



Hye Precision Products
Pneumatic Testing Machine 4
PTM4



OPERATING AND MAINTENANCE
MANUAL

Table of Contents

| | |
|---|----|
| MACHINE SPECIFICATIONS | 2 |
| GENERAL MACHINE SPECIFICATIONS: | 2 |
| MACHINE SETUP..... | 3 |
| PTM 4 REMOTE OPERATIONS | 7 |
| PTM 4 REMOTE OPERATIONS INSTALLATION INSTRUCTIONS | 7 |
| PTM TEMPLATE OPERATIONS PAGE USER INSTRUCTIONS..... | 13 |
| PTM TEMPLATE MULTIPLE SHOT REPORT PAGE | 14 |
| OPERATING INSTRUCTIONS..... | 15 |
| TURNING ON THE MACHINE | 15 |
| LOADING BALLS FOR TESTING | 16 |
| OPERATOR INTERFACE | 16 |
| TEST SETUP PROCEDURE..... | 22 |
| MACHINE SAFETY..... | 23 |
| SAFETY LIMIT AND PROXIMITY SWITCHES | 23 |
| MAINTENANCE OVERRIDE SWITCH | 23 |
| BARREL CHANGE PROCEDURE..... | 24 |
| TROUBLE SHOOTING MACHINE..... | 26 |
| PLC/VELOCITY SENSORS | 27 |
| DIGITAL INPUTS AND OUTPUTS..... | 27 |
| ANALOG INPUTS/OUTPUTS | 28 |
| KEYENCE VELOCITY SENSORS | 29 |
| SENSOR VALIDATION TEST SETUP & PROCEDURE | 31 |
| SENSOR VALIDATION TEST SETUP | 31 |
| SENSOR VALIDATION TEST PROCEDURE | 31 |
| PREVENTATIVE MAINTENANCE | 32 |
| PREVENTATIVE MAINTENANCE SCHEDULE | 32 |
| ELECTRICAL DRAWINGS..... | 33 |
| ASSEMBLY DRAWINGS..... | 34 |
| PNEUMATICS DRAWINGS..... | 35 |
| COMPONENT MANUAL(S)..... | 36 |

Machine Specifications

General Machine Specifications:

Machine Requirements:

Electrical: 120 VAC, 1 Ph, 50/60 Hz, 15 A

Pneumatic: 50-110 psi @ 7 CFM

Floor Space: 8 ft x 8 ft

Machine Dimensions:

Height: 80"

Depth: 32"

Width: 32"

Weight: 1800 lb

Machine Performance:

Inbound Velocity: 75-250+ fps (100 psi required to reach 250 fps)

Inbound Velocity Repeatability: +/- 1-3 ft/s (depending on consistency of test samples)

Machine Cycle Time: 5-6 s

Velocity Accuracy: Less than +/- .5 ft/s @ 200 ft/s

Velocity Repeatability: Less than +/- .5 ft/s @ 200 ft/s

Control:

PLC: Allen-Bradley CompactLogix 5370 L24ER

Operator Interface: Allen-Bradley Panelview Plus 7

Data Collection: All velocity data is collected by a special Microsoft Excel document (provided by Hye Precision Products) from the CompactLogix PLC

REMOVING FROM CRATE

Remove the Lag Screws from one side panel shown in the image below.



Remove the two Bolts from the PTM4 Crating Foot as shown in the image below.



Repeat the procedure for the opposite side, removing 2 additional Bolts. **NOTE: removing both crate sides at the same time may make the crate unstable. It is advisable to reattach side one before removing side 2.**

After removing all four of the Lag Screws securing the PTM4 to the bottom of the crate, you can now use a forklift to lift the machine and remove it from the crate.



When the PTM4 is out of the crate and still on the fork lift, remove the PTM4 Crating Feet from all four corners, as shown in the image below.



Once the PTM4 Crating Feet are removed, install the PTM4 Leveling Feet as shown in the image below.



LEVELING

After removing the machine from the shipping crate, install the steel leveling pads provided. Set the machine by adjusting the steel leveling pads and checking the machine table, from the top and bottom interior, both lengthwise and crosswise with a leveling instrument. After leveling the machine, the machine transportation packing can be removed.

PACKING REMOVAL

Remove the wood block from below the shot cylinder as show in the image below.



Now remove any other packing materials from the PTM4.

ELECTRICAL

Power requirements: 120 VAC (90 - 240VAC), 1-Phase, 50/60 Hz. There is a document inside the electrical cabinet the shows where to check the incoming voltage. **WARNING: CHECK INCOMING POWER BEFORE TURNING THE PTM4 ON.**

AIR HOOK UP

Compressed Air Requirements: 50-110 PSI, 7.0 SCFM (Air must be clean and dry)
Regulator (Main) Pressure Setting: 50-110 PSI
Regulator (Ball Velocity) Pressure Setting: Variable, depending on desired ball velocity

NOTE- Standard location of both electrical and air hookups are at top of machine. The preferred method is to have the pneumatic and electrical drops come from above the machine. A twist lock receptacle and plug are included with the machine for quick electrical disconnect.

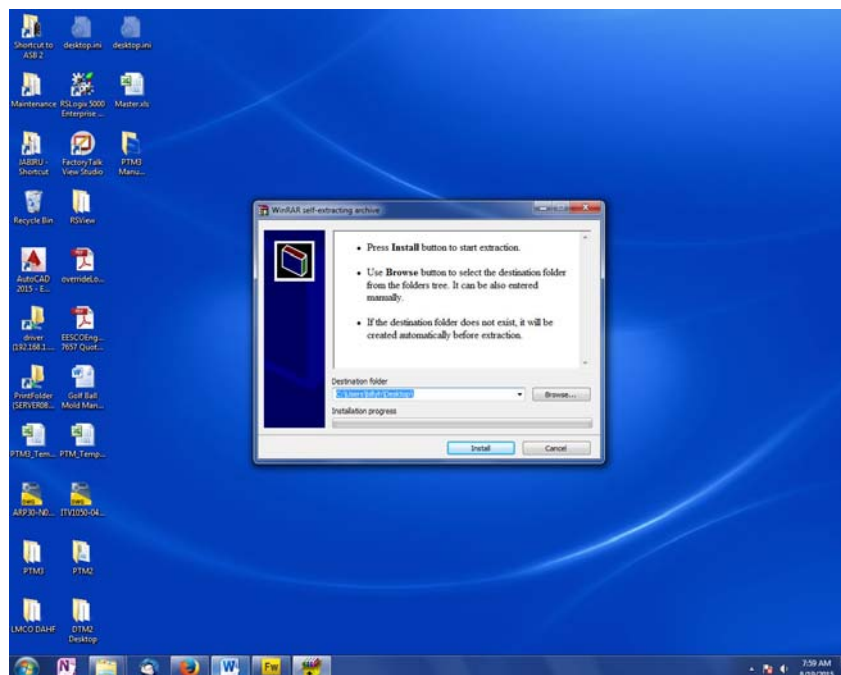
PTM 4 Remote Operations

PTM 4 Remote Operations Installation Instructions

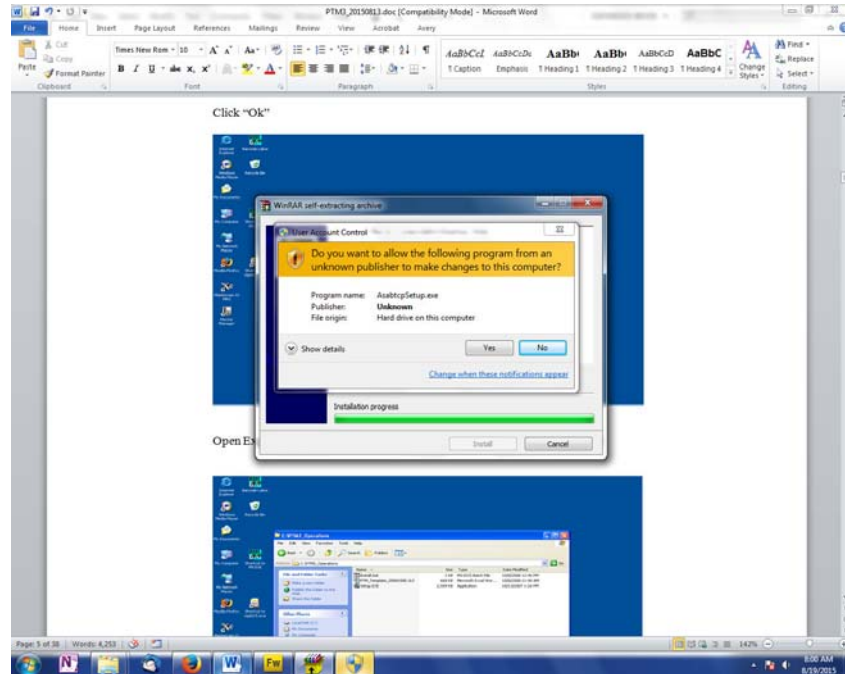
Double click “PTM4_Data_Collection.exe”



Click the “Install” button



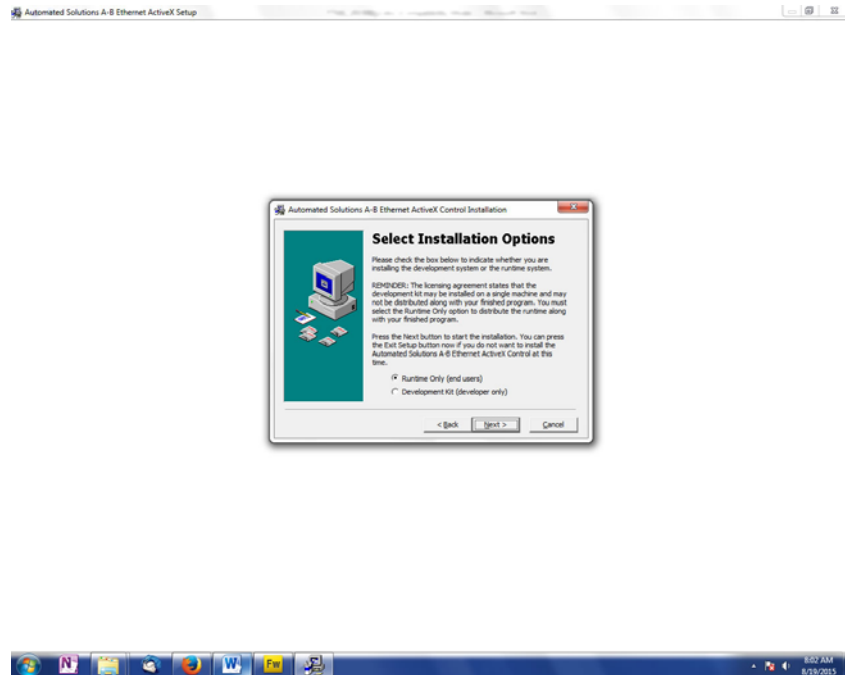
Press the “Yes” Button



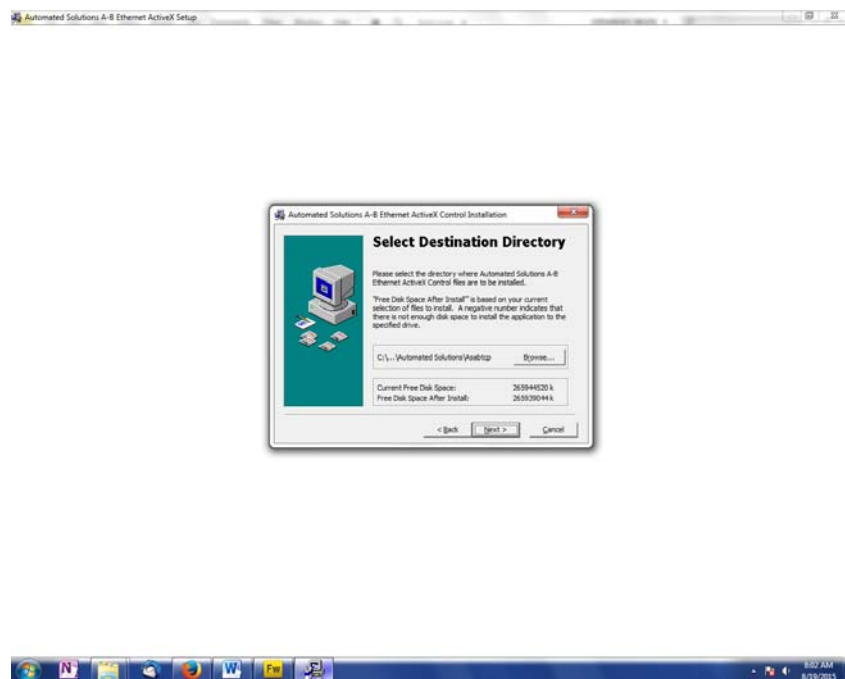
Press the “Yes” Button



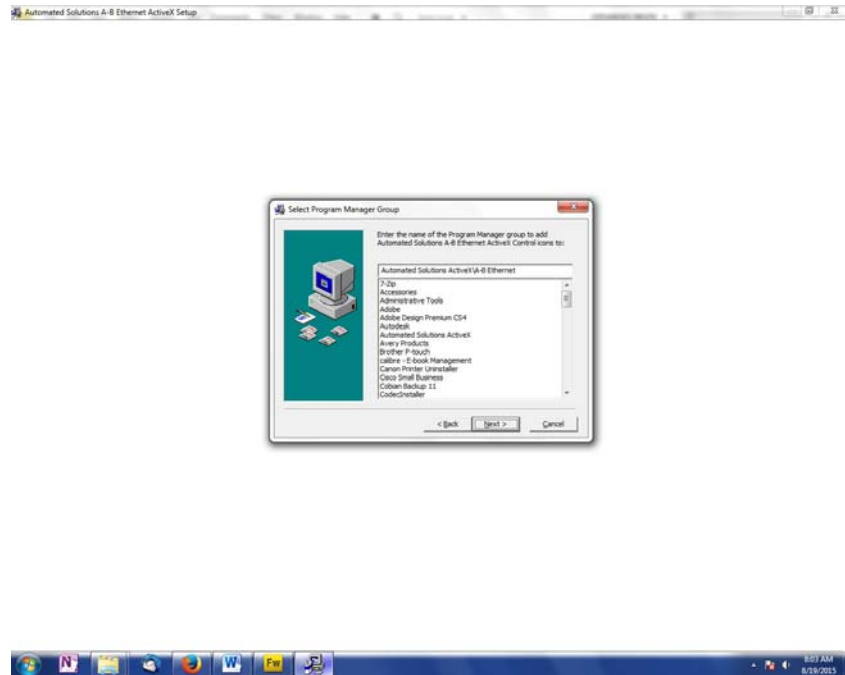
Select the “Runtime Only (end users)” Option, then press “Next>”.



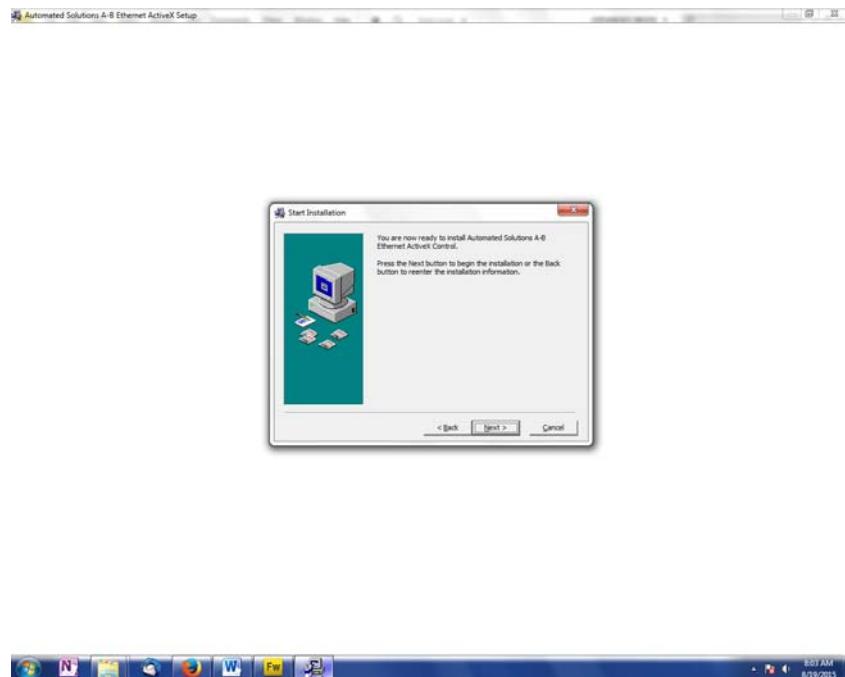
Press the “Next>” button.



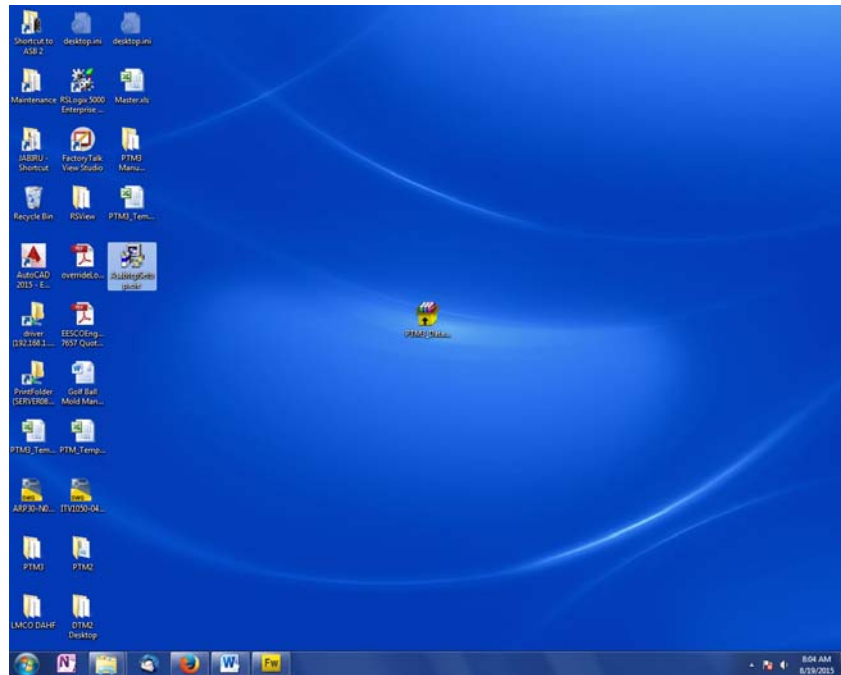
Press the “Next>” button.



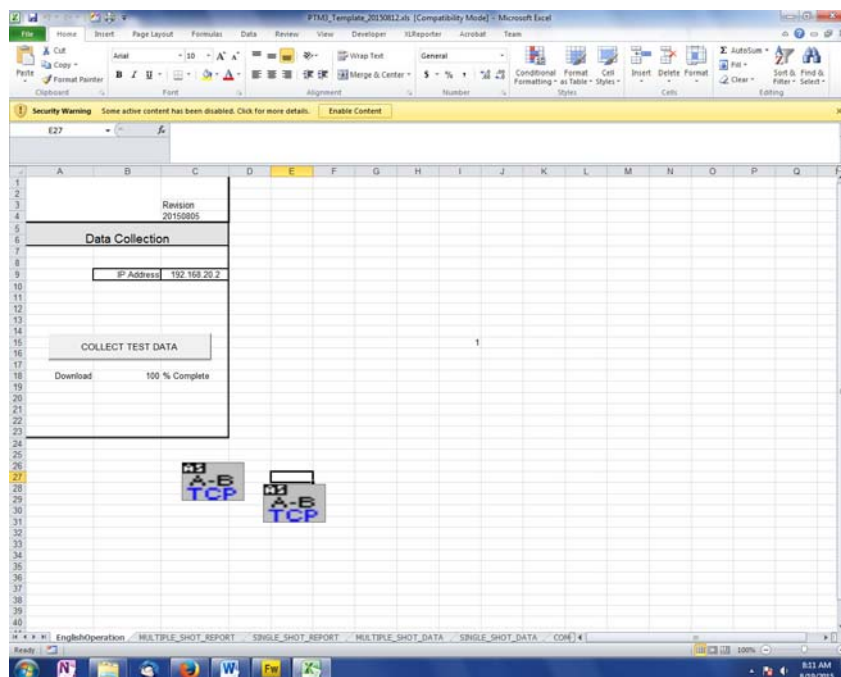
Press the “Next>” button.



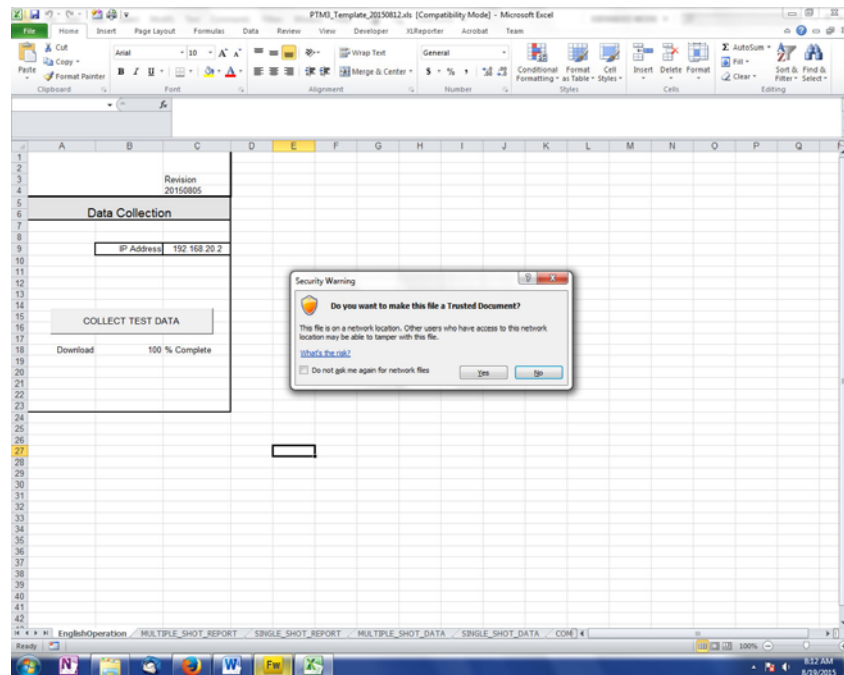
After the installation completes, open the PTM4_Template_.xls file.



