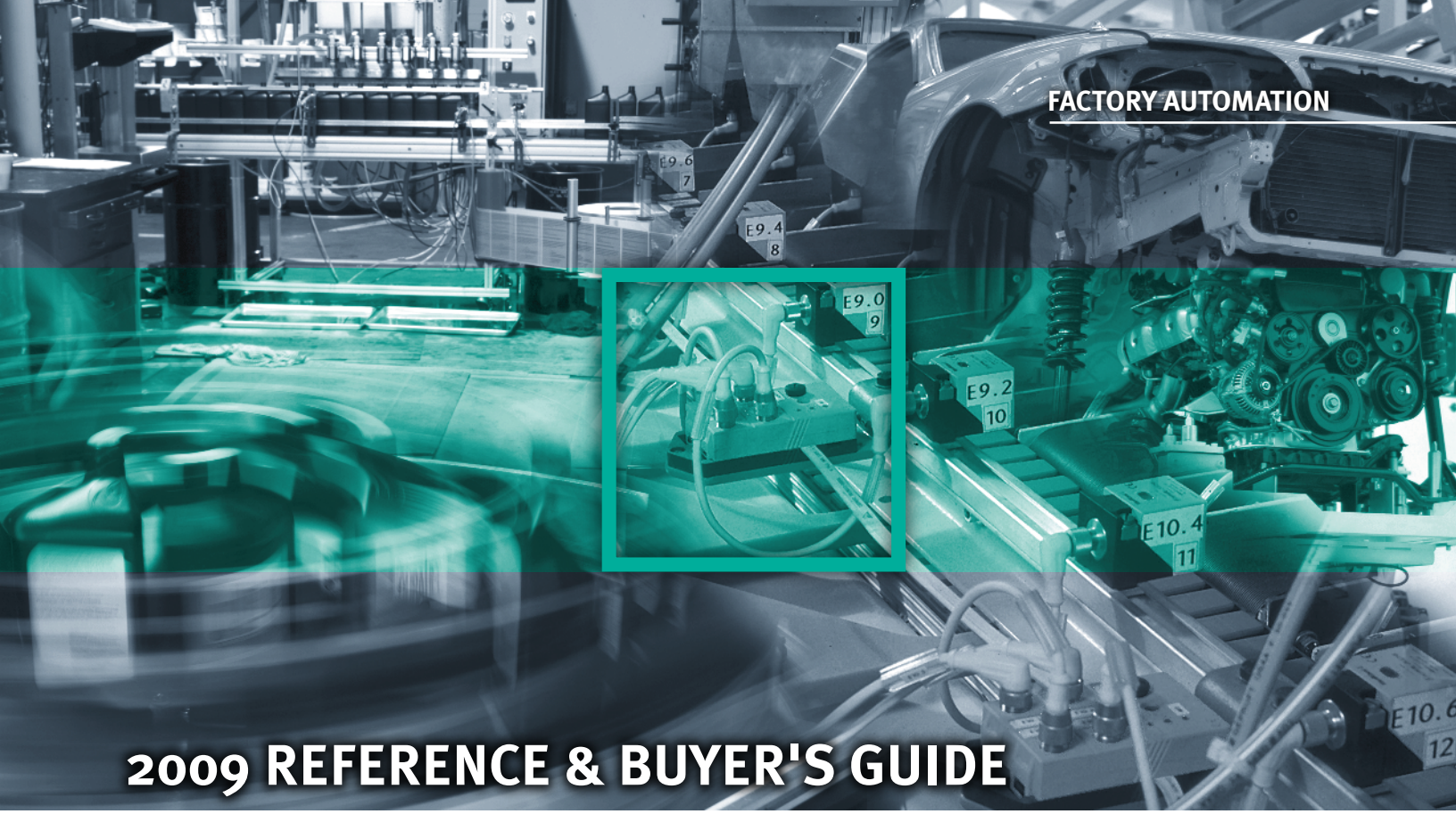


FACTORY AUTOMATION

2009 REFERENCE & BUYER'S GUIDE

AS-INTERFACE PRODUCTS

PEPPERL+FUCHS
SENSING YOUR NEEDS

SPOTLIGHT on AS-Interface

Safety Products

Fully approved low-cost networkable safety system

- Panel and enclosure mount e-stops
- Safety modules for gates, light curtains, and perimeter guarding
- Approved by NFPA, UL, and OSHA
- Safe to Cat 4/ SIL 3

See pages 117-150

Advanced Gateways

Gateways with advanced diagnostics for quick troubleshooting

- Integrated ground fault detection
- Duplicate address detection
- Noise detector and error counters
- RS-232 diagnostic port and optional software for user-friendly interface

See pages 27-54

Tool-Free I/O Modules

No tools are required to install or remove this module from the network. The module snaps in and a makes secure connection every time.

- Stainless steel installation bar clicks in for secure worry free connection
- 1/2-turn SPEEDCON I/O connection for fast installation
- Gold plated machined pins for superior performance
- Quick change top for easy module swapping
- Outputs with RED overload indication right at each connector

See pages 80-83

Magnetic and RFID Safety Interlock Switches

Noncontact safety devices are designed to be a low cost safety option for use in wet and dirty environments.

- IP69K watertight housing
- All AS-Interface powered
- Tamper-resistant coded magnet actuator
- RFID heads have no mechanical components for long lasting reliability
- Guard up to four doors on one controller

See pages 141-147

New Safety Interlock Switches

AS-Interface mechanical safety interlock switches are used on doors and gates to restrict access.

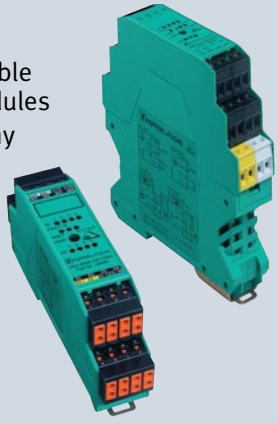
- Direct connection to AS-Interface
- Power to lock/unlock options
- AS-Interface or auxiliary power options
- Manual override integrated
- Large selection of unique keys
- Rugged IP67 water-tight housing

See pages 135-140

Enclosure Style Modules

Standard and low profile housings for J-boxes and enclosures

- Class I, Div. 2 approved for hazardous locations
- Color-coded, keyed, removable terminals included with modules
- Accessories to connect to any 120 VAC input
- Input power selectable, AS-Interface or auxiliary power



See pages 91-98

Pepperl+Fuchs has been providing the highest-quality industrial sensors for nearly 60 years. We are the world's largest sensor manufacturer, and we continue to set the standard by offering sensors that cover a vast range of applications, from the most basic to the most challenging. Pepperl+Fuchs' sensors are crafted using state-of-the-art components and the latest technologies to ensure precision, reliability and functionality.

2009 REFERENCE & BUYER'S GUIDE

AS-INTERFACE PRODUCTS

Automation using networks

The history of automation shows that innovative technologies often follow a similar path: before becoming accepted, they are greeted with skepticism. Before the PLC became widely accepted in the 1970s, automation depended heavily on relays to perform logic tasks. In hind site, the logic tasks performed using relays were limited and made process changes difficult. Any changes to the logical operation required moving wires, adding additional relays, and possibly creating more panel space. All of that changed when Modicon introduced the Programmable Logic Controller (PLC) in the late 1960s.

Many control professionals were first skeptical of the PLC, questioning whether a single electrical component could replace electromechanical devices. They asked:

- Would the PLC be reliable enough to run a line?
- How difficult would it be to find errors and problems?
- Would the dedicated programming panels needed to setup the logic create another level of problems?
- Would the PLC present an affordable solution?
- Why would anybody want to change a logic system that worked?

While those were valid questions at the time, the PLC has since proven to be reliable and very capable of controlling complex automation systems. Advanced diagnostics and PC based programming with the ability to keep programmers from making many basic mistakes helped to establish the PLC. In addition, many electronic solutions, including PLCs and PCs, are extremely affordable today, offering fast set-up time and reduced panel space over relays.

Perhaps the lesson to be learned with the introduction and eventual success of the PLC is this: many industry professionals must be convinced that innovations will improve their processes before making changes. Like the PLC, two other advancements in automation, I/O networks and more recently, the networking of safety devices such as light curtains, door interlock switches and safety e-stops, were received with a similar level of skepticism and doubt.

History repeats itself

The generation of control engineers who bucked tradition to bring us the PLC suddenly found themselves involved in another paradigm shift in 1987, when INTERBUS, the first I/O network for industrial applications was introduced, with many other such networks soon to follow. Some automation professionals embraced the concept while others adopted the mindset of their colleagues of the previous generation, repeating the concerns they once worked to dispel.

- Would networked I/O be reliable enough to run a line?
- How difficult would it be to find errors and problems?
- Would the additional electronics needed to setup the network just create another level of problems?
- Would it be an affordable solution?
- Why would anybody want to change an I/O system that worked?

Not only are these the same questions asked previously, but so are the answers. Of course, not every I/O network proposed at the time was able to address reliability concerns adequately, and some poorly designed solutions disappeared. Now, twenty years later, we know that well-designed I/O networks offer excellent reliability, and increased setup flexibility: the same features that aided the transition to PLCs. History had repeated itself.

Networks in the New Millennium

Today, a few networks stand out in terms of features and flexibility: PROFIBUS, CC-Link, DeviceNet, Ethernet, and AS-Interface. Those familiar with networks know that this network quintet dominates the world market with a combined strength of close to 40 million installed nodes! However, it is less well-known that AS-Interface stands out in a very important way: AS-Interface was designed not to compete with the others, but rather to enhance them. To understand how AS-Interface can work to improve these higher level networks, it helps to compare automation networks with another movement system we are familiar with: human transportation systems.

Optimizing Flow

Moving data is comparable to moving people around the country using various transportation systems. Traveling cross country might include: driving to the airport, boarding a plane, flying to another airport, and finally using another car to reach the destination. While some people prefer driving the entire distance, nobody expects an airline to pick them up at home and drop them off at their final destination. Therefore, we have become accustomed to being 're-packaged' in various vehicles, and with other travelers. In other words: the traveler starts out on a system that allows small units to be transported quickly to a consolidator. Here units, arriving from all different directions are re-packaged into larger packets, moved at high speed to another consolidator, and again taken apart and sent on their final leg of the trip. Clearly, this structured approach optimizes flow, reduces the time it takes to reach a destination, and increases efficiency.

AS-Interface is the road system connecting highly distributed I/O to a data consolidator, handing it over to an upper level network designed to handle large amounts of data, which moves it to the PLC for processing and analysis. AS-Interface enhances networks such as DeviceNet because it collects I/O data to create large bundles, ensuring that it does not lose efficiency by transmitting a few data bits in its multi-byte size cargo space. PROFIBUS also works better because AS-Interface removes the stringent requirement of adhering to a single topology (daisy-chain), allowing I/O to be placed anywhere needed. We call this topology-free networking.

In its 15 year history, AS-Interface has become the accepted universal feeder system for data. With over 13 million field nodes, AS-Interface is well past the initial acceptance phase, having proven its effectiveness in a wide variety of applications. This Reference & Buyer's Guide focuses on the many reasons for its success, including its flexibility and simplicity, exceptional noise immunity, availability of a full electromechanical installation system, and its low price point.

Networking Safety

Today, another relatively new and revolutionary idea in automation concerns the way safety devices are connected. The concept of transmitting safety data over a network, while technologically a huge step, is ultimately just another example of technological innovation in automation. PLCs replaced relay logic, networks replaced hardwired I/O, and networking safety devices will most certainly make hardwired safety a relic of our times.

Again AS-Interface stands out, as the I/O network enhancing the functionality of upper level solutions. With AS-Interface Safety at Work – the base technology that allows AS-Interface to transmit safety data in applications up to Category 4 or Safety Integrity Level (SIL) 3 – DeviceNet, PROFIBUS, CC-Link and any industrial Ethernet can now benefit in more ways than ever from the flexibility and simplicity of AS-Interface.

The Future

It is very difficult to predict what technological advances will shape the world of automation over the next decade. It is certainly not too early to recognize Ethernet as one of the technologies that will significantly influence the way control systems are designed and built. But irrespective of what the automation and networking future will hold, AS-Interface will surely be a part of it. As the only true, universal I/O level network, working flawlessly with all important upper level solutions, addressing the most important demands of the automation market (broad support world wide, excellent troubleshooting features, flexible installation, and low cost, to name just a few), it has all the great features needed to be the preferred partner for today's and tomorrow's automation networks.

Gateways




	Enhanced	Enhanced with Safety Controller	Basic	Basic
See Pages	36, 40, 47, 48, 52	41	36, 40, 52	40
Highlights	• Duplicate address detection and diagnostic port • One and two network versions available	• Duplicate address detection and diagnostic port • 16 independent release circuits	• RS-232 version comes with stand-alone control functionality • One and two network versions available	• Low-profile, slim housing with top-mount connector • LCD display with pushbuttons
Specification and Profile	3.0 (M4)	3.0 (M4)	3.0 (M4)	3.0 (M4)
PLC Connectivity				
EtherNet/IP	■			
Modbus/TCP	■			
PROFINET	■			
PROFIBUS	■	■	■	■
DeviceNet	■		■	
Modbus ASCII/RTU	■			
RS-232			■	
Diagnostics				
RS-232 Port	■	■		
Ground Fault Detection	■	■	■	■
Noise Detection	■	■	■	■
Duplicate Addr. Detection	■	■		
Over Voltage Detection	■	■	■	■
Approvals	CE cULus	CE cULus	CE cULus	CE cULus
Safety				
Safe Outputs (onboard)		2 relay and 2 electronic		
Safe AS-i Output Channels		16		
Safe Network Coupling		■		
Scan 2 Networks		■		
Memory Card		■		
Graphical Display		■		
CAT 4/SIL 3 Approved		■		

Scanner Cards

Allen-Bradley

See Page	29
Highlights	• AS-i connected to backplane of PLC • Many scanner cards can be connected to one rack
Specification and Profile	3.0 (M4)
PLC Connectivity	
SLC503/04/05	■
MicroLogix 1500	■
ControlLogix	■
CompactLogix	■
Diagnostics	
Diagnostic Port	■
Ground Fault Detection	
Noise Detection	
Duplicate Addr. Detection	
Over Voltage Detection	
Approvals	CE cULus AS-i

Network Extension

Repeaters

See Page	67
Highlights	• Field mount or enclosure mount housings • Built-in terminator extends the first segment to 200 m, 300 m total
Length of First Segment	100 m, 200 m
Length of Second Segment	100 m
Protection Rating	IP20 and IP67
Communication Monitoring	■
AS-i Connection	Flat cable piercing or terminals

Terminator

Tuner

See Page	206	206
Highlights	• Extends linear network to 200 m without repeater • Low voltage diagnostic LEDs	• Extends linear network to 300 m without repeater • Network communication and diagnostic LEDs
Length of Segment (linear topology only)	200 m	300 m
Protection Rating	IP65	IP65
Communication Monitoring		■
AS-i Connection	M12 quick disconnect	Flat cable piercing or M12 quick disconnect

Want more information?
Simply go to: **www.sensing.net/as-interface**

I/O Modules

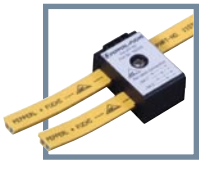




	Flat (G2)	Flat (G12)	Field (G4)	Compact (G16)	Enclosure (KE)
See Page	75	80	84	88	91
Highlights	• Low-profile flat housing • Integrated addressing jack	• Overload indication at each output • No tools required for installation • Metal M12 SPEEDCON connectors	• Input wires can be cut to exact length • Anti-vibration spring terminals	• Smallest field mount housing offered • Waterproof potted housing • Metal M8 connectors	• Thinnest housing offered • AS-Interface or external power, switchable • Approved for hazardous locations
AS-Interface 3.0 (4 In/4 Out)	■	■	■	■	■
Address Range	1-31 A/B	1-31 A/B	1-31 A/B	1-31 A/B	1-31 A/B
I/O Mix	4 in, 4 in/2 out, 4 in/4 out, 4 in/3 out, 2 in/2 out, 8 in	4 in, 4 in/4 out, 2 in/2 out, 4 out, 8 in	4 in, 4 in/4 out, 4 in/3 out, 2 in/2 out	4 in, 4 in/4 out	4 in, 4 in/4 out, 4 in/3 out
Input Type	2-, 3-, 4-wire, dry contact	2-, 3-, 4-wire, dry contact	2-, 3-, 4-wire, dry contact	2-, 3-wire, dry contact	2-, 3-, 4-wire, dry contact
Input Power Supplied By	AS-Interface/aux.	AS-Interface/aux.	AS-Interface	AS-Interface	AS-Interface/ext.
Sensor Type	PNP	PNP	PNP	PNP	PNP/NPN
Output Power Supplied By	AS-Interface/aux.	Auxiliary	Auxiliary	Auxiliary	AS-Interface/aux.
Output Type	PNP	PNP	PNP	PNP	PNP, NPN, Relay
Approvals	CE cULus	CE cULus	CE cULus	CE cULus	CE cULus Class 1 Div 2, groups A,B,C,D
Protection	IP67	IP67	IP65, IP67	IP69K	IP20
I/O Connection Method	M12 quick disconnect	M12 (SPEEDCON compatible)	Spring terminals	M8 quick disconnect	Keyed, removable colored terminals


					
Junction Box (KE1)	**Junction Box (CB1)**	**Analog (G4, KE2)**	**Pushbuttons and Stack Lights**	**Pneumatic**	**Drive Control**
95	95	99	105	111	115
• Low-profile housing • Easy connection for pushbuttons & pilot lights • Anti-vibration spring terminals option	• Lowest profile housing available • Fully potted • Mounting strips included	• Scaled automatically 0-10,000 or 4,000-20,000 • AS-Interface or auxiliary power options available	• Different colored button covers available • Red, yellow, green, blue, clear stack light options • Audible alarm	• 4 inputs available on 2 connectors • Pneumatics powered from AS-Interface or auxiliary	• All auxiliary powered • M25 conduit adapter included • Stainless steel cylindrical housing
	■				
1-31 A/B	1-31 A/B	1-31 A/B	1-31 A/B	1-31 A/B	1-31 A/B
4 in, 4 in/2 out, 4 in/4 out	4 in/4 out	4 in, 2 in, 2 out	2 in/2 out, 4 out	4 in/2 out	1 in/3 out
2-, 3-wire, dry contact	2-, 3-, 4-wire, dry contact	2-, 3-, 4-wire	LEDs, pushbuttons	2-, 3-, 4-wire, dry contact	2-, 3-, 4-wire, dry contact
AS-Interface/aux.	AS-Interface	AS-Interface/aux.	AS-Interface	AS-Interface	Auxiliary
PNP	PNP	4-20 mA, 0-10 V or PT100	Pushbuttons	PNP	PNP
Auxiliary	AS-Interface	AS-Interface/aux.	AS-Interface/aux.	AS-Interface/aux.	Auxiliary
PNP	PNP	4-20 mA or 0-10 V	LEDs	Pneumatic	PNP
CE cULus	CE cULus	CE cULus	CE cULus	CE	CE
IP20	IP20	IP20, IP67	IP67	IP65	IP67
Keyed, removable colored terminals	Removable terminals	Terminals		M12 quick disconnect, 8 mm pneumatic	20 cm cabled

Accessories



Flat Cable Splitters

Connects or splits two pieces of flat cable, 8 A capacity.

Flat to M12 Adapters

Connects one or two flat cables to an M12 connector or pigtail. Many lengths and connector styles available.

Handheld Programmer

A must for every network. Can set AS-i addresses, read inputs and set outputs of a single AS-i node.

Want more information?

Simply go to: **www.sensing.net/as-interface**

Safety Monitors

	2-Channel Basic	16-Channel Enhanced
See Page	119	41, 119
Highlights	• Scans up to 31 safe input modules • 1 channel for safe AS-i outputs	• Scans up to 62 safe input modules on two networks • 16 channels for safe AS-i outputs
Safe Outputs (onboard)	1 or 2 relay	2 relay and 2 electronic
Safe AS-i Output Channels	1	16
Safe Network Coupling	■	■
Scan 2 Networks		■
Memory Card		■
Graphical Display		■
CAT 4/SIL 3 Approved	■	■

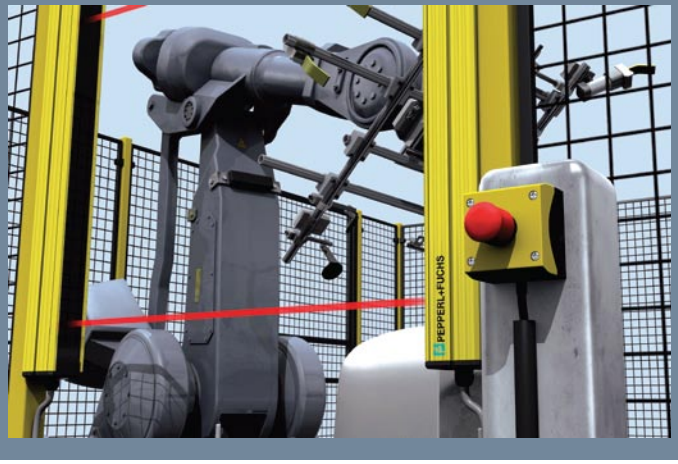
Safety Modules

	Safe Inputs	Safe Outputs	E-Stops
See Page	123	123	132
Highlights	• Dry-contact inputs for connection of standard e-stops and gate switches • Electronic inputs for connection of light curtains or any device with electronic OSSDs	• One set of redundant relay outputs • 4 inputs, one can be for EDM • One address for safety output channel • One A/B address for inputs	• AS-i safety e-stop connects directly to AS-i cable • Field mount or panel mount e-stop housings • Available with or without illumination
Safe Inputs	1 or 2	-	1 E-Stop
Safe Relay Outputs	-	1	
Standard Inputs/Outputs	2-out	4-in/1-out	1-out
CAT 4/SIL 3 Approved	■	■	■

Safety Interlock Switches

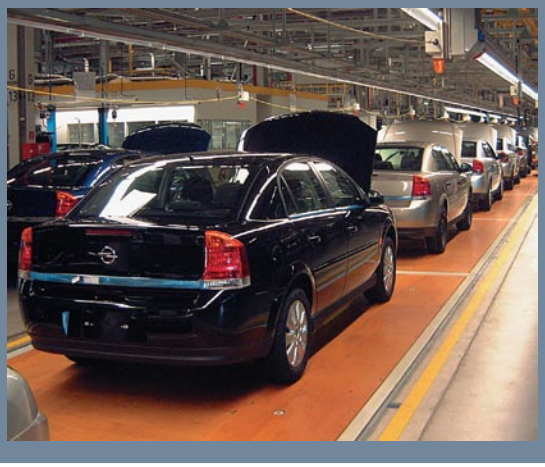
	 Mechanical	 Coded Magnetic	 RFID	 Enabling Switch
See Page	135	141	144	148
Highlights	• Steel actuator head • Key and coil monitoring • High-visibilty LEDs	• Direct connection to AS-Interface • 1 m pigtail integrated • IP69K good for wash-down applications • Small mounting footprint	• High-end RFID solution replaces magnetic interlocks • Up to 4 doors monitored from one control unit • Long read range for worry free alignment • High-visibility diagnostic LEDs	• Lightweight enabling switch • Rugged rubberized housing • Ergonomic design
Address Range	1-31	1-31	1-31	1-31
Input Type	Safety, mechanical	Safety, magnetic	Safety, RFID	Safety, mechanical
Input Activations	1,000,000	100,000,000	Unlimited	100,000
Input Powered By	AS-Interface	AS-Interface	AS-Interface	AS-Interface
Output Type	Solenoid/LEDs			
Output Powered By	AS-Interface/aux.			
CAT 4/SIL 3 Approved	■	■	■	■

Want more information?
Simply go to: **www.sensing.net/as-interface**



Power Supplies

	AS-i	AS-i with Ground Fault Detection	Power Conditioners	24 VDC
See Page	58	61	64	70
Highlights	• Class 2 power option • Power/overload LEDs • High-output current in slim package • Low-current option for smaller networks	• Ground fault simulator button with potential-free electronic output • Rear and side mounting options • Switch-selectable power disconnect on ground fault • Spring terminals and metal DIN rail clip for high-vibration environments	• Two networks or two segments can connect to one conditioner • Enclosure or field-mount options • LED low-voltage indication • 2.8 A and 4 A field-mount versions	• 115/230 VAC jumper selectable • Used with -C1 gateways that have integrated power conditioner • Voltage adjustable from 24 V to 30 V • 3-phase power supply option
Output Current	1.8 A, 2.5 A, 4 A, 8 A	2.4 A, 4.8 A	2.8 A, 4 A, 2 x 4 A	5 A, 10 A
Input Voltage	90-265 VAC	85-264 VAC	30 VDC	93-132 VAC, 187-265 VAC or 3 x 340-500 VAC
Output Voltage	30 V AS-i	30 V AS-i	30 V AS-i	24-30 VDC
Output Voltage Adjustable				■
IP Rating	IP20	IP20	IP20 or IP65	IP20
Mounting	DIN rail	DIN rail	DIN rail or mounting holes	DIN rail
Approvals	CE cULus	CE cULus	CE cULus	CE cULus



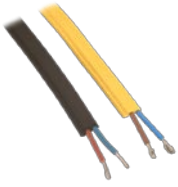
Intelligent Sensors

				
	Cylindrical Inductive	**Limit Switch Inductive**	**Rhino™ Inductive**	**Rectangular Inductive**
See Page	153	157	160	162
Highlights	• 12, 18, and 30 mm diameter models • Weld field immunity • Normally open/normally closed programmable • Collision monitoring	• 20, 30, and 40 mm sensing ranges • Terminal compartment with conduit entrance • Oscillator monitoring • Collision monitoring	• 25-position rotating head • Multi-corner LEDs for easy visibility • Quick connect lever	• Embeddable in metal with 6 mm range • 2 m pigtail • Normally open/normally closed programmable • Oscillator monitoring

				
	Flat Pack Inductive	**Valve Positioning Inductive**	**Series 28 Photoelectric**	**Absolute Rotary Encoders**
See Page	164	166	169	178, 182
Highlights	• 40 and 50 mm sensing ranges • Plastic base with molded M12 connector • Oscillator monitoring	• Two inductive sensors for 1/4 turn valve positioning • 2.5 W solenoid driver • Normally open/normally closed programmable	• Background suppression, thru-beam, retro-reflective, and foreground suppression modes available • Weak signal output • -40 ° F rating	• 16-bit absolute rotary encoder, max. 5 ms update time • Servo or clamping flange • 10 or 12 mm recessed hollow shaft

Accessories

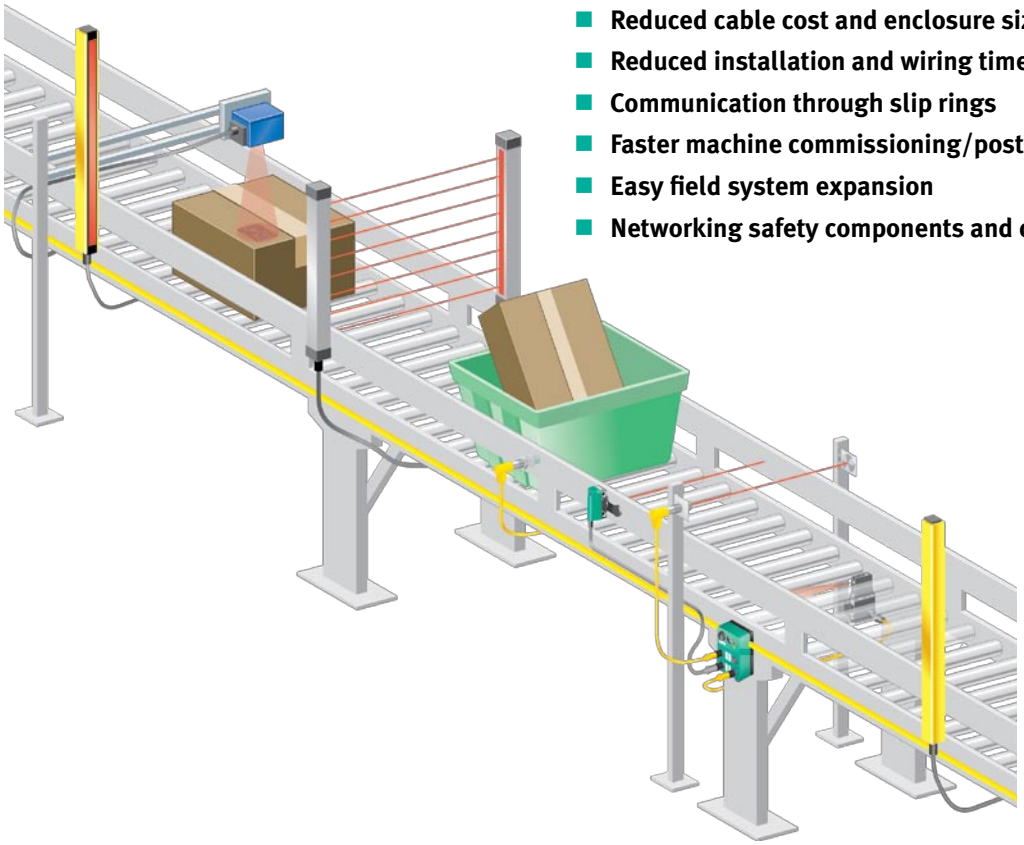
	Handheld Programmer	Software and Cables	Diagnostic Tools	Master Simulators
				
See Page	202	203	204	205
Highlights	• Programs any AS-i module • Rechargeable battery for cable free operation	• AS-i safety programming software • Diagnostic and configuration software	• AS-i network analyzer • Statistical mode for easy health status of network	• Converters for PROFIBUS, DeviceNet, and RS-485 • Easy RS-232 or USB connections to the PC

	Terminator and Tuner	Bases	AS-Interface Cable	Flat Cable Adapters/Splitters
				
See Page	206	207	208	209
Highlights	• Extend network 200 m or 300 m without repeater • Diagnostic LEDs for network health indication	• Bases for flat or round cable • Standard or DIN rail mounting styles	• Yellow and black standard and oil resistant flat cable • Flat cable stripper available	• Flat cable splitters and M12 to flat cable adapters • Water tight housings IP69K rated

	Bulkhead Connectors, Cordgrips, and Conduit Adapters	Covers and Mounting Accessories	AC Input Accessories	Passive and Protected Tees	PROFIBUS Accessories
					
See Page	212	213	214	215	216
Highlights	• Attach flat cable to junction boxes and enclosures • 0.606", 0.740", and 0.807" mounting hole clearances	• Flat cable mounting adapters • M12 and M8 covers • Flat cable rubber covers	• Convert any DC module into an AC input module • LED diagnostic indicator • Easy DIN rail mounting	• 1, 2, or 4 port protected and unprotected round cable splitters • Disconnect switch optional	• For one or two PROFIBUS cables and termination switch • Up to 12 Mbps

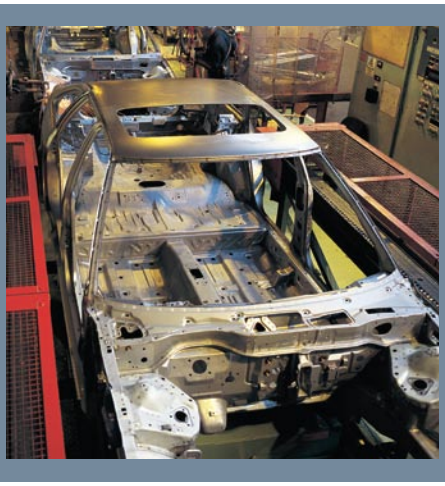
AS-Interface for the Material Handling Industry

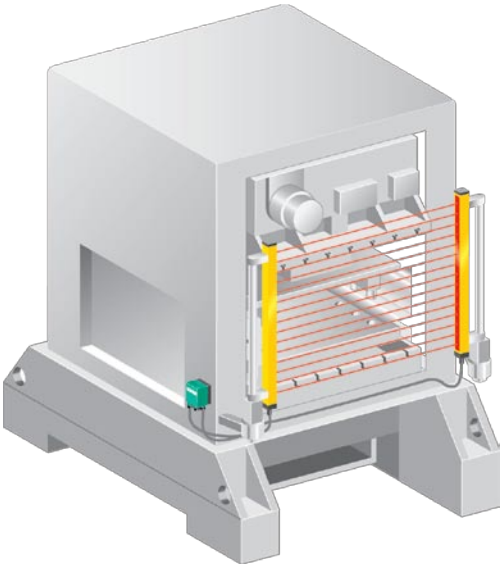
Material handling applications demand fast and reliable networks. AS-Interface is a fast and dependable discrete I/O network designed to help you stay competitive and increase profitability in the new global economy. AS-Interface reduces the total cost of ownership for OEMs, as well as increasing productivity and safety for end users.



- **Reduced cable cost and enclosure size**
- **Reduced installation and wiring time**
- **Communication through slip rings**
- **Faster machine commissioning/post commissioning**
- **Easy field system expansion**
- **Networking safety components and devices on one cable**

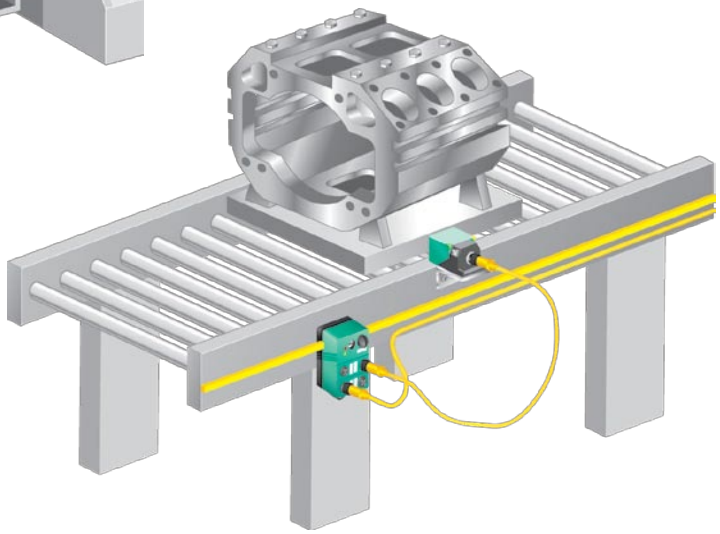
AS-Interface for the Automotive Industry



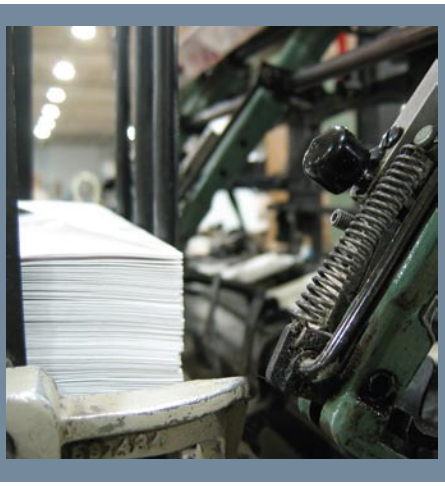


The automotive industry demands equipment that supports lean, flexible manufacturing. Pepperl-Fuchs' AS-Interface meets this challenge by providing speed, simplicity, and reliability in I/O networking.

- **Reduced cost (smaller PLC rack, less wire, smaller panel, and fewer I/O cards)**
- **Fast I/O exchange on robots and end-effectors**
- **Increased system availability and safety system uptime**
- **Reduced installation and maintenance time**



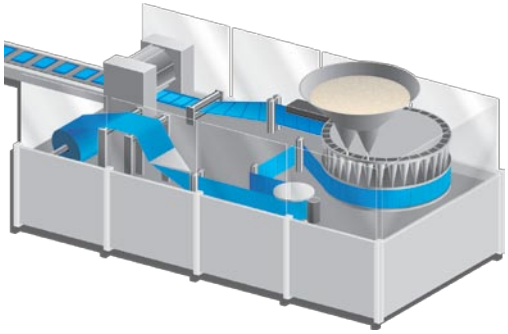
AS-Interface for the Packaging and Printing Industries



Packaging

Changeover and uptime maximization are the name of the game in packaging. AS-Interface keeps networks simple, versatile, and ready to respond to changing demands. From flow-wrappers to palletizers, AS-Interface connects all modular components together. In the dynamic world of packaging, AS-Interface just makes sense.

- **Simplified machine guarding (Safety at Work: SaW)**
- **Fast modular machine setup and changeover**
- **Superior diagnostics enable efficient and fast trouble shooting**
- **Fast I/O updates support high speed packaging**
- **Rugged housings hold up to messy packaging materials**



Printing

The printing/converting industries require heavy-duty, flexible equipment to get the job done right and on time. If your application requires high-speed operation, excellent diagnostic features, optimum cost-effectiveness, and safety device monitoring, you simply won't find a better solution than Pepperl+Fuchs' AS-Interface discrete I/O system.

- **Reduced wiring saves time and cabinet space**
- **Diagnostic monitoring decreases downtime**
- **Simplified safety device monitoring via Safety at Work (SaW)**

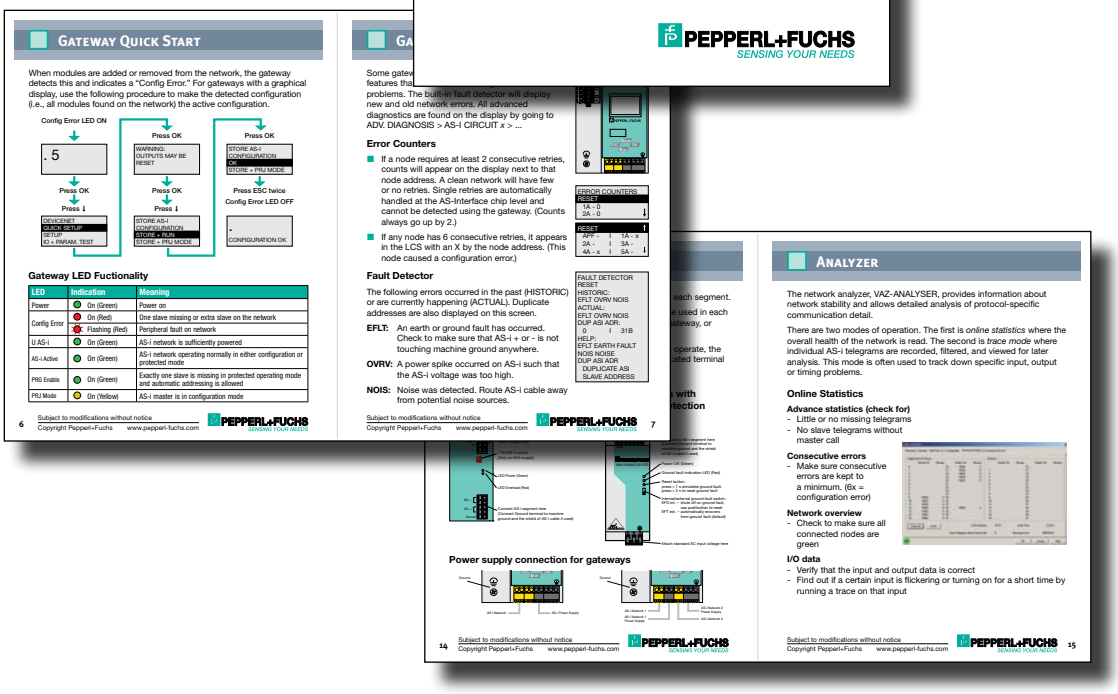
We stand behind AS-Interface...even if you bought it from the competition.

The Pepperl+Fuchs AS-Interface Maintenance and Troubleshooting Guide is the true must have document for every maintenance person; even if you are currently not using Pepperl+Fuchs AS-Interface hardware. This is a handy document that can assist in setting up and troubleshooting a system and is available in print and electronically

Order your copy today and see why we are considered to be one of the premier AS-Interface suppliers ... worldwide.

The following topics are included in this guide:

- **AS-Interface Basics**
- **Handheld Programmer (Reading Inputs and Setting Outputs)**
- **Gateway Quick Start**
- **Gateway Advanced Features**
- **Exchanging SafetyNodes**
- **Exchanging SafetyMonitors**
- **LED Functionality (Modules)**
- **LED Functionality (SafetyMonitors)**
- **Repeaters**
- **Termination and Tuner**
- **Power Supplies**
- **Analyzer**



What is AS-Interface?

Actuator Sensor Interface (AS-Interface) is a simple to install two-wire network for discrete I/O, intelligent sensors, analog and safety data, encoders, light curtains, and e-stops. Specifically designed for simplicity, flexibility, and reliability, AS-Interface has extremely fast mounting, start-up and update times, and replaces traditional wiring architectures. It has a totally open topology—there are no limitations on how to route or split network runs. A single unshielded cable with no termination and a very high degree of noise immunity carries both data and power. In addition, AS-Interface is truly an open system, supported by all major PLC manufacturers and compatible with any of the major industrial upper level networks.

The Development of AS-Interface

AS-Interface was developed by a group of companies that saw the need for a cost-effective, simple, and reliable sensor network designed for discrete sensors and simple output devices that could replace discrete wiring. The original objective was not a universal field bus for all areas of automation, but rather a system for discrete I/O only. And so, a consortium of 11 sensor, actuator, and control-system companies—Balluff, Baumer, Elesta, Festo, ifm electronic, Leuze electronic, Pepperl+Fuchs, Sick, Siemens, Turck, and Visolux—started work on this innovative wiring system in 1990. The consortium completed its work in 1993, and ownership of the specification was transferred to AS-International.

AS-International is a nonprofit, member-funded organization of AS-Interface manufacturers. Numerous national organizations exist worldwide. There are over 300 members and to date, over 15 million AS-Interface chips are in use around the world.

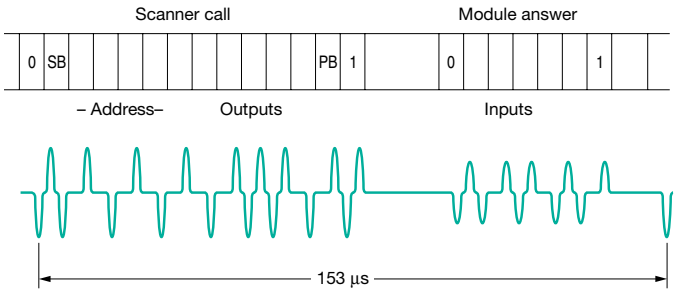
The AS-Interface Standard

AS-Interface was introduced into the market in 1994. Since that time, it has become the standard discrete I/O system used in automation industries throughout the world to connect devices such as sensors, solenoids, limit switches, pushbuttons, valves, and relays to higher level controllers such as PCs, PLCs, CNCs, and DCSs. Featuring a single, unshielded, two-wire cable design, AS-Interface transfers signals and power simultaneously, simplifying installation and significantly reducing commissioning costs. AS-Interface requires only a single cable to connect I/O modules from any manufacturer, offering users an elegant, simple to use I/O discrete communication system, requiring no knowledge of bus systems or communication protocols. And, unlike all other networks, AS-Interface doesn't use shielded cables and terminating resistors. Installing the network is fast and configuration takes less time than with other networks on the market. AS-Interface is standardized in EN50295 and IEC 62026-2.

With AS-Interface, compatibility between devices is not a matter of luck: compatibility is a guaranteed part of the system design. A module is only permitted to use the AS-Interface logo after it has successfully completed testing by an independent institute. The AS-Interface logo ensures quality and compatibility, guaranteeing that approved devices can be used in the system with no problems.

How Does AS-Interface Operate?

The scanner/gateway automatically controls communication over the AS-Interface cable. Up to 62 modules can be connected to the network and each module can connect a number of I/O points. The scanner/gateway calls each module sequentially and awaits each response. If the module fails to respond, the scanner/gateway repeats the request. If there is still no response, the scanner/gateway will record the address of the module and inform the PLC. The scanner/gateway will continue to try to access the unresponsive address. In each cycle, 4 bits of information are transferred from the scanner/gateway unit to each module, and 4 bits are returned.



Interoperability of Pepperl+Fuchs Products with Other AS-Interface Manufacturers

AS-Interface is truly an open, vendor-independent system. Interoperability of certified products is guaranteed by rigid conformance testing so that all AS-Interface products will work well on the same network.

Device Profiles

Each module's I/O mix and device type are stored in its profile. The I/O code is used to define the inputs and outputs that are used by the module. The ID code defines other advanced features of the module. For example, the profile S-0.A means 4 inputs with extended addressing capability. In addition, many AS-Interface modules have an ID1 and ID2 subprofile that further breaks down the module's functionality. The ID1 can be programmed by the user, but caution must be taken to ensure that the device profile stored in the AS-Interface master matches that of the I/O module. If they are different, the AS-Interface scanner/gateway will need to be 'retaught' to activate the node. While this transfer of information sounds complicated, the scanner/gateway knows what to do. It performs these actions seamlessly.

Device Profiles

Scanner profiles			ID code 0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
IO CODE	0	I, I, I, I	0.0	0.1									0.A	0.B				0.F
	1	I, I, I, O	1.0	1.1									1.A					1.F
	2	I, I, I, B	2.0										R					2.F
	3	I, I, O, O	3.0	3.1									3.A					3.F
	4	I, I, B, B	4.0										4.A					4.F
	5	I, O, O, O	5.0										5.A					5.F
	6	I, B, B, B	6.0										6.A					6.F
	7	B, B, B, B	7.0	7.1	7.2	7.3	7.4	7.5					7.A	7.B		7.D	7.E	7.F
	8	O, O, O, O	8.0	8.1									8.A					8.F
	9	O, O, O, I	R										9.A					9.F
	A	O, O, O, B	A.0										R					A.F
	B	O, O, I, I	R	B.1									B.A					B.F
	C	O, O, B, B	C.0										C.A					C.F
	D	O, I, I, I	R	D.1									D.A					D.F
	E	O, B, B, B	E.0										E.A					E.F
	F	T, T, T, T	for future use															

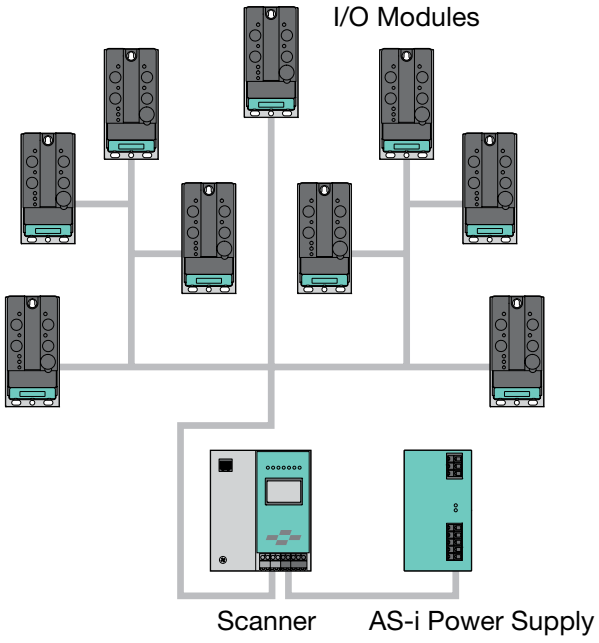
I: input, O: output, B: bi-directional port, R: reserved, V: new status

Extended Device Profiles with ID Code = A

Profile Description	IO Code	ID2 Code
Remote I/Os (X = 0, 1, 3-9, B-E)	X	0
Free profiles for slaves in extended address mode (X = 0 ... E)	X	E
Remote I/Os with dual signals (X = 0, 3, 7, 8, B)	X	2
Single sensor with extended control	3	1
Combination slave with support for serial profile	7	5
4I/4O in extended addressing mode	7	7
Slave profile for analog input (single channel)	7	8
Slave profile for analog input (dual channel)	7	9
8I/8O in extended addressing mode	7	A
Slave with support for serial profile	B	5

AS-Interface Topology

The topology of the AS-Interface network is completely open, enabling the user to install the system in a layout that best fits each application. Because AS-Interface does not use termination, additions are possible without the time consuming task of locating the “end” of the existing network. The power supply and additional modules can also be placed anywhere in the segment. This truly unique approach not only reduces the total network length, but also simplifies installation, resulting in the shortest installation time possible.



Network Length

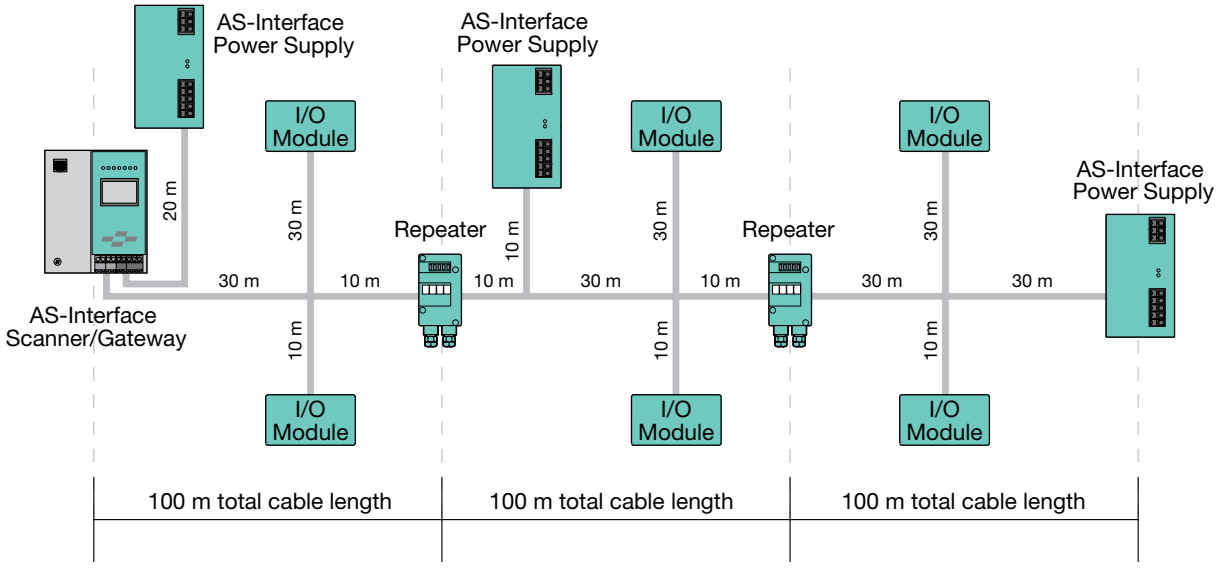
AS-Interface segments can have a cumulative cable length of 100 meters (328 feet). This means that all network cable added together in a segment must equal less than 100 m. If larger networks are needed, a repeater can be used to extend the length by 100 meters. Because repeaters isolate the connected network segments, an AS-Interface power supply must be located in each. When designing networks with repeaters, it is important to note that no signal from a scanner/gateway to a node can travel through more than 2 repeaters. Consequently, the maximum length of a linear AS-Interface network is 500 m. Star shaped networks can use even more repeaters allowing for even larger area networks.

NOTE: Regardless of cable length and number of repeaters, a maximum of 62 I/O modules can be placed on AS-Interface. Other than that, there are no complicated rules or limitations based on trunk and spur lengths to consider.

Wiring

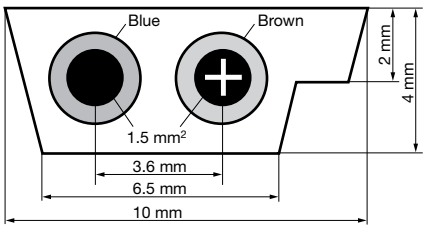
Installation and wiring of AS-Interface is as easy as it gets. First of all, the system is based on a two-conductor power and communication method. Secondly, when using the famous mechanically keyed “yellow flat cable” electrical connections are not only reliable and secure, but also extremely fast.

The distinctive yellow cable that typically identifies an AS-Interface system has several additional features that make it stand out. The cable has a special mechanical



profile that guarantees a correct connection every time by eliminating the danger of reversing polarity. It utilizes redundant piercing connection technology that allows the connectors to nestle tightly and securely among the fine copper strands in the core of each of the conductors. The reliability of the connections has been proven repeatedly and has been formally evaluated using the DIN EN-60068-2-64. The self-sealing property (insulation displacement) of the rubber insulation maintains a protection class of up to IP69K. To further enhance system reliability, Pepperl+Fuchs uses round, machined, and gold plated piercing contacts in all models. In terms of long term reliability, nothing beats gold!

Because the contacts penetrate the insulation to secure an electrical connection, some of the most time-consuming electrical tasks are eliminated. There is no need to cut, strip, apply terminals, or label the wire ends. AS-Interface does not use termination. Workers spend less time pulling long lengths of wire through hard to reach places. The reduction of wires not only decreases the size of the control panel, it increases modularity—machines are easier to disassemble, and easier to reassemble at another site.



Update Time

AS-Interface is a deterministic network. Given the number and type of modules, one can determine the network update time. To calculate the total network update time, simply multiply the number of modules by 150 microseconds. The cycle time is the same for I/O modules with full or half addresses. Analog nodes, however, are exceptions as they split the data up over several scans. AS-Interface is typically as fast as the update time on a typical PLC (or faster) and in most cases, significantly faster than any upper level network. In fact, because AS-Interface gateways act as data consolidators, they help to make those upper level networks faster, while reducing overhead by as much as 90%.

Data Integrity and Noise Immunity of AS-Interface

AS-Interface has been designed from the ground up to be used in tough industrial applications. As a result, AS-Interface is extremely noise immune — as applications involving linear sliding contacts and slip rings impressively prove every day. You can rely on AS-Interface to perform in environments where other systems fail. Nevertheless, an AS-Interface system does not negate the need for good wiring practices to make sure that AS-Interface's advanced noise management features are available when needed. Pepperl+Fuchs has over 10 years of application experience with AS-Interface. We can help you design an AS-Interface system that is most suitable for your application, assist you in choosing the correct components, and guide you through the installation in order to ensure that your system fulfils your manufacturing requirements

Approvals

All Pepperl+Fuchs AS-Interface devices are constructed to adhere to national and international rules and regulations.

All Pepperl+Fuchs modules are CE approved and meet the highest level for electronic noise immunity possible for AS-Interface.

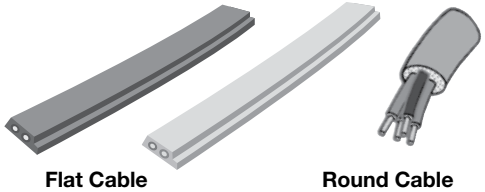
This symbol indicates products have been tested and listed to Underwriters Laboratory standards and are in compliance with both Canadian and U.S. requirements.

