

NEW Safety Laser Scanner

SZ-V Series





Industry Leading Safety Laser Scanner





VERSATILE, EASY TO USE, AND TRULY SUPERIOR SAFETY SCANNER



Innovative Way of Guarding Time-of-Flight Based Detection



UR.



VERSATILE

- Large Customizable Zones
- Monitor Multiple Areas
- Protect Countless Hazards

EASY TO USE

- USB and Network Compatible
- Easy to Navigate Software
- Quickly Customized Zones



TRUE SUPERIORITY

- Advanced Features
- Unmatched Stability
- Visual Innovation



Safety Laser Scanner SZ-V Series

VERSATILE

LARGE CUSTOMIZABLE ZONES



190° Field of View 8.4 m 27.56' Protection Zone 26 m 85.30' Warning Zone

Boasting a large customizable zone, the SZ-V Series offers a truly unique safety solution compared to other types of safety equipment. The reflective nature of the scanner allows for versatile mounting, coupled with user-defined protection and warning zones, to cover any hazardous location.

PROTECT MULTIPLE AREAS ON A SINGLE MACHINE



Connect Up To 3 Units

Expand machine protection by connecting multiple heads to a single display unit. Seamlessly monitoring multiple sections of a machine without the need for extensive or complicated wiring.

SAFELY PROTECT COUNTLESS TYPES OF HAZARDS



Area Protection

Safety scanners prevent hazards from operating when an unintended object or person is in a dangerous area. Unlike safety mats, safety scanners can be unobtrusively mounted to avoid damage or potential impact, while still protecting complex shaped areas.



Access Protection

The SZ-V also allows for vertical mounting to detect any undesirable entrances into a hazardous area. This is ideal in locations where it would be too difficult to effectively mount light curtains.



AGV/AGC

A safety laser scanner can be mounted on an automated guide vehicle to eliminate the risk of collisions with objects or people in the environment. The features of the SZ-V Series help to ensure proper operation without danger or unnecessary stoppage.

EASY TO USE

SIMPLE AND DIRECT COMMUNICATION



USB/Ethernet Direct Connection PROFINET/EtherNet/IPTM Network Communication

Directly connect to SZ-V Series scanners through either USB or Ethernet to easily modify the units program, monitor the current status of the scanner, or check recent interruptions. The SZ-V Series can also communicate directly with PLCs via several different communication protocols, including EtherNet/IPTM, PROFINET, and UDP, as well as the following safety rated protocols, CIP Safety and PROFIsafe. *Network communication only available on designated models.

EASY TO NAVIGATE SOFTWARE



Simplified step-by-step menus.

Clean and concise page layouts provide a seamless flow between settings.

Drop-down menus and buttons make configuration faster than ever.

QUICKLY CUSTOMIZED DETECTION ZONES (3 Methods)



Automatic Drawing Function

Instantly map out the protection zone with the push of a button! This innovative feature automatically draws around obstacles to ensure proper protection in complex environments.



Dynamic Drawing Function

Using a specialty reflector, simply mark the corners of the desired zone for a truly unmatched zone creation technique. This function can be used to generate simple square zones, as well as complex polygonal areas.



Upload Existing Zones

Speed up integration by uploading zones that have already been created in a 3rd party software (ex. robotics software) via an XML file. The reverse can also be realized by exporting zones created in the SZ-V software for use in other devices.

SUPERIORITY Advanced Functionality

IMPROVEMENTS

System Memory

When replacing a unit, the original settings can be easily transferred by removing the system memory from the original unit and connecting it to the new unit.



8.4 m 27.56' Detecting Range

Several KEYENCE innovations work together to provide an impressive 8.4 m 27.56 detecting range for flexible scanner usage.



INNOVATIONS



Safety Laser Scanner SZ-V Series

Network Compatibility

The SZ-V supports various networking options to enable remote monitoring.

SZ-V(U)32N(C)(X)



CRC Code

This 4 digit code is located in both the software and on the display unit, to verify that the settings have not been changed.



Encoder Inputs

The SZ-V can take encoder inputs directly from an AGV/AGC to enable smooth profile transitions.

SZ-V(U)32N(X) SZ-V(U)32(X)



2 Scanners in 1 Unit

The SZ-V can protect two independent zones simultaneously, saving costs and wiring.

SZ-V(U)04(X) SZ-V(U)32N(C)(X)



Muting Function

The built-in muting function ensures high productivity and efficiency, while still maintaining a safe working environment.





96 Programmable Profiles

Provide precise and dynamic control of AGV/AGC operations using 32 banks, each containing 1 protection zone and 2 warning zones.

SZ-V(U)32N(X) SZ-V(U)32(X)



SUPERIORITY Unmatched Stability

IMPROVED ENVIRONMENTAL RESISTANCE



Enhanced Detection

0.1° Beam Pitch

Tight Beam Spot

By reducing the spot diameter by $1/3^*$ and increasing the number of beam axes almost $4X^*$, the SZ-V Series is able to stably detect targets while greatly decreasing the number of errant trips due to environmental factors. *Compared to conventional models.

Target Differentiation

Intensity Comparison Algorithm (I.C.A.)

The innovative Intensity Comparison Algorithm (I.C.A.) allows the scanner to analyze the amount of light returned to stably differentiate between people/objects and dust or mist.





INCREASED FLEXIBILITY



More Coverage, Less Costs

8.4 m 27.56 Detection Zone

26 m 85.30' Warning Zone

By deploying the new "Cannon Hole" structure, the SZ-V is able to detect further than ever before. This achievement eliminates the need for multiple scanners to cover the same location. This along with the intuitive customization provide for clear cost savings.