If the Security Warning is displayed click the “Enable Content” button. Contact your system administrator if macros or Active X controls are disabled for security reasons.

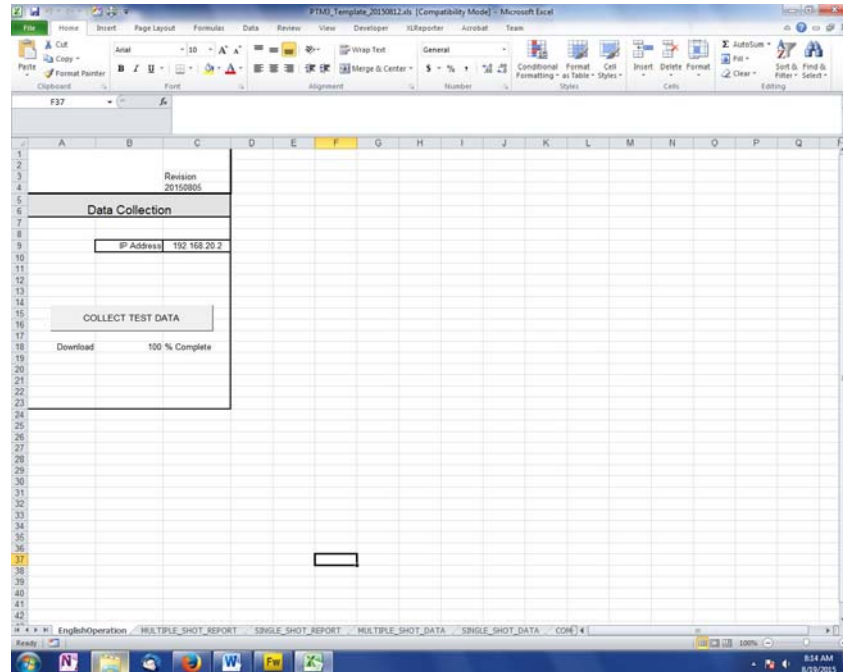


Press the “Yes” button to make the file a trusted document. This will allow you to open the document without security warnings in the future.



PTM Template Operations Page User Instructions

The Operations page of the PTM Template Excel Workbook allows an operator to remotely collect test data from the PTM 3.



IP Address: The IP Address of the PTM4's PLC 10.125.125.2

Collect Test Data Ball Collects the test data and places it in the MULTIPLE_SHOT_DATA worksheet.

PTM Template Multiple Shot Report Page

| Ball # | Hits | COR |
|--------|--------|--------------|
| 1 | 10 | 0.776313 |
| 2 | 10 | 0.770920 |
| 3 | 10 | 0.774139 |
| 4 | 10 | 0.776633 |
| 5 | 10 | 0.775539 |
| 6 | 10 | 0.775328 |
| 7 | 10 | 0.775281 |
| 8 | 10 | 0.775340 |
| 9 | 10 | 0.776089 |
| 10 | 10 | 0.777782 |
| 11 | 10 | 0.778623 |
| 12 | 10 | 0.778382 |
| 13 | | |
| 14 | | |
| 15 | | |
| 16 | | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | | |
| 29 | | |
| 30 | AVG | 10.0 0.7745 |
| 31 | ST DEV | 0.000 0.0017 |
| 32 | MAX | 10 0.7763 |
| 33 | MIN | 10 0.7709 |
| 34 | RANGE | 0 0.0054 |

The PTM Template Multiple Shot Report worksheet contains charts and graphs from data contained in the **MULTIPLE_SHOT_DATA** worksheet.

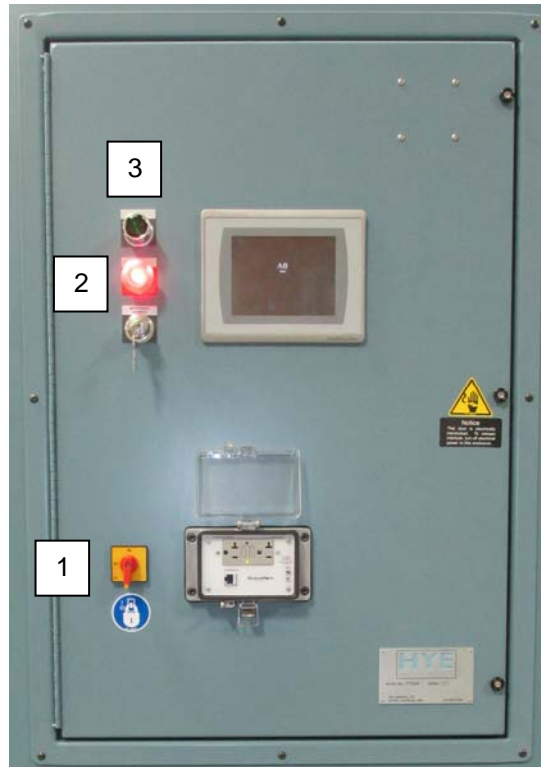
- Ball** Lists the ball number.
- Hits** Lists the number of shots for the ball.
- COR** Lists the average COR for the first six shots.
- AVG** Lists the average COR and shots for all balls in the test.
- SD** Lists the standard deviation for the COR and shot for all the balls in the test.
- Max** Lists the maximum amount of hits of all balls in the test.
- Min** Lists the minimum amount of hit of all balls in the test.
- Range** The difference between the Max and Min (Max – Min).

This Report is not needed for the data collection component of the PTM Template. You may create your own report page to show test results however you like.

Operating Instructions

Turning On the Machine

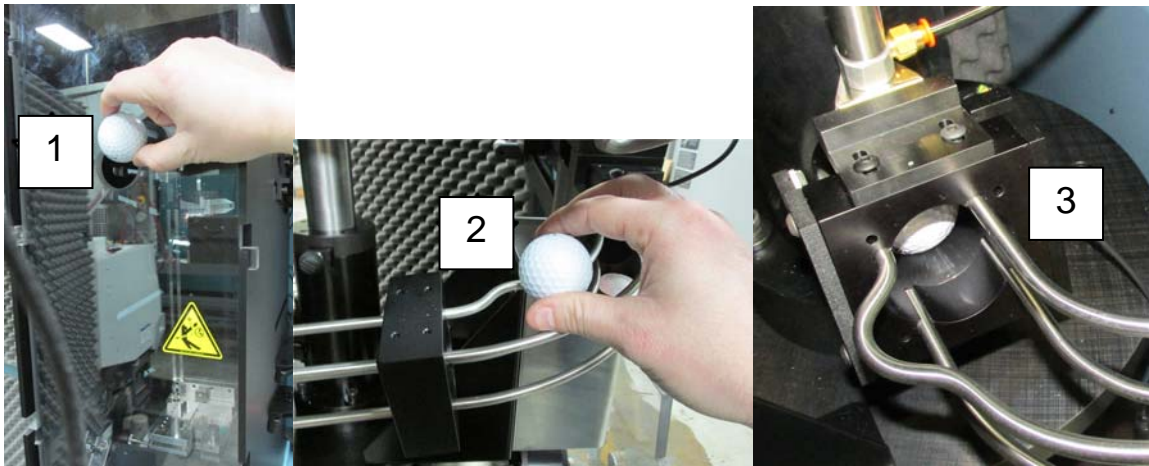
Make sure machine has the proper electrical and compressed air requirements!



1. Turn the MAIN DISCONNECT located at 1 to the ON position.
2. Pull out EMERGENCY STOP button located at 2.
3. Push in ON button located at 3. Wait 2 minutes for PLC and HMI to initialize.

Loading Balls for Testing

The PTM4 has three methods of loading balls into the machine. The operator may place the balls one at a time through the Lexan Chamber Guard (shown as location 1), into the magazine access point (shown as location 2), or at the escapement.

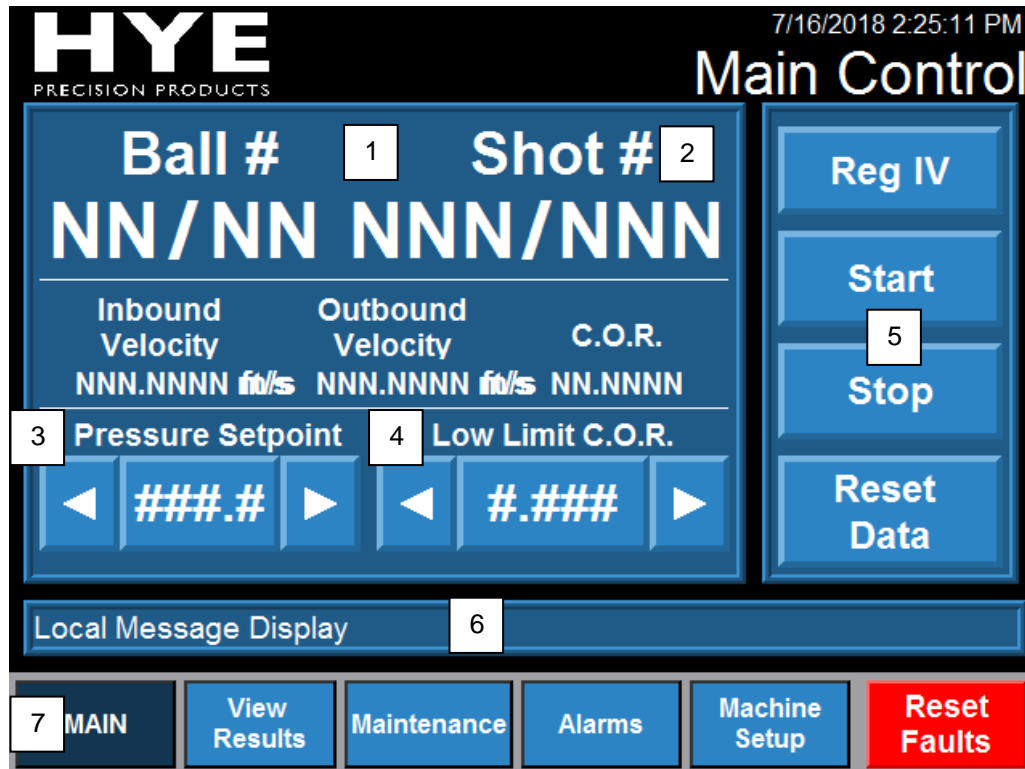


Operator Interface

This machine incorporates the Allen-Bradley Panelview Plus 7 human machine interface (HMI). The HMI is a touch screen interface that is capable of receiving and transmitting data to the CompactLogix 5370 L24 Programmable Logic Controller (PLC).

MAIN SCREEN

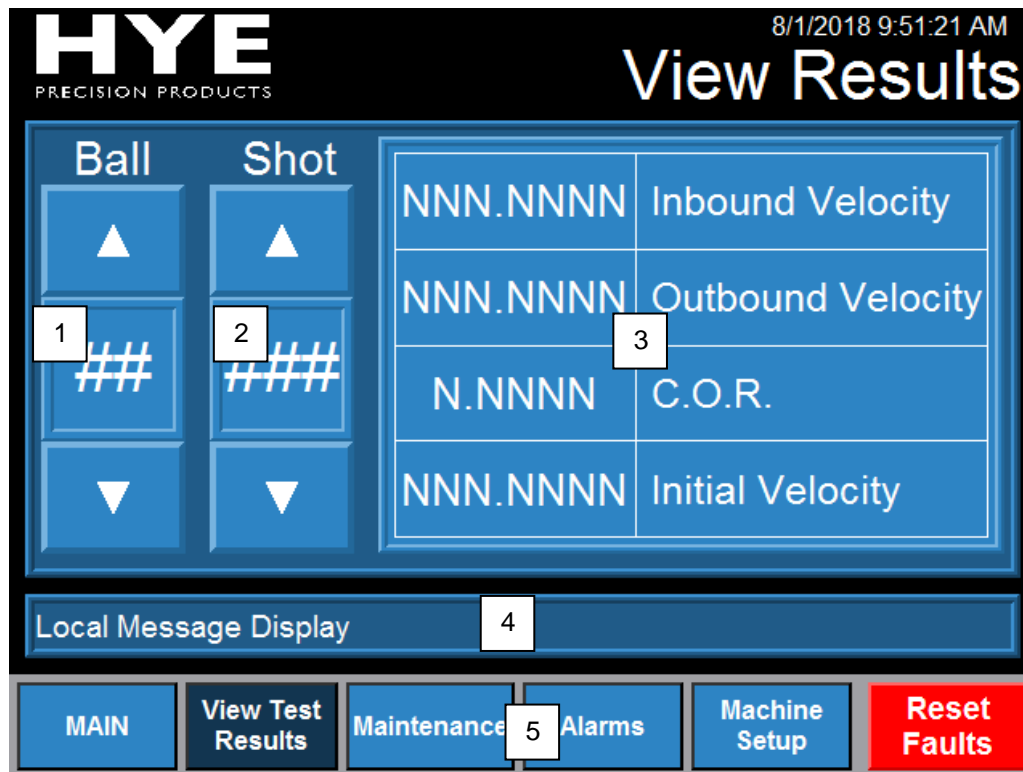
The Main Screen is the primary point for general machine operation. It displays the present ball and shot counter and test results such as inbound and outbound velocities, C.O.R. (coefficient of restitution), as well as the total ball and shot test parameters.



1. **Current Ball Number / Test Ball Count:** Pressing the Test Ball Count allows the user to enter the amount of balls for the next test.
2. **Current Shot Number / Test Shot Count:** Pressing the Test Shot Count allows the user to enter the amount of shots for the next test.
3. **Air Pressure Setpoint:** Pressing the Air Pressure launches a popup keypad allowing the user to set the air pressure of the test. The arrows to the left and right of the Air Pressure Setpoint allow the user to increase and decrease the air pressure by 0.1 PSI (NOTE: Air Pressure can be adjusted during the test to fine tune velocities.)
4. **Low C.O.R. Setpoint:** Pressing the Low C.O.R. Setpoint allows the user to set the low coefficient of restitution ball removal setpoint. The arrows to the left and right of the Low C.O.R. Setpoint allow the user to increase and decrease the C.O.R. setpoint by 0.001 (NOTE: C.O.R. Setpoint can be adjusted during the test.)
5. **Test Control Buttons:** The top button is the test type button, by pressing the button it cycles through the three types of tests. The three types of test are Reg IV, C.O.R., and Validate. The Start Test button starts a test with the currently displayed setting, Stop Test stops the current test, and the Reset Test button resets all the current test data and progress. **NOTE: The Reset button erases all stored test data.**
6. **Test Status Message Bar:** List the current state of the PTM4. If the machine is in the Sensor Validation Test Mode the message bar will be red. This warning is displayed when the sensor validation test is enabled on the Machine Setup Page. **NOTE. This should not be displayed under normal testing circumstances.**
7. **HMI Navigational Buttons:** Each button corresponds to a HMI screen the current screen is denoted by shading on the button.

VIEW SCREEN

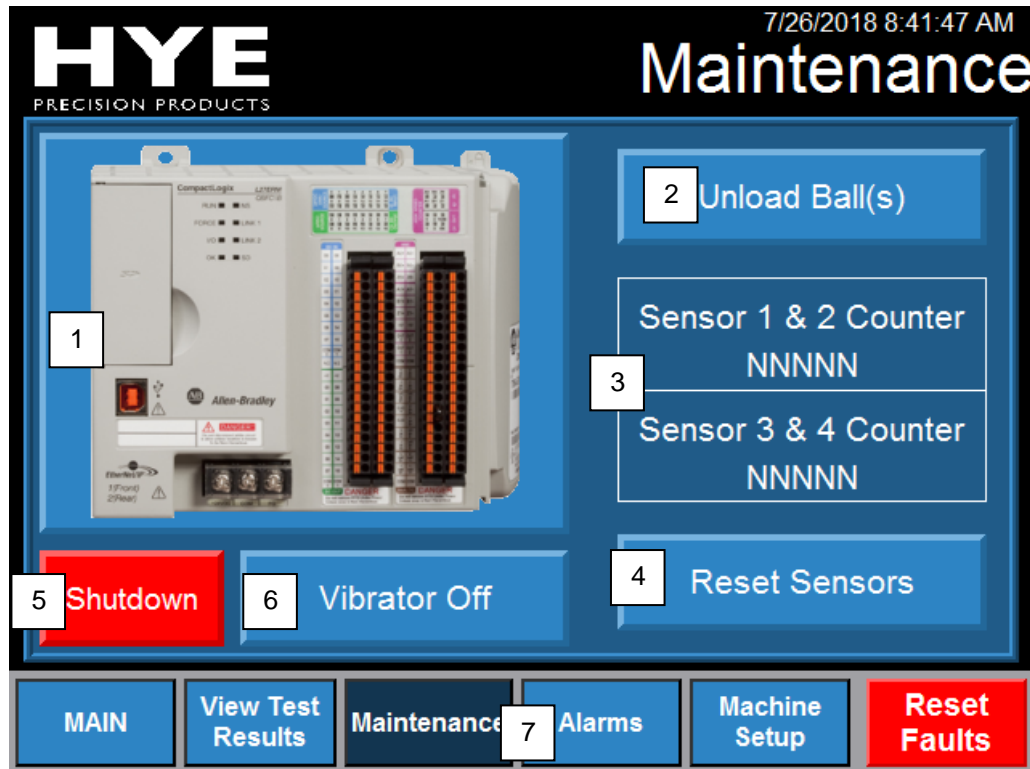
The View Screen is the screen that one can use to quickly view the non-current shot data of a test from the PLC memory without the need to plug in a computer running PTM4 Data Collection document.



1. **Ball Number:** To enter particular ball number of which Vin, Vout, & C.O.R. values are desired. Pressing the Up or Down arrows will increase or decrease the Ball value by 1.
2. **Shot Number:** To enter particular shot number of which Vin, Vout, & C.O.R. values are desired. Pressing the Up or Down arrows will increase or decrease the shot value by 1.
3. **Data Display:** Displays the following information on the Ball and Shot selected: Inbound Velocity, Outbound Velocity, C.O.R., and Initial Velocity.
4. **Machine Status Display:** Displays the current machine and testing status.
5. **HMI Navigational Buttons:** Each button corresponds to a HMI screen the current screen is denoted by shading on the button.

MAINTENANCE SCREEN

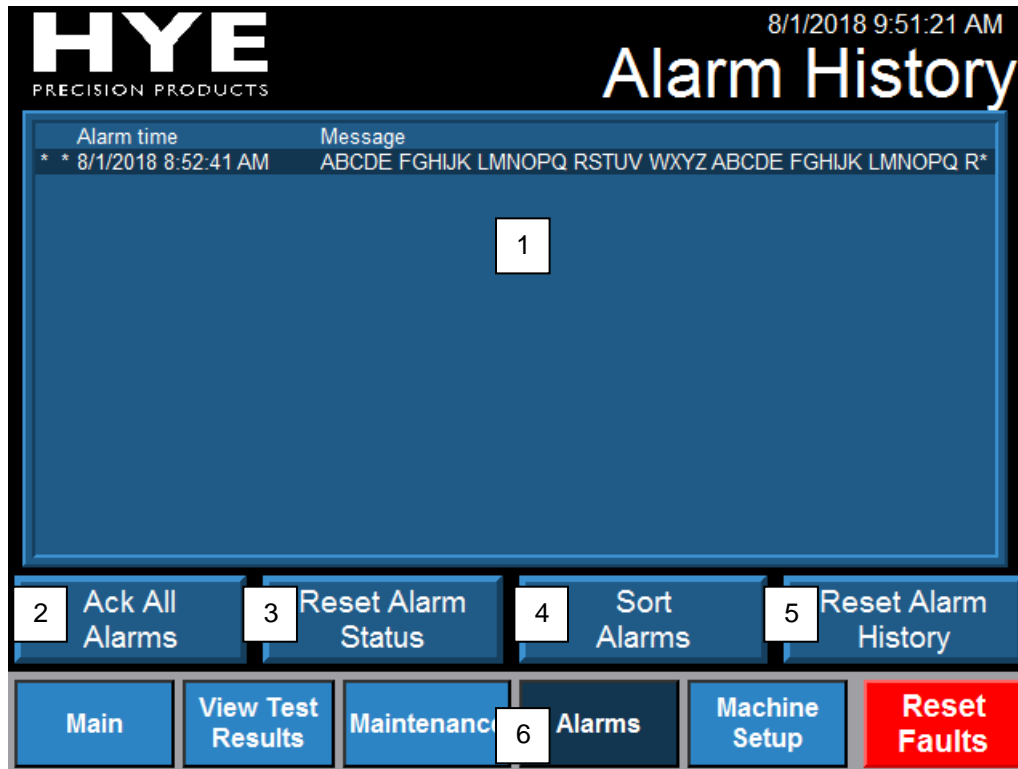
The Maintenance Screen provides the user with PLC, IO, and Sensor indication tools and the ability to clear balls from the machine after a failed or stopped test.



1. **Processor Status & IO:** Pressing this button will display a pop up screen that allows the user to collect information from the PLC such as: Fault Data, PLC Status Indication, Communications Data, Current IO status, and current program information.
2. **Unload Ball(s) Button:** Forces a single shot from the Breach and unloads it in the finished ball bin.
3. **Sensor Counts:** Shows the current amount of counts for Sensors 1 & 2, and Sensors 3 & 4. Viewing these counts during a test can tell the user if the sensors are behaving properly.
4. **Reset Sensors Button:** Resets the velocity sensor set points and counts for both counters located above.
5. **Shutdown Button:** Shuts down the HMI program and returns to windows CE desktop
NOTE! Only use this button if instructed to by HPP.
6. **Vibrator Button:** Turns the magazine vibrator option on or off.
7. **HMI Navigational Buttons:** Each button corresponds to a HMI screen the current screen is denoted by shading on the button.

