools on bolts, press and hold trigger → **Release Trigger** → **Next**



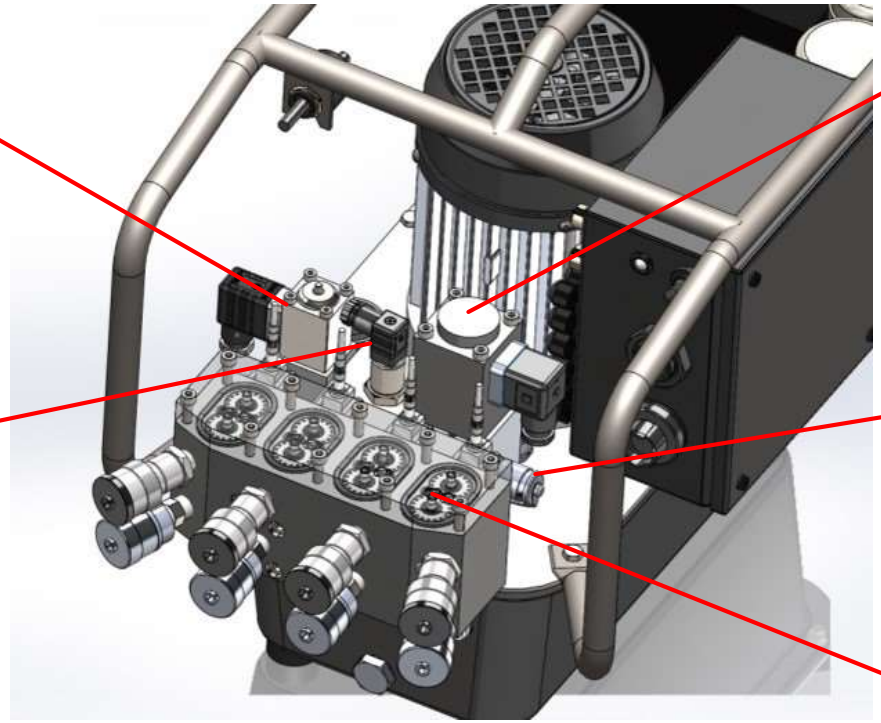
The sequence show here is the DOC Documentation sequence, the standard version looks slightly different.

Automated Flow Control

The HY-VECTOR Pump automates the hydraulic flow, just keep holding the trigger and the fully automated control will apply the appropriate flow and pressure until the bolt is tight.

Solenoid
Controls the direction of the oil flow as directed by the controller; advance or retract.

Pressure Sensor
Pressure measurement is compared the setting at the proportional valve and if the difference increases beyond a threshold the controller makes an adjustment to the proportional valve.



Pressure and Temperature Compensation
The actual pressure at the connections on the valve block are constantly monitored. Pressure changes due to oil heating during operation are automatically compensated by the electric control and the proportional pressure-limiting valve.

Proportional Valve
Proportional pressure-limiting valve consists of a magnet controlled needle valve to adjust pressure to the tools, used instead of a manually adjusted torque valve.

Optional Port for Gauge
Optional port allows the user to connect an analog external gauge – port also used for calibration.

Integrated flow meters
Used on the Fully Automated pumps to measure the actual flow rate to each tool to provide data collection on the torque operation (these are omitted in the manual VECTOR pumps)

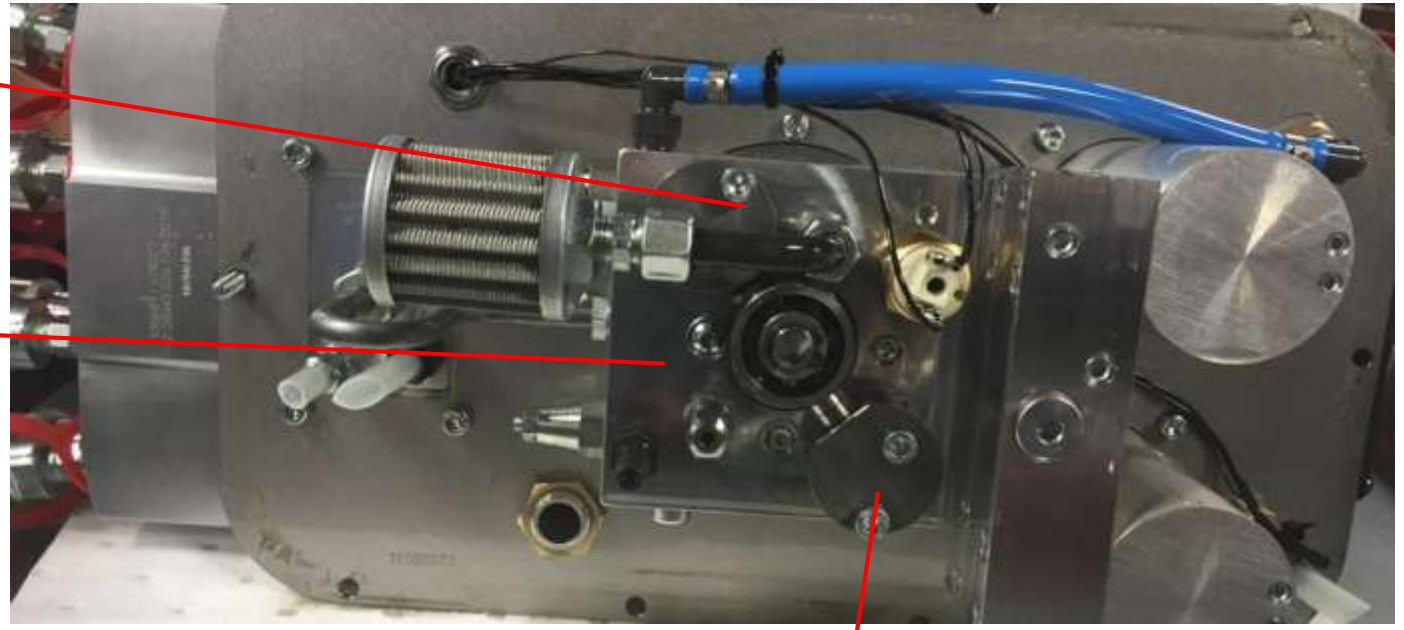
Highly Reliable 3-Stage Pump

The HY-VECTOR uses a three stage pump with a smooth transition from one stage to the next providing more consistent bolting operations.

Stage 3 Pump

Stage 3 piston pump provides high pressure pumping in in the range of 4,000psi to 10,000psi (or to the end).

Shown beneath the pump platform after removing the oil basin.



Stage 1 Primary Pump

The stage 1 gear pump provides low pressure pumping in the range of 0 to 1,000psi.

Stage 2 Pump

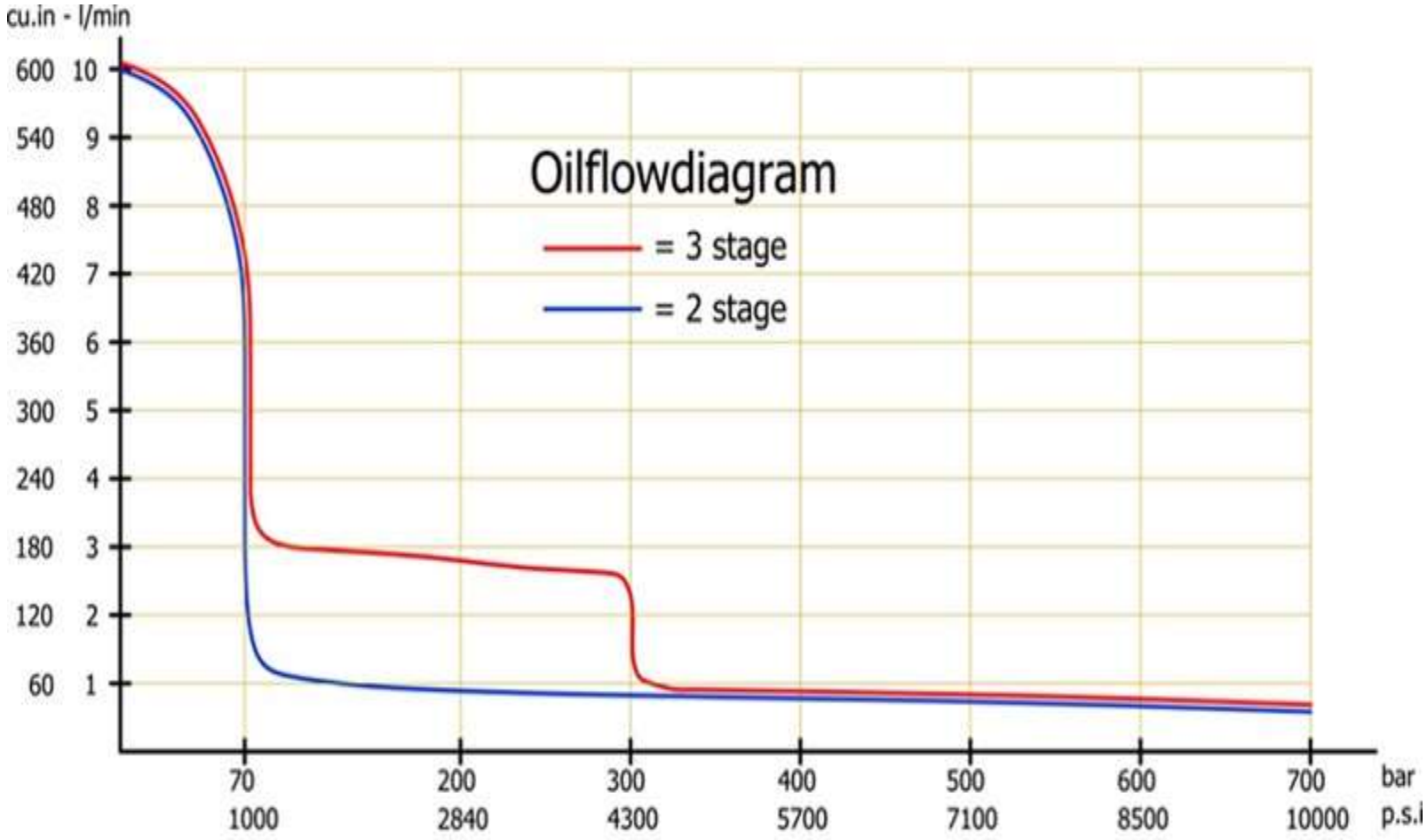
Stage 2 piston pump provides medium pressure pumping in the range of 1,000psi to 4,000psi.