SUPERIORITY Visual Innovation



The SZ-V Series utilizes visualization in every aspect of scanner usage to provide a truly unique experience. Installation is now easier than ever with built-in cameras, available on specific models, to not only show what the scanner sees but also the actual detection plane.



The SZ-V camera models show real time images of what the scanner sees.



The software view combines the camera images and zone layout for a complete overview.



With conventional scanners, it was very difficult to monitor the scanner's status while the machine was operating. This is no longer a concern with the detachable SZ-V Display Unit which enables users to easily monitor the scanner at any time.



Quick checks through the Display Unit Detailed setting information through a laptop

Ideal for mounting outside of the hazardous zone to prevent unnecessary machine stoppage.





The combination of the previous features, along with KEYENCE's innovative Detection History function, completely eliminate maintenance headaches. The SZ-V records WHEN and WHERE detections occur to provide a thorough archive of pertinent information that can be used to better understand scanner operations.

(1) Detection History



Detection History Content

Time	Duration
Position	OSSD/Warning/Alert Status

The Detection History feature allows SZ-V users to clearly visualize WHEN, WHERE, and for HOW LONG detections are occurring. With up to 500 events that can be saved, this feature provides crucial details to better understand machine shut downs.

(2) Built-in Camera

With the built-in camera models, the SZ-V takes pictures or movies before and after the OSSD turn OFF. Now users can visually see the cause of trip and react accordingly.

Cause: Dropped Tool



NETWORKING

EXTENSIVE NETWORKING OPTIONS

The SZ-V32NC(X), SZ-V32N(X), and SZ-VU32N models contain an abundance of networking options that offer a wide variety of beneficial features. From programming the unit remotely to controlling machine stoppage through a Safety PLC, the SZ-V Series can adapt to almost any need.



KEYENCE NETWORK ADVANTAGE EtherNet/IP



Easily Accessible Information

Detachable and Detailed Display

The highly detailed display utilized by the SZ-V Series provides a perfect platform to view all network related settings directly on the unit. As an added benefit, the display unit can also be separated and mounted in an easily accessible location.

UDP



Quickly and Easily Check the Following:

- IP Setting
- IP Address
- MAC Address

All can be seen directly on the display unit!



- · Control machine power through a safety PLC
- Check/protect different areas simultaneously
- Monitor the status of the scanner







NON-SAFETY FUNCTIONS

- Read measurement distance data
- Monitor the status of the scanner (AUX information)
- Send status information to an HMI



PLC or Industrial PC





Ethernet

SZ-V CONFIGURATOR FUNCTIONS

- Change/view all settings remotely
- View the history of OSSD trips and errors
- · Monitor the protection area in real-time



KEYENCE CIP Safety/PROFIsafe ADVANTAGE ADVANTAGE



Step1 Select separate or integrated system and required functions.							
<mark>1</mark> Selec	t system		2 Select functions		<mark>3</mark> Select ca	imera model or standa	rd model
Integrated system			Multi-OSSD/		Camera	SZ-VO4X	
					Standard	SZ-V04	
	<u>J</u>		Multi-hank	-	Camera	\$Z-V32X	
				_	Standard	SZ-V32	
A			Network Communication (PROFIsafe)	-	Camera	SZ-V32NX	
		Multi-bank Muting	_	Standard	SZ-V32N		
			Network Communication		Camera	SZ-V32NCX	
			(UF Salety) Multi-bank		Standard	SZ-V32NC	
Separat	e system		Multi-OSSD/Muting	-	Camera	Display unit: SZ-VU04 Scanner head: SZ-VH1X System memory: SZ-VSM)
					Standard	Display unit: SZ-VUO4 Scanner head: SZ-VH1 System memory: SZ-VSM	
	*		Multi-bank	_	Camera	Display unit: SZ-VU32 Scanner head: SZ-VH1X System memory: SZ-VSM	
	June 1	Standard	Display unit: SZ-VU32 Scanner head: SZ-VH1 System memory: SZ-VSM)			
			Network Communication (PROFIsafe) Multi-bank	_	Camera	Display unit: SZ-VU32N Scanner head: SZ-VH1X System memory: SZ-VSM	
			Muting		Standard	Display unit: SZ-VU32N Scanner head: SZ-VH1 System memory: SZ-VSM	



Integrated models

Function		Model	Weight	
	Multi-function	Camera	SZ-V04X	Approx. 2100 g
	type	Standard	SZ-V04	Approx. 2100 g
	Multi-bank	Camera	SZ-V32X	Approx. 2100 g
	type	Standard	SZ-V32	Approx. 2100 g
	Network type	Camera	SZ-V32NX	Approx. 2300 g
	(PROFIsafe)	Standard	SZ-V32N	Approx. 2300 g
	Network type (CIP Safety)	Camera	SZ-V32NCX	Approx. 2300 g
		Standard	SZ-V32NC	Approx. 2300 g

* Integrated models include display unit, scanner head, system memory and a connection cable (SZ-VS005).

Display units

Function		Model	Weight
The P	Multi-function type	SZ-VU04	Approx. 420 g
Tue P	Multi-bank type	SZ-VU32	Approx. 420 g
	Network type	SZ-VU32N	Approx. 600 g

Scanner heads

Function		Model	Weight
	Camera type	SZ-VH1X	Approx. 1600 g
	Standard type	SZ-VH1	Approx. 1600 g

System memory

	Model	Weight
2	SZ-VSM	Approx. 60 g

Protection cover

Model	Weight
SZ-VB21*1	Approx. 1000 g

Protection cover (visor)

Model	Weight
SZ-VB22*1	Approx. 660 g

*1 The SZ-VB21/SZ-VB22 protection covers can be mounted over a mounting bracket.