Safety modules with this approval can be used up to category 4 according to EN954 and up to SIL 3 according to IEC 61508.

Round Cable and Flat Cable Connections of AS-Interface

Although a standard two-wire round cable can be used, the preferred way to install AS-Interface is via the famous yellow flat cable. It provides an efficient installation method and, due to the mechanical keying, guarantees correct polarity. Also, the yellow cable ensures that the network operates at peak electrical performance, regardless of the network length (up to 100 meters per segment) and network topology. On the practical side, AS-Interface cable is sold in 100-meter spools. This eliminates the possibility of inadvertently creating a network that is too long.

In addition to using the yellow AS-Interface network cable, a black, mechanically keyed flat cable supplies auxiliary power. The auxiliary power is used to power output devices, such as lights, valves, or actuators. Both cables are offered in standard and oil-resistant versions.



Flat Cable Round Cable

Shielding or No Shielding

In general, AS-Interface uses unshielded cable. If shielded cable is used, it is important to connect the shielded wire to a solid machine ground wherever the data/power leads are exposed and at the power supply ground connection. Essentially, shielding is used for mechanical protection, not noise immunity. Because of the way AS-i is designed the shield may reduce the performance of the network by as much as 20%.

NOTE: Do not ground ANY of the AS-Interface leads under ANY circumstances.

AS-Interface utilizes a floating signal and derives much of its noise immunity from it. Tying one lead to ground will interfere with AS-Interface communications. Data transmission of AS-Interface is at 167 kHz and requires no shielding, no termination and no twisted pairs.

Flat Cable Piercing Technology

In addition to being the fastest installation method, the AS-Interface flat cable offers other benefits resulting in long-term performance and reliability.

Redundant piercing—Redundant electrical connections are established when the AS-Interface flat cable is placed on a Pepperl+Fuchs I/O module. The reliability of those connections has been proven time and again and has been formally evaluated using the DIN EN-60068-2-64 standard.

Applications

Easy machine connection / breakdown / reassembly

AS-Interface is the ideal solution to wire modular systems. During the build phase, modules are placed on various sections of the machine, and sensors/actuators are connected. Quick-Blocks and molded cordsets are used between the individual conveyor/machine sections.

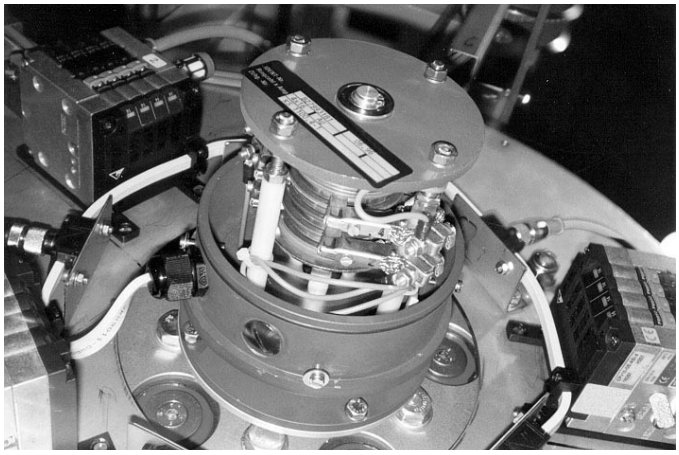
Breaking down the machine is as easy as removing the cordsets. No cutting. No splicing. No wire bundles hanging off the module during shipment.

Slip Ring and Sliding Contact Wiring

AS-Interface is the wiring method of choice when I/O is required on a continuously rotating machine.

With AS-Interface, only two conductors are necessary to get hundreds of I/O back to a PLC. Therefore, it is no longer necessary to over size the slip rings. With its high noise immunity, AS-Interface will easily deal with the electrical noise generated by the sliding contacts.

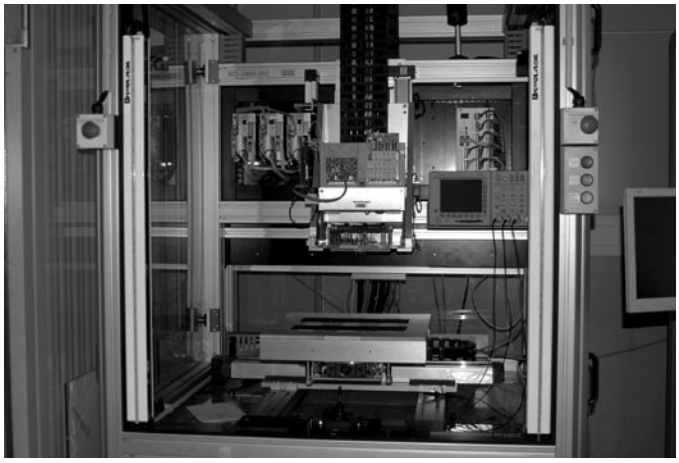
AS-Interface has been successfully transferred to applications with linear sliders, such as on overhead cranes and assembly lines Only the I/O modules are placed on the carrier system while the PLC remains separate, at a more convenient location. Since this system is controlled by a small number of PLCs, software modifications are quickly and easily accomplished. Additionally, adding I/O on the carriers is trouble-free, uncomplicated, and fast.



Note: To get the best possible long term reliability, Pepperl+Fuchs suggests silver/carbon contacts. A silver/carbon combination has been proven to be superior to traditional copper contacts, which are less stable and have shorter service lives.

Safety

It is also possible to route safety data (from door interlocks, e-stops, light curtains) over AS-Interface. AS-Interface Safety at Work allows networking of safety devices using a standard AS-Interface network. With the Safety at Work system, safety devices benefit from all of the advantages that AS-Interface offers. Safety input status is directly available to the PLC without the need for additional wiring to auxiliary contacts. The safe outputs on the SafetyMonitor (roughly equivalent to the safety relay in a hardwired system) can also be retrieved by the PLC without the need for additional wiring.

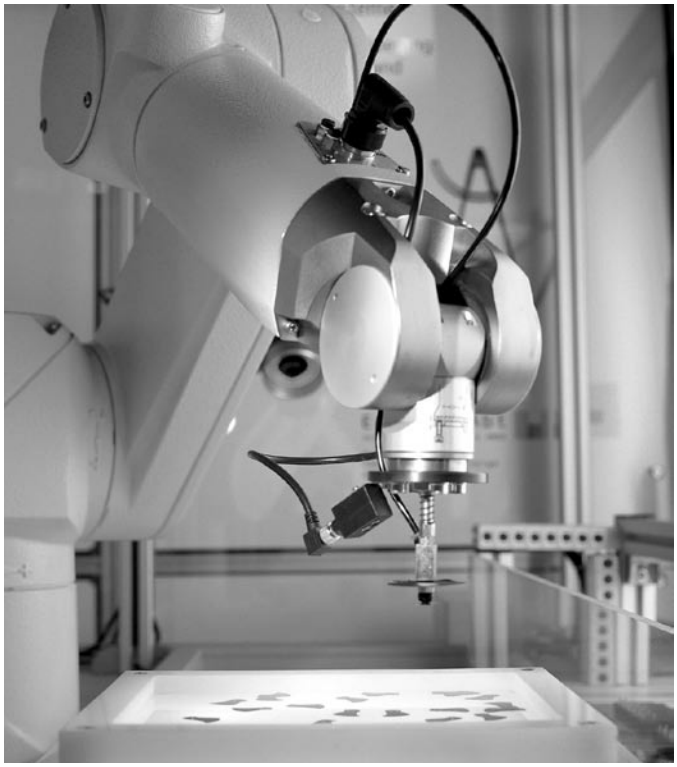


Repositioning of Work Stations During System Start-up

Frequently, workstations need to be redesigned, modified, or moved. While this is a common occurrence, only AS-Interface has the flexibility to address it fully and offer a simple, efficient, and cost-effective solution. If a module needs to be moved to a different location, it can simply be removed from the yellow cable and relocated where it will best fit the application. The piercings at the original location in the cable will self-heal. The same is true when larger groups of I/O modules, including safety devices, are moved.

Quick Change Tools On Robotic Arms

Many robotic applications frequently require a change of end arms within the same work cell. AS-Interface is so versatile that a scanner is able to recognize the I/O components on the new end arm in a fraction of a second. With a fully loaded network of 62 nodes the quick change time is only 35 ms. By the time the mechanical connections are complete, the I/O system is available.



Valve Tops

Valves have been controlled by AS-Interface for many years and remain a prime example of network efficiency. Typically, a valve top has two sensors (indicating the open and closed position of the valve) and one or two outputs that drive the valve into position. AS-Interface utilizes a small I/O module that is integrated into the valve top. As a result, connecting a large number of valves to a PLC or DCS is reduced to running a single two-conductor cable between the DCS and the valves. It can't get any simpler.

Enhancements and Compatibility: How to Expand to 62 Modules

In its original (2.0) specification, AS-Interface accommodates 31 I/O modules where each module uses one, complete address between 1 and 31. With later enhancements, AS-Interface 2.1 allows I/O modules to take up only one half of an address. Therefore, scanners/gateways that support this addressing scheme are able to communicate with up to 62 modules on a network. This is accomplished with full forward and backward compatibility where modules that use a full address offer up to 4 inputs and 4 outputs, and modules with one half of an address provide 4 inputs and 3 outputs. AS-Interface 2.0 supports up to 124 inputs and 124 outputs, AS-Interface 2.1 supports up to 248 inputs and 186 outputs, and AS-interface 3.0 supports up to 248 inputs and 248 outputs.

Any scanner/gateway can communicate with any type of node. Whole-address modules and half-address modules may be used within the same AS-Interface network. However, the following rules must be observed:

- When an address number is assigned to a whole-address module (5, 6, 7...), that address number cannot be used for a half-address module (5A or 5B, 6A or 6B, 7A or 7B...). Another number must be selected. Likewise, an address number assigned to a half-address module (5A or 5B, 6A or 6B, 7A or 7B...) cannot be used for a whole-address module (5, 6, 7...).
- When an address number is assigned to a half-address module (9A), the other half of the address number (9B) can be used by another half-address module.
- When a half-address module is used on a scanner/gateway that does not support A/B addressing, that module must be set to an A address (3A). No additional modules can be used at that address (3B, for example, cannot be used). Also, the control/system must not turn on or use output D3 or parameter P3.

NOTE:

- **Analog modules with profile S-7.3 use a full address and profile S-7.A supports extended addressing.**
- **Safety at Work modules use a full address.**

- The newest specification enhancements make AS-Interface even more powerful. With the release of Specification 3.0, it is possible to use I/O nodes that support half-addresses and still offer 4 inputs and 4 outputs. As long as a scanner/gateway is used that supports this newest specification, selecting an I/O module is easy: any configuration is possible, irrespective of how old the module is. How does that sound for design simplicity?

The AS-Interface gateways and scanners have a master specification. This specification defines the capabilities and features of the device. All gateways and scanners in this catalog support all features of the latest AS-i specification 3.0 and are M4 compliant.

Master Specification

M4 (Version 3 extended master)

- Extended addressing 1-31A, 1-31B
- Support for analog profile S-7.1 and S-7.3
- Support for 4-in/4-out with extended addressing
- Support for analog with extended addressing
- Support for analog using consecutive addresses
- Support for bi-direction serial data transfer

M3 (Full extended master)

- Extended addressing 1-31A, 1-31B
- Support for analog profile S-7.1 and S-7.3

M1 (Full standard master)

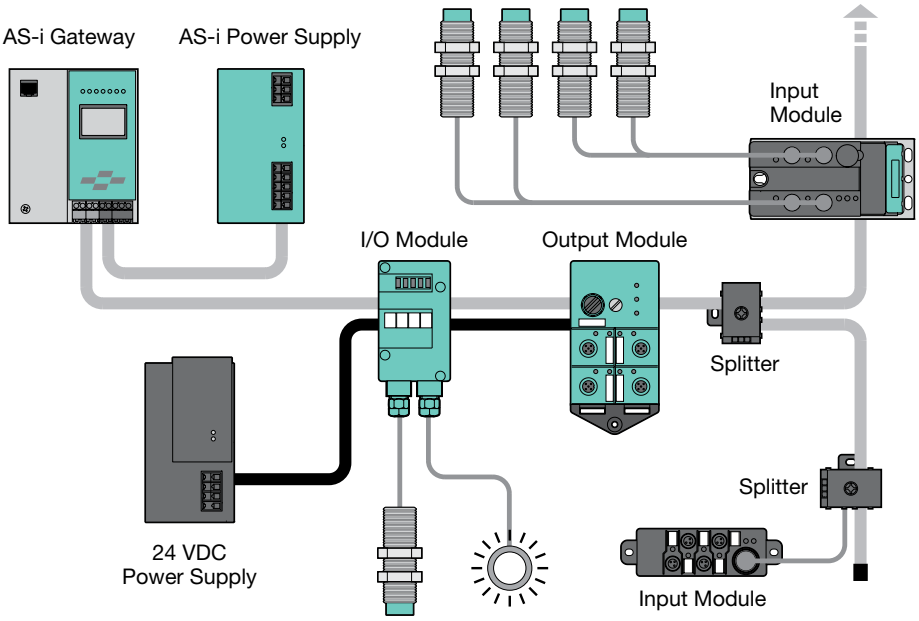
- Standard addressing 1-31, complete support

M2 (Reduced standard master)

- Standard addressing 1-31, some parameters used

M0 (minimum standard master)

- Standard addressing 1-31, I/O data only



Standard AS-Interface Components

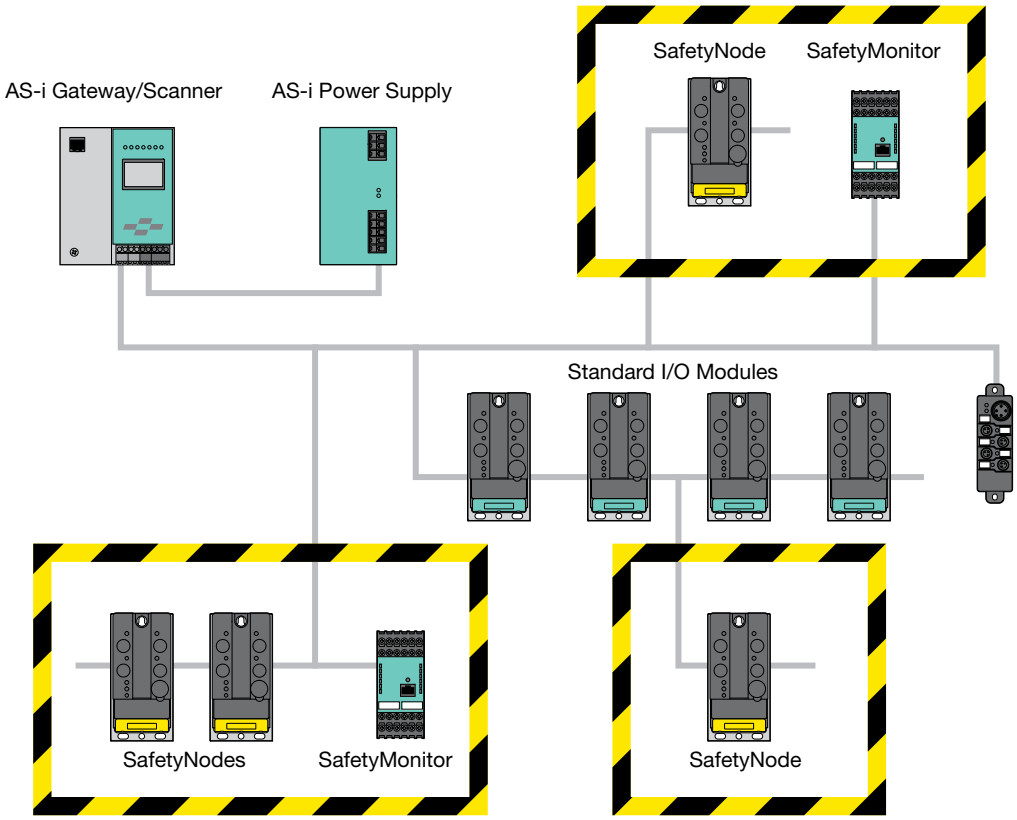
Requirements

- *AS-Interface scanner or gateway:* This may be a P+F model or made directly by the PLC manufacturer.
- *AS-Interface power supply:* Every AS-Interface network must have a single power supply with AS-Interface decoupling circuitry. If a repeater is used, an additional power supply is required for each.
- *Cable:* This can be the patented flat cable with the piercing technology or any round cable that meets AS-Interface specifications.
- *I/O modules:* Any I/O module from any manufacturer will work, but the Pepperl+Fuchs modules are guaranteed AS-Interface compliant and will work for years to come.
- *24 V external power supply:* A power supply is required only if externally powered outputs are used. Any standard 24 V power supply is suitable. See page 70 for Pepperl+Fuchs standard 24-30 V power supplies.

Safety at Work

AS-Interface Safety at Work (SaW) is a system that enables networking of safety devices (safety door switches, e-stops, safety light curtains, etc.) using a standard AS-Interface network. With SaW, users can quickly implement a safety system that satisfies the rules and regulations needed for Category 4, SIL 3 safety. The simplicity of the successful AS-Interface is retained and is a major reason for users to implement SaW systems. The following features make SaW unique and powerful:

- Control I/O and safety information on the same network
- Usable up to Safety Category 4, SIL 3
- Does not require a Safety PLC
- Automatic single node replacement is supported
- SafetyMonitor allows implementation of both simple and powerful safety procedures
- Adding additional safety devices is simple and fast
- SafetyNodes can be added wherever needed, even during final phases of the project
- Each SafetyNode requires one whole address; 31 SafetyNodes per network



- SafetyMonitor can be placed anywhere on the AS-Interface network—it is not necessary to be close to the SafetyNodes
- The status of safety inputs and safety relays can be monitored directly on AS-Interface and sent to the PLC
- The SafetyMonitor does not require an address. Assign an address to read the states of OSSDs
- SaW devices are certified according EN 954 and IEC 61508 from TÜV Rheinland and are UL approved
- Configured using VAZ-SW-SIMON(+) software
- Can scan up to two networks simultaneously
- Up to 16 channels on one safety monitor
- Gateways also available with integrated 16-channel enhanced safety monitors

Notes

Gateways and Scanners

Gateways and Scanners

An AS-Interface system is based on just a few essential components. Scanner cards/gateways are at the heart of the AS-Interface system and "connect" the I/O to the control system. Scanner cards are directly mounted in the PLC rack and appear in the PLC configuration as large, standard I/O cards. Therefore, transitioning between discrete wiring with standard input and output card systems to the AS-Interface is seamless. The PLC programmer won't even see a difference between the two systems. One AS-Interface card can replace 10, 20 or more I/O cards and save valuable panel space, as well as reduce the cost of the PLC.

Gateways

Upper level (i.e., word and byte based) networks such as PROFIBUS, DeviceNet, and Ethernet benefit from the strength of AS-Interface, and handle the AS-Interface gateway simply as a large collection of I/O. Users familiar with their upper level network of choice will have no problem reading inputs and setting outputs on AS-Interface.

Pepperl+Fuchs' large selection of scanner cards and gateways presents another advantage that is especially important for OEM users. Regardless of the upper level network (or PLC model) used in a particular application, the AS-Interface I/O modules remain unchanged. One can even use a PC with its graphical capabilities during the I/O system installation and setup. Once completed, the same two-conductor AS-Interface cable is connected to the scanner card or gateway. Assured that the I/O system is operational, and that sensor connections and output switches are connected correctly, programming the PLC logic will be be fast and easy. AS-Interface drastically reduces the overall time necessary to complete an installation.

In addition to simplifying the installation, AS-Interface can also increase the performance speed of the upper level bus. Because the AS-Interface gateway collects all I/O data for a single scan update on the upper level network, overhead processing is significantly reduced, by up to 90%.

Scanners

AS-Interface Scanners are available from virtually every PLC/DCS manufacturer, and are a great way to bring AS-Interface directly into your control system. A number of scanner card options are available to suit your networking needs. Some cards are available with two AS-Interface networks and with twice as many inputs and outputs available for simultaneous scanning (compared to single network systems). Also, all scanners can communicate with A and B addressed AS-Interface modules. Up to 62 modules can be scanned by AS-Interface. Analog capabilities are often required for control systems. All scanners and gateways in the *2009 Reference & Buyer's Guide* fully support analog modules.

AS-Interface Scanners by Manufacturer

Manufacturer	PLC/PCS Platform	Extended Addressing	Number of AS-Interface Networks	Analog Capable	AS-i Specification
Allen-Bradley (sold by Pepperl+Fuchs, see page 29)	SLC 503/4/5	Yes	2	Yes	3.0 (M4)
	ControlLogix	Yes	2	Yes	3.0 (M4)
	MicroLogix 1500	Yes	1	Yes	3.0 (M4)
	CompactLogix	Yes	1	Yes	3.0 (M4)
Emerson Process Management	DeltaV	No	2	No	2.0 (M0)
GE Fanuc	VersaMax	No	1	No	2.0 (M1)
Mitsubishi	FX2N	No	1	No	2.0 (M1)
	AnS(H)/QnAS	No	2	No	2.0 (M1)
	Q	Yes	1	Yes	2.1 (M3)
Schneider Electric (Modicon, Telemecanique)	Quantum	No	1	No	2.0 (M1)
	Premium	No	1	No	2.0 (M1)
	Micro	No	1	No	2.0 (M1)
	Nano, Twido	Yes	1	Yes	2.1 (M3)
Omron	CQM1H	No	1	No	2.0 (M1)
Siemens	S7-300, ET-200M	Yes	1	Yes	3.0 (M4)
	S7-200	Yes	1	Yes	2.1 (M3)

Scanners and Gateways Supporting 2.1 Specification

Scanners/gateways that support version 2.1 or higher are able to communicate with up to 62 modules on one network. This is accomplished with full forward and backward compatibility; modules that use a full address offer up to 4 inputs and 4 outputs, and modules with one half of an address provide 4 inputs and 3 outputs. AS-Interface 2.1 supports up to 248 inputs and 186 outputs. A scanner/gateway that supports 2.1 can communicate with full-address modules, and can also communicate with half-address modules, set to both A and B addresses. With the release of AS-Interface specification 3.0, users also have the option of utilizing modules that offer half addressing mode and still have 4 inputs and 4 outputs.

Diagnostics

How is the I/O data from the AS-Interface modules mapped into various PLCs?

Typically, PLCs are organized using 16/32-bit input and output words, and I/O cards are associated with those words, based on their location in the rack. The same is true when using an AS-Interface scanner card. The difference is that the AS-Interface scanner represents an I/O card with many more inputs and outputs. The following example for an Allen-Bradley SLC illustrates this difference:

The AS-Interface scanner has been mounted in rack slot 3 and the inputs are mapped in I:3. In contrast to a discrete input card at this rack location (where inputs are mapped between I:3.0/0 and I:3.0/15), the data from the AS-Interface scanner is mapped between I:3.0/0 to I:3.31/15. The input data from four AS-Interface modules is represented within each data table word.

Allen-Bradley Scanners

- MicroLogix 1500, ControlLogix, SLC500, and CompactLogix supported
- Easy configuration port, PLC, or pushbutton programming
- Easy visual indication of network status
- Advanced diagnostics for easy troubleshooting

A-B Scanner Overview

All scanner cards come with a configuration port that is great for online diagnostics and commissioning. The MicroLogix and ControlLogix cards can be monitored online while the PLC maintains control. During the start-up phase, the outputs can be set and the inputs can be read without going online with the PLC.

Display

Some cards have an integrated seven-segment display. This display is used in configuration mode to show all connected I/O modules. In Protected (Run) mode, the display is used to show missing nodes or recently added nodes that have not yet been added to the scan list.

See pages 31-32 for Allen-Bradley gateway/ scanner wiring.

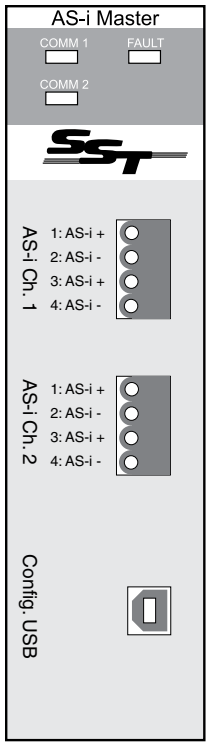
Specifications

PLC PLATFORM OR NETWORK		SLC 5/03, SLC 5/04, SLC 5/05	ControlLogix	MicroLogix 1500, CompactLogix
MODEL NUMBER(S)	*Single Network*			VBM-MLX/CPLX ⚡
	Dual Network	SST-ASI-SLC ⚡	VBM-CLX-DM ⚡	
CAPABILITIES				
SPECIFICATION		3.0	3.0	3.0
MASTER PROFILE		M4	M4	M4
EXTENDED ADDRESSING POSSIBLE (62)		Yes	Yes	Yes
ANALOG CAPABILITY		Yes	Yes	Yes
MAX DISCRETE I/O COUNT		496 in/496 out	496 in/496 out	248 in/248 out
CONFIGURATION OPTIONS				
PUSHBUTTONS		–	Yes	Yes
PLC		Yes	Yes	Yes
DISPLAY		–	2, 7 segment + LEDs	2, 7 segment + LEDs
SOFTWARE		Windows HyperTerminal	VAZ-SW-ACT32 (optional)	VAZ-SW-ACT32 (optional)
Cable		USB (included)	K-ADP2 (purchased separately)	K-ADP2 (purchased separately)
STAND-ALONE CONTROL (Optional)		No	No	No
ELECTRICAL SPECIFICATION				
OPERATING CURRENT AS-INTERFACE (1/2)		50 mA	70 mA/70 mA	100 mA
OPERATING CURRENT BACKPLANE		500 mA @ 5 VDC	390 mA @ 5 VDC, 2 mA @ 24 VDC	450 mA @ 5 VDC
ALLEN-BRADLEY				
CONNECTION		Backplane	Backplane	Backplane
I/O MAPPING		Input and output files	Input and output files	Input and output files
DIAGNOSTICS MAPPING		M0 and M1 files	Input and output files using mailbox	Input and output files using mailbox
CARDS PER PLC		Limited by rack space	Limited by rack space	Power supply rating of 4
ADVANCED FUNCTIONALITY				
GROUND FAULT DETECTION		No	No	No
NOISE DETECTION		No	No	No
DUPLICATE ADDRESS DETECTION		No	No	No
OVER VOLTAGE DETECTION		No	No	No
DIAGNOSTIC PORT		Yes (USB)	Yes (RS-232)	Yes (RS-232)
PROTECTION (IEC)		IP20	IP20	IP20
TEMPERATURE RANGE	*Working*	+32 °F to +122 °F (0 °C to +50 °C)	+32 °F to +122 °F (0 °C to +50 °C)	+32 °F to +122 °F (0 °C to +50 °C)
	Storage	-13 °F to +158 °F (-25 °C to +70 °C)	-13 °F to +158 °F (-25 °C to +70 °C)	-13 °F to +158 °F (-25 °C to +70 °C)
WEIGHT		620 g (22 oz)	375 g (13 oz)	258 g (9 oz)
APPROVALS		CE	CE cULus	CE cULus
AS-INTERFACE CONNECTION		Removable terminals	Removable terminals	Removable terminals

⚡ Stocked item
Consult factory for all other models

Wiring Diagrams

SST-ASI-SLC

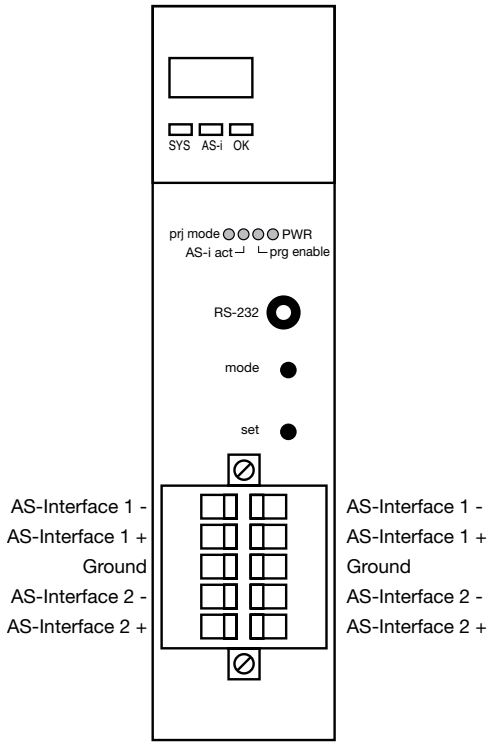


LED Indicators

FAULT	COMM 1/COMM 2	Description
Off	Green	Normal operation
Red (flashing)		G-File error or slot disabled
Red (flashing)	Green (flashing)	2 or more AS-I nodes missing, configuration mismatch
Red (flashing)	Red (flashing)	In HyperTerminal configuration mode
	Red (flashing)	Power too low, off-line, in configuration mode
	Green (flashing)	1 AS-I node missing
Red	Red	Error

Wiring Diagrams

VBM-CLX-DM



LED Indicators

SYS: Green: PLC Connected

AS-i: Green (solid): Good
Green (flashing) In configuration mode
Red (flashing): Peripheral fault
Red (solid) Configuration error

OK: Red (solid/flashing): Error
Green (solid): PLC run mode
Green (flashing): PLC program mode

PRJ Mode: Yellow: AS-i master is in configuration mode

AS-i act: Green: AS-i network operating normally in either configuration or protected mode

PRG Enable: Green: Exactly one slave is missing in protected operating mode and automatic addressing is allowed

PWR: Green: Power on

Pushbuttons

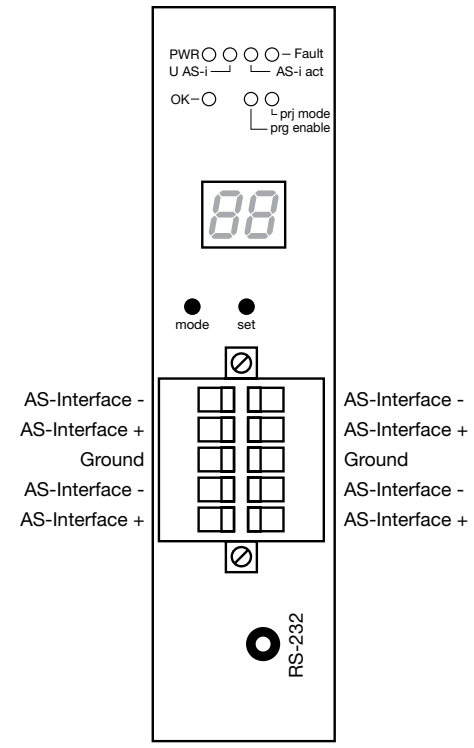
Mode: Switches between normal operating mode and configuration mode

Set: Changes slave addresses in configuration mode

Display

LED Display: 4 digits

VBM-MLX/CPLX



LED Indicators

SYS: LED PWR: Green: Power on

U AS-i: Green: AS-i network is sufficiently powered

AS-i act: Green: AS-i network operating normally in either configuration or protected mode

Fault: Red (solid): One slave missing or extra slave on the network
Red (flashing): Peripheral fault on network

PRG Enable: Green: Exactly one slave is missing in protected operating mode and automatic addressing is allowed

PRJ Mode: Yellow: AS-i master is in configuration mode

OK: Green: PLC in run mode

Pushbuttons

Mode: Switches between normal operating mode and configuration mode

Set: Changes slave addresses in configuration mode

Display

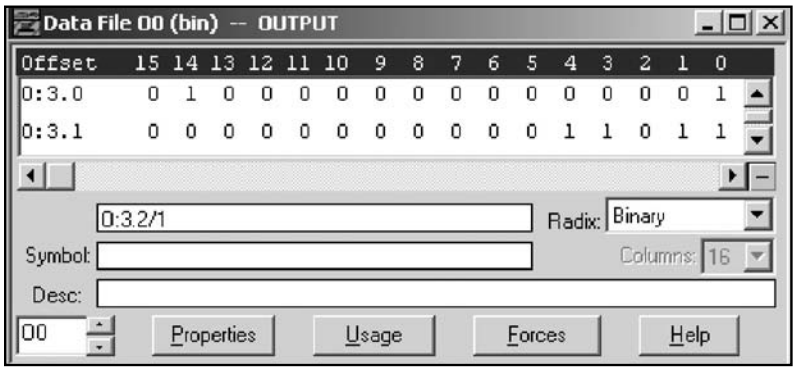
7 Segment Display: 2 digits and 2 dots

DATA MAPPING – SLC500

Allen-Bradley scanners map directly into the input and output images of your PLC.

The SLC 500 scanner works with the SLC 5/03, SLS 5/04 and SLC 5/05.

An example of an RS Logix 500 screen capture for SLC 500 mapping (slot 3).



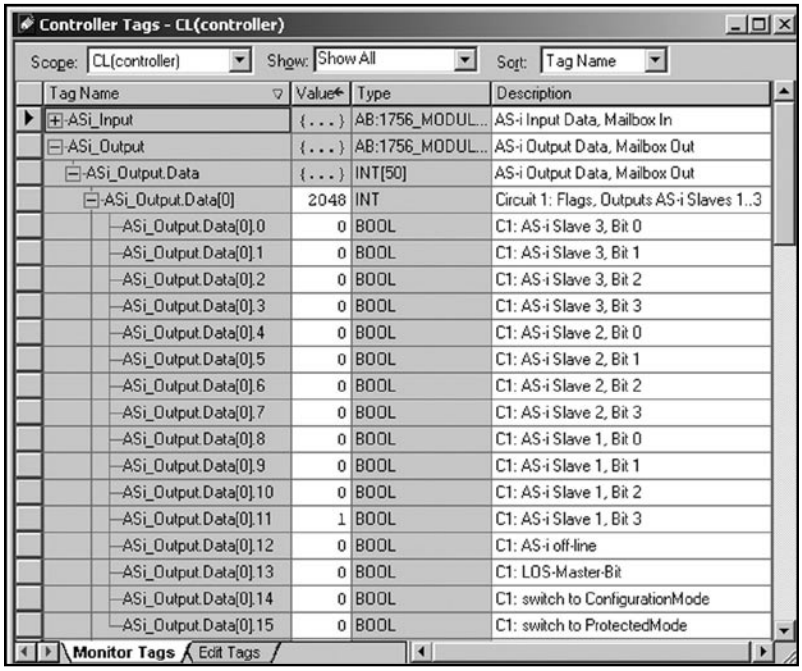
Mapping Data

Address 1 outputs 1-4 O:3.0/4 - O:3.0/7
Address 2 outputs 1-4 O:3.0/8 - O:3.0/11
Address 3 outputs 1-4 O:3.0/12 - O:3.0/15
Address 4 outputs 1-4 O:3.1/0 - O:3.1/3
Address 5 outputs 1-4 O:3.1/4 - O:3.1/7
Address 6 outputs 1-4 O:3.1/8 - O:3.1/11
Address 7 outputs 1-4 O:3.0/12 - O:3.0/15
...

DATA MAPPING – ControlLogix

The ControlLogix scanner works with all models.

An example of an RS Logix 5000 screen capture for ControlLogix mapping (slot 1).

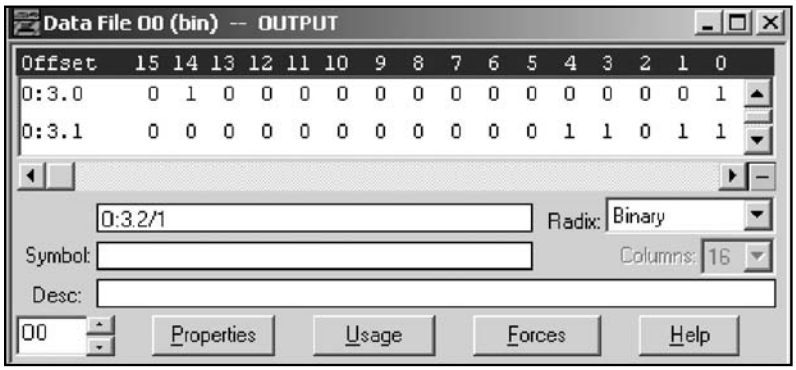


DATA MAPPING – MicroLogix

Allen-Bradley scanners map directly into the input and output images of your PLC.

The Compact I/O scanner works with the MicroLogix 1500 or the CompactLogix.

An example of an RS Logix 500 screen capture for MicroLogix 1500 mapping third card.



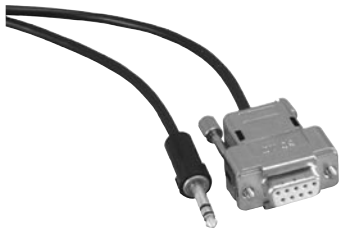
Mapping Data

Address 1/1A outputs 1-4 O:3.0/8 - O:3.0/11
Address 2/2A outputs 1-4 O:3.0/4 - O:3.0/7
Address 3/3A outputs 1-4 O:3.0/0 - I:3.0/3
Address 4/4A outputs 1-4 O:3.1/12 - O:3.1/15
Address 5/5A outputs 1-4 O:3.1/8 - O:3.1/11
Address 6/6A outputs 1-4 O:3.1/4 - O:3.1/7
Address 7/7A outputs 1-4 O:3.1/0 - O:3.1/3

Accessories

VAZ-SW-ACT32
AS-Interface Control Tools configuration and diagnostic software for ControlLogix and Compact I/O scanners

K-ADP2
Communication cable for ControlLogix and Compact I/O scanners (RS-232)



See pages 201-216 for complete AS-Interface accessory listing.

DeviceNet Gateways

- Advanced graphical display
- Polled, cyclic, change of state, and explicit messaging
- Powered via AS-Interface
- Duplicate address, noise, and ground fault detection

DeviceNet Gateway Overview

The VBG-DN-K20-D single network gateway and the VBG-DN-K20-DMD... double network gateway support the AS-Interface Specification 3.0.

DeviceNet CONFORMANCE TESTED

The advanced graphical display is great for configuring the AS-Interface network as well as diagnosing problems at every stage of installation. Complete lists of all configured nodes, failed nodes, and detected nodes are all stored in the unit. Diagnostic counters keep track of all communication errors in the unlikely event of EMC or noise problems on the network. The easy-to-use pushbuttons can also be used to configure the entire network. DeviceNet gateways also offer features such as duplicate address detection, over voltage detection, and integrated noise monitoring—features no other manufacturer can match.

DEVICENET
QUICK SETUP
SLAVE ADR TOOL
SLAVE TEST TOOL
SETUP
IO + PARAM. TEST
DIAGNOSIS
ADV. DIAGNOSIS
AS-I SAFETY
LANGUAGE
DISP CONTRAST

To expedite troubleshooting, all outputs can be set directly from the display and every input can be easily read.

In addition to discrete inputs and outputs, analog points are easy to troubleshoot as well. Analog outputs can be written and analog inputs can be read as if you were standing in front of an HMI.

BINARY INPUTS
D3 . . . D0
1A - 0 1 0 1
2A - 0 1 0 1 ↓

BINARY OUTPUTS
D3 . . . D0
1A - 0 1 0 1
2A - 0 1 0 1 ↓

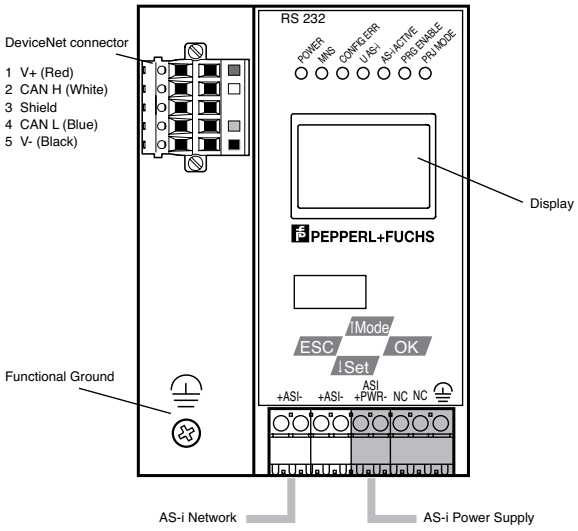
See pages 37-38 for DeviceNet gateway wiring and dimensions.

Specifications		Enhanced Diagnostics	Basic Diagnostics
NETWORK		**DeviceNet**	
MODEL NUMBER(S)	*Single Network*	**VBG-DN-K20-D** ⚡	
	Dual Network	**VBG-DN-K20-DMD** ⚡	**VBG-DN-K20-DMD-BV**
CAPABILITIES			
SPECIFICATION		3.0	
MASTER PROFILE		M4	
EXTENDED ADDRESSING POSSIBLE (62)		Yes	
ANALOG CAPABILITY		Yes	
MAX DISCRETE I/O COUNT		248 inputs/248 outputs per network	
CONFIGURATION OPTIONS			
PUSHBUTTONS		Yes	
PLC / DEVICENET		Yes	
DISPLAY		Graphical	
SOFTWARE		VAZ-SW-ACT32 (optional)	
	Converter required	No	Yes
STAND-ALONE CONTROL (Optional)		Disabled by default, purchase VAZ-CTR to unlock	
ELECTRICAL SPECIFICATION			
OPERATING CURRENT (1/2)		200 mA/70 mA	
OPERATING CURRENT DEVICENET		35 mA	
DEVICENET			
CONNECTION		Dual row 5-pin removable terminals	
COMMUNICATION		Polling, change of state, cyclic	
BAUD RATES (Set via DeviceNet or graphical display)		125, 250, 500 kbps	
MAC ID (Set via DeviceNet or graphical display)		0-63	
ADVANCED FUNCTIONALITY			
GROUND FAULT DETECTION		Yes	Yes
NOISE DETECTION		Yes	Yes
DUPLICATE ADDRESS DETECTION		Yes	No
OVER VOLTAGE DETECTION		Yes	Yes
RS-232 DIAGNOSTIC PORT		Yes	No
PROTECTION (IEC)		IP20	
TEMPERATURE RANGE	*WORKING*	+32 ºF to +131 ºF (0 ºC to +55 ºC)	
	STORAGE	-13 ºF to +185 ºF (-25 ºC to +85 ºC)	
HOUSING MATERIAL		Stainless steel	
WEIGHT		590 g (21 oz)	
APPROVALS		CE cULus	
AS-INTERFACE CONNECTION		Yellow removable spring terminals	
AS-INTERFACE POWER SUPPLY CONNECTION		Black removable spring terminals for 30 V AS-i power supply	

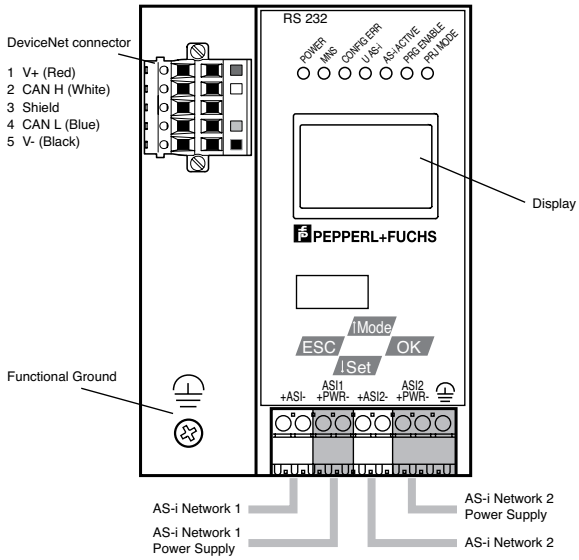
⚡ Stocked item
Consult factory for all other models

Wiring Diagrams

VBG-DN-K20-D



VBG-DN-K20-DMD
VBG-DN-K20-DMD-BV (no RS-232 port)



LED Indicators

Power: Green: Power on

MNS: DeviceNet Status: Green (solid): Online connected
Green (brinking): Online not connected
Red: Busoff
Off: Offline no connection

Config Error: Red (solid): One slave missing or extra slave on the network
Red (flashing): Peripheral fault on network

U AS-i: Green: AS-i network is sufficiently powered

AS-i Active: Green: AS-i network operating normally in either configuration or protected mode

PRG Enable: Green: Exactly one slave is missing in protected operating mode and automatic addressing is allowed

PRJ Mode: Yellow: AS-i master is in configuration mode

Pushbuttons

↑ **Mode**: Switching between normal operating mode and configuration mode and moving up through display

↓ **Set:** Changes slave addresses in configuration mode and moves down through display

OK: Moves forward through graphical display and to accept changes

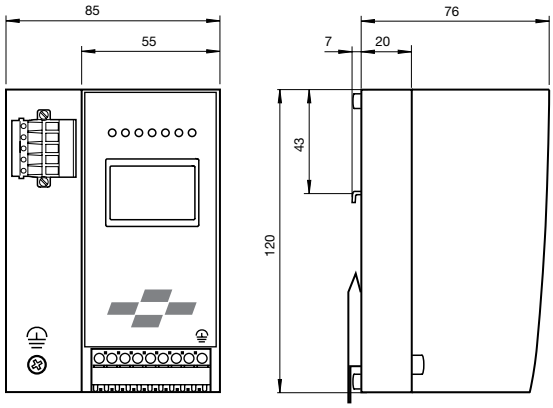
ESC: Moves backward through display

Display

Graphical Display: 4 Line black and white display

Dimensions (mm)

VBG-DN-K20-D
VBG-DN-K20-DMD
VBG-DN-K20-DMD-BV



Accessories

VAZ-DN-SIM-USB
DeviceNet master simulator connects DeviceNet gateway directly to USB port on PC.

VAZ-SW-ACT32
AS-Interface Control Tools configuration and diagnostic software. BV version also requires simulator.

VAZ-CTR
Unlock codes for stand-alone control functionality of gateway. Must have VAZ-SW-ACT32 to program and unlock stand-alone control functionality. BV version also requires simulator.

Serial Number: 1234567
Unlock codes: ____, _____, ____

See pages 201-216 for complete AS-Interface accessory listing.

PROFIBUS
Gateways

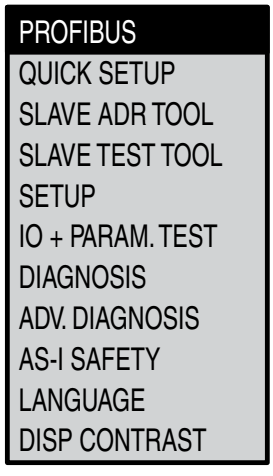
- **RS-232 port for diagnostic monitoring of network**
- **Low-cost housing option available without advanced diagnostics**
- **Built-in duplicate address, noise, and ground fault detection**

PROFIBUS Gateway Overview

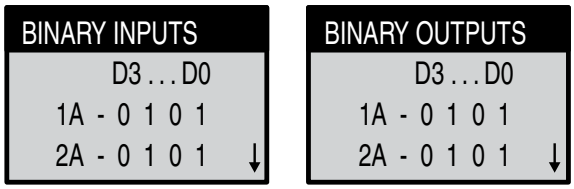
Pepperl+Fuchs offers single and double PROFIBUS gateways that fulfill AS-Interface Specification 3.0. These units are also modular PROFIBUS slaves, which means that they can be configured using the GSD file to specify which data, and the amount of data that will be transferred.

These gateways also support acyclical communication of the PROFIBUS DPV1. The acyclical services are used to access all the data made available by the AS-Interface/PROFIBUS gateway. Communication is available up to 12 Mbps.

Pushbuttons or the graphical display are used to assign addresses, accept the target configuration, and adjust the PROFIBUS address and baud rate. Some models use 7 LEDs on the front panel to show the current status of the AS-Interface network. Our top of the line PROFIBUS gateways use a graphical display to provide status indication in full text.



AS-Interface gateways with graphical displays allow the AS-Interface circuit to be placed in service and the test of the connected I/O can be kept entirely separate from the commissioning of PROFIBUS and the programming.



The K20 housing series provides new functions with an improved display. The PROFIBUS connection is recessed on the side. When connected, the device and the connector fit snugly together (only 83 mm high). These gateways are ideal for installation in low-profile junction boxes.

All of the information presented on the large, graphic display is clearly readable thanks to the backlit illumination. Extensive diagnostic functions make fault location a simple task.

Dual addresses are detected via the gateway. The gateway also monitors AS-Interface for ground faults. The integrated ground connection and the color-coded removable terminals make it easy to replace a defective unit or to disassemble a machine for maintenance.

See pages 42-44 for PROFIBUS gateway wiring and dimensions.