Cutoff valves

Cutoff valves provide cutoff points where stage one and stage two pumps are shut off when the higher stage pump takes over. The cutoff valves are adjusted in the factory or by a service technician in the field if necessary to make sure these are set properly. Set too low the flow slows at the higher range of the pump reducing pressure and slowing down the pump, if too high the motor can stall.

Higher Flow Rate Pump

The HY-VECTOR uses a three stage pump which has higher flow rate in the range of 1,000 to 4,300 psi, resulting in faster tool action and overall much faster bolting operation.



- Up to 1,000 psi] (70 bar) nearly identical flow data.
- Between 1,000 psi (70 bar) and 4,300 psi (300 bar), flow rate is approximately 3 times higher for the 3 stage pump.
- The complete bolting time of a 3-stage pump is considerably shorter, especially with pre-tightened bolts.

Documentation Capture

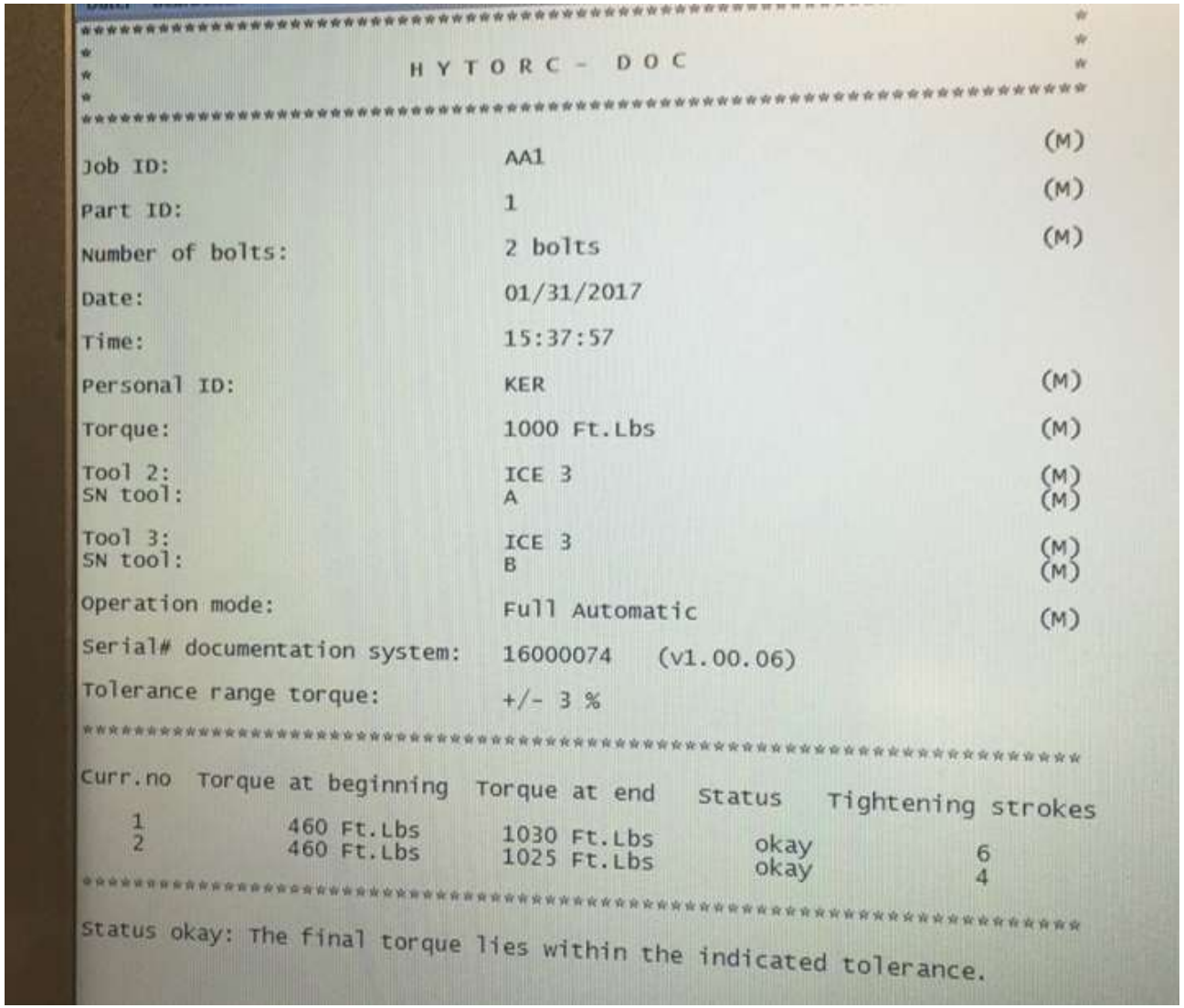
The HY-VECTOR Fully Automated Pump can be configured to capture bolting performance data for an entire job.

USB Offload

When the documentation mode is used the bolting data may be easily saved in the controller and then transferred to a USB drive.

USB.

Job data displayed on a computer screen



```
**********************************************************************
*                                                                    *
*                        HYTORC - DOC                                *
*                                                                    *
**********************************************************************

Job ID:                          AA1                              (M)
Part ID:                         1                                (M)
Number of bolts:                 2 bolts                          (M)
Date:                            01/31/2017
Time:                            15:37:57
Personal ID:                     KER                              (M)
Torque:                          1000 Ft.Lbs                      (M)
Tool 2:                          ICE 3                            (M)
SN tool:                         A                                (M)
Tool 3:                          ICE 3                            (M)
SN tool:                         B                                (M)
Operation mode:                  Full Automatic                   (M)
Serial# documentation system:    16000074    (v1.00.06)
Tolerance range torque:          +/- 3 %
**********************************************************************
Curr.no  Torque at beginning  Torque at end   Status   Tightening strokes
   1          460 Ft.Lbs       1030 Ft.Lbs      okay          6
   2          460 Ft.Lbs       1025 Ft.Lbs      okay          4
**********************************************************************
Status okay: The final torque lies within the indicated tolerance.
```

Save in Excel

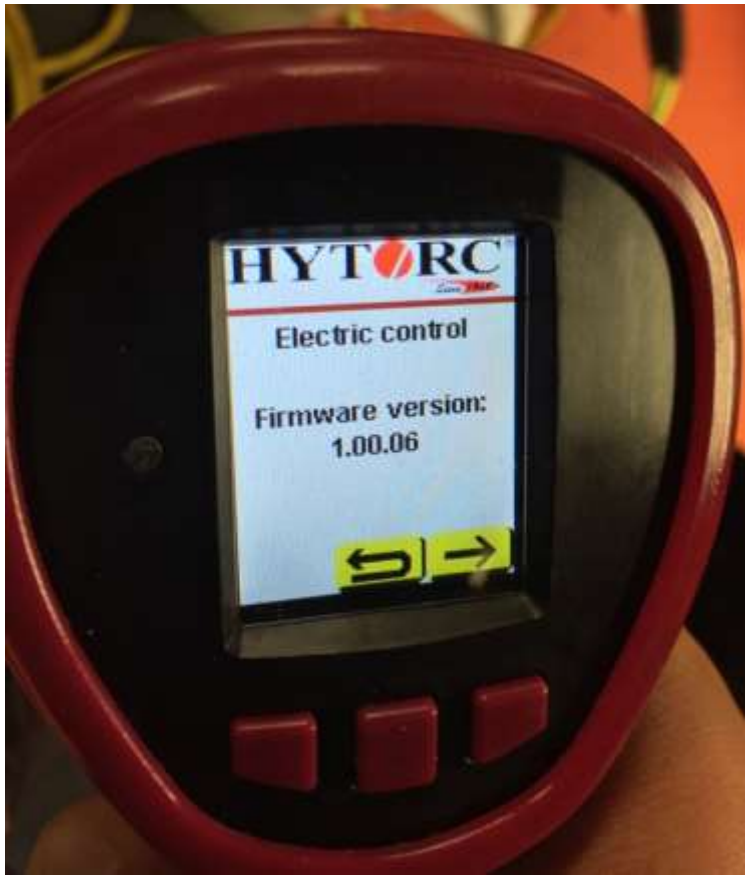
When the USB is connected to a PC the documentation data is easily saved in Excel format.