Replacement window

Model	Weight
SZ-VHW	Approx. 130 g

Configuration software

Configuration software <Safety Device Configurator> can be downloaded from the KEYENCE website for free.

Mounting brackets

Installation	Name · Model	Weight
	Adjustable angle mounting bracket (horizontal) SZ-VB01	Approx. 900 g
.	Adjustable angle mounting bracket (vertical) SZ-VB02	Approx. 1800 g
	Floor bracket \$Z-VB03	Approx. 1350 g
J	Display unit standard bracket SZ-VB11	Approx. 700 g
	Display unit DIN rail mounting bracket (flat) SZ-VB12	Approx. 350 g
	Display unit DIN rail mounting bracket (slim) SZ-VB13* ²	Approx. 350 g

*2 SZ-VB13 cannot be used with SZ-VU32N.

Power cable

	Туре	Length	Model	Weight
		5 m 16.40'	SZ-VP5	Approx. 400 g
	Ctandard	10 m 32.81'	SZ-VP10	Approx. 800 g
	Stanuaru	20 m 65.62'	SZ-VP20	Approx. 1500 g
Q		30 m 98.43'	SZ-VP30	Approx. 2200 g
	Power cable when using PROFIsafe or CIP Safety	10 m 32.81'	SZ-VP10PW	Approx. 650 g
\bigcirc	M12 quick disconnect	0.3 m 0.98'	SZ-VPC03* ³	Approx. 80 g

*3 SZ-VPC03 is equipped with only 4 pins: 24 V, 0 V, OSSD1, OSSD2.

Extension cable (for use with SZ-VPC03)

	Туре	Length	Model	Weight
Ó	Power cable extension (M12)	10 m 32.81'	SZ-VCC10	Approx. 750 g

Connection cable

	Length	Model	Weight
	0.05 m 0.16'	SZ-VS005	Approx. 80 g
Ņ	5 m 16.40'	SZ-VS5	Approx. 350 g
	10 m 32.81'	SZ-VS10	Approx. 700 g
	20 m 65.62'	SZ-VS20	Approx, 1300 g

Ethernet cable/USB cable

		Length	Model	Weight
	Main unit connection cable	0.3 m 0.98'	SZ-VNC03	Approx. 110 g
		2 m 6.56'	OP-88086	Approx. 160 g
Q	Ethernet extension cable (RJ45)	5 m 16.40'	OP-88087	Approx. 340 g
		10 m 32.81'	OP-88088	Approx. 660 g
Q	Ethernet extension cable (M12)	2 m 6.56'	OP-88089	Approx. 160 g
		5 m 16.40'	OP-88090	Approx. 340 g
		10 m 32.81'	OP-88091	Approx. 660 g
		20 m 65.62'	OP-88092	Approx. 1280 g
		2 m 6.56'	OP-51580	Approx. 70 g
Y	USD CAUR	5 m 16.40'	OP-86941	Approx. 200 g