ALARM SCREEN

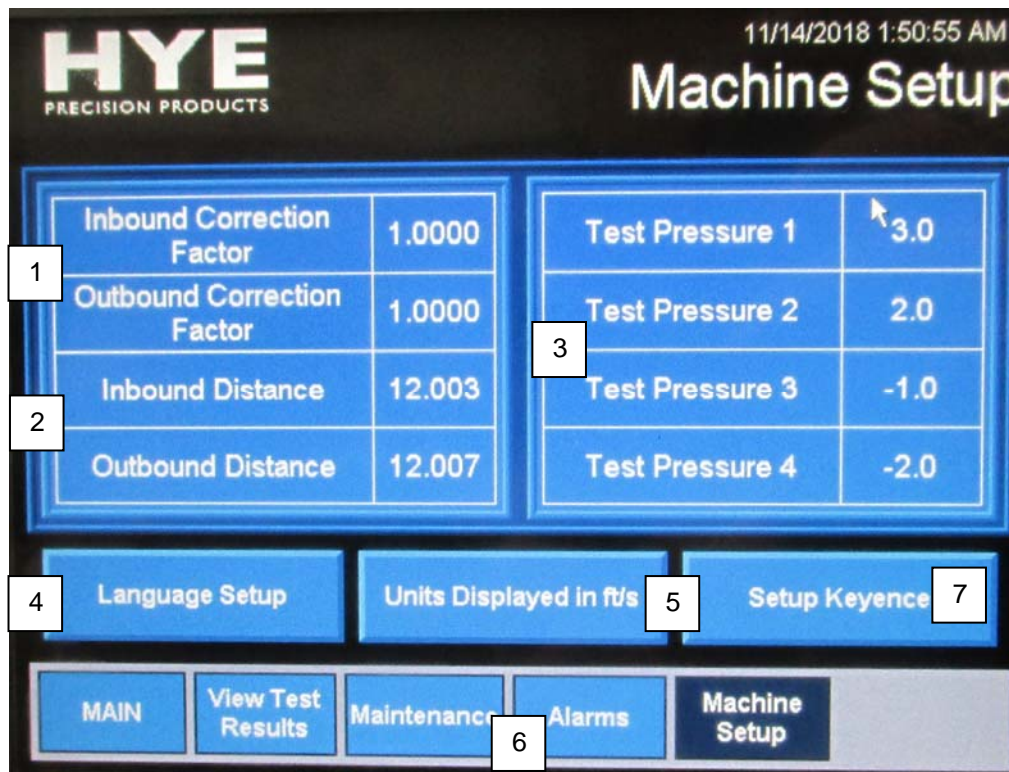
The Alarm Screen shows the user current and past alarms that have occurred and allows the user to acknowledge, sort, and clear the alarms.



1. **Alarm History List:** Shows all recent alarms.
2. **Ack All Alarms Button:** Acknowledges all active alarms.
3. **Reset Alarm Status Button:** Resets the selected alarm's status.
4. **Sort Alarms Button:** Sorts Alarms by name.
5. **Reset Alarm History Button:** Clears the Alarm History List.
6. **HMI Navigational Buttons:** Each button corresponds to a HMI screen the current screen is denoted by shading on the button.

MACHINE SETUP SCREEN

The Machine Setup Screen provides access to key system variables needed to fine tune the functionality of the machine. Also, a Vibrator On/Off button allows the user to turn the air vibration module on/off. The Machine Setup Screen is only accessible when the Maintenance Override Key Switch is in the On position.



1. **Inbound / Outbound Correction Factors:** Scaling factors used to correlate the machine to previous test data. The correction factors are not active during Regulation IV test only during C.O.R. tests
2. **Inbound / Outbound Distance:** The distance between Inbound or Outbound Sensors. Nominally 12.000" this should be calibrated for best possible accuracy
3. **Test Pressures:** Sets the four test pressures for the regulation IV test. Each test pressure is added to the Pressure Setpoint on the Main Screen at the beginning of a Reg IV test.
4. **Language Setup:** Displays a new window that allows the end user to select the language for the PTM4 HMI.
5. **Units Displayed:** Sets the units displayed by the HMI and recorded by the test to feet per second or meters per second.
6. **HMI Navigational Buttons:** Each button corresponds to a HMI screen the current screen is denoted by shading on the button.
7. **Keyence Setup Button:** This button allows the operator to program the Keyence amplifiers if they are replaced.

Test Setup Procedure

TO SET TEST VELOCITY

1. Open side door on machine (the door near the magazine track) and insert 5 balls (similar to the balls to be tested).
2. On Main Screen, press the Reset button.
3. On Main Screen, press the Ball # area and enter 5 balls (Any amount of balls is acceptable).
4. On Main Screen, press the Shot # area and enter 2 shots (Any amount of shots is acceptable).
5. On Main Screen, press the Air Pressure Setpoint area and enter an approximate pressure (125 ft/s = 31.0 PSI, 143.8 ft/s = 37 psi, 200 ft/s = 64.8 PSI)
6. On Main Screen, press the Start Cycle button, the machine will now execute a short automatic test. Adjust the Air Pressure Setpoint by entering a new value or by pressing the left or right arrows to increase or decrease by 0.1 psi using the Inbound Velocity as reference to adjust the ball velocity until the Inbound Velocity value on Main Screen matches the desired testing velocity.
7. After 10 shots (the duration of the 5 ball - 2 shot test previously setup) the machine will, after dumping the balls into the ball bin, automatically end this velocity setting procedure.
8. Run again as necessary until the desired test velocity is set.

TO PERFORM A REGULATION IV TEST

1. Go to the Main Screen on the HMI
2. Press the Reset Data button to reset previous test data
3. Press the Test Type button until Reg IV is displayed
4. Press the Ball # area and enter the number of balls desired for the test (12 Balls Recommended)
5. Load the balls into the PTM4
6. Set the Pressure Setpoint to the value you recorded in the Set Test Velocity procedure
7. Press the Start button to begin the test

TO PERFORM A C.O.R. or DURABILITY TEST

1. Go to the Main Screen on the HMI
2. Press the Reset button to reset the previous test data
3. Press the Test Type button until C.O.R. is displayed
4. Press the Ball # area and enter the number of balls desired for the test
5. Press the Shot # area, and then enter desired number of shots per ball for test
6. Set the Pressure Setpoint to the value you recorded in the Set Test Velocity procedure
7. Press the Start button to begin the test
8. If it is desired to do data analysis and subsequent data saving on the preceding test, start the special Microsoft Excel program (provided by Hye Precision Products). Then follow the instructions as seen in Chapter 2 PTM Template Multiple Shot Report Page and PTM Template Operations Page User Instructions

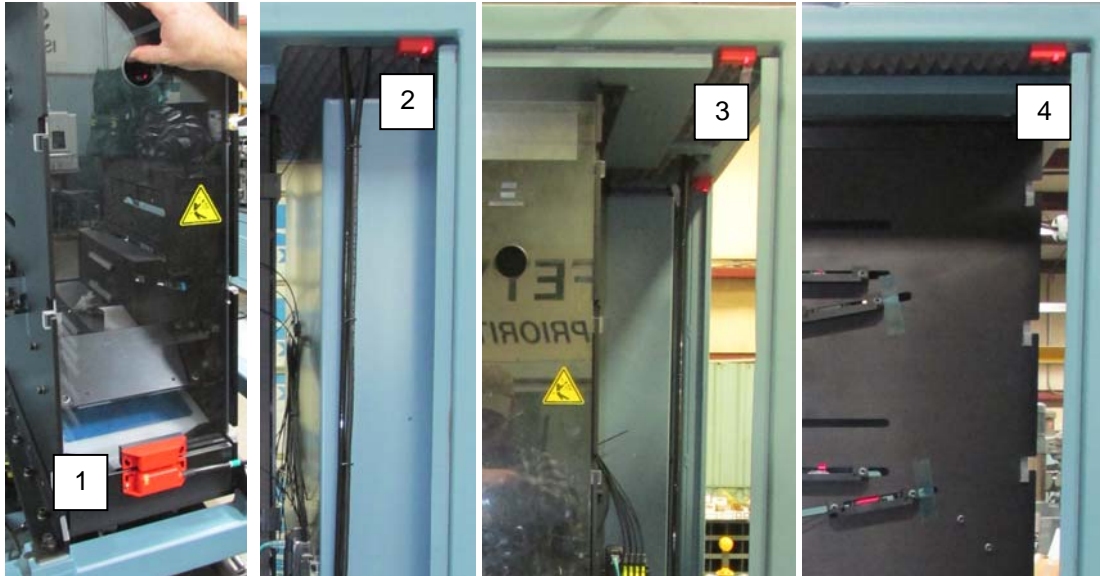
Each user will develop their own testing criteria; below we have suggested some examples:

- Durability Test – 12 -36 Balls, 100 Shots ,150 ft/s
- Ball C.O.R. Test – 12 Balls, 10 Shots, 143.8 ft/s
- Core C.O.R. Test – 12 Cores, 1 Shot, 125 ft/s (Requires a custom size barrel)
- Initial Velocity Test – 12 Balls, 4Shots, 143.8 ft/s

Machine Safety

Safety RFID and Magnetically Encoded Switches

This machine is equipped with safety switches at all points of personal injury risk:



1. SS1 – Lexan Chamber Guard Removed
2. SS2 – Left Door Open
3. SS3 – Rear Door Open
4. SS4 – Right Door Open

If any of these points of entry are breached, the machine will react in the following way:

- Test program will be halted (enters Emergency Stop mode)
- All air pressure safety dump valves will engage, thus depressurizing the entire pneumatic system.

The Safety Switches SS2, SS3, and SS4 can be overridden by the Maintenance Override Key Switch during maintenance operations. The Lexan Chamber Guard cannot be overridden.

For any safety halted mode, the test can be restarted but, care must be made to ensure the last ball shot was diverted correctly before starting the test, failure to do so could cause data to be incorrect.

Maintenance Override Switch

The Maintenance Override Key Switch is used by maintenance personnel to disable machine safeguards to facilitate troubleshooting. It must be realized that the machine is dangerous in this mode! **ONLY TRAINED, APPROVED, and CERTIFIED** maintenance personnel should be in possession of the Maintenance Override Key!

Barrel Change Procedure

STEP 1

After assuring that all electrical and pneumatic energy is removed, open the front door of the PTM4 (side opposite of control panel).

Now, remove clear Lexan panel.



STEP 2

Pull out the Barrel Release Knob.

**STEP 3**

At the same time as STEP 2, pull Barrel up and remove the barrel from the PTM4



To install a different Barrel into the PTM4, repeat STEP1 through STEP3 in reverse. NOTE: Make sure Barrel Release has the new Barrel locked in place before closing up the machine and continuing operation! ALSO – GENTLY lower the Barrel onto the Cannon Assembly – AVOID Bouncing the Barrel as it may dent and cause difficulty in future Barrel changes!

Trouble Shooting Machine

Problem#1

Problem: Odd, outrageous, unchanged, or zero time/velocity figures show up in the display and/or the Excel file.

Cause #1: It is possible that dust has accumulated on the lens of the Fiber Optic Unit Lens which senses the speed of the golf ball. This would result in the Fiber Optic Units being unable to sense a ball passing by.

Solution #1: To fix the problem, open the front door, remove the clear Lexan panel, and with a soft cloth and a 50/50 mixture of water and isopropyl alcohol, wipe the dust off the Fiber Optic Unit's clear lens.

Cause #2: It is also possible that the Fiber Optic Amplifier Units are(s) may be un-powered or malfunctioning.

Solution #2: Make sure that all the Fiber Optic Amplifier Units are properly powered by 24VDC. This can be verified if the LED digital displays are lit/operational.

Cause #3: It is also possible that particles from broken balls or rubber after extended testing may be moved by the air cannon when shot at high velocities.

Solution #3: Vacuum test chamber to remove dust and debris.

Problem#2

Problem: Machine, while in "Cycle Start Mode", stands still (i.e., does not shoot)

Cause: Most likely a cylinder position switch on the Breach cylinder is not being made due to either loose/misadjusted switches or for the reason of the Breach mechanism being mechanically jammed and preventing the Breach cylinder from reaching its end of travel.

Solution: Make sure Breach mechanism is working smoothly and is not jammed by debris, or by an out of place golf ball. If the mechanism is working smoothly, then check and readjust Breach cylinder limit switch.

Cause #2: The escapement cylinder has trapped the ball before it has been loaded into the breach.

Solution #2: Press the Start Cycle button again to cycle the escapement cylinder and allow the ball to roll into the breach.

PLC/Velocity Sensors

Digital Inputs and Outputs

24 VDC NPN (PNP Load) INPUTS

| | |
|-------------------|---------------------------------|
| Local:1:I.Data.0 | Safety Relay Disabled |
| Local:1:I.Data.1 | Verify Ball Return Sensor |
| Local:1:I.Data.2 | Breach Down Sensor |
| Local:1:I.Data.3 | Breach Up Sensor |
| Local:1:I.Data.4 | Ball Breach Sensor |
| Local:1:I.Data.5 | Emergency Stop Push Button |
| Local:1:I.Data.6 | Maintenance Override Key Switch |
| Local:1:I.Data.7 | |
| Local:1:I.Data.8 | E Breaker Alarm S3 |
| Local:1:I.Data.9 | Left Door Safety Switch |
| Local:1:I.Data.10 | Rear Door Safety Switch |
| Local:1:I.Data.11 | Right Door Safety Switch |
| Local:1:I.Data.12 | Shot Chamber Exit Switch |
| Local:1:I.Data.13 | |
| Local:1:I.Data.14 | |
| Local:1:I.Data.15 | |

24 VDC PNP OUTPUTS

| | | |
|-------------------|--------------------------------|------|
| Local:1:O.Data.0 | Breach Down | SOL5 |
| Local:1:O.Data.1 | Diverter Open | SOL4 |
| Local:1:O.Data.2 | Escapement Ret | SOL3 |
| Local:1:O.Data.3 | Ext Mag Div Cyl Ext | SOL2 |
| Local:1:O.Data.4 | Vibrator Control | SOL1 |
| Local:1:O.Data.5 | Velocity Sensor Setpoint Input | |
| Local:1:O.Data.6 | Shot Valve | SOL6 |
| Local:1:O.Data.7 | CT Daq Collection Trigger | |
| Local:1:O.Data.8 | E Breaker Reset | |
| Local:1:O.Data.9 | | |
| Local:1:O.Data.10 | | |
| Local:1:O.Data.11 | | |
| Local:1:O.Data.12 | | |
| Local:1:O.Data.13 | | |
| Local:1:O.Data.14 | | |
| Local:1:O.Data.15 | | |

Analog Inputs/Outputs

1-5 VDC INPUTS

| | |
|-------------------|---|
| Local:2:I.Ch0Data | Electro-Pneumatic Regulator Pressure Feedback |
| Local:2:I.Ch1Data | Spare |
| Local:2:I.Ch2Data | Spare |
| Local:2:I.Ch3Data | Spare |

0-10 VDC OUTPUTS

| | |
|-------------------|--|
| Local:2:O.Ch0Data | Electro-Pneumatic Regulator Pressure Set Point |
| Local:2:O.Ch1Data | Spare |

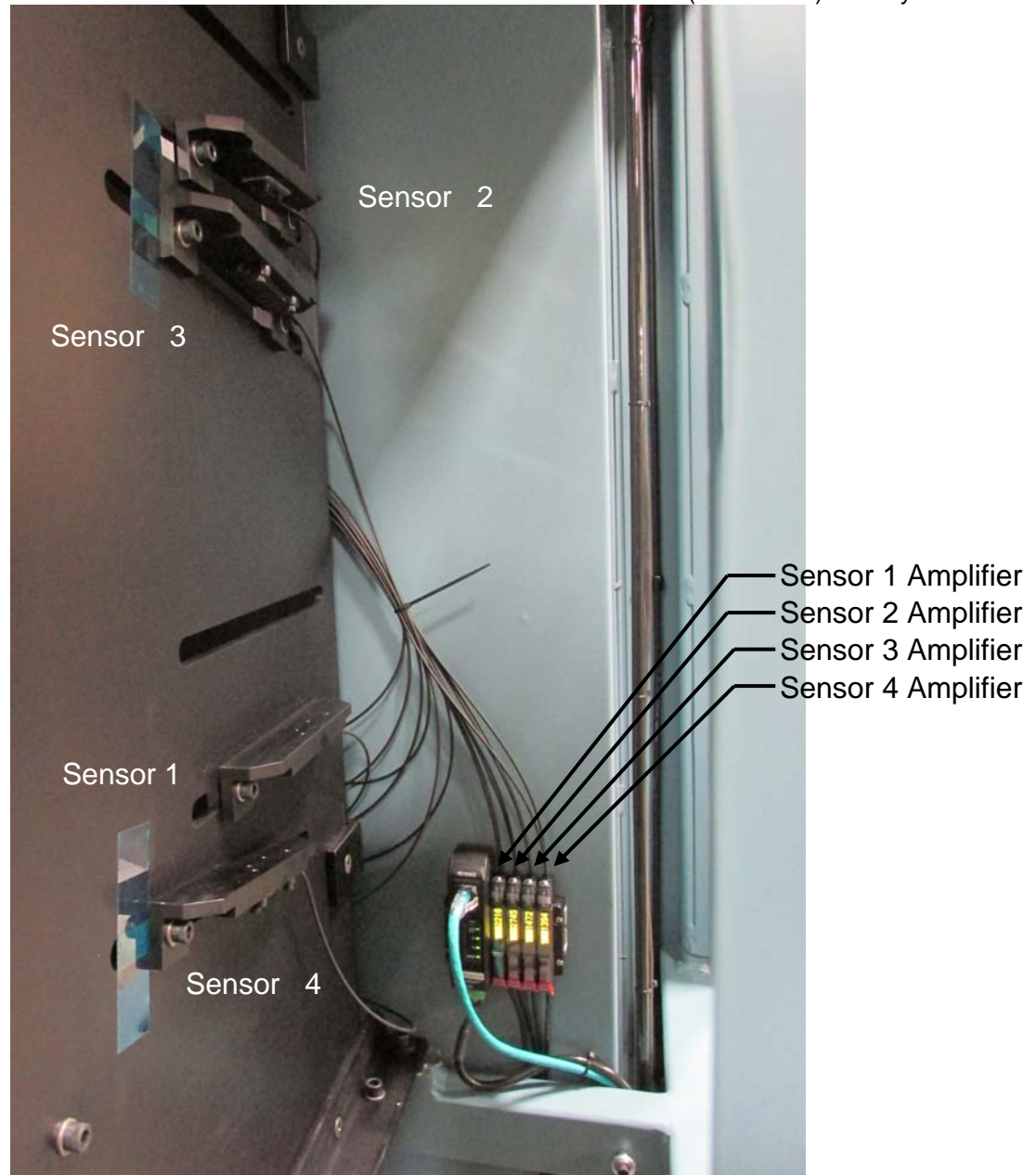
HIGH SPEED COUNTER INPUTS

| | |
|------------------------|-----------------------|
| Local:3:I.InputStateA0 | Keyence Sensors 1 & 2 |
| Local:3:I.InputStateA1 | Keyence Sensors 3 & 4 |

Keyence Velocity Sensors

Overview

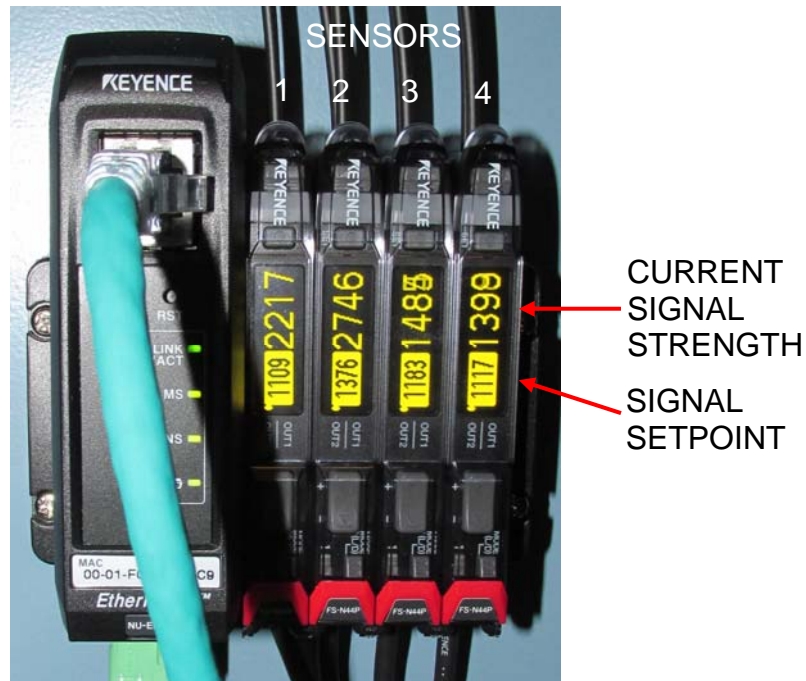
The Velocity Measurement system of the PTM4 Machine utilizes Fiber Optic Sensors. Referring to Drawing # HM4-WIRD in Chapter 8 – Electrical Diagrams section of this manual (and also in the figure below) – it can be seen that there are (4) sensor systems involved in the PTM4 velocity measurement system referred to as S1, S2, S3 and S4. Each 'Sensor System' consists of a Fiber Optic unit and an Amplifier unit. The golf ball is shot from the cannon – as it leaves the Barrel it first passes through S1 and then S2. The PTM4's machine control then measures and records the time the ball takes to travel from S1 to S2 – using this 'inbound' time to calculate 'inbound' velocity. After the golf ball passes S2 it strikes the Striking Block. After rebounding from the Striking Block the golf ball next passes through S3 and then finally through S4. The time the golf ball takes to travel from S3 to S4 is in turn used to calculate the 'outbound (or rebound) velocity'.



Keyence Velocity Sensors (*Continued*)

Amplifier Settings

The amplifier units are pre-programmed at the factory. When the sensor's beam is obscured the signal strength decreases, when the signal strength decreases below the signal set point value the sensor turns on. The sensors can be tested by blocking the beam with an object and then viewing the state of Local:3:I.InputStateA0 for sensors 1 & 2 or Local:3:I.InputStateA1 for sensors 3 & 4.



