

MAXON PSCHECK™

Partial Stroke Technology

Honeywell



Technical Catalog

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FEATURES AND BENEFITS

- Improve plant safety without interrupting operations
- Maintain full control of an industrial combustion process by automatically partial stroking and testing of the shut-off valve to ensure it is operating properly
- Identify potential performance issues so proper maintenance can be scheduled, resulting in less operation downtime and longer production runs
- When used with MAXON Series 8000 Shut-off Valves, the PSCHECK™ Partial Stroke Technology can be incorporated into a Safety Instrumented System (SIS) that will meet SIL 3 performance requirements
- Configurations available for monitoring 1 to 9 valves per panel, with choice of three user interface designs

PRODUCT DESCRIPTION

MAXON's PSCHECK™ Partial Stroke Technology will identify a potential early failure or signal a hard failure on the Series 8000 Pneumatic Shut-off Valve by checking the amount of time required for the valve to "trip", signaling the valve's capability to open or close. The longer time it takes to trip the valve indicates potential performance issues. After the MAXON PSCHECK™ Partial Stroke Technology test has run, the unit will signal a PASS/FAIL result that can be seen either from an alarm LED, touchscreen display indicator, or communicated to the DCS directly.

When used in conjunction with MAXON Series 8000 Shut-off Valve, the MAXON PSCHECK™ captures this information and tracks the overall health of the valve, plotting the results on an optional touchscreen display to show partial stroke testing results over the life of the valve. This trending information shows a linear relationship between the degradation of the valve's performance, indicating when the valve may potentially fail.

MAXON PSCHECK™ is offered in three different configurations scaled to fit any budget and installation requirement, communicating its status via a manual LED push-button panel, interactive on-board LCD touchscreen display, or a remote DCS connection. It is available as a 1-2 valve system, 3-5 system or 6-9 valve system.

PARTIAL STROKE TESTING TECHNOLOGY

A process control plant in any industry is dependant on the reliability of its sub-systems to keep the operation running seamlessly and without downtime. In most combustion safety systems, the final control element - the safety shut-off valve - is one of the most critical elements of a complete Safety Instrumented System (SIS).

In order for a system to remain SIL compliant, the safety shut-off valve must be tested once a year at a minimum to lower the probability of failure on demand (PFD). This historically requires a full process system shut-down in order to conduct a full-stroke test that completely closes and opens the valve to prove that it is functioning properly. Valves are often located in hard-to-reach locations and local testing at the site or a full process shut-down may be unrealistic.

The partial stroke technology is a diagnostic method to determine the status of a valve in terms of its ability to perform on demand, allowing the valve to be credited with a higher SIL performance level. Partial stroke testing can help detect up to 70% of dangerous undetected failures and performance issues that may prevent the valve from closing or opening.

MAXON's PSCHECK™, when combined with MAXON Series 8000 safety shut-off valve, helps maintain full control of a process with less downtime, longer production runs, and better predictive maintenance scheduling. MAXON now offers a compelling solution for a SIL 3 capable system with the MAXON Series 8000 pneumatic safety shut-off valve combined with the MAXON PSCHECK™ partial stroke test technology.

APPLICATIONS

MAXON PSCHECK™ Partial Stroke Technology can be used in any application that utilizes MAXON's Series 8000 Shut-off Valves. The PSCHECK™ and Series 8000 Valve are both SIL 2 compliant, and when combined into a fully Safety Instrumented System, a SIL 3 certification is possible. No additional system add-ons or non-conforming hardware is required to attain SIL 3 certification.

MODEL NUMBER

MAXON PSCHECK™ Partial Stroke Technology

Configured Item Number		Options						Standards				
System Size	Series	Indication Type	Power Supply	Panel Inlet Voltage	Valve Voltage	Pressure Transducer	Automated Test Interval	Communication	Enclosure Rating	SIL Rated	Area Classification	Language
01	PST	B	N	A	A	N	D	A	A	N	A	0

System Size

- 01 - 1 valve system
- 02 - 2 valve system
- 03 - 3 valve system
- 04 - 4 valve system
- 05 - 5 valve system
- 06 - 6 valve system
- 07 - 7 valve system
- 08 - 8 valve system
- 09 - 9 valve system
- XX - Special [1]

Series

- PST - MAXON PSCHECK

Indication Type

- A - Status lighting
- B - HMI display
- C - None (DCS integration required)
- X - Special

Power Supply

- N - No
- Y - Yes

Panel Inlet Voltage

- A - 24VDC
- B - 110VAC
- C - 220VAC
- X - Special

Valve Voltage

- A - 24VDC
- X - Special

Pressure Transducer

- N - No
- X - Special

Automated Test Interval

- A - Daily
- B - Weekly
- C - Bi-weekly
- D - Monthly
- E - Bi-monthly
- F - Annually
- G - None
- X - Special

Communication

- A - Ethernet
- B - ModBus 1761-NET
- C - ModBus AIC+
- D - None
- X - Special

Enclosure Rating

- A - Type 12
- B - Type 4X
- X - Special

SIL Rated

- N - No
- Y - Yes

Area Classification

- A - General purpose
- B - Class I, Division 2
- X - Special

Language

- 0 - English

[1] Up to 20 valves by special request

SPECIFICATIONS

The MAXON PSCHECK™ Partial Stroke Technology system is offered in a variety of configurations to offer full control of a wide range of industrial processes through regularly scheduled partial stroke testing of the MAXON Series 8000 Shut-off Valves.

Panel sizes

Four panel sizes are available, based on the number of MAXON Series 8000 Shut-off Valves in each system and the SIL rating.

- 20" x 20" x 8" panel - for 1 to 2 valve systems
- 24" x 24" x 8" panel - for 3 to 5 valve systems
- 36" x 30" x 12" panel - for 6 to 9 valve systems
- 36" x 36" x 12" panel - for 1 to 9 valve systems, SIL rated

Panel configurations

Three configuration options are available:

- LED indicator lights - no display, uses manual buttons and indicator lights to communicate testing results (PASS/FAIL only, not SIL capable)
- LCD touchscreen display - color graphic display (HMI) communicates valve test status, test frequency, valve health trends and alarm history
- DCS integration - plain front panel, download data to Compact Flash (CF) drive, with exported information available as .csv file

System capabilities

Specific capabilities of each MAXON PSCHECK™ panel are based on the number of valves in the system and the panel configuration. Table 1 lists all functions and their availability. A summary of features and capabilities is listed below, along with brief descriptions for each function.

PARTIAL STROKE TEST VERIFICATION OF TEST PASS/FAIL

The partial stroke test can be run manually or automatically at pre-set times. Depending on the system capabilities, the valve's health status will be conveyed either by LED indicator lights on the panel, via an icon on the touchscreen display, or via direct communication to the DCS.