********	**********	******************	************	*********
*				*
*		H Y T O R C -	C	*
*				*
********	**********	******************	************	*********
Job ID:		AAA1		(M)
Part ID:		FLANGE 1 TE	ST	(M)
Numb	f bolts:	8 bolts		(M)
Date:		1/31/2017		
Time:		16:24:15		
Perso	ID:	TC		(M)
Torque:		1000 Ft.Lbs		(M)
Tool 2:		ICE 3		(M)
SN tool:		A		(M)
Tool 3:		ICE 3		(M)
SN tool:		B		(M)
Opera	n mode:	Full Automa	tic	(M)
Serial#	documen	n system: 160	(v1.00.06)	
Tolera	e range	ue: 3 %		

Curr.n	Torque a	eginning Torqu	Status T	ightening strokes
1	460	Ft.Lbs 1016	okay	6
2	460	Ft.Lbs 1007	okay	5
3	460	Ft.Lbs 1012	okay	5
4	460	Ft.Lbs 1007	okay	6
5	460	Ft.Lbs 1007	okay	4
6	460	Ft.Lbs 1007	okay	5
7	460	Ft.Lbs 1016	okay	5
8	460	Ft.Lbs 1016	okay	5
********	**********	******************	************	****************
Status	kay: The	al torque lies wi	he indicated	tolerance.

Firmware Easily Updated

The HY-VECTOR Pump has (4) firmware routines that can be updated with new firmware releases.



Primary Electronic Control Firmware

Sensor Device Firmware

Pendant Firmware

Actuator Device Firmware (Automated Torque Control)

Electronic Control Easily Serviced

The HY-VECTOR Pump System Controller is serviceable through the removable side panel.

Controller Front

Status LED Indicator

Power Toggle Switch
Down is on

Acoustical Signal Generator
“Beeper”

USB Port

Electronic Control Unit

Specifications

80 MHz PIC24 µController

512k built-in Flash

384k RAM / 16MB Flash

4GB Mass storage

USB-Connection

CAN-Bus

Backup Battery

DIP Switches

Additional connectivity

- Plug-in-Boards
- Extension boards

Primary Upgrade Features

The HY-VECTOR Pump can be upgraded in the factory/field to incorporate enhanced features. Currently pumps can be upgraded from 1 to 4 ports, manual to fully automatic and with software to support documentation capture.

Starting With	Primary Upgrade Paths				
	4 Port Manual	1 Port Fully Automatic	4 Port Fully Automatic	Documentation (add software)	Future Upgrades*
1 Port Manual HY-VECTOR-T1	✓ HY-VECTOR-T4	✓ HY-VECTOR-FA1	✓ HY-VECTOR-FA4	✓ HY-VECTOR-FA1-DOC HY-VECTOR-FA4-DOC	✓
4 Port Manual HY-VECTOR-T4		✓ HY-VECTOR-FA1	✓ HY-VECTOR-FA4	✓ HY-VECTOR-FA4-DOC	✓
1 Port Fully Automatic HY-VECTOR-FA1			✓ HY-VECTOR-FA4	✓ HY-VECTOR-FA1-DOC HY-VECTOR-FA4-DOC	✓
4 Port Fully Automatic HY-VECTOR-FA4				✓ HY-VECTOR-FA4-DOC	✓

*** Future Upgrades - The HY-VECTOR** protects investment, provides user with a cost effective platform that is easily upgraded to include new functionality to improve efficiency and reduce operating cost; potential future functionality includes Torque and Angle, Bar Code Scanner and Wireless Remote Control and other features.

HY-VECTOR Pump - STEALTH Application

The STEALTH Tool must be modified for use with the <u>Fully Automated</u> VECTOR Pump.

Note: The letters “TA” are stamped on the housing to confirm the tool has been modified to a TA version.

Application Note

The standard STEALTH tool has a check valve in the bottom piston that allows hydraulic fluid to bleed-by as a standard safety feature. This feature makes the standard STEALTH unable to operate with the Fully Automated HY-VECTOR pump because the pump very precisely senses pressure applied to the tool. A modified version of the STEALTH tool (the –TA version) is required for use with the VECTOR pump in Fully Automated mode, for example the following part numbers should be used in Fully Automatic applications:

STEALTH-2-TA
STEALTH-4-TA
STEALTH-8-TA
STEALTH-14-TA

There is also an upgrade kit available should you require updating any tools already out in the field.

Basic Operation

This section contains essential elements for training users on the basic operation

Additional details on operation and maintenance may be found in the HY-VECTOR Operations Instructions supplied with the unit.

⚠ WARNING	
	**Severe injuries or death may be caused by accidents due to disregard of the Operating Instructions supplied with the unit. Review all safety precautions in the Operating Instructions and summarized in the Safety Section of this document before operating this pump.**

Unpack Unit and Check it Over

Carefully Inspect the Pump and all components upon receipt and before each use.

Unpack the Unit

To unpack the unit, proceed as follows:

- ❑ Open the cardboard box.
- ❑ Remove the supplied documents.
- ❑ Remove the foam padding.
- ❑ Take the unit out of the box.
- ❑ Place it on a flat and stable base.
- ❑ Remove the plastic bag.
- ❑ Dispose of the packaging material according to regulations on site.

Checking the condition

- ❑ Check the delivery against the delivery note for accuracy and completeness.
- ❑ In case of deviations contact HYTORC.
- ❑ Check the delivery for any damage.
- ❑ If you notice any damage, please indicate this on the delivery note.
- ❑ Have the damage confirmed by the signature of the supplier.
- ❑ Photograph the damage.
- ❑ Report the damage immediately to the manufacturer.

Operating, Storage and Handling Conditions

The pump should be turned-off when not in use to extend the service life, cables are coiled around the aluminum frame so they are not damaged.

Operating Conditions

Operating Temperature range: –20 °C to +55 °C (–4 °F to 131 °F)
Humidity should be non-condensing.
The unit is not suitable for the use in explosive environments. In an explosive environment, use an air-operated pump for driving tools.

Storage and Transportation

Store the unit standing on its feet in a dry, dust-free room with stable temperature.
The permissible temperature range is –30 °C to +60 °C (–22 °F to +140 °F).
Humidity should be non-condensing.

Cords

The AC power cord and Hand-Held controller cord are wrapped around the aluminum frame to protect them from damage.
Caution: Take care not to drop or damage the hand-held controller.

Lifting and Carrying

With a weight of 55lb (25 kg), the unit is generally carried with the help of a second person.

Check the Oil Level Before Each Use

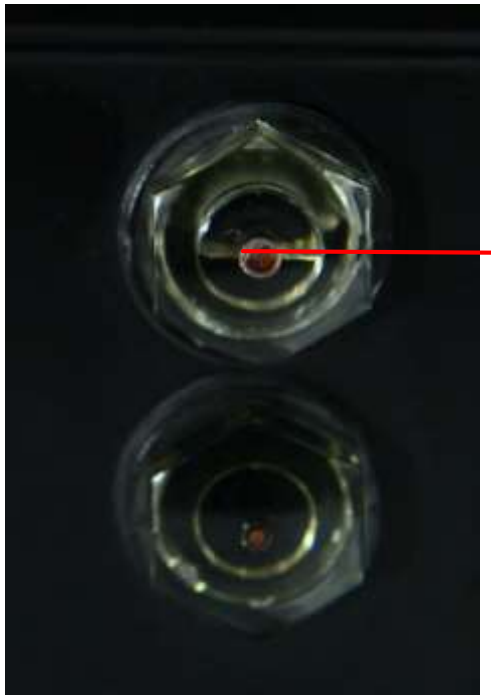
**The pump oil should be changed after 500 hours or each major use,
oil level should be checked before each use,
make sure the oil is filled to the middle of upper site glass.**

Air Escape Valve

Oil Filler Port

Oil Drain

If replacing oil, drain the old oil through this port.

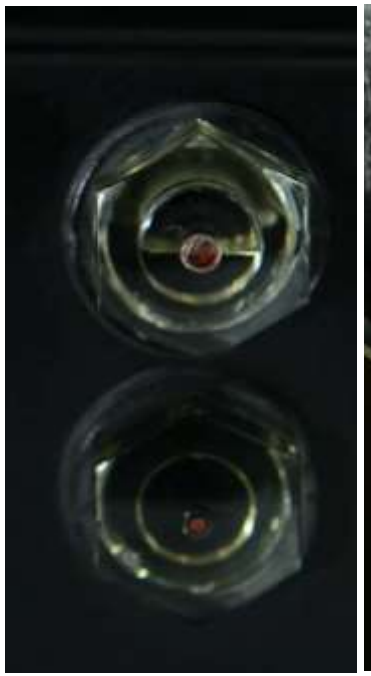


The pump is equipped with (2) Site Glasses

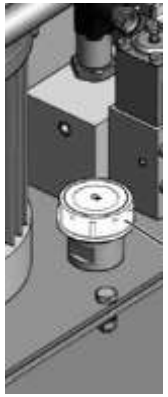
Before each use make sure the reservoir is filled to middle of upper site glass

Adding Hydraulic Oil

Hydraulic oil is added through the filler port, until the oil level is at the middle of the upper site glass.