Specifications		Enhanced Diagnostics	Basic Diagnostics	Basic Diagnostics
NETWORK		**PROFIBUS**		
MODEL NUMBER(S)	*Single Network*	**VBG-PB-K20-D** ⚡		**VBG-PB-K25**
	Dual Network	**VBG-PB-K20-DMD** ⚡	**VBG-PB-K20-DMD-BV**	
CAPABILITIES				
SPECIFICATION		3.0		
MASTER PROFILE		M4		
EXTENDED ADDRESSING POSSIBLE (62)		Yes		
ANALOG CAPABILITY		Yes		
MAX DISCRETE I/O COUNT		248 inputs/248 outputs per network		
CONFIGURATION OPTIONS				
PUSHBUTTONS		Yes		
PLC / PROFIBUS		Yes		
DISPLAY		Graphical		3, 7 segment + LEDs
SOFTWARE		VAZ-SW-ACT32 (optional)		
Converter Required		No	Yes	Yes
STAND-ALONE CONTROL (Optional)		Disabled by default, purchase VAZ-CTR to unlock		
ELECTRICAL SPECIFICATION				
OPERATING CURRENT (1/2)		200 mA/70 mA	200 mA/70 mA	200 mA
PROFIBUS				
CONNECTION		DB9		
COMMUNICATION		PROFIBUS, DPV0 AND DPV1		
BAUD RATES		Up to 12 Mbps		
ADDRESSES		0-127		
ADVANCED FUNCTIONALITY				
GROUND FAULT DETECTION		Yes	Yes	Yes
NOISE DETECTION		Yes	Yes	Yes
DUPLICATE ADDRESS DETECTION		Yes	No	No
OVER VOLTAGE DETECTION		Yes	Yes	Yes
RS-232 DIAGNOSTIC PORT		Yes	No	No
PROTECTION (IEC)		IP20		
TEMPERATURE RANGE	*WORKING*	+32 °F to +131 °F (0 °C to +55 °C)		+32 °F to +131 °F (0 °C to +55 °C)
	STORAGE	+5 °F to +167 °F (-15 °C to +75 °C)		-13 °F to +185 °F (-25 °C to +85 °C)
HOUSING MATERIAL		Stainless steel		
WEIGHT		590 g (21 oz)		460 g (16 oz)
APPROVALS		CE cULus		
AS-INTERFACE CONNECTION		Yellow removable spring terminals		
POWER SUPPLY CONNECTION		Black removable spring terminals for 30 V AS-i power supply		

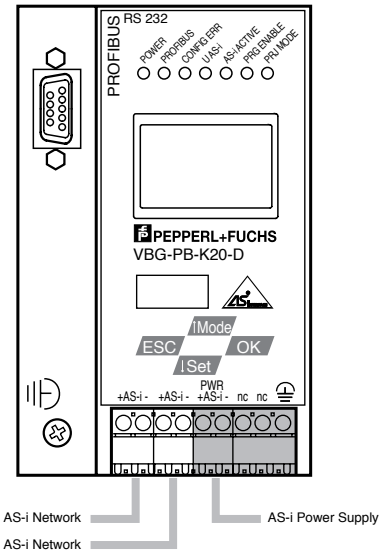
⚡ Stocked item
Consult factory for all other models

Specifications		Enhanced Diagnostics + Enhanced SafetyMonitor
NETWORK		**PROFIBUS**
MODEL NUMBER(S)	*Single Network*	**VBG-PB-K30-D-S16**
	Dual Network	**VBG-PB-K30-DMD-S16**
CAPABILITIES		
SPECIFICATION		3.0
MASTER PROFILE		M4
EXTENDED ADDRESSING POSSIBLE (62)		Yes
ANALOG CAPABILITY		Yes
MAX DISCRETE I/O COUNT		248 inputs/248 outputs per network
CONFIGURATION OPTIONS		
PUSHBUTTONS		Yes
PLC / PROFIBUS		Yes
DISPLAY		Graphical
SOFTWARE		VAZ-SW-ACT32 (optional) and VAZ-SW-SIMON+ (required)
Converter Required		No
STAND-ALONE CONTROL (Optional)		Disabled by default, purchase VAZ-CTR to unlock
ELECTRICAL SPECIFICATION		
OPERATING CURRENT (1/2)		300 mA/70 mA
PROFIBUS		
CONNECTION		DB9
COMMUNICATION		PROFIBUS, DPV0 AND DPV1
BAUD RATES		Up to 12 Mbps
ADDRESSES		0-127
ADVANCED FUNCTIONALITY		
GROUND FAULT DETECTION		Yes
NOISE DETECTION		Yes
DUPLICATE ADDRESS DETECTION		Yes
OVER VOLTAGE DETECTION		Yes
RS-232 DIAGNOSTIC PORT		Yes
PROTECTION (IEC)		IP20
TEMPERATURE RANGE	*WORKING*	+32 ºF to +131 ºF (0 ºC to +55 ºC)
	STORAGE	-13 ºF to +185 ºF (-25 ºC to +85 ºC)
HOUSING MATERIAL		Stainless steel
WEIGHT		800 g (28 oz)
APPROVALS		CE cULus
AS-INTERFACE CONNECTION		Yellow removable spring terminals
POWER SUPPLY CONNECTION		Black removable spring terminals for 30 V AS-i power supply
SAFETY INFORMATION		
START/EDM INPUTS		4, 10 mA @ 24 VDC
SAFETY OUTPUT CHANNELS		16
SAFETY OUTPUTS (OSSDs)		4 channels (2 relay, 2 PNP)
SAFE OUTPUTS ON AS-i		Yes (up to 16 channels)
SAFE COUPLING		Yes (up to 16 channels)
NETWORK CONNECTIONS		2
MAX. NUMBER SAFETY DEVICES		(31 x 2 networks) = 62
MAX. NUMBER PROG. BLOCKS		256
REMOVABLE MEMORY CARD		Yes

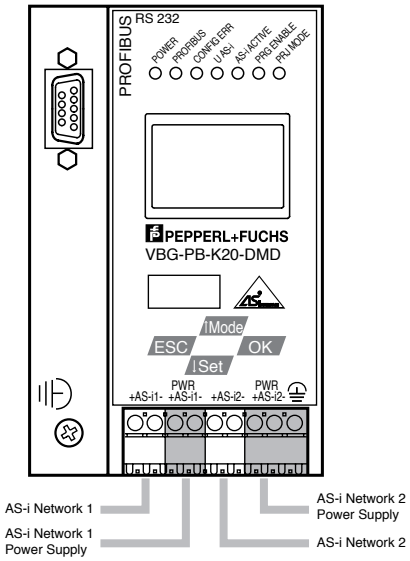
Stocked item
Consult factory for all other models

Wiring Diagrams

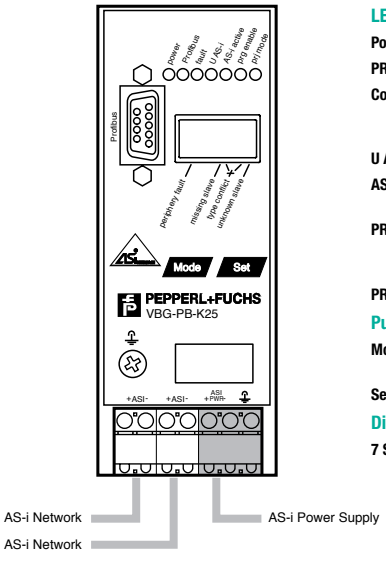
VBG-PB-K20-D



VBG-PB-K20-DMD
VBG-PB-K20-DMD-BV (no RS-232 port)



VBG-PB-K25



LED Indicators

Power: Green: Power on

PROFIBUS: Green (solid): Allocated to a PROFIBUS master

Config Error: Red (solid): One slave missing or extra slave on the network
Red (flashing): Peripheral fault on network

U AS-i: Green: AS-i network is sufficiently powered

AS-i Active: Green: AS-i network operating normally in either configuration or protected mode

PRG Enable: Green: Exactly one slave is missing in protected operating mode and automatic addressing is allowed

PRJ Mode: Yellow: AS-i master is in configuration mode

Pushbuttons

Mode: Switching between normal operating mode and configuration mode

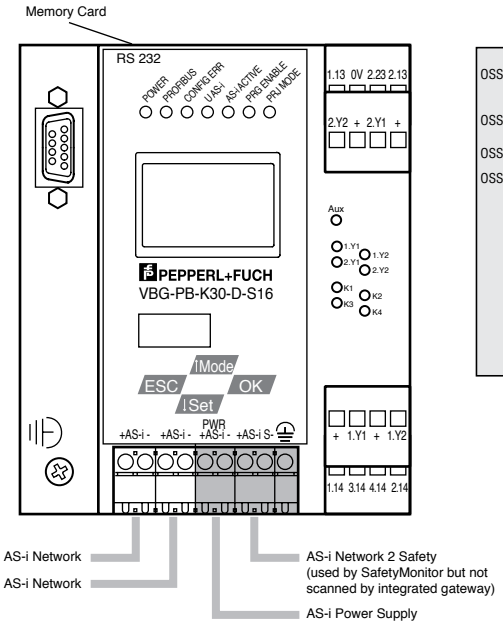
Set: Changes slave addresses in configuration mode

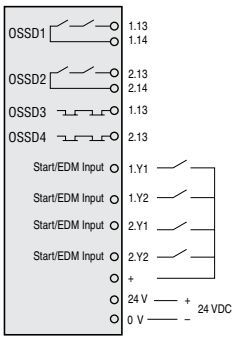
Display

7 Segment Display: 3 digits, 2 dots

Wiring Diagrams

VBG-PB-K30-D-S16





LED Indicators

Power: Green: Power on

PROFIBUS: Green (solid): Allocated to a PROFIBUS master

Config Error: Red (solid): One slave missing or extra slave on the network
Red (flashing): Peripheral fault on network

U AS-i: Green: AS-i network is sufficiently powered

AS-i Active: Green: AS-i network operating normally in either configuration or protected mode

PRG Enable: Green: Exactly one slave is missing in protected operating mode and automatic addressing is allowed

PRJ Mode: Yellow: AS-i master is in configuration mode

Aux: Green: Power on

1.Yx, 2.Yx: Yellow: Input on

Kx: Yellow: OSSD on

Pushbuttons

↑ **Mode**: Switching between normal operating mode and configuration mode and moving up through display

↓ **Set:** Changes slave addresses in configuration mode and moves down through display

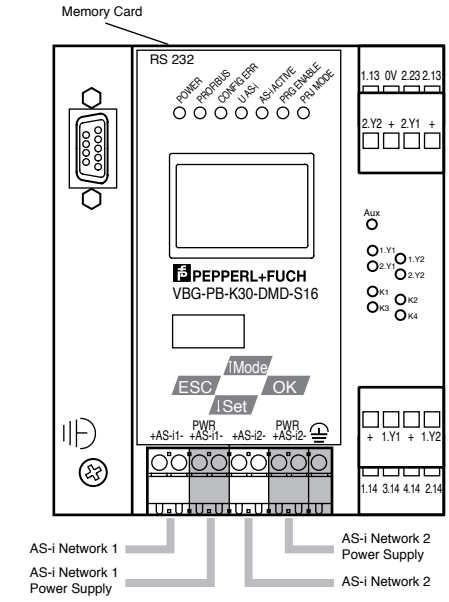
OK: Moves forward through graphical display and to accept changes

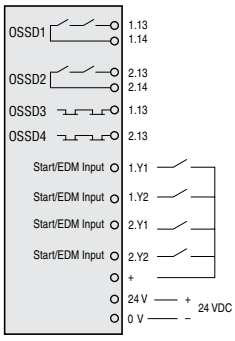
ESC: Moves backward through display

Display

Graphical Display: 4 line black and white display

VBG-PB-K30-DMD-S16





LED Indicators

Power: Green: Power on

PROFIBUS: Green (solid): Allocated to a PROFIBUS master

Config Error: Red (solid): One slave missing or extra slave on the network
Red (flashing): Peripheral fault on network

U AS-i: Green: AS-i network is sufficiently powered

AS-i Active: Green: AS-i network operating normally in either configuration or protected mode

PRG Enable: Green: Exactly one slave is missing in protected operating mode and automatic addressing is allowed

PRJ Mode: Yellow: AS-i master is in configuration mode

Aux: Green: Power on

1.Yx, 2.Yx: Yellow: Input on

Kx: Yellow: OSSD on

Pushbuttons

↑ **Mode**: Switching between normal operating mode and configuration mode and moving up through display

↓ **Set:** Changes slave addresses in configuration mode and moves down through display

OK: Moves forward through graphical display and to accept changes

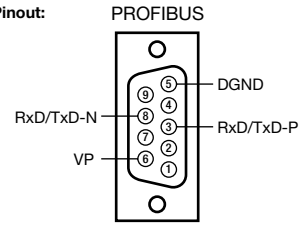
ESC: Moves backward through display

Display

Graphical Display: 4 line black and white display

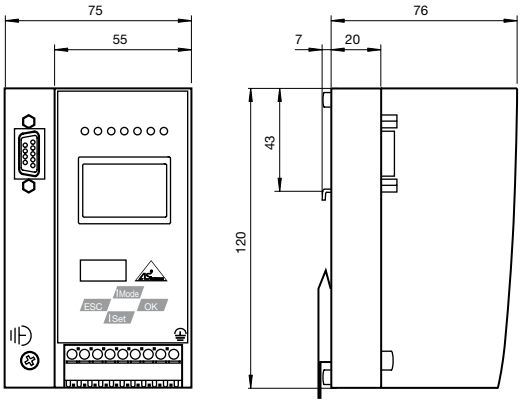
Wiring Diagrams

PROFIBUS Pinout:

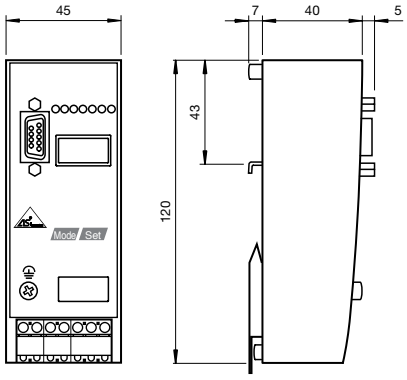


Dimensions (mm)

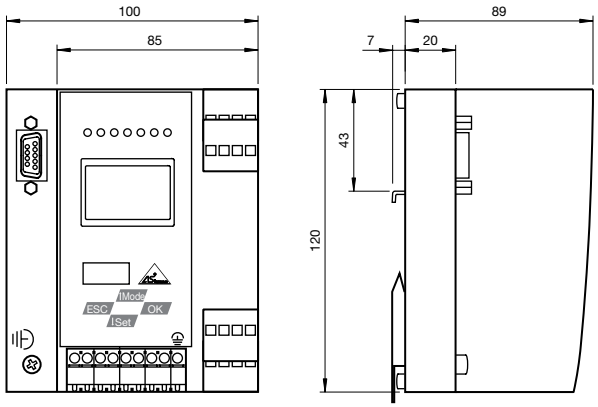
VBG-PB-K20-D
VBG-PB-K20-DMD
VBG-PB-K20-DMD-BV



VBG-PB-K25



VBG-PB-K30-D-S16
VBG-PB-K30-DMD-S16



Accessories

VAZ-PB-SIM
PROFIBUS master simulator

VAZ-SW-ACT32
AS-Interface Control Tools configuration and diagnostic software

VAZ-PB-DB9-W
PROFIBUS 9-pin, right angle D-sub connector for 2 PROFIBUS cables with terminator switch

VAZ-SW-SIMON+
AS-Interface safety monitor configuration software. RS-232 configuration cable included.

VAZ-CTR
Unlock codes for stand-alone control functionality of gateway. Must have VAZ-SW-ACT32 to program and unlock stand-alone control functionality. BV and K25 also require simulator to communicate with gateway.

Serial Number: 1234567
Unlock codes: ____, _____, ____

See pages 201-216 for complete AS-Interface accessory listing.

Ethernet
Gateways

- RS-232 port for diagnostic monitoring of network
- Advanced graphical display
- Duplicate address, noise, and ground fault detection built in
- 10/100 Mbps Ethernet connection, IP address set using display, DHCP, or BOOTP
- ActiveX, DLLs, OPC servers, .NET drivers
- EtherNet/IP support allows direct integration with modern Allen-Bradley PLCs
- Integrated PROFINET and Modbus/TCP protocols

Overview

Pepperl+Fuchs offers gateways that function as complete AS-Interface networks and also as servers to the upper level Ethernet networks. In configuration mode, all AS-Interface modules detected are displayed on the LCD. There are seven LEDs on the front panel available for diagnostics. Pushbuttons are used to program the addresses of the AS-Interface modules and to store the network configuration.

Each Ethernet gateway is supplied with a unique MAC-ID. An IP address can be assigned to the gateway using the graphical display or DHCP. All the information presented on the large, graphical display is clearly readable thanks to the backlit illumination. Extensive diagnostic functions make fault location a simple task.

BINARY INPUTS	
	D3 . . . D0
1A -	0 1 0 1
2A -	0 1 0 1 ↓

BINARY OUTPUTS	
	D3 . . . D0
1A -	0 1 0 1
2A -	0 1 0 1 ↓

Duplicate addresses are detected via the gateway. The gateway also monitors AS-Interface for ground faults. The integrated ground connection and the color-coded removable terminals make it easy to replace a defective unit or disassemble a machine.

With direct EtherNet/IP, support integration of our Ethernet gateways into an Allen-Bradley ControlLogix or Compact I/O environment is easy and convenient. Once the gateway is inserted into the configuration, all I/O data is directly mapped and immediately available for use. The native implementations guarantee fast data updates. PROFINET is another Ethernet based protocol predominately supported by many, including Siemens PLCs.

If Ethernet is used, Modbus/TCP is uniquely qualified to allow multiple users to log on simultaneously. This function enables one control program to be used along side data acquisition, diagnostic, and monitoring software.

Special C1 gateways are available with integrated power conditioner. This allows one standard 30 VDC supply to power both networks.

See pages 48-49 for Ethernet gateway wiring and dimensions.

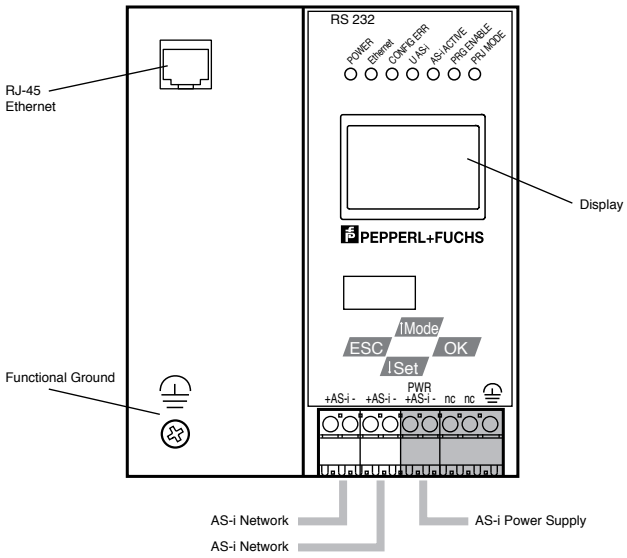


Specifications		Enhanced Diagnostics		
NETWORK		**EtherNet/IP**	**Modbus/TCP**	**PROFINET**
MODEL NUMBER(S)	*Single Network*	**VBG-EN-K20-D** ⚡	**VBG-IP-K20-D** ⚡	**VBG-PN-K20-D**
	Dual Network	**VBG-EN-K20-DMD** ⚡	**VBG-IP-K20-DMD** ⚡	
CAPABILITIES				
SPECIFICATION		3.0		
MASTER PROFILE		M4		
EXTENDED ADDRESSING POSSIBLE (62)		Yes		
ANALOG CAPABILITY		Yes		
MAX DISCRETE I/O COUNT		248 inputs/248 outputs per network		
CONFIGURATION OPTIONS				
PUSHBUTTONS		Yes		
PLC / ETHERNET		Yes		
DISPLAY		Graphical		
SOFTWARE		VAZ-SW-ACT32 (optional)		
Converter required		No		
STAND-ALONE CONTROL (Optional)		Disabled by default, purchase VAZ-CTR to unlock		
ELECTRICAL SPECIFICATION				
OPERATING CURRENT (1/2)		200 mA/70 mA		200 mA
ETHERNET				
CONNECTION		RJ45		
COMMUNICATION		EtherNet/IP	Modbus/TCP	PROFINET I/O
BAUD RATES		Autonegotiate 10/100 Mbps full/half duplex		
ADDRESSES		IP address static, DHCP, or BOOTP		IP address static, DHCP, or BOOTP and PROFINET Name
ADVANCED FUNCTIONALITY				
GROUND FAULT DETECTION		Yes		
NOISE DETECTION		Yes		
DUPLICATE ADDRESS DETECTION		Yes		
OVER VOLTAGE DETECTION		Yes		
RS-232 DIAGNOSTIC PORT		Yes		
AVAILABLE DRIVERS		–	ActiveX-Control, 32 bit DLL, OPC SERVER, .NET, LINUX	–
PROTECTION (IEC)		IP20		
TEMPERATURE RANGE	*WORKING*	+32 ºF to +131 ºF (0 ºC to +55 ºC)	+32 ºF to +131 ºF (0 ºC to +55 ºC)	
	STORAGE	-13 ºF to +167 ºF (-25 ºC to +75 ºC)	-13 ºF to +185 ºF (-25 ºC to +85 ºC)	
HOUSING MATERIAL		Stainless steel		
WEIGHT		590 g (21 oz)		
APPROVALS		CE cULus AS-i		
AS-INTERFACE CONNECTION		Yellow removable spring terminals		
AS-INTERFACE POWER SUPPLY CONNECTION		Black removable spring terminals for 30 V AS-i power supply		

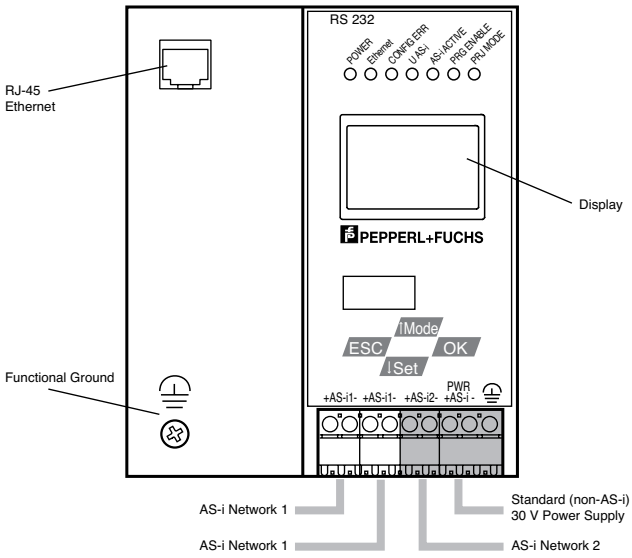
⚡ Stocked item
Consult factory for all other models

Wiring Diagrams

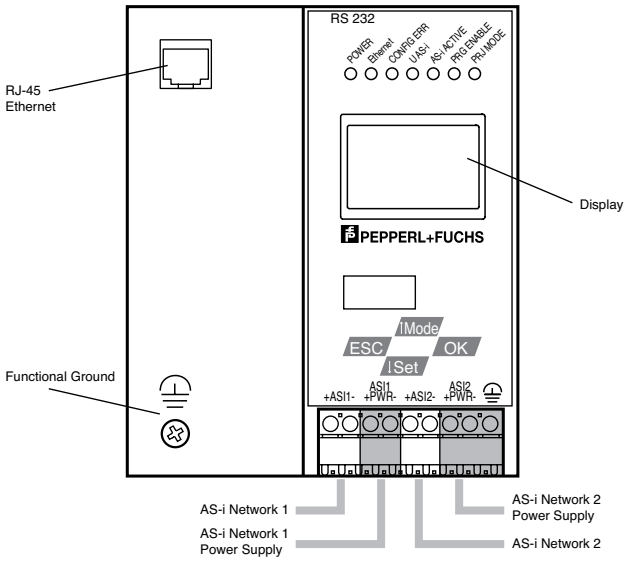
VBG-IP-K20-D
VBG-EN-K20-D
VBG-PN-K20-D



VBG-EN-K20-DMD-C1



VBG-IP-K20-DMD
VBG-EN-K20-DMD



LED Indicators

Power: Green: Power on

Ethernet: Green (solid): IP address assigned
Green (3 flashes): No Ethernet cable connected
Green (4 flashes): No MAC address assigned, defective
Green (5 flashes): Waiting for BOOTP/DHCP

Config Error: Red (solid): One slave missing or extra slave on the network
Red (flashing): Peripheral fault on network

U AS-i: Green: AS-i network is sufficiently powered

AS-i Active: Green: AS-i network operating normally in either configuration or protected mode

PRG Enable: Green: Exactly one slave is missing in protected operating mode and automatic addressing is allowed

PRJ Mode: Yellow: AS-i master is in configuration mode

Pushbuttons

↑ **Mode**: Switching between normal operating mode and configuration mode and moving up through display

↓ **Set:** Changes slave addresses in configuration mode and moves down through display

OK: Moves forward through graphical display and to accept changes

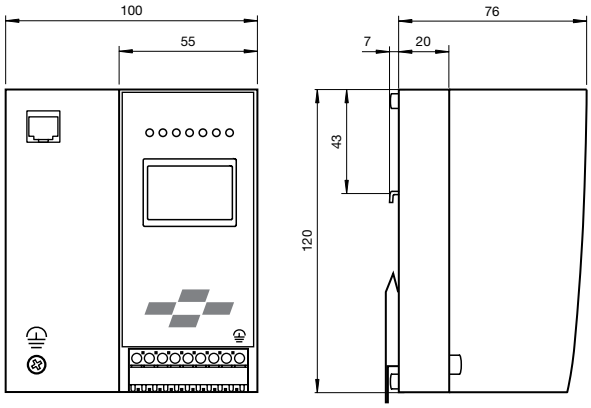
ESC: Moves backward through display

Display

Graphical Display: 4 line black and white display

Dimensions (mm)

VBG-...-K20-D
VBG-...-K20-DMD...



Accessories

VAZ-SW-ACT32
AS-Interface Control Tools
configuration and diagnostic software

VAZ-CTR
Unlock codes for stand-alone control functionality of gateway. Must have VAZ-SW-ACT32 to program and unlock stand-alone control functionality.

Serial Number: 1234567
Unlock codes: ____, _____, ____

See pages 201-216 for complete AS-Interface accessory listing.

Serial Gateways

- P+F or Modbus protocol support
- Stand-alone control
- Removable terminals
- ActiveX, DLLs, OPC, .NET drivers
- RS-232 up to 57.6 kbps
- RS-485 up to 115.2 kbps on Modbus

Serial Gateway Overview

The RS-232 gateway is used for PC or stand-alone control applications. The serial port can communicate up to 57.6 kbps. Up to 62 discrete I/O or 31 analog modules can be placed on one network. The keyed removable terminals add flexibility when connecting AS-Interface or RS-232.

Our Modbus gateways are designed to support the open Modbus protocol. Since many PC based control platforms and SCADA packages support the Modbus protocol, our serial gateway is the ideal solution for adding hundreds of I/O points. Modbus driver communication can also be used with custom PC based applications written in Visual Basic or other higher level languages.

Our gateways using the P+F protocol, such as VBM-CTR…, also have built-in and enabled stand-alone control offering PLC functionality. This control platform allows users to write powerful programs to control their process without using a PLC or PC. In addition, these gateways are perfect for distributed control systems where some outputs are controlled by the gateways, while others are controlled by the PLC. Stand-alone control programs have the following capabilities:

Stand-Alone Control Capabilities

Program memory	16 kB
Data memory ex. counters, timers	8 kB
Cycle time	2 ms /1000 instructions
Timers	1024, 10ms resolution
Counters	1024
Programming language	AWL (structured text), or Assembly

This simple programming language allows for easy reading of inputs, setting of outputs, and manipulation of analog data. Binary operations such as AND, AND NOT, OR, OR NOT, =, NOT, SET, and RESET are available. Word based operations include Load Timer, Load Counter, Load Parameter, Load Byte, Load Word, Copy Byte, Copy Word, Addition, and Subtraction. In addition, logical operators such as LESS THAN, LESS THAN OR EQUAL, GREATER THAN, GREATER THAN OR EQUAL, EQUAL, and NOT EQUAL can be used.

Program control is done with segment end, block end, and jump type instructions. These gateways also have built-in function blocks to retrieve and send data up to the AS-Interface master. These blocks include read/write parameters, reading slave lists, reading safety data, and accessing the mailbox. Over 15 built-in function blocks are available to the user.

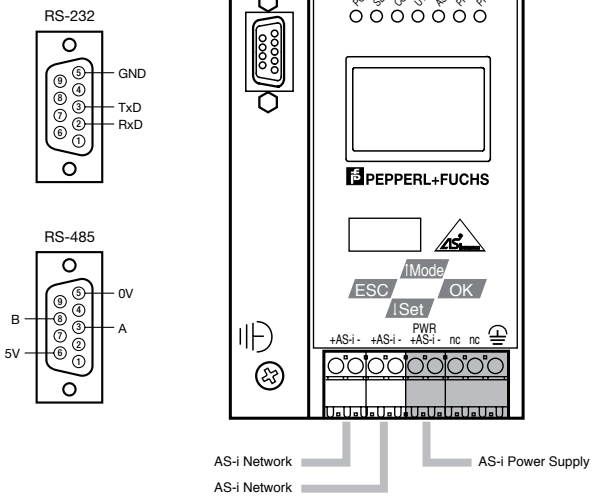
See page 52 for Serial gateway wiring and dimensions.

Specifications		Enhanced Diagnostics	Basic Diagnostics
NETWORK		**Modbus Serial RS-485**	**P+F Serial RS-232**
MODEL NUMBER(S)	*Single Network*	**VBG-MOD-K20-D**	**VBM-CTR-K20-R2** ⚡
	Dual Network		
CAPABILITIES			
SPECIFICATION		3.0	3.0
MASTER PROFILE		M4	M4
NUMBER OF NETWORKS		1	1
EXTENDED ADDRESSING POSSIBLE (62)		Yes	Yes
ANALOG CAPABILITY		Yes	Yes
MAX DISCRETE I/O COUNT		248 inputs/248 outputs per network	248 inputs/248 outputs per network
CONFIGURATION OPTIONS			
PUSHBUTTONS		Yes	Yes
PC		Yes	Yes
DISPLAY		Graphical	Graphical
SOFTWARE		VAZ-SW-ACT32 (optional)	VAZ-SW-ACT32 (optional)
Converter required		No	No
STAND-ALONE CONTROL (Optional)		Disabled by default, purchase VAZ-CTR to unlock	Enabled by default
ELECTRICAL SPECIFICATION			
OPERATING CURRENT AS-INTERFACE		200 mA	200 mA
SERIAL-SPECIFIC INFORMATION			
CONNECTION		DB9	DB9
SERIAL INTERFACE		RS-485	RS-232
COMMUNICATION		Modbus ASCII/RTU	Standard P+F protocol
BAUD RATES		1200 to 115200 bps	1200 to 57600 bps, autobaud
PARITY		Odd, even or none	None
ADDRESSES		1-31	None
ADVANCED FUNCTIONALITY			
GROUND FAULT DETECTION		Yes	Yes
NOISE DETECTION		Yes	Yes
DUPLICATE ADDRESS DETECTION		Yes	No
OVER VOLTAGE DETECTION		Yes	Yes
RS-232 DIAGNOSTIC PORT		Yes	No
AVAILABLE DRIVERS		ActiveX-Control, 32 bit DLL, OPC SERVER, .NET, LINUX	ActiveX-Control, 32 bit DLL, OPC SERVER, .NET, LINUX
PROTECTION (IEC)		IP20	IP20
TEMPERATURE RANGE	*WORKING*	+32 ºF to +131 ºF (0 ºC to +55 ºC)	+32 ºF to +131 ºF (0 ºC to +55 ºC)
	STORAGE	+5 ºF to +167 ºF (-15 ºC to +75 ºC)	-13 ºF to +185 ºF (-25 ºC to +85 ºC)
HOUSING MATERIAL		Stainless steel	Stainless steel
WEIGHT		590 g (21 oz)	590 g (21 oz)
APPROVALS		CE cULus	CE cULus
AS-INTERFACE CONNECTION		Yellow removable spring terminals	
AS-INTERFACE POWER SUPPLY CONNECTION		Black removable spring terminals for 30 V AS-i power supply	

⚡ Stocked item
Consult factory for all other models

Wiring Diagrams

VBG-MOD-K20-D
VBM-CTR-K20-R2



LED Indicators

Power: Green: Power on

Ser. Active: Green (flash): On successful send/receive of serial data

Config Error: Red (solid): One slave missing or extra slave on the network
Red (flashing): Peripheral fault on network

U AS-i: Green: AS-i network is sufficiently powered

AS-i Active: Green: AS-i network operating normally in either configuration or protected mode

PRG Enable: Green: Exactly one slave is missing in protected operating mode and automatic addressing is allowed

PRJ Mode: Yellow: AS-i master is in configuration mode

Pushbuttons

↑ **Mode**: Switching between normal operating mode and configuration mode and moving up through display

↓ **Set:** Changes slave addresses in configuration mode and moves down through display

OK: Moves forward through graphical display and to accept changes

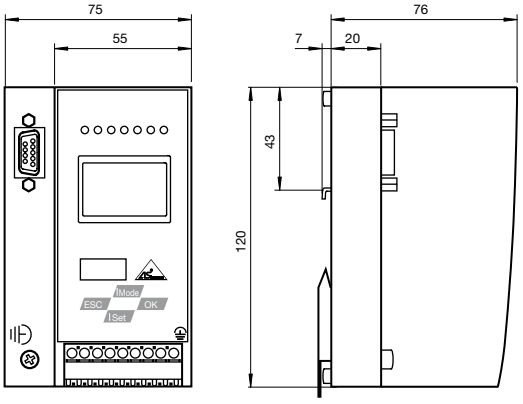
ESC: Moves backward through display

Display

Graphical Display: 4 line black and white display

Dimensions (mm)

VBG-MOD-K20-D
VBM-CTR-K20-R2



Accessories

VAZ-SW-ACT32
AS-Interface Control Tools configuration and diagnostic software

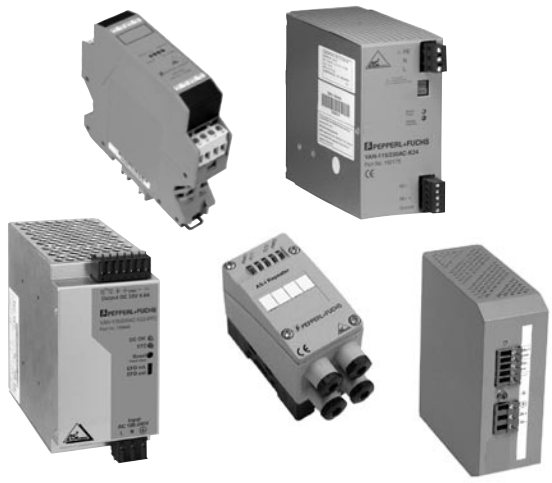
VAZ-R4-R2
RS-232 to RS-485 converter

VAZ-CTR
Unlock codes for stand-alone control functionality of gateway. Must have VAZ-SW-ACT32 to program and unlock stand-alone control functionality.

Serial Number: 1234567
Unlock codes: ____, _____, ____

See pages 201-216 for complete AS-Interface accessory listing.

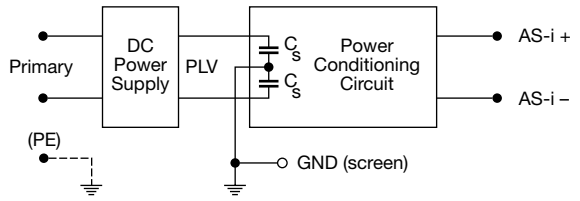
Notes



Power Supplies and Repeaters

Power Supplies and Repeaters

AS-Interface power supplies are an integral part of the AS-Interface network. On AS-Interface, data and power are transmitted on the same cable. The data signal is transferred using amplitude pulse modulation and rides on top of 30 VDC that powers the modules. Because both DC and high-frequency communication components are present on AS-Interface, power conditioning circuitry is required.



Features of AS-Interface Power Supplies

Startup and overload protection

An overload can last for an indefinite amount of time without damaging the power supply. Removing the overload will allow the power supply to come back automatically to the the full-rated current.

Power specifications

The output voltage of the power supply is between 29.5 VDC and 31.6 VDC over the entire load range.

Power interruptions

Power interruption of 10 ms or less on the primary side will not affect AS-Interface.

Power-on delay

The power-on delay is less than 2 s.

Rated Operating Current

The rated operating current can be exceeded by a maximum of 0.4 A to meet the expectations of the modules requiring extra current during power up.

AC input and AS-Interface output connections

Primary	**L**	Single phase
	N	Neutral
	PE	Protected earth ground
	AS-i+	AS-Interface Power +
	AS-i–	AS-Interface Power –
	GND	Machine ground and shield connection

Ground Fault Detection

AS-Interface (+) and AS-Interface (–) must never be grounded. In addition, they can never be connected to any load other than the appropriate terminals on AS-Interface I/O modules, AS-Interface intelligent sensors, or other loads. Standard PNP or NPN sensors are connected to AS-Interface through I/O modules. Grounding will reduce the noise immunity of the network. For this reason, ground fault detection supplies have been developed and will ensure that the AS-Interface network runs properly. This feature is also built into a number of AS-Interface gateways. Pepperl+Fuchs recommends using a power supply with ground fault detection when the scanner or gateway does not have integrated ground fault detection. We also recommend using these supplies in network segments after a repeater.

Choosing the Correct Power Supply

AS-Interface power supplies feature short-circuit and overload protection. In addition to providing power to the AS-Interface scanner/gateway, the AS-Interface power supply provides power to the electronics of

the I/O modules and most inputs on the network. Modules can consume between 15 and 250 mA and a typical AS-Interface scanner/gateway uses 200 mA. A power supply must be chosen that has a current rating that is equal to or greater than total current required by the network. Power supply units are certified by the AS-Interface Association and are available with current ratings from 2.4 A to 8 A.

Sizing the AS-Interface power supply:

Current AS-Interface Scanner/Gateway
+ Max current of I/O modules
= Total Current

Example:

1	AS-Interface Scanner	VBM-MLX/CPLX	100 mA
10	Flat 4 input modules	VBA-4E-G2-ZA	240 mA
10	Flat 4 output modules	VAA-4A-G12-EA2	40 mA

100 mA
+ 10 (240 mA)
+ 10 (40 mA)
= 2.9 A

With a total of 2.9 A, a number of power supplies or power conditioners can be used:

VAN-115/230AC-K17	*4 A*
VAN-115/230AC-K22-EFD	*4.8 A*
VAN-115/230AC-K24	*8 A*
VAN-G4-PE-4A	*4 A*
VAN-KE2-2PE	*2 x 4 A*

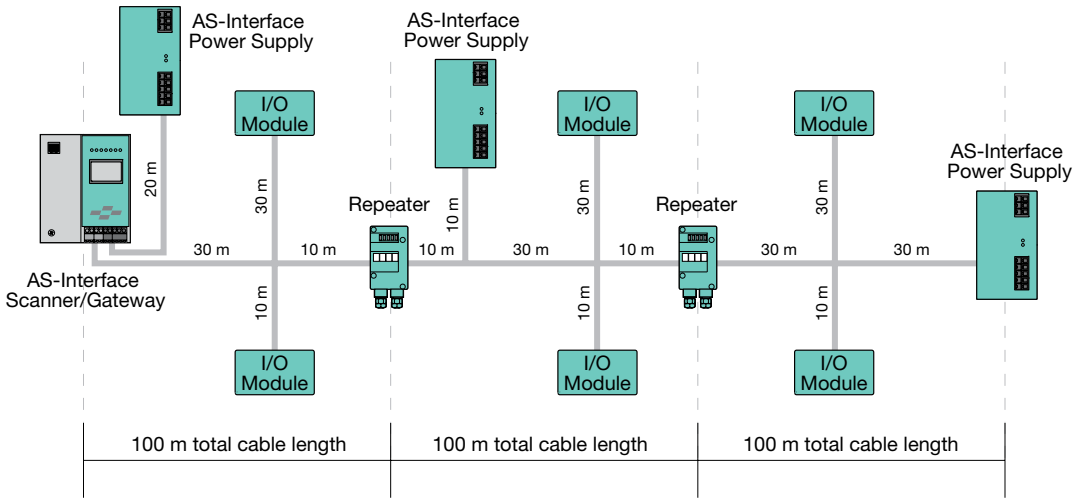
The calculations are very conservative because not all of the modules will be used to the maximum current consumption listed. See the AS-i power supply calculator and network checking utility on our web site for a more accurate calculation. The software is called "AS-i PS Calculator and Network Checking Utility."

With AS-Interface, one single cable transmits both power and data. Pepperl+Fuchs' power supplies contain internal data separation coils so that the capacitive filtering of the supply does not interfere with the data stream. One of the strongest features of AS-Interface is its immunity to noise without a shielded cable. The communication signal is symmetrically transmitted on AS-Interface (+) and AS-Interface (–) so that all noise transmitted and radiated that affects (+) and (–) will be filtered out.

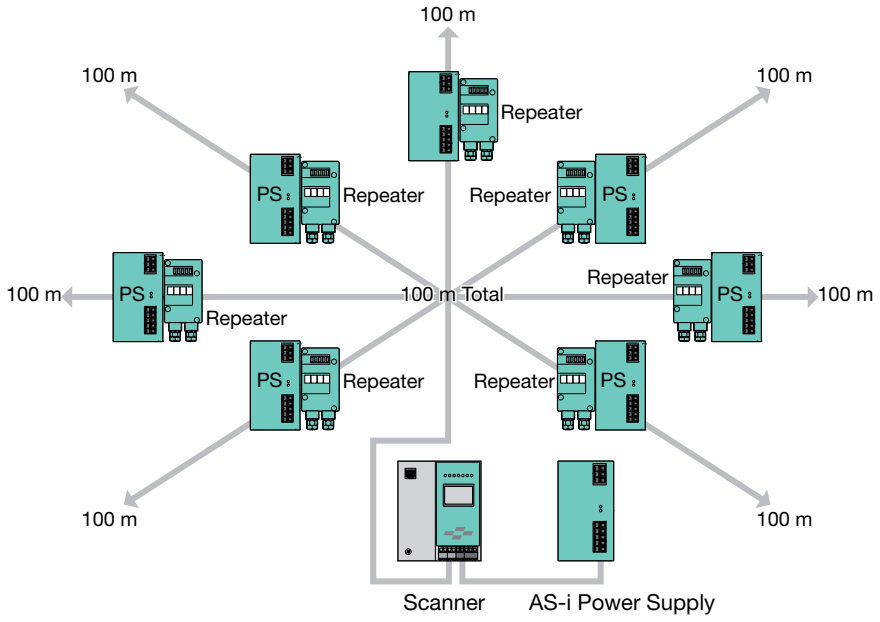
Network Length and Repeaters

AS-Interface segments can have a cumulative cable length of 100 meters (328 feet). If larger networks are needed, the use of a repeater allows extension by another 100 meters. Because repeaters isolate the connected network segments, an additional AS-Interface power supply must be located in each 100-meter segment. I/O modules can be placed anywhere within the segments. Repeaters occupy no AS-Interface address (they are passive on the AS-Interface network).

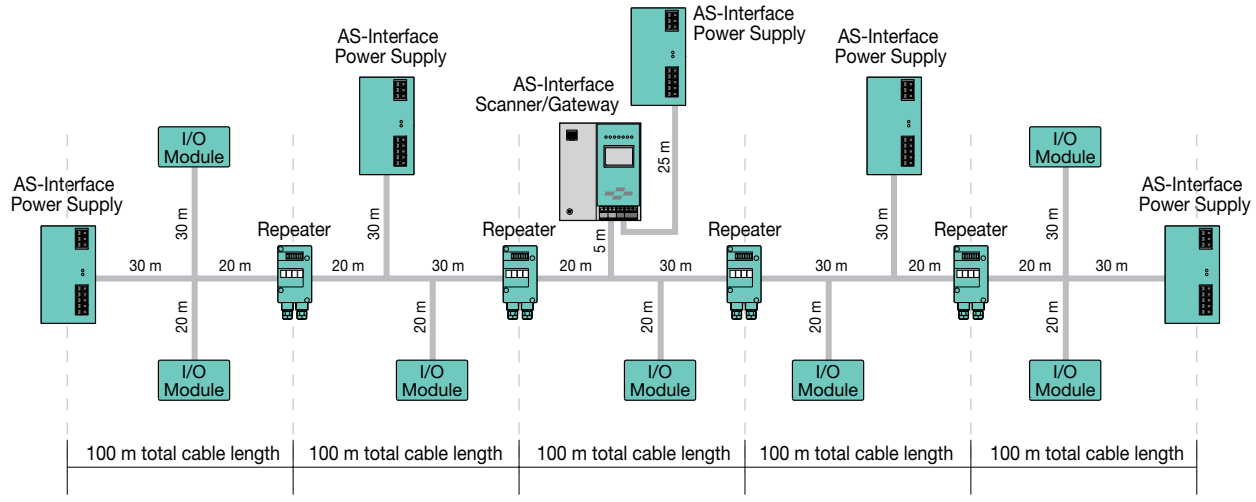
NOTE: Regardless of cable length and number of repeaters, a maximum of 62 I/O modules can be placed on one AS-Interface network.



300 m network with two repeaters



800 m network in a star topology



500 m network with gateway/scanner in the middle

Standard AS-Interface Power Supplies

- LED power/overload indicators
- Automatic overload recovery
- Narrow 70 mm housing
- Class 2 rated power supply

Standard AS-Interface Power Supply Overview

All P+F power supplies have power factor correction and high efficiency ratings. The wide input voltage range allows the power supplies to be used in Europe, the United States, and all over the world. All are overload protected and can recover easily when a short is removed.

The VAN-115/230AC–K24 unit has a high output current of 8 A.

The VAN-115/230AC–K17 has a high current rating of 4 A in a very narrow housing. The removable terminals make disconnecting the network quick and easy.

A low current model, K26, in a small compact plastic housing is used for systems where all nodes will not exceed the 1.8 A current limit. This power supply will make AS-i economical for even the smallest networks.

A Class 2 power supply should be used whenever open wiring must have a maximum of 100 VA of power. Also some products are not approved without connection to a Class 2 power source.

See pages 59-60 for standard AS-Interface power supply wiring and dimensions.




Specifications

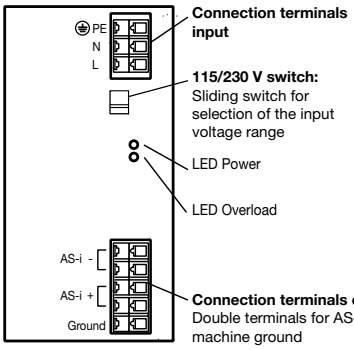
TYPE	8 A	4 A	2.5 A (Class 2)	1.8 A
MODEL NUMBER(S)	**VAN-115/230AC-K24** ⚡	**VAN-115/230AC-K17** ⚡	**VAN-115/230AC-K17-CL2** ⚡	**VAN-115/230AC-K26** ⚡
OUTPUT SUPPLY				
CURRENT NOMINAL	8 A	4 A	2.5 A	1.8 A
CURRENT LIMIT	≈ 8.5 A	≈ 4.5 A	≈ 2.6 A	≈ 2.3 A
VOLTAGE	29.5-31.6 VDC AS-Interface			31.2 V ± 3%
SHORT CIRCUIT/ OVERLOAD PROTECTED	Yes			
INPUT SUPPLY				
RATED OPERATING CURRENT @ 115 VAC	4 A	2.2 A	1.7 A	1.1 A
FREQUENCY	47-63 Hz			
OPERATING VOLTAGE	93-132 VAC, 190-265 VAC	90-265 VAC		110-250 VAC
EFFICIENCY	≈ 87%	≈ 89%		≈ 89%
POWER FACTOR CORRECTION	Yes			
INPUT VOLTAGE SELECTION	115/230 AC selector switch	Automatic		Automatic
FUSE INTERNAL	T6.3 / 250 V	T3.15 / 250 V		T2.5/250 V
POWER SUPPLY OVERLOAD RESET	Automatic			
GROUND FAULT DETECTION	No			
PROTECTION (IEC)	IP20			
TEMPERATURE RANGE *WORKING*	+14 °F to +131 °F (-10 °C to +55 °C)			+14 °F to +104 °F (-10 °C to +40 °C)
STORAGE	-13 °F to +185 °F (-25 °C to +85 °C)			-13 °F to +185 °F (-25 °C to +85 °C)
HOUSING MATERIAL	Steel, aluminum			Plastic
WEIGHT	1320 g (46 oz)	890 g (31 oz)		200 g (7 oz)
APPROVALS	CE cULus AS-i		CE cULus Class 2 AS-i	CE cULus AS-i
MOUNTING*	DIN rail			
AS-INTERFACE CONNECTION	Removable terminals			Terminals

*** Important:** Power supplies must be mounted with ventilation holes located at top. Allow 100 mm top/bottom clearance and 30 mm side clearance.

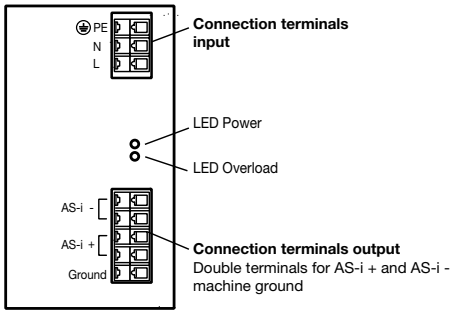
⚡ Stocked item
Consult factory for all other models

Wiring Diagrams

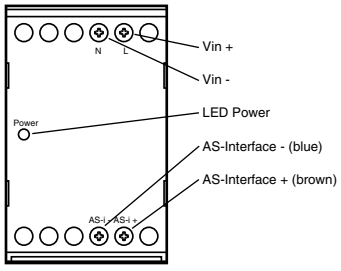
VAN-115/230AC-K24



VAN-115/230AC-K17
VAN-115/230AC-K17-CL2

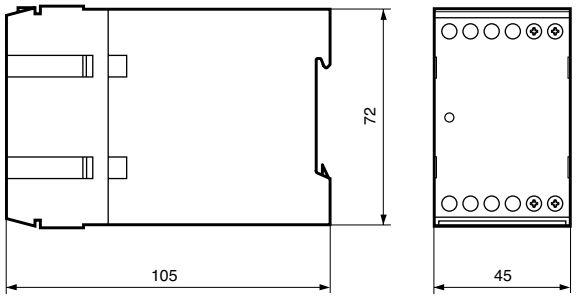


VAN-115/230AC-K26

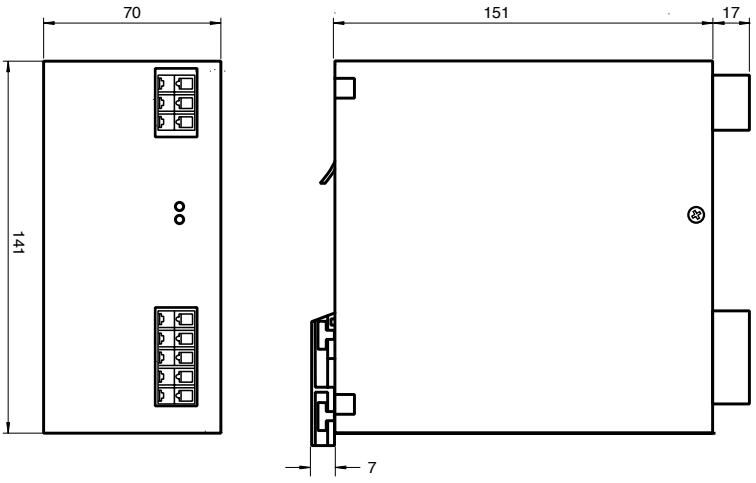


Dimensions (mm)

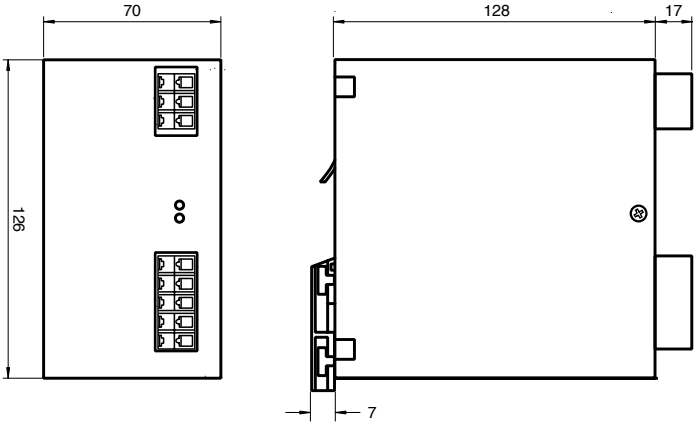
VAN-115/230AC-K26



VAN-115/230AC-K24



VAN-115/230AC-K17
VAN-115/230AC-K17-CL2



See pages 201-216 for complete AS-Interface accessory listing.

Ground Fault Detection
Power Supplies

- 2.4 A or 4.8 A nominal load current
- Reset/simulate button
- Ground fault detection
- Network disconnect/recovery ground fault switch

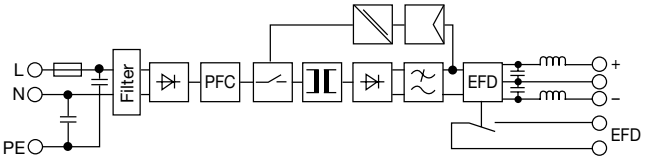
Ground Fault Detection Power Supply Overview

As mentioned in the introduction, the AS-Interface cable must not be grounded. Grounding the AS-Interface cable would lead to faults that may cause the system to fail, weakening the noise immunity of the network. Pepperl+Fuchs offers AS-Interface power supplies that have the ability to signal ground faults on both the AS-Interface (+) or the AS-Interface (–) conductors. The fault is indicated via an LED and an electronic output.

These power supplies should be used on systems that do not use a Pepperl+Fuchs gateway with integrated ground fault detection, or when the power supply is connected to an AS-Interface segment on the secondary side of a repeater.

In the factory-default configuration, the power supply resets automatically when the ground fault is removed. It is also possible to configure the AS-Interface power supply so that, in the event of a ground fault, the AS-Interface voltage will be automatically disconnected (until reset using the button on the front panel of the supply). This eliminates the risk of endangering personnel and/or equipment.

The VAN-115/230AC-K21-EFD and the VAN-115/230AC-K22-EFD power supplies are designed for all AS-Interface applications. They are



electronically protected against short circuits, and supply a fully loaded AS-Interface system with an output current of up to 4.8 A.

These power supplies also have the unique feature of side mounting. The DIN rail base can be removed and remounted on the side of the power supply using the mounting holes and self tapping screws provided. Side mounting provides a low profile power supply that sits only 2 1/4” from the din rail

See page 63 for ground fault detection power supply wiring and dimensions.

Specifications

TYPE	2.4 A (with Ground Fault Detection)	4.8 A (with Ground Fault Detection)
MODEL NUMBER(S)	**VAN-115/230AC-K21-EFD** ⚡	**VAN-115/230AC-K22-EFD** ⚡
OUTPUT SUPPLY		
CURRENT NOMINAL	2.4 A	4.8 A
CURRENT LIMIT	≈ 3 A	≈ 6 A
VOLTAGE	29.5-31.6 VDC AS-Interface	
SHORT CIRCUIT/ OVERLOAD PROTECTED	Yes	
INPUT SUPPLY		
RATED OPERATING CURRENT @ 120 VAC	1.2 A	1.8 A
FREQUENCY	45-65 Hz	
OPERATING VOLTAGE	85-264 VAC	
EFFICIENCY	> 86%	
POWER FACTOR CORRECTION	Yes	
INPUT VOLTAGE SELECTION	Yes	
FUSE INTERNAL	5 AT	
POWER SUPPLY OVERLOAD RESET	Automatic	
GROUND FAULT DETECTION	Yes	
EFD OUTPUT RATING	Max. 30 VAC/VDC, 1 A	
PROTECTION (IEC)	IP20	
TEMPERATURE RANGE *WORKING*	-13 ºF to +158 ºF (-25 ºC to +70 ºC)	
STORAGE	-40 ºF to +185 ºF (-40 ºC to +85 ºC)	
HOUSING MATERIAL	Aluminum	
WEIGHT	750 g (27 oz)	900 g (32 oz)
APPROVALS	CE cULus	
MOUNTING*	DIN rail	
AS-INTERFACE CONNECTION	Removable spring terminals	

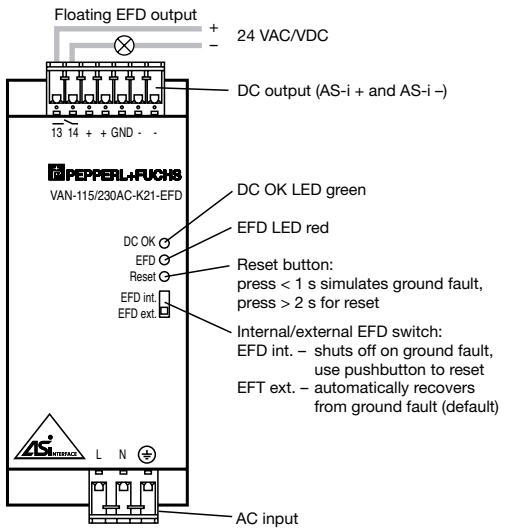
*** Important:** Power supplies must be mounted with ventilation holes located at top. 50 mm spacing should be observed at top and bottom of power supply.

⚡ Stocked item
Consult factory for all other models

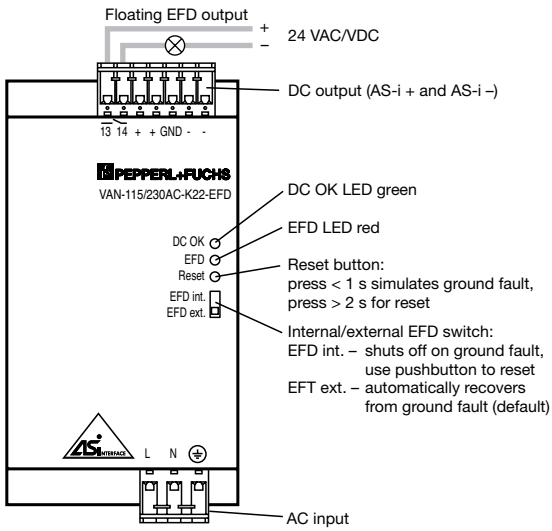
See pages 201-216 for complete AS-Interface accessory listing.