The amplifier units must be aligned properly to assure accurate golf ball velocity/COR measurements. Each Fiber Unit is precisely aligned at the factory using an accurate sensor calibration device and the results that are indicated on the PTM SENSOR SETING Drawing inserted in the manual.

Fiber Optic Unit Adjustment/Alignment

If it is found that there is a need to adjust the alignment of the Fiber Optic unit, use a properly sized Hex Wrench to loosen the Sensor Bracket Clamp to enable lateral movement of the Fiber Optic Unit until proper alignment is achieved according to the aforementioned Gage Block method. Also, if a Yaw adjustment is needed to maximize signal, use a hex wrench to loosen the 'Sensor Yaw Adjustment Screw' and moving the Fiber Unit until its respective Amplifier unit shows maximized signal strength. After all adjustments are completed, retighten any loosened screws.

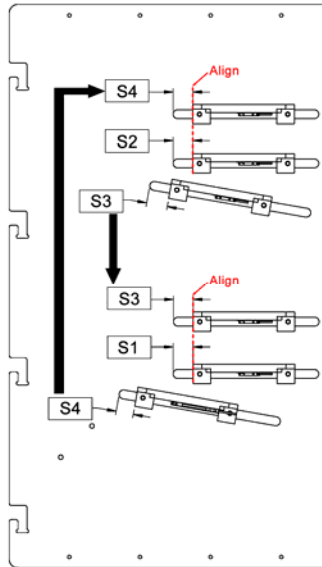
Sensor Alignment and Calibration Procedure

Contract Hye Precision for hardware and instructions.

Sensor Validation Test Setup & Procedure

Sensor Validation Test Setup

1. Move Sensor 3 to the slot above Sensor 1 and align with Sensor 1
2. Move Sensor 4 to the slot above Sensor 2 and align with Sensor 2



3. Turn the PTM4 on. Allow PLC and HMI to initialize completely
4. Using the Calibration Fixture measure the distance between Sensor 3 and Sensor 4
5. Turn the Maintenance Override key switch on.
6. Navigate to the Machine Setup page on the HMI.
7. Enter the distance between Sensor 3 and 4 in the Outbound Distance
8. Press the Normal Test button to toggle to the Sensor Validation Test
9. Navigate to the Main Page.

Sensor Validation Test Procedure

1. Press the Test Control Button on the main screen until Validate is displayed.
2. Set desired ball speed.
3. On Main Screen, press the Reset button.
4. On Main Screen, press the Ball # area and enter the number of balls for the test (typically 12)
5. On Main Screen, press the Shot # area, and then enter desired number of shots per ball (typically 10).
6. On Main Screen, press the Start Cycle button to begin the test.
7. After 120 shots (if using above mentioned typical number of balls & shots), the test will end.
8. If it is desired to do data analysis and subsequent data saving on the preceding test, start the special Microsoft Excel program (provided by Hye Precision Products). Then follow the instructions as seen in Chapter 2 PTM Template Multiple Shot Report Page and PTM Template Operations Page User Instructions

Preventative Maintenance

Preventative Maintenance Schedule

The Hye Precision Products Pneumatic Testing Machine is an extremely dependable and nearly maintenance free testing machine. The primary moving parts are pneumatic cylinders and valves that are lubrication sealed for life. No maintenance required. The guide bearings used with this machine are designed to operate without lubrication. So again no maintenance required. The most common issue related to machine performance is the accumulation of dust on the polycarbonate light sensor covers and the optical sensors. The accumulation of dust varies depending on the frequency of usage and the type of product tested. Subsequently periodic cleaning is necessary to insure good test results and proper operation.

The table list below serves as a guide to suggested preventive maintenance.

| DESCRIPTION | FREQUENCY | P/N |
|---|-----------|------------------|
| Inspect the EAR (Energy Absorbing Rubber) pad for defects. Replace as required. | Daily | HM4-CFTP1-A |
| Vacuum the inside of the test chamber to remove dust & debris | Monthly | N/A |
| Clean the polycarbonate light sensor covers to remove dust, use a moist cloth of 50/50 Isopropyl Alcohol & water or equivalent. | Monthly | N/A |
| Clean the optical sensors to remove dust using a moist cloth of 50/50 Isopropyl Alcohol & water or equivalent. | Monthly | N/A |
| Replace the air filter media (Figure 1 Item 2) | Bi-Yearly | SMC:AF20P-060S |
| Replace the mist separator media (Figure 1 Item 1) | Bi-Yearly | SMC:AFM20P-606AS |

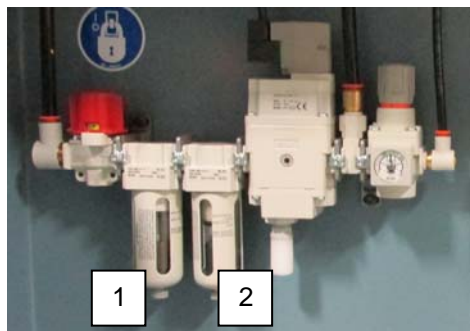
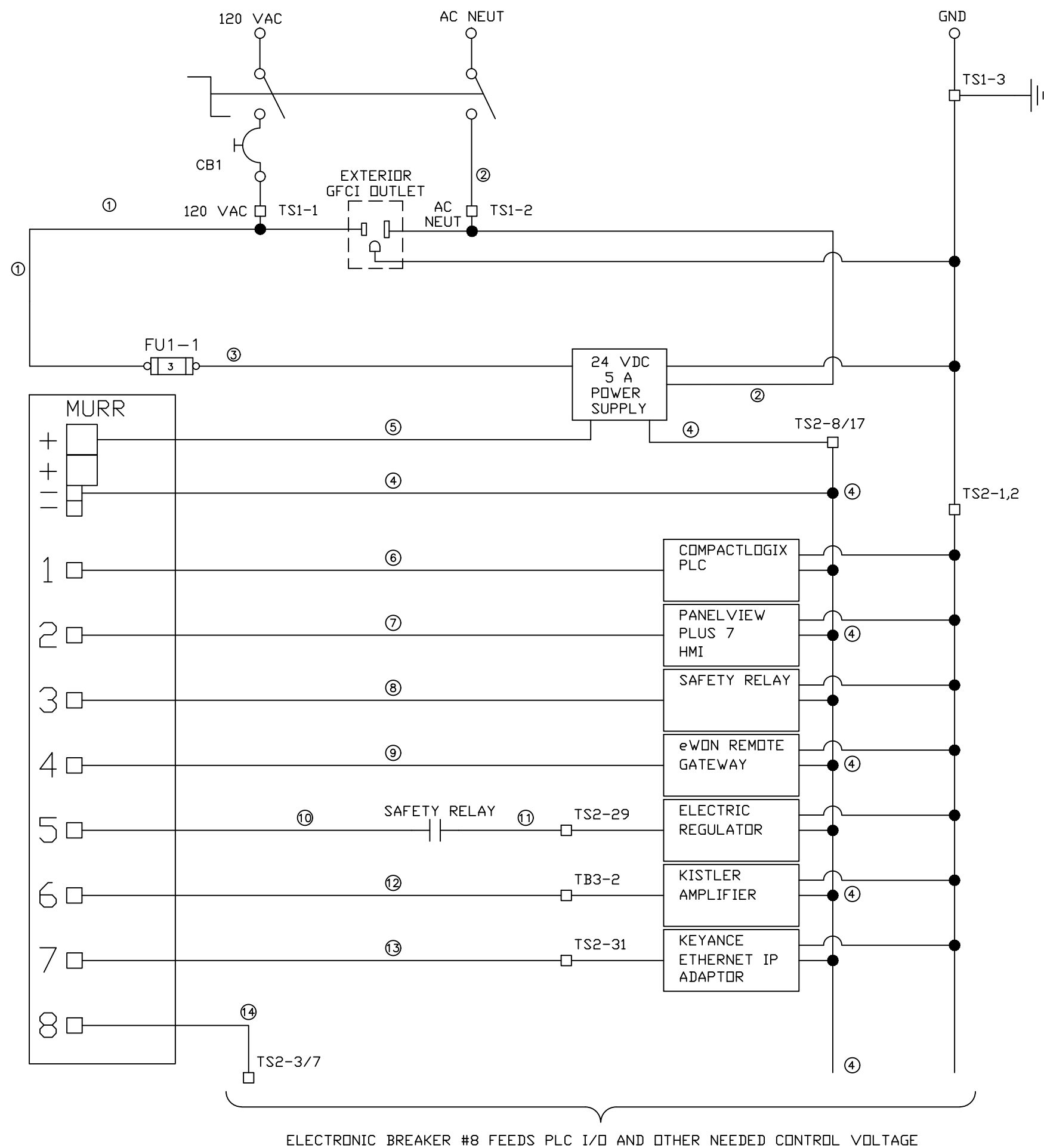


Figure 1 PTM4 Pneumatic Filters

Electrical Drawings

120VAC / 24VDC MAIN POWER



| 120 VAC SUPPLY POWER | | |
|----------------------|-------|----------------------------|
| WIRE COLOR | GAUGE | WIRE PURPOSE |
| BLACK | 12-14 | 120VAC CONSTANT VOLTAGE |
| WHITE | 12-18 | 120VAC NATURAL/Common |
| RED | 12-14 | SWITCHED 120VAC |
| GREEN | 12-14 | EARTH GROUND |
| 24 VDC CONTROL POWER | | |
| WIRE COLOR | GAUGE | WIRE PURPOSE |
| BROWN | 18 | 24VDC CONSTANT VOLTAGE |
| BLUE | 18 | OVDC COMMON |
| YELLOW | 18 | SAFETY CIRCUIT |
| BLACK | 18 | TS2 PLC INPUTS AND OUTPUTS |



Hye Precision Products

TOLERANCE - THREE PLACE DEC $\pm .002$ - FOUR PLACE DEC $\pm .0005$

DRAWN BY WBHII

DATE 10/01/18

| | |
|-------|-----|
| SCALE | N/A |
|-------|-----|

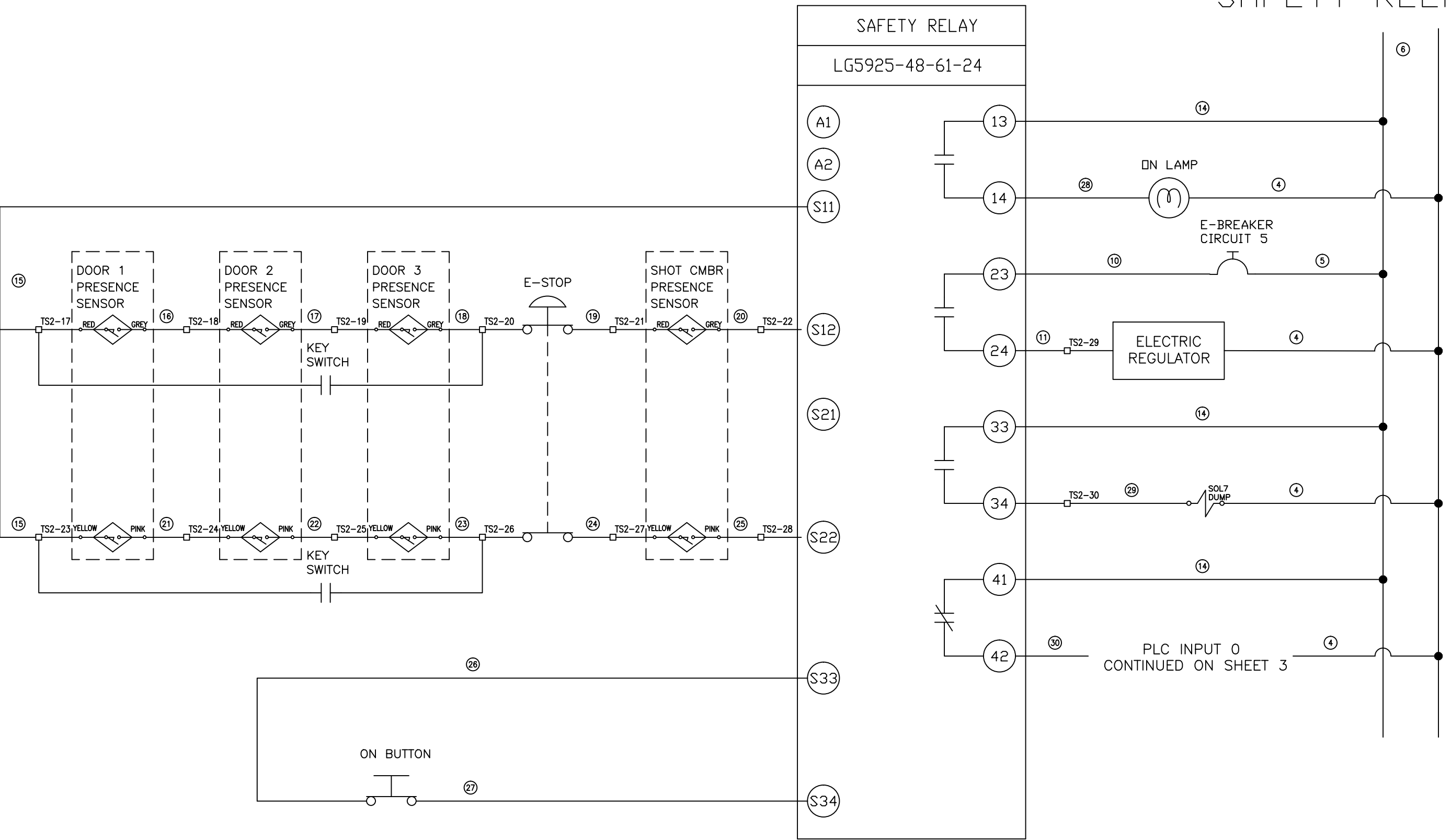
| | |
|--|-------------|
| | APPROVED BY |
|--|-------------|

| | | THREE PLACE DEC ± .002 | FLOOR PLACE DEC ± .0005 |
|-----|--------------------|------------------------|-------------------------|
| III | MAIN POWER CIRCUIT | | |
| 18 | PTM4 | | |


| | |
|-----|----------|
| NO. | SHEET NO |
|-----|----------|

| | |
|-------------|-----|
| HM4-WIRE-S1 | 1/5 |
|-------------|-----|

SAFETY RELAY



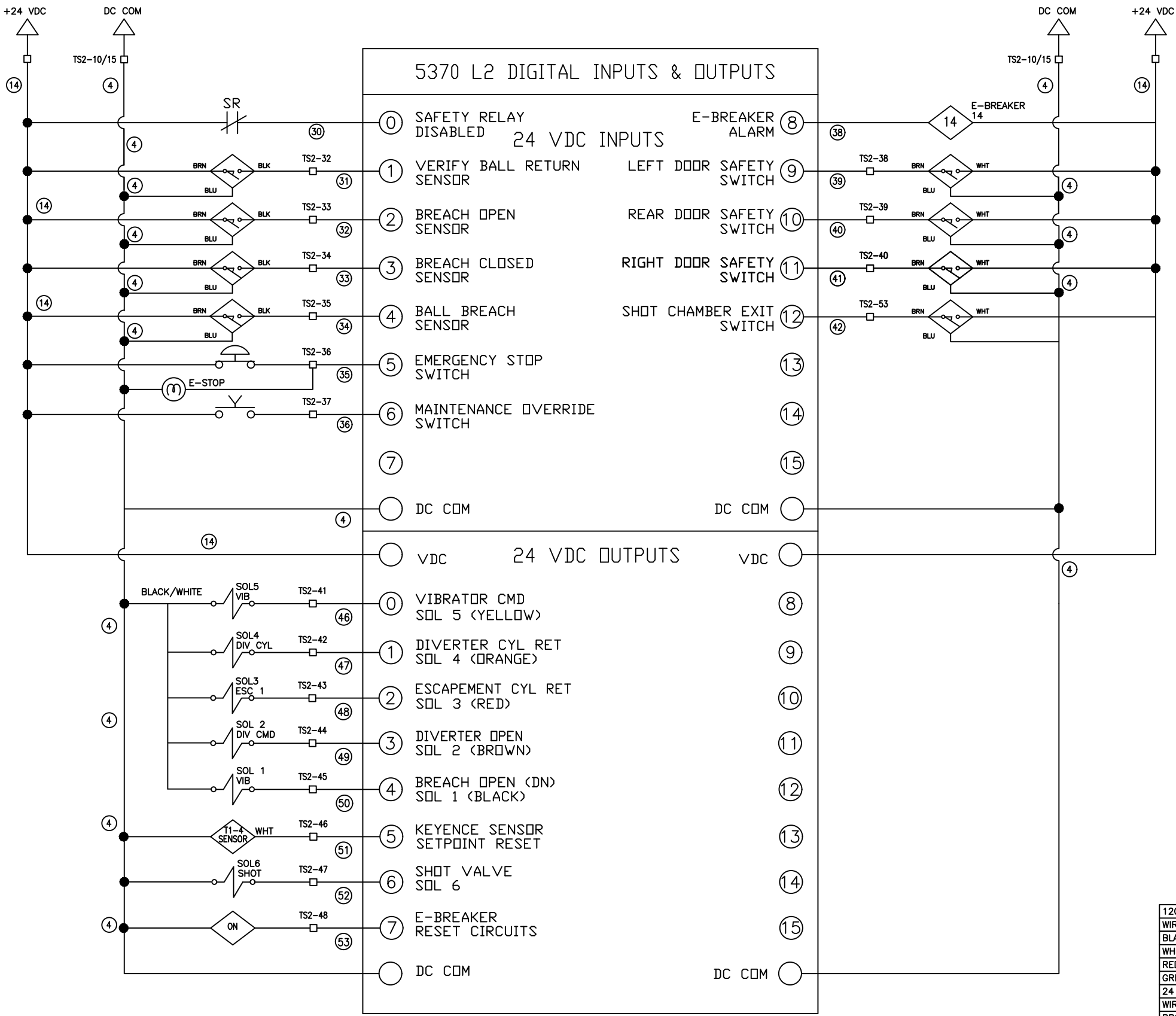
| 120 VAC SUPPLY POWER | | |
|----------------------|-------|----------------------------|
| WIRE COLOR | GAUGE | WIRE PURPOSE |
| BLACK | 12-14 | 120VAC CONSTANT VOLTAGE |
| WHITE | 12-18 | 120VAC NETURAL/COMMON |
| RED | 12-14 | SWITCHED 120VAC |
| GREEN | 12-14 | EARTH GROUND |
| 24 VDC CONTROL POWER | | |
| WIRE COLOR | GAUGE | WIRE PURPOSE |
| BROWN | 18 | 24VDC CONSTANT VOLTAGE |
| BLUE | 18 | 0VDC COMMON |
| YELLOW | 18 | SAEFTY CIRCUIT |
| BLACK | 18 | TS2 PLC INPUTS AND OUTPUTS |




Hye Precision Products

| | |
|---|-----------------|
| TOLERANCE - THREE PLACE DEC ±.002 - FOUR PLACE DEC ±.0005 | |
| DRAWN BY WBHII | SAFETY CIRCUIT |
| DATE 10/01/18 | PTM4 |
| SCALE N/A | |
| APPROVED BY | NO. HM4-WIRE-S2 |
| | SHEET NO 2/5 |

DIGITAL INPUTS & OUTPUTS

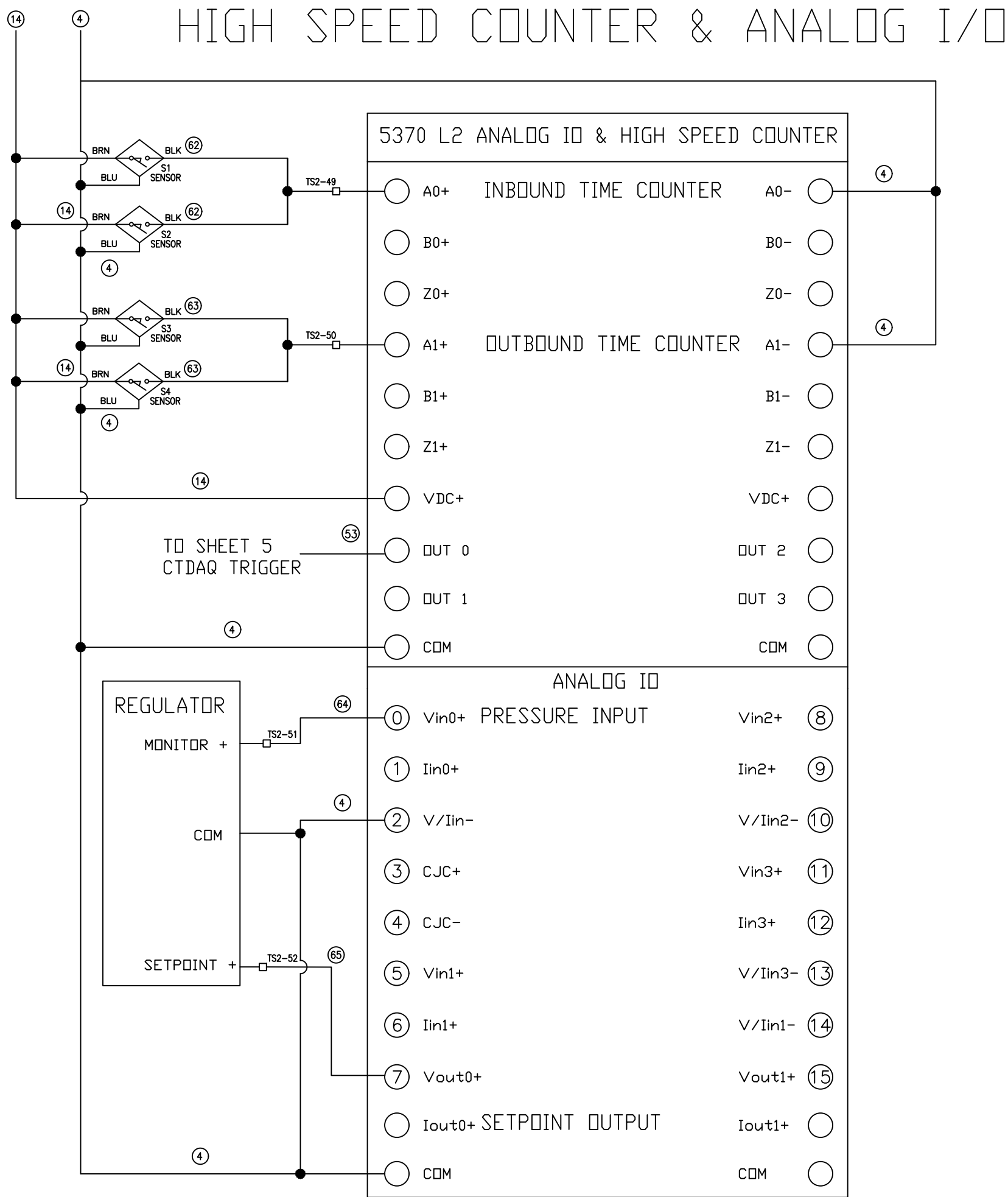


| 120 VAC SUPPLY POWER | | |
|----------------------|-------|----------------------------|
| WIRE COLOR | GAUGE | WIRE PURPOSE |
| BLACK | 12-14 | 120VAC CONSTANT VOLTAGE |
| WHITE | 12-18 | 120VAC NETURAL/COMMON |
| RED | 12-14 | SWITCHED 120VAC |
| GREEN | 12-14 | EARTH GROUND |
| 24 VDC CONTROL POWER | | |
| WIRE COLOR | GAUGE | WIRE PURPOSE |
| BROWN | 18 | 24VDC CONSTANT VOLTAGE |
| BLUE | 18 | OVDC COMMON |
| YELLOW | 18 | SAEFTY CIRCUIT |
| BLACK | 18 | TS2 PLC INPUTS AND OUTPUTS |