Model Name				SZ-V04(X)	SZ-V32(X)	SZ-V32N(X)	SZ-V32NC(X)	
Туре				Multi-function Type	Multi-bank Type	Network Type (PROFIsafe)	Network Type (CIP Safety)	
	Minimum o	detectable object size		Diameter 20, 30, 40, 50, 70, 150 mm	0.79", 1.18", 1.57", 1.97", 2.76", 5.91" (0	lepends on the setting) Reflectance 1.89	6 min., Speed 1.6 m/s 5.25 ft/s max.*1	
	Detectable	angle		190° (-5° to 185°)				
		_	Scan Cycle A		160 ms (2scans) to	1280 ms (16scans)*3		
		Standard Mode*2	Scan Cycle B		168 ms (2scans) to	1344 ms (16scans)*3		
	Response time		Scan Cycle C		176 ms (2scans) to	1408 ms (16scans)*3		
	(ON to OFF)		Scan Cycle A		80 ms (2scans) to	640 ms (16scans)*3		
		High Speed Mode*2	Scan Cycle B		84 ms (2scans) to	672 mc (16ccanc)*3		
		Thigh Speed Mode	Scan Cycle D		04 III3 (230alis) to	704 mc (16coanc)*3		
	Deserves		Scall Gycle G		00 IIIS (2SCAIIS) 10	704 IIIS (IOSCAIIS) *		
	Response	time (UFF to UN)	70 / 450		Response time (U	N to UFF) + 150 ms		
Detection		Minimum detectable object size: a	(0 / 150 mm 2.76° / 5.91°		8.4 m 27.56" (Standard Mode)	5.7 m 18.70" (High Speed Mode)		
canability	Protection	Minimum detectable object	t size: 50 mm 1.97"		5.6 m 18.37' (Standard Mode)	3.8 m 12.47' (High Speed Mode)		
oupubling	7000	Minimum detectable object	t size: 40 mm 1.57"		4.3 m 14.11' (Standard Mode)	2.9 m 9.51' (High Speed Mode)		
	20110	Minimum detectable object	t size: 30 mm 1.18"		2.9 m 9.51' (Standard Mode)	2.0 m 6.56' (High Speed Mode)		
		Minimum detectable object	t size: 20 mm 0.79"		1.6 m 5.25' (Standard Mode)	1.1 m 3.61' (High Speed Mode)		
		Minimum detectable object size: 7	70 / 150 mm 2.76" / 5.91"		26 m 85.30' (Standard Mode) 2	3 m 75.46' (High Speed Mode)*4		
		Minimum detectable object	t size: 50 mm 1.97"		25 m 82.02' (Standard Mode) 2	1 m 68.90' (High Speed Mode)*4		
	warning	Minimum detectable object	t size: 40 mm 1.57"		24 m 78.74' (Standard Mode) 2	0 m 65.62' (High Speed Mode)*4		
	zone	Minimum detectable object	t size: 30 mm 1.18"		23 m 75.46' (Standard Mode) 1	8 m 59.06' (High Speed Mode)*4		
		Minimum detectable object	t size: 20 mm 0 79"		21 m 68 90' (Standard Mode) 1	5 m 49 21' (High Speed Mode)*4		
	Additional	safety distance	0.201 20 1111 0110		100 mn	1 3 94"*5		
	Maximum	measurement distance			60 m 10	06 85' *6		
Maximum	umber of h	anke		Max 4 banks	May 32 banks	Max 32 banks	May 16 banke	
Multiple.co		ains		IVIAA. 4 DATIKS	Max. 32 Dallk3	Innor boodo	Iviax. To Dallks	
Comoro mo	aiiiiei ileaus				Manitar areas aver	1009 / 58 to 1959*7		
Disalau	intorning are	d			MOTILOT area. Over	190 (-5 10 165)	-	
Display	T	1			UVGA 2.2IN			
	Type, wave	elength			Infrared laser	diode, 905 nm		
Light	Laser	IEC			Class1 IEC,	/EN60825-1		
source	Class	FDA			Class1 FDA 21CFR 1040.10, 1	040.11 (Laser Notice No.50)*8		
		JIS			Class1 J	IS C6802		
Rating	Power volt	age		24 VDC ±10% (Ripple P-P 1	0% or less): When using a conve	rter power supply, 24 VDC +20%/-	30%: When using a battery	
maning	Power con	sumption		11.8 W (without load), 55.0 W (with load)*9	11.8 W (without load), 55.0 W (with load)*9	13.4 W (without load), 50.8 W (with load)*9	13.4 W	
	Output			Transistor out	puts (NPN or PNP is selected in	the software)		
	Number of	outputs		4 outputs	2 outputs	2 outputs	—	
	Max. load	current			500 mA*10		_	
Control	Residual v	oltage (during ON)		Max. 2.5 V (with a cable length of 5 m 16.40')				
output	utput OFE-state voltage			Max. 2	2.0 V (with a cable length of 5 m	16.40')		
(0550)	Leakage ci	urrent			Max. 1 mA*11			
	Max cana	citive load		22	uE (with a load resistance of 10	0.0)		
	Load wirin	a resistance						
	DND	grosistanoc		Nukak, 2.3 M				
Inputs	NDN			On-voltage: To to over, other voltage: open of to or, stort circuit current: Approx. 2.5 mix (Approx. To finAtor EDM)				
		-		Transister autoute (N	TO VIO FOWEI VOItage, Short-circuit current	Approx. 2.5 IIIA (Approx. To IIIA TOT EDW)		
	Output typ			Inalisistor outputs (N	IPIN OF PINP IS Selected by the de	autaieu PC soltware)		
Non-safety	Number of	outputs		6 outputs	4 outputs	4 outputs		
related	Wax. load				Max. 50 mA	40,400		
output	Residual v	oitage (during ON)		Wax. 2	.5 V (with a cable length of 5 m	16.40)	—	
(AUX				Incandescent lamp (24 VDC, 1 to 5.5 W)		Incandescent lamp (24 VDC, 1 to 5.5 W)		
output)	Muting lan	np		or LED lamp (load current: 10 to 230 mA)	—	or LED lamp (load current: 10 to 230 mA)	—	
				can be connected		can be connected		
	USB				USI	B2.0		
		Standard		—	—	IEEE802.3u (100 BASE-TX)	
Interface		Transmission rate		—	_	100	Mbps	
Internace	Ethernet	O-his				STP(Shielded	Twisted Pair)	
		Cable		—	—	cable or UTP(Unshielded Twisted	l Pair) cable. Ćategory5 or higher.	
		Connector		_		BJ45 (IP6	(5) 2 ports	
N						PROFIsafe, PROFINET.		
Network ful	nction			_	—	EtherNet/IP™ UDP	GIP Safety, EtherNet/IPIM, UDP	
	Enclosure	rating			IP65(IE	C60529)		
	Operating	ambient temperature			-10 to +50°C 14 to	122°F (No freezing)		
	Storage an	nhient temperature			-25 to +60°C -13 to -	140°E (No freezing)		
Environmental	Onerating	relative humidity			35% to 85% BH (No condensation)		
resistance	Storage re	lative humidity			35% to	95% BH		
1001010100	Curroundi	a light			Incondescent lamp	: 1500 lux or loog*12		
	Vibration	ing light		10 to 55 Uz		. 1500 lux of less	7 directions	
	Chook			10 l0 55 HZ,	0.7 IIIII 0.03 COMPOUND AMPIN	uue, 20 Sweeps each III A, F, and		
	SHUCK	Main unit and -		100 m/s² 328.	00 11/S= (Approx. 10 G) 10 MS p	uise, III A, T, Z uirections 1000 ti	IIIES EAUII AXIS	
	Scanner	Wall unit case			Magn			
	head	window			Polycarb	onate, PEI		
Material		Indicator part			Alumin	um, PES		
	Display unit	Case			Magnesium, PP	S, Polycarbonate		
	System memory	Case			Alumin	um, PPE		
Cable	Power and	I/O cable			30 m 98.43	B' or less *13		
Cable	Between s	canner head and display unit			20 m 65.62' c	r less each *14		
iengtii	Ethernet ca	able		_	_	100 m 328.0	08' or less*15	
	5140	EMS			IEC61496-1. EN61496-1.	UL61496-1 (Type 3 ESPE)		
Approved	EMC	EMI			EN55011 ClassA, FCC Part1	5B ClassA, ICES-003 ClassA		
standards				IEC61496-1. EN61496-1 UL6	1496-1 (Type 3 ESPE). IEC61496-	3. EN61496-3 (Type 3 AOPDDR) IF	C61508, EN61508, IEC62061.	
	Safety			EN62061 (SIL2 / SILCL2)	EN ISO13849-1 2015 (PLd Cate	1000/3) 111 508 111 1008 CSA C22 2	No 14 CSA C22 2 No 0 8	