DATA LOGGING

Valve health trending data is captured in non-volatile microprocessor memory and will retain all of the valve health information for up to 10 years or longer, dependent on how many times a year the valve partial stroke test is run.

VALVE DEGRADATION ERROR DETECTION

Tests performed by MAXON PSCHECK™ systems will identify a soft or hard failure (on the MAXON Series 8000 shut-off valve) by checking the amount of time required for the valve to 'trip', signaling a capability to either open or close. The longer time it takes to trip the valve indicates potential performance issues. If the valve is degrading, it will signal a soft failure alert; if the valve fails, it will indicate a failure.

EXPORT OF VALVE TRENDING INFORMATION

It is simple to export the valve health trending data via a supplied Compact Flash (CF) drive. The information is presented in a .csv format that can be modified for analysis, audits, and for presentation to regulatory or insurance authorities.

DATE VALVE BUILT

A factory build date will be established in permanent memory.

DATE VALVE INSTALLED AND COMMISSIONED

During the commissioning process, the customer will be required to set the date the system is installed and run a manual partial stroke test to establish the baseline for the valve's health.

VALVE IDENTIFICATION/LOCATION

The customer has the ability to set a custom number for each valve to help identify its location.

TRENDING OF VALVE PERFORMANCE

Diagnostics capture the valve testing information and track the overall health of the MAXON Series 8000 pneumatic safety shut-off valve by plotting this information on a touchscreen display showing the valve's health trending over the life of the valve. This trending information or predictive indicator shows a linear relationship between the initial installation health data vs. the degradation of the valve's performance over the life of the valve. This trending data is used to indicate when the valve may require maintenance, replacement or that it will potentially fail.

COMPARE VALVE HISTORICAL TRENDING DATA

Ability to switch between three different screens by changing the number of captured data points, enabling better short and long term viewing of the trending information.

VIEW ALARM HISTORY

Captures all alarms, the dates of the alarms, and valve testing information when either a soft 'alert' alarm or a hard 'failure' alarm is triggered. The system will track all alarm instances over the life of the valve.

MANUAL TEST

Ability to start an immediate manual test on the valves by pushing a button on the panel, an icon on the touchscreen display, or initiated via the DCS, dependent on the configuration ordered. The test will return immediate results on the valve's performance and will not interfere with any pre-set automatic tests nor will it interfere with any of the valve or burner management functions.

AUTOMATIC TEST

The unit will ship from the factory with all systems pre-set to a monthly partial stroke test schedule.

SET FREQUENCY OF TEST

In systems with the touchscreen display or DCS connection, the customer has the option to change the frequency of the automatic test timing to daily, weekly, bi-weekly, monthly, bi-monthly, annually, none or a custom set test rate.

SET LIMITS ON ALARMS

The unit will ship with factory-set limits on when a hard or soft alarm will trigger, indicating that the valve's performance is degrading and maintenance should be scheduled, or that the valve has failed the test. The hard alarm limit is factory-set. The soft alarm limit can be changed by the customer (LCD touchscreen only) during the commissioning process or at a later date. This limit can be increased, meaning the valve will run longer without any warnings or alerts, or can be lowered meaning the system will alarm out, indicating the valve's degradation sooner.

USER AUTHORIZATION

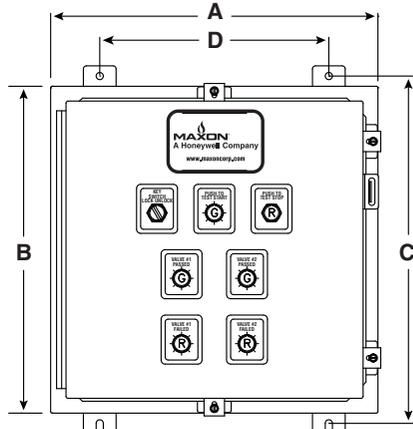
For systems with a touchscreen display, limits access to some functions based on type of user (Manager or Operator). For manual units with LED indicator lights, a key is required to conduct a manual test.

Table 1: Available MAXON PSCHECK™ panel configurations

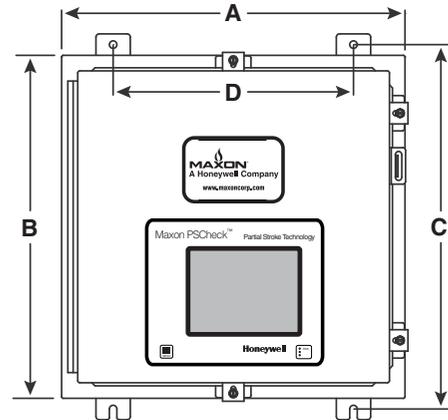
Panel Features	Panel Configurations		
	LED Indicator Lights	LCD Touchscreen	DCS Integration
	1 - 5 valves	1 - 9 valves	1 - 9 valves
Partial stroke test PASS/FAIL verification	•	•	•
Data logging		•	
Valve degradation error detection		•	•
Export of valve trending information		•	
Date valve built	Factory set	Factory set	
Date valve is installed and commissioned	Factory set	•	
Valve identification/location		•	
Trending of valve performance		•	
Compare valve historical trending data		•	
View alarm history		•	
Manual partial stroke test	Keyed access	•	•
Automatically run partial stroke test	•	•	•
Set frequency of test	Factory set	•	
Set limits for alarms		•	
User authorization	Keyed access	•	

DIMENSIONS

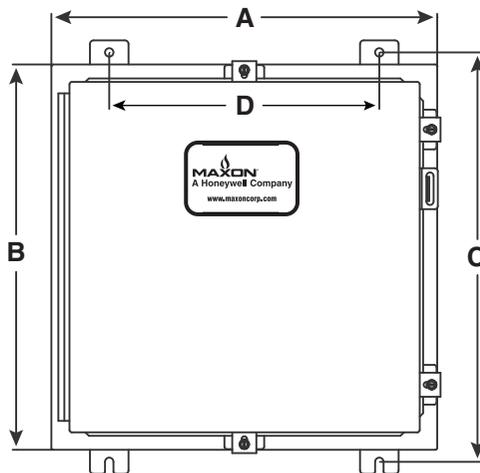
MAXON PSCHECK™ panel - 1 to 2 valve systems