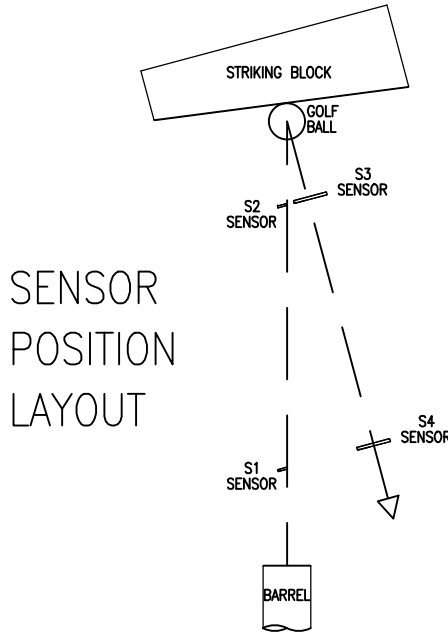


Hye Precision Products


| | |
|---|----------|
| TOLERANCE - THREE PLACE DEC ±.002 - FOUR PLACE DEC ±.0005 | |
| DRAWN BY | WBHII |
| DATE | 10/03/18 |
| SCALE | N/A |
| APPROVED BY | NO. |
| 24 VDC IO CIRCUIT PTM4 | |
| HM4-WIRE-S3 | |
| SHEET NO 3/5 | |



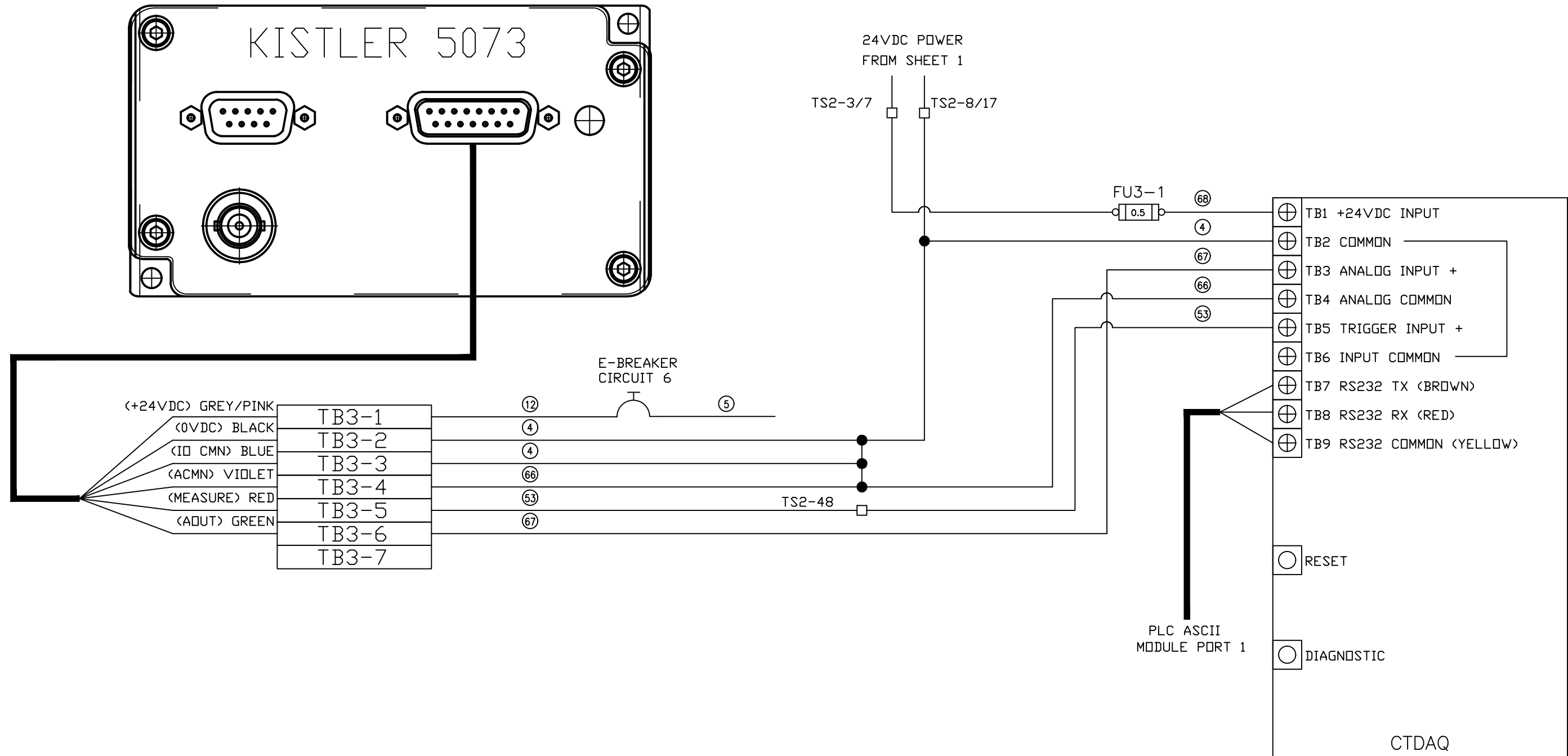
| REV. | DESCRIPTION | ECN NO. | APPROVED |
|------|---|---------|----------|
| A | CHANGED CTDAQ TRIGGER TO ALLOW FULL RANGE DATA COLLECTION | N/A | WBHII |
| B | OUT 0 FROM HSC CARD NOW GOES DIRECTLY TO TB3-5 | N/A | WBHII |
| C | CHANGED ANALOG IN AND OUTPUTS TO VOLTAGE FROM CURRENT | N/A | WBHII |




| 120 VAC SUPPLY POWER | | |
|----------------------|-------|----------------------------|
| WIRE COLOR | GAUGE | WIRE PURPOSE |
| BLACK | 12-14 | 120VAC CONSTANT VOLTAGE |
| WHITE | 12-18 | 120VAC NETURAL/COMMON |
| RED | 12-14 | SWITCHED 120VAC |
| GREEN | 12-14 | EARTH GROUND |
| 24 VDC CONTROL POWER | | |
| WIRE COLOR | GAUGE | WIRE PURPOSE |
| BROWN | 18 | 24VDC CONSTANT VOLTAGE |
| BLUE | 18 | OVDC COMMON |
| YELLOW | 18 | SAEFTY CIRCUIT |
| BLACK | 18 | TS2 PLC INPUTS AND OUTPUTS |

| | |
|---|------------------|
|  Hye Precision Products | |
| TOLERANCE - THREE PLACE DEC ±.002 - FOUR PLACE DEC ±.0005 | |
| DRAWN BY WBHII | HSC & ANALOG I/O |
| DATE 10/01/18 | PTM4 |
| SCALE N/A | |
| APPROVED BY NO. | HM4-WIRE-S4 |
| | SHEET NO 4/5 |

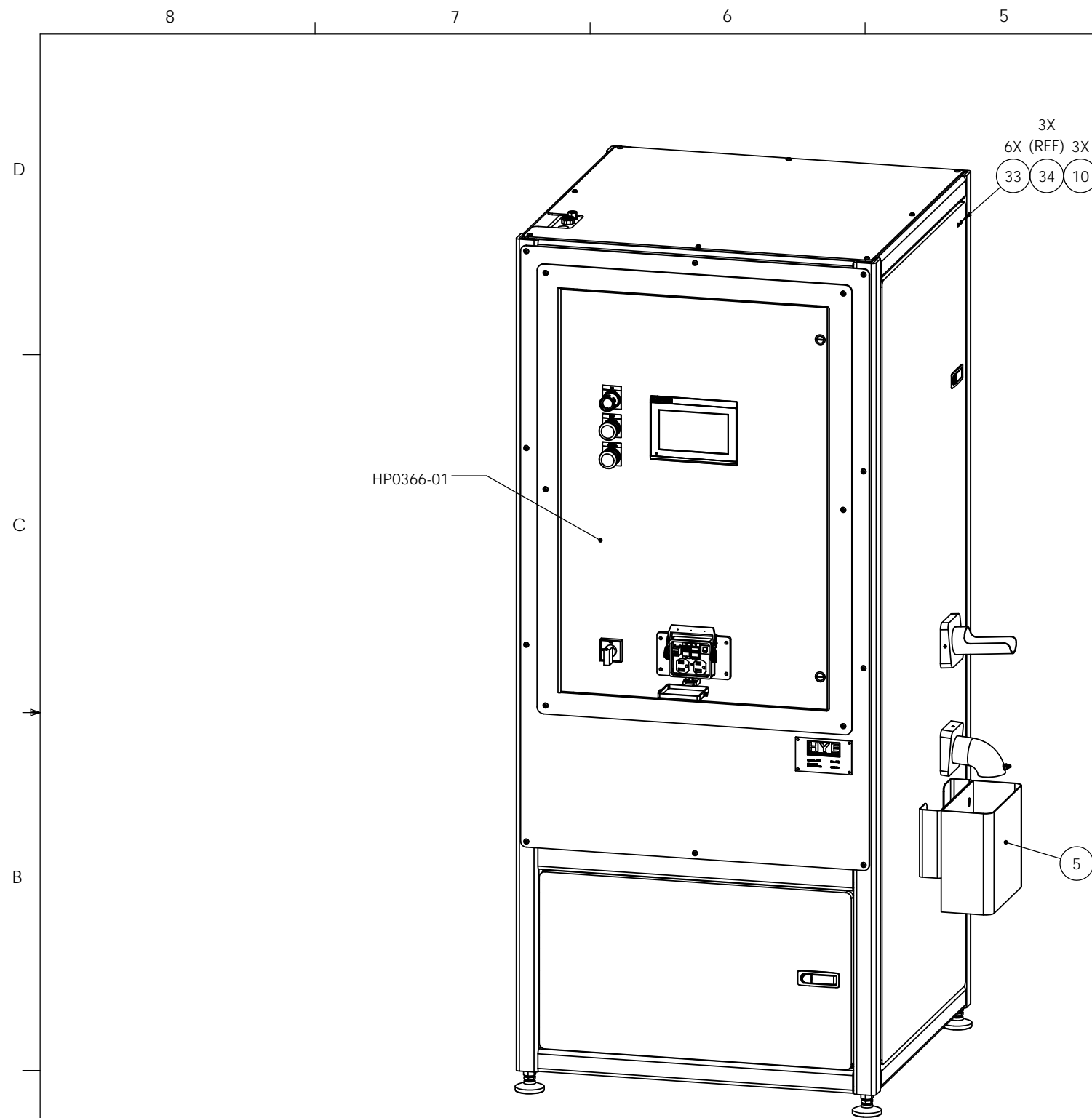
FORCE SENSOR AMPLIFIER & CONTACT TIME SENSOR



| 120 VAC SUPPLY POWER | | |
|----------------------|-------|----------------------------|
| WIRE COLOR | GUAGE | WIRE PURPOSE |
| BLACK | 12-14 | 120VAC CONSTANT VOLTAGE |
| WHITE | 12-18 | 120VAC NATURAL/Common |
| RED | 12-14 | SWITCHED 120VAC |
| GREEN | 12-14 | EARTH GROUND |
| 24 VDC CONTROL POWER | | |
| WIRE COLOR | GUAGE | WIRE PURPOSE |
| BROWN | 18 | 24VDC CONSTANT VOLTAGE |
| BLUE | 18 | 0VDC COMMON |
| YELLOW | 18 | SAEFTY CIRCUIT |
| BLACK | 18 | TS2 PLC INPUTS AND OUTPUTS |


| | |
|---|----------------------------------|
|  | |
| <p><i>Hye Precision Products</i></p> | |
| <p>TOLERANCE - THREE PLACE DEC ±.002 - FOUR PLACE DEC ±.0005</p> | |
| <p>DRAWN BY WBHII</p> | <p>DATE 10/01/18</p> |
| <p>SCALE N/A</p> | <p>FORCE ANALOG I/O PTM4</p> |
| <p>APPROVED BY</p> | <p>NO. 5</p> |
| <p>HM4-WIRE-S5</p> | <p>SHEET NO 5/5</p> |

Assembly Drawings



| REVISIONS | | | | |
|-----------|------|---------------------------|-----------|-------|
| ZONE | REV. | DESCRIPTION | DATE | ECN |
| A2 | A | HP0366-02_B WAS HP0366-02 | 9/12/2019 | 19028 |

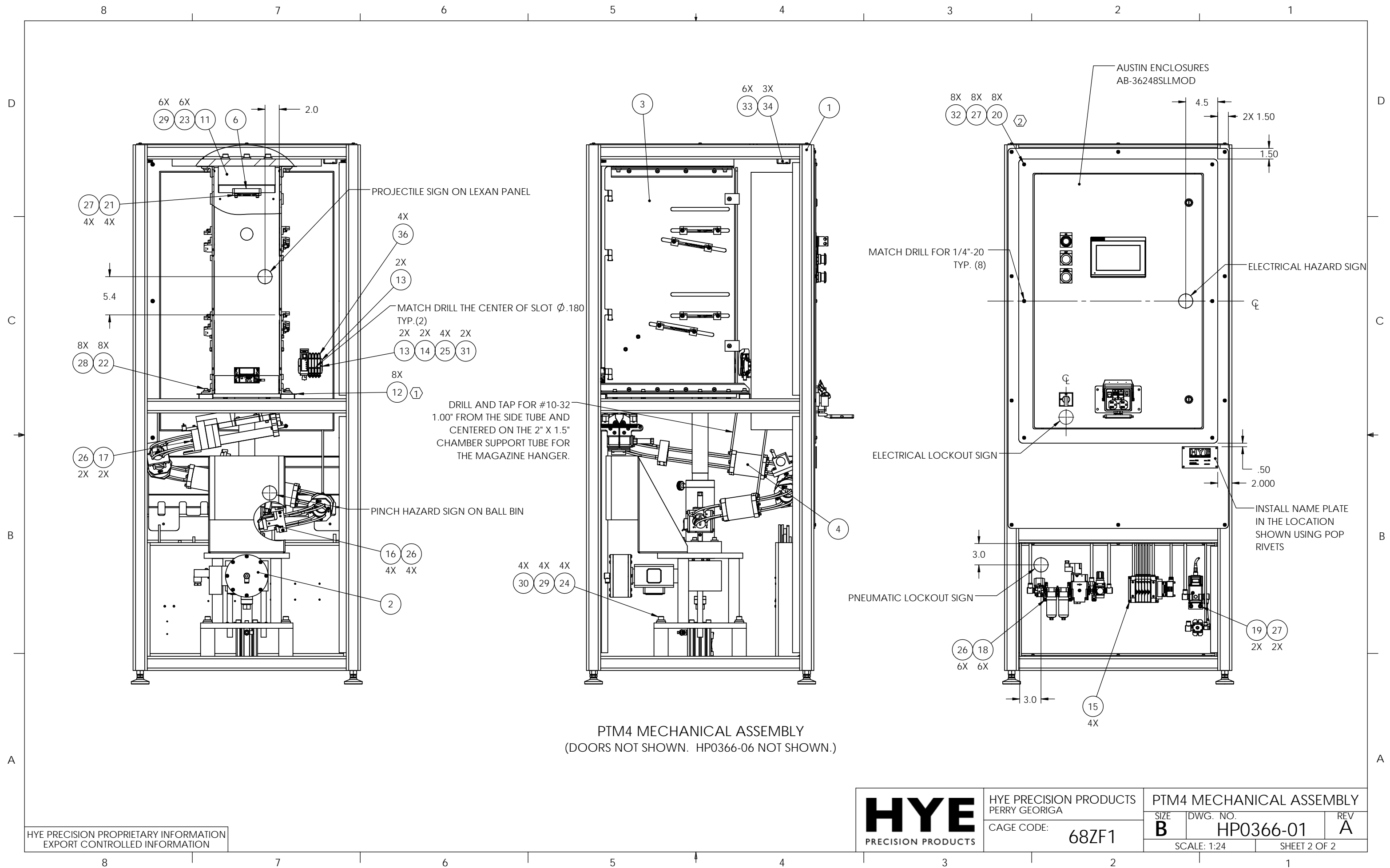
| | | | | | | | | | |
|---|----|------|----------------------|---------------------------------------|-------------|-----------|-------------|--------|------|
| ① | 4 | 36 | FSN-44P | AMPLIFIER | | | | | |
| | 1 | 35 | NU-EP1 | COMMUNICATION UNIT | | | | | |
| | 3 | 34 | 440N-Z21W1PA | MAGNETICALLY CODED NON-CONTACT SWITCH | | N/A | | | |
| | 12 | 33 | 99355A151 | HIGH-SECURITY BHCS, #8-32 X 1.00L | 0KVE6 | 18-8 S.S. | PLAIN | | |
| | 8 | 32 | 91847A029 | #10-32 HEX NUT | 39428 | 18-8 S.S. | PLAIN | | |
| | 2 | 31 | 91841A009 | #8-32 HEX NUT | 39428 | 18-8 S.S. | PLAIN | | |
| | 4 | 30 | 98099A045 | 5/8" HEAVY DUTY WASHER | 39428 | STEEL | BLACK OXIDE | | |
| | 10 | 29 | 98099A033 | 1/2" HEAVY DUTY WASHER | 39428 | STEEL | BLACK OXIDE | | |
| | 8 | 28 | 98099A030 | 5/16" HEAVY DUTY WASHER | 39428 | STEEL | BLACK OXIDE | | |
| | 14 | 27 | 98017A660 | 1/4" NAS WASHER | 39428 | 18-8 S.S. | PLAIN | | |
| | 12 | 26 | 90945A741 | #10 NAS WASHER | 39428 | 18-8 S.S. | PLAIN | | |
| | 4 | 25 | 90945A726 | #8 NAS WASHER | 39428 | 18-8 S.S. | PLAIN | | |
| | 4 | 24 | 72260 | 1/2"-13 X 7.00 SHCS | 74445 | ALY STL | BLACK OXIDE | | |
| | 6 | 23 | 72234 | 1/2"-13 X 2.00" SHCS | 74445 | ALY STL | BLACK OXIDE | | |
| | 8 | 22 | 72128 | 5/16"-18 X 1.00" SHCS | 74445 | ALY STL | BLACK OXIDE | | |
| | 4 | 21 | 72102 | 1/4"-20 X 1.25" SHCS | 74445 | ALY STL | BLACK OXIDE | | |
| | 6 | 20 | 64044 | 1/4"-20 X .625" BHCS | 74445 | ALY STL | BLACK OXIDE | | |
| | 2 | 19 | 73054 | 1/4"-20 X .375" SHCS | 74445 | ALY STL | BLACK OXIDE | | |
| | 6 | 18 | 73034 | #10-32 X .375" SHCS | 74445 | ALY STL | BLACK OXIDE | | |
| | 2 | 17 | 72084 | #10-24 X 1.50" SHCS | 74445 | ALY STL | BLACK OXIDE | | |
| | 4 | 16 | 72076 | #10-24 X .75" SHCS | 74445 | ALY STL | BLACK OXIDE | | |
| | 4 | 15 | 72060 | #8-32 X .75" SHCS | 74445 | ALY STL | BLACK OXIDE | | |
| | 2 | 14 | 72054 | #8-32 X .375" SHCS | 74445 | ALY STL | BLACK OXIDE | | |
| | 2 | 13 | OP-26751 | DIN RAIL END CAP | | N/A | N/A | | |
| | 8 | 12 | (PART NUMBER VARIES) | TRADE SIZE "AA" SLOTTED SHIM | 39428 | 18-8 S.S. | PLAIN | | |
| | 1 | 11 | HP0091-102 | FRAME STRIKING PLATE | 68ZF1 | A2 | Rc 56-58 | | |
| | 3 | 10 | HP0366-141 | DOOR SENSOR NUT PLATE | 68ZF1 | 440 S.S. | PLAIN | | |
| | 1 | 9 | HP0366-136 | AMPLIFIER DIN RAIL | 68ZF1 | ALUMINUM | | | |
| | AR | 8 | HP0366-09 | 24 BALL MAGAZINE | 68ZF1 | N/A | | | |
| | 1 | 7 | HP0366-07 | DIVERTER ASSEMBLY | 68ZF1 | N/A | N/A | | |
| | 1 | 6 | HP0091-06 | FORCE SENSOR ASSEMBLY | 68ZF1 | N/A | N/A | | |
| | 1 | 5 | HP0366-06 | OUTSIDE LOAD/UNLOAD KIT | 68ZF1 | N/A | N/A | | |
| | AR | 4 | HP0366-05 | 36 BALL MAGAZINE ASSEMBLY | 68ZF1 | N/A | N/A | | |
| | 1 | 3 | HP0366-04 | CHAMBER ASSEMBLY | 68ZF1 | N/A | N/A | | |
| | 1 | 2 | HP0366-03 | GUN ASSEMBLY | 68ZF1 | N/A | N/A | | |
| | △ | 1 | HP0366-02_B | FRAME ASSEMBLY | 68ZF1 | N/A | N/A | | |
| | | QTY. | ITEM NO. | PART NUMBER | DESCRIPTION | CAGE | MATERIAL | FINISH | ZONE |

| | | | | | | |
|---------------|---|-----------|---------------|---|------------------------------|-----------------|
| Y (HP0366-04) | UNLESS OTHERWISE SPECIFIED: | DATE | 9/13/2018 | <div> PRECISION PRODUCTS</div> | | |
| | DIMENSIONS ARE IN INCHES TOLERANCES: | DRAWN | C. ORINGDERFF | | | |
| | FRACTIONAL ± .03 | CHECKED | F. SUAREO | PTM4 MECHANICAL ASSEMBLY | | |
| | ANGULAR: MACH ± .25 BEND ±.25 | ENG APPR. | B. HUGHES | | | |
| | TWO PLACE DECIMAL ±.03 | MFG APPR. | S. WHITNEY | | | |
| | THREE PLACE DECIMAL ±.002 | Q.A. | J. BATCHELOR | | | |
| | FOUR PLACE DECIMAL ±.0005 | | | SIZE B | DWG. NO. HP0366-01 | REV A |
| | CAGE CODE: 68ZF1 | | | SCALE: 1:24 | | SHEET 1 OF 2 |

NOTES:

① USE TRADE SIZE AA SHIMS TO FIT THE CHAMBER ASSEMBLY (HP0366-04) TO THE FRAME ASSEMBLY (HP0366-02).