*1 If the object to be detected moves parallel to the detection plane, SZ-V cannot detect the object moving at speed over 1.6 m/s 5.25 II/s, regardless of the encoder setting. *2 The response time, protection zone, and warning zone are affected by the operation mode. *3 When using PROFsale, 6 ms is added to the response time. When using CIP Salety, 10ms is added to the response time. *4 20% or more reflectance is necessary for the minimum detectable object in the warning zone. *5 If there is a highly reflective background within 1.5 m 4.92 from the boundary of the protection zone, 200 mm 7.87 must be added as supplementary necessary distance to the protection zone when calculating the minimum sately distance. *6 Even when using the network data output, the maximum measured output distance is 60 m 196.85'. *7 Only applicable for the type with a camer. *8 The laser classification for FDA (CDRH) is implemented based on IEC60825-1 in accordance with the requirements of Laser Notice No.50. *9 When using the SZ-V0 with series connected sensor heads, it is necessary to add 9.4 W per scamer head. Also, power consumption may temporarily be higher (maximum 3.6 W). Power consumption will be within the specification after SZ-V moves to normal operation. *10 For the SZ-V04 type, the load current calculation of the OSSD output and AUX output is 1.5 A or less when using one scanner heads, and 0.5 A or less when using three scanner heads. Sort less SZ-V and type and the SZ-V04 type, the load current calculation of the OSSD output and AUX output is 1.5 A or less when using two scanner heads, and 0.5 A or less when using two scanner heads, and 0.5 A or less when using three scanner heads. Sort less CV-32N type, the load current calculation of the OSSD output and AUX output is 1.5 A or less when using two scanner heads, and 0.5 A or less when using two scanner heads, and 5 m. *11 Includes when the power is OFF. *12 An ambient light source should not be located within .5* of the detection plane. *13 10 m 32.81' or less when using

Functions

Model		SZ-V04 (X) SZ-V32 (X) SZ-V32 (X) Image: Simple state stat		N (X)	SZ-V32NC(X)		
Туре		Multi-function	Multi-bank	Netw Not using PROFIsafe	ork Using PROFIsafe	Network (CIP Safety)	
Detection	Protection zone	✓ 2 zones	✓ 1 zone	🗸 1 zone	🗸 2 zones	✓ 2 zones	
canability	Warning zone	✓ 2 zones	✓ 2 zones	✓ 2 zones	🗸 2 zones	✓ 2 zones	
capability	Minimum detectable object size	Diameter 20, 30, 40, 50, 70, 150 mm		0.79", 1.18", 1.57", 1	.97", 2.76", 5.91"		
Camera		✓*1	✓*1	✓*1	✓*1	✓*1	
Interlock function		✓			✓*3	✓*3	
EDM functi	on	✓	1	1	—	_	
	Maximum number of banks	4	32	32	16	16	
Bank	Switching through wiring inputs	/	/	1	—	—	
function	Switching through encoder inputs	—		1	—	—	
	Monitoring multiple banks via network	-	-	—	1	~	
Multi-OSSD function		1		—	1	1	
Muting function		1		1	_		
Reference points monitoring function		1	1	1	1	✓	
Number of	AUX outputs	✓ 6 outputs	✓ 4 outputs ^{*2}	✓ 4 outputs ^{*2}	*3	*3	
State inform	nation output	1	1	1	*3	*3	
Detection h	istory	1	1	1	1	✓	
Ethernet Co	mmunication		_	1	1	1	
Cascading	scanner heads	Max. 3 units					

*1 Only when using a scanner head with a camera. *2 The number of usable AUX outputs varies depending on the settings. *3 When using PROFIsate or CIP Safety, all physical I/O wires will be deactivated. Corresponding information can be read/written over PROFIsate (PROFINET) or CIP Safety (EtherNet/IPTM) communication. Reference: Depending on the settings, some functions cannot be used simultaneously. For details, refer to the SZ-V Series user's manual.

Ethernet communication

SZ-V32N(X)/U32N and SZ-V32NC(X) can exchange data with a PC or PLC via Ethernet cable.