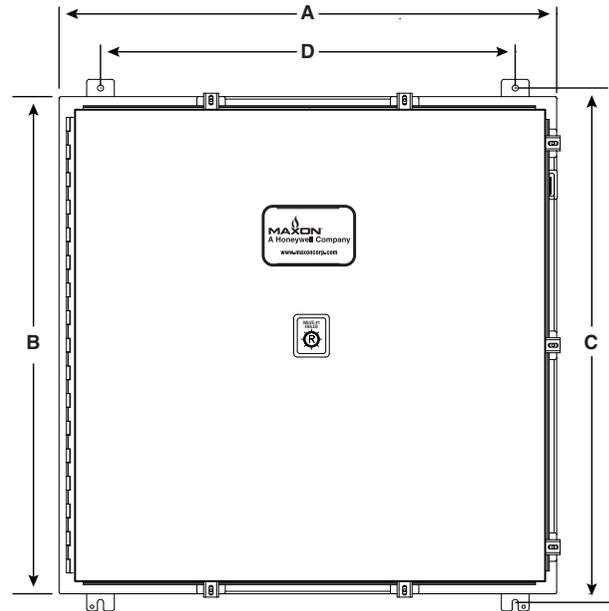
with LED indicator lights



with LCD touchscreen display



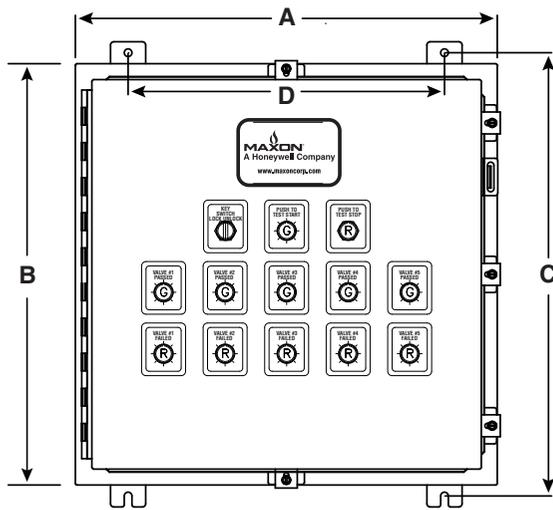
with DCS integration



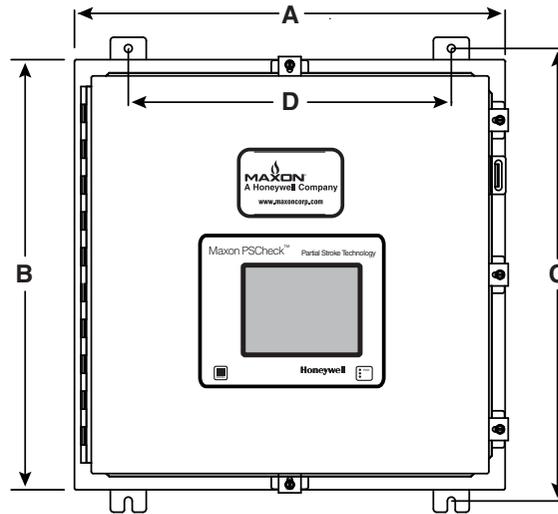
SIL version

Dimensions in mm unless stated otherwise				
Type of panel	A	B	C	D
With LED indicator lights	508	508	540	355
With LCD touchscreen display	508	508	540	355
With DCS integration	508	508	540	355
SIL version	914	914	946	762

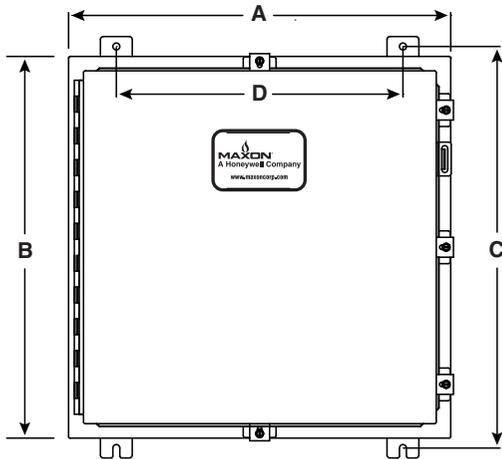
MAXON PSCHECK™ panel - 3 to 5 valve systems