HYE PRECISION PROPRIETARY INFORMATION
THIS DOCUMENT SHALL NOT BE REPRODUCED NOR SHALL THE
INFORMATION CONTAINED HEREIN BE USED BY OR DISCLOSED TO
OTHERS EXCEPT AS EXPRESSLY AUTHORIZED BY HYE PRECISION PRODUCTS
EXPORT CONTROLLED INFORMATION

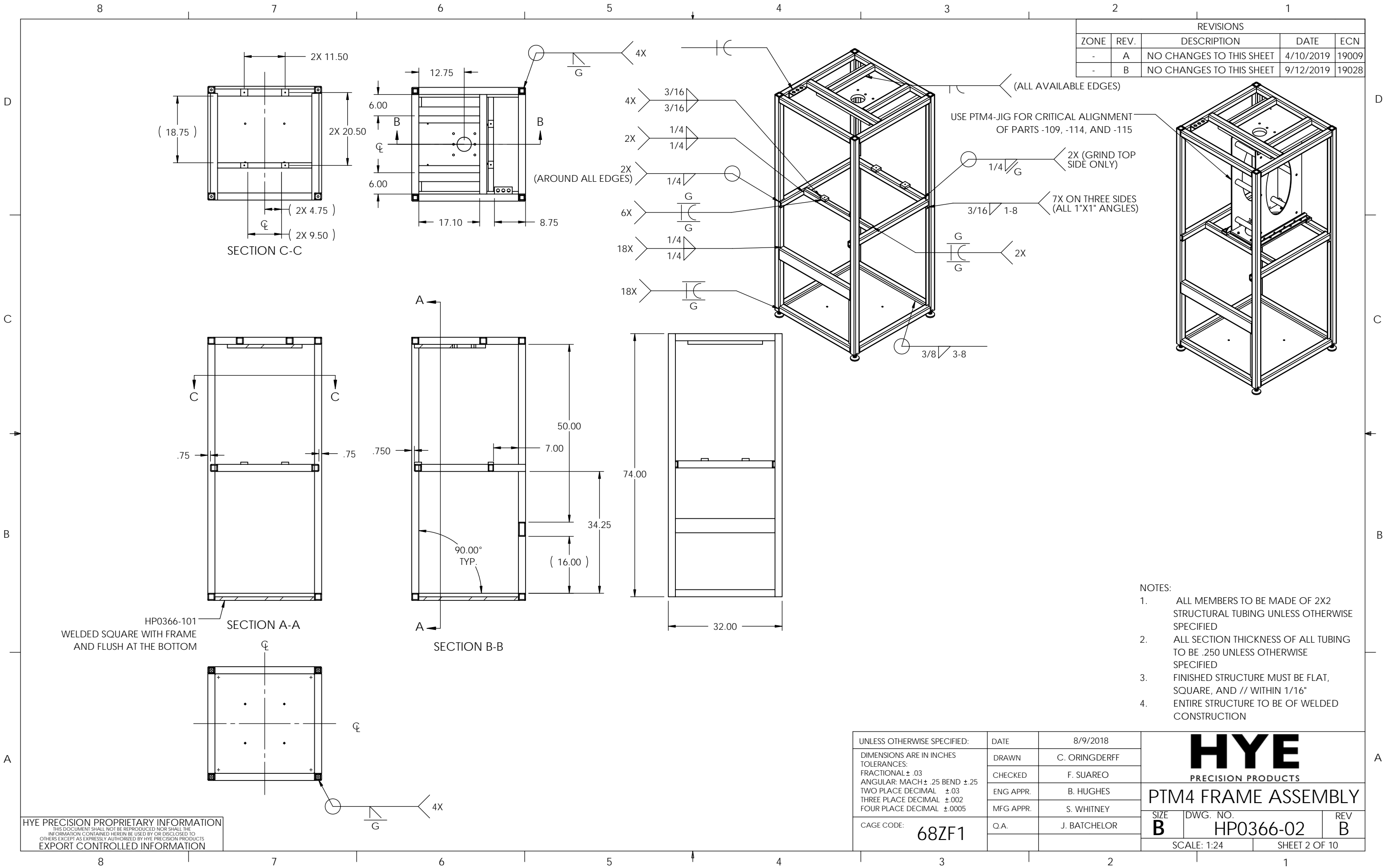


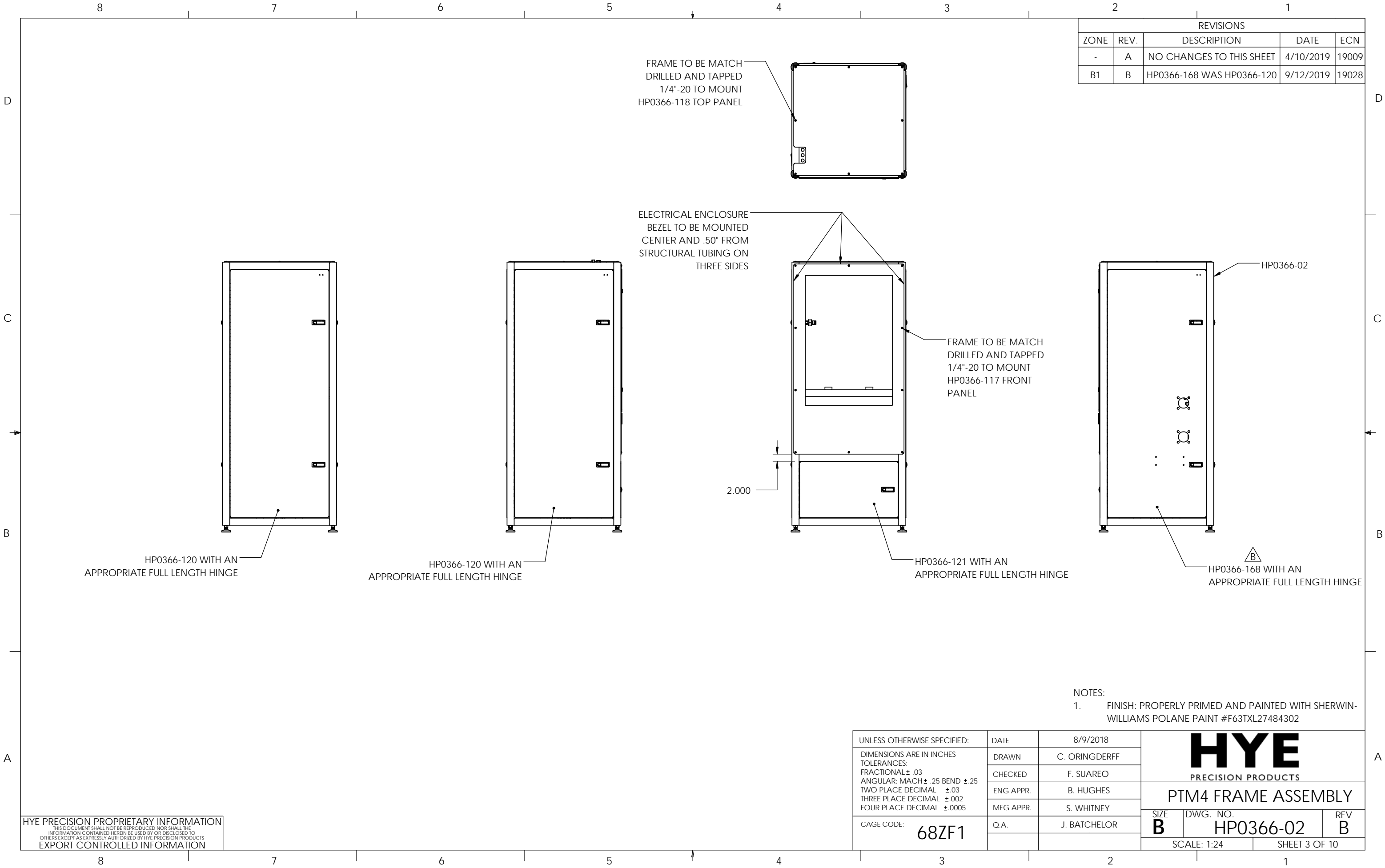
HYE PRECISION PROPRIETARY INFORMATION
EXPORT CONTROLLED INFORMATION

HYE
PRECISION PRODUCTS

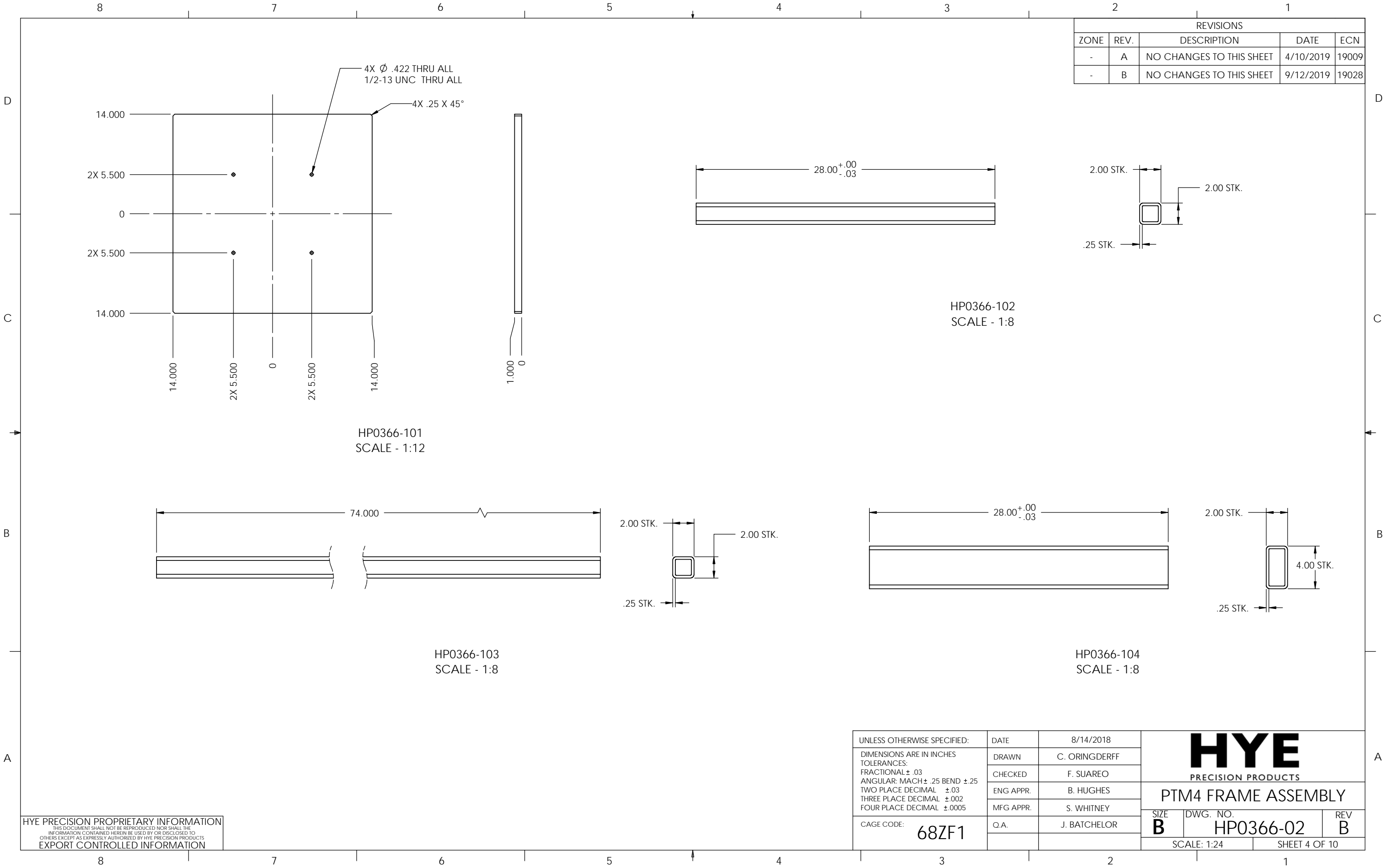
HYE PRECISION PRODUCTS
PERRY GEORGIA
CAGE CODE: 68ZF1

PTM4 MECHANICAL ASSEMBLY
SIZE B DWG. NO. HP0366-01 REV A
SCALE: 1:24 SHEET 2 OF 2





HYE PRECISION PROPRIETARY INFORMATION
THIS DOCUMENT SHALL NOT BE REPRODUCED NOR SHALL THE
INFORMATION CONTAINED HEREIN BE USED BY OR DISCLOSED TO
OTHERS EXCEPT AS EXPRESSLY AUTHORIZED BY HYE PRECISION PRODUCTS
EXPORT CONTROLLED INFORMATION



| REVISIONS | | | | |
|-----------|------|--------------------------|-----------|-------|
| ZONE | REV. | DESCRIPTION | DATE | ECN |
| - | A | NO CHANGES TO THIS SHEET | 4/10/2019 | 19009 |
| - | B | NO CHANGES TO THIS SHEET | 9/12/2019 | 19028 |