Depending on the device to be connected, multiple communication options are available.



laptop PC

Functions available via communication	Communication to SZ-V Configurator	UDP Command*1	EtherNet/IPTM, PROFINET*1*2	PROFIsafe*2	CIP Safety
Configure SZ-V protection zones	✓ <i>✓</i>	_	—	—	—
Configure SZ-V functions	1	-	_	—	—
Check detection status with monitor view	1	—	—	—	—
Read distance measurement data	—	✓	▲	▲ * ³	▲*4
Read error status of SZ-V	1	✓	1	✓*3	✓*4
Read error history of SZ-V	1	-	_	—	—
Check configuration code (CRC)	✓ <i>✓</i>	✓	✓ <i>✓</i>	✓*3	✓*4
Monitor camera image of SZ-V	✓*5	-	—	—	—
Use OSSD status for safety related controls	—	—	—	1	1
Monitor multiple banks	—	-	—	1	1
Send interlock reset signal to SZ-V	—	-	—	1	1
Typical devices to be connected	Desktop PC and laptop PC	Original program on board computers	PLC or industry PC	Safet	y PLC
Application examples	Monitor remote SZ-V	AGV control using measurement data	Show scanner status on HMI	Safety relat	ed controls

Possible A Possible with limitations — Impossible or not realistic *1 Information read through UDP Command Communication, EtherNet/IP^{IM} Communication, and PROFINET communication cannot be used for safety related part of the control system.

*2 Only available with version 2 or later of Network Type models.

*3 Can be read by PROFINET communication. PROFINET communication can be used simultaneously with PROFIsafe communication.

*4 Can be read by EtherNet/IP™ communication. EtherNet/IP™ communication can be used simultaneously with CIP Safety communication.

*5 Only when using a scanner head with a camera.

Communication functions that can be used simultaneously

-



When using the SZ-V32N(X), it is necessary to select one of the following communication protocols.

The relation between a selected communication protocol and the communication functions that can be used is shown in the following table.

	Communication functions that can be used at the same time							
protocol	Communication to SZ-V Configurator	UDP Command	EtherNet/IP [™]	PROFINET	PROFIsafe			
UDP	1	1	-	_	—			
EtherNet/IP [™]	✓	✓	1	—	—			
PROFINET	1	1	-	1	—			
PROFIsafe	1	1	_	1	1			

Network specifications

Ethernet General Specifications	
Standard	IEEE 802.3u (100BASE-TX)
Transmission rate	100 Mbps
Cable	Category5 or higher STP (Shielded Twisted Pair) or UTP (Unshielded Twisted Pair) cable
Connector	RJ45 (IP65 connector) 2 ports
EtherNet/IP [™] Specifications ¹	
	Cyclic communication
Compatible functions	Compatible with UCMM and Class 3 messaging (Explicit messaging)
Number of connections	16
RPI (Transmission cycle)	5 to 10000 ms (0.5 ms unit) "2
Tolerable communication bandwidth for cyclic	3000 pps
Conformance Test	Conform to CT12 "3
*1 The S7-V32NC(X) supports DLB_OoS and ACD_*2 When us	ing CIP Safety, it is "9ms to 999ms (9ms unit)"

*2 When using CIP Safety, it is "9ms to 999ms (9ms unit) *3 The SZ-V32NC(X) conforms to CT17-ES.

PROFINET Specifications					
Compatible Network		PROFINET IO Communication			
	Compatible functions	Cyclic communication (Data I/O Communication)			
	companyle functions	Acyclic communication (Record I/O Communication)			
	Conformance Class	Conformance Class B			
Dania Crasificationa	GSDML version	Version 2.32			
basic specifications	Conformance Test Version	Based on version 2.33			
	MRP	Available as client			
	Applicable Protocols	LLDP, SNMP, MRP, DCP			
	Netload	Class 3			
Cyclic Specification	Update time	1 to 512 ms			

PROFIsafe Specification	
PROFIsafe Version	V2

Data available with PROFIsafe or CIP Safety communication

INPUT (from SZ-V to Safety PLC) Byte offset Details bit Description 0 Protection Zone A State 1 Protection Zone B State 2 Warning Zone A State " Zone Detection State / Warning Zone B State * 3 0 SZ-V Status 4 Interlock-Reset-Ready A * 5 Interlock-Reset-Ready B^{*1} 6 Normal Operation State *1 7 Error State^{*1} 0 Bank Number (A)*1 Bank Number (B)* 2 Bank Number (C)* 3 Bank Number (D) 1 SZ-V Status 4 Bank Number valid 5 Laser off state⁻¹ 6 Reserved 7 Reserved 0 Head1 Window Pollution State 1 Head2 Window Pollution State* 2 Head3 Window Pollution State* Window Pollution 3 Reserved 2 Information / Head1 State 4 Head1 Protection Zone A State 5 Head1 Protection Zone B State 6 Head1 Warning Zone A State* 7 Head1 Warning Zone B State 0 Head2 Protection Zone A State 1 Head2 Protection Zone B State 2 Head2 Warning Zone A State* 3 Head2 Warning Zone B State 3 Head2 State / Head3 State 4 Head3 Protection Zone A State 5 Head3 Protection Zone B State 6 Head3 Warning Zone A State* 7 Head3 Warning Zone B State* 0 Protection Zone A State for Bank0 Protection Zone A State 4 for each Bank" 15 Protection Zone A State for Bank15 0 Protection Zone A State for Bank0 Protection Zone B State 6 for each Bank*2 15 Protection Zone A State for Bank15 0 Warning Zone A State for Bank0^{*1} Warning Zone A State 8 for each Bank*2 15 Warning Zone A State for Bank15*1 0 Warning Zone B State for Bank0^{*1} Warning Zone B State 10 for each Bank*2 15 Warning Zone B State for Bank15*1

OUTPUT (fro	om Safety PLC to SZ-V)			
Byte offset	Details	bit	Description	
		0	Reset A	
		1	Reset B	
		2	Reserved	
0	Output	3	Reserved	
U	Output	4	Reserved	
		5	Laser OFF 1	
		6	Reserved	
		7	Return to Normal Operation	
	Bank Number	0		
		1	Pank Number	
		2	Dalik Nullibei	
4		3		
1		4		
		5	Bank Number (reverse)	
		6	For each bit, specify opposite value of bit 0-3	
		7		
		0	Reserved	
2				
		15	Reserved	
	Reserved			
		0	Reserved	
10				
		15	Reserved	

*1 This data cannot be used as a safety output for the safety-related part of a machine control system.