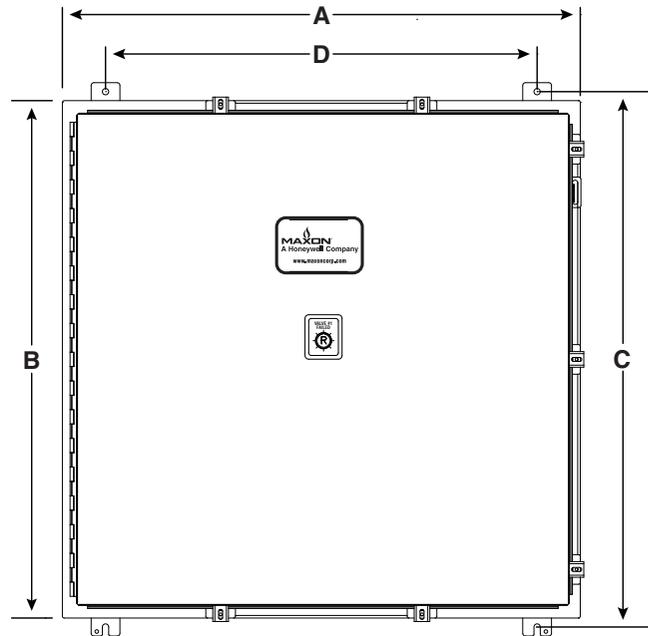
with LED indicator lights



with LCD touchscreen display



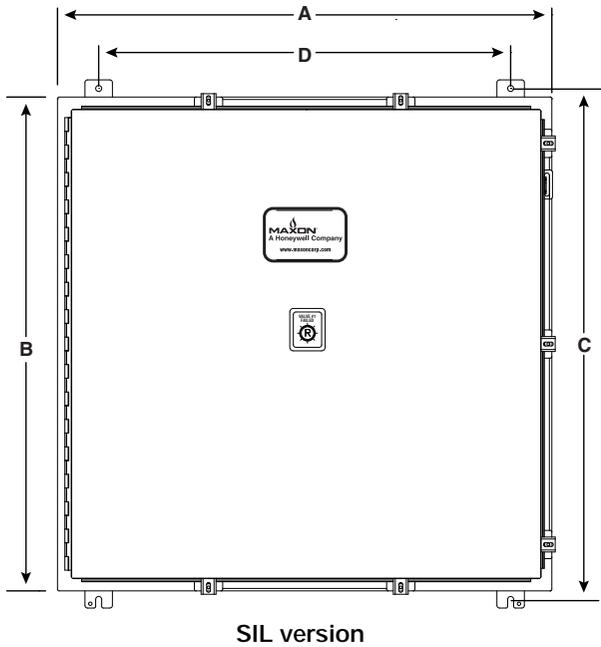
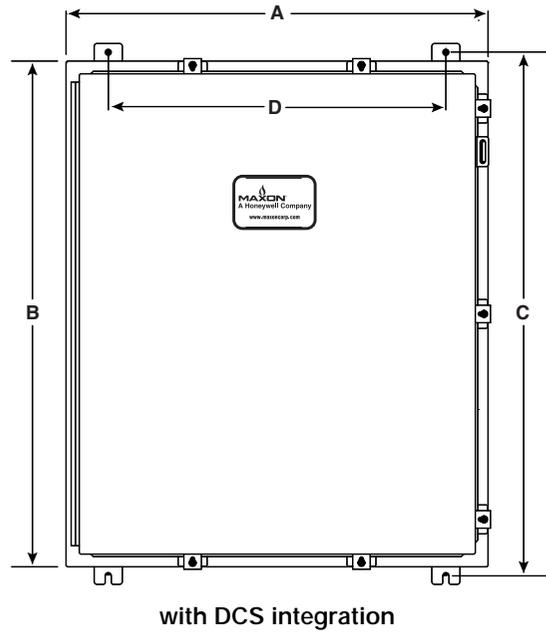
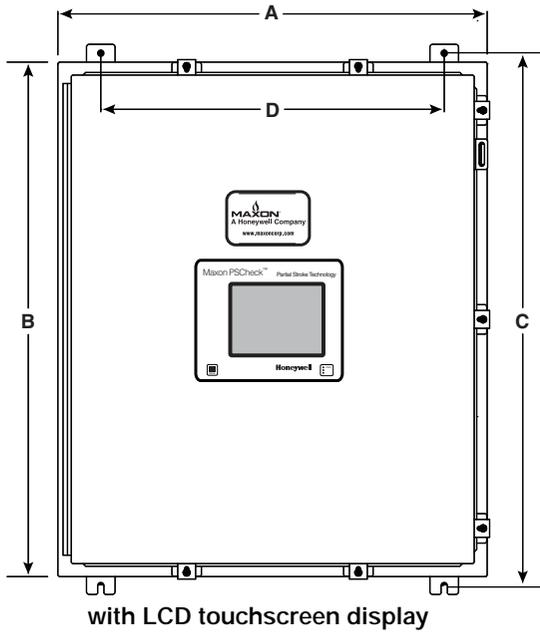
with DCS integration



SIL version

Dimensions in mm unless stated otherwise				
Type of panel	A	B	C	D
With LED indicator lights	610	610	640	457
With LCD touchscreen display	610	610	640	457
With DCS integration	610	610	640	457
SIL version	914	914	946	762

MAXON PSCHECK™ panel - 6 to 9 valve systems



Dimensions in mm unless stated otherwise				
Type of panel	A	B	C	D
With LCD touchscreen display	762	914	946	610
With DCS integration	762	914	946	610
SIL version	914	914	946	610

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS



Please read the operating and mounting instructions before using the equipment. Install the equipment in compliance with the prevailing regulations.

Bedrijfs- en montagehandleiding voor gebruik goed lezen! Apparaat moet volgens de geldende voorschriften worden geïnstalleerd.

Lire les instructions de montage et de service avant utilisation! L'appareil doit impérativement être installé selon les réglementations en vigueur.

Betriebs- und Montageanleitung vor Gebrauch lesen! Gerät muß nach den geltenden Vorschriften installiert werden.



The Installation, Operating and Maintenance Instructions contain important information that must be read and followed by anyone operating or servicing this product. Do not operate or service this equipment unless the instructions have been read. **IMPROPER INSTALLATION OR USE OF THIS PRODUCT COULD RESULT IN BODILY INJURY OR DEATH.**

Description

MAXON PSCHECK™ partial stroke technology, when combined with MAXON Series 8000 Pneumatic Shut-off Valves, can offer a SIL 3 capable system. MAXON PSCHECK™ utilizes partial stroke testing technology to determine the status of the safety shut-off valves without shutting down or interrupting combustion system operations. Data from the tests can be collected and trended to detect valve degradation, giving process control plants better predictive maintenance and reducing the possibility of detected valve failures. Frequent testing of the Series 8000 pneumatic safety shut-off valve also helps clean the surface of the metal-to-metal valve seats, which are enhanced by the wear in, not out design feature.

Definitions of safety standards

Standard	Definition	Explanation
SIL	Safety Integrity Level	A measure of safety system performance. Specifying the probability of a safety instrumented system satisfactorily performing the required safety instrumented functions under all the stated conditions within a stated period of time. SIL is required for Safety Instrumented Systems (SIS). The PSCHECK partial stroke test technology and the Series 8000 pneumatic shut-off valve are both SIL 2 certified and, when combined into a Safety Instrumented System (SIS), they will meet SIL 3 performance requirements.
SIS	Safety Instrumented System	A set of sensors and actuators designed to carry out one or more safety instrumented functions. Designed to protect personnel, equipment, and the environment by reducing the likelihood or severity of an identified emergency event.
SIF	Safety Instrumented Function	Recent NFPA safety specifications mandated that safety shut-off valves utilize partial stroke diagnostics, manual valve reset capability, and a fire-safe rating. All are required to meet new IEC61508/61511 standards. These new features are required to meet the combustion safety integrity performance requirements for Safety Instrumented Functions (SIF) deemed necessary for the safe operation of process plants.
PFD	Probability of Failure on Demand	In order for a system to remain SIL compliant, the safety shut-off valve must be tested once a year at a minimum to lower the probability of failure on demand (PFD).

MAXON Series 8000 Valve description

The MAXON Series 8000 Valve is a pneumatically operated fuel shut-off valve, requiring compressed air for actuation. The MAXON Series 8000 Valve will open or close by the addition of a control voltage signal, and removal of the signal will cause a fast acting return to the “at rest” position. Options are available in both normally-closed and normally-open versions. They are also available in optional configurations that meet hazardous location requirements and fire safe trim configurations that meet API 6FA.

Cast iron, carbon steel, low temperature carbon steel and stainless steel body assemblies with internal trim options to handle general purpose or corrosive gases; oxygen compatibility, NACE compliance. Ambient temperature ranges of -58°F (-50°C) to 140°F (60°C); gas temperature range of -58°F (-50°C) to 212°F (100°C)

Actuator assemblies are field-replaceable and available in 120VAC 50/60 Hz, 240VAC 50/60 Hz, and 24VDC (with low power option), rated for NEMA 4, NEMA 4X and IP65.

MAXON Series 8000 Valves meet Fluid Control Institute (FCI) 70-2 control valve standard for Class VI seat leakage.

