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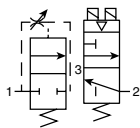
# P33T Series Redundant Safety Exhaust Valve

Bulletin 0700-B13



ENGINEERING YOUR SUCCESS.

# Redundant Safety Exhaust Valve Features



## Control Reliable

Category 4 (Cat 4); Performance Level e (PLe) in accordance with Machine Directive - EN ISO 13849-1. (certification pending)

## Options:

Port size			Cv		Weight kg (lb)	Part number*
Inlet	Outlet	Transducer	1 to 2	2 to 3		
3/4	3/4	w/o transducer	3.7	8.5	7.3 (16.1)	P33TA96RG4F2CN
3/4	3/4	w/ transducer	3.7	8.5	7.4 (16.3)	P33TA96RG4G2CN

\* NPT port threads. For BSPP threads, replace "9" in the part number with a "1".

- Proven control reliable technology with integrated soft start
- Soft start application of air to the system when energized; can be adjusted for slower or faster buildup of system pressure
- Rapid exhaust of downstream air when de-energized to remove stored energy and allow safe access

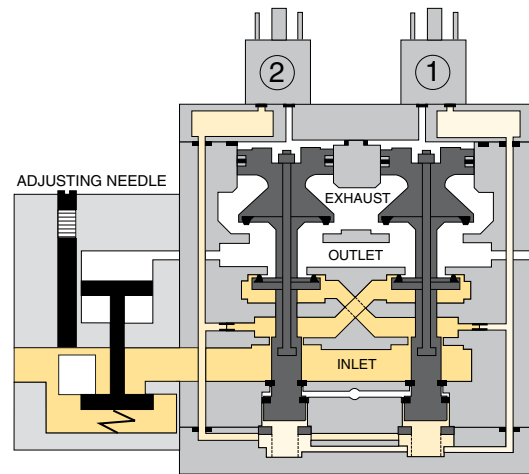
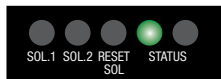
- Memory, monitoring, and air flow control functions are integrated into two identical valve elements. Valves lock-out if asynchronous movement of valve elements occurs during actuation or de-actuation, resulting in a residual outlet pressure of less than 1% of supply.
- Reset can only be accomplished by the integrated electrical (solenoid) reset. Cannot be reset by removing and re-applying supply pressure.
- Basic 3/2 normally closed valve function: Dirt tolerant, wear compensating poppet design for quick response and high flow capacity.
- LED indicators of main solenoid operation, reset solenoid operation, and status indicator condition.

- Optional transducer for monitoring of downstream pressure in the system.
- Dual exhaust silencers included.
- Not for use with clutch / brake applications.
- For use in conjunction with a safety relay or safety PLC.

# Redundant Safety Exhaust Valve Functions – De-Actuated / Actuated

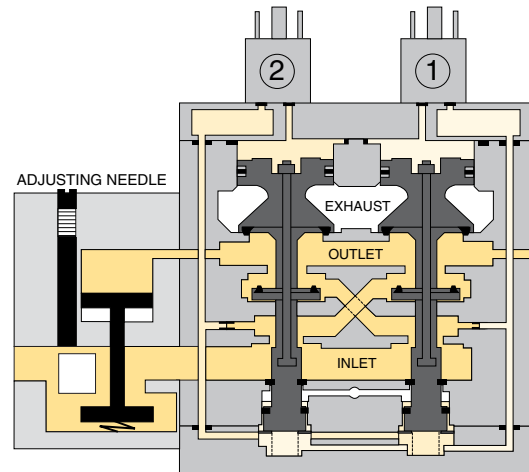
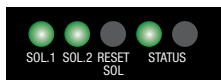
## Valve de-actuated (ready-to-run):

- Soft start and redundant safety exhaust valve in the at rest condition
- Air enters crossover passages through stem and valve body area
- Crossover passages and timing chambers are pressurized
- Pressure balance holds internals in the de-energized condition
- The green "Status" LED will be illuminated indicating the valve is ready to run