*2 Zone States on Byte offset 4 to 10 may be easily affected by mutual interference or other environmental factors, compared to states in Zone Detection Status (Byte offset 0)

PROFIsafe / PROFINET diagnostics

SZ-V is compatible with PROFINET Diagnostics function. The following information can be sent to a safety PLC as PROFINET Diagnostic alert information.

Alert notification item	PROFINET	PROFIsafe
PROFIsafe Parameter Error	—	1
PROFIsafe Transmission Error	—	1
Window pollution Alert	1	1
Window pollution Error	1	1
MI Error	1	1
Bank Input Error	1	1
Bank Sequence Error	1	1
Configuration Error	1	1
System Error	1	1
AUX Error	1	—
EDM Error	1	—
Encoder Error	1	—
OSSD Error	1	—
Other Error	1	1
Other Alert	1	1

Wiring and cables for PROFIsafe or CIP Safety



Srown (+24 V Slue (0 V)

* When PROFIsafe or CIP Safety communication is used, all physical I/O wires (OSSDs, EDM, Reset, AUX, etc.) will be deactivated.

* For Ethernet cable selection, please refer to the selection guide on p.16 as well as the figure below.





2 m 6.56': OP-88086 5 m 16.40': OP-88087 10 m 32.81': OP-88088

Examples of wiring

SZ-V04 Type

OSSD3/4: Multi-OSSD Bank switching: Used Muting: Not used (usage not possible) Interlock: Used EDM: Used





SZ-V32 Type

Bank switching: Used Bank switching method: Single or binary No. of banks: Used Single: 8 or less, Binary: 16 or less Interlock: Used EDM: Used





SZ-V32N Type

Bank switching: Not used Muting: Not used Interlock: Not used EDM: Not used

When not using PROFIsafe PNP/NPN wiring example Light blue/Black (Not used Orange/Black (Not used) Yellow/Black (Not used used) Red/Black (Not used) Light blue (Not used) Red (EDM input 1/2) Yellow (Reset input) àray/Black (AUX2) Orange (Not used) àreen/Black (AUX4 Pink (Not used) Pink/Black (Not White (OSSD2) Black (OSSD1) Brown (+24 V) Green (AUX3) Gray (AUX1) Blue (0 V) Y P δ 9 P 7 Safety-IN IN PLC Safety PLC

Symbols

K1, K2, K3, K4: External device

(Safety relay, magnet contactor, etc.)

K5, K6: Solid state contactor S1: Switch for resetting OSSD1/2 (N.O.)

S2: Switch for resetting OSSD3/4 (N.O.)

PLC: Used for monitoring, not for control systems related to safety.

Safety PLC: Control systems related to safety.

S2-1, S2-2, S2-3, S2-4, S2-5, S2-6, S2-7, S2-8: Switch for bank switching.

M: 3-phase motor

■ OSSD output circuit (Safety output)





AUX output circuit

Common for both PNP and NPN output



Input circuit



OSSD output

The OSSD is a safety output for the safety-related part of a machine control system. When the SZ-V detects an object (someone or something) in the protection zone, the OSSD goes to the OFF-state.

OSSD 1/2 is a pair of safety outputs that are redundant. Similarly, OSSD 3/4 is also a pair of safety outputs that are redundant.

The SZ-V generates self-diagnosis signals on its internal control circuit to perform diagnostics on the OSSD. These signals periodically force the OSSD into a temporary OFF-state when the OSSD is in the ON-state (when the SZ-V detects no objects in the protection zone.).

The internal control circuit receives a feed-back signal (OFF-signal) based on the selfdiagnosis, the SZ-V determines that its OSSD is operating normally. If the OFF-signal is not returned to the internal control circuit, the SZ-V determines that there is a problem with the OSSD or wiring and goes to an error state.

Note:

The devices connected to the OSSD, such as safety relay or contactors, should not respond to these temporary, self-diagnostic OFF-signals.



Muting lamp output circuit



*Muting lamp output will always be an NPN output regardless of what input and output polarity is selected.



Self-diagnosis pulse



A: 50 µs (If a capacitive load is connected, max. 250 µs can apply.)