Remove the Air Escape Valve
Unscrew counter clockwise



Insert a funnel
With the narrow end in the filler port

Add hydraulic oil through the funnel
Use ISO Grade 32 hydraulic fluid (see operating guidelines for use of higher grade oils)

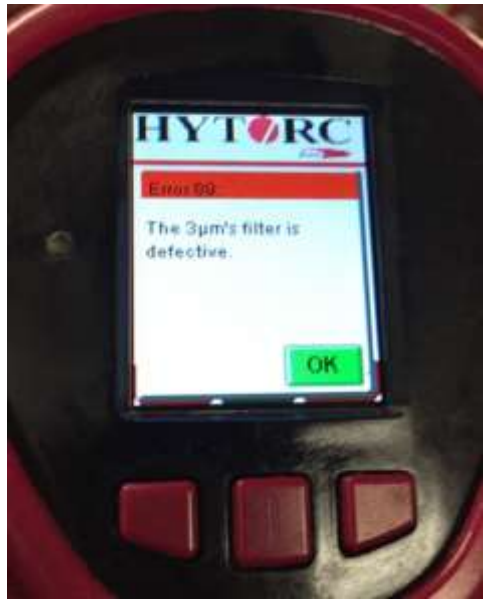
Fill Oil
to middle of upper site glass

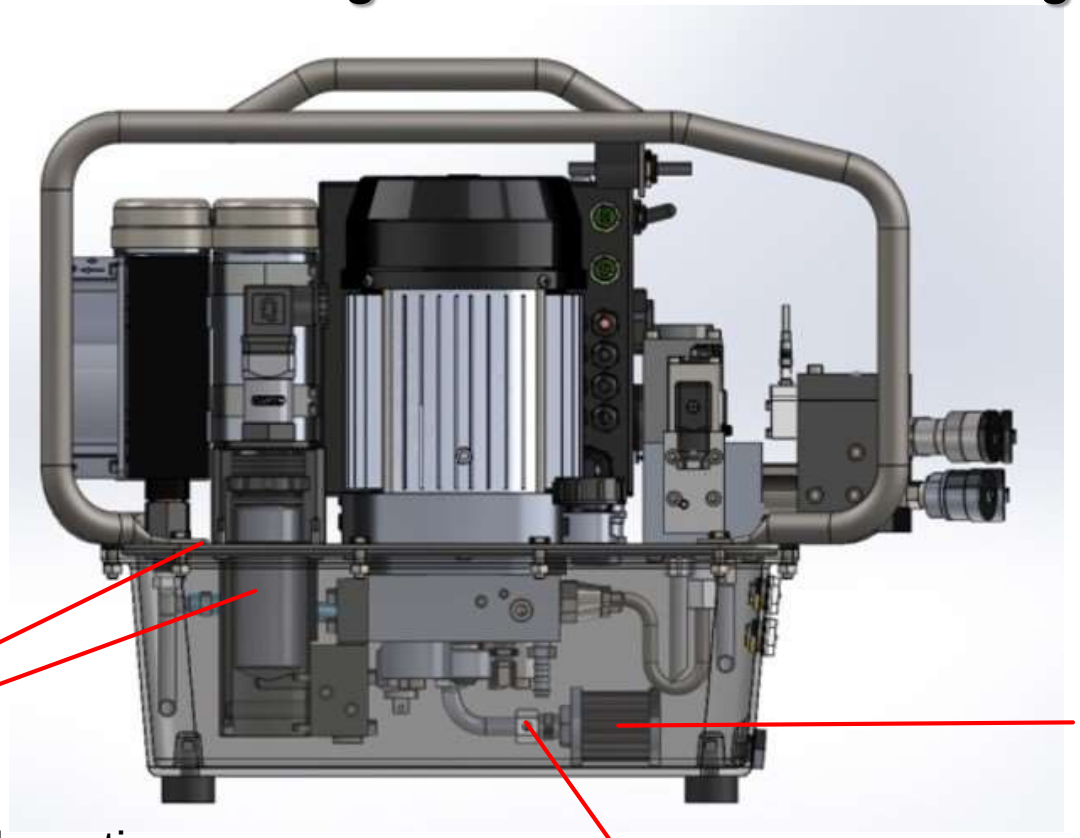
Replace the Air Escape Valve
Screw clockwise until valve is seated hand-tight

Periodic Filter Maintenance

The Pump has a (3) stage filter system for hydraulic fluid with replaceable filters at each stage, filters are on a periodic maintenance schedule monitored by timers and pressure gauges. The Remote Control will signal when it is time to change a filter.

Typical Maintenance Message
to change the 3μm filter





Oil Cooling and Filtering
During operation, the oil is passed through the oil cooler where it is cooled and through a series of filters to keep the oil clean.

Coarse Oil Filter
Suction filter (100 micron)

Fine Oil Filters
A 20micron filter supervised by 500 hour timer and 3 micron is supervised by clocking, the controller provides a message to change these filters when needed.

Pressure monitoring switch
Monitors the pressure drop, when pressure falls below a threshold a signal is generated to change the Coarse Oil Filter.

Connect Hydraulic Hoses to Pump

Tools are connected to the pump via hydraulic hose.

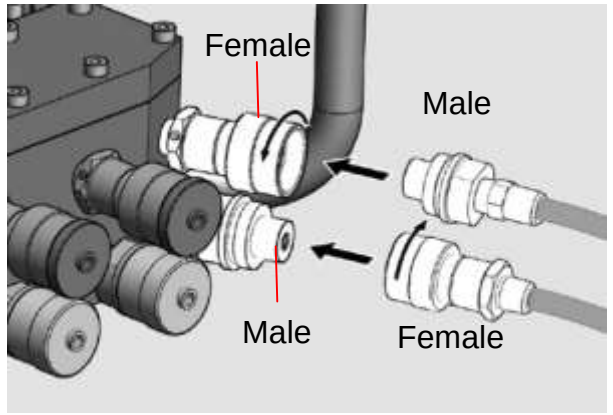
Connect the hydraulic hoses to the pump in pairs

Remove the protective caps from couplings selected.

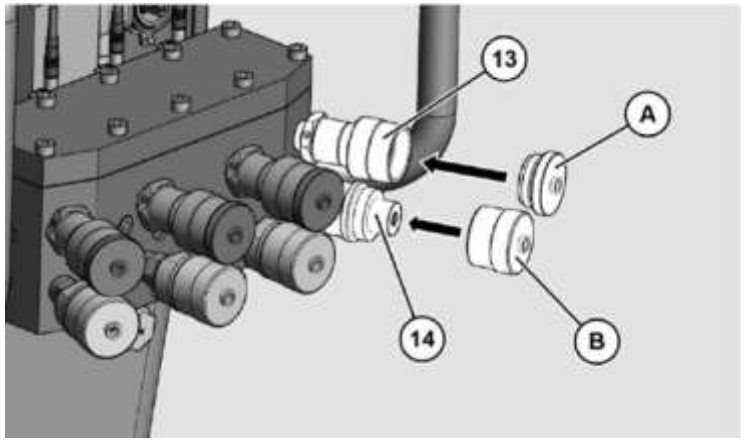
Make sure couplings are free of dirt or debris and O-rings are seated.

Connect Couplings Male to Female and Female to male

Hand tighten hose couplings to the pump making sure to tighten the coupling sleeve flush against the mating coupling.



Protect the couplings when not in use with the protective caps and plugs.
Unprotected couplings can be damaged and contaminated causing the couplings to leak.



Connect Hydraulic Hoses to Tools

Tools are connected to the pump via hydraulic hose.

Connect the hydraulic hoses to tools in pairs
Make sure the couplings are free of dirt or debris and O-rings are seated.

Fasten tool(s) to the hoses and places them loosely on a table or on the floor.

IMPORTANT: Do **NOT** install the tools on the bolts until instructed to do so to avoid possible damage or injury.

Connect Power

Connect power using approved outlet and electrical service, ensure all components and connections are compatible and provide required service.

Connect the pump power plug to the main power supply.

Check Compatibility

The voltage and frequency of the main supply outlet must match the information on the pump plate. The AC plug should match the appropriate voltage/service outlet.

Check for Damage

Ensure that the power cable is not damaged.

Grounded Outlet

Connect the power plug of the pump only to a suitable grounded electrical outlet.

Extension Cords

Use only extension cords of equal or greater size to the pump cord.

Typical rule for extension cords; 12AWG or larger and 50-feet maximum.

CAUTION: Using a smaller size or longer extension cord can damage the pump motor.

Turn on Pump

Turn the pump on and the system controller is automatically initialized.

Switch on the Pump

Push the toggle switch down for on

Status LED Indicator

Green Pulsating

Flashes green during system initialization.

Solid Green

Solid green upon successful completion of the initialization – unit is operational

Red

Fault condition.

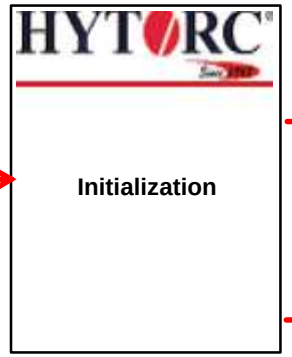
Flashes Red Twice Cyclically

Wrong direction of rotation of the motor on the 400V unit.

Beeper

Initialization typically less than 10 seconds – please wait until the LED is solid green and until the controller beeps (short beep approx. 50ms.

Automatic Initialization



"Initialization" The pump starts to initialize all electronic subsystems.

Daily Operation

If the initial setup has been previously completed the system goes directly to "System Ready

Initial Setup

Language, Date, Time, Torque & Pressure Units

The first time the pump is commissioned the user is prompted to enter basic Initial Setup information including language, date, time, torque units and pressure units.

This information is stored in the system and need not be re-entered for daily operation.