Wiring Diagrams

VAN-115/230AC-K21-EFD

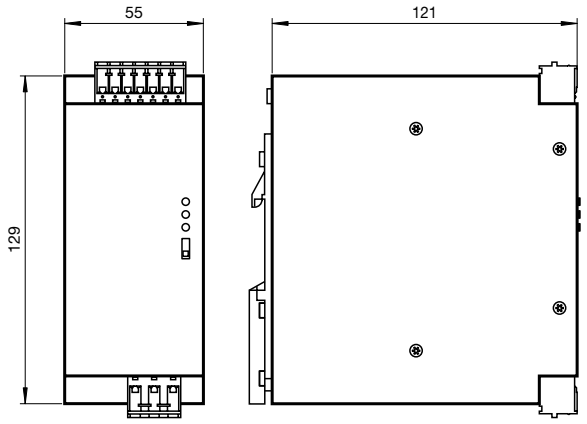


VAN-115/230AC-K22-EFD

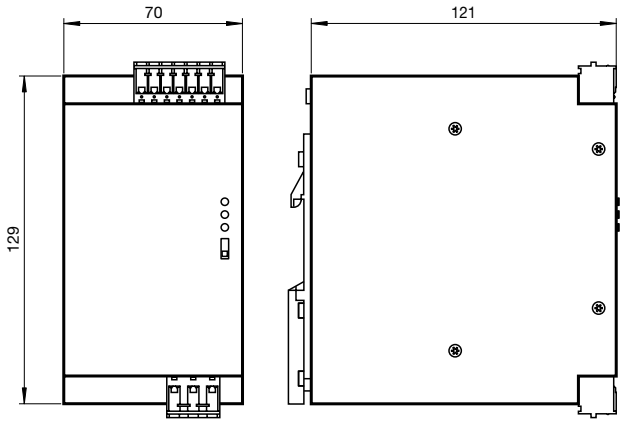


Dimensions (mm)

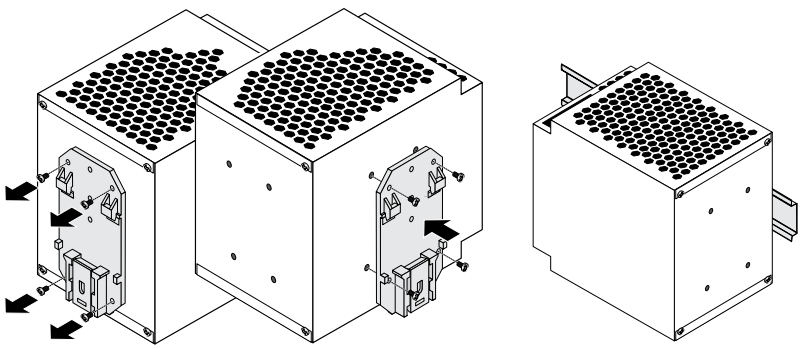
VAN-115/230AC-K21-EFD



VAN-115/230AC-K22-EFD

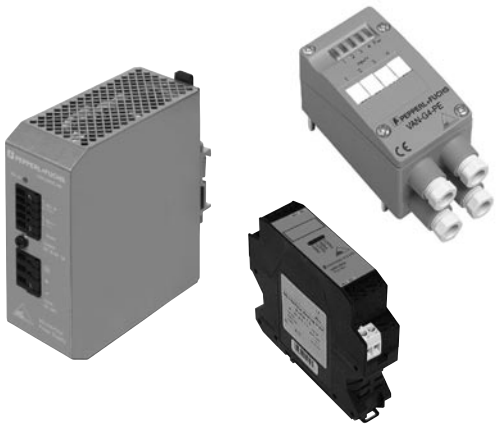


Side Mount Option



Power Conditioners

- Output current up to 4 A per segment
- DC input voltage
- Diagnostic LED indication
- Protection degree IP20 or IP67



DC Input Overview

The AS-Interface power supply unit VAN-24DC-K6 can supply 31.5 V at 3 A to a fully loaded AS-Interface system. The input voltage from 18-32 VDC is stepped up to power AS-Interface. This model is perfect for mobile equipment or other applications where no AC power is present.

The VAN-G4-PE is a power conditioner for either flat or round cable. Often, multiple power extenders are used with a single 30 VDC power supply. Also available is an enclosure mount power extender, VAN-KE2-2PE, for two AS-i segments. This is often used on a dual network gateway or before and after a repeater.

Because any 30 VDC supply can be used with the power conditioner, it is possible to utilize redundant power supplies. Often, redundant power supplies are required for process applications. The power conditioner, however, can never be redundant. A maximum of one power conditioner can be used in each AS-Interface segment.

Since power conditioners are field mountable IP67 devices, it is now possible to feed an AS-Interface segment from a standard 30 VDC power supply located in an enclosure far away from the AS-Interface network without taking up segment length. The length of cable that feeds the power conditioner does not count towards the 100 m AS-Interface segment limit.

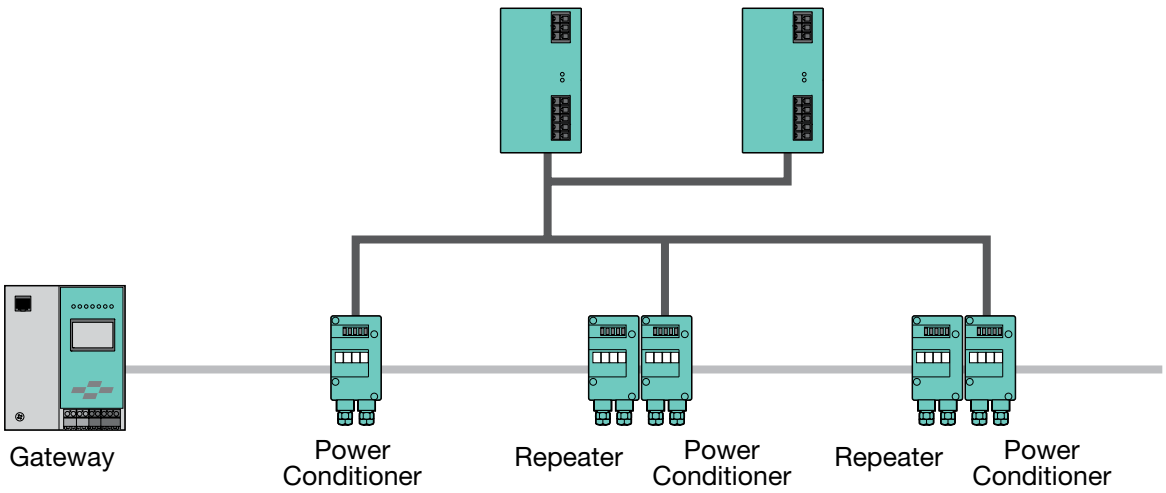
Regardless of the cable length and the use of repeaters, a maximum of 62 modules per gateway can be placed on an AS-Interface network.

Power extender voltage will depend on network length. The following typical limits should be observed:

≈ 30 V 100 m AS-i cable
≈ 28 V 80 m AS-i cable
≈ 26 V 60 m AS-i cable

See pages 65-66 for DC input power supply wiring and dimensions.

30 V Standard or Redundant Power Supplies





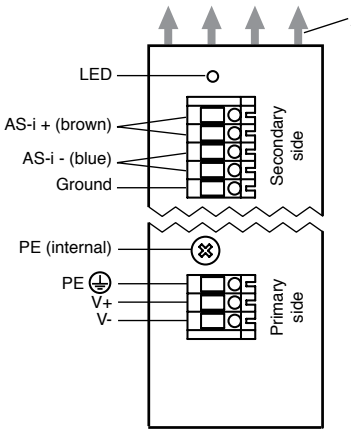

Specifications

TYPE	3 A Power Supply	2.8 A Power Conditioner	4 A Power Conditioner	Dual 4 A Power Conditioner
MODEL NUMBER(S)	**VAN-24DC-K6** ⚡	**VAN-G4-PE** ⚡	**VAN-G4-PE-4A**	**VAN-KE2-2PE** ⚡
OUTPUT SUPPLY				
CURRENT NOMINAL	3 A	2.8 A	4 A	4 A x 2 networks
CURRENT LIMIT	≈ 3.6 A	≈ 3 A	≈ 6 A	≈ 6 A x 2 networks
VOLTAGE	29.5-31.6 VDC AS-Interface	29.5-31.6 VDC AS-Interface	29.5-31.6 VDC AS-Interface	29.5-31.6 VDC AS-Interface
SHORT CIRCUIT/ OVERLOAD PROTECTED	Yes	–	–	–
INPUT SUPPLY				
RATED OPERATING CURRENT	6 A @ 24 VDC	2.8 A @ 30 VDC	4 A @ 30 VDC	8 A @ 30 VDC
FREQUENCY	–	–	–	–
OPERATING VOLTAGE	24 V ± 1 %	30 VDC	30 VDC	30 VDC
VOLTAGE RANGE	18-32 VDC	–	–	–
EFFICIENCY	≈ 88%	–	–	–
POWER SUPPLY OVERLOAD RESET	Automatic	–	–	–
GROUND FAULT DETECTION	No	No	No	No
PROTECTION (IEC)	IP20	IP65	IP65	IP20
TEMPERATURE RANGE *WORKING*	+14 °F to +158 °F (-10 °C to +70 °C)	+32 °F to +158 °F (0 °C to +70 °C)	+32 °F to +158 °F (0 °C to +70 °C)	+32 °F to +131 °F (0 °C to +55 °C)
STORAGE	-4 °F to +176 °F (-20 °C to +80 °C)	-13 °F to +185 °F (-25 °C to +85 °C)	-13 °F to +185 °F (-25 °C to +85 °C)	-13 °F to +185 °F (-25 °C to +85 °C)
HOUSING MATERIAL	Steel, aluminum	PA6-GF30	PA6-GF30	PA 66-FR
WEIGHT	550 g (20 oz)	120 g (6 oz)	120 g (6 oz)	120 g (6 oz)
APPROVALS	CE cULus AS-i	CE cULus AS-i	CE AS-i	CE AS-i
MOUNTING	DIN rail	DIN rail, mounting holes	DIN rail, mounting holes	DIN rail
AS-INTERFACE CONNECTION	terminals	Flat or round cable	Flat or round cable	Removable terminals

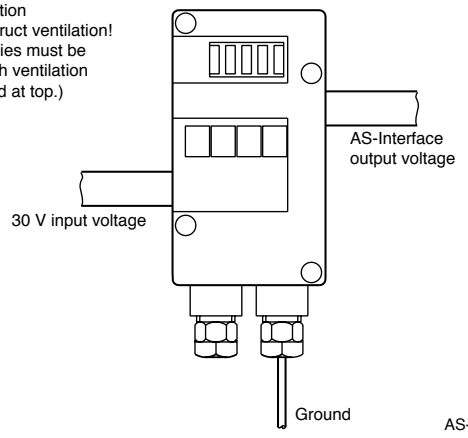
⚡ Stocked item
Consult factory for all other models

Wiring Diagrams

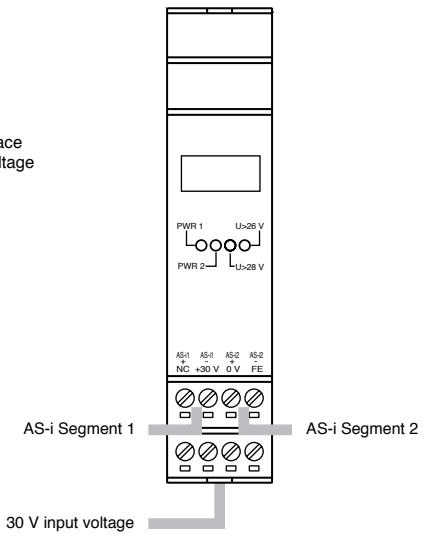
VAN-24DC-K6



VAN-G4-PE
VAN-G4-PE-4A

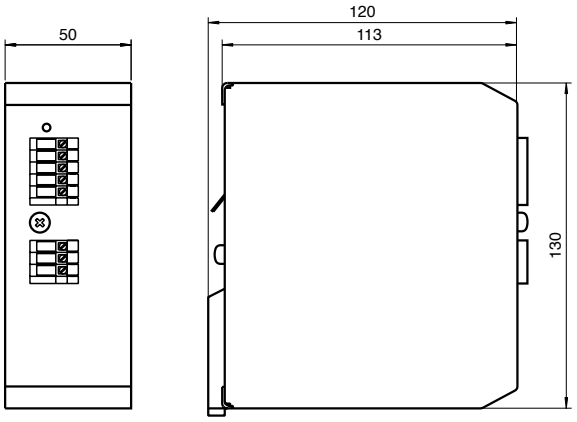


VAN-KE2-2PE

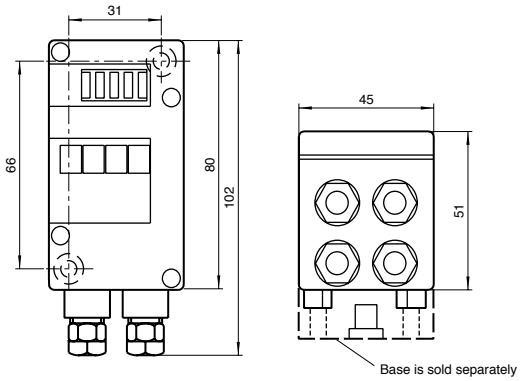


Dimensions (mm)

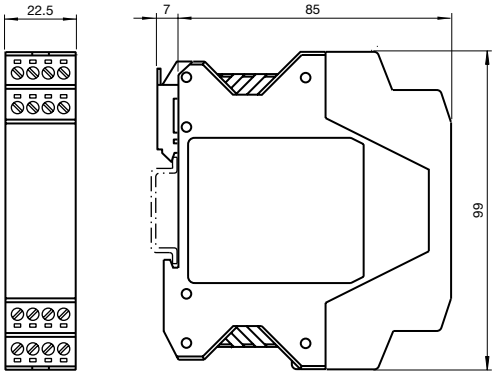
VAN-24DC-K6



VAN-G4-PE
VAN-G4-PE-4A



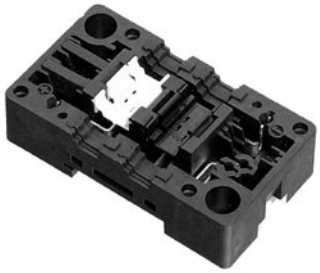
VAN-KE2-2PE



Accessories

U-G1PP
Round cable base with external power terminals

U-G1FF
Flat cable mounting base for black and yellow cables



PG11-1/2NPT
PG11 male to 1/2" NPT female conduit adapter

See pages 201-216 for complete AS-Interface accessory listing.

Repeaters

- Lengthens line by 100 m (max. 2 repeaters in series)
- Galvanic isolation
- IP67 or IP20 housings
- No address required

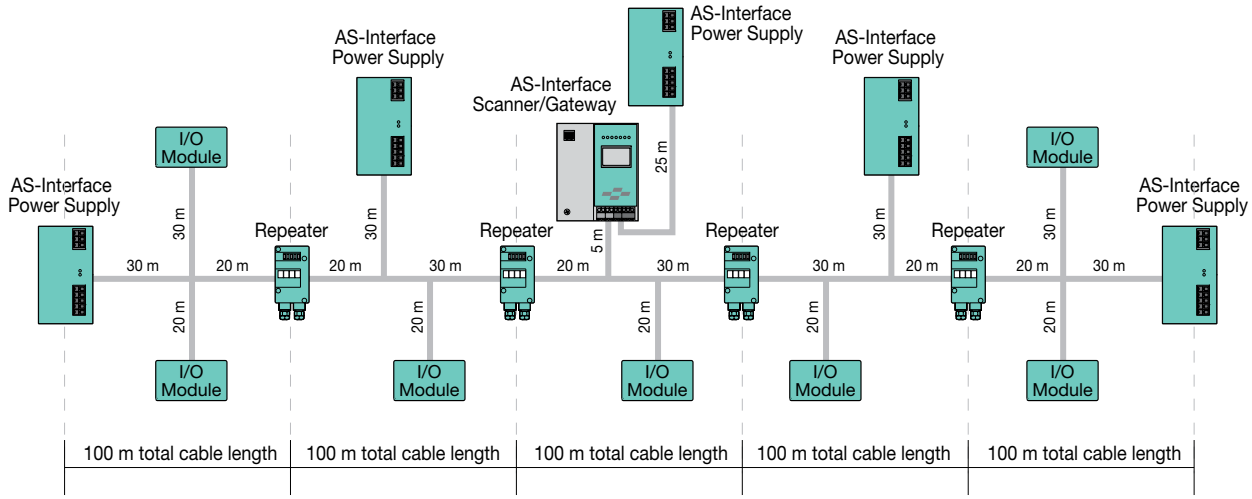
Repeaters Overview

AS-Interface cable length can be increased an additional 100 meters with the use of a repeater. Since repeaters isolate the connected network segments, an AS-Interface power supply must be located in both segments. A maximum of two repeaters can be used back-to-back in a single cable run resulting in an overall length of 300 meters. As long as a signal traveling from the scanner/gateway to a module does not cross more than two repeaters, longer networks can be built. A linear network of 500 m is easily possible by placing the scanner/gateway in the middle section. When using repeaters, I/O modules can be placed in any cable segment. Regardless of the cable length and number of repeaters, a maximum of 62 modules per gateway can be placed on an AS-Interface network.

The enclosure mount repeater VAR-KE3-TERM, only 22.5 mm in width, takes up little space in the control cabinet. The new KE3 Series modules feature color-coded terminals to help simplify the installation. This method of mounting permits easy removal during initial operation or servicing.

The VAR-KE3-TERM also includes a termination switch. Once enabled, this termination can extend the first segment to 200 m. In this case, the incoming segment is 200 m long and the outgoing segment is 100 m, for a total length of 300 m. If termination is used the power supply must be located as far from the termination as possible at the other end of the network.

See pages 68-69 for repeater wiring and dimensions.



Specifications

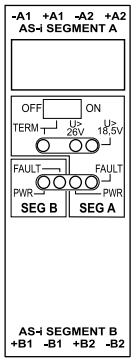
TYPE		Advanced Repeaters	
MODEL NUMBER(S)		VAR-KE3-TERM ⚡	VAR-G4F ⚡
BASE		–	Flat cable base included, U-G1PP base optional
MAX. SEGMENT LENGTH (1/2)		100 m (200 m with termination)/100 m	100 m/100 m
OPERATING CURRENT			
	NETWORK 1	60 mA	
	NETWORK 2	60 mA	
DELAY TIME		9 µs	9 µs
TERMINATION SWITCH		Yes	No
PROTECTION (IEC)		IP20	IP67
TEMPERATURE RANGE	*WORKING*	+32 ºF to +131 ºF (0 ºC to +55 ºC)	+14 ºF to +131 ºF (-10 ºC to +55 ºC)
	STORAGE	-13 ºF to +167 ºF (-25 ºC to +75 ºC)	-13 ºF to +167 ºF (-25 ºC to +75 ºC)
HOUSING MATERIAL		PA66-FR	PA6-GF
WEIGHT		120 g (6 oz)	
APPROVALS		CE cULus AS-i	
MOUNTING		DIN rail	DIN rail, mounting holes
AS-INTERFACE CONNECTION		Removable terminals	Flat yellow or round cable

⚡ Stocked item
Consult factory for all other models

Wiring Diagrams

TERMINALS

VAR-KE2



LED Indicators

PWRx: Green: Power on
Off: no power

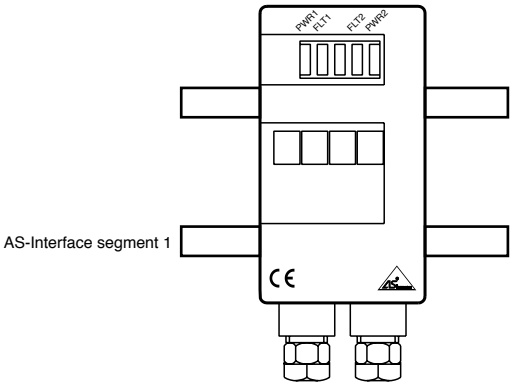
FAULT: Off: no errors
Red: Communication errors

TERM: On: Termination connected
Off: No termination

26V: On: Voltage above 26 V
Off: Voltage below 26 V

18.5V: On: Voltage above 18.5 V
Off: Voltage below 18.5 V

VAR-G4F



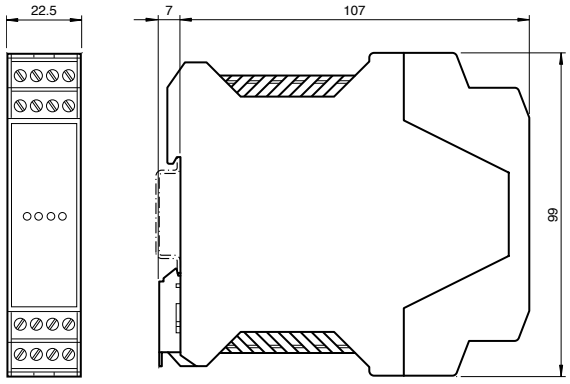
LED Indicators

PWRx: Green: Power on
Off: no power

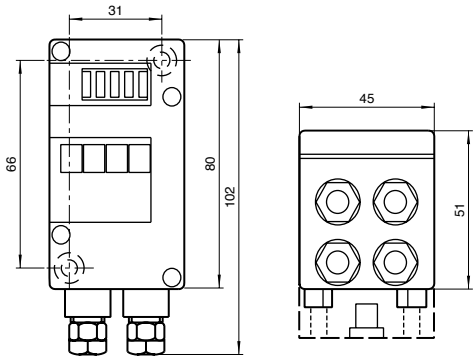
FLTx: Off: no errors
Red: Communication errors

Dimensions (mm)

VAR-KE3



VAR-G4F



Accessories

U-G1PP
Round cable base with external power terminals

PG11-1/2NPT
PG11 male to 1/2" NPT female conduit adapter

See pages 201-216 for complete AS-Interface accessory listing.

Standard 24-30 VDC Power Supplies

- Slim 70 mm housing
- Cover to protect AC terminals
- Voltage adjustment potentiometer

Standard 24-30 VDC Power Supply Overview

These power supplies are desgned to be used with the AS-Interface black cable or with the power conditioner only. They can never be used on the AS-Interface yellow cable or with an AS-Interface gateway without a built-in conditioner. These power supplies do not have the required decoupling coils in them to allow error-free AS-Interface communication.

Three versions are available with 5 A or 10 A capacities. Plastic covers protect the power supplies against accidental shorting of AC input lines as well as the voltage adjustment terminals. The voltage adjustment screw is ofen used to bump the power supply up to the 30 V required by AS-Interface if you are using the power conditioner. If the voltage is increased then the total current output will be reduced to a maximum of 4 A and 8 A, respectively.

See pages 71-72 for standard 24-30 VDC power supply wiring and dimensions.

Specifications

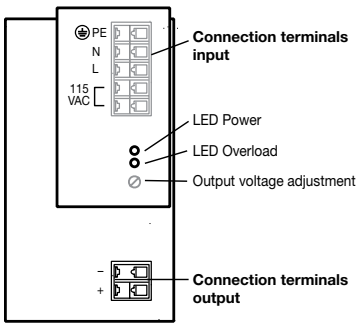
TYPE	5 A	10 A	10 A (3-phase)
MODEL NUMBER(S)	**K17-STR-24..30VDC-5A** ⚡	**K24-STR-24..30VDC-10A** ⚡	**K34-STR-24..30V-3X500VAC-10A**
OUTPUT SUPPLY			
CURRENT NOMINAL	5 A @ 24 VDC	10 A @ 24 VDC	10 A @ 24 VDC
CURRENT LIMIT	≈ 6 A	≈ 12 A	≈ 12.5 A
VOLTAGE	24 V ± 1 %		24 V ± 1 %
ADJUSTMENT RANGE	22 - 30 VDC, default 30 VDC		23 - 30 VDC, default 30 VDC
SHORT CIRCUIT/ OVERLOAD PROTECTED	Yes		Yes
MAX. OUTPUT POWER	220 W, 30 V @ 4 A	240 W, 30 V @ 8 A	240 W, 30 V @ 8 A
PARALLEL/REDUNDANT WIRING POSSIBLE	Yes		
INPUT SUPPLY			
RATED OPERATING CURRENT	2.2 A @ 115 VAC	4.2 A @ 115 VAC	3 x 0.7 A @ 400 VAC
FREQUENCY	47-63 Hz		
OPERATING VOLTAGE	93-132 VAC, 187-265 VAC		3 x 380-500 VAC, 3-phase
EFFICIENCY	≈ 89%		
POWER FACTOR CORRECTION	Yes		
INPUT VOLTAGE SELECTION	115/230 VAC, selectable using jumper		–
FUSE INTERNAL	T3.15 / 250 V	T6.3 / 250 V	None (protect with 690 V 1A fuse on each line)
POWER SUPPLY OVERLOAD RESET	Automatic		
PROTECTION (IEC)	IP20		
TEMPERATURE RANGE *WORKING*	+14 ºF to +140 ºF (-10 ºC to +60 ºC)		
STORAGE	-13 ºF to +185 ºF (-25 ºC to +85 ºC)		
HOUSING MATERIAL	Steel, aluminum		
WEIGHT	890 g (31 oz)		1400 g (49 oz)
APPROVALS	CE cULus		
MOUNTING*	DIN rail		
AS-INTERFACE CONNECTION	Spring terminals		

*** Important:** Power supplies must be mounted with ventilation holes located at top. Allow 100 mm top/bottom clearance and 30 mm side clearance.

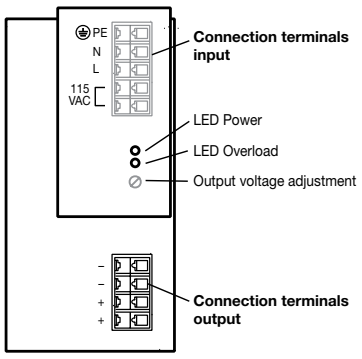
⚡ Stocked item
Consult factory for all other models

Wiring Diagrams

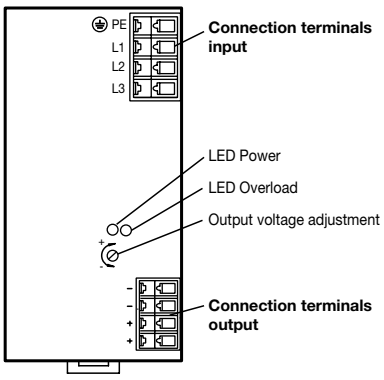
K17-STR-24..30VDC-5A



K24-STR-24..30VDC-10A

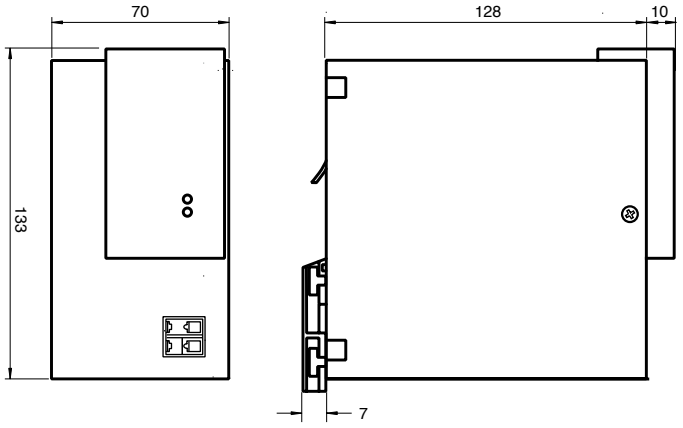


K34-STR-24..30V-3X500VAC-10A

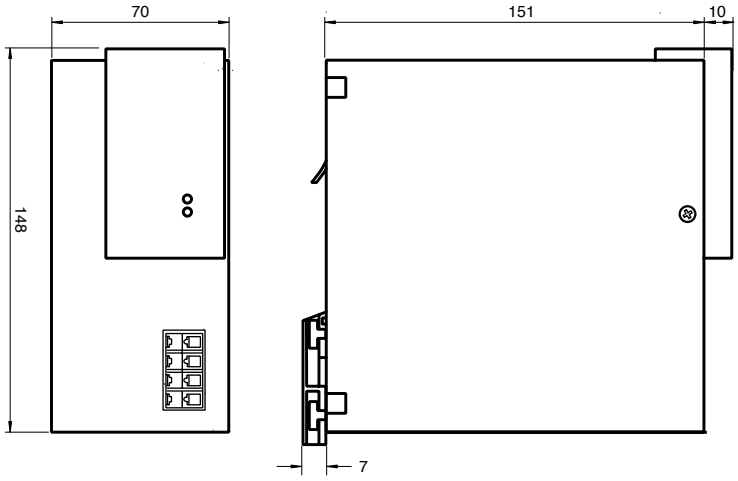


Dimensions (mm)

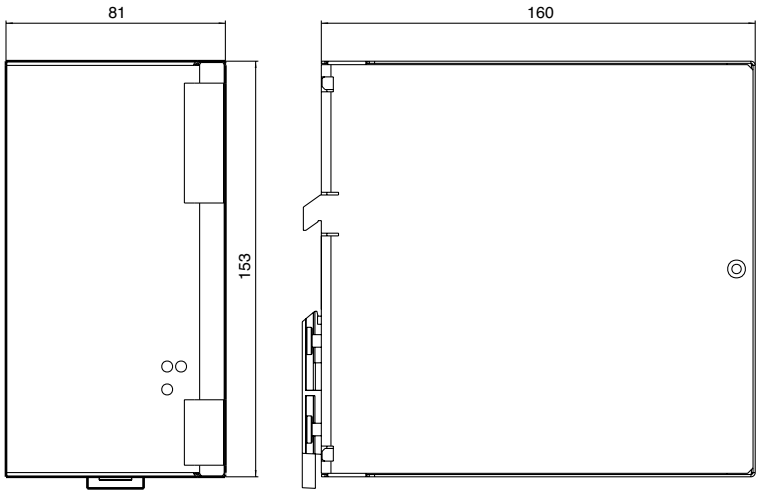
K17-STR-24..30VDC-5A



K24-STR-24..30VDC-10A



K34-STR-24..30V-3X500VAC-10A



I/O Modules

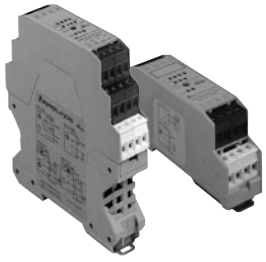
I/O modules

I/O modules are the essence of the AS-Interface system. All inputs and outputs communicate with the scanner/gateway through the modules. They drive the solenoids and relays, initiate the valves, and enable the pushbuttons. For enclosures and junction boxes, Pepperl+Fuchs offers a broad selection of modules to connect AS-Interface to DIN rail, as well as junction box modules sure to meet the specific needs of each application. Pepperl+Fuchs offers a wide variety of rugged and robust field mountable modules for any application, including flat modules for limited space applications, compact modules with a variety of mounting options, field modules that use cord grips instead of quick disconnects, and modules that use both the AS-Interface flat cable or standard 16 AWG round cable.

Our top-of-the-line family of field mounted modules, the G12 series, reduces installation time and enhances diagnostics even further. It is now possible to install AS-Interface I/O modules without any tools! The G12 line is an important addition to our products and is Pepperl+Fuchs' long term answer to our customers demands concerning high end, feature rich products. It is yet another reason why Pepperl+Fuchs' AS-Interface system stands out from the competition.

Within an Enclosure

Enclosure modules feature a narrow profile that uses a minimal amount of space. All enclosure modules have diagnostic LEDs, feature removable terminals that support wire sizes up to 14 AWG for connection of the I/O, and have a protection rating of IP20.



KE Series Modules feature color-coded terminals to help simplify installation. Both standard and extended addressing versions are available.

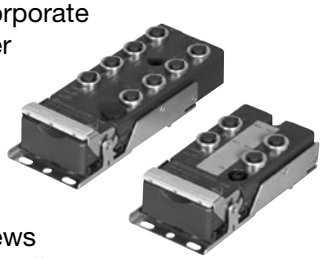
KE1 Series Modules are especially designed to be installed in junction boxes. The height of the KE1 is only 50 mm and are available with 4 inputs, 4 inputs and 2 outputs, or 4 inputs and 4 outputs. The addressing can be accomplished via an addressing jack.

In the Field

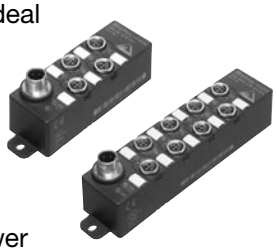
Pepperl+Fuchs offers modules with rugged housings and high IP ratings for various types of field applications where cost savings, installation time, and module size are crucial.

G4 Modules are designed for quick installation. Sensors and actuators are connected to the G4 module via cable glands and cage tension spring terminals making it ideal for applications where heavy vibrations may be encountered. These connections also enable the use of standard cabled sensors and eliminate the need for coiled up, molded cables. Additionally, G4 modules can be used with flat or round AS-Interface cable.

G2 Flat Modules are ideal when installation time is critical. They feature an addressing jack for connection of the handheld programmer. By using the cinch cable, (VAZ-PK-1.5M-V1-G), the module can also be addressed while connected to the network.



G12 Series Modules incorporate what we have learned over the last 15 years and offer an AS-Interface solution that reduces installation time to an absolute minimum. No tools are required; no screws need to be turned. Additionally, we added diagnostic features like true output overload/ short circuit indication on a per output basis. With clear, uncomplicated fault indication, maintenance personnel can act faster, getting lines up and running again in the shortest time imaginable. The universal SPEEDCON M12 makes sensor connections faster than ever before. Making a 1/2 turn on the connector is all it takes to install the modules. Naturally, these top-of-the-line modules satisfy IP67, making them applicable for most field mounted applications.



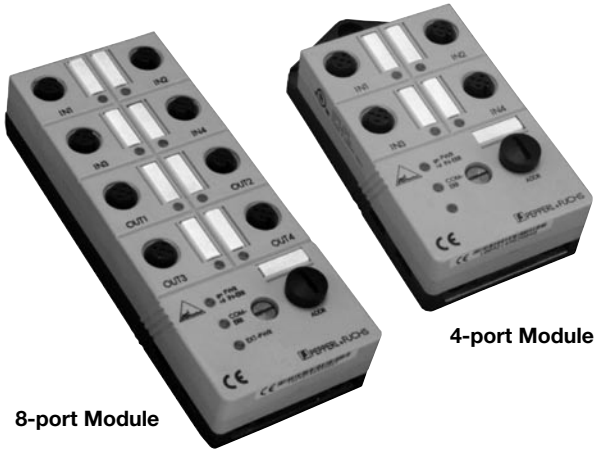
G16 Compact Modules are ideal for limited space applications where it is not possible to mount any other module. G16 modules are commonly used for material handling equipment and robotics. The AS-Interface and external power connections are made using a single M12x1 quick disconnect. The sensors/ actuators are attached via nano (M8x1) quick disconnects. By eliminating the mounting plate, the IP69K rated compact module is simple to mount.

Analog Modules use standard AS-Interface analog profiles, which put these modules into operation in the same way as digital modules and starts the data exchange automatically.

Illuminated Pushbutton Modules are offered in two styles and attach to the network to provide a link between maintenance personnel and AS-Interface.

AS-Interface Stack Lights are flexible devices that allow multiple configurations by simply combining individual light and audible alarm modules. The 4 output base can power up to four modules in any combination.

Additionally, Pepperl+Fuchs offers **pneumatic modules**.

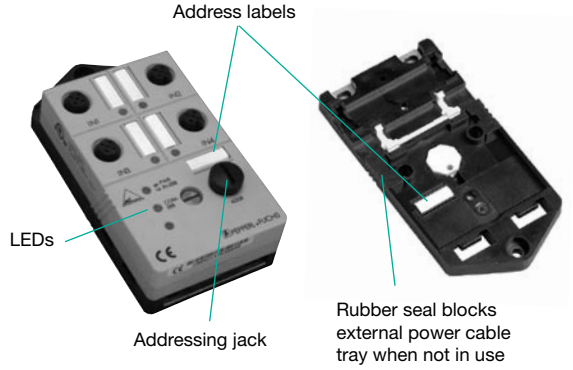


Low-Profile Flat I/O Modules

- Low-profile flat housing—30 mm high
- Built in addressing jack
- M12 quick disconnect for all I/O
- Flat cable AS-Interface connections

Flat Module Overview

With the G2 line of AS-Interface, Pepperl+Fuchs offers a wide variety of I/O modules suitable when the advanced features offered by the high-end G12 line are not desired. With a height of only 30 mm, the G2 line is ideal for limited space applications. This IP67 housing can be mounted directly in the field and accepts sourcing I/O from a variety of different devices. The following diagrams show some of the features of this product:



The flat module mounting bases (U-G2FF and U-G3FF) are mechanically coded for reverse polarity protection. To prevent the possibility of connection errors, each AS-Interface module has I/O and ID codes that allow the scanner/gateway to electronically identify the I/O configuration and version of the device.

To simplify addressing of the flat modules, an addressing jack is integrated into the housing for easy connection of a hand-held addressing device (e.g., VBP-HH1-...). The addressing jack enables the user to address the module before or after connection to AS-Interface.

See pages 77-78 for Flat Module wiring and dimensions.

Common Specifications

OPERATING VOLTAGE AS-i		26.5-31.6 V
OPERATING VOLTAGE, V_{AUX}		20-30 VDC
INPUT SWITCHING FREQUENCY		≤ 250 Hz
INPUT DELAY		≤ 2 ms from input to AS-i
PROTECTION		IP67
HOUSING MATERIAL		PBT-FR
TEMPERATURE RANGE	*Working*	-13 °F to +140 °F (-25 °C to +60 °C)
	Storage	-13 °F to +185 °F (-25 °C to +85°C)
APPROVALS		CE cULus AS-i




Specifications

INPUTS/OUTPUTS	4-in	8-in	2-in/2-out	4-in/4-out
MODEL NUMBER(S)*	**VBA-4E-G2-ZA** ⚡	**VBA-8E-G2-ZA** ⚡	**VBA-2E2A-G2-ZA/EA2** ⚡	**VBA-4E4A-G2-ZA/EA2** ⚡
BASE	U-G3FF	U-G2FF	U-G3FF	U-G2FF
EXTENDED ADDRESSING (62 NODES)	Yes	Yes (2 addresses)	Yes	Yes
REQUIRED MASTER SPEC.	–	–	M3, M4	M4
AS-i OPERATING CURRENT	40-240 mA	80-280 mA	40-140 mA	40-220 mA
AUXILIARY CURRENT LIMIT	–	–	2 A	2 A
INPUTS *-ZA,*	PNP, AS-i powered	PNP, AS-i powered	PNP, AS-i powered	PNP, AS-i powered
	–	–	–	–
TYPE	2-,3-, or 4-wire	2-,3-, or 4-wire	2-,3-, or 4-wire	2-, 3-, or 4-wire
SUPPLY VOLTAGE	21-31 V from AS-Interface	21-31 V from AS-Interface	21-31 V from AS-Interface	21-31 V from AS-Interface
MAXIMUM CURRENT	150 mA, 200 mA (T ≤ 104 °F)	200 mA	75 mA, 100 mA (T ≤ 104 °F)	140 mA, 180 mA (T ≤ 104 °F)
SWITCH POINT	OFF ≤ 2 mA, ON ≥ 4 mA	OFF ≤ 2 mA, ON ≥ 4 mA	OFF ≤ 2 mA, ON ≥ 4 mA	OFF ≤ 3 mA, ON ≥ 5 mA
LOAD CURRENT	≤ 8 mA	≤ 8 mA	≤ 8 mA	≤ 9 mA
OUTPUTS *EA2,*	–	–	PNP, auxiliary powered	PNP, auxiliary powered
SUPPLY VOLTAGE	–	–	≥ (V_{AUX}-0.5 V)	≥ (V_{AUX}-0.5 V)
CURRENT PER OUTPUT	–	–	≤ 1 A	≤ 0.5 A
DATA BITS *D0*	IN1	IN1.1, IN2.1	OUT1	IN1/OUT1
D1	IN2	IN1.2, IN2.2	OUT2	IN2/OUT2
D2	IN3	IN1.3, IN2.3	IN3	IN3/OUT3
D3	IN4	IN1.4, IN2.4	IN4	IN4/OUT4
PARAMETER BITS *P0*	–	–	–	Watchdog on†/off
P1	–	–	–	–
P2	–	–	–	–
PERIPHERAL FAULT BIT	Input overload	Input overload	Input/output overload	Input/output overload
PROFILE *S-IO.ID.ID1.ID2*	S-0.A.7.2	S-0.A.7.2, S-0.A.7.2	S-B.A.7.2	S-7.A.7.7
WEIGHT	100 g (3.5 oz)	150 g (5.3 oz)	100 g (3.5 oz)	150 g (5.3 oz)
AS-INTERFACE CONNECTION	Flat yellow cable	Flat yellow cable	Flat yellow cable	Flat yellow cable
AUXILIARY POWER CONNECTION	–	–	Flat black cable	Flat black cable
I/O CONNECTION	M12 quick disconnect	M12 quick disconnect	M12 quick disconnect	M12 quick disconnect

† Default setting

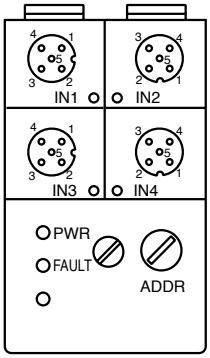
⚡ Stocked item
Consult factory for all other models

*Also Available

INPUTS/OUTPUTS	Model Number	Base	Required Master Spec.	Profile S-IO.ID.ID1.ID2	Extended Addressing	Special Features
4-in	**VAA-4E-G2-ZA**	U-G3FF	–	S-0.1.F.F	No	
2-in/2-out	**VBA-2E2A-G2-ZEJ/XE2J** ⚡	U-G3FF	M3, M4	S-B.A.7.E	Yes	AS-i powered inputs and outputs
	VAA-2EA-G2-ZA/EA2	U-G3FF	–	S-3.F.F.F	No	
4-in/2-out	**VBA-4E2A-G2-XE/E2**	U-G3FF	M3, M4	S-7.A.7.E	Yes	Auxiliary powered inputs and outputs
4-in/3-out	**VBA-4E3A-G2-ZA/EA2**	U-G2FF	M3, M4	S-7.A.7.2	Yes	
4-in/4-out	**VAA-4E4A-G2-ZA/EA2** ⚡	U-G2FF	–	S-7.F.F.E	No	

Wiring Diagrams

Note: Wiring Diagrams show quick disconnect pin numbers.



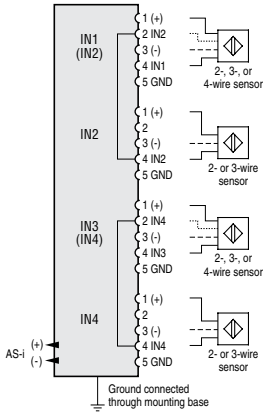
LED Indicators

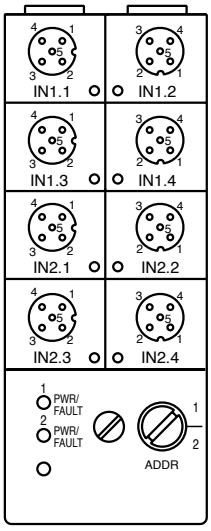
IN: Yellow: Input on

PWR: Green: AS-Interface powered

FAULT: Red (solid): Address 0 or no communication
Red (flashing): Overload of input power

VBA-4E-G2-ZA



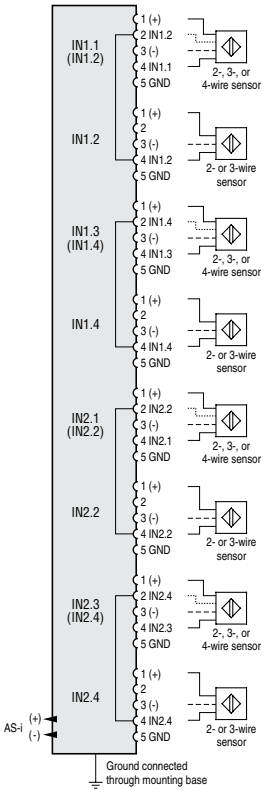


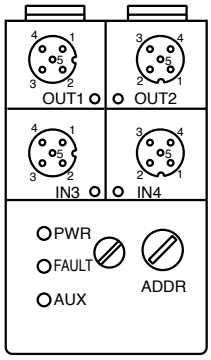
LED Indicators

IN: Yellow: Input on

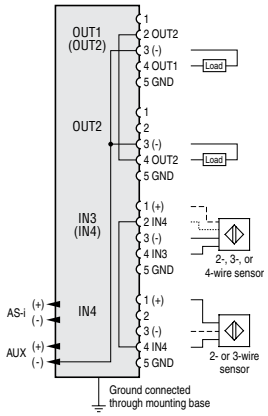
PWR/FAULT: Green: Powered
Red (solid): Address 0 or no communication
Green/Red (flashing): Overload of input power

VBA-8E-G2-ZA





VBA-2E2A-G2-ZA/EA2



LED Indicators

IN: Yellow: Input on

OUT: Yellow: Output on

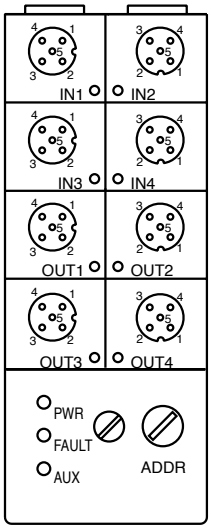
PWR: Green: AS-Interface powered

FAULT: Red (solid): Address 0 or no communication
Red (flashing): Overload of input power or outputs

AUX: Green: Auxiliary powered

Wiring Diagrams

Note: Wiring Diagrams show quick disconnect pin numbers.



LED Indicators

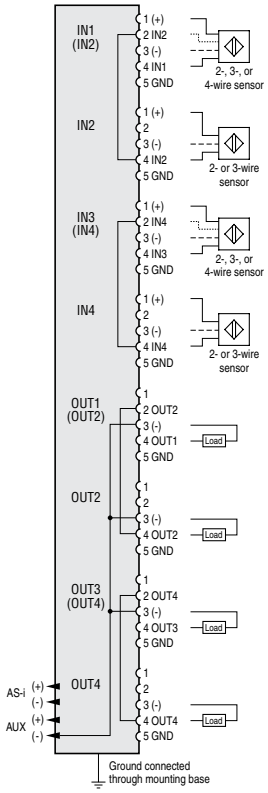
IN: Yellow: Input on

OUT: Yellow: Output on

PWR: Green: AS-Interface powered

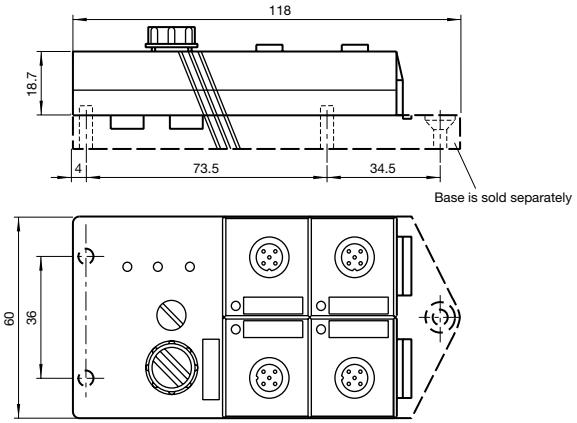
FAULT: Red (solid): Address 0 or no communication
Red (flashing): Overload of input power or outputs

VBA-4E4A-G2-ZA/EA2

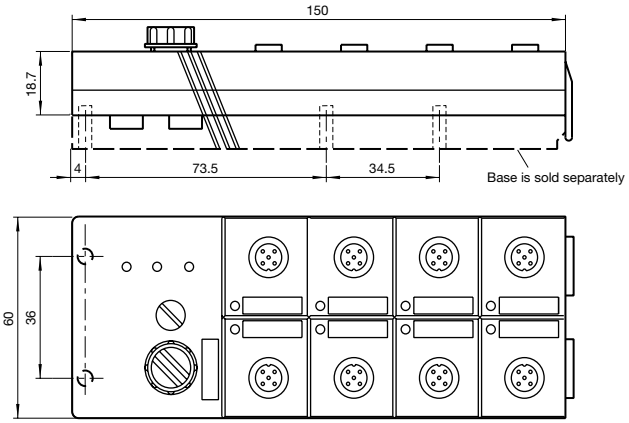


Dimensions (mm)

VBA-4E-G2-ZA
VBA-2E2A-G2-ZA/EA2



VBA-8E-G2-ZA
VBA-4E4A-G2-ZA/EA2



Accessories

U-G3FF
Mounting base for 4-port flat modules

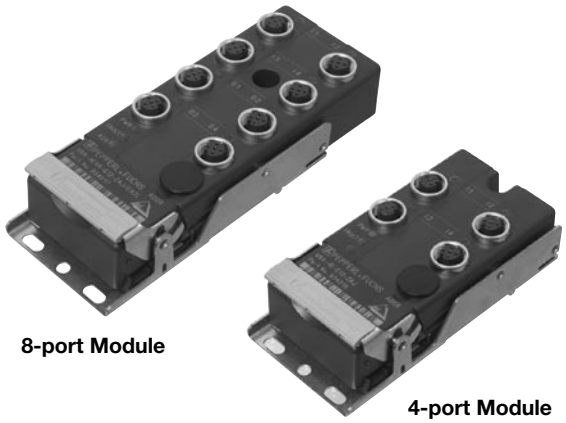
U-G2FF
Mounting base for 8-port flat modules

VAZ-V1-B
M12x1 protective cap

See pages 201-216 for complete AS-Interface accessory listing.

Low-Profile Flat with SPEEDCON I/O Modules

- Low-profile flat housing—30 mm high
- Standard and DIN rail mount integrated in base
- Built in addressing jack
- SPEEDCON M12 quick disconnect for all I/O
- Flat cable AS-Interface connections



8-port Module

4-port Module

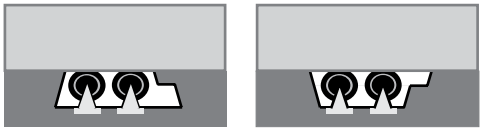
Flat Module with SPEEDCON Overview

High-end G12 modules are ideal for applications requiring fast and flexible installation, easy access to diagnostic feedback, and long service lives. The G12 features a stainless steel installation bar that pulls the module safely onto the stainless steel base. Once the installation bar has been closed, a “click” tells the user that the module has been installed properly and securely. I/O connections are achieved with a single ½-turn using our SPEEDCON M12 solution. These M12 I/O connectors can be used with both standard cables as well as SPEEDCON versions.

G12 comes in a number of I/O mixes and two distinct housing sizes. Both housing sizes use the same rugged stainless steel mounting base. With the stainless steel mounting base, changing the I/O count is as simple as replacing one module top with another, without having to remount the base and AS-Interface cable.

Diagnostic feedback is provided with an output-specific overload indication right on the module. Under normal operating conditions, the multicolor LEDs display the state of the output. Short-circuited and overloaded outputs are provided at the PLC via the peripheral fault bit. This allows maintenance personnel to quickly determine which module has a problem. The overloaded output is directly indicated via a red LED. Faster problem resolution results in higher machine up-time.

Gold-plated piercing contacts ensure long-term, AS-Interface performance. Our machined, gold-plated contacts offer corrosion resistance that is superior to stamped (flat) contacts plated with non-precious metals.

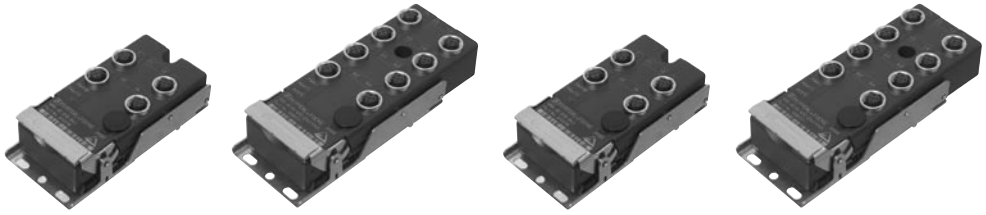


The G12 also features an integrated DIN clip for DIN rail mounting. With the integrated DIN clip, stainless steel mounting base customers do not have to choose ahead of time how G12 is mounted. Less to consider means faster planning, ordering, and installation.

See pages 82-83 for Flat Module with SPEEDCON wiring and dimensions.

Common Specifications

OPERATING VOLTAGE AS-i		26.5-31.6 V
OPERATING VOLTAGE, V_{AUX}		20.4-27.6 VDC
INPUT SWITCHING FREQUENCY		≤ 1 kHz
INPUT DELAY		≤ 1 ms from input to AS-i
PROTECTION		IP67
HOUSING MATERIAL		PBT
TEMPERATURE RANGE	*Working*	-13 ºF to +158 ºF (-25 ºC to +70 ºC)
	Storage	-13 ºF to +185 ºF (-25 ºC to +85 ºC)
APPROVALS		CE cULus



Specifications

INPUTS/OUTPUTS	4-in	8-in	2-in/2-out	4-in/4-out
MODEL NUMBER(S)*	**VBA-4E-G12-ZAJ** ⚡	**VBA-4E4E-G12-ZAJ** ⚡	**VBA-2E2A-G12-ZAJ/EA2L** ⚡	**VBA-4E4A-G12-ZAJ/EA2L** ⚡
BASE	Included	Included	Included	Included
EXTENDED ADDRESSING (62 NODES)	Yes	Yes (2 addresses)	Yes	Yes
REQUIRED MASTER SPEC.	–	–	M3, M4	M4
AS-i OPERATING CURRENT	40-240 mA	80-280 mA	40-240 mA	40-240 mA
AUXILIARY CURRENT LIMIT	–	–	4 A	4 A, 6 A (T ≤ 104 °F)
INPUTS *-ZAJ*	PNP, AS-i powered	PNP, AS-i powered	PNP, AS-i powered	PNP, AS-i powered
	–	–	–	–
TYPE	2-, 3-, or 4-wire	2-, 3-, or 4-wire	2-, 3-, or 4-wire	2-, 3-, or 4-wire
SUPPLY VOLTAGE	21-31 V from AS-Interface	21-31 V from AS-Interface	21-31 V from AS-Interface	21-31 V from AS-Interface
MAXIMUM CURRENT	200 mA	200 mA	200 mA	200 mA
SWITCH POINT	OFF ≤ 2 mA, ON ≥ 4 mA	OFF ≤ 2 mA, ON ≥ 4 mA	OFF ≤ 2 mA, ON ≥ 4 mA	OFF ≤ 2 mA, ON ≥ 4 mA
LOAD CURRENT	≤ 8 mA	≤ 8 mA	≤ 8 mA	≤ 8 mA
OUTPUTS *EA2L*	–	–	PNP, auxiliary powered	PNP, auxiliary powered
SUPPLY VOLTAGE	–	–	≥ (V_{AUX}-0.5 V)	≥ (V_{AUX}-0.5 V)
CURRENT PER OUTPUT	–	–	≤ 2 A	≤ 2 A
DATA BITS *D0*	IN1	IN1.1, IN2.1	OUT1	IN1/OUT1
D1	IN2	IN1.2, IN2.2	OUT2	IN2/OUT2
D2	IN3	IN1.3, IN2.3	IN3	IN3/OUT3
D3	IN4	IN1.4, IN2.4	IN4	IN4/OUT4
PARAMETER BITS *P0*	–	–	Watchdog on†/off	Watchdog on†/off
P1	2 ms input filtering on/off†	2 ms input filtering on/off†	2 ms input filtering on/off†	2 ms input filtering on/off†
P2	Synchronization on/off†	Synchronization on/off†	Synchronization on/off†	Synchronization on/off†
PERIPHERAL FAULT BIT	Input overload	Input overload	Input/output overload	Input/output overload
PROFILE *S-I0.ID.ID1.ID2*	S-0.A.7.2	S-0.A.1.2, S-0.A.2.2	S-B.A.7.2	S-7.A.7.7
WEIGHT	200 g (7.1 oz)	230 g (8.1 oz)	200 g (7.1 oz)	230 g (8.1 oz)
AS-INTERFACE CONNECTION	Flat yellow cable	Flat yellow cable	Flat yellow cable	Flat yellow cable
AUXILIARY POWER CONNECTION	–	–	Flat black cable	Flat black cable
I/O CONNECTION	M12 SPEEDCON	M12 SPEEDCON	M12 SPEEDCON	M12 SPEEDCON

† Default setting

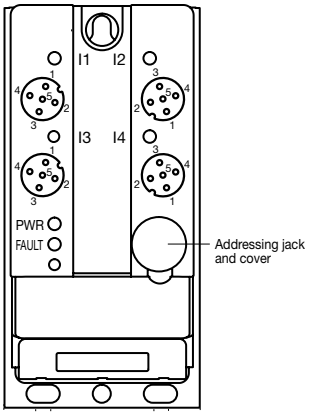
⚡ Stocked item
Consult factory for all other models

*Also Available

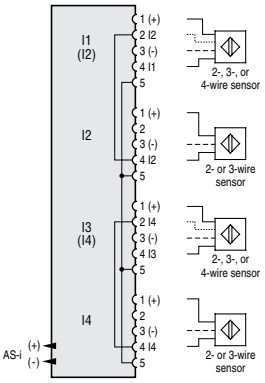
INPUTS/OUTPUTS	Model Number	Base	Required Master Spec.	Profile S-I0.ID.ID1.ID2	Extended Addressing	Special Features
4-in	**VBA-4E-G12-ZAL**	Included	–	S-0.A.7.2	Yes	Auxiliary powered inputs
4-in/3-out	**VBA-4E3A-G12-ZAJ/EA2L**	Included	M3, M4	S-7.A.7.2	Yes	
4-in/4-out	**VAA-4E4A-G12-ZAJ/EA2L** ⚡	Included	–	S-7.F.F.E	No	
	VAA-4E4A-G12-ZAL/EA2L	Included	–	S-7.F.F.E	No	Auxiliary powered inputs and outputs
4-out	**VAA-4A-G12-EA2L** ⚡	Included	–	S-8.1.F.E	No	

Wiring Diagrams

Note: Wiring Diagrams show quick disconnect pin numbers.