B: Approximately 60 ms

C: Approximately 920 ms

Dimensions

143 5.63

Unit: mm inch



136 5.35 181.4 7.14

25

Dimensions

$\textbf{SZ-VB01+SZ-V04}(\textbf{X}) \ / \ \textbf{V32}(\textbf{X})$





$\textbf{SZ-VB02} + \textbf{SZ-V04}(\textbf{X}) \ / \ \textbf{V32}(\textbf{X})$





SZ-VB03 + SZ-V04(X) / V32(X)









Example of area protection (Direction of approach parallel to the protection zone)

I Top view of the machine



$Ds = K \times T + Dpf + A$ [ANSI B11.19]

Ds: Safety distance

- K: The maximum speed that an individual can approach the hazard
- T: The total time that it takes for the hazardous motion to stop, or for the hazardous portion of the machine cycle to be completed. This value varies depending on machine type and/or the safeguarding device applied.
- Dpf: Additional distance for horizontal sensing field applications without vertical sensing: 1200 mm / 48".
- A: Additional safety distance (mm inch)

Example of safety distance calculation

K = 1600 mm/s 62.99 inch/s

- T = t1 + t2 = 0.82 s Overall response time
- t1 = 0.32 s SZ-V response time (Changeable)
- t2 = 0.5 s Max. time required to stop the machine after receiving the OSSD signal from SZ-V*
- Dpf = 1200 mm / 48"
- A = 100 mm 3.94" Additional safety distance of SZ-V
- B = 68 mm 2.68" Distance between the edge of the hazardous area and protection zone origin on the SZ-V

W1 = W2 = 1000 mm 39.37" Width of the hazardous area

* When using PROFIsate or CIP Safety, please add communication and processing time required for the stop signal to reach the machine after SZ-V protection zone state turns OFF.

I Side view of the machine



P1, P2, P3: Protection distances to be configured as the protection zones

- W1, W2: Width of the hazardous area
- B: Distance between the edge of the hazardous area and protection zone origin on the SZ-V D: Unprotected space

Safety Distances

 $\begin{array}{c} S = K \times T + Dpf + A = 1600 \times 0.82 \ +1200 + 100 = 2612 \ mm \\ 62.99^{\circ} \qquad 47.24^{\circ} \ \ 3.94^{\circ} \ \ 102.83^{\circ} \end{array}$

Protection distances to be configured as the protection zones P1 = S - B = 2544 mm 100.16" P2 = S + W1 = 3612 mm 142.20" P3 = S + W2 = 3612 mm 142.20"

The unprotected space (D) between the protection zone and the protective structure must be less than the minimum detectable object size when the SZ-V is installed, in order to prevent the machine operators from approaching into the hazardous area through this space (D). Additional countermeasures for protection must be provided if there is a space (D) between the protection zone and the protective structure that the minimum detectable object is not detected by the SZ-V.
 There is a risk of inadvertent undetected access beneath the detection plane (protection zone), if the height "H" of detection plane (protection zone) is greater than 300 mm 11.81" (200 mm 7.87" for non-

A DANGE

- industrial application, for example in the presence of children). The responsible personnel must perform the risk assessment with taking into account this factor in case of installation of the SZ-V. If necessary, the additional countermeasure must be taken by the responsible personnel.
 In the protection zone setting, you cannot select the object size of 150 mm 5.91° when "H" (Height of detection plane) is 1000 mm 39.37° or less. You must select the object size of 70 mm 2.76° or smaller if
- you want to use SZ-V for area protection (direction of approach is parallel to the protection zone.)
- I fi there is a highly reflective background within 1.5 m 4.92' from the boundary of the protection zone, another 200 mm 7.87' must be added as supplementary necessary distance to the P1, P2 and P3 respectively.
- I We recommend you should have a marking on the floor for indicating the specified protection zone.

Example of access protection (Direction of approach normal to the protection zone)

I Front view of the machine





Side view of the machine

S = K × T + C [ISO13855 and IEC61496-3]

- S: Minimum safety distance (mm inch)
- K: Approach speed of the body or parts of the body (mm/s inch/s)
- T: Overall Response time (t1 + t2) (s)
- t1: SZ-V response time (s)
- t2: Max. time required to stop the machine after receiving the OSSD signal from SZ-V (s) *
- C: Additional distance, taking into accounts the intrusion prior to actuation of protective equipment (mm inch).

Example of safety distance calculation

- K = 1600 mm/s 62.99 inch/s Approach speed of the body or parts of the body
- T = t1 + t2 = 0.58 s Overall response time
- t1 = 0.08 s SZ-V response time (Changeable)
- t2 = 0.5 s Max. time required to stop the machine after receiving the OSSD signal from SZ-V
- C = 850 mm 33.46" (Constant)
- d = 70 mm 2.76" Minimum detectable object size (Changeable)

* When using PROFIsafe or CIP Safety, please add communication and processing time required for the stop signal to reach the machine after SZ-V protection zone state turns OFF.

Reference points monitoring function must be applied when the SZ-V is used for the access protection specified in IEC61496-3: 2008 Annex A.12 and A.13 (the application where the angle of the approach

exceeds ±30° to the detection plane). In this case, the tolerance for reference points must be ±100 mm 3.94° or less and the response time must be 90 ms or less.

- A DANGER
- I The unprotected space between the protection zone and the protective structure must be less than the minimum detectable object size when the SZ-V is installed, in order to prevent the machine operators from approaching into the hazardous area through this space. Additional countermeasures for protection must be provided if there is a space between the protection zone and the protective structure that the minimum detectable object is not detected by the SZ-V.
- I According to GB 19436.3-2008, "if the maximum distance between the AOPDDR and the reference boundary is greater than 4.0 m 13.12", displacement of the detection zone greater than 100 mm 3.94" shall be detected." In order to comply with this requirement for SZ-V, this may be achieved by limiting the width of the objects of the reference point to <200 mm 7.87". For the case where the maximum protection distance of the protection zone is over 4.0 m 13.12", this limitation must be followed.</p>

Safety Distance S = K × T + C = 1600 × 0.58 + 850 = 1778 mm 62.99" 33.46" 70.00"

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