System Ready

The pump has finished the system initialization and is now ready to operate.

Press → to start a new bolting job.

Press to enter the menu. (Password Required)

Passwords & Access Rights

The pump has several levels of password access; User (Password 1) and Supervisor (Password 2). The user has limited access to options, the supervisor is higher level and can access all options. The system recognizes the access level when the assigned password is entered.

Press Menu Button

Enter Password

Press ↓ to decrease the highlighted numeric value.

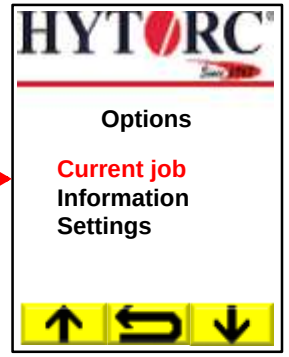
Press ↑ to increase the highlighted numeric value.

Press  to go back to the language selection.

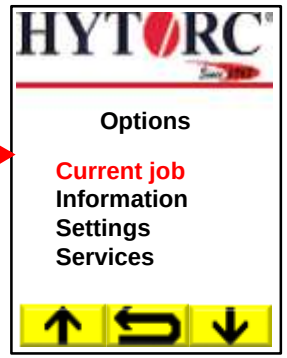
Press ***Trigger*** to select the value and move to next.

After selecting all 8 positions press Trigger again to enter password.

Password 1
User
Default 00000000



Password 2
Supervisor
Default 87654321



Rights	Options			
	Current Job	Information	Settings	Services
User or Supervisor Password provides access to these options	**Change Parameters** Select Tool Maximum Torque **Abort**	**System Components** Electric control Pendant Sensor device Activator **Serial Number** **Error Log** **System Report**	**Date + Time** Date Time	
Supervisor Only Password provides access to these options			**System** Language Torque Units Pressure Units **Factory settings**	**System Update** **Maintenance** **Passwords** Password 1 Password 2

Recommend supervisor change the passwords after commissioning.
Distribute passwords according to local practice for security and safety.
Make sure that only adequately qualified staff receive the passwords.
For complete definition of the options see the Operation Guide.

Remote Control Symbols

Symbols/Icons at the base of the screen correspond to the 3 buttons located just beneath them – allowing functions to be performed by simply pushing the button for the desired action.

Symbols in the display

Symbol	Description
↑	Upward Increase value
↓	Downward Decrease value
←	Return
→	Continue
⮌	One menu level up
▤	Open the Settings menu (password required)
⏻	Switch off motor
🗑	Delete entry
✕	Abort
✓	Confirm
Stop	Trigger Emergency stop
▲	Release Mode
OK	OK

LCD Display

Displays instructions, menus and status information.

Display Symbols

The symbols at the base of the LCD display provide a short-cut description of the action taken by pushing the button just beneath the symbol.

For example, pushing the left button in this display will open the settings menu.

Initial Setup

The first time the pump is commissioned, the user is prompted to specify language, date, time, the torque units and the pressure units - settings are saved so the next time the pump is operated it is not necessary to re-enter this basic data. These values can be modified through the options menu.

Language

Press ↓ to highlight the language below.

Press ↑ to select the language above.

Press ***Trigger*** to select language.

Date

Press ↓ to decrease the highlighted part of the date.

Press ↑ to increase the highlighted part of the date.

Press ⮌ to go back to the language selection.

Press ***Trigger*** to select the next part of the date.

Time

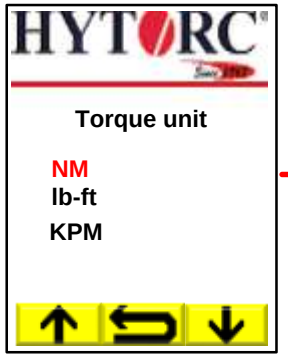
Press ↓ to decrease the highlighted part of the time.

Press ↑ to increase the highlighted part of the time.

Press ⮌ to go back to the date entry.

Press ***Trigger*** to select the next part of the time.

Torque Units



Press ↓ to select the torque unit below.

Press ↑ to select the torque unit above.

Press ⮌ to go back to the time entry.

Press ***Trigger*** to set the currently selected torque unit for the system.

Pressure Units

Press ↓ to select the pressure unit below.

Press ↑ to select the pressure unit above.

Press ⮌ to go back to the torque unit selection.

Press ***Trigger*** to set the currently selected pressure unit for the system.

System Ready

The pump has finished the system initialization and is now ready to operate.

Press → to start a new bolting job.

Press ☰ to enter the menu at any time to modify any value in the initial setup.

Select Mode

Once the system is ready the user has the choice to continue a current job, define a new job or if Documentation is available the user can select to run documentation.

Continue a Current Job?

Press ✓ to continue with the current settings.
Press ✗ to delete the current settings. Proceed with next step.

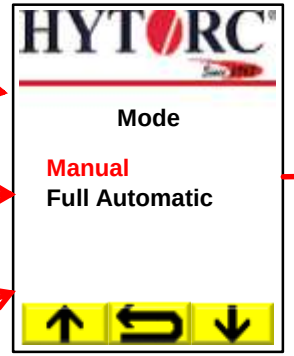
System Ready

Current Job

Continue Job with Current Settings – in Current Mode → **Start Pump**

If no current job, proceed to select mode

Select Mode



Set:
Tool Type
Tool Size
Torque
(Job ID for DOC mode)
→ **Start Pump**

Activate Documentation?

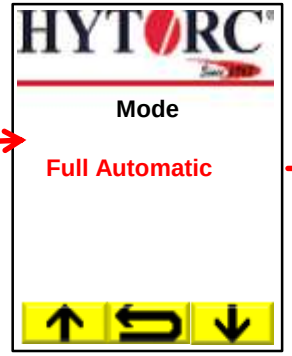
If configured with Documentation Firmware, the user is prompted to turn on Documentation.
Select Yes or No
Press ***Trigger***

Documentation

No → Select Mode

Yes

User is forced to select Full Automatic to activate documentation, the documentation feature does not work with manual bolting



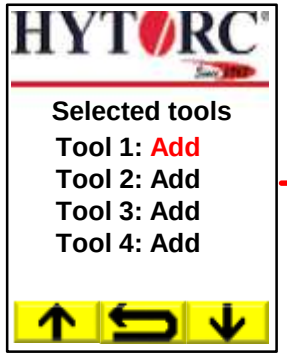
Set:
Tool Type
Tool Size
Torque
(Job ID for DOC mode)
→ **Start Pump**

Assign Tool Series, Size and Serial Numbers

If continuing the current job skip this step. If starting a new job select tool, size and serial numbers.
(Serial number only required if operating in the DOC mode)

Assign Tools

Assign Tools Needed for the Job



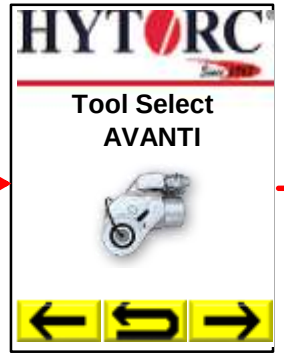
Press ↓ to select the option or tool below.

Press ↑ to select the option or tool above.

Press ⮌ to go back to the mode selection.

Press ***Trigger*** to chose the currently selected option or tool.

Select Tool Series



Press → to select the next available tool family.

Press ← to select the previous available tool family.

Press ⮌ to go back to the selected tools list.

Press ***Trigger*** to set the currently selected tool for the bolting job.

Select Tool Size

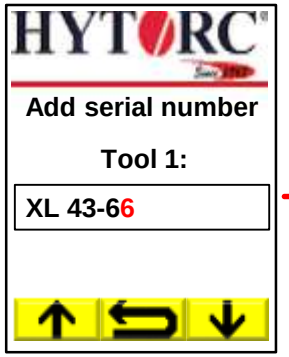
Press → to select the next available tool size.

Press ← to select the previous available tool size.

Press ⮌ to go back to the tool selection.

Press ***Trigger*** to set the currently selected tool size for the bolting job.

Add Serial Number



Press ↓ to scroll through digits & letters.

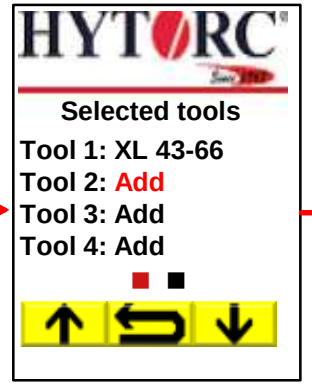
Press ↑ to scroll through digits and letters opposite direction

Press ⮌ to delete the last character.

Press and hold ⮌ to go back to the selected tools list.
Press ***Trigger*** to set the selection and advances to next.

Press and hold *Trigger* to finish the entry for tool 1, return to Select Tools menu.

Assign Additional Tools



Press ↓ to select the tool below.

Press ↑ to select tool above.

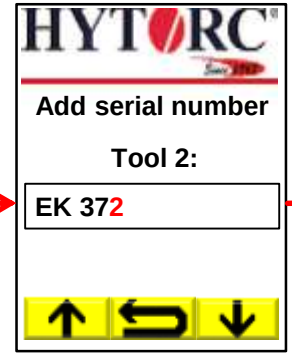
Press ⮌ to go back to mode selection.

Press ***Trigger*** to chose the selected tool.

NOTE: Make sure tools are connector to correct port on pump.