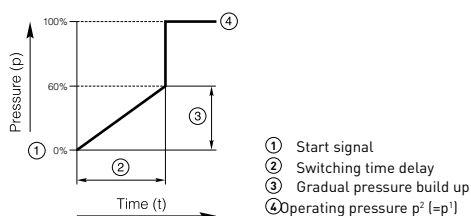


## Valve actuated:

- Solenoid 1 and Solenoid 2 energize simultaneously within 100ms, shifting the pilot valves
- Timing chambers experience a pressure drop as each element shifts to its actuated state
- Exhaust poppets seat blocking the exhaust
- Flow restriction at inlet removed
- Inlet poppet shifts allowing flow downstream
- Soft start piston remains un-shifted supplying a limited air flow to the redundant safety exhaust valve internals
- As downstream pressure reaches approximately 60% of line pressure the soft start piston shifts supplying full pressure downstream
- Solenoid 1, Solenoid 2 and the green "Status" LED's will be illuminated indicating the valve is operating properly



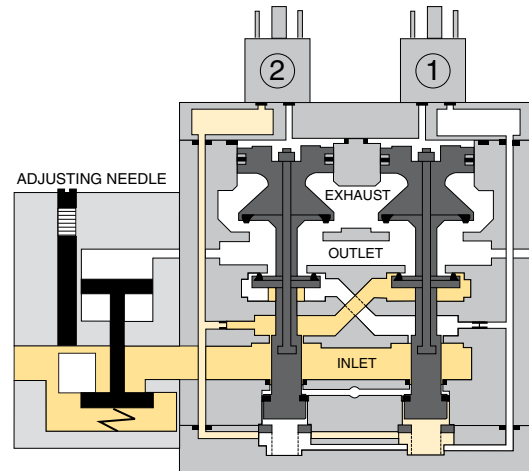
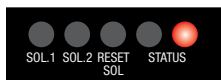
## Soft start function:



# Redundant Safety Exhaust Valve Functions – Fault / Reset

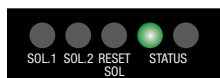
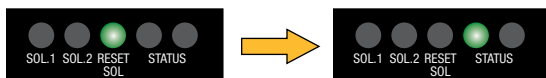
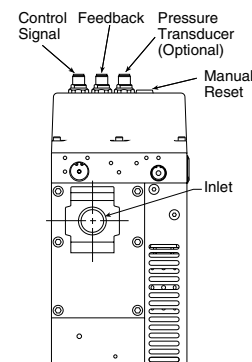
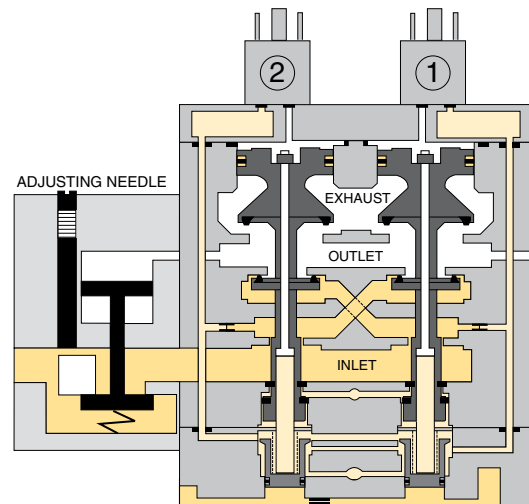
## Valve fault and lock-out:

- If Solenoid 1 and Solenoid 2 do not energize simultaneously within 100ms, a fault occurs
- A timing chamber will be exhausted before the correct internal shifting has occurred
- Valve will be latched out
  - No return piston pressure
  - No pilot pressure
- The red “Status” LED will be illuminated indicating the valve is in fault and lock-out must be reset



## Valve reset (electrical or manual):

- **Fault: Electrical Reset procedure:**
  - Remove the electrical signal from the main coils
  - Ensure there is air supplied to the valve
  - Energize the reset solenoid momentarily (minimum of 200 ms)
  - Allow 200 ms delay after removing the reset signal prior to re-energizing the main coils (Solenoid 1 and Solenoid 2)
- **Fault: Manual Reset procedure:**
  - Remove the electrical signal from the main coils
  - Ensure there is air supplied to the valve
  - Depress the manual reset button
- A momentary shift of the reset valve solenoid via electrical or mechanical operation, provides a pneumatic signal
- The “Reset” green LED will indicate when the solenoid is energized
- Provides pressure under the reset pistons to push both internals to the home position
- Both timing chambers are exhausted
- De-energizing the reset allows the reset to return to its home position
- The pressure chambers will quickly refill
- The green “Status” LED will be illuminated once the valve is reset



# Machinery Directive Overview

## Parker is protecting your most valuable assets...

**In the context of the Machinery Directive, the goal is to protect people and the environment from accidents caused from all types of machinery**

EN 954-1 has now been superseded by EN 13849-1 (safety of machines; safety-related parts of control systems, part 1: general design principles) and EN 62061 (safety of machines; functional safety of electrical, electronic and programmable electronic control systems).