MAXON Series 8000 Valve nameplate and abbreviations

Consult the nameplate on your MAXON Series 8000 safety shut-off valve. This lists the maximum operating pressure, temperature limitations, voltage requirements and service conditions of your specific valve. Do not exceed nameplate ratings.

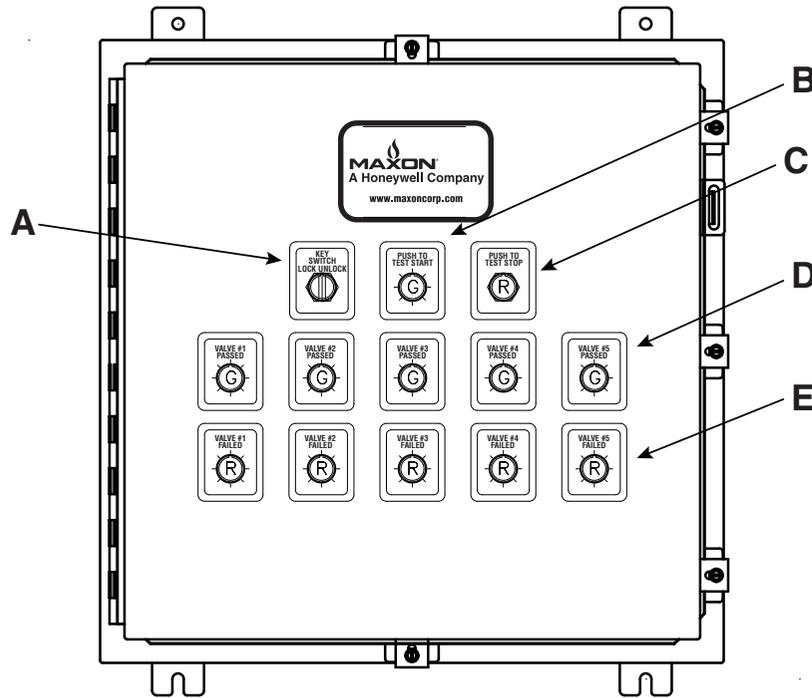
Abbreviation or Symbol	Description
M.O.P. (P _S)	Maximum Operating Pressure
P _{ACT}	Required actuator pressure
T _{S(AMB)}	Ambient service temperature range
T _{S(FL)}	Fluid service temperature range
	Visual indication determined by text, color and symbol; valve is shown in open position
	Visual indication determined by text, color and symbol; valve is shown in closed position
	Valve is shut
	Valve is partially open
	Valve is full open
VOS-1/2	Valve open switch(es)
VCS-1/2	Valve closed switch(es); proof of closure

Operating instructions: LED indicator version

AVAILABLE IN 1-2 VALVE PANEL OR 3-5 VALVE PANEL CONFIGURATIONS (5 VALVE SYSTEM SHOWN)

The manual version of the MAXON PSCHECK™ offers factory-set parameters for the hard alarms and partial stroke test frequency.

It will automatically run the partial stroke test based on the factory-set intervals, as well as manual testing at any time when prompted by the authorized user. Manual testing will require keyed access to the panel to initiate test.



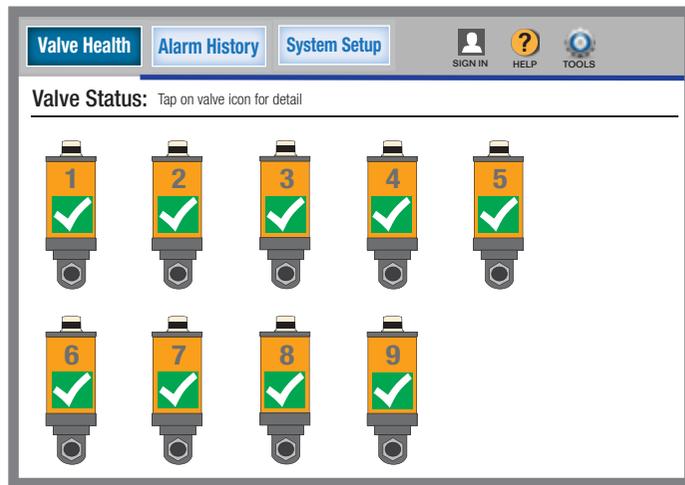
A	Switch to lock or unlock PSCHECK™ system. Key required to unlock and run manual test. One key will be used to allow access to all valves in system.
B	Push button to start manual test for all valves. One start button is used to start testing of all valves in system simultaneously. The start button will flash while testing is underway and will remain flashing until the last valve has completed testing.
C	Push button to stop manual test for all valves.
D	Valves have passed partial stroke test. Green light stays on continuously and will remain illuminated for 24 hours after a test is completed. Lights are numbered to indicate which valves passed testing.
E	Valves have failed partial stroke test. Red light stays on continuously until valve passes test. Lights are numbered to indicate which valve failed testing.

Operating instructions: LCD touchscreen display version

AVAILABLE IN 1-9 VALVE CONFIGURATIONS (9 VALVE SYSTEM SHOWN)

FIGURE 1: VALVE STATUS SCREEN

The initial screen on the LCD touchscreen display (following system boot-up) shows all of the valves in the MAXON PSCHECK™ configuration. First time MAXON PSCHECK™ unit is powered, valves will appear with green check marks (see below). Following testing, each valve will display results of the most recent partial stroke testing.



Green check mark indicates that the valve has PASSED and is operating properly; **Yellow** exclamation point indicates that the valve's performance is in ALERT mode and is degrading; and a **Red** "X" indicates the valve has FAILED the partial stroke test.

To view details for an individual valve, touch the valve icon on the touchscreen display. This will show detailed information for the individual valve selected (see Figure 7).

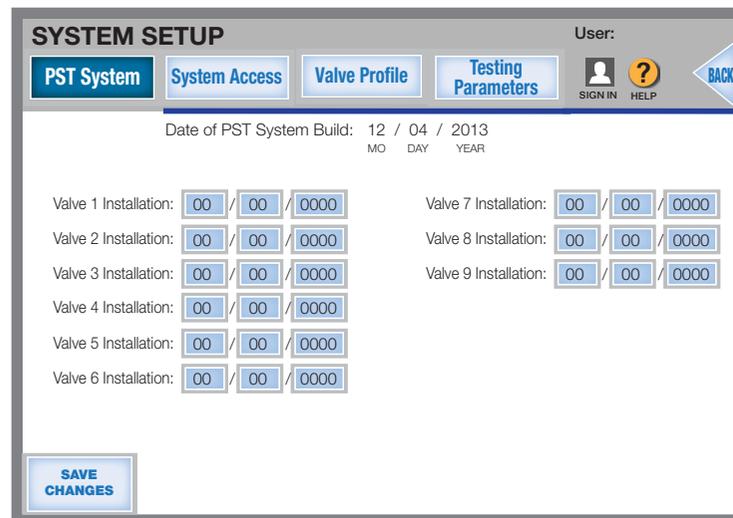
Test results can also be downloaded to a Compact Flash (CF) drive (supplied) by touching the "Tools" icon in the upper right of the screen. Instructions for downloading are provided on-screen. The exported information is in an easily tabulated format (.csv file) that can be used for analysis, audits and for presentation to regulatory or insurance authorities.