HP0366-102
SCALE - 1:8

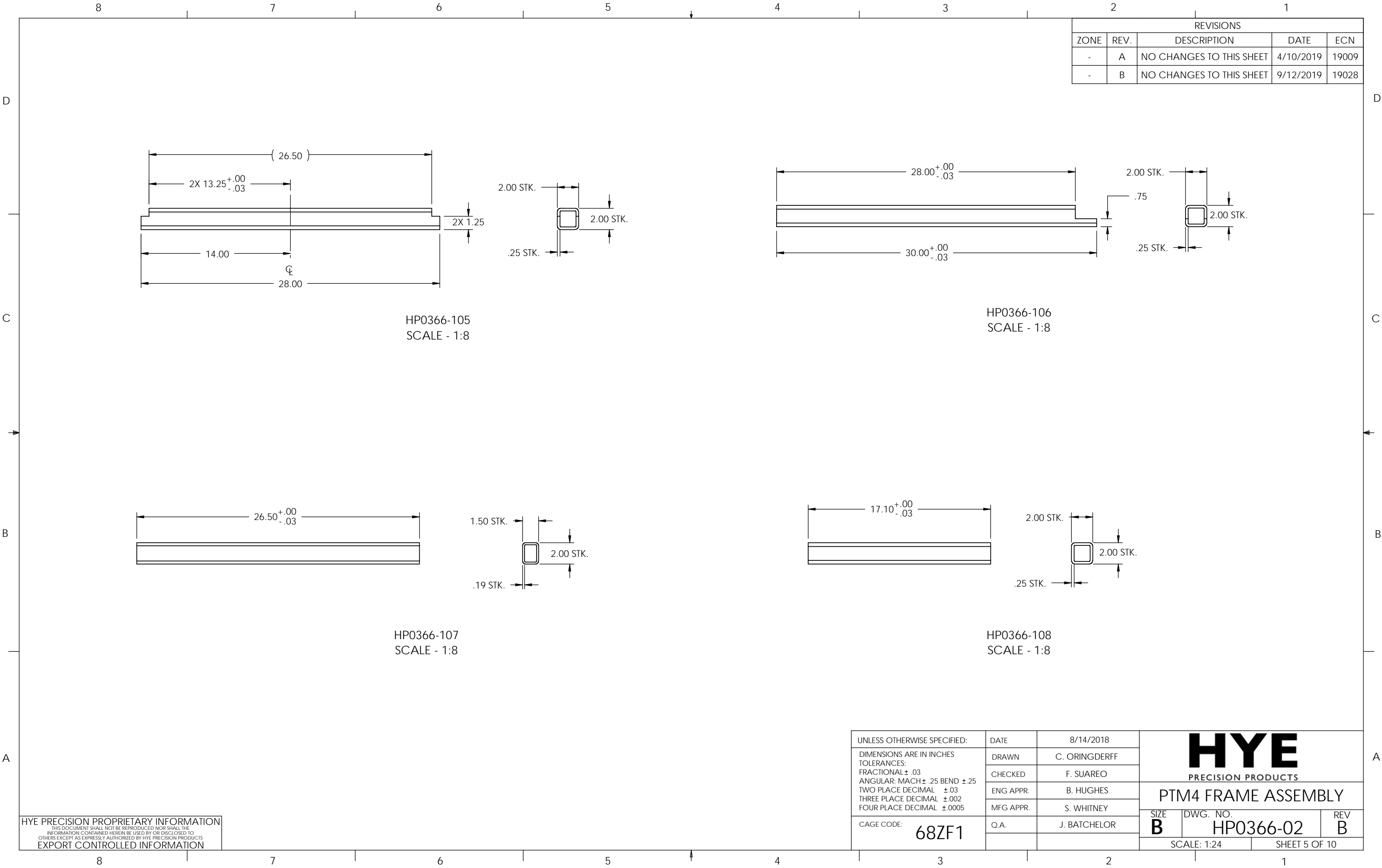
HP0366-101
SCALE - 1:12

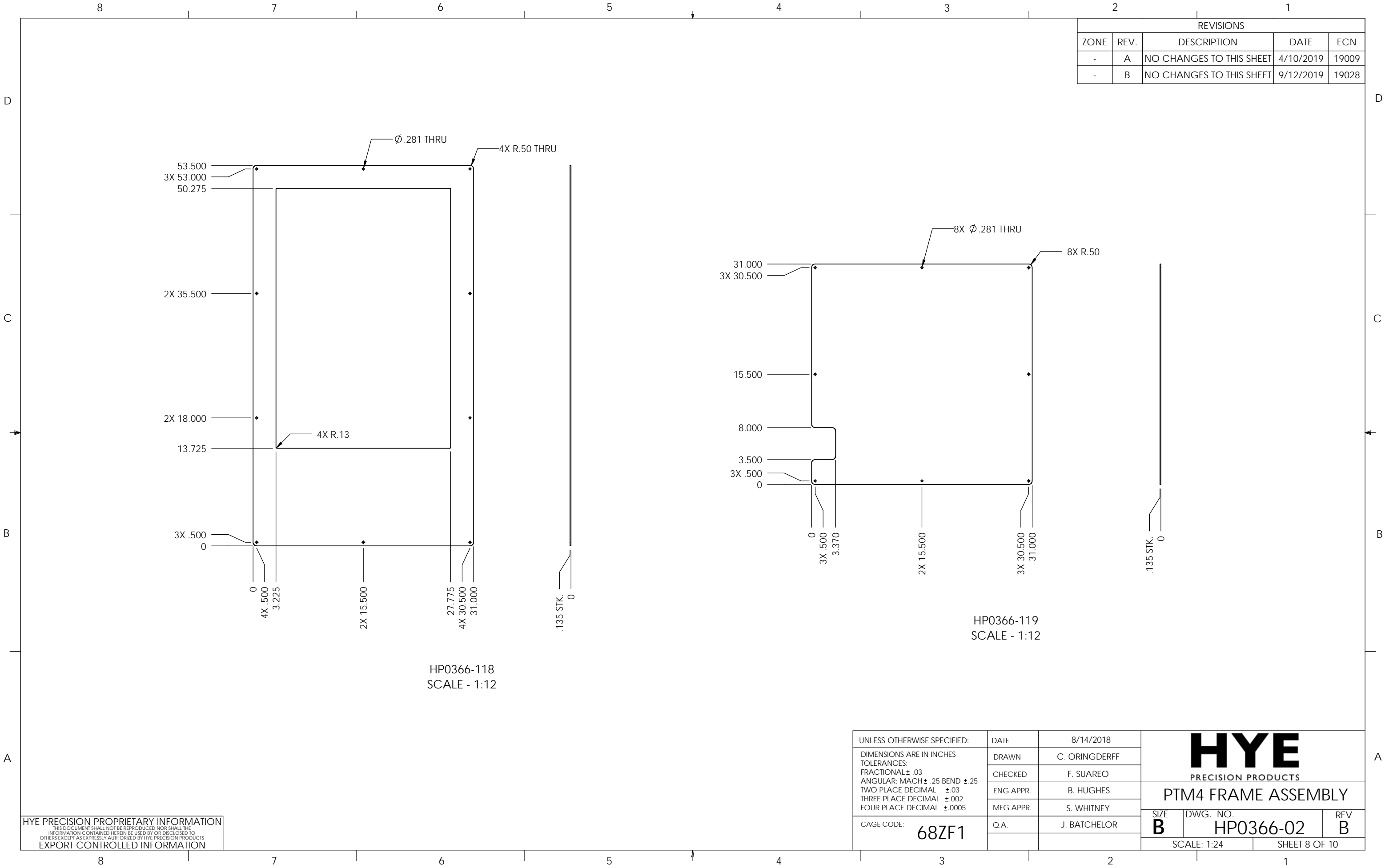
HP0366-103
SCALE - 1:8

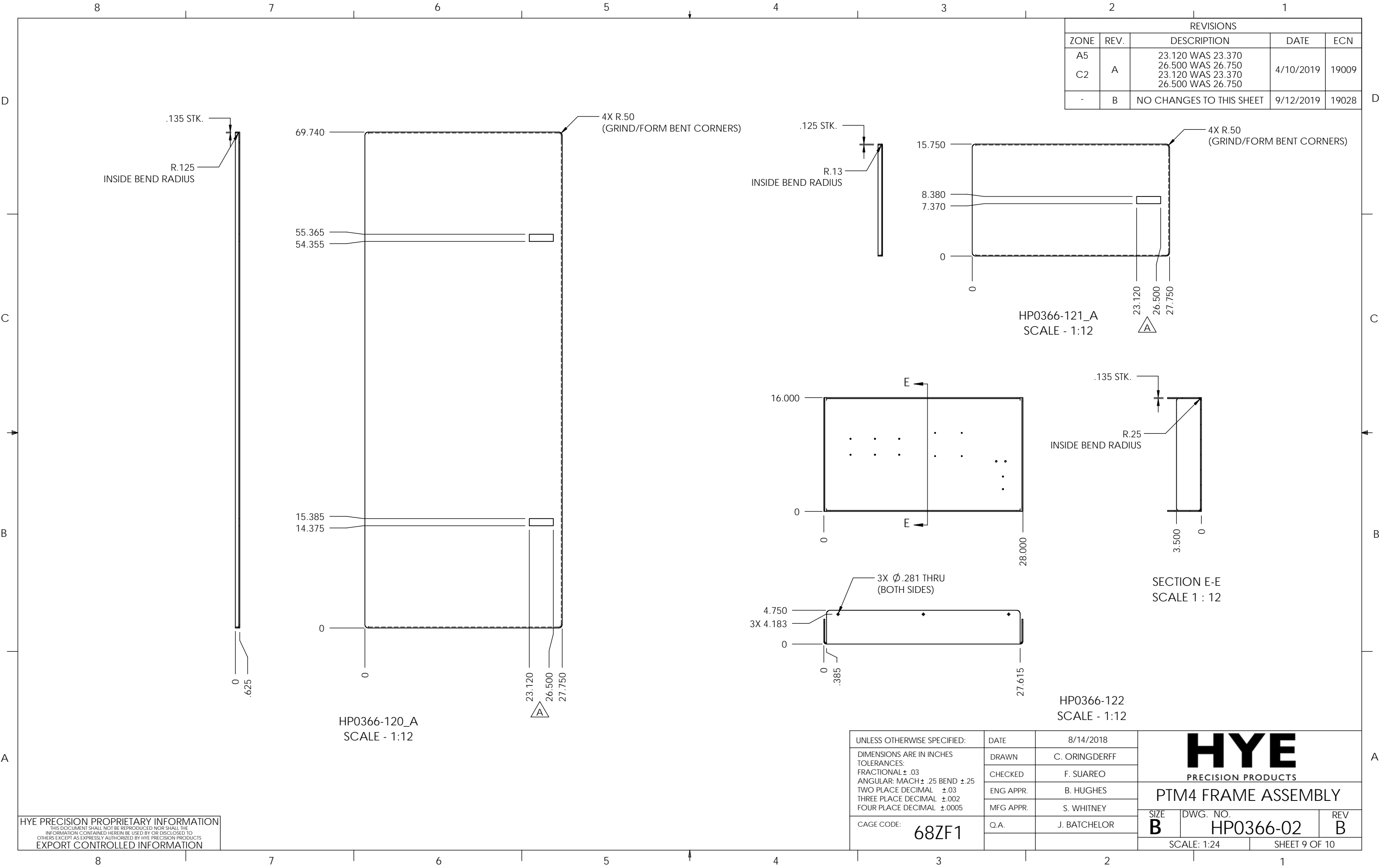
HP0366-104
SCALE - 1:8

HYE PRECISION PROPRIETARY INFORMATION
THIS DOCUMENT SHALL NOT BE REPRODUCED NOR SHALL THE
INFORMATION CONTAINED HEREIN BE USED BY OR DISCLOSED TO
OTHERS EXCEPT AS EXPRESSLY AUTHORIZED BY HYE PRECISION PRODUCTS
EXPORT CONTROLLED INFORMATION

| | | | | |
|---|-----------|------------------------------|---|--|
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm .03$ ANGULAR: MACH $\pm .25$ BEND $\pm .25$ TWO PLACE DECIMAL $\pm .03$ THREE PLACE DECIMAL $\pm .002$ FOUR PLACE DECIMAL $\pm .0005$ | DATE | 8/14/2018 | HYE PRECISION PRODUCTS PTM4 FRAME ASSEMBLY | |
| | DRAWN | C. ORINGDERFF | | |
| | CHECKED | F. SUAREO | | |
| | ENG APPR. | B. HUGHES | | |
| | MFG APPR. | S. WHITNEY | SCALE: 1:24 SHEET 4 OF 10 | |
| CAGE CODE: | Q.A. | J. BATCHELOR | | |
| 68ZF1 | | | | |
| SIZE B | | DWG. NO. HP0366-02 | REV B | |

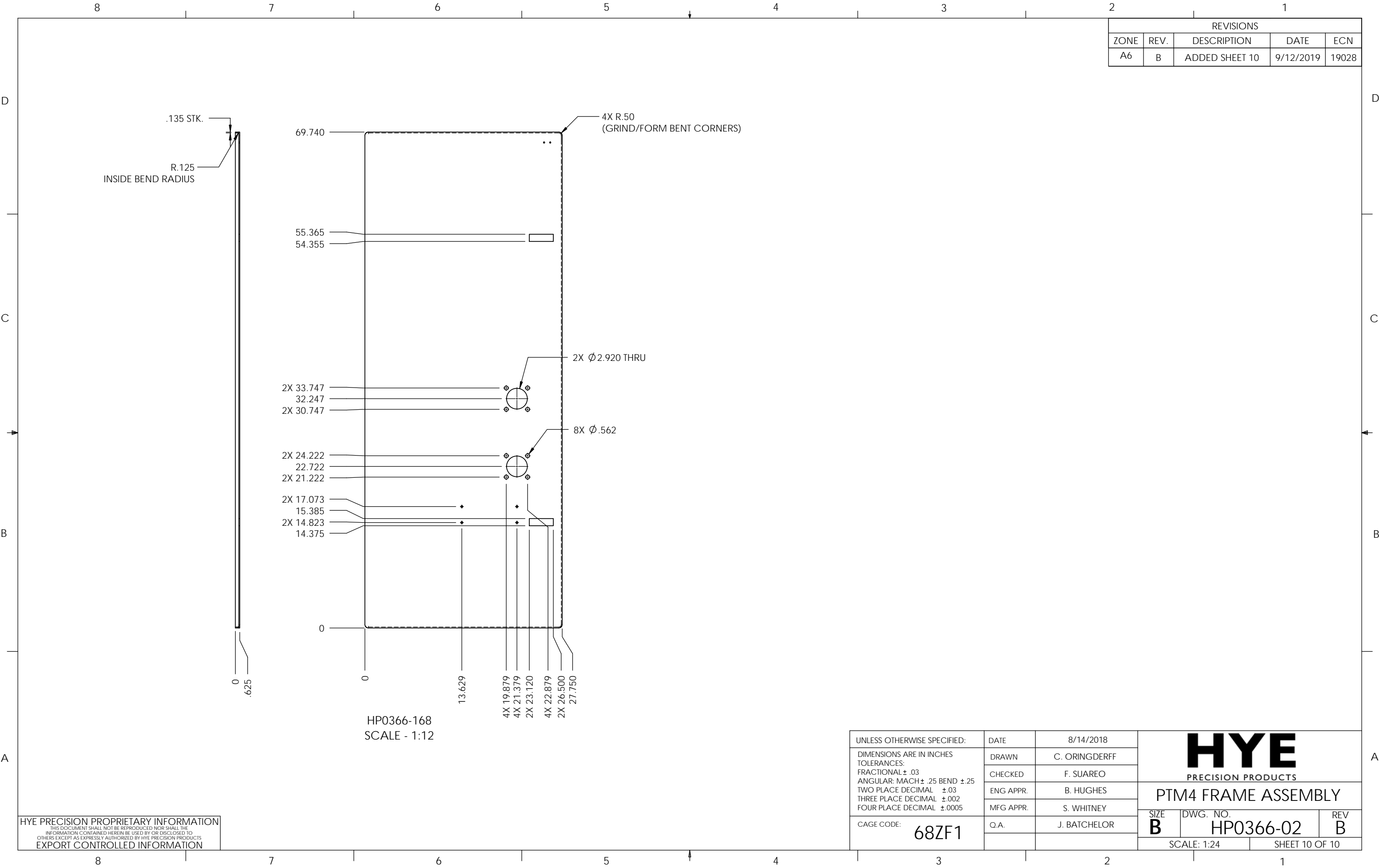






HYE PRECISION PROPRIETARY INFORMATION
THIS DOCUMENT SHALL NOT BE REPRODUCED NOR SHALL THE
INFORMATION CONTAINED HEREIN BE USED BY OR DISCLOSED TO
OTHERS EXCEPT AS EXPRESSLY AUTHORIZED BY HYE PRECISION PRODUCTS
EXPORT CONTROLLED INFORMATION

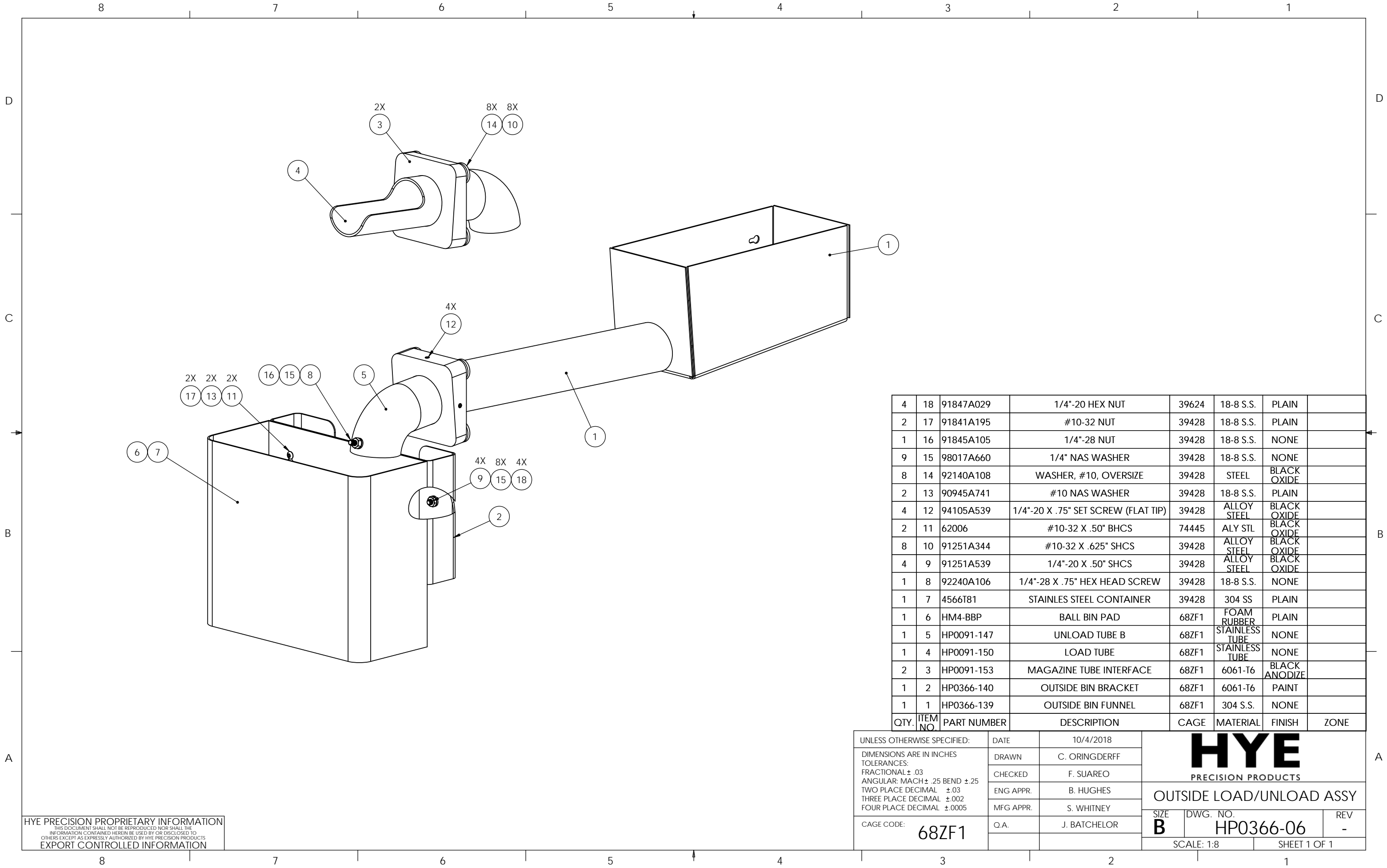
| | | | | | | |
|---|-----------|---------------|-------------|--|---------------|--|
| UNLESS OTHERWISE SPECIFIED: | | DATE | 8/14/2018 | <div><div>HYE</div><div>PRECISION PRODUCTS</div><div>PTM4 FRAME ASSEMBLY</div></div> | | |
| DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± .03 ANGULAR: MACH ± .25 BEND ± .25 TWO PLACE DECIMAL ±.03 THREE PLACE DECIMAL ±.002 FOUR PLACE DECIMAL ±.0005 | DRAWN | C. ORINGDERFF | | | | |
| | CHECKED | F. SUAREO | | | | |
| | ENG APPR. | B. HUGHES | | | | |
| | MFG APPR. | S. WHITNEY | | | | |
| CAGE CODE: <div>68ZF1</div> | Q.A. | J. BATCHELOR | SIZE B | DWG. NO. HP0366-02 | REV B | |
| | | | SCALE: 1:24 | | SHEET 9 OF 10 | |
| | | | | | | |



| REVISIONS | | | | |
|-----------|------|----------------|-----------|-------|
| ZONE | REV. | DESCRIPTION | DATE | ECN |
| A6 | B | ADDED SHEET 10 | 9/12/2019 | 19028 |

| | | | | | | |
|---|-----------|---------------|-----------|---|-----------------------|----------------|
| UNLESS OTHERWISE SPECIFIED: | | DATE | 8/14/2018 | <div><div><div>HYE</div><div>PRECISION PRODUCTS</div></div><div>PTM4 FRAME ASSEMBLY</div></div> | | |
| DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± .03 ANGULAR: MACH ± .25 BEND ± .25 TWO PLACE DECIMAL ±.03 THREE PLACE DECIMAL ±.002 FOUR PLACE DECIMAL ±.0005 | DRAWN | C. ORINGDERFF | | | | |
| | CHECKED | F. SUAREO | | | | |
| | ENG APPR. | B. HUGHES | | | | |
| | MFG APPR. | S. WHITNEY | | | | |
| CAGE CODE: <div>68ZF1</div> | Q.A. | J. BATCHELOR | | SIZE B | DWG. NO. HP0366-02 | REV B |
| | | | | SCALE: 1:24 | | SHEET 10 OF 10 |

HYE PRECISION PROPRIETARY INFORMATION
THIS DOCUMENT SHALL NOT BE REPRODUCED NOR SHALL THE
INFORMATION CONTAINED HEREIN BE USED BY OR DISCLOSED TO
OTHERS EXCEPT AS EXPRESSLY AUTHORIZED BY HYE PRECISION PRODUCTS
EXPORT CONTROLLED INFORMATION




| | | | | | | | |
|------|----------|-------------|-------------------------------------|-------|----------------|---------------|------|
| 4 | 18 | 91847A029 | 1/4"-20 HEX NUT | 39624 | 18-8 S.S. | PLAIN | |
| 2 | 17 | 91841A195 | #10-32 NUT | 39428 | 18-8 S.S. | PLAIN | |
| 1 | 16 | 91845A105 | 1/4"-28 NUT | 39428 | 18-8 S.S. | NONE | |
| 9 | 15 | 98017A660 | 1/4" NAS WASHER | 39428 | 18-8 S.S. | NONE | |
| 8 | 14 | 92140A108 | WASHER, #10, OVERSIZE | 39428 | STEEL | BLACK OXIDE | |
| 2 | 13 | 90945A741 | #10 NAS WASHER | 39428 | 18-8 S.S. | PLAIN | |
| 4 | 12 | 94105A539 | 1/4"-20 X .75" SET SCREW (FLAT TIP) | 39428 | ALLOY STEEL | BLACK OXIDE | |
| 2 | 11 | 62006 | #10-32 X .50" BHCS | 74445 | ALY STL | BLACK OXIDE | |
| 8 | 10 | 91251A344 | #10-32 X .625" SHCS | 39428 | ALLOY STEEL | BLACK OXIDE | |
| 4 | 9 | 91251A539 | 1/4"-20 X .50" SHCS | 39428 | ALLOY STEEL | BLACK OXIDE | |
| 1 | 8 | 92240A106 | 1/4"-28 X .75" HEX HEAD SCREW | 39428 | 18-8 S.S. | NONE | |
| 1 | 7 | 4566T81 | STAINLES STEEL CONTAINER | 39428 | 304 SS | PLAIN | |
| 1 | 6 | HM4-BBP | BALL BIN PAD | 68ZF1 | FOAM RUBBER | PLAIN | |
| 1 | 5 | HP0091-147 | UNLOAD TUBE B | 68ZF1 | STAINLESS TUBE | NONE | |
| 1 | 4 | HP0091-150 | LOAD TUBE | 68ZF1 | STAINLESS TUBE | NONE | |
| 2 | 3 | HP0091-153 | MAGAZINE TUBE INTERFACE | 68ZF1 | 6061-T6 | BLACK ANODIZE | |
| 1 | 2 | HP0366-140 | OUTSIDE BIN BRACKET | 68ZF1 | 6061-T6 | PAINT | |
| 1 | 1 | HP0366-139 | OUTSIDE BIN FUNNEL | 68ZF1 | 304 S.S. | NONE | |
| QTY. | ITEM NO. | PART NUMBER | DESCRIPTION | CAGE | MATERIAL | FINISH | ZONE |

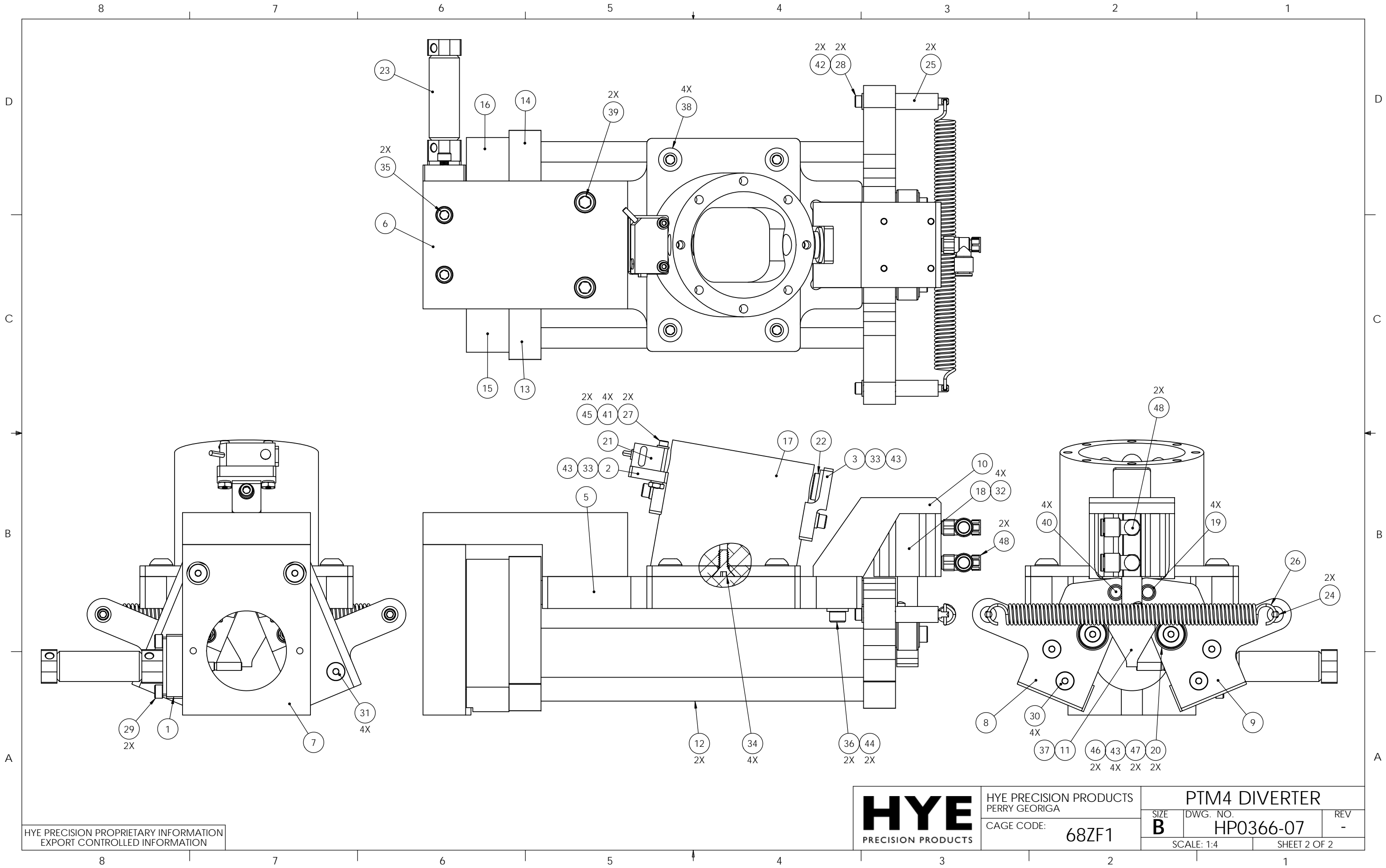
| | | | | | |
|---|-----------|---------------|--|-----------------------|--------------|
| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm .03$ ANGULAR: MACH $\pm .25$ BEND $\pm .25$ TWO PLACE DECIMAL $\pm .03$ THREE PLACE DECIMAL $\pm .002$ FOUR PLACE DECIMAL $\pm .0005$ | DATE | 10/4/2018 | <div>HYE</div> <div>PRECISION PRODUCTS</div> <div>OUTSIDE LOAD/UNLOAD ASSY</div> | | |
| | DRAWN | C. ORINGDERFF | | | |
| | CHECKED | F. SUAREO | | | |
| | ENG APPR. | B. HUGHES | | | |
| | MFG APPR. | S. WHITNEY | | | |
| CAGE CODE: 68ZF1 | Q.A. | J. BATCHELOR | SIZE B | DWG. NO. HP0366-06 | REV - |
| | | | SCALE: 1:8 | | SHEET 1 OF 1 |
| | | | | | |

HYE PRECISION PROPRIETARY INFORMATION
THIS DOCUMENT SHALL NOT BE REPRODUCED NOR SHALL THE
INFORMATION CONTAINED HEREIN BE USED BY OR DISCLOSED TO
OTHERS EXCEPT AS EXPRESSLY AUTHORIZED BY HYE PRECISION PRODUCTS
EXPORT CONTROLLED INFORMATION



| | | | | | |
|--|-----------|---------------|---|------------------|--------------|
| UNLESS OTHERWISE SPECIFIED: | DATE | 11/5/2018 |  HYE PRECISION PRODUCTS PTM4 DIVERTER | | |
| DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm .03$ ANGULAR: MACH $\pm .25$ BEND $\pm .25$ TWO PLACE DECIMAL $\pm .03$ THREE PLACE DECIMAL $\pm .002$ FOUR PLACE DECIMAL $\pm .0005$ | DRAWN | C. ORINGDERFF | | | |
| | CHECKED | F. SUAREO | | | |
| | ENG APPR. | B. HUGHES | | | |
| | MFG APPR. | S. WHITNEY | SIZE | DWG. NO. | REV |
| CAGE CODE: | Q.A. | J. BATCHELOR | B | HP0366-07 | - |
| 68ZF1 | | | SCALE: 1:4 | | SHEET 1 OF 2 |

HYE PRECISION PROPRIETARY INFORMATION
THIS DOCUMENT SHALL NOT BE REPRODUCED NOR SHALL THE
INFORMATION CONTAINED HEREIN BE USED BY OR DISCLOSED TO
OTHERS EXCEPT AS EXPRESSLY AUTHORIZED BY HYE PRECISION PRODUCTS
EXPORT CONTROLLED INFORMATION



HYE PRECISION PROPRIETARY INFORMATION
EXPORT CONTROLLED INFORMATION

HYE
PRECISION PRODUCTS

HYE PRECISION PRODUCTS
PERRY GEORGIA

CAGE CODE:

68ZF1

PTM4 DIVERTER

SIZE

B

DWG. NO.