VBA-4E-G12-ZAJ

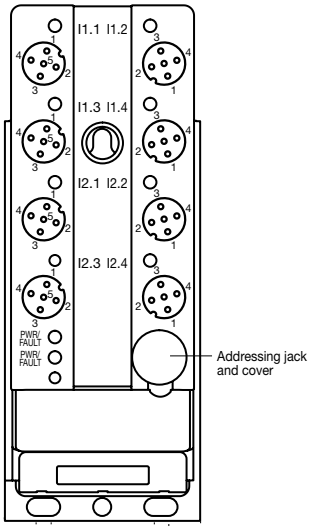


LED Indicators

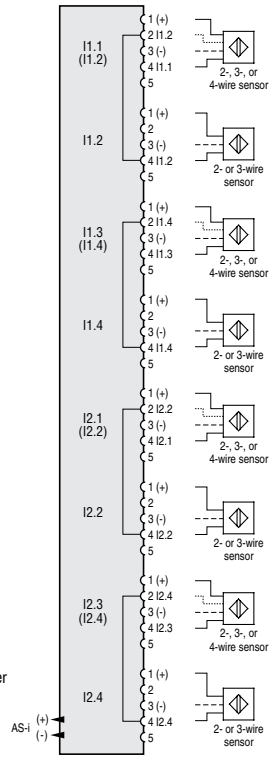
I: Yellow: Input on

PWR: Green (solid): AS-Interface powered
Green (flashing): Address 0

FAULT: Red (solid): Address 0 or no communication
Red (flashing): Overload of input power



VBA-4E4E-G12-ZAJ

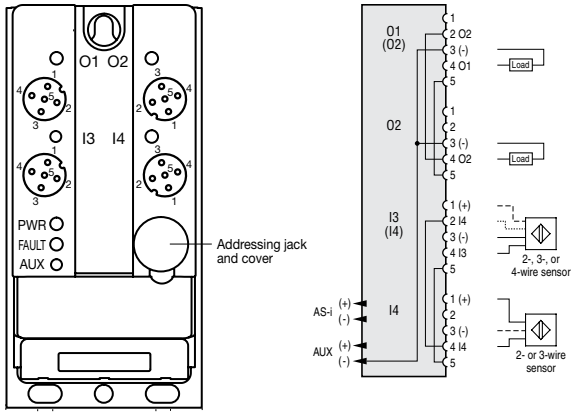


LED Indicators

I: Yellow: Input on

PWR/FAULT: Green (solid): AS-Interface powered
Red (solid): No communication
Red/Yellow (alternating): Address 0
Red/Green (alternating): Overload of input power

VBA-2E2A-G12-ZAJ/EA2L



LED Indicators

I: Yellow: Input on

O: Yellow: Output on
Red: Output overload

PWR: Green (solid): AS-Interface powered
Green (flashing): Address 0

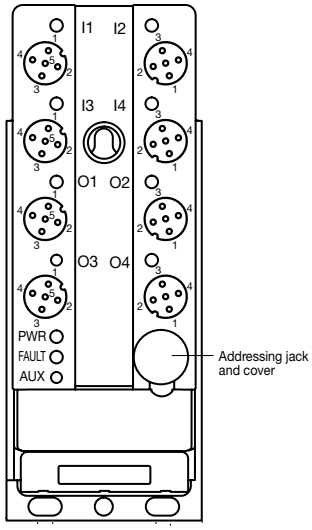
FAULT: Red (solid): Address 0 or no communication
Red (flashing): Overload of input power or outputs

AUX: Green: Auxiliary powered
Red: Reverse polarity

See pages 201-216 for complete AS-Interface accessory listing.

Wiring Diagrams

Note: Wiring Diagrams show quick disconnect pin numbers.



LED Indicators

I: Yellow: Input on

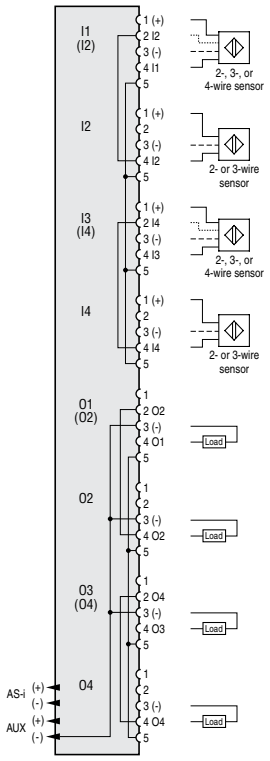
O: Yellow: Output on
Red: Output overload

PWR: Green (solid): AS-Interface powered
Green (flashing): Address 0

FAULT: Red (solid): Address 0 or no communication
Red (flashing): Overload of input power or outputs

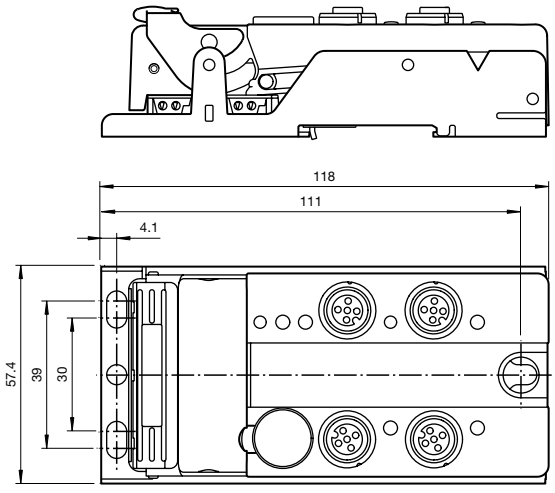
AUX: Green: Auxiliary powered
Red: Reverse polarity

VBA-4E4A-G12-ZAJ/EA2L

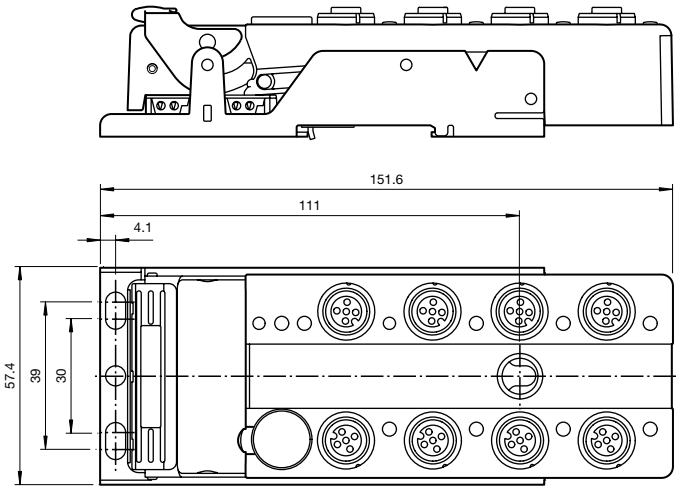


Dimensions (mm)

VBA-4E-G12-ZAJ
VBA-2E2A-G12-ZAJ/EA2L

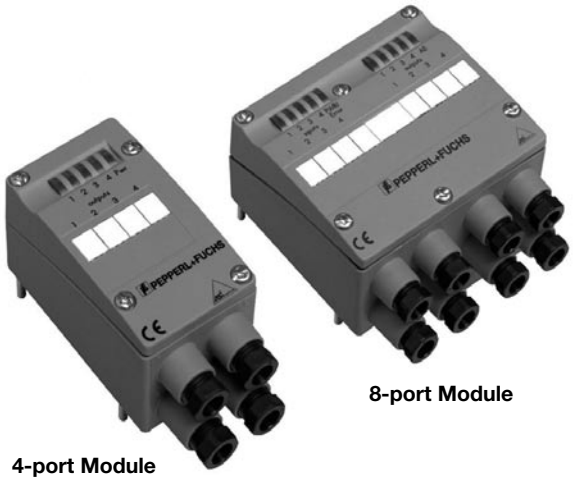


VBA-4E4E-G12-ZAJ
VBA-4E4A-G12-ZAJ/EA2L



Field Mountable
I/O Modules

- Cord grips allow input cable to be cut to length
- Module fits directly on top of programmer without cable
- Flat or round cable AS-Interface connection through base
- Mounting through holes or DIN rail
- Field-mount housing

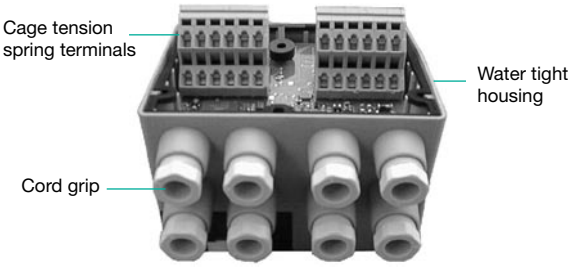


8-port Module

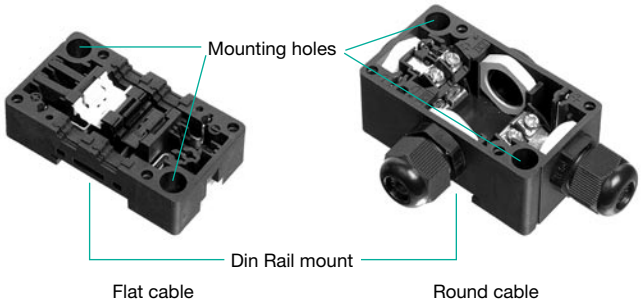
4-port Module

Field Module Overview

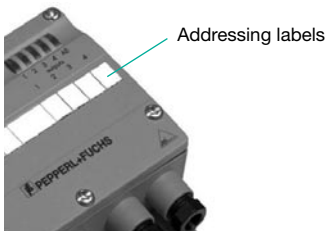
These watertight modules were developed in response to customer requests for a rugged, water tight housing. They can withstand high vibration applications such as valve positioning and actuation. The following is an overview of the G4 module key features:



Sensors and actuators are connected to the field module using the included cord grips for the cable connection and cage tension spring terminals for the electrical connection. By eliminating the quick disconnect, I/O connections are inexpensive and offer a water tight, more compact installation. Custom molded cables of differing lengths are no longer required because these field modules accept cable that can be cut to any length, eliminating waste and coiled leads. Below are the two AS-Interface cable options.



The field modules are connected to the AS-Interface cable using standard bases. These bases allow connection of AS-Interface flat or round cable. Also, the U-G1FFA base has an integrated addressing jack that eliminates the need to unscrew the cover or use a master for addressing.



See pages 86-87 for Field Module wiring and dimensions.

Common Specifications

OPERATING VOLTAGE AS-i		26.5-31.6 V
OPERATING VOLTAGE, V_{AUX}		21.4-27.6 VDC
INPUT SWITCHING FREQUENCY		≤ 250 Hz
INPUT DELAY		≤ 2 ms from input to AS-i
HOUSING MATERIAL		PA 6 GF30
TEMPERATURE RANGE	*Working*	-13 °F to +140 °F (-25 °C to +60 °C)
	Storage	-13 °F to +185 °F (-25 °C to +85 °C)
APPROVALS		CE cULus



Specifications

INPUTS/OUTPUTS		4-in	2-in/2-out	4-in/4-out
MODEL NUMBER(S)*		**VBA-4E-G4-ZE** ϟ	**VBA-2E2A-G4-ZE/E2** ϟ	**VBA-4E4A-G4-ZE/E2** ϟ
BASES		U-G1FFA, U-G1PP	U-G1FFA, U-G1PP	U-G1FFA, U-G1PP
EXTENDED ADDRESSING (62 NODES)		Yes	Yes	Yes
REQUIRED MASTER SPEC.		–	M3, M4	M4
AS-i OPERATING CURRENT		40-190 mA	30-140 mA	30-230 mA
AUXILIARY CURRENT LIMIT		–	2 A	4 A
INPUTS	*-ZE*	PNP, AS-i powered	PNP, AS-i powered	PNP, AS-i powered
		–	–	–
	TYPE	2-, 3-wire	2-, 3-wire	2-, 3-wire
	SUPPLY VOLTAGE	21-31 V from AS-Interface	21-31 V from AS-Interface	21-31 V from AS-Interface
	MAXIMUM CURRENT	120 mA, 150 mA (T ≤ 104 ºF)	75 mA, 100 mA (T ≤ 104 ºF)	160 mA, 200 mA (T ≤ 104 ºF)
	SWITCH POINT	OFF ≤ 2 mA, ON ≥ 4 mA	OFF ≤ 2 mA, ON ≥ 4 mA	OFF ≤ 3 mA, ON ≥ 5 mA
	LOAD CURRENT	≤ 8 mA	≤ 8 mA	≤ 9 mA
OUTPUTS	*E2*	–	PNP, auxiliary powered	PNP, auxiliary powered
	SUPPLY VOLTAGE	–	≥ (V_{AUX}-0.5 V)	≥ (V_{AUX}-0.5 V)
	CURRENT PER OUTPUT	–	≤ 1 A	≤ 1 A
DATA BITS	*D0*	IN1	OUT1	IN1/OUT1
	D1	IN2	OUT2	IN2/OUT2
	D2	IN3	IN3	IN3/OUT3
	D3	IN4	IN4	IN4/OUT4
PARAMETER BITS	*P0*	–	–	Watchdog on†/off
	P1	–	–	–
	P2	–	–	–
PERIPHERAL FAULT BIT		Input overload	Input/output overload	Input/output overload
PROFILE	*S-I0.ID.ID1.ID2*	S-0.A.7.0	S-B-A.7.0	S-7.A.7.7
PROTECTION		IP67	IP67	IP65
WEIGHT		180 g (6.3 oz)	180 g (6.3 oz)	312 g (11 oz)
AS-INTERFACE CONNECTION		Flat yellow or round cable	Flat yellow or round cable	Flat yellow or round cable
AUXILIARY POWER CONNECTION		–	Flat black or round cable	Flat black or round cable
I/O CONNECTION		Cage tension spring terminals	Cage tension spring terminals	Cage tension spring terminals

† Default setting

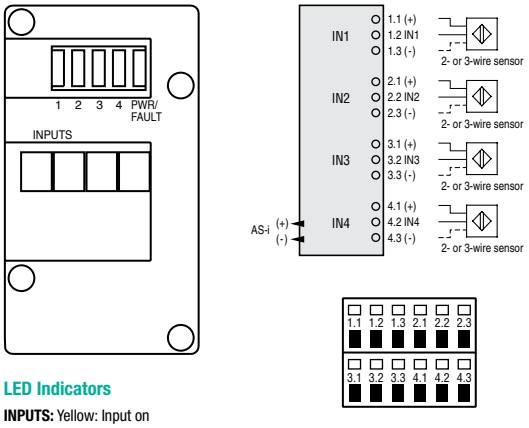
ϟ Stocked item
Consult factory for all other models

*Also Available

INPUTS/OUTPUTS	Model Number	Bases	Required Master Spec.	Profile S-I0.ID.ID1.ID2	Extended Addressing	Special Features
4-in	**VAA-4E-G4-ZE**	U-G1FFA, U-G1PP	–	S-0.0.F.E	No	
4-in/3-out	**VBA-4E3A-G4-ZE/E2**	U-G1FFA, U-G1PP	M3, M4	S-7.A.7.0	Yes	
4-in/4-out	**VAA-4E4A-G4-ZE/E2** ϟ	U-G1FFA, U-G1PP	–	S-7.0.F.E	No	

Wiring Diagrams

VBA-4E-G4-ZE

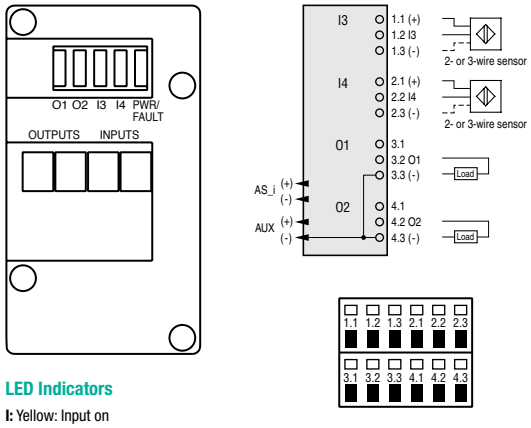


LED Indicators

INPUTS: Yellow: Input on

PWR/FAULT: Green: AS-Interface powered
Red (solid): Address 0 or no communication
Green/Red (flashing): Overload of input power

VBA-2E2A-G4-ZE/E2



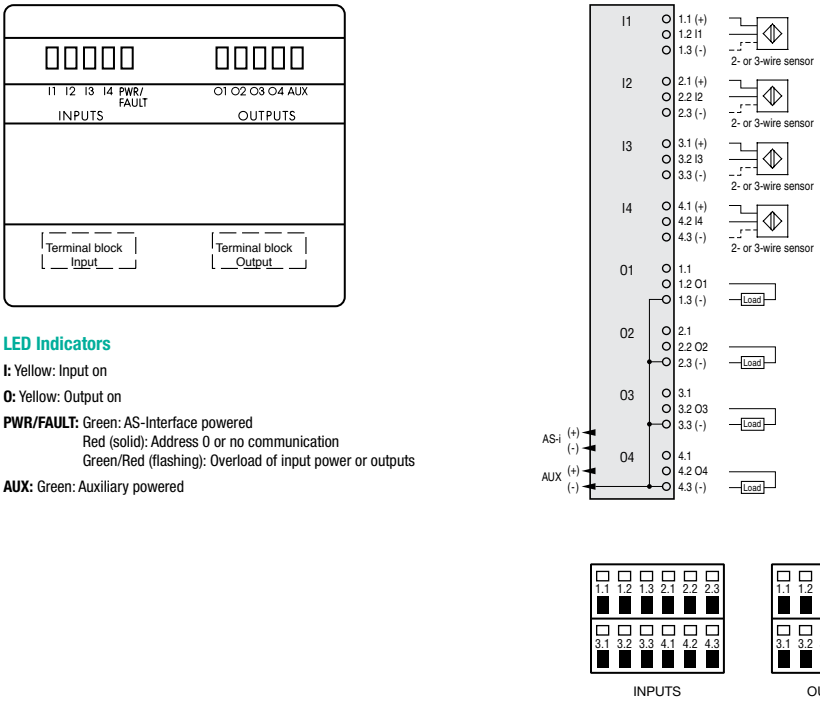
LED Indicators

I: Yellow: Input on

O: Yellow: Output on

PWR/FAULT: Green: AS-Interface powered
Red (solid): Address 0 or no communication
Green/Red (flashing): Overload of input power or outputs

VBA-4E4A-G4-ZE/E2



LED Indicators

I: Yellow: Input on

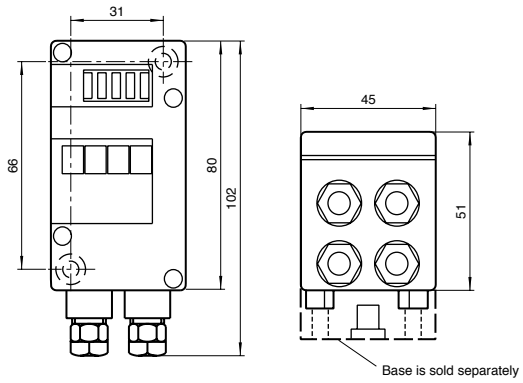
O: Yellow: Output on

PWR/FAULT: Green: AS-Interface powered
Red (solid): Address 0 or no communication
Green/Red (flashing): Overload of input power or outputs

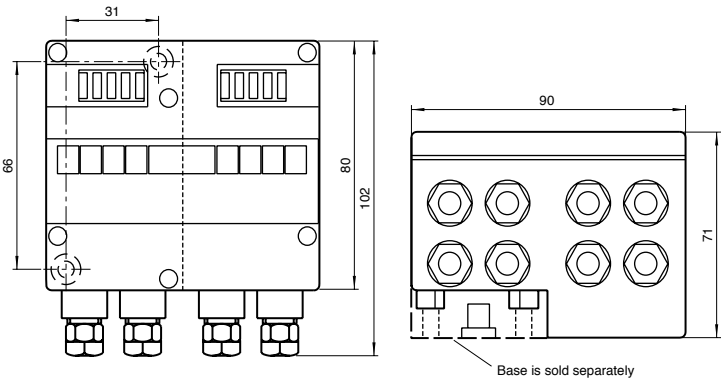
AUX: Green: Auxiliary powered

Dimensions (mm)

VBA-4E-G4-ZE
VBA-2E2A-G4-ZE/E2

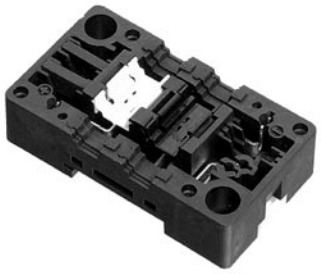


VBA-4E4A-G4-ZE/E2



Accessories

U-G1FFA
Flat cable mounting base for black and yellow cables with addressing jack



U-G1PP
Round cable base with external power terminals

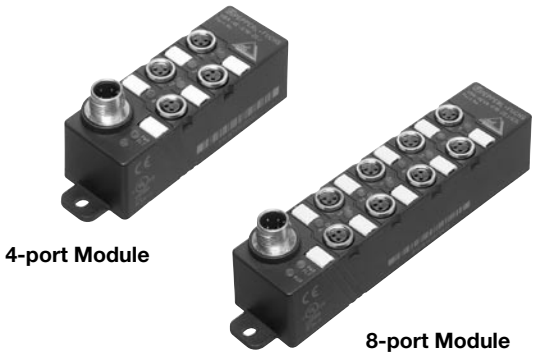
PG11 CORD GRIP
PG11 cord grip, includes nut and round cable grommet

PG11-1/2NPT
PG11 male to 1/2" NPT female conduit adapter

See pages 201-216 for complete AS-Interface accessory listing.

Compact
I/O Modules

- Potted water tight housing, IP69K
- AS-Interface and I/O quick disconnect
- Smallest field mountable housing available
- Short circuit indication output



4-port Module

8-port Module

Compact Module Overview

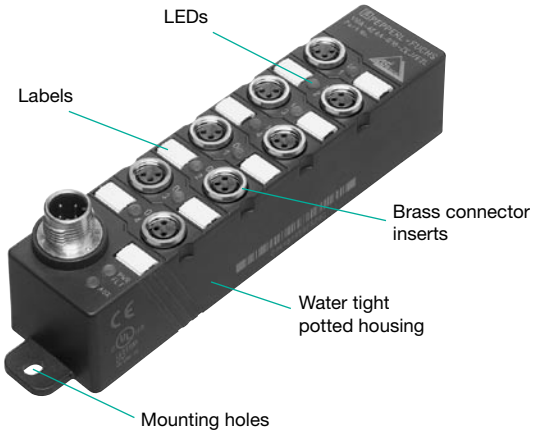
AS-Interface offers advantages for many areas of automation. Many of the modules commonly available on the market are too large for robotics and material handling applications. Circuit boards are an alternative but are expensive to protect from rigorous industrial environmental conditions. Pepperl+Fuchs offers these compact modules as a cost-effective solution.

Our compact modules connect to field devices through the use of Nano (M8x1) quick disconnects. These small modules are rated IP69K and are ideal for rugged industrial environments. The unique mounting hole arrangement enables the module to be mounted in almost any location.

Compact modules use V1 M12x1 quick disconnects to attach AS-Interface and external power. The VAZ-2T1-FK-... adapter connects both the yellow (AS-Interface) and black (external 24 VDC) flat cables.

The same adapter can also be used for the 4 input modules, but because no external power is required for input-only modules, the VAZ-T1-FK-... is the preferred option. The VAZ-2T5-G2 adapter allows connection of up to five compact modules using standard V1 (M12x1) extension cables.

The VBP-HH1-... hand-held addressing device uses a V1 (M12x1) quick disconnect and a V1-G-2M-PVC-V1-G cable to connect to the compact module. The VBP-HH1-... enables the user to address the compact module before or during installation.



See page 90 for Compact Module wiring and dimensions.

Common Specifications

OPERATING VOLTAGE AS-i		26.5-31.6 V
OPERATING VOLTAGE, V_{AUX}		20-30 VDC
INPUT SWITCHING FREQUENCY		≤ 1 kHz
INPUT DELAY		≤ 1 ms from Input to AS-i
PROTECTION		IP69K
HOUSING MATERIAL		PBT
TEMPERATURE RANGE	*Working*	-13 °F to +158 °F (-25 °C to +70 °C)
	Storage	-13 °F to +185 °F (-25 °C to +85 °C)
APPROVALS		CE cULus

Specifications

INPUTS/OUTPUTS		4-in	4-in/4-out
MODEL NUMBER(S)*		VBA-4E-G16-ZEJ ⚡	VBA-4E4A-G16-ZEJ/E2L ⚡
EXTENDED ADDRESSING (62 NODES)		Yes	Yes
REQUIRED MASTER SPEC.		–	M4
AS-i OPERATING CURRENT		40-240 mA	40-240 mA
AUXILIARY CURRENT LIMIT		–	4 A
INPUTS	-ZEJ	PNP, AS-i powered	PNP, AS-i powered
		–	–
TYPE		2- or 3-wire	2- or 3-wire
SUPPLY VOLTAGE		21-31 V from AS-Interface	21-31 V from AS-Interface
MAXIMUM CURRENT		150 mA, 200 mA (T ≤ 104 ºF)	150 mA, 200 mA (T ≤ 104 ºF)
SWITCH POINT		OFF ≤ 3 mA, ON ≥ 5 mA	OFF ≤ 3 mA, ON ≥ 5 mA
LOAD CURRENT		≤ 9 mA	≤ 9 mA
OUTPUTS	E2L	–	PNP, auxiliary powered
SUPPLY VOLTAGE		–	≥ (V_{AUX}-0.5 V)
CURRENT PER OUTPUT		–	≤ 1 A
DATA BITS	D0	IN1	IN1/OUT1
	D1	IN2	IN2/OUT2
	D2	IN3	IN3/OUT3
	D3	IN4	IN4/OUT4
PARAMETER BITS	P0	–	Watchdog on†/off
	P1	2 ms input filtering on/off†	2 ms input filtering on/off†
	P2	Synchronization on/off†	Synchronization on/off†
PERIPHERAL FAULT BIT		Input overload	Input/output overload
PROFILE	S-I0.ID.ID1.ID2	S-0.A.7.0	S-7.A.7.7
WEIGHT		100 g (3.5 oz)	150 g (5.3 oz)
AS-INTERFACE CONNECTION		M12 quick disconnect	M12 quick disconnect
AUXILIARY POWER CONNECTION		–	
I/O CONNECTION		M8 quick disconnect	M8 quick disconnect

† Default setting

⚡ Stocked item
Consult factory for all other models

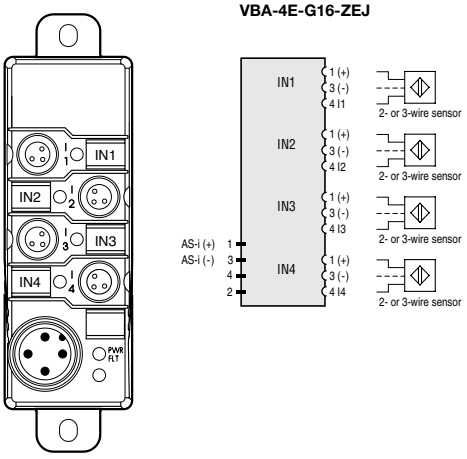
*Also Available

INPUTS/OUTPUTS	Model Number	Bases	Required Master Spec.	Profile S-I0.ID.ID1.ID2	Extended Addressing	Special Features
4-in/4-out	VAA-4E4A-G16-ZEJ/E2L ⚡	–	–	S-7.0.F.E	No	

Wiring Diagrams

Note: Wiring Diagrams show quick disconnect pin numbers.

VBA-4E-G16-ZEJ

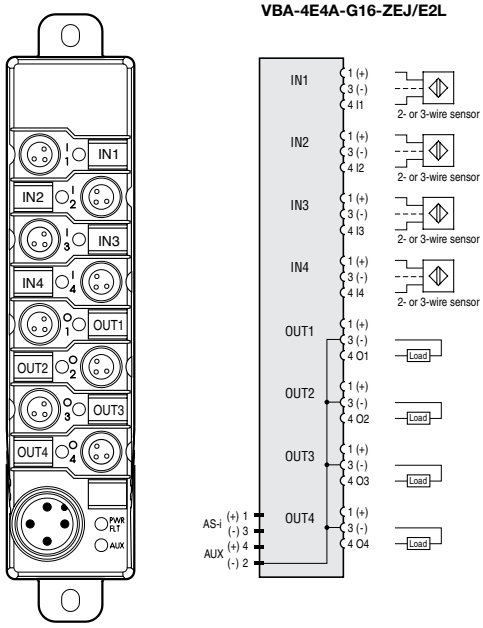


LED Indicators

I: Yellow: Input on

PWR/FLT: Green (solid): AS-Interface powered
Red (solid): Communication error
Yellow/Red (flashing): Address 0
Green/Red (flashing): Overload of input power

VBA-4E4A-G16-ZEJ/E2L



LED Indicators

I: Yellow: Input on

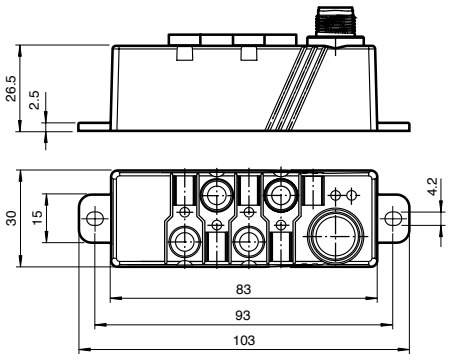
O: Yellow: Output on, Red: Output overload

PWR/FLT: Green (solid): AS-Interface powered
Red (solid): Communication error
Yellow/Red (flashing): Address 0
Green/Red (flashing): Overload of input power or outputs

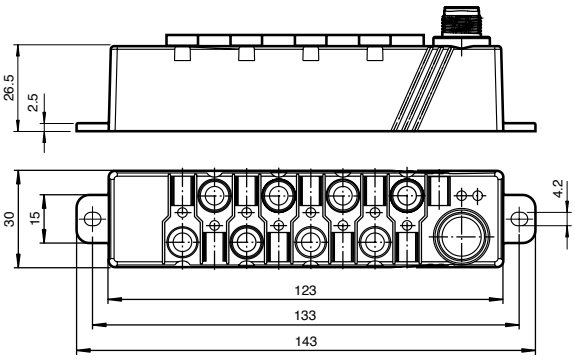
AUX: Green: Auxiliary powered
Red: Reverse polarity

Dimensions (mm)

VBA-4E-G16-ZEJ



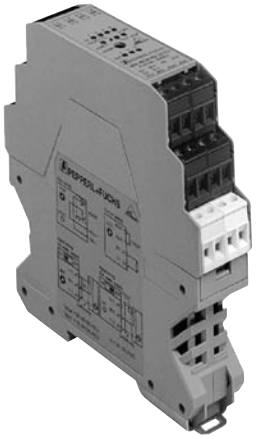
VBA-4E4A-G16-ZEJ/E2L



Accessories

VAZ-V3-B
V3 (M8 x 1) protective cover

See pages 201-216 for complete AS-Interface accessory listing.

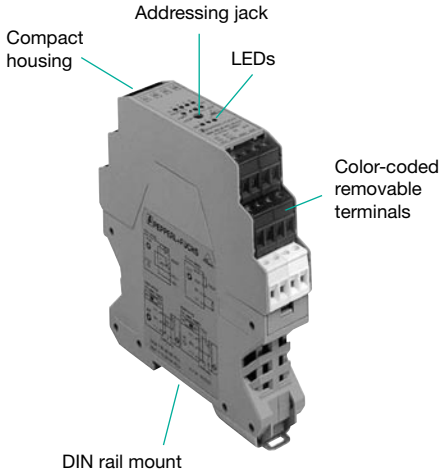


Enclosure
I/O Modules

- Color-coded removable terminals
- Choose between AS-Interface or externally powered inputs
- Class I, Division 2 approvals for electronic and relay outputs

Enclosure Module Overview

The KE modules have the following features: narrow housing, internal/external input power switch, color-coded removable terminals and advanced diagnostic capabilities. Special relays are used so that the modules can carry the Class I, Division 2 hazardous location approval. The AS-Interface network is signaled when a short occurs on the inputs or outputs. If the outputs are shorted, the inputs will still function and the reverse is also true. The module will automatically recover once the overload/short circuit is removed. Both standard versions and extended addressing versions are available for any application.



See pages 93-94 for Enclosure wiring and dimensions.

Common Specifications

OPERATING VOLTAGE AS-i		26.5-31.6 V
OPERATING VOLTAGE, V_{EXT}		12-30 VDC (inputs using EXT mode)
OPERATING VOLTAGE, V_{AUX}		20-30 VDC (electronic outputs)
INPUT SWITCHING FREQUENCY		≤ 250 Hz
INPUT DELAY		≤ 2 ms from input to AS-i
PROTECTION		IP20
HOUSING MATERIAL		PA 66-FR
RELATIVE HUMIDITY		90%, non-condensing
TEMPERATURE RANGE	*Working*	-13 ºF to +140 ºF (-25 ºC to +60 ºC)
	Storage	-13 ºF to +185 ºF (-25 ºC to +85 ºC)
APPROVALS	*Hazardous location**	c UL us Class I, Div. 2, Groups A, B, C, D
	General purpose	CE

Specifications

INPUTS/OUTPUTS	4-in	4-in/4-out	4-in/4-out (relay)
MODEL NUMBER(S)*	**VBA-4E-KE-ZE** ϟ	**VBA-4E4A-KE-ZE/E2** ϟ	**VBA-4E4A-KE-ZE/R** ϟ
EXTENDED ADDRESSING (62 NODES)	Yes	Yes	Yes
REQUIRED MASTER SPEC.	–	M4	M4
AS-i OPERATING CURRENT	30-180 mA	35-190 mA	35-210 mA
AUXILIARY CURRENT LIMIT	–	2.8 A	–
INPUTS *-ZE*	PNP, AS-i or V_{EXT} powered	PNP, AS-i or V_{EXT} powered	PNP, AS-i or V_{EXT} powered
TYPE	2-, 3-wire	2-, 3-wire	2-, 3-wire
SUPPLY VOLTAGE	21-31 V from AS-i, or V_{EXT}	21-31 V from AS-i, or V_{EXT}	21-31 V from AS-i, or V_{EXT}
MAXIMUM CURRENT	150 mA (when using AS-i power)	150 mA (when using AS-i power)	150 mA (when using AS-i power)
SWITCH POINT	OFF ≤ 2 mA, ON ≥ 4 mA	OFF ≤ 2 mA, ON ≥ 4 mA	OFF ≤ 2 mA, ON ≥ 4 mA
LOAD CURRENT	≤ 8 mA	≤ 8 mA	≤ 8 mA
ELECTRONIC OUTPUTS *-E2*	–	PNP, auxiliary powered	–
SUPPLY VOLTAGE	–	≥ (V_{AUX}-0.5 V)	–
CURRENT PER OUTPUT	–	≤ 0.7 A	–
RELAY OUTPUTS *-R*	–	–	Relay, SPST
NOMINAL LOAD PER CONTACT	–	–	2 A @ 30 VDC, 2 A @ 253 VAC
NOMINAL LOAD PER MODULE	–	–	8 A
SWITCH DELAY	–	–	< 10 ms
MAXIMUM SWITCHING OPERATIONS	–	–	5,000,000 (no load) 200,000 (250 VAC , 2 A, cos ø = 0.4)
CONTROL CIRCUIT	–	–	8 mA from AS-i per relay
DATA BITS *D0*	IN1	IN1/OUT1	IN1/OUT1
D1	IN2	IN2/OUT2	IN2/OUT2
D2	IN3	IN3/OUT3	IN3/OUT3
D3	IN4	IN4/OUT4	IN4/OUT4
PARAMETER BITS *P0*	–	–	Watchdog on†/off
P1	–	–	2 ms input filtering on/off†
P2	–	–	Synchronization on/off†
PERIPHERAL FAULT BIT	Input overload	Input/output overload	Input overload
PROFILE *S-IO.ID.ID1.ID2*	S-0.A.7.0	S-7.A.7.7	S-7.A.7.7
WEIGHT	150 g (5.3 oz)	150 g (5.3 oz)	170 g (6.0 oz)
AS-INTERFACE CONNECTION	Yellow removable terminals	Yellow removable terminals	Yellow removable terminals
AUXILIARY POWER CONNECTION	–	Gray removable terminals	–
I/O CONNECTION	Black removable terminals	Black removable terminals	Black removable terminals (input), red removable terminals (output)

† Default setting

ϟ Stocked item
Consult factory for all other models

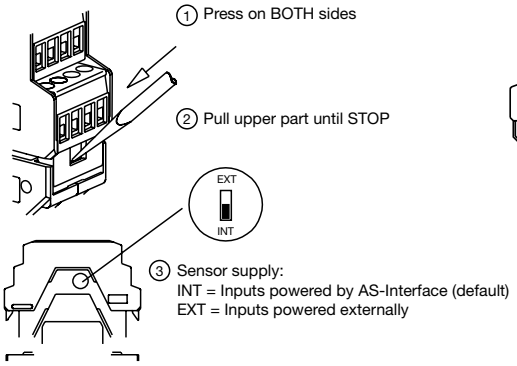
*Also Available

INPUTS/OUTPUTS	Model Number	Base	Required Master Spec.	Profile S-IO.ID.ID1.ID2	Extended Addressing	Special Features
4-in	**VBA-4E-KE-ZE0**	–	–	S-0.A.7.0	Yes	NPN
4-in/3-out	**VBA-4E3A-KE-ZE/E2**	–	M3, M4	S-7.A.7.0	Yes	Outputs 3 A or 1.5 A, 6 A total
4-in/3-out	**VBA-4E3A-KE-ZE0/E0**	–	M3, M4	S-7.A.7.0	Yes	NPN, outputs 3 A or 1.5 A, 6 A total
4-in/3-out (relay)	**VBA-4E3A-KE-ZE/R** ϟ	–	M3, M4	S-7.A.7.0	Yes	Relay outputs
4-in/4-out	**VAA-4E4A-KE-ZE/E2** ϟ	–	–	S-7.0.F.E	No	
4-in/4-out (relay)	**VAA-4E4A-KE-ZE/R** ϟ	–	–	S-7.0.F.E	No	Relay outputs

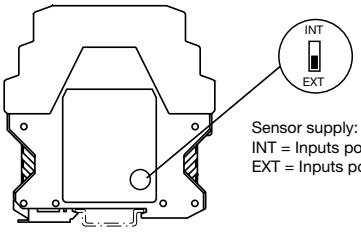
Wiring Diagrams

Switching Between AS-i and External Input Power

VBA-4E-KE-ZE



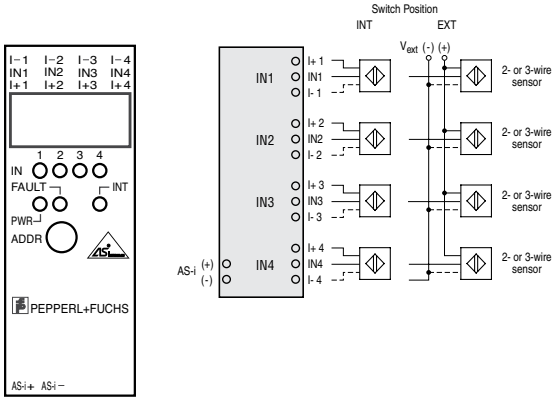
VBA-4E4A-KE-ZE/R
VBA-4E4A-KE-ZE/E2



ATTENTION
Do not connect the terminals I+, IN and I- with any external potential when switch set to "INT".

INT/EXT switchable under off-circuit conditions only

VBA-4E-KE-ZE



LED Indicators

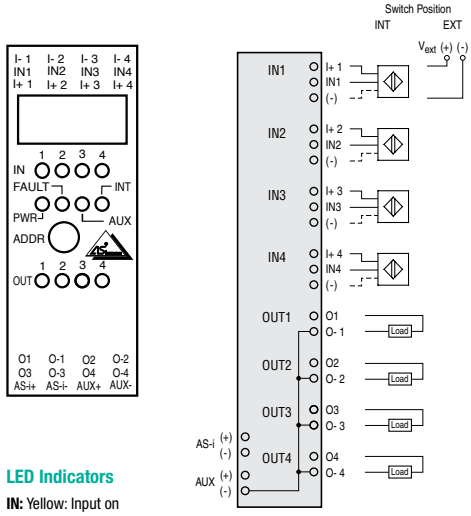
IN: Yellow: Input on

PWR: Green: AS-Interface powered

FAULT: Red (solid): Address 0 or no communication
Red (flashing): Overload of input power

INT: Yellow: Inputs powered by AS-Interface
Off: Inputs powered externally

VBA-4E4A-KE-ZE/E2



LED Indicators

IN: Yellow: Input on

OUT: Yellow: Output on

PWR: Green: AS-Interface powered

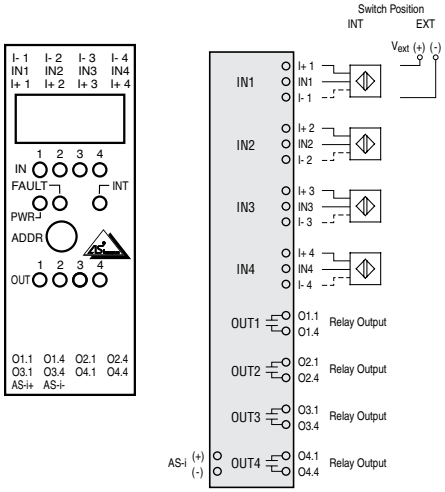
FAULT: Red (solid): Address 0 or no communication
Red (flashing): Overload of input power or outputs

INT: Yellow: Inputs powered by AS-Interface
Off: Inputs powered externally

AUX: Green: Auxiliary powered
Red: Reverse polarity

Wiring Diagrams

VBA-4E4A-KE-ZE/R



LED Indicators

IN: Yellow: Input on

OUT: Yellow: Output on

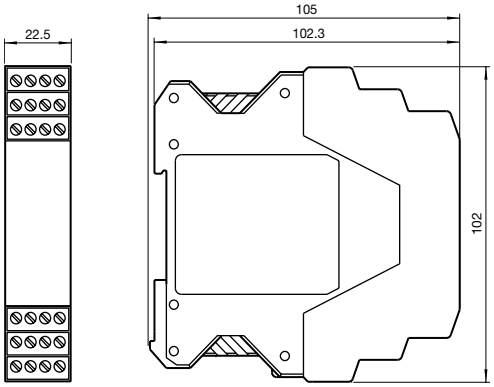
PWR: Green: AS-Interface powered

FAULT: Red (solid): Address 0 or no communication
Red (flashing): Overload of input power

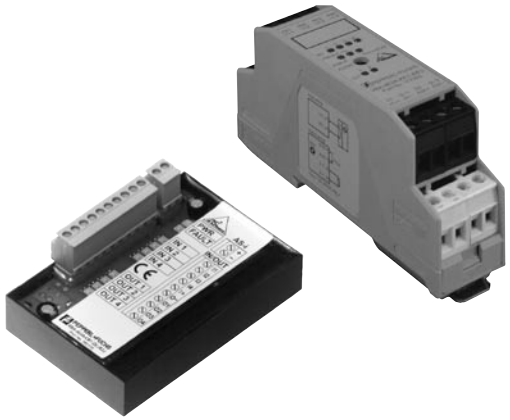
INT: Yellow: Inputs powered by AS-Interface
Off: Inputs powered externally

Dimensions (mm)

VBA-4E-KE-ZE
VBA-4E4A-KE-ZE/E2
VBA-4E4A-KE-ZE/R



See pages 201-216 for complete AS-Interface accessory listing.



Junction Box
I/O Modules

- 2- and 3-wire models
- AS-Interface and auxiliary powered options
- Lowest profile housing, 1” high including removable terminals

Junction Box Module Overview

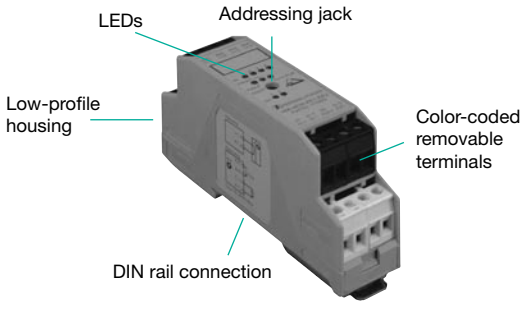
To ensure the correct fit for your applications, Pepperl+Fuchs offers the compact KE1 series modules.

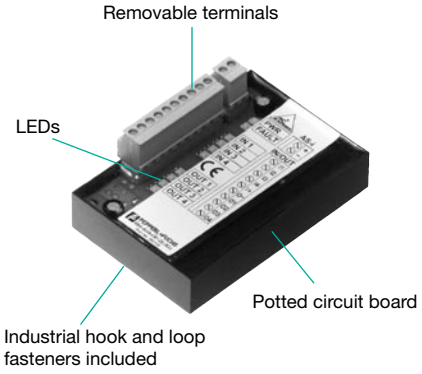
The KE1 series modules come in several input/output configurations. The housing, only 22.5 mm in width and 48.5 mm in height, takes up very little space in the junction box. The module is mounted by snapping onto the 35 mm DIN rail. Plug-in terminals are used for connection. LEDs on the front control plate are used to display the current switching state for each input.

The VBA-4E-KE1-Z connects to AS-Interface using a yellow removable terminal. Inputs are for 2-wire and dry contact type inputs only. The load current is limited internally to 8 mA.

The VBA-4E2A-KE1-Z/E2 connects to AS-Interface and external power using gray and yellow removable terminals. This makes it possible to separate power to individual modules or to disconnect power during commissioning or servicing. Inputs are for two-wire and dry contact type inputs only. The load current is limited internally to 8 mA.

The CB1 junction box module offers the lowest profile housing. Including the removable terminals the module only sits 25 mm high. It is uniquely mounted with dual-lock mounting strips eliminating the requirement for the extra space required for DIN rail. This 3.0 spec housing allows up to 62 nodes to be put on one network all having 4-in and 4-out. The completely encapsulated housing protects it from accidental damage.





See pages 97-98 for Junction Box Module wiring and dimensions.

Common Specifications

OPERATING VOLTAGE AS-i	26.5-31.6 V
OPERATING VOLTAGE, V_{AUX}	21.4-27.6 VDC
INPUT SWITCHING FREQUENCY	≤ 250 Hz
INPUT DELAY	≤ 2 ms from input to AS-i
PROTECTION	IP20
HOUSING MATERIAL	PA 66-FR
APPROVALS	CE cULus AS-i




Specifications

INPUTS/OUTPUTS		4-in (2-wire)	4-in/2-out (2-wire)	4-in/4-out (AUX powered)	4-in/4-out (AS-i powered)
MODEL NUMBER(S)*		**VBA-4E-KE1-Z** ⚡	**VBA-4E2A-KE1-Z/E2** ⚡	**VAA-4E4A-KE1-Z/E2** ⚡	**VBA-4E4A-CB1-ZEJ/E2J** ⚡
EXTENDED ADDRESSING (62 NODES)		Yes	Yes	No	Yes
REQUIRED MASTER SPEC.		–	M3, M4	–	M4
AS-i OPERATING CURRENT		25-60 mA	25-60 mA	≤ 40 mA	30-180 mA
AUXILIARY CURRENT LIMIT		–	2 A, 3 A (T ≤ 104 °F)	2 A	–
INPUTS	*-Z, -ZEJ*	PNP, AS-i powered	PNP, AS-i powered	PNP, auxiliary powered	PNP, AS-i powered
		–	–	–	–
	TYPE	2-wire	2-wire	2-, 3-wire	2-, 3-wire
	SUPPLY VOLTAGE	21-31 V from AS-Interface	21-31 V from AS-Interface	V_{AUX}	21-31 V from AS-Interface
	MAXIMUM CURRENT	–	–	–	Limited by operating current
	SWITCH POINT	OFF ≤ 2 mA, ON ≥ 4 mA	OFF ≤ 2 mA, ON ≥ 4 mA	OFF ≤ 2 mA, ON ≥ 4 mA	OFF ≤ 0.5 mA, ON ≥ 2 mA
	LOAD CURRENT	≤ 8 mA	≤ 8 mA	≤ 8 mA	≤ 5 mA
OUTPUTS	*E2, E2J*	–	PNP, auxiliary powered	PNP, auxiliary powered	PNP, AS-i powered
		–	–	–	–
	SUPPLY VOLTAGE	–	≥ (V_{AUX}-0.5 V)	≥ (V_{AUX}-0.5 V)	21-31 V from AS-Interface
	CURRENT PER OUTPUT	–	≤ 1 A, ≤ 1.5 A (T ≤ 104 °F)	≤ 0.5 A	≤ 100 mA (≤ 140 mA total)
DATA BITS	*D0*	IN1	IN1/OUT1	IN1/OUT1	IN1/OUT1
	D1	IN2	IN2/OUT2	IN2/OUT2	IN2/OUT2
	D2	IN3	IN3	IN3/OUT3	IN3/OUT3
	D3	IN4	IN4	IN4/OUT4	IN4/OUT4
PARAMETER BITS	*P0*	–	–	–	Watchdog on†/off
	P1	–	–	–	2 ms input filtering on/off†
	P2	–	–	–	Synchronization on/off†
PERIPHERAL FAULT BIT		Input overload	Input/output overload	Output overload	Output overload
PROFILE	*S-IO.ID.ID1.ID2*	S-0.A.7.0	S-7.A.7.0	S-7.0.F.E	S-7.A.7.7
TEMPERATURE RANGE	*WORKING*	-13 °F to +185 °F (-25 °C to +85 °C)	-13 °F to +158 °F (-25 °C to +70 °C)	-13 °F to +140 °F (-25 °C to +60 °C)	-13 °F to +140 °F (-25 °C to +60 °C)
	STORAGE	-13 °F to +185 °F (-25 °C to +85 °C)	-13 °F to +185 °F (-25 °C to +85 °C)	-40 °F to +185 °F (-40 °C to +85 °C)	-40 °F to +185 °F (-40 °C to +85 °C)
WEIGHT		80 g (2.8 oz)	80 g (2.8 oz)	80 g (2.8 oz)	90 g (3.2 oz)
AS-INTERFACE CONNECTION		Yellow removable terminals	Yellow removable terminals	Removable cage tension spring terminals	Green removable terminals
AUXILIARY POWER CONNECTION		–	Gray removable terminals	Removable cage tension spring terminals	–
I/O CONNECTION		Black removable terminals	Black removable terminals	Removable cage tension spring terminals	Green removable terminals

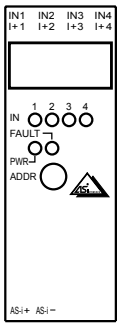
† Default setting

⚡ Stocked item
Consult factory for all other models

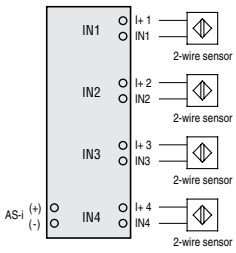
*Also Available

INPUTS/OUTPUTS	Model Number	Base	Required Master Spec.	Profile S-IO.ID.ID1.ID2	Extended Addressing	Special Features
4-in/4-out	**VAA-4E4A-CB1-Z/E2** ⚡	–	–	S-7.0.F.E	No	AS-i powered inputs and outputs
4-in/4-out	**VAA-4E4A-CB2-Z/E2**	–	–	S-7.0.F.E	No	Auxiliary powered inputs and outputs

Wiring Diagrams



VBA-4E-KE1-Z

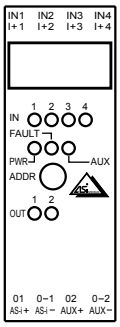


LED Indicators

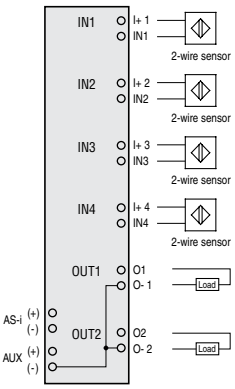
IN: Yellow: Input on

PWR: Green: AS-Interface powered

FAULT: Red (solid): Address 0 or no communication



VBA-4E2A-KE1-Z/E2



LED Indicators

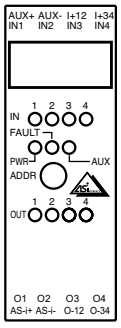
IN: Yellow: Input on

OUT: Yellow: Output on

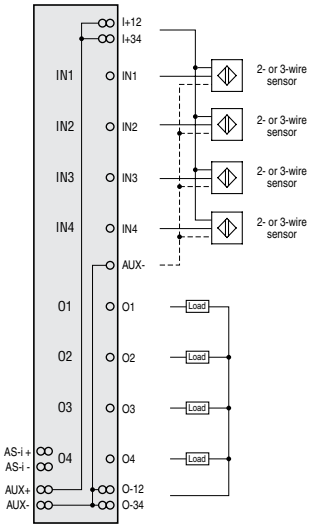
PWR: Green: AS-Interface powered

FAULT: Red (solid): Address 0 or no communication
Red (flashing): Overload of outputs

AUX: Green: Auxiliary powered



VAA-4E4A-KE1-Z/E2



LED Indicators

IN: Yellow: Input on

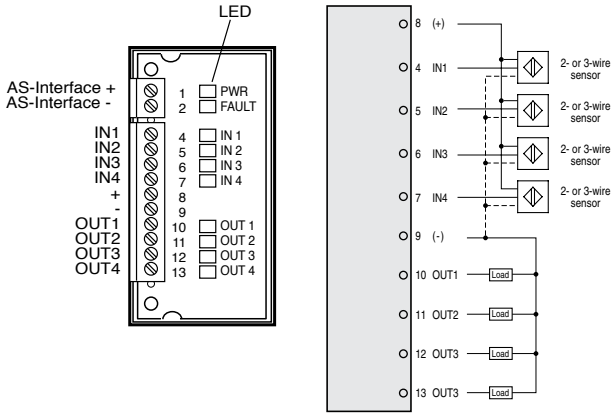
OUT: Yellow: Output on

PWR: Green: AS-Interface powered

FAULT: Red (solid): Address 0 or no communication
Red (flashing): Overload of outputs

AUX: Green: Auxiliary powered
Red: Reverse polarity

VBA-4E4A-CB1-ZEJ/E2J



LED Indicators

PWR: Green: AS-Interface powered

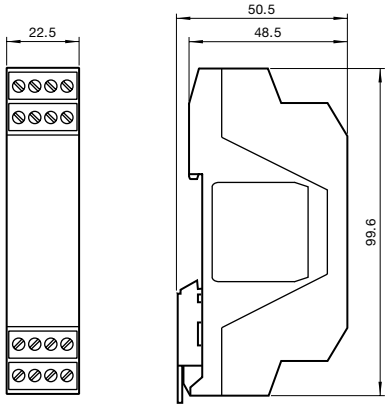
FAULT: Red (solid): Address 0 or no communicaiton
Red (flashing): Overload of outputs

IN: Yellow: Input on

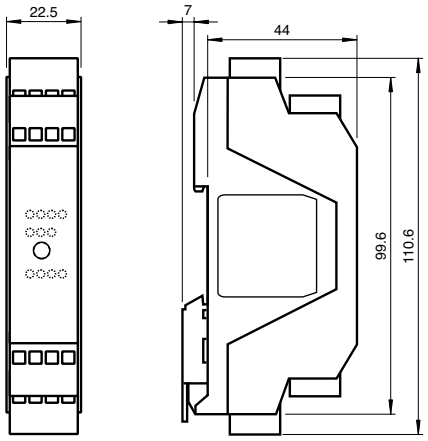
OUT: Yellow: Output on

Dimensions (mm)

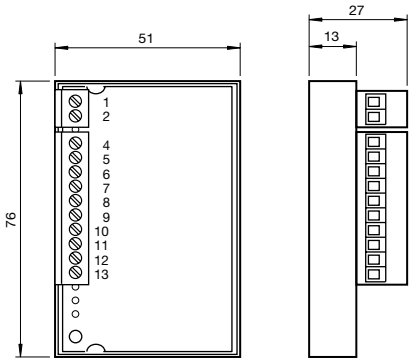
VBA-4E-KE1-Z
VBA-4E2A-KE1-Z/E2



VAA-4E4A-KE1-Z/E2



VBA-4E4A-CB1-ZEJ/E2J



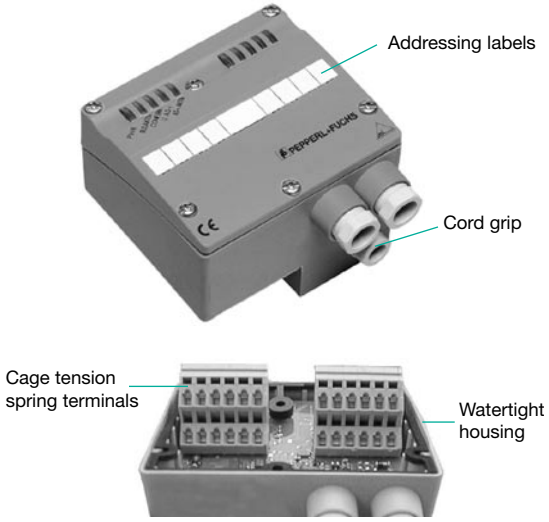
See pages 201-216 for complete AS-Interface accessory listing.