Prompts for Serial Numbers

System assumes same tool family and type



Press ↓ to scroll through digits & letters.
Press ↑ to scroll through opposite direction.
Press ⮌ to delete the last character.
Press and hold ⮌ to go back to the selected tools list.
Press ***Trigger*** to set the selection and advance to next.
Press and hold ***Trigger*** to finish the entry for tool 2.
Repeat for additional tools 3,4 as required.

DONE: When all tools are assigned correctly scroll down select Done and press the *Trigger*.

Modify Tool Description if Needed

After tools have been initialized, any tool serial number can be changed and any tool can be deleted by the selecting the tool and following the menu. (this sequence reflects the DOC version, the standard version does not require serial number)

Done Entering Tool Information

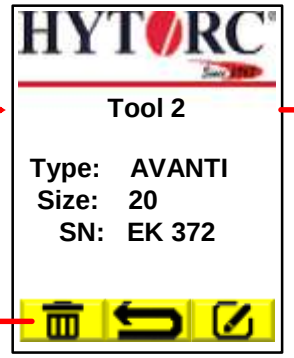
Modify Tool SN

To modify serial number for any tool select the tool to modify.

Delete Tool Info

Any tool description can be deleted, allowing for reentry if required.

Modify Tool 2 Description



From the list of Selected Tools, select a tool and press the Trigger to display the tool parameteris.

Press to change the serial number.

Press to remove the tool.

Press to go back to the selected tools list.

Edit Serial Number – Tool 2

Press ↓ to scroll digits & characters.

Press ↑ to scroll opposite direction

Press to delete the last character.

Press and hold to go back to the selected tools list.

Press ***Trigger*** to set the selection and advances to next.
Press and hold ***Trigger*** to finish the entry for tool 2, return to Select Tools menu.

When you have assigned all tools correctly scroll down to select Done and press the *Trigger*.

After Done the Tool Information can be modified any time by accessing the Settings.

Set Torque

If continuing current job skip this step. If starting a new job enter the torque required for the job, the torque tables are built into the system so the correct pressure will be applied to each tool.

The Torque Value entered will be applied to each tool; 1, 2, 3 or 4 Tools.

Set Torque

Press and hold ↓ to decrease the torque.

Press and hold ↑ to increase the torque.

Press ⮌ to go back to the selected tools list.

Press ***Trigger*** to set torque for the bolting job.

Enter Job Identification (ID)

If starting a new job enter the job identification (ID) and number of bolts with the particular job. This is only required for Documentation capture.

Enter Job ID

Change highlighted characters by pushing buttons

Press ↓ to scroll through characters & digits.

Press ↑ to scroll characters & digits is the opposite.direction,

Press ↩ to delete last character.

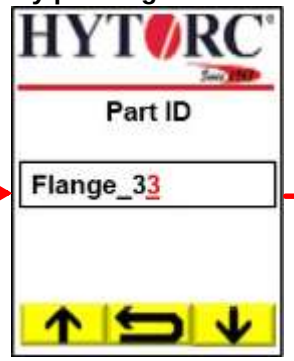
Press and hold ↩ to go back to the torque selection.

Press ***Trigger*** to set character and advances to next.

Press and hold ***Trigger*** to finish entry.

Enter Part ID

Change highlighted characters by pushing buttons



Press ↓ to scroll through characters & digits.

Press ↑ to scroll characters & digits is the opposite.direction,

Press ↩ to delete last character.

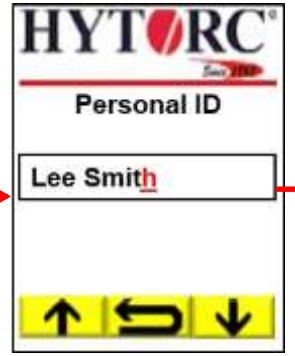
Press and hold ↩ to go back to the torque selection.

Press ***Trigger*** to set character and advances to next.

Press and hold ***Trigger*** to finish entry.

Enter Personal ID

Change highlighted characters by pushing buttons



Press ↓ to scroll through characters & digits.

Press ↑ to scroll characters & digits is the opposite.direction.

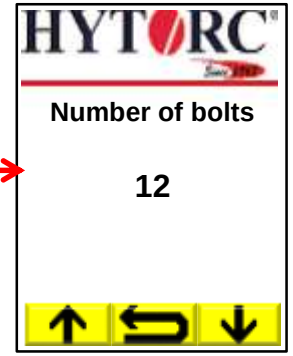
Press ↩ to delete last character.

Press and hold ↩ to go back to the torque selection.

Press ***Trigger*** to set character and advances to next.

Press and hold ***Trigger*** to finish entry.

Enter Number of Bolts



Press and hold ↓ to decrease the number of bolts.

Press and hold ↑ to increase the number of bolts.

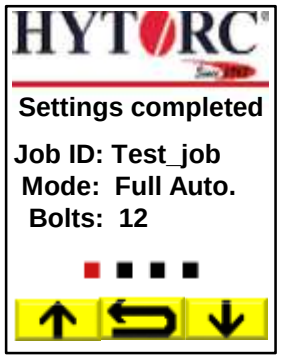
Press ↩ to go back to the personal ID

Press ***Trigger*** to set the currently adjusted number of bolts for the bolting job.

Confirm Settings

Review the settings for the current job and make any modifications.
(sequence shown for DOC version, standard version does not include Serial Number)

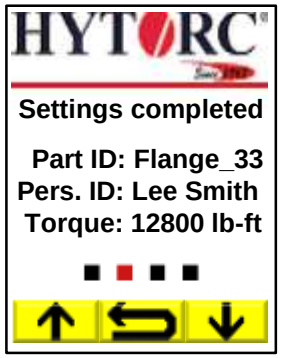
Confirm Settings



Overview about the bolting job settings.

Press ↓ to see the next settings page.

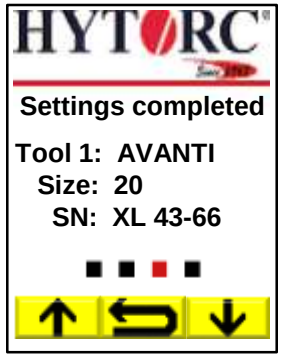
Press ⮌ to go back to the bolt number entry.



Press ↓ to see the next settings page.

Press ↑ to see the previous settings page.

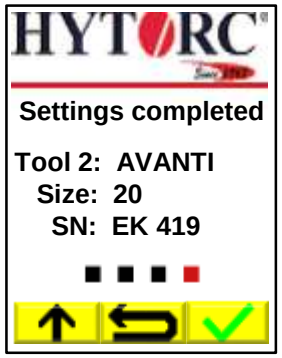
Press ⮌ to go back to the bolt number entry.



Press ↓ to see the next settings page.

Press ↑ to see the previous settings page.

Press ⮌ to go back to the bolt number entry.



Press ✓ to confirm the current settings.

Press ↑ to see the previous settings page.

Press ⮌ to go back to the bolt number entry.

Confirm Tools 3 & 4 If used

. . .

Start Pump and System Measurement

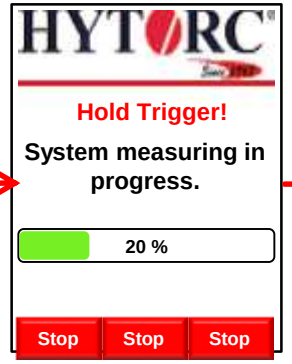
Upon first use or any change to system settings, when the trigger is pushed the pump motor starts and performs and the unit performs a system measurement to prepare to apply torque. (sequence shown reflects the DOC version, standard version slightly different)

Position Tools on Ground for Safety

Press and hold the ***Trigger*** to start system measuring.

Press  to enter the settings menu.

Start Pump

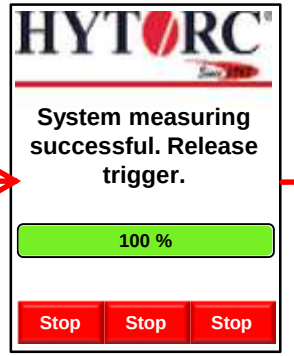


The pump starts to build up pressure and starts the system measuring. The status bar shows the progress of the system measuring as a percentage complete.

Continue to hold the ***Trigger***.

Press ***Stop*** in case of an emergency.

Measuring Complete

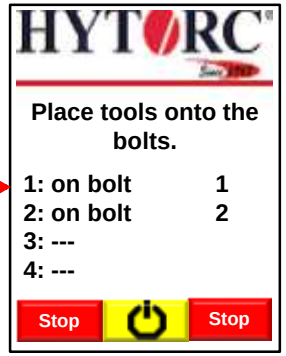


The status bar indicates that system measuring is 100% complete.

Please release the ***Trigger***.

Press ***Stop*** in case of an emergency.

Position Tools on Bolts



Now the pump is ready to work. Place the tools onto the bolts. (Screen example for a bolting job with 2 tools)

Press and hold ***Trigger*** to begin bolting.

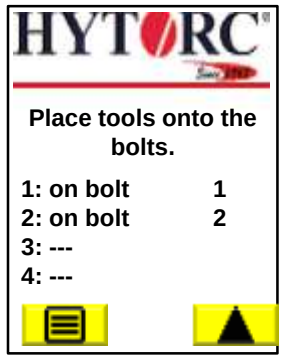
Press  to switch off the motor.

Press ***Stop*** in the case of an emergency.