A significant revision in these standards is the approach that is taken to the assessment of safety-related controls systems, especially with regard to modern electronic control circuits.

In essence, the new standard builds on the existing categories within EN 954-1, adding a new procedure for risk assessment. This is called a Performance Level (PL) and is associated with a given safety function, with definitions for diagnostic capabilities and common cause failures.

This ensures that safety is not just focused on component reliability, but instead introduces common sense safety principles such as redundancy, diversity, and fail-safe behavior.

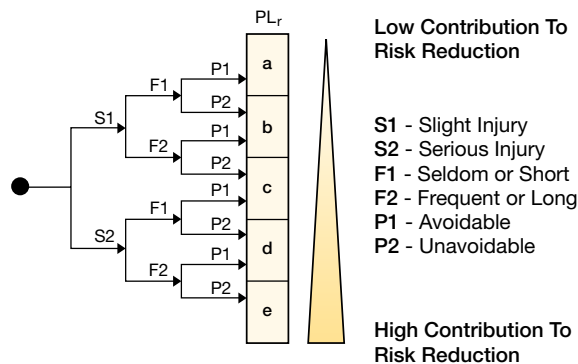
PLs are based on the original B, 1, 2, 3, 4 safety categories and are described by the following parameters:

- Category (structural requirements)
- Mean time to dangerous failure (MTTFd)
- Diagnostic coverage (DC)
- Common cause failure (CCF)

With EN ISO 13849-1 and EN 62061 the performance of each safety function is specified as either:

- PL (Performance Level,  $PL_a - PL_e$ ) in the case of ISO13849-1
- SIL (Safety Integrity Level, SIL 1 – 3) in the case of EN 62061

## Determining PL according to EN ISO 13849-1



## Risk Parameters

### S = Severity of Injury

- S1 = Slight (usually reversible) injury
- S2 = Severe (usually irreversible) injury, including death

### F = Frequency and/or duration of exposure to hazard

- F1 = Rare to often and/or short exposure to hazard
- F2 = Frequent to continuous and/or long exposure to hazard

### P = Probability of avoiding or limiting harm

- P1 = Possible under certain conditions
- P2 = Hardly possible

**a, b, c, d, e = targets of the safety related performance level**

When determining the performance level; the greater the risk, the higher the requirements of the control system. The level of each hazardous situation is classified in five stages, from a to e. With  $PL_a$  the control function's contribution to risk reduction is low, while at  $PL_e$  it is high. The risk graph above can be used as a guideline to determine the required performance level  $PL_r$  for safety function.

## Categories defined according to EN ISO 13849-1

Category	Summary
Category B	When a fault occurs it can lead to the loss of the safety function
Category 1	When a fault occurs it can lead to the loss of the safety function, but the $MTTF_d$ of each channel in Category 1 is higher than in Category B. Consequently the loss of the safety function is less likely.
Category 2	Category 2 system behavior allows that: the occurrence of a fault can lead to the loss of the safety function between the checks; the loss of the safety function is detected by the check.
Category 3	SRP/CS to Category 3 shall be designed so that a single fault in any of these safety related parts does not lead to the loss of the safety function. Whenever reasonably possible the single fault shall be detected at or before the next demand upon the safety function.
Category 4	SRP/CS to Category 4 shall be designed so that a single fault in any of these safety related parts does not lead to the loss of the safety function, and the single fault is detected on or before the next demand upon the safety functions, e.g. immediately, at switch on, at end of a machine operation cycle. If this detection is not possible an accumulation of undetected faults shall not lead to the loss of the safety function