Analog
I/O Modules

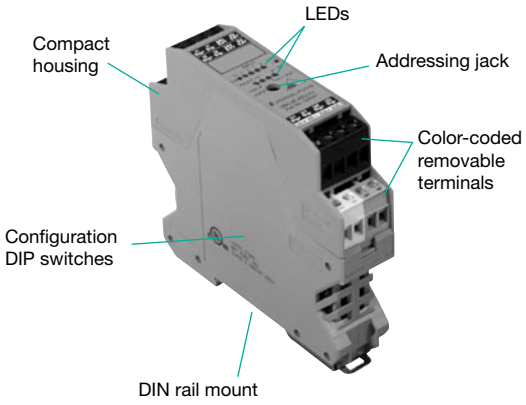
- **Monitor 4-20 mA, 0-10 V analog signals via AS-Interface**
- **Transmit analog values as simply as binary signals**
- **Automatic scaling 4000-20000 or 0-10000**
- **Modules with extended addressing now available**
- **12- and 14-bit resolution possible for fast response times**

Analog Module Overview

The transmission of analog values with AS-Interface is not completely revolutionary: it has been available for several years. However, the integration of analog values in real applications has not been as simple as that of binary values. With *Profile 7.3* and AS-Interface specifications greater than or equal to 2.1, it is possible to transmit analog values as simply as binary signals. The AS-Interface gateway/scanner puts the analog modules into operation in the same manner as the digital modules and starts data exchange automatically. The module transmits analog data, such as pressure and temperature, in interference-free digital signal form. The host system (PC, PLC, fieldbus, etc.) can read the 16-bit value directly out of the AS-Interface gateway/scanner.



Pepperl+Fuchs' AS-Interface analog modules have been developed for secure and direct connection of sensors and actuators according to the standardized Profile 7.3.



See pages 102-104 for Analog Module wiring and dimensions.

Common Specifications

OPERATING VOLTAGE AS-i		26.5-31.6 V
OPERATING VOLTAGE, V_{AUX}		21.4-27.6 VDC
PROTECTION		IP65, IP20 for KE2 module
HOUSING MATERIAL		PA 6 GF30, PA66-FR for KE2 module
TEMPERATURE RANGE	***Working****	+32 °F to +158 °F (0 °C to +70 °C)
	Storage	-13 °F to +185 °F (-25 °C to +85 °C)
APPROVALS		CE cULus

* VBA-2A-KE2-I/U working temp. is +32 °F to +131 °F (0 °C to +55 °C)

Specifications

INPUTS/OUTPUTS		2-in (analog I or V)	4-in (analog RTD)	2-out (analog I or V)
MODEL NUMBER(S)		**VBA-2E-G4-I** ⚡ **VBA-2E-G4-U** ⚡	**VBA-4E-G4-PT100**	**VBA-2A-G4-I** ⚡ **VBA-2A-G4-U** ⚡
BASES		U-G1FFA, U-G1PP	U-G1FFA, U-G1PP	U-G1FFA, U-G1PP
EXTENDED ADDRESSING (62 NODES)		No	No	No
REQUIRED MASTER SPEC.		M3, M4	M3, M4	M3, M4
AS-i CYCLES PER ANALOG CHANNEL		7	7	7
AS-i OPERATING CURRENT		80-170 mA	50 mA	80-170 mA
AUXILIARY CURRENT LIMIT		500 mA	–	500 mA
INPUTS	*-I, -PT100*	2 analog in 4-20 mA	4 RTDs -200 °C to +850 °C	–
	-U	2 analog in 0-10 V	–	–
	TYPE	2-, 3-, 4-wire	2-, 3-wire	–
	SUPPLY VOLTAGE	21-31 V from AS-i or from V_{AUX}	21-31 V from AS-i or from V_{AUX}	–
	MAXIMUM CURRENT	90 mA from AS-i or use V_{AUX}	–	–
	INPUT RESISTANCE	4-20 mA is 50 Ω, 0-10 V is 100 kΩ	–	–
	MAXIMUM INPUT LOAD	40 mA, 50 V	< 1.2 mA	–
	RESOLUTION	16 bit / 1 mV /1 µA	16 bit / 0.1 °C	–
	SCALING	4-20 mA (4000 to 20000), 0-10 V (0 to 10000)	-200 °C to +850 °C (-2000 to 8500)	–
OUTPUTS	*-I,*	–	–	2 analog out 0-20 mA
	-U	–	–	2 analog out 0-10 V
	TYPE	–	–	2-, 3-, 4-wire
	SUPPLY VOLTAGE	–	–	21-31 V from AS-i or from V_{AUX}
	MAXIMUM CURRENT	–	–	90 mA from AS-i or use V_{AUX}
	LOAD RESISTANCE	–	–	max 600 Ω (0-20 mA), min 3.3 kΩ (0-10V)
	RESOLUTION	–	–	16 bit / 1 mV /1 µA
	SCALING	–	–	0-20 mA (0 to 20000), 0-10 V (0 to 10000)
ANALOG DATA	*W1*	Analog Input 1	Analog Input 1	Analog Output 1
	W2	Analog Input 2	Analog Input 2	Analog Output 2
	W3	–	Analog Input 3	–
	W4	–	Analog Input 4	–
PARAMETER BITS	*P0*	Main power filter 50 Hz*, 60 Hz	Main power filter 50 Hz*, 60 Hz	–
	P1	2nd channel connected yes*/no	Channels connected selector, default all	2nd channel connected yes*/no
	P2	Peripheral fault bit reported yes*/no		Peripheral fault bit reported yes*/no
	P3	–	2-wire* or 3-wire mode	–
PERIPHERAL FAULT BIT		< 1 mA, > 23 mA, > 11.5 V	Input disconnected, analog out of range	> 23 mA, > 11.5 V
PROFILE	*S-IO.ID.ID1.ID2*	S-7.3.F.D	S-7.3.F.E	S-7.3.F.5
WEIGHT		350 g (12.4 oz)	350 g (12.4 oz)	350 g (12.4 oz)
AS-INTERFACE CONNECTION		Flat yellow or round cable	Flat yellow or round cable	Flat yellow or round cable
AUXILIARY POWER CONNECTION		Flat black or round cable	–	Flat black or round cable
I/O CONNECTION		Cage tension spring terminals	Cage tension spring terminals	Cage tension spring terminals

* Default setting

⚡ Stocked item
Consult factory for all other models



Specifications

INPUTS/OUTPUTS		2-in (analog I or V)	2-in (analog I or V)	2-out (analog I or V)
MODEL NUMBER(S)		**VBA-2E-KE2-I/U** ϟ	**VBA-2E-KE2-I/U-V3.0** ϟ	**VBA-2A-KE2-I/U** ϟ
EXTENDED ADDRESSING (62 NODES)		No	Yes	No
REQUIRED MASTER SPEC.		M3, M4	M4	M3, M4
AS-i CYCLES PER ANALOG CHANNEL		7	3 (12-bit) or 4 (14-bit)	7
AS-i OPERATING CURRENT		80-170 mA	80-170 mA	80-170 mA
AUXILIARY CURRENT LIMIT		500 mA	500 mA	500 mA
INPUTS	*-I/U,*	2 analog in 4-20 mA or 0-10 V	2 analog in 4-20 mA or 0-10 V	–
TYPE		2-, 3-, 4-wire	2-, 3-, 4-wire	–
SUPPLY VOLTAGE		21-31 V from AS-i or from V_{AUX}	21-31 V from AS-i or from V_{AUX}	–
MAXIMUM CURRENT		90 mA from AS-i or use V_{AUX}	90 mA from AS-i or use V_{AUX}	–
INPUT RESISTANCE		4-20 mA is 50 Ω, 0-10 V is 100 kΩ	4-20 mA is 50 Ω, 0-10 V is 100 kΩ	–
MAXIMUM INPUT LOAD		40 mA, 50 V	40 mA, 50 V	–
RESOLUTION		16 bit / 1 mV /1 µA	12 bit or 14 bit/ 1 mV /1 µA	–
SCALING		4-20 mA (4000 to 20000), 0-10 V (0 to 10000)	4-20 mA (4000 to 20000), 0-10 V (0 to 10000)	–
OUTPUTS	*-I/U,*	–	–	2 analog out 0-20 mA or 0-10 V
TYPE		–	–	2-, 3-, 4-wire
SUPPLY VOLTAGE		–	–	21-31 V from AS-i or from V_{AUX}
MAXIMUM CURRENT		–	–	90 mA from AS-i or use V_{AUX}
LOAD RESISTANCE		–	–	max 600 Ω (0-20 mA), min 3.3 kΩ (0-10V)
RESOLUTION		–	–	16 bit / 1 mV /1 µA
SCALING		–	–	0-20 mA (0 to 20000), 0-10 V (0 to 10000)
ANALOG DATA	*W1*	Analog Input 1	Analog Input 1 (address A)	Analog Output 1
	W2	Analog Input 2	Analog Input 2 (address A)	Analog Output 2
	W3	–	Analog Input 1 (address B)	–
	W4	–	Analog Input 2 (address B)	–
PARAMETER BITS	*P0*	Main power filter 50 Hz*, 60 Hz	Main power filter 50 Hz*, 60 Hz	Automatic output recognition* or set by parameter
	P1	2nd channel connected yes*/no	Both channels 4-20 mA or automatic input recognition*	Channel 1 current* or voltage
	P2	Peripheral fault bit reported yes*/no	Peripheral fault bit reported yes*/no	Peripheral fault bit reported yes*/no
	P3	Both channels 4-20 mA or automatic input recognition*	–	Channel 2 current* or voltage
PERIPHERAL FAULT BIT		< 1 mA (only in automatic mode), > 23 mA, > 11.5 V	< 1 mA (only in automatic mode), > 23 mA, > 11.5 V	> 23 mA, > 11.5 V
PROFILE	*S-I0.ID.ID1.ID2*	S-7.3.F.D	S-7.A.7.9†	S-7.3.F.5
WEIGHT		150 g (5.3 oz)	150 g (5.3 oz)	150 g (5.3 oz)
AS-INTERFACE CONNECTION		Yellow removable terminals	Yellow removable terminals	Yellow removable terminals
AUXILIARY POWER CONNECTION		Gray removable terminals	Gray removable terminals	Gray removable terminals
I/O CONNECTION		Black removable terminals	Black removable terminals	Black removable terminals

* Default setting

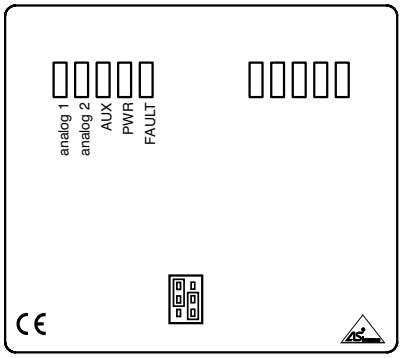
† See ID1 configuration table on page 103

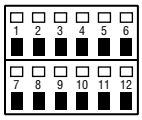
ϟ Stocked item
Consult factory for all other models

16 bits, 14 bits, or 12 bits of analog data are sent to or from the I/O modules. When only 14 bits or 12 bits of analog data are used, the least significant 2 bits or 4 bits are set to 0 respectively.

Analog data bits sent based on the reolution of the module																
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
16-bit (profile 7.3.x.x)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
14-bit (profile 7.A.x.x)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0	0
12-bit (profile 7.A.x.x)	x	x	x	x	x	x	x	x	x	x	x	x	0	0	0	0

Wiring Diagrams



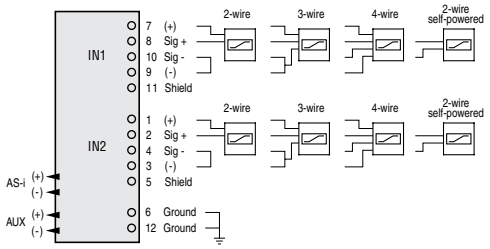


Plug-in jumper:

Power supply of inputs from the external auxiliary power

Power supply of inputs from the module (AS-Interface)

VBA-2E-G4-I
VBA-2E-G4-U



LED Indicators (VBA-2E-G4-I)

Analog: Green: 1 mA ≤ I ≤ 3 mA
Green (flashing): > 23 mA
OFF: < 1 mA or disconnected

PWR: Green: AS-Interface powered

FAULT: Red (solid): Address 0 or no communication
Red (flashing): Analog current out of range

AUX: Green: Power available to analog devices

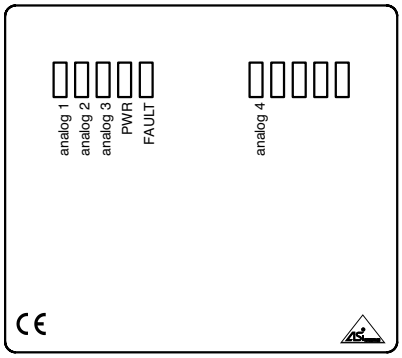
LED Indicators (VBA-2E-G4-U)

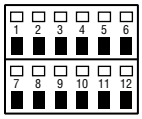
Analog: Green: 0 V ≤ V ≤ 11.5 V
Green (flashing): V > 11.5 V

PWR: Green: AS-Interface powered

FAULT: Red (solid): Address 0 or no communication
Red (flashing): Analog voltage out of range

AUX: Green: Power available to analog devices





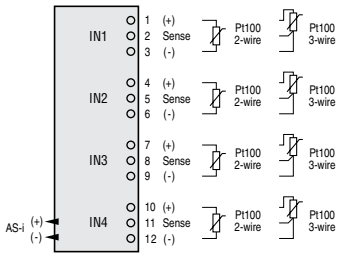
LED Indicators

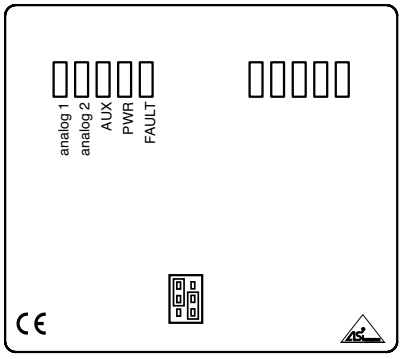
Analog: Green: -200 °C to +850 °C
Green (flashing): Out of range

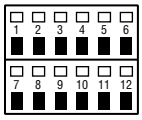
PWR: Green: AS-Interface powered

FAULT: Red (solid): Address 0 or no communication
Red (flashing): Temperature out of range

VBA-4E-G4-PT100





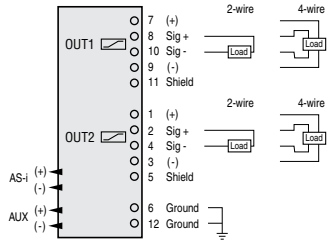


Plug-in jumper:

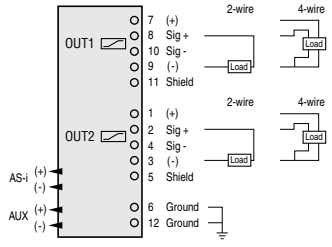
Power supply of outputs from the external auxiliary power

Power supply of outputs from the module (AS-Interface)

VBA-2A-G4-I



VBA-2A-G4-U



LED Indicators (VBA-2A-G4-I)

Analog: Green: 0 mA ≤ I ≤ 23 mA
Green (flashing): > 11.5 V
OFF: Disconnected

PWR: Green: AS-Interface powered

FAULT: Red (solid): Address 0 or no communication
Red (flashing): Analog current out of range

AUX: Green: Power available to analog devices

LED Indicators (VBA-2A-G4-U)

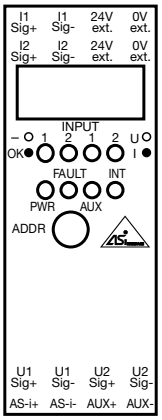
Analog: Green: 0 V ≤ V ≤ 11.5 V
Green (flashing): V > 11.5 V

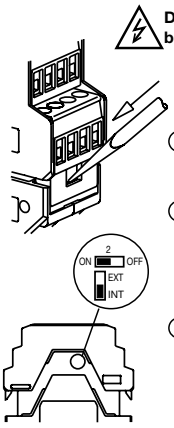
PWR: Green: AS-Interface powered

FAULT: Red (solid): Address 0 or no communication
Red (flashing): Analog voltage out of range

AUX: Green: Power available to analog devices

Wiring Diagrams





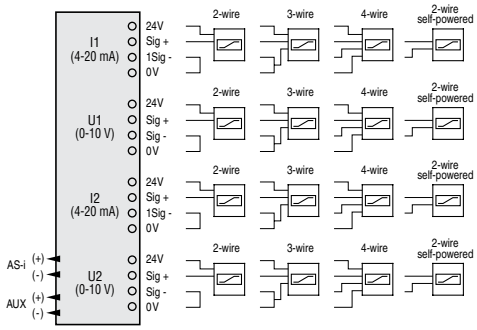
De-energize all connections before opening

① Press on BOTH sides

② Pull upper part until STOP

③ Set switches:
INT = Sensors powered by AS-Interface (default)
EXT = Sensors powered by AUX
2 ON = Channel 2 on
2 OFF = Channel 2 off

VBA-2E-KE2-I/U
VBA-2E-KE2-I/U-V3.0



LED Indicators

Analog OK: Green: 0 V ≤ V ≤ 11.5 V or 1 mA ≤ I ≤ 23 mA
Green (flashing): Out of range
Off: Not connected

Analog UI: Green: Analog current mode
Off: Analog voltage mode

PWR: Green: AS-Interface powered

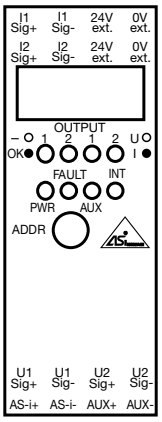
FAULT: Red (solid): Address 0 or no communication
Red (flashing): Analog current out of range

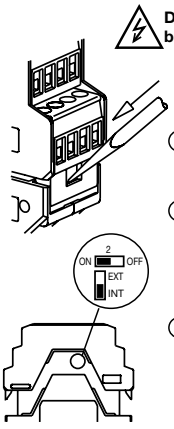
AUX: Green: Power available to analog devices

INT: Yellow: Inputs powered by AS-Interface
Off: Inputs powered by auxiliary

Special ID1 Settings for VBA-2E-KE2-I/U-V3.0

	14-bit	12-bit
Input 1 only	ID1 = (0,2,3)	ID1 = (1)
Input 1 and 2	ID1 = (4,5,7)	ID1 = (6)





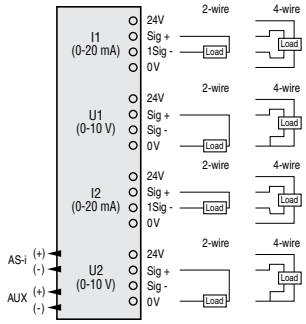
De-energize all connections before opening

① Press on BOTH sides

② Pull upper part until STOP

③ Set switches:
INT = Outputs powered by AS-Interface (default)
EXT = Outputs powered by AUX
2 ON = Channel 2 on
2 OFF = Channel 2 off

VBA-2A-KE2-I/U



LED Indicators

Analog OK: Green: 0 V ≤ V ≤ 11.5 V or 1 mA ≤ I ≤ 23 mA
Green (flashing): Out of range
Off: Not connected

Analog UI: Green: Analog current mode
Off: Analog voltage mode

PWR: Green: AS-Interface powered

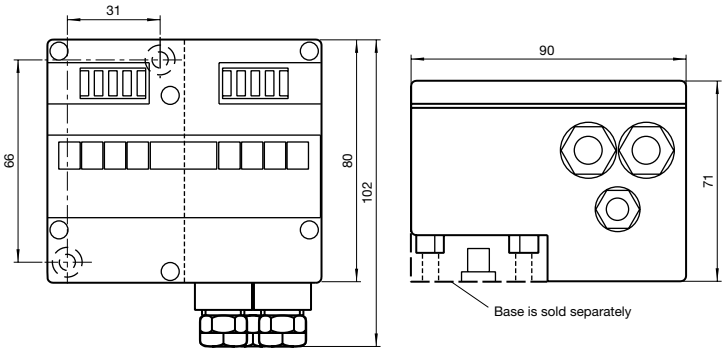
FAULT: Red (solid): Address 0 or no communication
Red (flashing): Analog current out of range

AUX: Green: Power available to analog devices

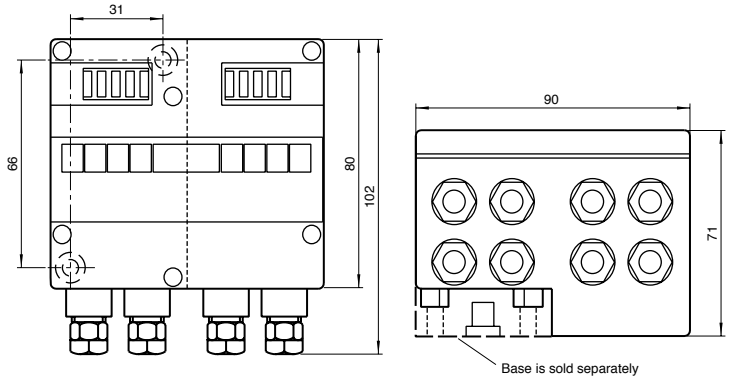
INT: Yellow: Inputs powered by AS-Interface
Off: Inputs powered by auxiliary

Dimensions (mm)

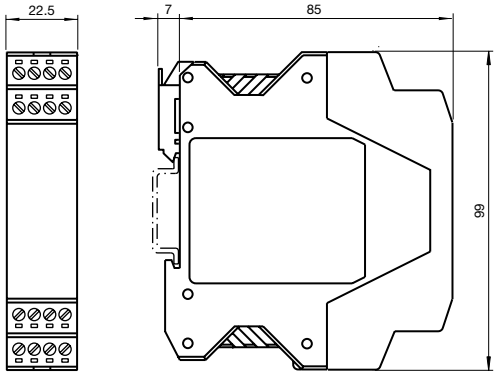
VBA-2A-G4-I
VBA-2A-G4-U
VBA-2E-G4-I
VBA-2E-G4-U



VBA-4E-G4-PT100

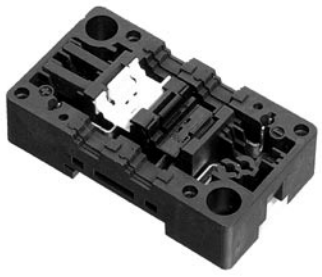


VBA-2E-KE2-I/U
VBA-2E-KE2-I/U-V3.0
VBA-2A-KE2-I/U



Accessories

U-G1FFA
Flat cable mounting base for black and yellow cables with addressing jack



U-G1PP
Round cable base with external power terminals

PG11 CORD GRIP
PG11 cord grip, includes nut and round cable grommet

PG11-1/2NPT
PG11 male to 1/2" NPT female conduit adapter

See pages 201-216 for complete AS-Interface accessory listing.

Pushbuttons and Stack Lights
I/O Modules

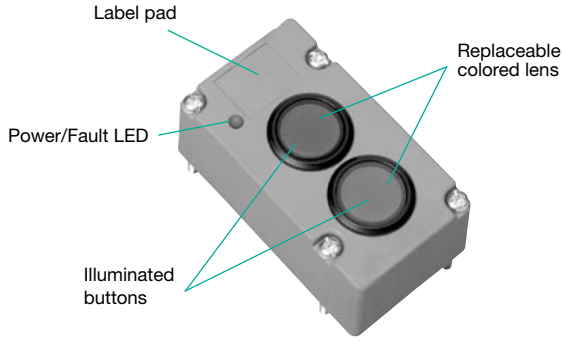
- User configurable housing for pushbutton, selector switches, and LEDs
- Up to 62 LT2 pushbutton stations on one network
- Red, yellow, blue, green, and clear stack light options
- 85 and 105 dBA audible alarms

Pushbutton and Stack Lights Overview

Illuminated pushbutton modules attach easily to AS-Interface without diminishing the simplicity of the system, providing a link between the maintenance personnel and AS-Interface. Pepperl+Fuchs offers I/O pushbutton modules for AS-Interface in two styles:

The VBA-LT2-G1 module features two LEDs that are integrated in the buttons. The LEDs are white with green and red lens covers.

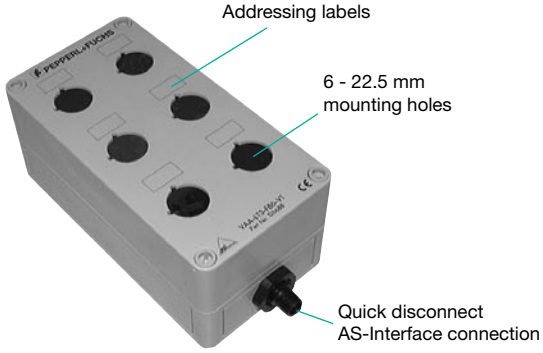
The module has an IP67 protection class and is especially suitable for use in the field. Use the U-G1FFA base to connect to the AS-Interface flat cable, or use the U-G1PP base to connect to the round cable. The VBA-LT2-G1 is fully powered from AS-Interface. The AS-Interface standardized base U-G1FFA includes an integrated addressing jack that allows easy connection to the hand-held addressing device.



The VAA-LT3-F86-V1 module is a user configurable pushbutton station for AS-Interface. The internal AS-Interface I/O module is ideally suited for integrating customer-specific electronics. Six 22.5 mm diameter holes can be used for any combination of pushbuttons, rotary selectors, key switches, and LED clusters that are typically used at operator call stations.

The inputs and outputs are protected against short circuits and overload. The connection to the AS-Interface is implemented by means of a micro (M12 x 1) quick disconnect.

Output overloads are relayed to the AS-Interface gateway/scanner via the “peripheral fault” function. Communication via the AS-Interface remains intact. The pushbutton module can be expanded to a total of 8 inputs/8 outputs by means of an additional printed circuit board module VAA-4E4A-CB1-Z/E2.



The stack light is a fully configurable system utilizing a 4-output AS-i node and up to four light/audible alarm modules. Lights can be used in any combination (including the same color multiple times) while each stack light can have only one audible alarm, which must be the last module. Power to the lights/alarm is switch selectable (internal from AS-Interface or external from AUX power). Status LEDs on the base output node provide detailed diagnostics information. The node is addressed using a standard cinch connector.

Specifications

INPUTS/OUTPUTS		2-in (pushbuttons)/2-out (LEDs)	6 knockouts for 4-in/4-out
MODEL NUMBER(S)		**VBA-LT2-G1** ⚡	**VAA-LT3-F86-V1**
BASES		U-G1FFA, U-G1PP	–
EXTENDED ADDRESSING (62 NODES)		Yes	No
REQUIRED MASTER SPEC.		M3, M4	–
OPERATING VOLTAGE AS-i		26.5-31.6 V	26.5-31.6 V
OPERATING VOLTAGE V_{AUX}		–	–
AS-i OPERATING CURRENT		≤ 50 mA	30-180 mA
INPUTS		PNP, AS-i powered	PNP, AS-i powered
	TYPE	Pushbuttons	2-, 3-wire
	SUPPLY VOLTAGE	21-31 V from AS-i	21-31 V from AS-i
	MAXIMUM CURRENT	–	Limited by operating current of module
	SWITCH POINT	–	OFF ≤ 1.5 mA, ON ≥ 4 mA
	LOAD CURRENT	–	≤ 8 mA
OUTPUTS		PNP, AS-i powered	PNP, AS-i powered
	SUPPLY VOLTAGE	21-31 V from AS-i	21-31 V from AS-i
	CURRENT PER OUTPUT	–	100 mA
	CURRENT PER MODULE	–	140 mA
DATA BITS	*D0*	LED 2 red	IN1/OUT1
	D1	LED 1 green	IN2/OUT2
	D2	Button 2 red	IN3/OUT3
	D3	Button 1 green	IN4/OUT4
PARAMETER BITS	*P0*	–	–
	P1	–	–
	P2	–	–
PERIPHERAL FAULT BIT		–	–
PROFILE	*S-IO.ID.ID1.ID2*	S-B.A.F.E	S-7.0.F.E
PROTECTION (IEC)		IP67	IP65 (when knockouts are covered)
TEMPERATURE RANGE	*Working*	32 °F to +158 °F (-25 °C to +60 °C)	32 °F to +104 °F (-25 °C to +40 °C)
	Storage	-40 °F to +185 °F (-40 °C to +85 °C)	-40 °F to +185 °F (-40 °C to +85 °C)
HOUSING MATERIAL		–	Polycarbonate
WEIGHT		110 g (3.9 oz)	80 g (5.3 oz)
APPROVALS		CE AS-i	CE AS-i
AS-INTERFACE CONNECTION		Flat yellow or round cable	M12 quick disconnect
AUXILIARY POWER CONNECTION		–	–
I/O CONNECTION		–	Terminals

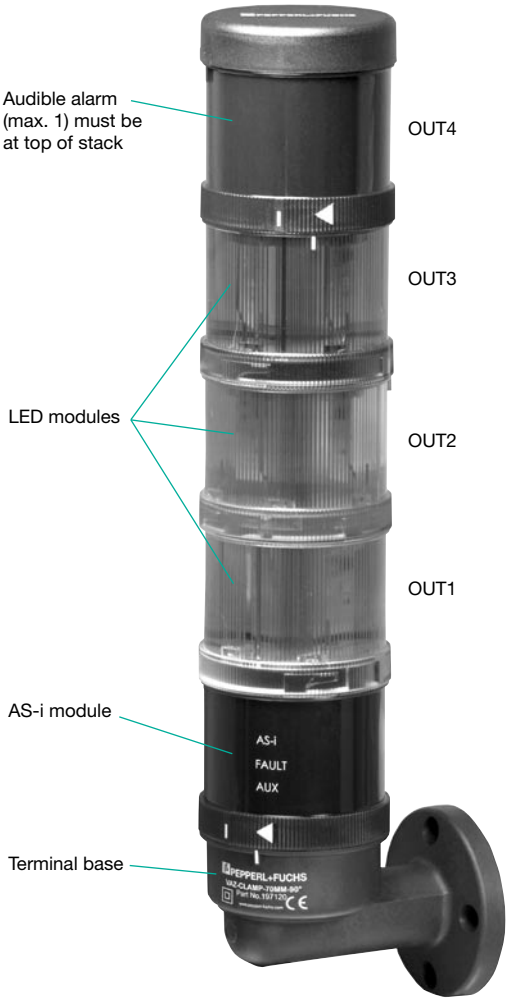
⚡ Stocked item
Consult factory for all other models

Specifications

INPUTS/OUTPUTS		4-out
MODEL NUMBER(S)		
AS-i Module (optional)		**VAA-4A-70MM** ⚡
LEDs and Audible Alarm (choose up to 4 with AS-i, 5 without AS-i)	*Red*	**VAZ-LED-70MM-RD** ⚡
	Red (flashing)	**VAZ-FLASH-70MM-RD**
	Yellow	**VAZ-LED-70MM-YE** ⚡
	Yellow (flashing)	**VAZ-FLASH-70MM-YE**
	Green	**VAZ-LED-70MM-GN** ⚡
	Blue	**VAZ-LED-70MM-BU**
	Clear	**VAZ-LED-70MM-CL**
	Alarm (85 dBA)	**VAZ-HORN-70MM-85DBA** ⚡
	Alarm (105 dBA)	**VAZ-HORN-70MM-105DBA**
Terminal base, mount and cover (choose 1 set)	*Tube mount (order both)*	**VAZ-CLAMP-70MM** ⚡ **VAZ-MH 100-70MM** ⚡
	90° mount (order both)	**VAZ-CLAMP-70MM-90°** ⚡ **VAZ-MH 90°-70MM** ⚡
EXTENDED ADDRESSING (62 NODES)		No
REQUIRED MASTER SPEC.		–
OPERATING VOLTAGE AS-i		26.5-31.6 V
OPERATING VOLTAGE V_{AUX}		21.4-27.6 VDC
AS-i OPERATING CURRENT		21-210 mA
AUXILIARY CURRENT LIMIT		≤ 300 mA
OUTPUTS		
SUPPLY VOLTAGE		From AS-i or AUX switchable
CURRENT PER OUTPUT		25 mA - green, blue, clear, 85 dBA alarm 30 mA - red, yellow 35 mA - red, yellow (flashing) 150 mA - 105 dBA alarm
DATA BITS	*D0*	OUT1
	D1	OUT2
	D2	OUT3
	D3	OUT4
PARAMETER BITS	*P0*	Watchdog on*/off
	P1	–
	P2	–
PERIPHERAL FAULT BIT		–
PROFILE	*S-I0.ID.ID1.ID2*	S-8.F.F.F
PROTECTION (IEC)		IP65, IP40 (using 105 dBA alarm)
TEMPERATURE RANGE	*Working*	-4 ºF to +122 ºF (-20 ºC to +50 ºC)
	Storage	-4 ºF to +122 ºF (-20 ºC to +50 ºC)
HOUSING MATERIAL		Polycarbonate
APPROVALS		CE cULus
AS-INTERFACE CONNECTION		Terminals
AUXILIARY POWER CONNECTION		Terminals (optional)

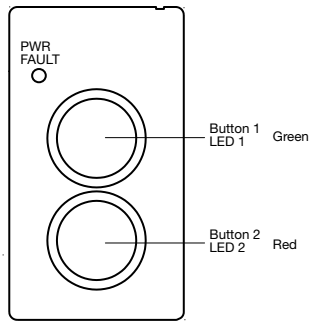
* Default setting

⚡ Stocked item
Consult factory for all other models



Wiring Diagrams

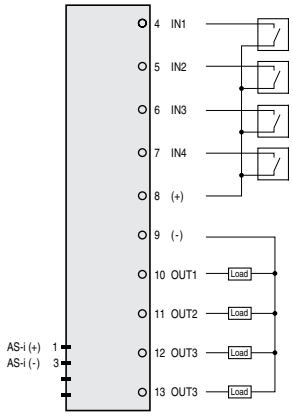
VBA-LT2-G1

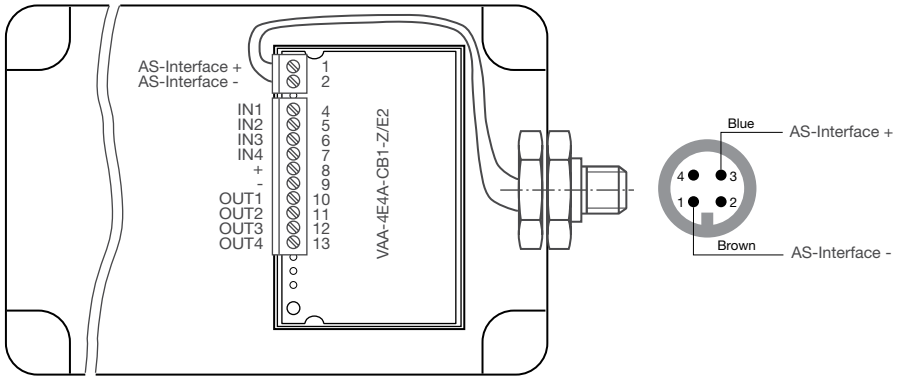


LED Indicators

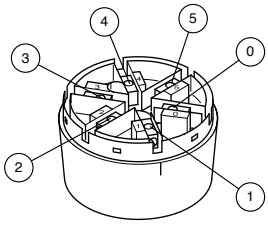
PWR/FAULT: Green: AS-Interface powered
Red (solid): Address 0 or no communication

VAA-LT3-F86-V1

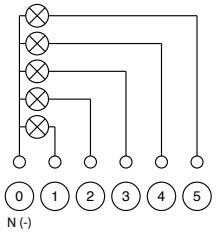


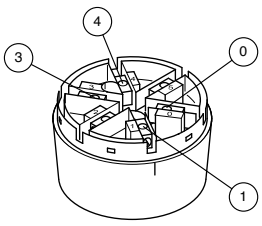


Stack lights



Without AS-Interface Module





With AS-Interface Module

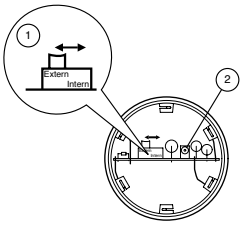
0 - AS-Interface

1 + AS-Interface

optional supply from V_{AUX}

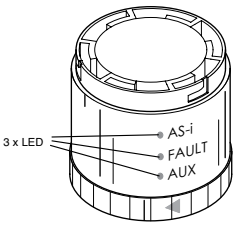
3 - V_{AUX}

4 + V_{AUX}



1 Switch

2 Addressing socket



LED Indicators

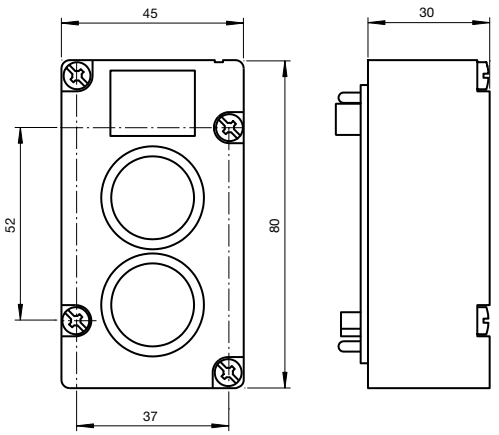
AS-i: Green: AS-Interface powered

FAULT: Red (solid): Address 0 or no communication

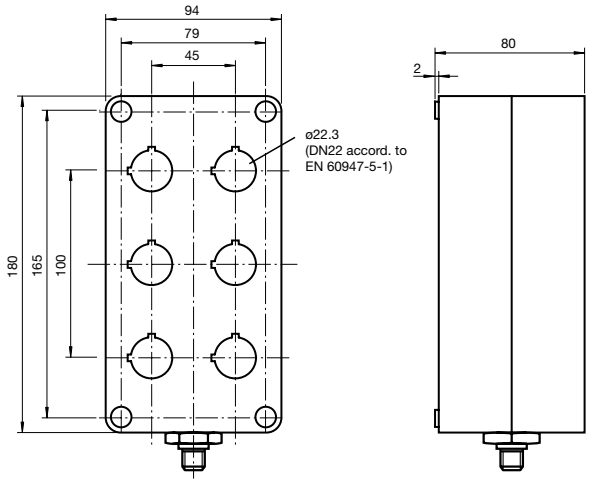
AUX: Green: Auxiliary powered

Dimensions (mm)

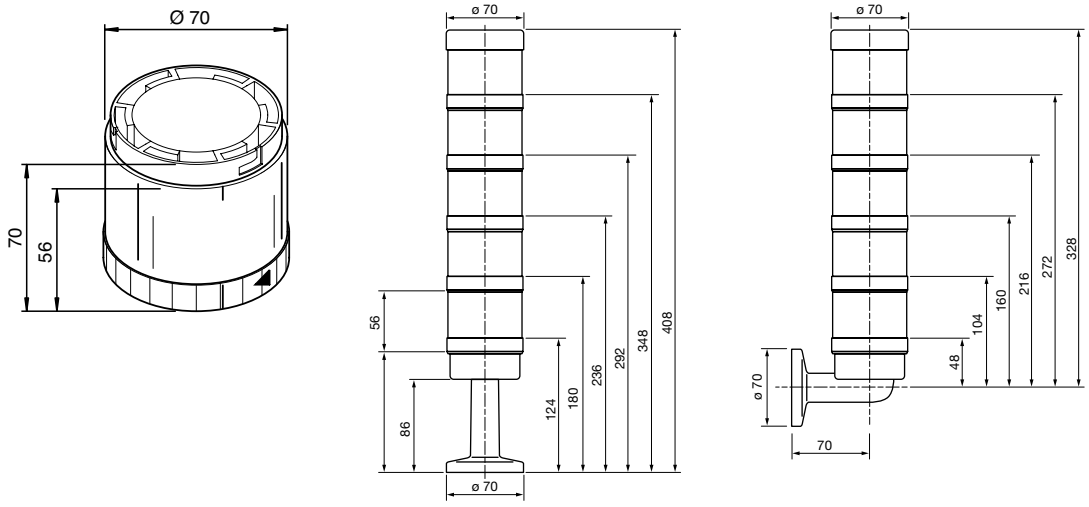
VBA-LT2-G1



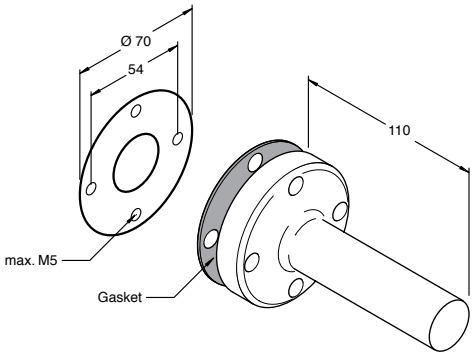
VAA-LT3-F86-V1



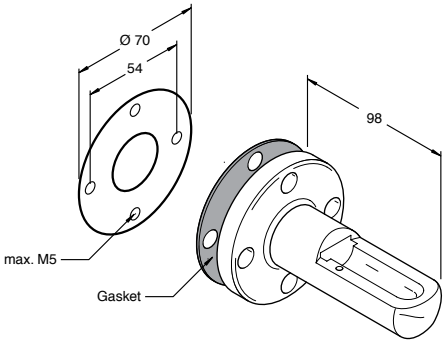
Stack lights



VAZ-MH 100-70MM



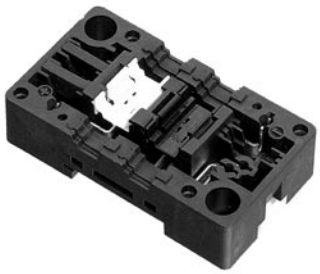
VAZ-MH 90°-70MM



Accessories

Pushbutton Module Accessories

U-G1FFA
Flat cable mounting base for black and yellow cables with addressing jack



U-G1PP
Round cable base with external power terminals

PG11 CORD GRIP
PG11 cord grip, includes nut and round cable grommet

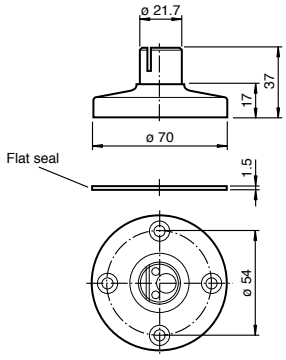
PG11-1/2NPT
PG11 male to 1/2" NPT female conduit adapter

Stack Light Accessories

VAZ-MH-1/2"Conduit-70MM
Connects tube mount base VAZ-CLAMP-70MM to 1/2" NPT conduit.

VAZ-TUBE400-70MM
A 400 mm long tube. Connects to tube mount base VAZ-CLAMP-70MM.

VAZ-TUBE-BASE-70MM
Mounting base for VAZ-TUBE400-70MM



See pages 201-216 for complete AS-Interface accessory listing.

Pneumatic
I/O Modules

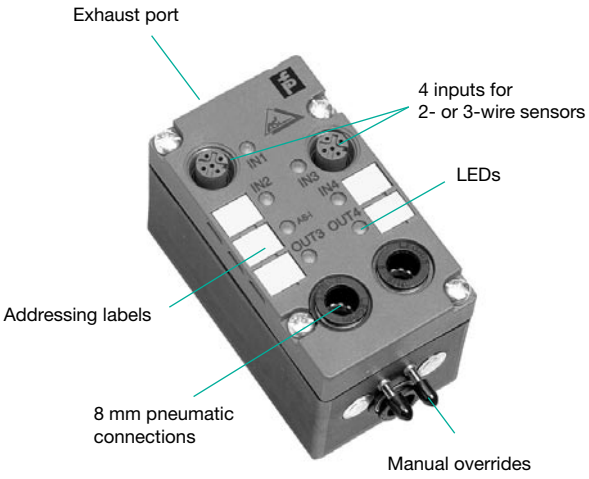
- 4 standard inputs and 2 pneumatic outputs
- Connects directly to pneumatic cylinders
- AS-Interface or externally powered outputs
- Flat or round cable AS-Interface connection
- Filter allows easy, direct exhaust to open air

Pneumatic Module Overview

Pepperl+Fuchs offers pneumatic modules that broaden the concept of integrated system components. Two single cylinders or one double-acting cylinder, for example, can be connected to a module of this series. You can wire up the input sockets directly with sensors (PNP, via M12 plugs) in 2- or 3-wire connection. The outputs (two 3/2-way valves) and the compressed air supply are connected to the module via an 8 mm plug-in tube connector.

Filtered (5 µm), oiled or unoiled compressed air (2 to 8 bar) must be used for correct operation.

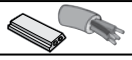
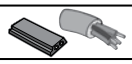
See page 113 for Pneumatic Module wiring and dimensions.



Common Specifications

OPERATING VOLTAGE AS-i		26.5-31.6 V
OPERATING VOLTAGE, V_{AUX}		21.4-27.6 VDC
PROTECTION		IP65
HOUSING MATERIAL		PBT
TEMPERATURE RANGE	*Working*	32 °F to +131 °F (0 °C to +55 °C)
	Storage	-4 °F to +185 °F (-20 °C to +85 °C)
APPROVALS		CE

Specifications

INPUTS/OUTPUTS		4-in/ 2-out (pneumatic AS-i powered)	4-in/2-out (pneumatic AUX powered)
MODEL NUMBER(S)*		VBA-4E2A-G1-ZE/P-S ⚡	VBA-4E2A-G1-ZE/PEXT-S
BASES		U-G1FFA, U-G1PP	
EXTENDED ADDRESSING (62 NODES)		Yes	
REQUIRED MASTER SPEC.		M3, M4	
AS-i OPERATING CURRENT		45-195 mA	45-145 mA
AUXILIARY CURRENT LIMIT		–	≤ 50 mA
INPUTS	-ZE	PNP, AS-i powered	
		–	
TYPE		2-, 3-, 4-wire	
SUPPLY VOLTAGE		21-31 V from AS-Interface	
MAXIMUM CURRENT		100 mA	
SWITCH POINT		OFF ≤ 1.5 mA, ON ≥ 5 mA	
LOAD CURRENT		≤ 8 mA	
OUTPUTS	P-S, PEXT-S	Pneumatic, AS-i powered	Pneumatic, AUX powered
SUPPLY VOLTAGE		From AS-Interface	From auxiliary
AIR VENTING		Sinter filter	
COMPRESSED AIR		2-8 bar, filtered (5 µm), oiled or unoiled	
AIR THROUGHPUT		550 Nl/min at 6/0 bar, 350 Nl/min at 6/5 bar	
CONNECTION		8 mm	
DATA BITS	D0	IN1/OUT1	
	D1	IN2/OUT2	
	D2	IN3	
	D3	IN4	
PARAMETER BITS	P0	–	
	P1	–	
	P2	–	
PERIPHERAL FAULT BIT		Input overload	
PROFILE	S-I0.ID.ID1.ID2	S-7.A.7.E	
WEIGHT		230 g (8 oz)	
AS-INTERFACE CONNECTION		 Flat yellow or round cable	
AUXILIARY POWER CONNECTION		–	 Flat black or round cable
I/O CONNECTION		 M12 quick disconnect and 8 mm pneumatic	

⚡ Stocked item
Consult factory for all other models

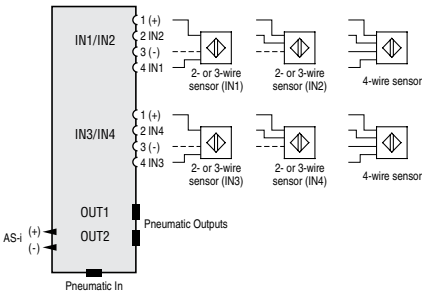
*Also Available

INPUTS/OUTPUTS	Model Number	Base	Required Master Spec.	Profile S-I0.ID.ID1.ID2	Extended Addressing	Special Features
4-in/2-out	VAA-4E2A-G1-ZE/P-S	U-G1FFA, U-G1PP	–	S-7.F.F.F	No	
4-in/2-out	VAA-4E2A-G1-ZE/PEXT-S	U-G1FFA, U-G1PP	–	S-7.F.F.F	No	Auxiliary powered outputs
2-in/2-out	VAA-2EA-G1-ZE/P-S	U-G1FFA, U-G1PP	–	S-3.F.F.F	No	
2-in/2-out	VAA-2EA-G1-ZE/P-V2A	U-G1FFA, U-G1PP	–	S-3.F.F.F	No	8 mm exhaust port, stainless steel

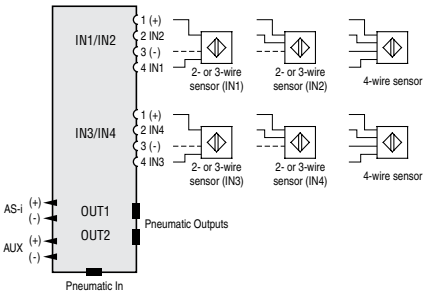
Wiring Diagrams

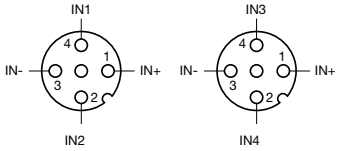
Note: Wiring Diagrams show terminal numbers.