Motor Off – Stop & Re-enable

If the pump motor is turned off the menu's can be accessed and the pump can be put into release mode and operated in manual mode – or the trigger can be pressed to turn the pump back on and begin bolting. If STOP is pressed the sequence can be re-enabled. (sequence show reflects the DOC version, standard version looks slightly different)

Motor Off



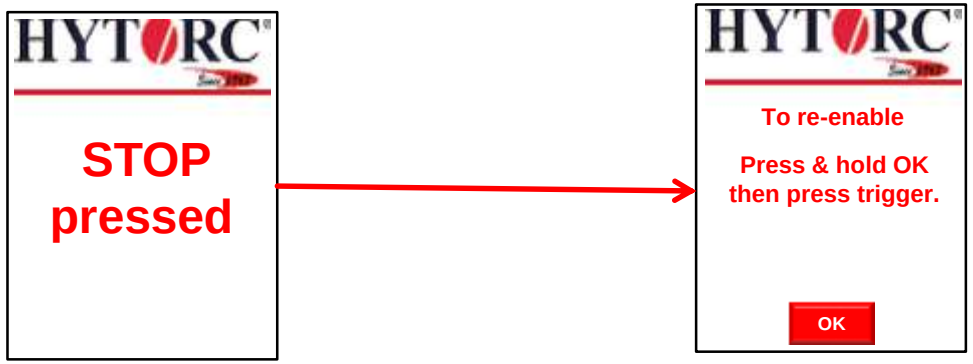
When the motor is off and the system waits to resume operation. (Screen example for a bolting job with 2 tools)

Press  to enter the settings menu.

Press  to enter the release mode. As long as the release mode is activ, the pump operates in the same way as the manual mode without documentation..

Press and hold ***Trigger*** to begin bolting.

Stop and Re-enable

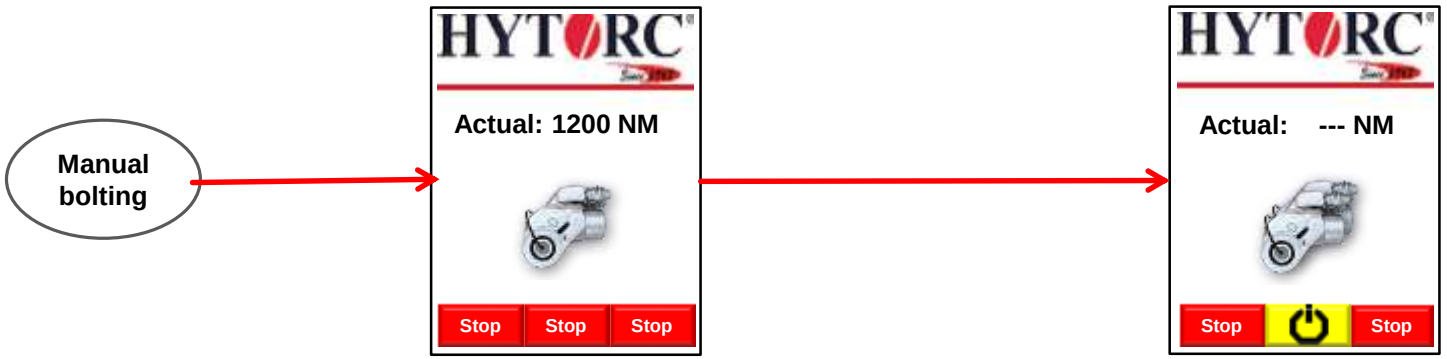


If the Remote Control STOP button is pushed during operation the pump stops, the entire system can be re-enabled to avoid having to go back to the beginning of the automated sequence.

To re-enable the system press and hold ***OK*** and simultaneously pull the ***Trigger***.

Manual Tightening

Manual Tightening is performed by pressing and releasing the trigger to cycle fluid pressure to the tool advance and release stroke. The Torque value is displayed on the screen, continue cycling pressure until the torque reaches the maximum torque set for the job.



Trigger is pressed, the pump starts to build up pressure and the actual torque of the tool is displayed on the fly. Release the Trigger if the adjusted torque is achieved and the tool does not move.

Press ***Stop*** in case of an emergency.

Trigger is released, the pump stops bolting and the tool retracts to its start position.

Press ***Trigger*** again to start the next bolting stroke.

Press ⏻ if the bolt is tight. The motor switches off and you can place the tool onto the next bolt

Press ***Stop*** in case of an emergency.

Full Automatic Tightening

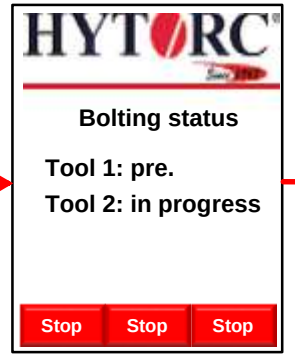
Once the trigger is pressed, the pump starts the fully automated process of tightening each bolt, up to 4 bolts simultaneously. Continue holding the trigger until the system tells you to release.

Begin

Trigger is pressed to start the full automatic tightening process and the current status of each bolt is displayed.

The tool status is **"in progress"** indicating that the pump begins delivering fluid under pressure to the tool..

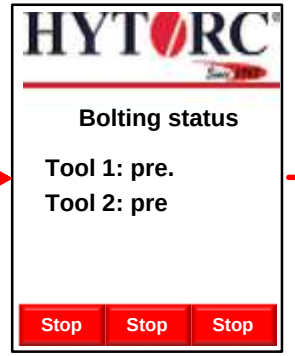
Synchronize



When tightening with multiple tools the tools may begin at different points in their stroke.

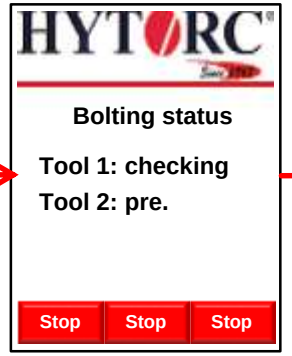
Tools first tighten bolts to a low torque level called pre-tightened or **"pre"** – at which point tools stop and wait for the other tools to catch up before applying full torque – tools may pre-tighten bolts in any order.

Apply Torque



When all bolts are pre-tightened the system will increase pressure to the tools and apply the maximum torque to each bolt.

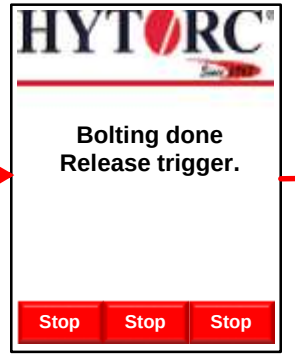
Check



A bolt may be tightened to maximum torque in any order - at that point the tool is marked as "checking"

If all bolts are tightened, status for all tools will be **"checking"** the pump will perform checking of the torque by applying control strokes on all bolts.

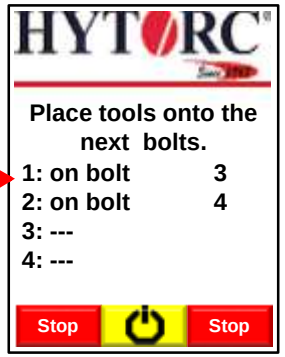
Finish Tightening



When control strokes are finished successfully a message indicates that bolting is done and the trigger can be released.

All bolts have been automatically tightened to the required torque.

Move to Next Bolts



If the sequence calls for tightening more bolts the system will prompt for next step.

Press  to switch off the motor.

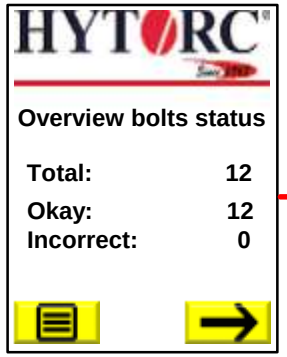
(sequence show reflects the DOC version, standard version looks slightly different)

Continue to press and hold the Trigger throughout the Full Automatic tightening process. Press Stop in the event of an emergency.

Save Documentation

When the motor is turned off the status of the bolting job is displayed and the job can be reviewed, saved and offloaded to the USB drive.

Status Overview

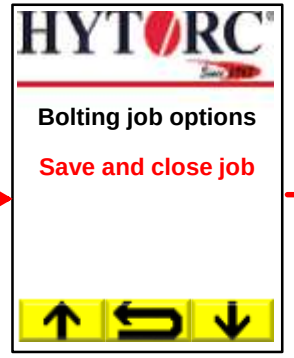


Trigger is released and the motor is off. An overview of the bolts status is displayed.

Press → to get an options menu for the actual bolting job just completed.

Press ☰ to enter the settings menu.

Save & Close



Choose an option for saving the bolting job documentation.

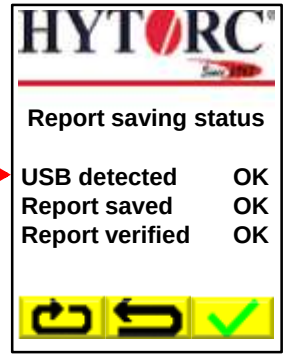
Press ↓ to select the option below.

Press ↑ to select the option above.

Press ⮌ to go back to the overview of the bolts status.

Press ***Trigger*** to select the highlighted option.

Save to USB



If the USB flash drive is attached, the pump will save and verify the report.

Press ✓ to close the overview and to go to the start screen (see step 9).

Press ⟲ to save the report again (only visible when the report saving process fails).