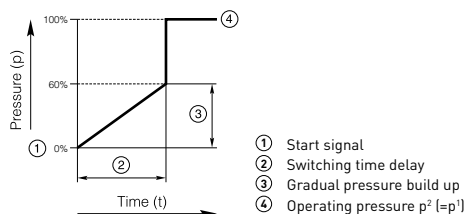
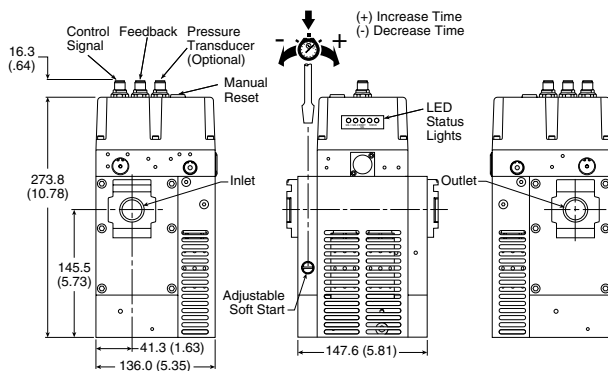
## ...By offering the best pneumatic safety for your machines

# Accessories & Technical Information

## Technical information

Pilot Solenoids:	According to VDE 0580
Enclosure rating:	According to DIN 400 50 IP 65
Connector socket:	According to DIN 43650 Form A
	Three solenoids, rated for continuous duty
Standard voltages:	24VDC
Power consumption (each solenoid):	
For primary and reset solenoids:	1.2 watts on DC
Enclosure rating:	IP65, IEC 60529
Electrical connection:	M12, 5-pin
Ambient temperature:	15°F to 122°F (-10°C to 50°C)
Media temperature:	40°F to 175°F (4°C to 80°C)
Flow media:	Compressed Air, filtered to minimum 40 micron
Inlet pressure:	30 to 150 PSIG (2 to 10 bar)
Pressure switch (status indicator) rating:	5 amps at 30 volts DC.
Monitoring:	Dynamically, cyclically, internally during each actuating and de-actuating movement. Monitoring function has memory and requires an overt act to reset unit after lockout.
Mounting orientation:	Vertically with pilot solenoids on top
Port threads:	3/4 NPT, 3/4 BSPP
Control reliable:	Category 4 [Cat 4]; performance Level e [PLe] in accordance with Machine Directive - EN ISO 13849-1 (certification pending)

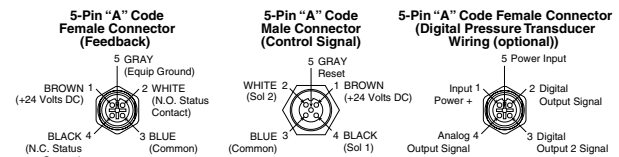
## Dimensions mm (inches)



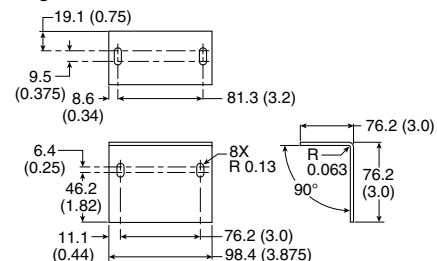
## Accessories

Description	Part number
Black grill	1834C05-001
Body connector	P32KA00CB
Cables	
M12, 5-pin female to flying lead cable, TPE; 2 m [6.6 ft]	RKC 4.5-2/S1587
M12, 5-pin male to flying lead cable, TPE; 2 m [6.6 ft]	RSC 4.5-2/S1587
Port block kit	
1/2 NPT	P32KA94CP
3/4 NPT	P32KA96CP
1/2 BSPP	P32KA14CP
3/4 BSPP	P32KA16CP
1/2 BSPT	P32KA24CP
3/4 BSPT	P32KA26CP
Pressure switch	1227A30-001
Pressure transducer (optional)	1232H30-001
T-bracket w/ body connector	P32KA00MT
T-bracket (fits to body connector or port block)	P32KA00MB
Silencer(s) 3/4"	5500A5013
Solenoid (main & reset)	1527B7916-001
Square flush mounting gauge kit, 0-160 psig	K4511SCR160

## Valve wiring



## Angle Mounting Bracket



**Note:** Mounting bracket and installation screws included and required to install unit in the system.

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