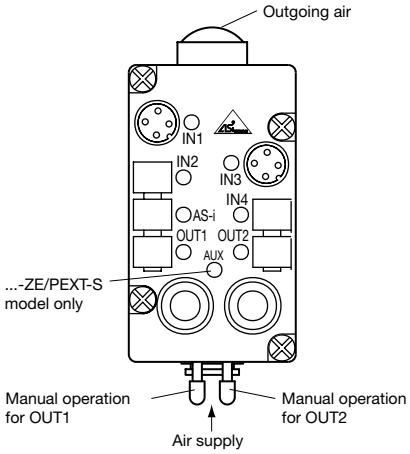
VBA-4E2A-G1-ZE/P-S



VBA-4E2A-G1-ZE/PEXT-S







LED Indicators

IN: Yellow: Input on

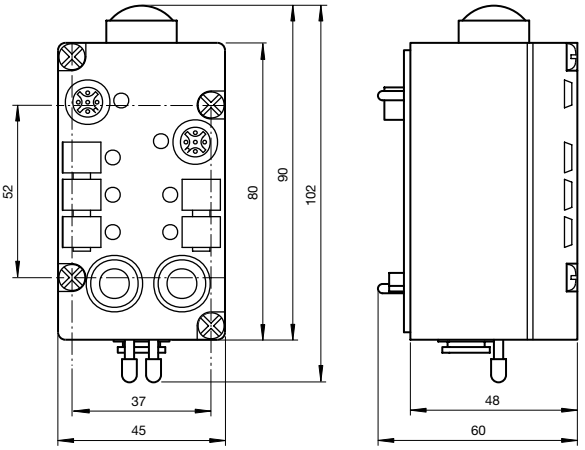
OUT: Yellow: Output on

Power: Green: AS-Interface powered

AUX: Green: Auxiliary powered (VBA-4E2A-G1-ZE/PEXT-S only)

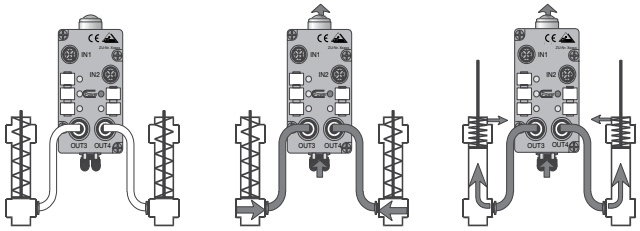
Dimensions (mm)

VBA-4E2A-G1-ZE/P-S
VBA-4E2A-G1-ZE/PEXT-S

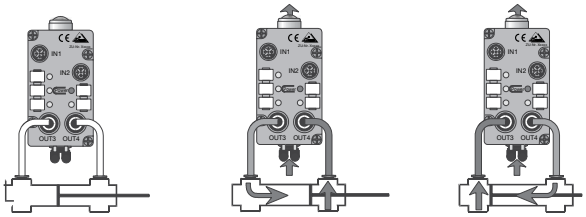


Example for AS-Interface Airbox Functions

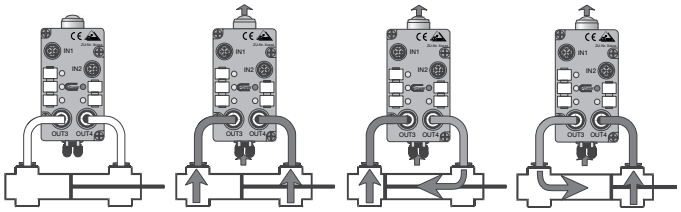
3/2-way valve



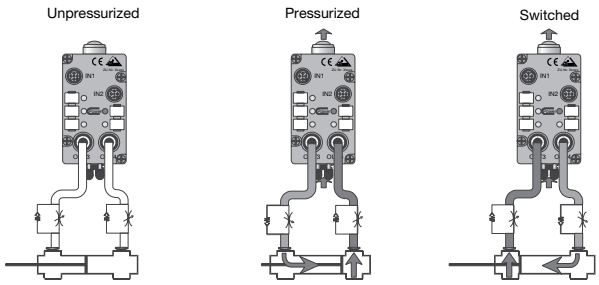
4/2-way valve



5/2-way valve

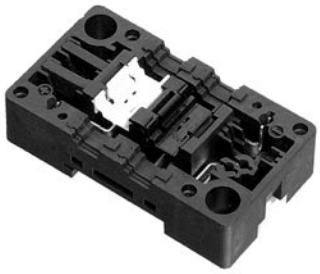


5/2-way valve



Accessories

U-G1FFA
Flat cable mounting base for black and yellow cables with addressing jack



U-G1PP
Round cable base with external power terminals

PG11 CORD GRIP
PG11 cord grip, includes nut and round cable grommet

PG11-1/2NPT
PG11 male to 1/2" NPT female conduit adapter

See pages 201-216 for complete AS-Interface accessory listing.

Drive Control
I/O Module

- 1-in/3-out in small cylindrical housing
- Included adapter to fit MOVIMOT® by SEW Eurodrive
- I/O Auxiliary powered

Drive Control Overview

Networks like AS-Interface are often used in decentralized control systems where a single AS-Interface module controls the functionality of a motor on a conveyor section.

Our AS-Interface module was specifically designed to control MOVIMOT® by SEW Eurodrive. MOVIMOT is a motor with a built-in digital frequency inverter. Because the drive is built into the motor, the AS-Interface module needs only to control the variable operation of the drive, including direction and speed. Our AS-Interface module for drive control can also be used for any application requiring 1 input and 3 outputs.

The 3 outputs on the module are often used to control motor Start/Stop, Forward/Reverse, and Fast/Slow. The input can be used to detect pallet presence on a power and free conveyor system, or any other common PNP/dry contact input.

Other options

Pepperl+Fuchs also offers other I/O modules particularly useful for drives. The flat module, VBA-2E2A-G2-ZEJ/XE2J (see page 76) is very useful for controlling two MOVISWITCH® drive inverters by SEW Eurodrive. The MOVISWITCH does not require any special motor starter, and the VBA-2E2A-G2-ZEJ/XE2J from Pepperl+Fuchs controls its on/off functionality directly from the field. What makes our VBA-2E2A-G2-ZEJ/XE2J so special is that it allows both inputs and outputs to be powered using AS-Interface, and each connector has an input and output both for easy wiring and control.

See page 116 for Drive Control wiring and dimensions.

Common Specifications

OPERATING VOLTAGE AS-i		26.5-31.6 V
OPERATING VOLTAGE, V_{AUX}		21.6 - 26.4 VDC
PROTECTION		IP67
HOUSING MATERIAL		Stainless Steel
TEMPERATURE RANGE	*Working*	32 °F to +158 °F (0 °C to +70 °C)
	Storage	-13 °F to +158 °F (-25 °C to +70 °C)
APPROVALS		CE

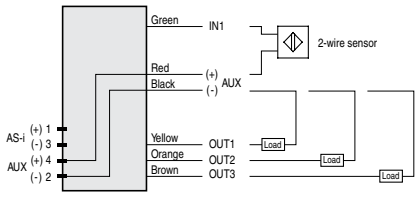
Specifications

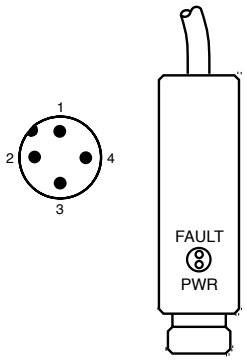
INPUTS/OUTPUTS		1-in/3-out (AUX powered)
MODEL NUMBER(S)		VBA-1E3A-M18-ZE/E2-V1
EXTENDED ADDRESSING (62 NODES)		Yes
REQUIRED MASTER SPEC.		M3, M4
AS-i OPERATING CURRENT		≤ 30 mA
AUXILIARY CURRENT LIMIT		≤ 68 mA
INPUTS		PNP, AS-i powered
TYPE		2-, 3-wire
SUPPLY VOLTAGE		from AUX
MAXIMUM CURRENT		–
SWITCH POINT		OFF ≤ 0.8 mA, ON ≥ 5 mA
LOAD CURRENT		≤ 8 mA
OUTPUTS		PNP, auxiliary powered
SUPPLY VOLTAGE		≥ (V_{AUX}-0.5 V)
CURRENT PER OUTPUT		≤ 20 mA
DATA BITS	*D0*	OUT1
	D1	OUT2
	D2	OUT3
	D3	IN1
PARAMETER BITS	*P0*	–
	P1	–
	P2	–
PERIPHERAL FAULT BIT		Input overload
PROFILE	*S-I0.ID.ID1.ID2*	S-9.A.7.E
	ID1	7
WEIGHT		110 g (3.9 oz)
AS-INTERFACE CONNECTION		M12 quick disconnect
AUXILIARY POWER CONNECTION		
I/O CONNECTION		0.2 m pigtail with flying leads

Stocked item
Consult factory for all other models

Wiring Diagrams

VBA-1E3A-M18-ZE/E2-V1





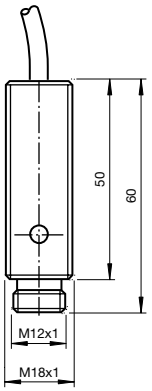
LED Indicators

FAULT: Red (solid): Address 0 or no communication

PWR: Green: AS-Interface powered

Dimensions (mm)

VBA-1E3A-M18-ZE/E2-V1



See pages 201-216 for complete AS-Interface accessory listing.

Safety Solutions

Overview

AS-Interface Safety at Work (SaW) is a system that enables networking of safety devices (safety door switches, emergency stop pushbuttons, safety lightarrays, etc.) using standard AS-Interface networks. With SaW, users can quickly implement a safety system that satisfies the rules and regulations needed for Category 4/SIL 3 Safety. The simplicity of AS-Interface is retained and is a major reason for users to implement SaW systems.

The following features make SaW unique and powerful:

- Control I/O and safety information on the same network
- Usable up to Safety Category 4 (SIL 3)
- Does not require a Safety PLC
- Automatic single SafetyNode replacement is supported
- SafetyMonitor allows implementation of powerful safety procedures
- Safe inputs and outputs both supported
- Scan one or two networks simultaneously
- Up to 16 safe independent output/coupling channels on a single network
- Adding additional safety devices is fast and easy

What is needed?

SaW utilizes AS-Interface's proven wiring design to transmit safety information (position of an e-stop, state of a blade switch, position of a key switch, etc.) from a SafetyNode to a SafetyMonitor. SafetyNode and SafetyMonitor are the only new hardware items needed to implement SaW. The AS-Interface Gateway/ Scanner and the AS-Interface power supply remain the same. The power supply and gateway/ scanner chosen enable communication over the network and reflect the parameters of the job (e.g, the upper-level network used, speed of application, etc.), but do not affect the safety level.

Safe Input modules

SafetyNodes are I/O modules that have been designed and constructed to satisfy the rules and regulations necessary to obtain desired safety ratings. This construction includes redundancy at the inputs and internal components. A SafetyNode transmits 4-bits of data like any other I/O module, but with the SafetyNode, the 4-bits transmitted from the module to the AS-Interface Gateway/Scanner follow special rules that allow the SafetyMonitor to determine whether an e-stop has been activated. The Gateway/Scanner evaluates this data in the same manner as the data from a 'nonsafe' I/O module. The SafetyMonitor takes the place of a Safety Relay in conventional hardwire systems.

Safe Output modules

Safety output modules work the opposite way that safe input modules do. The SafetyMonitor will generate an address that will be called the safe output channel. This safe output channel and a standard A/B address are programmed into the safety output module. The safety sequence will only be transmitted over the safe output channel when the SafetyMonitor determines that its configuration is safe. This information from the SafetyMonitor is then evaluated by the safe output module and the safe contacts are closed. If the SafetyMonitor determines that the machine must stop, all data bits that are

transmitted via the safe output channel are set to 0. Diagnostics and EDM inputs are all sent/connected through the inputs on the safety output module that can be monitored by the SafetyMonitor and PLC. Several safe output modules can be configured for the same safe output channel and, in that case, their safe contacts will all switch at the same time. An A/B standard address must however be unique for each safety output module used.

Safe Coupling

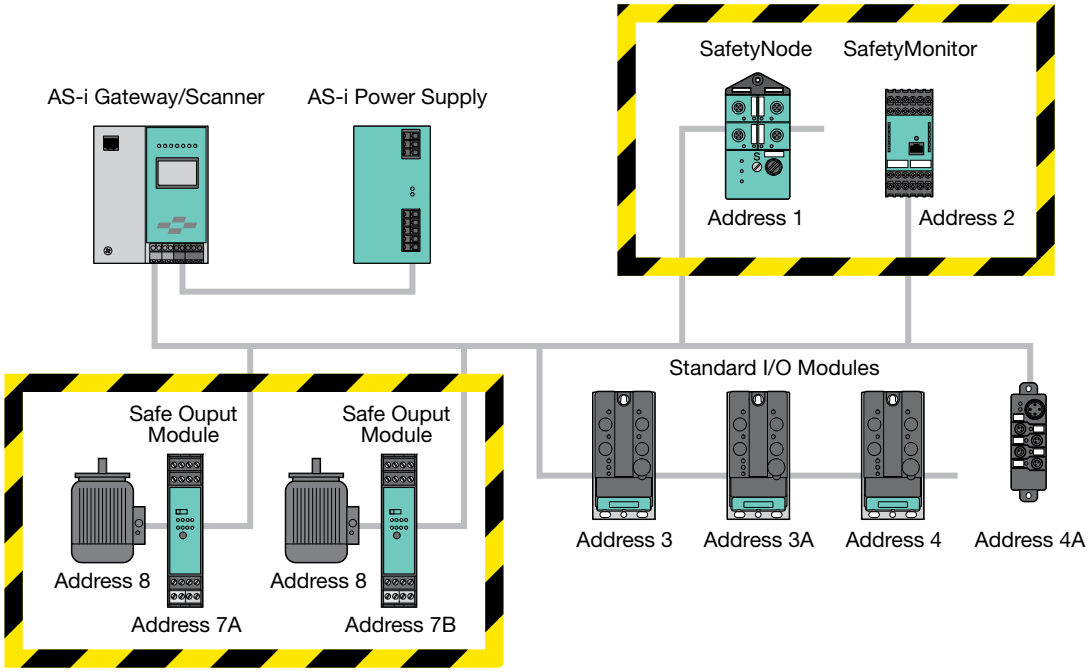
Safe Coupling is a term used to define a method of transmitting the state of one SafetyMonitor to another. A SafetyMonitor that needs to send the state of a channel will generate a safety address. It sends the safety sequence while running and sends 0000 when released. This safety address can be entered into the configuration of other SafetyMonitors allowing one SafetyMonitor to control another.

SafetyMonitors

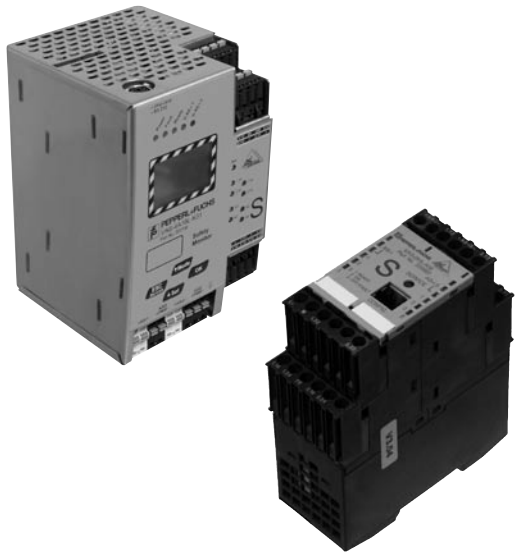
Constructed to meet safety requirements, the SafetyMonitor connects to the AS-Interface network like any other module, monitoring the data sent by AS-Interface modules on the network.

SafetyMonitor Configuration

SaW can be added to an existing AS-Interface system as long as the basic AS-Interface network rules are satisfied (see pages 21-25). In most cases, SaW is used along side standard I/O modules. All components are wired according to AS-Interface installation rules and the data from the Safety Nodes are evaluated in the same manner as any other I/O module on the network. The SafetyMonitor is added to the network as if it were a module. The SafetyMonitor is configured with the software package VAZ-SW-SIMON or VAZ-SW-SIMON+. This MS-Windows package offers a simple, user-friendly interface and supports drag & drop functionality. This software allows users to quickly configure a new SafetyMonitor, or retrieve an existing configuration from one, and make modifications to a configuration if the safety system has been changed. In addition, the software has powerful diagnostics tool. After configuration and start-up, the SafetyMonitor continuously monitors the data going over the AS-Interface network. If the monitor detects a discrepancy, it shuts down. The maximum time for the SafetyMonitor to open an OSSD (including the time it take for the relays to physically open) is 40 ms.



Two safe remote output modules share the safe address 8 thus switching simultaneously when the SafetyMonitor signals an on/off state. The two safe output modules also have a unique, standard A/B address to transmit standard inputs, EDM and diagnostics data.



Safety Monitors
Safety Solutions

- Connects to standard AS-Interface network
- Monitors status of safety inputs and sets safe outputs
- Safety requirements in accordance with category 4 to EN 954-1
- Comes with one or two redundant relay outputs, electronic outputs, and up to 16 safe output channels
- Safe coupling allows communication between safety monitors

Monitors Overview

Constructed to meet safety requirements, the SafetyMonitor monitors all SafetyNodes on the AS-Interface network and connects to the AS-Interface network like any other module.

NOTE: The SafetyMonitor is not an AS-Interface Gateway/Scanner. The primary functions of the SafetyMonitor are to evaluate the safe data from the safe input models, perform logic operations, and if needed activate internal or remote release circuits. Pepperl+Fuchs does offer safety monitors with integrated PROFIBUS gateways as well. See page 41 for details.

The SafetyMonitor contains the OSSDs (Output Signal Switching Devices, i.e., redundant set of safe relays or electronic outputs) that switch off the unsafe motion when an unsafe condition is detected.

It is not necessary to have the SafetyMonitor in close proximity to the SafetyNodes. The SafetyMonitor may be placed anywhere within the network. SafetyMonitors do not require a Node address. If the user wants to monitor the states of the OSSDs on a SafetyMonitor, the monitor itself will require an address.

There are two versions of SafetyMonitors available: 2-channel and 16-channel. The 2-channel versions have 1 or 2 sets of safe relay outputs and a safe output/coupling channel. This safe output/coupling channel can be used to turn on a safe output module or to couple to another SafetyMonitor.

The 16-channel SafetyMonitors come with 2 safe relay outputs and 2 safe electronic outputs. In addition to these integrated outputs, up to 16 safe output and coupling channels are possible. This makes it possible to release 16 different safe output groups and couple up to 16 other SafetyMonitors. This capability allows complete application flexibility. The 16-channel SafetyMonitors will also scan two networks, have an integrated memory card, integrated AS-i fault detector, and a graphical display and keypad.

See pages 121-122 for SafetyMonitor wiring and dimensions.

Specifications

NUMBER OF CHANNELS	16	2	
MODEL NUMBER(S)	VAS-4A16L-K31 ⚡	VAS-1A1L-K12 ⚡	VAS-2A1L-K12 ⚡
RESPONSE DELAY	40 ms	40 ms	
STARTUP DELAY	< 10 s	< 10 s	
EXTENDED ADDRESSING (62 NODES)	No	No	
REQUIRED MASTER SPEC.	M4	–	
OPERATING VOLTAGE AS-i	26.5-31.6 V	26.5-31.6 V	
OPERATING VOLTAGE V_{AUX}	21.4-27.6 VDC	21.4-27.6 VDC	
AS-i OPERATING CURRENT	45 mA	45 mA	
AUXILIARY CURRENT LIMIT	< 200 mA	< 200 mA	
INPUTS	4	2	
SUPPLY VOLTAGE	From AS-Interface	24 VDC	
LOAD CURRENT	≈ 4 mA	≈ 10 mA	
SAFE COUPLING CHANNELS	16	1	
SAFE OUTPUT CHANNELS	16		
OUTPUTS: Safe Relays	2	1	2
DRY CONTACT LOAD (RELAY)	DC-13, 1 A @ 30 VDC AC-15, 3 A @ 30 VAC	DC-13, 1 A @ 24 VDC AC-15, 3 A @ 230 VAC	
OUTPUTS: Safe Electronic	2	–	
LOAD CURRENT	0.5 A @ 30 VDC	–	
OUTPUTS: Non-Safe	–	1	2
LOAD CURRENT	–	< 200 mA at 24 VDC	
SERIAL INTERFACE	RS232: 19200, 8, n, 1	RS232: 9600, 8, n, 1	
PROFILE *S-IO.ID.ID1.ID2*	Base addr.(S-7.5.F.5), Simulated addr.(S-7.F.F.F), Safe coupling addr.(S-7.B.F.E), Safe output addr. (S-6.B.F.D)	Base addr.(S-7.F.F.F), Simulated addr.(S-7.F.F.F), Safe coupling addr.(S-7.B.1.F), Safe output addr. (S-6.B.0.D)	
PROTECTION (IEC)	IP20	IP20	
TEMPERATURE RANGE *WORKING*	+32 °F to +131 °F (0 °C to +55 °C)	-4 °F to +140 °F (-20 °C to +60 °C)	
TEMPERATURE RANGE *STORAGE*	-13 °F to +185 °F (-25 °C to +85 °C)	-22 °F to +158 °F (-30 °C to +70 °C)	
HOUSING MATERIAL	Stainless steel	PA 66	
WEIGHT	800 g (27 oz)	405 g (14 oz)	
APPROVALS	CE cULus TÜV approved up to cat.4 / SIL3 NFPA 79	CE cULus TÜV approved up to cat.4 / SIL3 NFPA 79	
AS-INTERFACE CONNECTION	Removable terminals	Removable terminals	

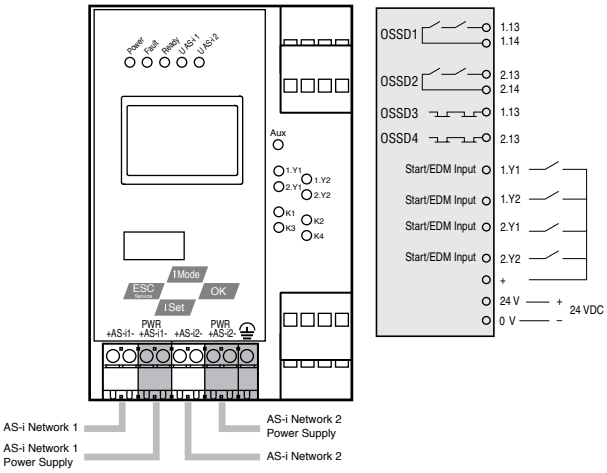
⚡ Stocked item
Consult factory for all other models

See Page 41 for PROFIBUS gateways with integrated 16 channel safety monitors: same functionality and diagnostics and no base address required.

Wiring Diagrams

Note: Wiring diagrams show terminal numbers.

VAS-4A16L-K31



LED Indicators

Power: Green: powered

Fault: Red (solid): Communication error on AS-i
Red (flashing): At least one OSSD released

Ready: Yellow (solid): Waiting for start condition
Yellow (flashing): Safety module test or local acknowledge required

UASI1: Green: AS-i power Okay

UASI2: Green: AS-i power Okay

Aux: Green: Power on

1.Yx, 2.Yx: Yellow: Input on

Kx: Yellow: OSSD on

Pushbuttons

↑ **Mode:** Switching between normal operating mode and configuration mode and moving up through display

↓ **Set:** Changes slave addresses in configuration mode and moves down through display

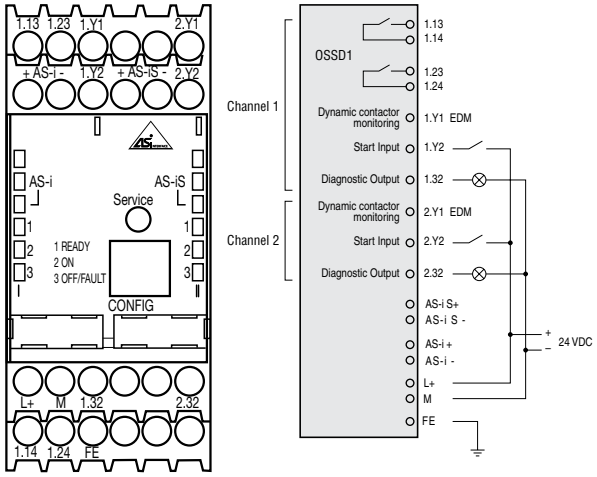
OK: Moves forward through graphical display and to accept changes

ESC: Moves backward through display

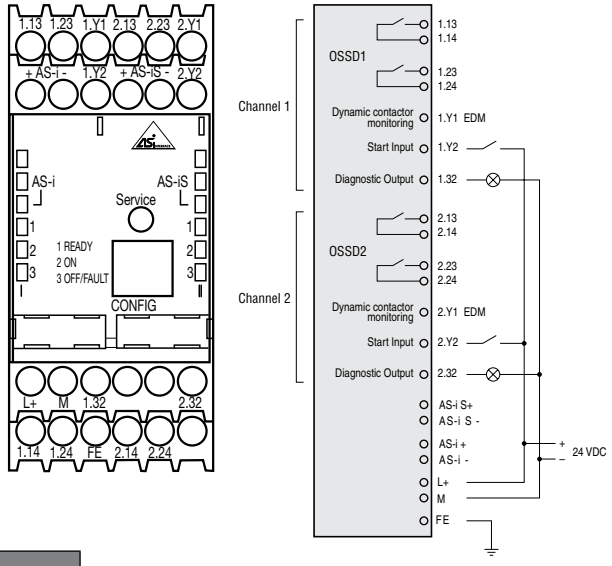
Display

Graphical Display: 4 line black and white display

VAS-1A1L-K12



VAS-2A1L-K12



LED Indicators

LED	Indication	Meaning
AS-i 1	Off	No 30 V AS-i connection to AS-i+ and AS-i- terminals
	On (Green)	Normal
AS-i 2	Off	Normal operation
	On (Red)	No AS-i communication or monitor address not stored in gateway/scanner
1 READY	On (Yellow)	Waiting for start condition or door unlock condition
	Flashing (Yellow)	Safety module test, local acknowledge required, or diagnostic stop enabled
2 ON	On (Green)	Contacts of the output switching elements closed
	Flashing (Green)	Delay time runs in event of Stop Category 1
3 OFF/FAULT	On (Red)	Contacts of the output switching elements open
	Flashing (Red)	Error on level of the monitored AS-i components
1 READY **2 ON** **3 OFF/FAULT**	Simultaneously flashing rapidly	Internal device error; power cycle is required
1 READY **2 ON** **3 OFF/FAULT**	Cycling slowly	Learning safety code sequences
1 READY **2 ON** **3 OFF/FAULT**	Off	No 24 V supply connected to L+ and M terminals

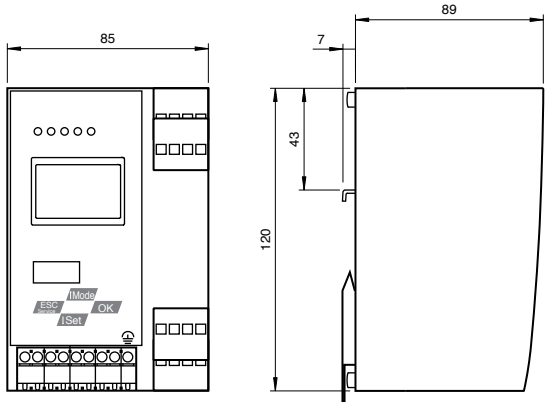
Service Button

Press to Clear faults, teach safety sequences of safety modules, swap safety monitors.

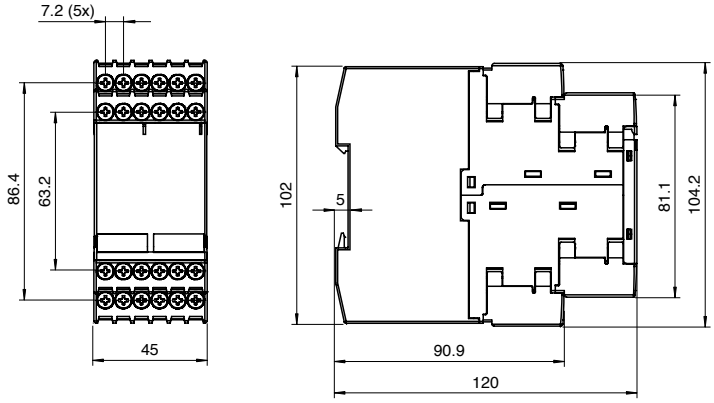
See manual for complete details.

Dimensions (mm)

VAS-4A16L-K31



VAS-1A1L-K12
VAS-2A1L-K12



Accessories

VAZ-SW-SIMON
Configuration software for VAS-...A1L-K12 SafetyMonitors. RS-232 configuration cable included.

VAZ-SW-SIMON+
Configuration software for VAS-4A16L-K31 SafetyMonitors. RS-232 configuration cable included.

VAZ-SIMON-RJ45
An interface cable for downloading configuration from one monitor to another (only used with VAS-...A1L-K12 models).

See pages 201-216 for complete AS-Interface accessory listing.

Safe Input/Output Modules
Safety Solutions

- Available in field and enclosure mount versions
- Easily connect existing safe components to modules
- Standard outputs can be controlled by PLC or directly by module
- Connect two safe inputs for Category 2 safety
- Connect one safe input for Category 3/4 safety

Safe Input/Output Modules Overview

SafetyNodes are I/O modules that have been designed and constructed to satisfy the rules and regulations necessary to obtain desired safety ratings. This construction includes redundancy at the inputs and internal components.

Safe Input modules

Typically, safe input modules are used to connect existing safety devices or muting sensors. Modules are available in a number of housing designs to accept dry contacts from an emergency stop or electronic outputs from a light curtain or muting sensor. Also safety input modules have the advantage of accepting two Category 2 inputs when a higher level of safety isn't necessary. The advantage is that two Category 2 e-stops, for example, would take up one AS-i address where two integrated AS-i e-stops would require two addresses.

Safe Output modules

The safety output module has the same safety output rating as a SafetyMonitor, but without programming. All of the programming and logic still resides on the SafetyMonitor itself. The safe output module should be viewed as a remote set of safe contacts controlled by the SafetyMonitor. These are often used to control motors locally and safely. Two addresses will be programmed into the safety output module. The first is the safe data channel that will control the safe operation of the module, and the second is an A/B address that is used for EDM inputs and diagnostics. Multiple modules can have the same safe data channel if required.

Safe output nodes can also be configured so that their safe relay output is controlled by the PLC. If there is a problem, the SafetyMonitor will act as an override and release the relay.

See pages 128-131 for Safety Solutions Safe Input/Output Modules wiring and dimensions.

Specifications		Safe Input (Dry Contact)	
INPUTS/OUTPUTS		**2-in (safe)**	**2-in (safe)/2-out**
MODEL NUMBER(S)		**VAA-2E-KE1-S** ϟ	**VAA-2E2A-KE1-S/E2** ϟ
EXTENDED ADDRESSING (62 NODES)		No	No
REQUIRED MASTER SPEC.		–	–
OPERATING VOLTAGE AS-i		26.5-31.6 V	26.5-31.6 V
OPERATING VOLTAGE V_{AUX}		–	20-30 VDC
AS-i OPERATING CURRENT		≤ 70 mA	≤ 70 mA
AUXILIARY CURRENT LIMIT		–	1 A
INPUTS	*-S*	Safety, dry contacts	Safety, dry contacts
TYPE		2-wire	2-wire
SUPPLY VOLTAGE		20-30 V from AS-i, pulsed	20-30 V from AS-i, pulsed
LOAD CURRENT		≤ 15 mA	≤ 15 mA
MAX. INPUT CABLE LENGTH		30 m each	30 m each
OUTPUTS	*E2*	–	PNP, auxiliary powered
SUPPLY VOLTAGE		–	≥ (V_{AUX}-0.5 V)
CURRENT PER OUTPUT		–	≤ 0.5 A
DATA BITS	*D0*	Input 1	Input 1/OUT1
	D1	Input 1	Input 1/OUT2
	D2	Input 2	Input 2
	D3	Input 2	Input 2
PARAMETER BITS	*P0*	–	Outputs controlled via AS-i* or inputs
	P1	–	–
	P2	–	–
PERIPHERAL FAULT BIT		–	Output overload
PROFILE	*S-I0.ID.ID1.ID2*	S-0.B.F.0	S-7.B.F.0
PROTECTION (IEC)		IP20	IP20
TEMPERATURE RANGE	*WORKING*	-13 ºF to +122 ºF (-25 ºC to +50 ºC)	-13 ºF to +122 ºF (-25 ºC to +50 ºC)
	STORAGE	-13 ºF to +185 ºF (-25 ºC to +85 ºC)	-13 ºF to +185 ºF (-25 ºC to +85 ºC)
HOUSING MATERIAL		PA 66-FR	PA 66-FR
WEIGHT		80 g (2.8 oz)	80 g (2.8 oz)
APPROVALS		CE cULus TÜV approved up to cat.4 / SIL3 NFPA 79	CE cULus TÜV approved up to cat.4 / SIL3 NFPA 79
AS-INTERFACE CONNECTION		Yellow removable terminals	Yellow removable terminals
AUXILIARY POWER CONNECTION		–	Gray removable terminals
I/O CONNECTION		Black removable terminals	Black removable terminals

* Default setting

ϟ Stocked item
Consult factory for all other models



Specifications		Safe Input (Dry Contact)		
INPUTS/OUTPUTS		**2-in (safe)**	**2-in (safe)/2-out**	
MODEL NUMBER(S)		**VAA-2E-G2-S**	**VAA-2E2A-G2-S/EA2** ⚡	**VAA-2E2A-G12-SAJ/EA2L** ⚡
BASES		U-G3FF	U-G3FF	Included
EXTENDED ADDRESSING (62 NODES)		No	No	
REQUIRED MASTER SPEC.		–	–	
OPERATING VOLTAGE AS-i		26.5-31.6 V	26.5-31.6 V	
OPERATING VOLTAGE V_{AUX}		–	20-30 VDC	
AS-i OPERATING CURRENT		≤ 70 mA	≤ 70 mA	
AUXILIARY CURRENT LIMIT		–	2 A	4 A
INPUTS	*-S, -SAJ*	Safety, dry contacts	Safety, dry contacts	
	TYPE	2-wire	2-wire	
	SUPPLY VOLTAGE	20-30 V from AS-i, pulsed	20-30 V from AS-i, pulsed	
	LOAD CURRENT	≤ 15 mA	≤ 15 mA	
	MAX. INPUT CABLE LENGTH	30 m each	30 m each	
OUTPUTS	*EA2, EA2L*	–	PNP, auxiliary powered	
	SUPPLY VOLTAGE	–	≥ (V_{AUX}-0.5 V)	
	CURRENT PER OUTPUT	–	≤ 1 A	≤ 2 A
DATA BITS	*D0*	Input 1	Input 1/OUT1	
	D1	Input 1	Input 1/OUT2	
	D2	Input 2	Input 2	
	D3	Input 2	Input 2	
PARAMETER BITS	*P0*	–	Outputs controlled via AS-i* or inputs	Watchdog on*/off
	P1	–	–	Outputs controlled via AS-i* or inputs
	P2	–	–	
PERIPHERAL FAULT BIT		–	Output overload	
PROFILE	*S-I0.ID.ID1.ID2*	S-0.B.F.0	S-7.B.F.0	
PROTECTION (IEC)		IP67	IP67	
TEMPERATURE RANGE	*WORKING*	-13 ºF to +131 ºF (-25 ºC to +55 ºC)	-13 ºF to +131 ºF (-25 ºC to +55 ºC)	
	STORAGE	-13 ºF to +185 ºF (-25 ºC to +85 ºC)	-13 ºF to +185 ºF (-25 ºC to +85 ºC)	
HOUSING MATERIAL		PBT-FR	PBT-FR	PBT
WEIGHT		100 g (3.5 oz)	100 g (3.5 oz)	
APPROVALS		CE cULus TÜV approved up to cat.4 / SIL3 NFPA 79	CE cULus TÜV approved up to cat.4 / SIL3 NFPA 79	
AS-INTERFACE CONNECTION		Flat yellow cable	Flat yellow cable	
AUXILIARY POWER CONNECTION		–	Flat black cable	
I/O CONNECTION		M12 quick disconnect	M12 quick disconnect	M12 SPEEDCON

* Default setting

⚡ Stocked item
Consult factory for all other models

Specifications		Safe Input (Electronic)
INPUTS/OUTPUTS		**2-in (safe)**
MODEL NUMBER(S)		**VAA-2E-G4-SE** ⚡
BASES		U-G1FFA, U-G1PP
EXTENDED ADDRESSING (62 NODES)		No
REQUIRED MASTER SPEC.		–
OPERATING VOLTAGE AS-i		26.5-31.6 V
OPERATING VOLTAGE V_{AUX}		21.4-27.6 VDC
AS-i OPERATING CURRENT		≤ 30 mA
AUXILIARY CURRENT LIMIT		2 A
INPUTS	*-SE*	Safety, electronic auxiliary powered
TYPE		3-wire, PNP
SUPPLY VOLTAGE		V_{AUX}
LOAD CURRENT		≤ 45 mA
MAX. INPUT CABLE LENGTH		30 m each
SWITCH POINT		OFF ≤ 5V/2 mA, ON ≥ 11 V/6 mA
TEST PULSE REQUIREMENTS		1% duty cycle, pulse duration max. 1 ms, 16 V min.
CAPACITANCE		≤ 10 nF
DATA BITS	*D0*	Input 1
	D1	Input 1
	D2	Input 2
	D3	Input 2
PARAMETER BITS	*P0*	–
	P1	–
	P2	–
PERIPHERAL FAULT BIT		–
PROFILE	*S-IO.ID.ID1.ID2*	S-0.B.F.E
PROTECTION (IEC)		IP67
TEMPERATURE RANGE	*WORKING*	-13 °F to +131 °F (-25 °C to +55 °C)
	STORAGE	-13 °F to +185 °F (-25 °C to +85 °C)
HOUSING MATERIAL		PA 6 GF30
WEIGHT		180 g (6.3 oz)
APPROVALS		CE cULus TÜV approved up to cat.4 / SIL3 NFPA 79
AS-INTERFACE CONNECTION		Flat yellow or round cable
AUXILIARY POWER CONNECTION		Flat black or round cable
I/O CONNECTION		Cage tension spring terminals

⚡ Stocked item
Consult factory for all other models

Pepperl+Fuchs Safety Light Curtains

- Versions available for finger, hand, and perimeter access detection
- Control-reliable and self-monitoring (conform to Type 4 according to IEC61496)
- Approvals: CUL, TÜV
- CE marked
- Integral diagnostics
- Signal reserve indication
- Enclosure rating: IP67
- Available with ATEX Approval for Ex Zone 2 and 22

(Refer to the Pepperl+Fuchs Machine Safety Products Selection Guide for further details.)

Specifications		Safe Output (Relay)
INPUTS/OUTPUTS		**4-in/1-out (safe)**
MODEL NUMBER(S)		**VBA-4E1A-KE3-ZEJ/SR** ⚡
RESPONSE DELAY		50 ms
EXTENDED ADDRESSING (62 NODES)		Yes
REQUIRED MASTER SPEC.		M3, M4
OPERATING VOLTAGE AS-i		26.5-31.6 V
OPERATING VOLTAGE V_{AUX}		–
AS-i OPERATING CURRENT		30-200 mA
AUXILIARY CURRENT LIMIT		–
INPUTS	*-ZEJ*	4 PNP, AS-i powered
TYPE		2-, 3-wire
SUPPLY VOLTAGE		26.5-31.6 V from AS-i
MAXIMUM CURRENT		90 mA
SWITCH POINT		OFF ≤ 2 mA, ON ≥4 mA
LOAD CURRENT		8 mA
OUTPUTS	*SR*	1 safe relay
DRY CONTACT LOAD (Relay)		DC-13, 3 A @ 24 VDC AC-15, 3 A @ 230 VAC
DATA BITS	*D0*	IN1/LED alarm
	D1	IN2/Safe Relay (if P1=0)
	D2	IN3 or output status (ID1=7 or F)
	D3	1.Y1
PARAMETER BITS	*P0*	-
	P1	Output controlled by PLC and safe output channel or by Safe output channel only*
	P2	D2 set on relay open* or D2 standard input (ID1 must be 7 or F to use P2 otherwise P2 not used)
PERIPHERAL FAULT BIT		Input overload
PROFILE	*S-I0.ID.ID1.ID2*	S.7.A.5**.F
PROTECTION (IEC)		IP20
TEMPERATURE RANGE	*WORKING*	+32 ºF to +131 ºF (0 ºC to +55 ºC)
	STORAGE	-13 ºF to +185 ºF (-25 ºC to +85 ºC)
HOUSING MATERIAL		PA 66-FR
WEIGHT		170 g (6.0 oz)
APPROVALS		CE cULus TÜV approved up to cat.4 / SIL3 NFPA 79
AS-INTERFACE CONNECTION		Yellow removable terminals
AUXILIARY POWER CONNECTION		–
I/O CONNECTION		Black removable terminals

* Default setting

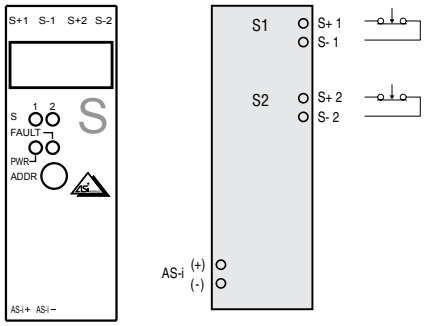
** ID1 is 5 then D2 is used as a standard input.
If ID1 is 7 or F then D2 is used to show the status of the safe relays.

⚡ Stocked item
Consult factory for all other models

Wiring Diagrams

Note: Wiring diagrams show terminal numbers.

VAA-2E-KE1-S



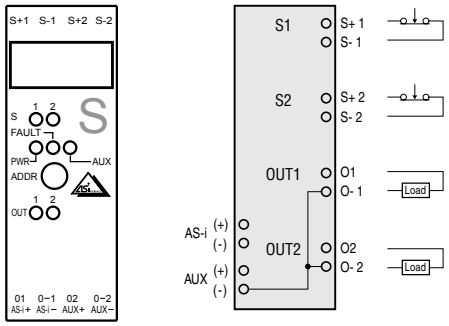
LED Indicators

IN: Yellow (solid or flashing very fast): Input on

PWR: Green: AS-Interface powered

FAULT: Red (solid): Address 0 or no communication

VAA-2E2A-KE1-S/E2



LED Indicators

IN: Yellow (solid or flashing very fast): Input on

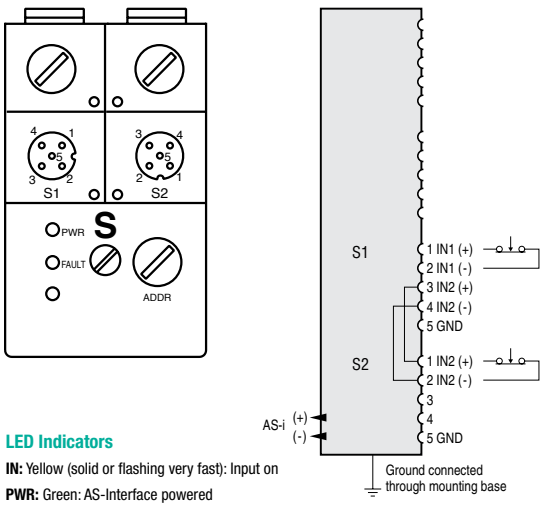
OUT: Yellow: Output on

PWR: Green: AS-Interface powered

FAULT: Red (solid): Address 0 or no communication
Red (flashing): Overload of outputs

AUX: Green: Auxiliary powered

VAA-2E-G2-S



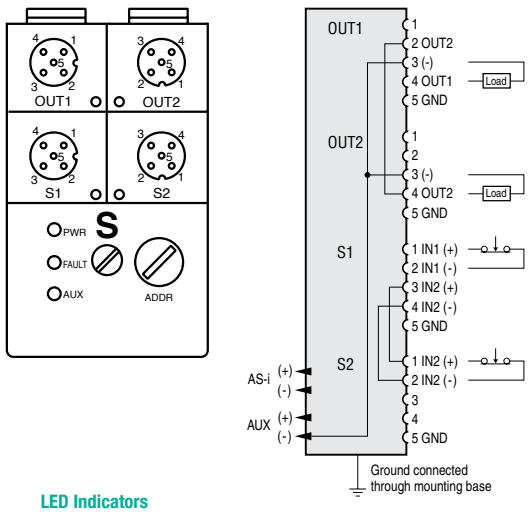
LED Indicators

IN: Yellow (solid or flashing very fast): Input on

PWR: Green: AS-Interface powered

FAULT: Red (solid): Address 0 or no communication

VAA-2E2A-G2-S/EA2



LED Indicators

IN: Yellow (solid or flashing very fast): Input on

OUT: Yellow: Output on

PWR: Green: AS-Interface powered

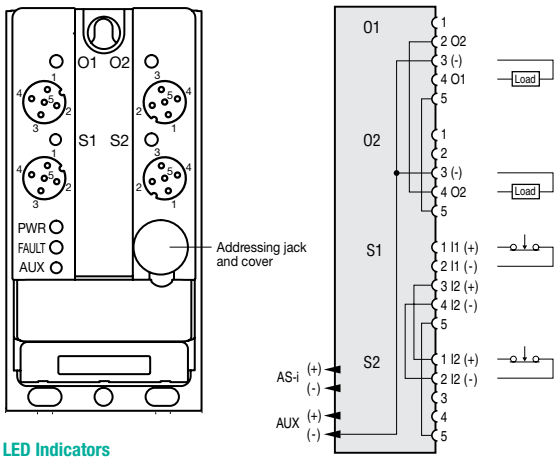
FAULT: Red (solid): Address 0 or no communication
Red (flashing): Overload of outputs

AUX: Green: Auxiliary powered

Wiring Diagrams

Note: Wiring diagrams show terminal numbers.

VAA-2E2A-G12-SAJ/EA2L



LED Indicators

IN: Yellow (solid or flashing very fast): Input on

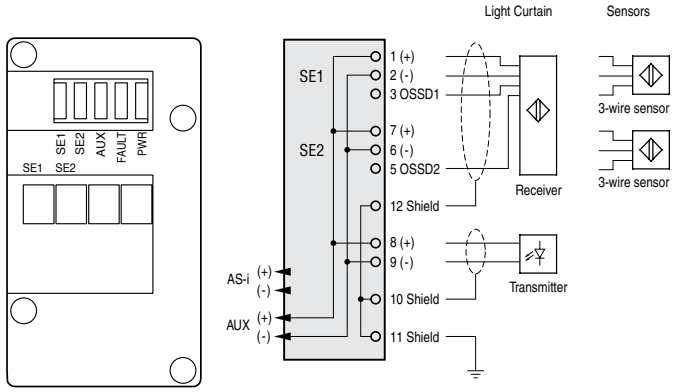
OUT: Yellow: Output on
Red: Output overload

PWR: Green (solid): AS-Interface powered
Green (flashing): Address 0

FAULT: Red (solid): Address 0 or no communication
Red (flashing): Overload of outputs

AUX: Green: Auxiliary powered

VAA-2E-G4-SE



LED Indicators

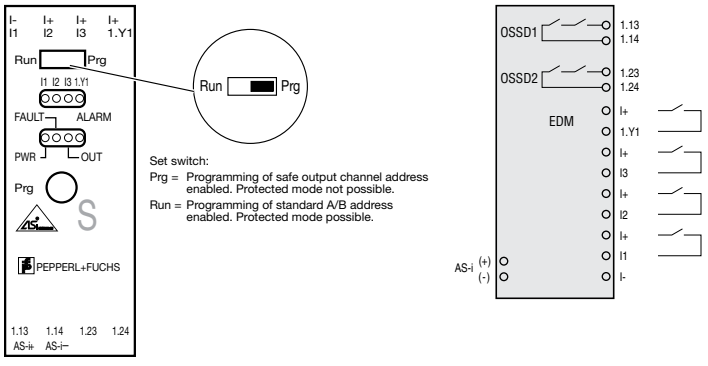
SE: Yellow: Input on

AUX: Green: Auxiliary powered

FAULT: Red (solid): Address 0 or no communication

PWR: Green: AS-Interface powered

VBA-4E1A-KE3-ZEJ/SR



LED Indicators

PWR: Off: No power
Green (solid): Power on
Green (flashing): Power on and address 0

FAULT: Red: No communication

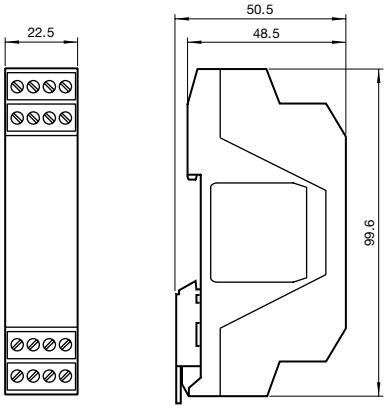
OUT: Yellow (solid): Relay contact closed
Yellow (flashing, 1 Hz): restart inhibited, waiting for start signal
Yellow (flashing, 8 Hz): device locked in error, Waiting for "reset of error condition" signal

ALARM: Red (solid): Output D0 has been turned on

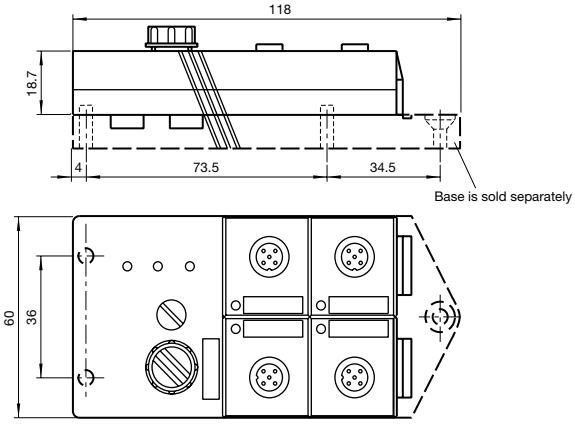
I, 1.Y1: Yellow: Input on

Dimensions (mm)

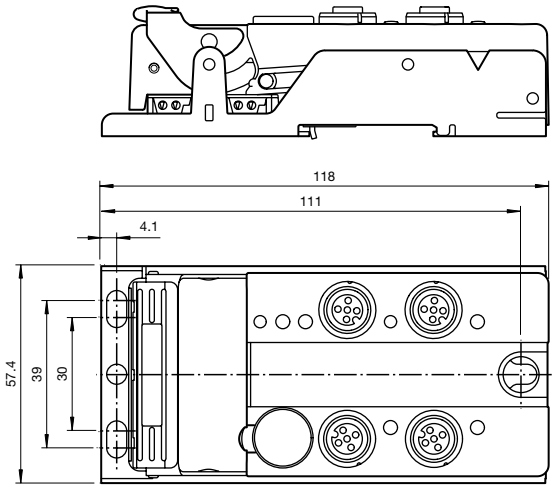
VAA-2E-KE1-S
VAA-2E2A-KE1-S/E2



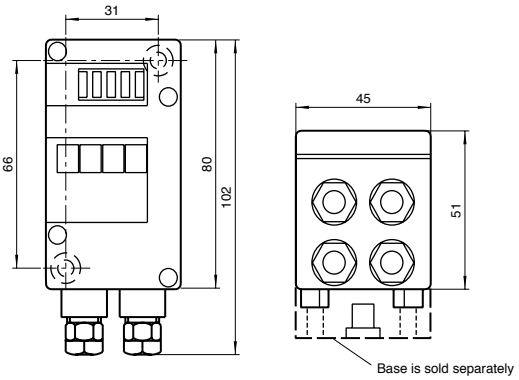
VAA-2E-G2-S
VAA-2E2A-G2-S/EA2



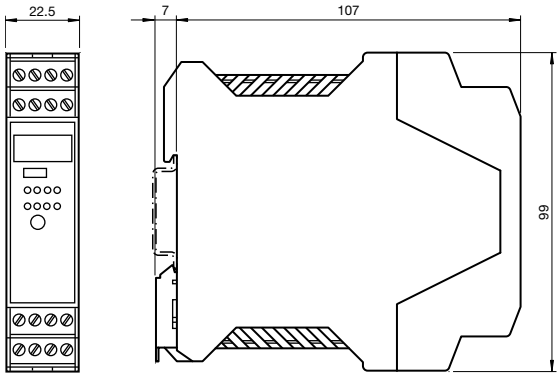
VAA-2E2A-G12-SAJ/EA2L



VAA-2E-G4-SE



VBA-4E1A-KE3-ZEJ/SR



Accessories

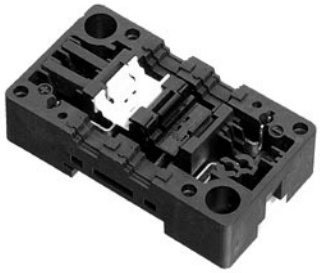
Accessories for VAA-2E2A-G2-S/EA2 or VAA-2E-G2-S

U-G3FF
Mounting base for 4-port flat modules

V1-CLIP
Prevents quick disconnects from being disconnected easily

Accessories for VAA-2E-G4-SE

U-G1FFA
Flat cable mounting base for black and yellow cables with addressing jack



U-G1PP
Round cable base with external power terminals

See pages 201-216 for complete AS-Interface accessory listing.

Emergency Stops
Safety Solutions

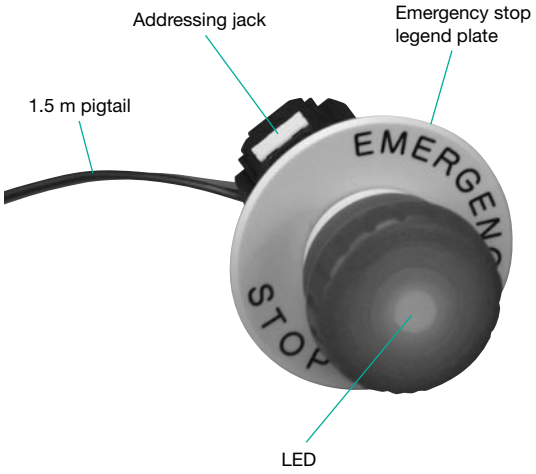
- Connects directly to AS-i cable
- Illuminated and non-illuminated versions
- Field mount and panel mount housings available
- Field mount e-stops with M12 quick disconnect
- Twist or pull to release
- Completely powered off AS-Interface

Emergency Stop Overview

These emergency stops connect directly to the AS-i cable for easy mounting. Because the AS-i safety module is integrated into the e-stop itself, the wiring between the two is eliminated. This reduces the overall wiring/complexity of your machine.

The four versions available are illuminated panel mount, non-illuminated panel mount, illuminated field mount, and non-illuminated field mount.

See page 134 for Emergency Stop wiring and dimensions.