FIGURE 2: ALARM HISTORY



View alarm history (list of alarms). Captures all alarms, the dates of the alarms, and valve testing information when either a soft “alert” alarm or a hard “failure” alarm is triggered. The system will track all alarm instances over the life of the valve.

FIGURE 3: SYSTEM SETUP - PST SYSTEM

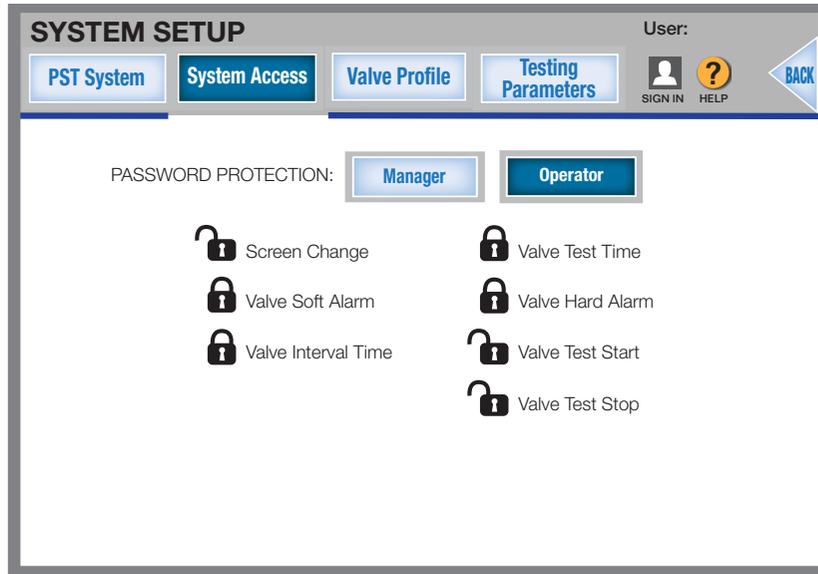


The system build date is factory-set and will be established in permanent memory.

During the commissioning process, the customer will be required to set the date each valve is installed. This installation date can be reset if the valve is replaced or repaired.

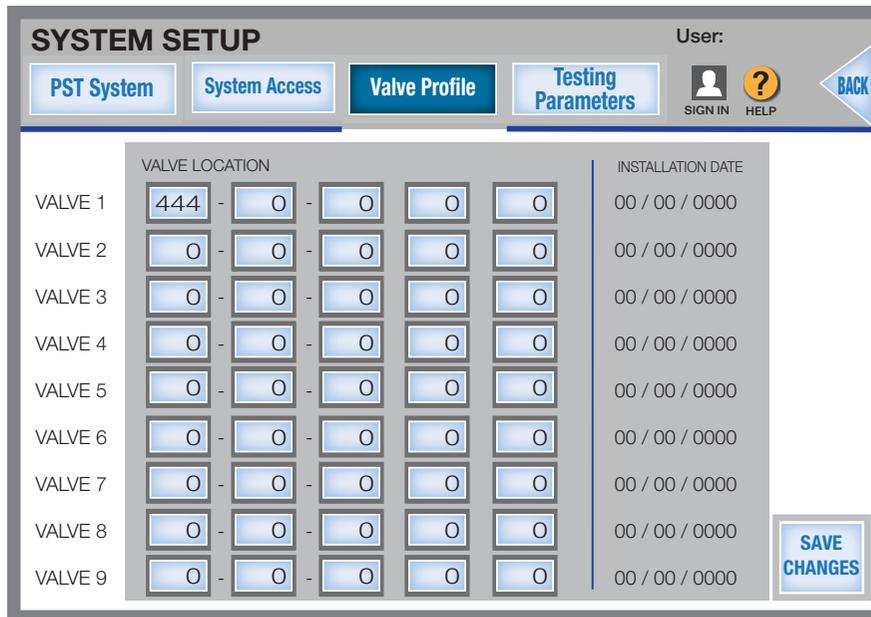
After entering the installation date for each valve, run a manual partial stroke test to save the installation date in memory and establish a baseline for trending the valve’s health. Enter the date and run the test for each valve individually, and repeat the process for each valve in the system.

FIGURE 4: SYSTEM SETUP - SYSTEM ACCESS



Visually indicates which users have the capability to perform or change various functions of the PSCHECK system, based on type of user (Manager or Operator). The permissions granted to Manager and Operator are factory-set and cannot be changed by the user.

FIGURE 5: SYSTEM SETUP - VALVE PROFILE



Lists the installation date for each valve in the system based on information entered on “PST System” screen during commissioning. Also provides the customer with the ability to set a custom numerical valve identifier (serial number, factory location, burner number, etc.) to help identify the valve’s physical location.

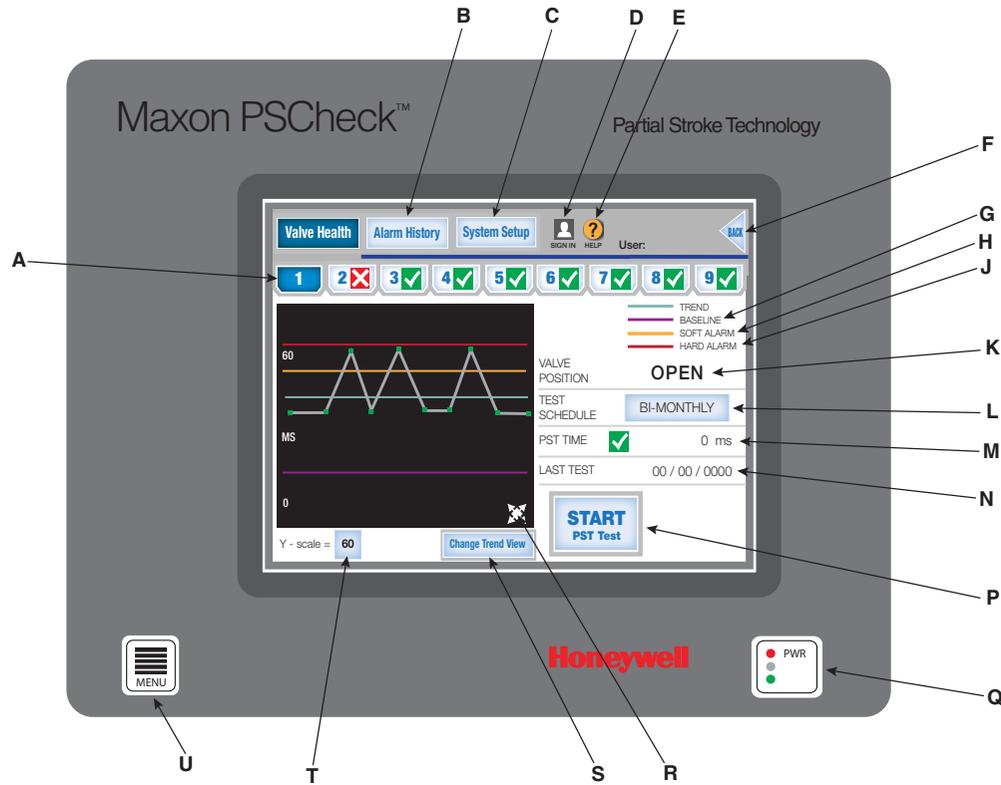
FIGURE 6: SYSTEM SETUP - TESTING PARAMETERS