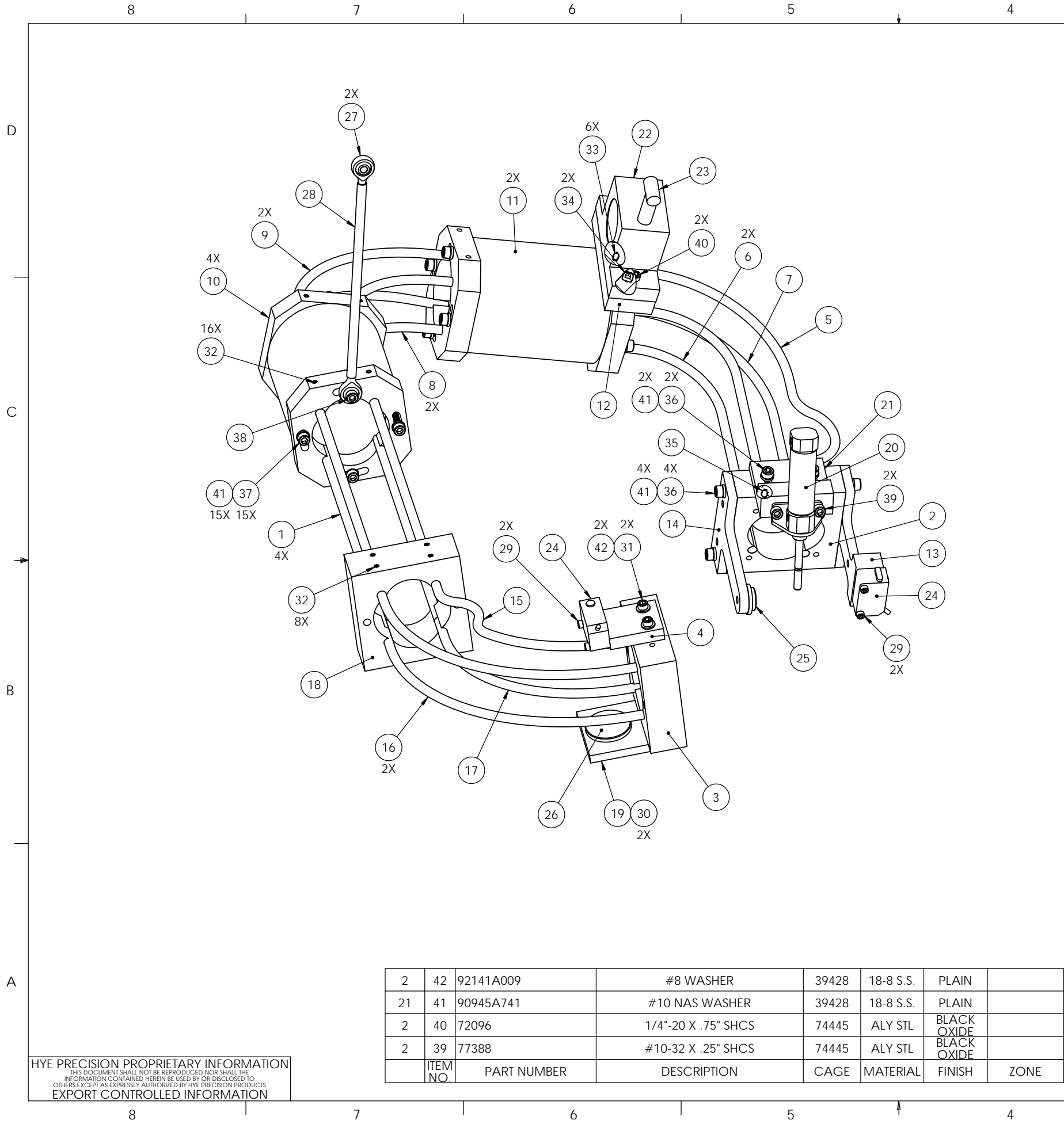
HP0366-07

REV

-

SCALE: 1:4

SHEET 2 OF 2



| | | | | | | | |
|----|----------|---------------------|----------------------------------|-------|----------|-----------------|------|
| 1 | 38 | 72082 | #10-24 X 1.25" SHCS | 74445 | ALY STL | BLACK OXIDE | |
| 15 | 37 | 72080 | #10-24 X 1.00" SHCS | 74445 | ALY STL | BLACK OXIDE | |
| 6 | 36 | 72072 | #10-24 X .50" SHCS | 74445 | ALY STL | BLACK OXIDE | |
| 1 | 35 | 91375A238 | #10-24 X .25" SET SCREW | 39428 | ALY STL | BLACK OXIDE | |
| 2 | 34 | 72056 | #8-32 X .50" SHCS | 74445 | ALY STL | BLACK OXIDE | |
| 6 | 33 | 91375A190 | #8-32 X .25" SET SCREW | 39428 | ALY STL | BLACK OXIDE | |
| 25 | 32 | 91375A194 | #8-32 X .50" SET SCREW | 39428 | ALY STL | BLACK OXIDE | |
| 2 | 31 | 91251A196 | #8-32 X .625" SHCS | 74445 | ALY STL | BLACK OXIDE | |
| 2 | 30 | 72054 | #8-32 X .375" SHCS | 74445 | ALY STL | BLACK OXIDE | |
| 4 | 29 | 91251A131 | #5-40 X .75" SHCS | 74445 | ALY STL | BLACK OXIDE | |
| 1 | 28 | MMC 6516K51 | ROD 10-32 | | STEEL | ZINC PLATED | |
| 2 | 27 | MMC 60645K111 | ROD END 10-32 | | STEEL | ZINC/CHR PLATED | |
| 1 | 26 | ALLEN-BRADLEY 92-47 | REFLECTOR - 1.25" DIA | | PLASTIC | N/A | |
| 1 | 25 | ALLEN-BRADLEY 92-46 | REFLECTOR - .625" DIA | | PLASTIC | N/A | |
| 2 | 24 | AB_42JS-P2MPA2-F4 | VISISIGHT SENSOR | | | | |
| 1 | 23 | AS2211F-01-07S | FLOW CONTROL WITH METER-IN | | | | |
| 1 | 22 | 5794K52 | TURBINE VIBRATOR | | | | |
| 1 | 21 | 080013000-27 | CYLINDER BRACKET | | STEEL | BLACK OXIDE | |
| 1 | 20 | NCJ2L16-075 | AIR CYLINDER | | AL/STEEL | N/A | |
| 1 | 19 | WS8-BSRP | BALL SENSOR REFLECTOR PLATE | 68ZF1 | 6061-T6 | BLACK ANODIZE | |
| 1 | 18 | HM4_MCB | MAGAZINE CONNECTOR BLOCK | 68ZF1 | 6061-T6 | BLACK ANODIZE | |
| 1 | 17 | HM4_RROD2 | ROUND ROD #2 | 68ZF1 | 304 SS | GROUND | |
| 2 | 16 | HM4_RROD1 | ROUND ROD #1 | 68ZF1 | 304 SS | GROUND | |
| 1 | 15 | HP0091-136 | ROUND ROD | 68ZF1 | 304 SS | GROUND | |
| 1 | 14 | HP0091-125 | REFLECTOR BRACKET | 68ZF1 | 6061-T6 | BLACK ANODIZE | |
| 1 | 13 | HP0091-124 | SENSOR BRACKET | 68ZF1 | 6061-T6 | BLACK ANODIZE | |
| 1 | 12 | HP0091-121 | VIBRATOR MOUNT INSIDE (OPTIONAL) | 68ZF1 | STEEL | BLACK OXIDE | |
| 2 | 11 | HP0091-109 | MAGAZINE ROTATIONAL INTERFACE | 68ZF1 | 6061-T6 | BLACK ANODIZE | |
| 4 | 10 | HP0091-108 | MAGAZINE CONNECTOR BLOCK | 68ZF1 | 6061-T6 | BLACK ANODIZE | |
| 2 | 9 | HP0366-167 | ROUND ROD #4 | 68ZF1 | 304 SS | GROUND | |
| 2 | 8 | HP0366-166 | ROUND ROD #3 | 68ZF1 | 304 SS | GROUND | |
| 1 | 7 | HP0366-165_A | END RAIL A | 68ZF1 | 304 SS | GROUND | |
| 2 | 6 | HP0366-164_A | END RAIL B | 68ZF1 | 304 SS | GROUND | |
| 1 | 5 | HP0366-163_A | END RAIL C | 68ZF1 | 304 SS | GROUND | |
| 1 | 4 | HP0366-145 | BALL SENSOR SUPPORT PLATE | 68ZF1 | 6061-T6 | BLACK ANODIZE | |
| 1 | 3 | HP0366-144 | MAGAZINE INTERFACE PLATE | 68ZF1 | 6061-T6 | BLACK ANODIZE | |
| 1 | 2 | HP0366-126 | BREACH CONNECTOR BLOCK | 68ZF1 | 6061-T6 | BLACK ANODIZE | |
| 4 | 1 | HP0366-124 | STRAIGHT ROD #1 | 68ZF1 | 304 SS | GROUND | |
| | ITEM NO. | PART NUMBER | DESCRIPTION | CAGE | MATERIAL | FINISH | ZONE |

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ± .03
ANGULAR: MACH ± .25 BEND ± .25
TWO PLACE DECIMAL ± .03
THREE PLACE DECIMAL ± .002
FOUR PLACE DECIMAL ± .0005

CAGE CODE: 68ZF1

DATE: 8/28/2018

DRAWN: C. ORINGDERFF

CHECKED:

ENG APPR: B. HUGHES

MFG APPR: S. WHITNEY

Q.A.: J. BATCHELOR

HYE

PRECISION PRODUCTS

PTM4 24 BALL MAGAZINE ASSY

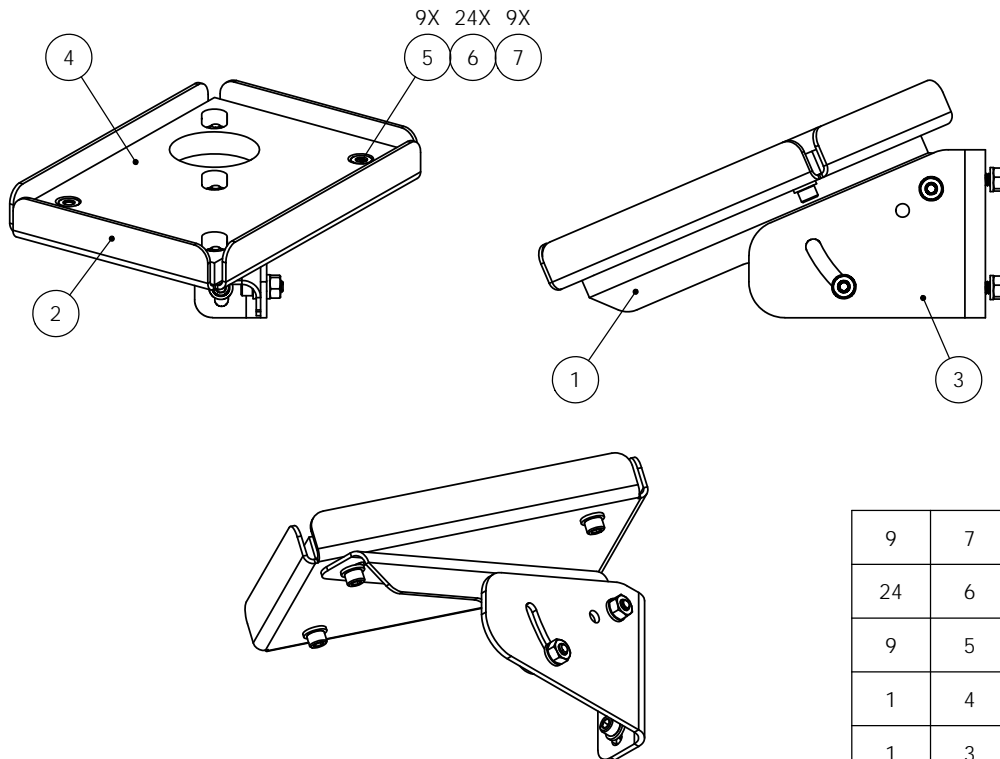
SIZE B

DWG. NO. HP0366-09

REV -

SCALE: 1:8

SHEET 1 OF 1



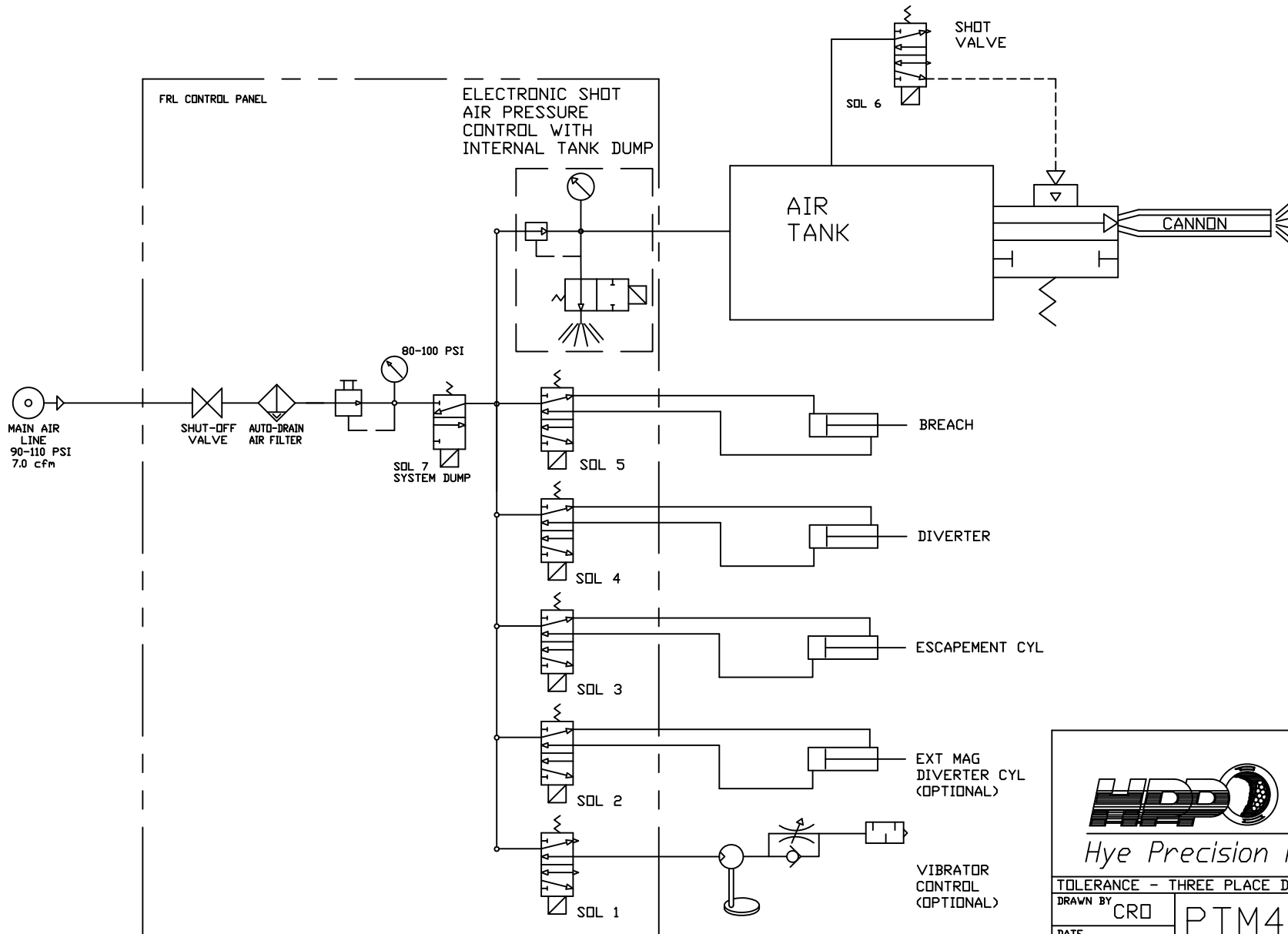
| 9 | 7 | 91845A029 | 1/4"-20 HEX NUT | 39428 | 18-8 S.S. | PLAIN | |
|------|----------|-------------|------------------------|-------|-------------|---------------|------|
| 24 | 6 | 98017A660 | 1/4" NAS WASHER | 39428 | 18-8 S.S. | PLAIN | |
| 9 | 5 | 91251A539 | 1/4-20 X 5/8 L SHCS | 39428 | ALLOY STEEL | BLACK OXIDE | |
| 1 | 4 | HP0091-152 | INSERT PLATE | 68ZF1 | PLASTIC | NONE | |
| 1 | 3 | HP0091-151 | BOX BIN BRACKET-BOTTOM | 68ZF1 | 6061-T6 AL | BLACK ANODIZE | |
| 1 | 2 | HP0091-149 | BOX BIN | 68ZF1 | 6061-T6 AL | BLACK ANODIZE | |
| 1 | 1 | HP0091-148 | BOX BIN BRACKET-TOP | 68ZF1 | 6061-T6 AL | BLACK ANODIZE | |
| QTY. | ITEM NO. | PART NUMBER | DESCRIPTION | CAGE | MATERIAL | FINISH | ZONE |

| | | | | | | | | |
|--------------------------------------|--|-----------|------|--|---|--|--|---------|
| UNLESS OTHERWISE SPECIFIED: | | NAME | DATE | <div><div>HYE</div><div>PRECISION PRODUCTS</div></div> | | | | |
| DIMENSIONS ARE IN INCHES TOLERANCES: | | DRAWN | CRO | | | | | 9/10/19 |
| FRACTIONAL ± .03 | | CHECKED | | | | | | |
| ANGULAR: MACH ±.25 BEND ±.25 | | ENG APPR. | | | | | | |
| TWO PLACE DECIMAL ±.03 | | | | | 12 BALL UNLOAD ATTACHMENT | | | |
| THREE PLACE DECIMAL ±.002 | | MFG APPR. | | | | | | |
| FOUR PLACE DECIMAL ±.0005 | | | | | <div><div>SIZE</div><div>A</div></div> <div><div>DWG. NO.</div><div>HP0366-10</div></div> <div><div>REV</div><div>-</div></div> <div><div>SCALE: 1:4</div><div>WEIGHT:</div><div>SHEET 1 OF 1</div></div> | | | |
| INTERPRET GEOMETRIC TOLERANCING PER: | | Q.A. | | | | | | |
| MATERIAL | | COMMENTS: | | | | | | |
| FINISH | | | | | | | | |
| DO NOT SCALE DRAWING | | | | | | | | |

PROPRIETARY AND CONFIDENTIAL

THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF HYE PRECISION PRODUCTS. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF HYE PRECISION PRODUCTS IS PROHIBITED.

Pneumatics Drawings



Hye Precision Products

TOLERANCE - THREE PLACE DEC $\pm .002$ - FOUR PLACE DEC $\pm .0005$

DRAWN BY
CRD

DATE
10/22/18

SCALE
N/A

APPROVED BY

PTM4 PNEUMATIC
DIAGRAM SN-001

NO. HP0366-PD

SHEET NO
1/1

Component Manual(s)