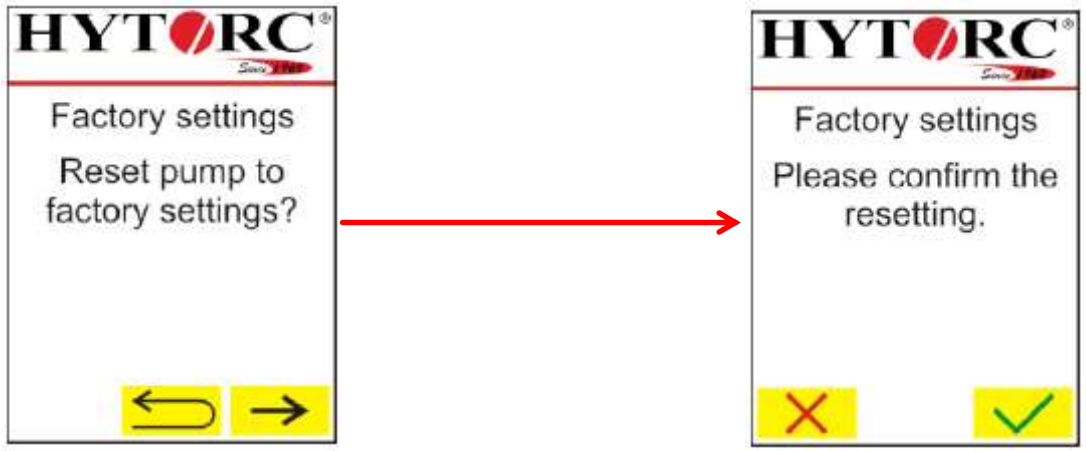
Press ⮌ to go back to the list of bolting job options.

External USB Port

Return to Factory Settings

The system can be reset to factory settings with the supervisor password.

The user rights of a supervisor are needed to reset to factory settings. Resetting to factory settings puts the control in the state prior to initial commissioning.



In the "Settings" menu, open the "Factory settings" sub-menu.

Press →

To switch to the previous entry, select ⮌

To abort the process, press ✕

To reset the control to factory settings, press ✓

Safety

⚠ WARNING

Severe injuries or death may be caused by accidents due to disregard of the Operating Instructions supplied with the unit. Review all safety precautions in the Operating Instructions and summarized in the Safety Section of this document before operating this pump.

Personal Protective Equipment (PPE)

- ❑ **Wear safety shoes with reinforced toes and non-slip soles.**
  To avoid crushing of the feet when lifting and carrying the unit.
  To avoid slipping and thereby risk of fractures when performing hydraulic work.

- ❑ **Wear oil resistant nitrile gloves to protect hands from hydraulic fluid.**
  To avoid skin irritation that may occur due to contact with hydraulic oil and components.

- ❑ **Wear gloves to protect hands against thermal and mechanical risks.**
  To avoid burns on contact with hot fluids, surfaces and components.
  To avoid cuts and abrasions of the skin on sharp-edged components.

- ❑ **Wear protective glasses or googles to protect eyes.**
  To avoid eye damage due to contact with hydraulic oil and mechanical components.

- ❑ **Wear hearing protection in areas with high noise to protect ears.**
  To avoid hearing impairments while unit is running.

- ❑ **Wear a respirator if oil vapor is present in poorly ventilated areas.**
  To avoid the risk of poisoning should the unit overheat and oil mist and vapors form.

- ❑ **Wear approved head gear to protect head in areas with overhead objects.**
  To reduce the risk of injury due to falling objects.

Basic Safety Information

❑ Prevent high-pressure “bursting” hydraulic oil accidents

Avoid severe injury or death from failure of high pressure hydraulic oil operated tools or hoses.
At pressures of more than 700 bar (10,000 psi) and operating the unit outside of the tool and tubing specifications can lead to bursting of the hydraulic hoses and spraying of hydraulic oil.
Make sure that the permissible pressure defined by the manufacturer is not exceeded.
Only use tools and hoses that meet required specifications of the manufacturer of the pump.
Never use hoses with defective or missing burst guards.
Wear chemical-resistant goggles.

❑ Prevent explosion

Avoid severe injury or death due to explosion, not for use in intrinsically safe areas.
Operate and service the pump only in areas where there is no explosive atmosphere.
Do not operate the presence of flammable liquids, gases or dusts.

❑ Prevent electric shock

Avoid severe injury or death from electrical shock
Check the electrical supply line for damage.
Use the unit only with a cord in excellent condition.
Immediately have a damaged electrical lines replaced by authorized personnel.
Make sure that the ground wire connection (green yellow cable) on the unit is properly connected.
Connect the power plug of the unit only to a properly grounded electrical outlet
Connect only to electrical supply with the correct electrical voltage and frequency.
Unplug the power cord from the wall outlet before performing any electrical service or cleaning the unit.
Only dry clean the unit. Do not clean the unit with a pressure washer, cold cleaner or water.
Never immerse the unit in water or other liquids.

Basic Safety Information

❑ Prevent fire

Prevent burns from fire due to short circuit.
When not in use and before any maintenance work pull the mains plug from the wall outlet..
Remove all unneeded and flammable materials from the work area.
Make sure that a fire extinguisher with powder or foam extinguishing agent is available.

❑ Prevent inhalation poisoning

Prevent inhalation poisoning for overheating that can produce oil mist or vapors.
Make sure there is sufficient ventilation.
In poorly ventilated areas and upon formation of oil mist and oil vapors, wear a respirator.
Switch the unit off when it overheats.
Allow the unit to cool down.
With the help of a non-contact infrared thermometer, ensure that the unit is cooled down to 25 °C (77 °F).
Check the unit for possible damage.
Have the unit repaired, if damaged, by qualified personnel before recommissioning.

❑ Avoid fractures and contusions

Prevent fractures and contusions from a falling unit or slipping during use or carrying.
Always set up the unit on a flat, solid and stable base.
Secure the unit and tools against falling.
When lifting and carrying the unit, wear safety shoes with steel toe caps.
Wear safety shoes with non-slip soles when working on hydraulics.

Basic Safety Information

❑ Prevent skin irritation

Prevent skin irritation that may occur due to contact with hydraulic oil.
Always provide a strong and tight connection between the unit and hydraulic tools.
Wear nitrile gloves at work where you might come in contact with hydraulic oil.
Make sure that the permissible pressure defined by the manufacturer is not exceeded.
Observe the tool and hose manufacturer's specifications.
Observe and follow the operating instructions for the hydraulic tools.

❑ Prevent exposure and contain fluids leaks

Wear temperature- and media-resistant gloves.
Take up liquid spills immediately with a suitable binding agent and a rag.
Dispose of the binding agent and rag environmentally correct.

❑ Preventing coupling damage

Avoid soiling couplings by installing protective caps and plugs when not in use.
Always hand tighten couplings, do not use a wrench to tighten or loosen couplings.
Always set the hydraulic tool down safely.

❑ Use pump only for intended use

This pump is intended for driving hydraulic bolting tools in the industrial sector.
Observe and following all instructions in this manual, especially the safety instructions.
Any other use is considered to be improper and will void the warranty and liability claims.

General Pump Safety

- **Keep fan vents clean**
  Vents on the AC motor and on the oil cooler fan should be free of debris to prevent overheating/fire.

- **Verify power control**
  Do not use a pump that cannot be powered on/off; this condition is dangerous and must be repaired.

- **Power unit off for configuration changes**
  Disconnect the pump from the power supply before making any configuration changes or before storing the tool to reduce the risk of inadvertently powering on the pump or bolting tools.

- **Untrained operators**
  Do not allow persons unfamiliar with these instructions to operate the Pump or Hydraulic bolting tools.
  Keep pumps out of the reach of children.

- **Maintain pump components**
  Check for breakage of parts and any other condition that may affect the pumps operation.
  If damaged, have the pump repaired before use.

General Bolting Safety

- **Keep work area clean**
  Keep the bolting work area clean, organized and well lit to reduce the chance of accidents.

- **Use the correct bolting tool for the job**
  The job will be safer when the proper tool is used for the applications and conditions for which it was designed.

- **Avoid distractions**
  Keep bystanders away from the bolting area to avoid distractions and loss of control.

- **Avoid pinch points**
  If using reaction arms, select reaction surfaces that avoid pinch points to avoid hand injury.

- **React in-line**
  Select reaction points in-line with the nut and make sure the tool drive and socket axis are aligned with the axis of the bolt – avoid bending or side-load on the or bolt.

- **React against a solid surface**
  Select the reaction surface so that the reaction arm firmly abuts against the surface to enhance work safety and longer tool life.

- **Practice socket safety**
  Review socket safety criteria, make sure to use only impact grade sockets that are free from defect or modification.

General Bolting Safety

- **Stay alert**
  Watch what you are doing and do not perform bolting while you are tired or under the influence of drugs, alcohol, or medication.

- **Avoid unintentional use**
  Disconnect the pump AC power cord when not in use.
  Do not hold your finger against the remote control trigger unless following the instructions for use.

- **Secure loose parts or tools**
  Make sure all tool rotating parts/sockets/drives are firmly affixed to the drive and remove any keys, wrenches or loose-parts before turning on the tool.

- **Do not lean-in or overreach**
  Keep proper footing and balance at all times to keep hands away from pinch points and to better control the tool in all situations.

- **Avoid loose fitting clothing**
  Do not wear loose clothing or jewelry and keep your hair, clothing, jewelry and gloves away from the moving parts.

Lets Bolt!

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