VALVE	MAX TIME PRESET (ms)	SOFT ALARM PRESET (ms)	TEST FREQUENCY (days)
VALVE 1	78	56	60 BI-MONTHLY
VALVE 2	456	785	7 WEEKLY
VALVE 3	785	785	365 ANNUALLY
VALVE 4	78	222	1 DAILY
VALVE 5	48	45	7 WEEKLY
VALVE 6	78	55	365 ANNUALLY
VALVE 7	9	9	30 MONTHLY
VALVE 8	45	45	0 NONE
VALVE 9	47	5	365 ANNUALLY

The MAXON PSCHECK™ ships with factory-set limits for both hard and soft alarms. Factory default value for the hard alarm is 500 ms and value for soft alarm is 50 ms. When a soft alarm is triggered, it indicates that the valve’s performance is degrading and maintenance should be scheduled. The soft alarm limit can be changed by the customer during the commissioning process. This limit can be increased, meaning the valve will run longer without any warnings or alerts, or can be lowered, meaning the system will alarm out to indicate the valve’s degradation sooner. Touch the value to be changed in the “Soft Alarm Preset (ms)” column, enter a new number, and touch “Save Changes” in the lower left corner of the screen.

Touch the “Test Frequency” buttons in right column to change test schedule. Available choices are daily, weekly, bi-weekly, monthly, bi-monthly, annually, none, or customer specified. Touch “Save Changes” after making changes to the test frequency.

FIGURE 7: VALVE HEALTH



A	Valve number selected.
B	View alarm history. Tracks all alarm instances over the life of the valve. See Figure 2.
C	See Figures 3 through 6 for System Setup screens.
D	Security manager. Enables password protected access to limit who can modify the MAXON PSCHECK™ settings.
E	Help screen. Content varies based on active screen.
F	Returns to the previous screen.
G	Baseline for trending the valve's health; determined by manual partial stroke test performed at system installation.
H	Limit for soft alarm. Factory set. Can be changed by the customer during or after commissioning.
J	Limit for hard alarm, indicating valve failure. Factory set.
K	Valve's normal position. Normally-closed shut-off valves begin opening cycle immediately upon being powered. Normally-open vent valves begin to close immediately upon being powered.
L	All systems ship pre-set to a monthly partial stroke test schedule. The customer has the option to change the frequency of the test timing to daily, weekly, bi-weekly, monthly, bi-monthly, annually, none or custom.
M	Amount of time required for the valve to "trip", signaling a capability to either open or close.
N	Date of last partial stroke test
P	Ability to start a manual test of any valve through the touchscreen display. The test will return immediate results on the valve's health and will not interfere with any pre-set automatic tests.
Q	Power indicator.
R	Expands trending graph to full screen mode.
S	Captures valve testing information and tracks the overall health of the MAXON Series 8000 shut-off valve by plotting testing information to show trending over the life of the valve. This trending information or predictive indicator shows a linear relationship between the installation health data vs. the degradation of the valve's performance over the life of the valve. This trending data is used to indicate when the valve may require maintenance, replacement or that it will probably fail. Features ability to switch between three different screens changing the number of captured data points (10, 60, or 120), enabling better short or long term viewing of the trending information.
T	The "Y" axis scale can be changed to allow user to zoom in and better analyze data.
U	Return to main menu (valve status screen shown in Figure 1).

Maintenance instructions



Do not attempt field repair of valve body or actuator. Any alterations void all warranties and can create potentially hazardous situations.

If foreign material or corrosive substances are present in the fuel line, it will be necessary to inspect the valve to make certain it is operating properly. If abnormal opening or closing is observed, the valve should be removed from service. Contact your MAXON representative for instructions.

Operator should be aware of and observe characteristic opening/closing action of the valve. Should operation ever become sluggish, remove valve from service and contact MAXON for recommendations.

Address inquiries to MAXON. Local worldwide offices may be located at www.maxoncorp.com or by phoning 011-765-284-3304.

Include valve serial number and nameplate information.

SIL SAFETY MANUAL FOR PSCHECK™

Purpose

This manual gives the end user information on how to commission, validate, operate and maintain the PSCHECK™ system.

Introduction

This manual provides necessary requirements for the IEC 61511 functional safety standards.

Reference Documents

PRODUCT DOCUMENTS

Follow the link below to the PSCHECK™ product literature on the MAXON website.

<https://www.maxoncorp.com/index.php?src=directory&view=product&srctype=display&back=product&refno=466&category=NaturalGasBurnerLine&pos=0,50,11>

STANDARDS

ANSI/ISA 84.00.01-2004 (IEC 61511 Mod) Functional Safety – Safety Instrumented Systems for the Process Industry Sector.

Description

The PSCHECK™ system is a custom built panel consisting of an HMI and PLC. This system is a testing device used to provide patented MAXON partial stroke testing on our Series 8000 safety shut-off valves. The system can be configured to operate the partial stroke testing on 1 to 9 valves.

The PSCHECK™ system is a system providing proof testing via a Partial Stroke Test for the MAXON Series 8000 safety shut-off valves. The proof test can be either automatically or manually initiated and checks the response of MAXON Series 8000 Safety Shut-off Valves while in service.

In order to be considered a SIL diagnostic test, the test must be automatically initiated by the PSCHECK SIL rated PLC. In addition, the completion of the test must be internally verified by confirmation of redundant feedback contacts. Test failures must be annunciated by a discrete safety rated contact with a local visual indicator light for feedback.

Limits

ENVIRONMENTAL LIMITS

Refer to the PSCHECK™ catalog section for the environmental limits of the product.

APPLICATION LIMITS

This product is designed to be used exclusively with MAXON Series 8000 safety shut-off valves. The current system limitation is a maximum of nine valves can be tested.

SIL Level

The PSCHECK™ system was designed and built for the requirements of SIL 2.

General Requirements

All SIS components used in conjunction with the PSCHECK™ system must be tested for operation before and after its installation to insure proper SIL rated functionality.

Personnel operating/maintaining the PSCHECK™ system must be competent to do so.

The PSCHECK™ system should be checked for any alarms that could be used to predict a possible valve failure.

The useful life of the PSCHECK™ system is based on the life stated by the manufacturers of the components used in the system construction. See individual components manufacturer's documentation for details. All components are considered replaceable.

Commissioning

Use the following table to commission the PSCHECK™ system.

Table 1: Commissioning Checklist		
Pass	Fail	Description
		Remove all shipping materials.
		Ensure no physical damage.
		The unit must be mounted in a SIL 2 or lower rated environment.
		All four mounting points are being used.
		The proper size/rated bolts are used.
		The panel is oriented correctly for proper HMI viewing.
		The panel is properly grounded.
		The power is properly connected and does not compromise the rating of the enclosure.
		The I/O properly connected and does not compromise the rating of the enclosure.
		The power wires/cables are rated and sized correctly.
		The I/O wires/cables are rated and sized correctly.
		Verify all protection devices at power up.
		Verify HMI powers up properly.
		Verify PLC powers up properly.
		From Valve Health screen, select any valve; select System Setup:
		Setup the Soft Alarm Preset (ms) - The time before the valve stroke test considers the valve response a concern.
		Setup the Test Frequency (days) - How often the valve is tested automatically.
		From System Setup screen, select PST System:
		Enter the date that each valve was installed.

Validation

Since the PSCHECK™ unit provides a means of validating and verifying operation of MAXON Series 8000 Valve train consisting of 1-9 valves, there is no specific Validation Checklist for this system.

Operation/Maintenance

Use the following table for basic operation/maintenance of the PSCHECK™ system.

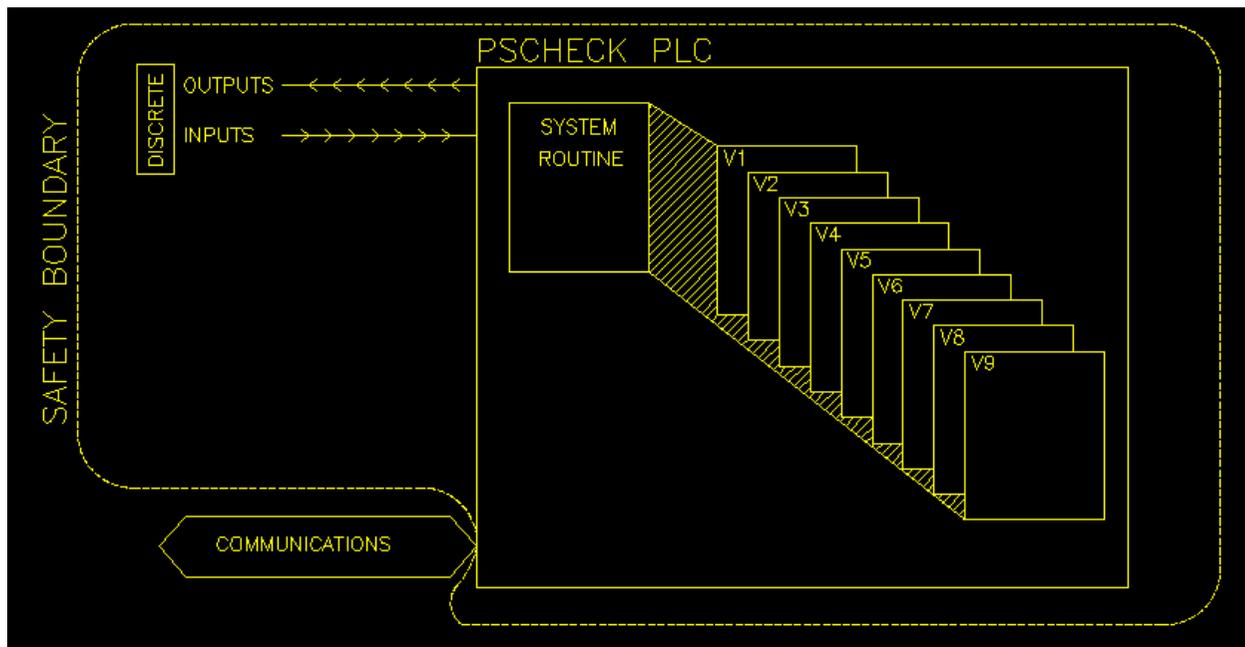
Table 2: Operation/Maintenance Checklist		
Pass	Fail	Description
		HMI and DCS interface units:
		After the unit is commissioned, the testing will operate automatically.
		Operation using HMI interface:
		There is a manual test operation.
		<i>Note: Running a manual test will reset the automatic testing counter so that the frequency will now be based off of this new day.</i>
		To get to that option from the Valve Health screen, select the valve to be tested.
		Select the START button to begin the test.
		For more detailed information on auxiliary functions, please consult the PSCHECK™ manual.
		<i>Note: HMI and network communication feedback is NOT within the SIL safety system.</i>
		Only discrete inputs and outputs may be used for safety critical communications as shown in system diagram.
		Operation using DCS interface:
		Communication and operation via network supported via specified network protocol.
		<i>Note: Network communication feedback is NOT within the SIL safety system.</i>
		Only discrete inputs and outputs may be used for safety critical communications as shown in system diagram.
		The alarms will need to be monitored:
		If a red "X" appears on a valve or next to a valve number, there is a hard/major alarm.
		If the bottom red LED on the HMI blinks, there is a hard/major alarm.
		If a yellow triangle with an "!" appears on a valve or next to a valve number, there is a soft alarm.

Failure Rate Data

The following table provides the failure rate data of the PSCHECK™ system. This failure rate information can be utilized if the system is configured to be a diagnostic. If the PSCHECK™ is utilized as a diagnostic, the following failure rates would be considered annunciation failures.

AD	1.77E-05
AU	3.78E-07

Safety Architecture - Safety Boundary



Failure Notification

Should any failures be detected that compromise functional safety, they should be reported to MAXON. Please contact MAXON customer service or your local MAXON vendor, so that this issue can be addressed immediately.

Legal Notice

MAXON or any of their affiliated entities shall not assume responsibility for the selection, use, operation, or maintenance of any product. That responsibility remains with the purchaser and end user.

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