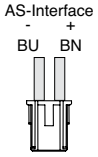
Specifications		Panel Mount	Field Mount	Field Mount
INPUTS/OUTPUTS		1 e-stop/1 LED (optional)		1 e-stop, 1 start, 1 stop/3 LEDs
MODEL NUMBER(S)	Non-illuminated	VAA-2E-PM-S ϟ	VAA-2E-F85A-S-V1	
	Illuminated	VAA-2E1A-PM-S ϟ	VAA-2E1A-F85A-S-V1 ϟ	VAA-4E3A-F85B-S-V1
EXTENDED ADDRESSING (62 NODES)		No		3 addr.(e-stop no, start yes, stop yes)*
REQUIRED MASTER SPEC.		–		M3, M4
OPERATING VOLTAGE AS-i		26.5-31.6 V		26.5-31.6 V
OPERATING VOLTAGE V_{AUX}		–		–
AS-i OPERATING CURRENT		≤ 25 mA (non-illuminated models) ≤ 40 mA (illuminated models)		≤ 75 mA
AUXILIARY CURRENT LIMIT		–		–
INPUTS	-S	Safety		Safety, pushbuttons
TYPE		E-stop		1 e-stop, 2 momentary pushbuttons
SUPPLY VOLTAGE		From AS-Interface		From AS-Interface
MECHANICAL ACTIVATIONS		> 250,000		> 250,000
OUTPUTS (Illuminated models)		LED, red		LED, e-stop (red), start (green), stop (red)
SUPPLY VOLTAGE		From AS-Interface		From AS-Interface
CURRENT PER OUTPUT		≤ 15 mA		≤ 15 mA
DATA BITS	D0	Contact 1		Contact 1/LED e-stop
	D1	Contact 1		Contact 1/LED stop/LED start
	D2	Contact 2		Contact 1/stop/start
	D3	Contact 1		Contact 1
PARAMETER BITS	P0	–		–
	P1	–		–
	P2	–		–
PERIPHERAL FAULT BIT		–		–
PROFILE	S-I0.ID.ID1.ID2	S-0.B.F.E (non-illuminated models) S-7.B.F.E (illuminated models)		E-stop (S-7.B.F.E), Start (S-B.A.0.E), Stop (S-B.A.0.E)
PROTECTION (IEC)		IP65 (when mounted)	IP65	IP65
TEMPERATURE RANGE	*WORKING*	-13 ºF to +131 ºF (-25 ºC to +55 ºC)		-13 ºF to +131 ºF (-25 ºC to +55 ºC)
	STORAGE	-40 ºF to +158 ºF (-40 ºC to +70 ºC)		-40 ºF to +158 ºF (-40 ºC to +70 ºC)
HOUSING MATERIAL		PA 6 GF30		PC
WEIGHT		60 g (2 oz)	195 g (7 oz)	590 g (21 oz)
APPROVALS		CE cULus TÜV approved up to cat.4 / SIL3 NFPA 79		CE TÜV approved up to cat.4 / SIL3 NFPA 79
AS-INTERFACE CONNECTION		Quick connect with pigtail 1.5 m long	M12 quick disconnect	M12 quick disconnect

* Default addresses on delivery are: Address 1 (e-stop), Address 2B (STOP button), Address 2A (START button)

ϟ Stocked item
Consult factory for all other models

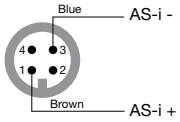
Wiring Diagrams

VAA-2E-PM-S
VAA-2E1A-PM-S

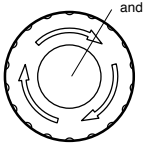


VAA-2E-F85A-S-V1
VAA-2E1A-F85A-S-V1
VAA-4E3A-F85B-S-V1

Male Receptacle End View

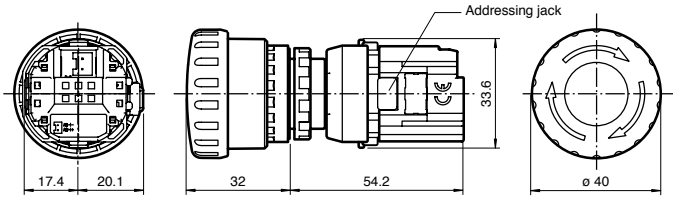


LED Indicator on VAA-2E1A-PM-S, VAA-2E1A-F85A-S-V1, and VAA-4E3A-F85B-S-V1

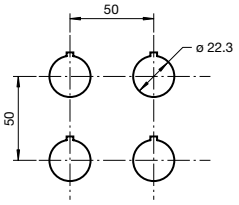


Dimensions (mm)

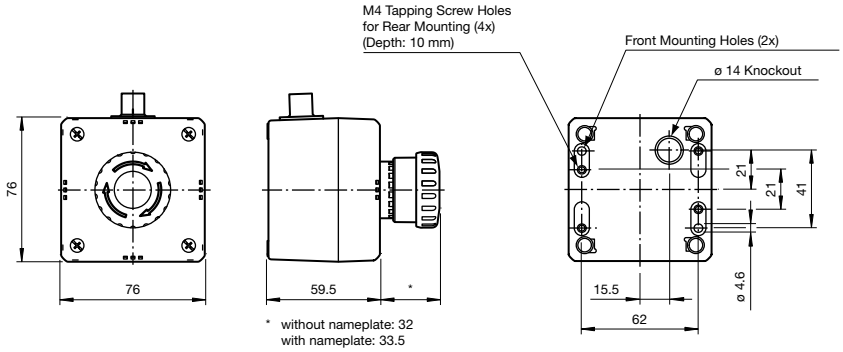
VAA-2E-PM-S
VAA-2E1A-PM-S



Cutout Guide:

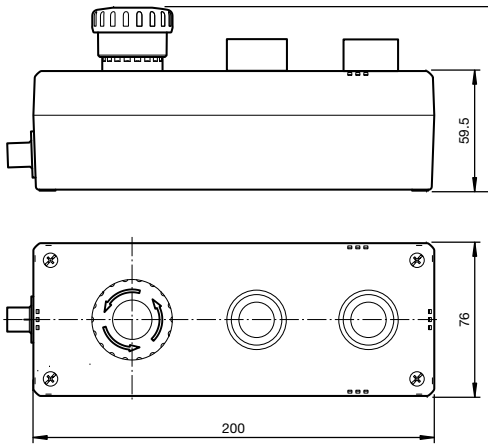


VAA-2E-F85A-S-V1
VAA-2E1A-F85A-S-V1



* without nameplate: 32
with nameplate: 33.5

VAA-4E3A-F85B-S-V1



Mechanical Safety Interlock Switches
Safety Solutions

- Connect directly to AS-Interface cable using M12 quick connect
- All AS-i powered versions available
- Tamper-resistant, unique key is difficult to defeat
- Power to lock and power to unlock options
- Metal head for robust and long-lasting design

Mechanical Safety Interlock Switches

Safety contacts

Safety switches are tasked with preventing machine operation in the event of a potential hazard. Every safety switch has two internal contacts that are safely opened when the key is removed. The safety data will immediately go to 0 when the gate is opened. This will cause the safety monitor to go into shut down and bring the machine to a safe state. Standard designs come with or without LEDs, and power to unlock or power to lock options are available.

Tamper-resistant actuating key

Tamper-resistant, removable keys cannot be simply defeated with screwdrivers, wire or other mechanical components. Multiple key entry points are allowed from top or side. The head can be moved to allow a total of 5 different entry positions for maximum flexibility.

Power to lock/unlock

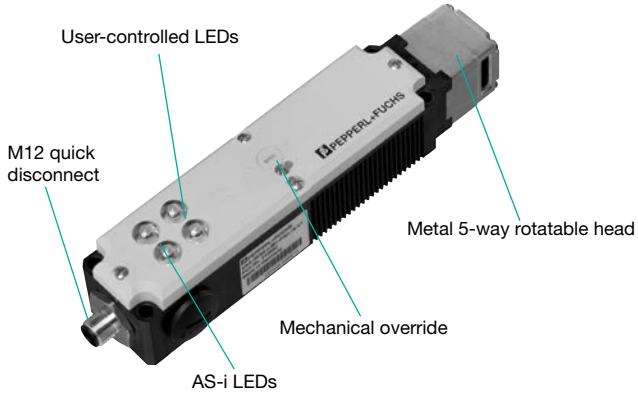
Four models are available with the power to lock/unlock feature. A data bit on AS-i must be turned on in order to close the door, power to lock, or open the door, power to unlock. The power to lock feature prevents unintentional closing by requiring the PLC to turn the output bit on first. The power to unlock version works by prevention the key from being removed until the output is actuated.

All switches include a mechanical override that can be used in the event of a power outage. The override will act the same as sending the output bit on AS-i and will not run again until the override is put back into the locked position. Additionally, if the output that allows the unit to be locked or unlocked is left on, the switch will not be considered safe and the machine will not run.

All power to lock/unlock switches also come with two user-controlled LEDs, red and green. These are often used to show if the device is locked or unlocked giving the user permission to enter the area.

Power options

Two power options are available: AS-i powered and auxiliary powered. The separation of power on the auxiliary powered versions allows the safety interlock switch to remain on AS-i but disable the power to lock/unlock feature.



See pages 138-140 for Mechanical Safety Interlock Switches wiring and dimensions

Specifications

MODEL NUMBER(S)	*No LEDs*	**VAA-2E-IM1-J-S-V1** ϟ
	With LEDs	**VAA-2E2A-IM1-J-S-V1** ϟ
EXTENDED ADDRESSING (62 NODES)		No
REQUIRED MASTER SPEC.		–
OPERATING VOLTAGE AS-i		26.5-31.6 V
OPERATING VOLTAGE V_{AUX}		–
AS-i OPERATING CURRENT		45 mA
AUXILIARY CURRENT LIMIT		–
INPUTS	*-S*	Safety
TYPE		Mechanical Interlock
SUPPLY VOLTAGE		From AS-Interface
MECHANICAL ACTIVATIONS		1 x 10^6
OUTPUTS		–
SUPPLY VOLTAGE		–
DATA BITS	*D0*	Contact 1
	D1	Contact 1
	D2	Contact 2
	D3	Contact 2
PERIPHERAL FAULT BIT		–
PROFILE	*S-I0.ID.ID1.ID2*	S-7.B.F.E
INSERTION SPEED		20 m/min
MIN/MAX TRAVEL		24.5 mm / 29.5 mm
INSERTION FORCE		25 N
EXTRACTION FORCE		10 N
LOCKING FORCE		–
PROTECTION (IEC)		IP67
TEMPERATURE RANGE	*WORKING*	-4 ºF to +131 ºF (-20 ºC to +55 ºC)
	STORAGE	-4 ºF to +131 ºF (-20 ºC to +55 ºC)
HOUSING MATERIAL		PA6-GF30, metal head
WEIGHT		198 g (7 oz)
APPROVALS		CE cULus TÜV approved up to cat.4 / SIL3 NFPA 79
AS-INTERFACE CONNECTION		M12 quick disconnect

ϟ Stocked item
Consult factory for all other models

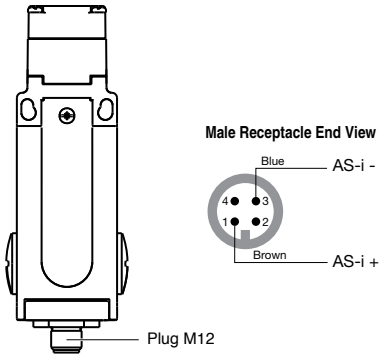
Specifications

		AS-i powered	AUX powered
MODEL NUMBER(S)	*Power to lock*	**VAA-2E3A-LIM1-PL-J-S-V1**	**VAA-2E3A-LIM1-PL-L-S-V1**
	Power to unlock	**VAA-2E3A-LIM1-PU-J-S-V1** ⚡	**VAA-2E3A-LIM1-PU-L-S-V1** ⚡
EXTENDED ADDRESSING (62 NODES)		No	No
REQUIRED MASTER SPEC.		–	–
OPERATING VOLTAGE AS-i		26.5-31.6 V	26.5-31.6 V
OPERATING VOLTAGE V_{AUX}		–	21.6-27.6 VDC
AS-i OPERATING CURRENT		45-300mA	45 mA
AUXILIARY CURRENT LIMIT		–	300 mA
INPUTS	*-S*	Safety	Safety
TYPE		Mechanical Interlock	Mechanical Interlock
SUPPLY VOLTAGE		From AS-Interface	From AS-Interface
MECHANICAL ACTIVATIONS		1 x 10^6	1 x 10^6
OUTPUTS		Power to lock (-PL) Power to unlock (-PU)	Power to lock (-PL) Power to unlock (-PU)
SUPPLY VOLTAGE		From AS-Interface	From Auxiliary
DATA BITS	*D0*	Contact 1+solenoid monitor/solenoid	Contact 1+solenoid monitor/solenoid
	D1	Contact 1+solenoid monitor/LED Red	Contact 1+solenoid monitor/LED Red
	D2	Contact 2/LED Green	Contact 2/LED Green
	D3	Contact 2	Contact 2
PERIPHERAL FAULT BIT		–	–
PROFILE	*S-I0.ID.ID1.ID2*	S-7.B.F.E	S-7.B.F.E
INSERTION SPEED		20 m/min	20 m/min
MIN/MAX TRAVEL		24.5 mm / 29.5 mm	24.5 mm / 29.5 mm
INSERTION FORCE (Not locked)		30 N	30 N
EXTRACTION FORCE (Not locked)		20 N	20 N
LOCKING FORCE		2000 N (2500 N max.)	2000 N (2500 N max.)
PROTECTION (IEC)		IP67	IP67
TEMPERATURE RANGE	*WORKING*	-4 ºF to +131 ºF (-20 ºC to +55 ºC)	-4 ºF to +131 ºF (-20 ºC to +55 ºC)
	STORAGE	-4 ºF to +131 ºF (-20 ºC to +55 ºC)	-4 ºF to +131 ºF (-20 ºC to +55 ºC)
HOUSING MATERIAL		PA6-GF30, metal head	PA6-GF30, metal head
WEIGHT		482 g (17 oz)	482 g (17 oz)
APPROVALS		CE cULus TÜV approved up to cat.4 / SIL3 NFPA 79	CE cULus TÜV approved up to cat.4 / SIL3 NFPA 79
AS-INTERFACE CONNECTION		M12 quick disconnect	M12 quick disconnect

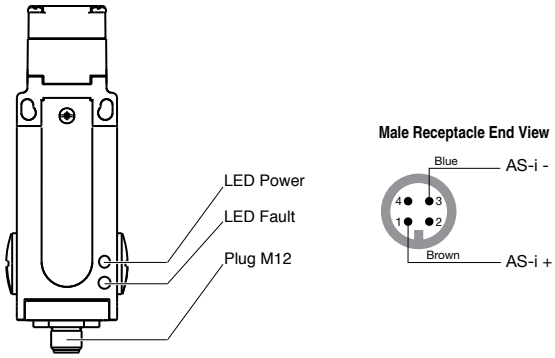
⚡ Stocked item
Consult factory for all other models

Wiring Diagrams

VAA-2E-IM1-J-S-V1



VAA-2E2A-IM1-J-S-V1

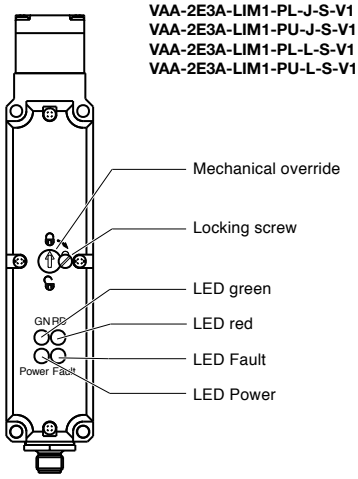


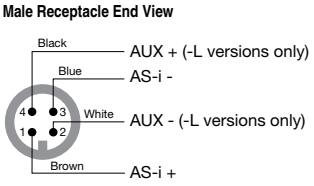
LED Indicators

PWR: Geen: AS-Interface powered

FAULT: Red: Address 0 or no communicaiton

VAA-2E3A-LIM1-PL-J-S-V1
VAA-2E3A-LIM1-PU-J-S-V1
VAA-2E3A-LIM1-PL-L-S-V1
VAA-2E3A-LIM1-PU-L-S-V1





LED Indicators

Power: Geen: AS-Interface powered

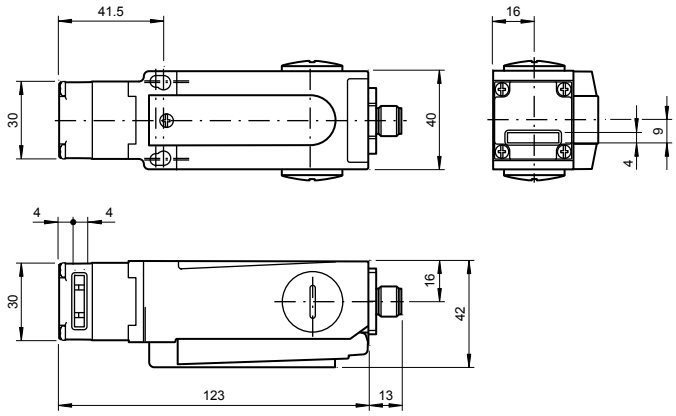
Fault: Red: Address 0 or no communication

RD: Red: User definable

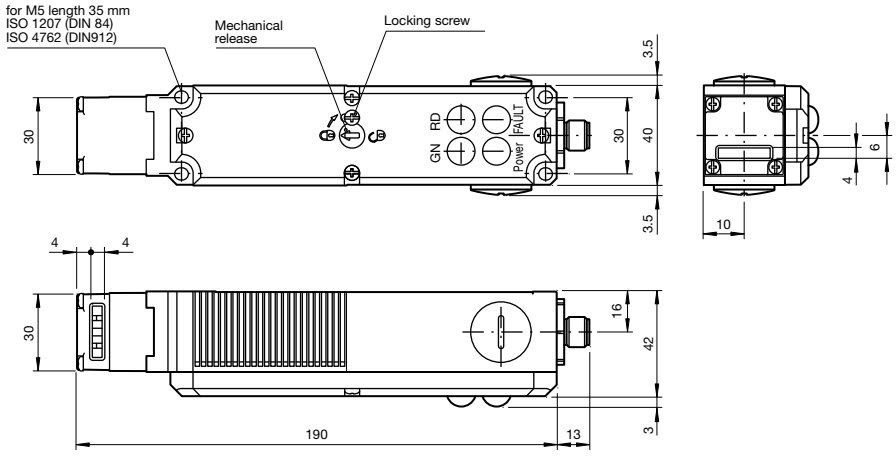
GN: Green: User definable

Dimensions (mm)

VAA-2E-IM1-J-S-V1
VAA-2E2A-IM1-J-S-V1

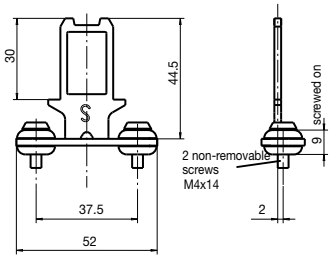


VAA-2E3A-LIM1-PL-J-S-V1
VAA-2E3A-LIM1-PU-J-S-V1
VAA-2E3A-LIM1-PL-L-S-V1
VAA-2E3A-LIM1-PU-L-S-V1

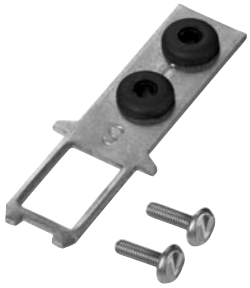


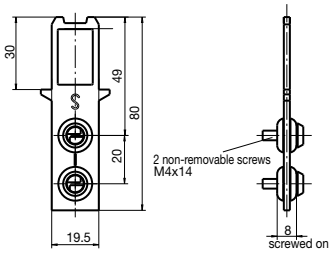
Accessories

VAZ-IM1-90°-BOLT-S
Right-angled key

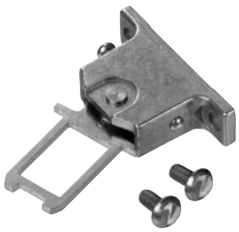


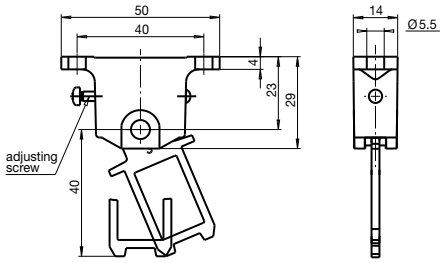
VAZ-IM1-BOLT-S
Straight key





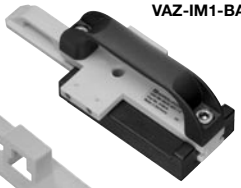
VAZ-IM1-LR-RADIUS-BOLT-S
Right-angled key, adjustable

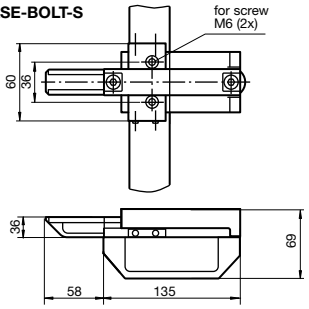




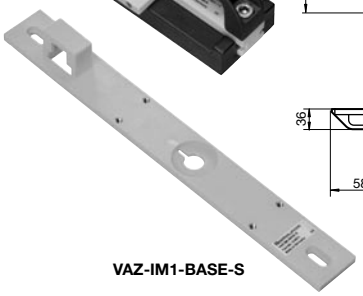
VAZ-IM1-BASE-BOLT-S
VAZ-IM1-BASE-S
Door handle and base for safe door locking. Key included. Design allows for lockout installation.

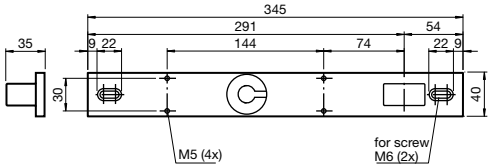
VAZ-IM1-BASE-BOLT-S



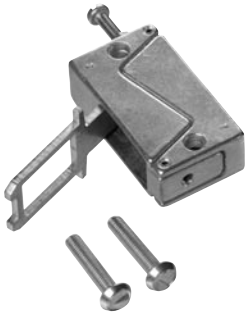


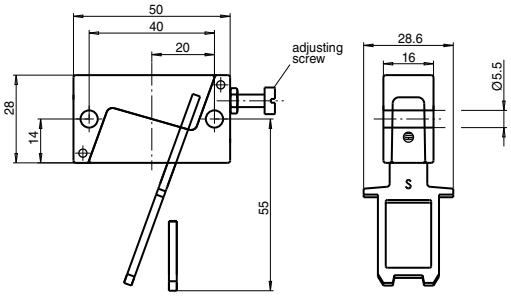
VAZ-IM1-BASE-S





VAZ-IM1-TD-RADIUS-BOLT-S
Key with adjustable start position and highly tolerant to close angle.





See pages 201-216 for complete AS-Interface accessory listing.

Coded Magnetic Safety Interlock Switches

Safety Solutions

- Tamper-resistant coded magnet actuator
- Sealed housing, good for washdown or dirty environments
- M12 quick disconnect for easy AS-Interface connection

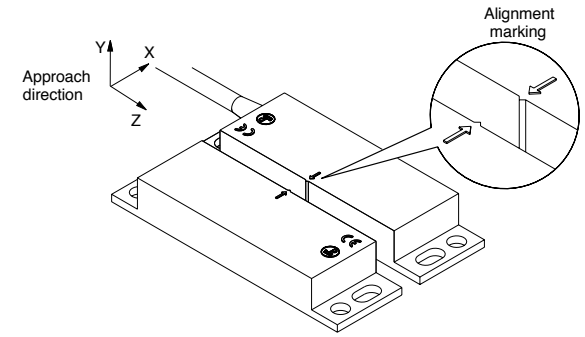
Coded Magnetic Safety Interlock Switches Overview

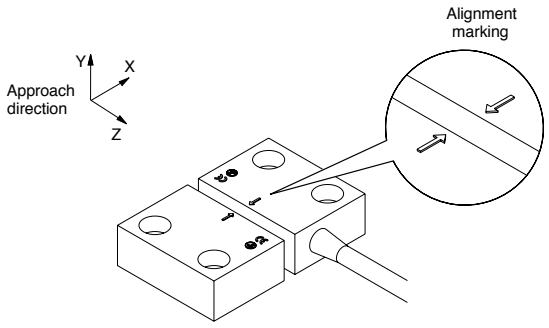
Non-contact magnetic switches are designed for use on moveable machine guarding components. Their small size makes them perfect for space-limited mounting applications. Two housing designs are available depending on the space available and sensing range requirements.

Typical applications include food processing, chemical processing, packaging equipment, and robotics.

These magnetic switches are coded, meaning that a simple magnet cannot be used to bypass the safety switch. A special magnetic-coded actuator is required with this product. Because they are non-contact, they are rugged and withstand mechanical abuse and vibration. See sensing distances and mounting tolerances to find out if they are right for your application.

See pages 142-143 for Coded Magnetic Safety Interlock Switches wiring and dimensions.





Specifications

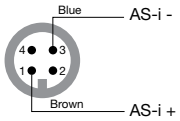
OFF DISTANCE/ON DISTANCE		12 mm/3 mm	18 mm/6 mm
MODEL NUMBER(S)	*Interlock Switch*	VAA-2E1A-IER1-S-1M-V1 ⚡	VAA-2E1A-IER2-S-1M-V1 ⚡
	Actuator	VAZ-IER1-ACTUATOR1-S ⚡	VAA-IER2-ACTUATOR2-S ⚡
EXTENDED ADDRESSING (62 NODES)		No	No
REQUIRED MASTER SPEC.		-	-
OPERATING VOLTAGE AS-i		26.5-31.6 V	26.5-31.6 V
OPERATING VOLTAGE V_{AUX}		-	-
AS-i OPERATING CURRENT		45 mA	45 mA
AUXILIARY CURRENT LIMIT		-	-
INPUTS		Safety	Safety
	TYPE	Coded magnetic	Coded magnetic
	SUPPLY VOLTAGE	From AS-Interface	From AS-Interface
	MECHANICAL ACTIVATIONS	100 x 10^6	100 x 10^6
OUTPUTS		-	-
	SUPPLY VOLTAGE	-	-
	CURRENT PER OUTPUT	-	-
DATA BITS	*D0*	Contact 1	Contact 1
	D1	Contact 1	Contact 1
	D2	Contact 2	Contact 2
	D3	Contact 2	Contact 2
PERIPHERAL FAULT BIT		-	-
PROFILE	*S-I0.ID.ID1.ID2*	S-0.B.F.E	S-0.B.F.E
ALLOWABLE LATERAL OFFSET		± 2.5 mm at 3 mm separation	± 2.5 mm at 3 mm separation
PROTECTION (IEC)		IP69K	IP69K
TEMPERATURE RANGE	*WORKING*	-4 °F to +140 °F (-20 °C to +60 °C)	-4 °F to +140 °F (-20 °C to +60 °C)
	STORAGE	-4 °F to +140 °F (-20 °C to +60 °C)	-4 °F to +140 °F (-20 °C to +60 °C)
HOUSING MATERIAL		PPS	PPS
WEIGHT		800 g (27 oz)	405 g (14 oz)
APPROVALS		CE cULus TÜV approved up to cat.4 / SIL3 NFPA 79	CE cULus TÜV approved up to cat.4 / SIL3 NFPA 79
AS-INTERFACE CONNECTION		1 m pigtail with M12 quick disconnect	1 m pigtail with M12 quick disconnect

⚡ Stocked item
Consult factory for all other models

Wiring Diagrams

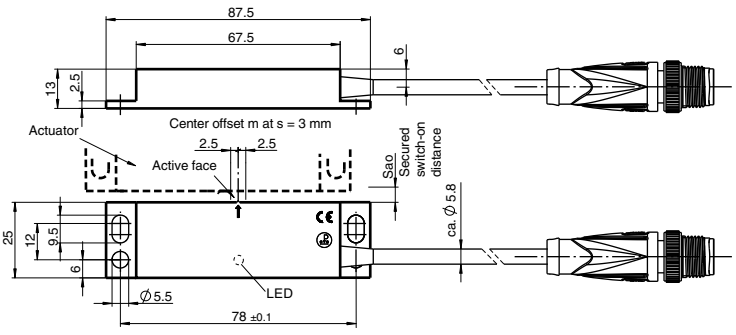
VAA-2E1A-IER1-S-V3
VAA-2E1A-IER2-S-V3

Male Receptacle End View

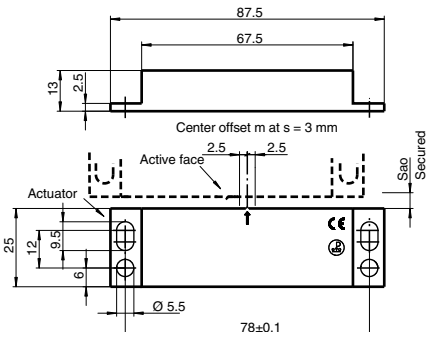


Dimensions (mm)

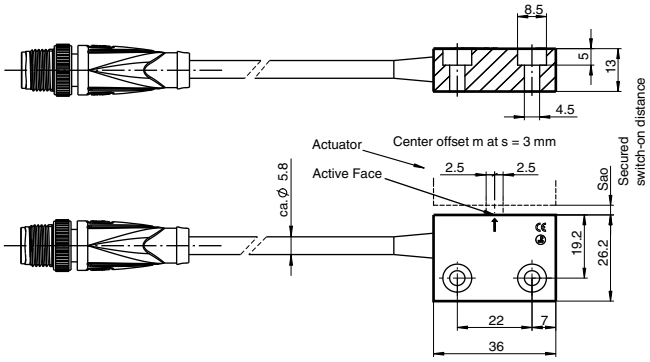
VAA-2E1A-IER1-S-V1



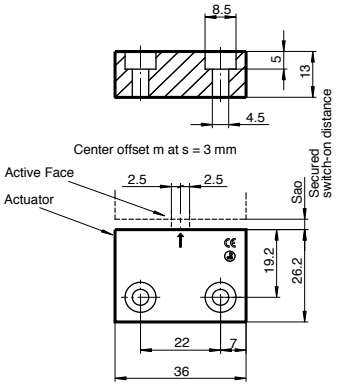
VAZ-IER1-ACTUATOR1-S



VAA-2E1A-IER2-S-V1



VAA-IER2-ACTUATOR2-S



See pages 201-216 for complete AS-Interface accessory listing.

RFID Safety Interlock Switches
Safety Solutions

- Up to 4 safe read heads on one safety module
- No mechanical components to wear out
- Worry-free installation with no alignment issues
- Read heads and tags good for washdown or dirty environments
- Non-contact heads and tags great for high-vibration environments

RFID Safety Interlock Switches Overview

RFID safety modules are unique because you can choose to connect as few as one read head, or as many as four read heads to one control module. A factory programmed read only code is embedded in every RFID tag. During the teach phase of the installation the tag code is read and associated with a specific read head channel. If any one of the heads does not see the corresponding tag, the module will safely switch to the off state and inform the SafetyMonitors on the network.

RFID read heads and tags are typically used in harsh and dirty environments where other mechanical safety switches would not hold up. Because RFID technology is used, alignment issues are a thing of the past and the RFID-based solution offers significant improvements in high vibration environments. Other safety switches can get into states where one of its contacts are closed but the other is not. RFID readers can be off or on and no other intermediate or undetermined conditions are possible.

RFID readers cannot be bypassed or overridden by other non-contact guard switching technologies making them the safest technology in the industry.

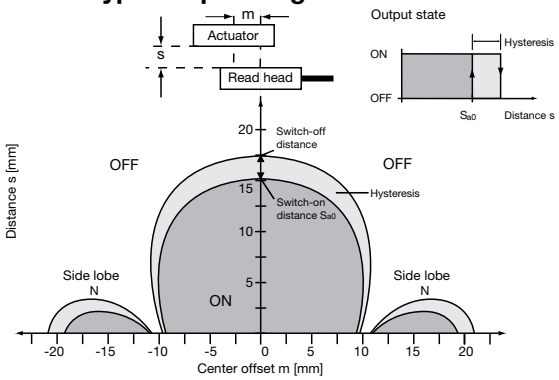
See pages 146-147 for RFID Safety Interlock Switches wiring and dimensions

Specifications

MODEL NUMBER(S)	*Controller*	**VAA-4E-IEI1-CONTROL-J-S** ⚡
	Read Head	**VAZ-IEI1-READER1-S-V3** ⚡
	Tag	**VAZ-IEI1-TAG1-S** ⚡
EXTENDED ADDRESSING (62 NODES)		No
REQUIRED MASTER SPEC.		-
OPERATING VOLTAGE AS-i		26.5-31.6 V
OPERATING VOLTAGE V_{AUX}		-
AS-i OPERATING CURRENT		< 130 mA
AUXILIARY CURRENT LIMIT		-
INPUTS	*-S*	Safety
TYPE		RFID, non-contact
SUPPLY VOLTAGE		From AS-Interface
OUTPUTS		-
SUPPLY VOLTAGE		-
DATA BITS	*D0*	Safe code sequence
	D1	Safe code sequence
	D2	Safe code sequence
	D3	Safe code sequence
PARAMETER BITS (read)	*P0*	Head 1 tag present/absent
	P1	Head 2 tag present/absent
	P2	Head 3 tag present/absent
	P3	Head 4 tag present/absent
PERIPHERAL FAULT BIT		Read head power overload
PROFILE	*S-I0.ID.ID1.ID2*	S-0.B.F.E
READ RANGE (see diagram)	*On*	15 mm
	Off	17 mm
MINIMUM READ DISTANCE		3 mm
PROTECTION (IEC)		IP67 (Read head/tag IP69K)
TEMPERATURE RANGE	*WORKING*	Controller: +32 ºF to +122 ºF (0 ºC to +50 ºC) Read head/tag: -13 ºF to +122 ºF (-25 ºC to +58 ºC)
	STORAGE	Controller: +32 ºF to +122 ºF (0 ºC to +50 ºC) Read head/tag: -13 ºF to +122 ºF (-25 ºC to +58 ºC)
HOUSING MATERIAL		PBT
WEIGHT		150 g (5.3 oz)
APPROVALS		CE cULus TÜV approved up to cat.4 / SIL3 NFPA 79
AS-INTERFACE CONNECTION		Flat yellow cable
I/O CONNECTION		Controller: M12 quick disconnect, Read head: M8 quick disconnect (max. read head to module distance is 25 m)

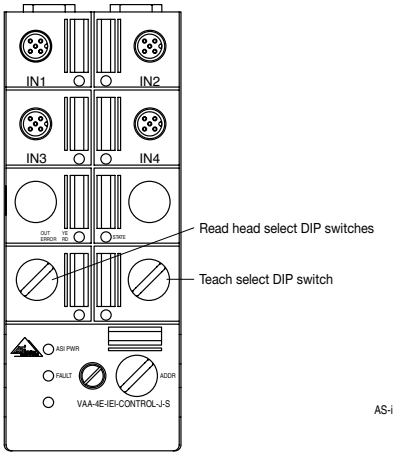
⚡ Stocked item
Consult factory for all other models

Typical operating distance

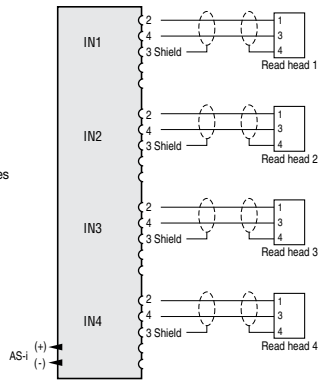


For a side approach direction for the actuator and read head, a minimum distance of s = 3 mm must be maintained so that the operating distance of the side lobes is not entered.

Wiring Diagrams



VAA-4E-IEI1-CONTROL-J-S



LED Indicators

FAULT: Red (solid): Communication error or address 0
Red (flashing): Overload of read head power

PWR: Green (solid): AS-Interface powered
Green (flashing): Address 0

IN: Yellow: Tag in front of read head

OUT/ERROR: Yellow (solid): Tag in front of all read heads
Red (solid): Device internal error, less then 0.5 s in detection zone
Red (solid) with state blinking: Configuration error

STATE: Green (solid) with OUT/ERROR Red: tag not in front of all read heads
Green (solid) with OUT/ERROR Yellow: tag in front of all read heads
Green (flashing 15 Hz): Self test
Green (flashing 4 Hz): Ready to teach tag
Green (flashing 1 Hz): Teaching tag
Green (flashing 3 times): Configuration error

VAZ-IEI1-READER1-S-V3

Male Receptacle End View

Read head/Tag teach procedure

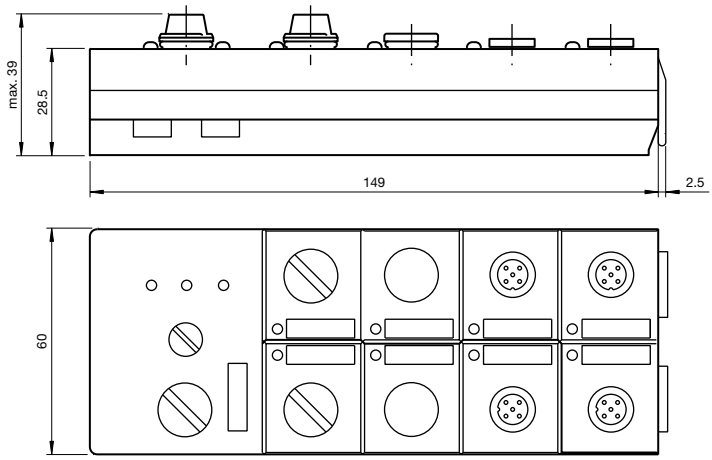
1. Disconnect node from AS-i, Remove right blank cover and turn DIP switch 1 on.
2. Remove left blank cover and set DIP switches to enable read heads to be used

Switch 1	ON = Read head 1 connected
Switch 2	ON = Read head 2 connected
Switch 3	ON = Read head 3 connected
Switch 4	ON = Read head 4 connected

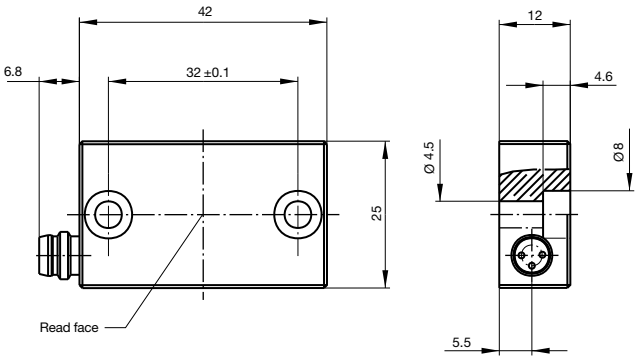
3. Place tags over read heads
4. Connect node to AS-i, Wait for 10s self test, and teach to complete. Teach successful if STATE LED is off and failed if blinking 3 times.
5. Disconnect node from AS-i and wait 10s. Turn DIP switches off that are under right blank cover.
6. Connect node to AS-i.

Dimensions (mm)

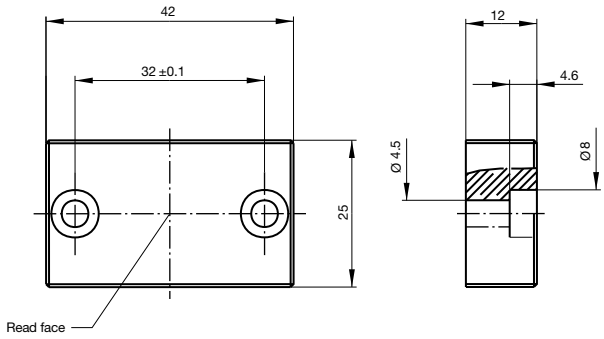
VAA-4E-IEI1-CONTROL-J-S



VAZ-IEI1-READER1-S-V3



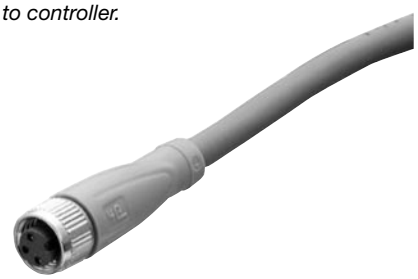
VAZ-IEI1-TAG1-S



Accessories

V3-GM-2M-PUR-ABG43-V1-G
2 meter shielded cable for connection of read head to controller.

V3-GM-5M-PUR-ABG43-V1-G
5 meter shielded cable for connection of read head to controller.



See pages 201-216 for complete AS-Interface accessory listing.

Enabling Switch
Safety Solutions

- Ergonomic, lightweight design
- Connects directly to AS-Interface
- Three switch positions for maximum safety

Enabling Switch Overview

Enabling switches are unique devices that allow a user to enter a potentially harmful area to do required maintenance without shutting the machine down. The three-position device (OFF-ON-OFF) must be continuously held in the center position to enable machine power. If the user senses an unsafe condition exists they can fully push or release the enabling switch to go to shut down.

Because the enabling switch has its own AS-Interface address it can be linked to any and all safety zones on the network. When the enabling switch is used with AS-i, the speed of the machine is reduced when a user enters the potentially harmful area, further reducing the risk of injury.

This device is particularly useful in robotics applications in conjunction with our 16-channel SafetyMonitor and the safe output modules. The safe output module can be used to locally interface with safe input on the robot instructing the robot controller to operate at reduced speed.

See pages 149-150 for Enabling Switch wiring and dimensions

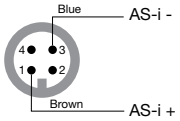
Specifications

MODEL NUMBER(S)		**VAA-3E-HH30-J-S-V1** ⚡
EXTENDED ADDRESSING (62 NODES)		No
REQUIRED MASTER SPEC.		-
OPERATING VOLTAGE AS-i		26.5-31.6 V
OPERATING VOLTAGE V_{AUX}		-
AS-i OPERATING CURRENT		< 45 mA
AUXILIARY CURRENT LIMIT		-
INPUTS	*-S*	Safety
TYPE		Enabling switch
SUPPLY VOLTAGE		From AS-Interface
MECHANICAL ACTIVATIONS		1 x 10^5
DATA BITS	*D0*	Contact 1
	D1	Contact 1
	D2	Contact 2
	D3	Contact 2
PERIPHERAL FAULT BIT		-
PROFILE	*S-I0.ID.ID1.ID2*	S-7.B.F.E
PROTECTION (IEC)		IP67
TEMPERATURE RANGE	*WORKING*	+23 ºF to +122 ºF (-5 ºC to +50 ºC)
	STORAGE	+23 ºF to +122 ºF (-5 ºC to +50 ºC)
HOUSING MATERIAL		PA, Neoprene
WEIGHT		150 g (5.3 oz)
APPROVALS		CE cULus TÜV approved up to cat.4 / SIL3 NFPA 79
AS-INTERFACE CONNECTION		M12 quick disconnect

Wiring Diagrams

VAA-3E-HH30-J-S-V1

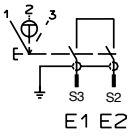
Male Receptacle End View



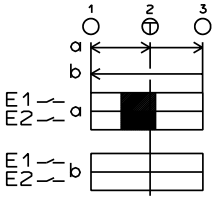
⚡ Stocked item
Consult factory for all other models

Function of the switching element

Switching element



Travel diagram

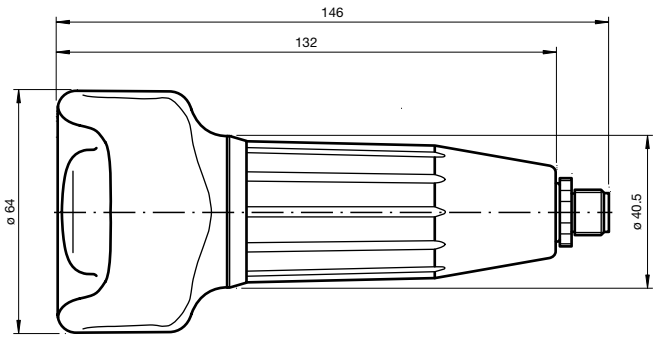


Contacts open
Contacts closed

E = switching element
Ⓣ = Action point

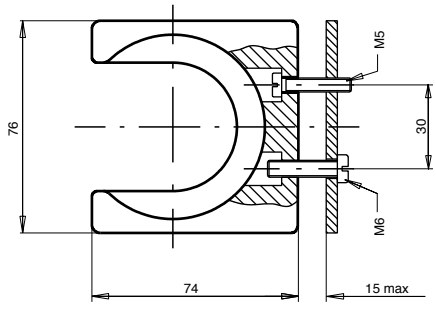
Dimensions (mm)

VAA-3E-HH30-J-S-V1



Accessories

VAZ-HH30-BRACKET



Height 30 mm

See pages 201-216 for complete AS-Interface accessory listing.

Intelligent Sensors

Intelligent Inductive Sensors

Sensors can be equipped with the AS-Interface chip. Every sensor can be a module on AS-Interface and up 62 smart sensors can be on the network at one time. Each sensor provides valuable diagnostic information. “Intelligent” sensors are self-monitoring, programmable, and transmit data over the network to a controller. An AS-Interface sensor offers many features that are not available with a standard sensor such as coil monitoring, precollision and out of range detection; and all are NO/NC programmable. Additional diagnostic capabilities available with intelligent inductive sensors include the following:

Normally Open/Normally Closed Programmable

Stocking two sensors is no longer required. With AS-Interface intelligent sensors, OEMs have the opportunity to reduce the number of sensors on a system. Instead of stocking inductive sensors with normally open and normally closed outputs, one intelligent sensor can be used and configured to be normally open or normally closed. Each time the sensor is plugged in, it is automatically configured to the correct setting.

Prefailure Indication

Prefailure indication is another advanced function offered in some of the P+F AS-Interface intelligent inductive sensors. If the target is between 100% and 120% of the sensor’s nominal sensing range, the prefailure bit is reported. When this situation is indicated, users can correct the mounting and/or the misalignment before the target is out of range.

Precollision Indication

When a target gets too close to an inductive sensor face, a precollision condition is indicated. Users can reposition the sensor so that the target does not hit the sensor. This type of indication may reduce the cost of replacing a standard sensor that was damaged because of misalignment.

Oscillator Monitoring

Repeated direct contact between sensors and their targets can cause coils and oscillators to stop running. If a sensor without oscillator monitoring stops operating, the PLC receives a failure code only once the target is missed. Using AS-Interface and intelligent sensors, a failure notice is immediately sent to the scanner/gateway in a data bit. The PLC is then notified, and the damaged sensor can be replaced quickly and easily, improving quality and reducing downtime.

Activation Delay Filter

With activation filtering, all targets present for less than 15 ms will not be transferred to AS-Interface. This eliminates false triggering due to noise, weld fields, and other unforeseen disruptions. When the sensor is programmed for normally open, there is a 15 ms ON delay. When the sensor is programmed for normally closed, there is a 15 ms OFF delay.

There are many housing styles available. All are directly connected to the AS-Interface line, and power and communications run over the same two wires. Pepperl+Fuchs has 12 mm, 18 mm and 30 mm cylindrical, limit switch style, rectangular, Rhino, and flat packs for your AS-Interface network.

Intelligent Photoelectric Sensors

In most applications, I/O modules bring sensor inputs back to the AS-Interface scanner/gateway and to the PLC. Modules can have up to 4 inputs (plus additional outputs), and each module takes up a full or a half address. Like modules, intelligent photoelectric sensors also take up a half address. Up to 4 input bits are available to provide valuable diagnostic information.

Additional Diagnostic Capabilities Available With Intelligent Photoelectric Sensors

- Weak signal indication: When photoelectric sensors are used, it is possible to detect a weak signal before the sensor stops working. Maintenance can be performed on an as-needed basis.
- Configurable light on/dark on: One intelligent sensor can be used and configured for the light on/dark on behavior. Separate sensors are not necessary.

Absolute Rotary Encoders

In automation applications, rotary encoders are used as sensors for angle, position, speed, and acceleration. By using spindles, gear racks, measuring wheels, or cable pulls, linear movements can also be monitored by a rotary encoder. Rotary encoders convert a mechanical rotation value into an electrical signal that can be processed by counters, tachometers, logic controllers, and industrial PCs. Rotary encoders are among the most useful and versatile pieces of equipment available to the automation industry.

Pepperl+Fuchs is proud to offer the industry's only AS-Interface absolute rotary encoders. Absolute encoders provide a uniquely coded numerical value for each shaft position. They eliminate the need for expensive input components in a positioning application because they have built-in reference data.

P+F AS-Interface rotary encoders use state-of-the-art components and the latest technologies to ensure reliability and a long service life. Additionally, P+F encoders feature precision bearings for a long life and low maintenance, with wire connections that are sealed up to IP65. Durable aluminum housings and solid-state circuitry make P+F encoders suitable for rugged environments.

Our absolute rotary encoders allow an easy 2-wire connection to AS-Interface and are available in both single- and multi-turn versions. Single-turn absolute encoders divide the shaft into a defined number of steps. The maximum resolution is 13 bits, which means that up to 8192 positions can be defined. By using a multi-step gear, multi-turn absolute encoders not only provide the angular position within a revolution, but also the number of revolutions. Multi-turn encoders have a 16-bit resolution or 65,536 total measuring steps.

Four nodes are used to transmit the 16 bits of data back to the AS-Interface network, and there is an AS-Interface network gateway/scanner available for almost any system. The standard 58 mm housings are available in solid-shaft (BV series) or recessed hollow-shaft (BS series) versions and in a variety of mounting configurations.

Cylindrical
Inductive Proximity Sensors

- Oscillator monitoring
- Programmable normally open/ normally closed
- Programmable activation delay filter
- Warning outputs for target too close and too far
- M12 quick disconnect AS-Interface connection

Cylindrical Sensors Overview

Inductive proximity sensors are inexpensive, durable, resistant to industrial contaminants, and have precise triggering characteristics. They utilize a high frequency electromagnetic field to detect metal objects. Their combination of durability, high accuracy, and quick response time makes them an invaluable tool in a wide variety of industries.

Cylindrical sensors are available that allow up to 62 intelligent sensors to be put on one AS-Interface network (2.1 compatible) and then be brought back to a controller. Pepperl+Fuchs offers these sensors in shielded (flush-mounted) or unshielded (nonflush-mounted) versions with sensing ranges from 4 mm to 15 mm in threaded stainless steel housings. All have micro (M12x1) connectors with multiple LEDs, IP67 rating, and all are programmable (normally open/ normally closed). Sensor diameters range from 12 mm to 30 mm.

Many of the cylindrical AS-Interface intelligent sensors offer oscillator monitoring, input filtering, and target too close/target too far away outputs.

A specially coated, weld immune version is available that is specifically designed to prevent weld slag accumulations and operate reliably in harsh welding conditions. The sensor coil system and control circuitry provide excellent protection from the effects of AC electromagnetic fields.

See pages 155-156 for Cylindrical Sensors wiring and dimensions.



Specifications

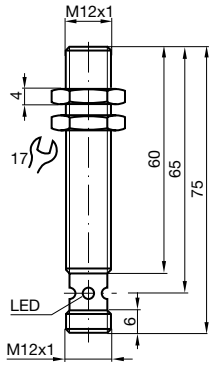
SENSING RANGE		4 mm	4 mm	5 mm
SHIELDED		Yes	No	Yes
MODEL NUMBER(S)		NCB4-12GM60-B3B-V1 ⚡	NCN4-12GM60-B3B-C2-V1	NCB5-18GM60-B3B-V1
EXTENDED ADDRESSING (62 NODES)		Yes	Yes	Yes
OPERATING CURRENT		30 mA	30 mA	30 mA
REPEATABILITY		≤ 0.01 mm	≤ 0.01 mm	≤ 0.01 mm
HYSTERESIS		1-15% (5% typical)	1-15% (5% typical)	1-15% (5% typical)
SWITCHING FREQUENCY		500 Hz	500 Hz	100 Hz
WELD FIELD IMMUNE		No	Yes, AC field 100 mT	No
DATA BITS	*D0*	Sensor output	Sensor output	Sensor output
	D1	Not used	Not used	Target too far away output
	D2	Not used	Not used	Oscillator monitor
	D3	Not used	Not used	Target too close output
PARAMETER BIT	*P0*	15 ms activation delay on*/off	15 ms activation delay on*/off	15 ms activation delay on*/off
	P1	N.O.*/N.C. programming	N.O.*/N.C. programming	N.O.*/N.C. programming
PROFILE	*S-I0.ID.ID1.ID2*	S-0.A.7.E	S-0.A.7.E	S-0.A.7.E
PROTECTION (IEC)		IP67	IP67	IP67
TEMPERATURE RANGE	*WORKING*	-13 ºF to +158 ºF (-25 ºC to +70 ºF)	-13 ºF to +158 ºF (-25 ºC to +70 ºF)	-13 ºF to +158 ºF (-25 ºC to +70 ºF)
	STORAGE	-40 ºF to +185 ºF (-40 ºC to +85 ºF)	-40 ºF to +185 ºF (-40 ºC to +85 ºF)	-40 ºF to +185 ºF (-40 ºC to +85 ºF)
HOUSING MATERIAL		PBT/stainless steel	PBT/stainless steel	PBT/stainless steel
WEIGHT		43 g (1.5 oz)	43 g (1.5 oz)	57 g (2 oz)
APPROVALS		CE	CE	CE
ELECTRICAL CONNECTION		M12 quick disconnect	M12 quick disconnect	M12 quick disconnect

* Default setting

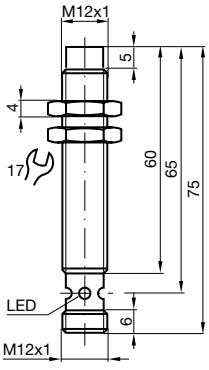
⚡ Stocked item
Consult factory for all other models

Dimensions (mm)

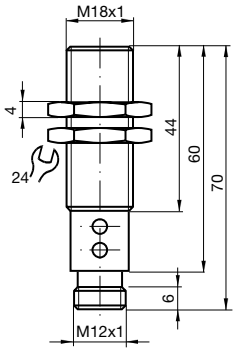
NCB4-12GM60-B3B-V1



NCN4-12GM60-B3B-C2-V1



NCB5-18GM60-B3B-V1



Specifications

SENSING RANGE		8 mm	15 mm
SHIELDED		No	Yes
MODEL NUMBER(S)		NCN8-18GM60-B3B-V1	NBB15-30GM60-B3B-V1
EXTENDED ADDRESSING (62 NODES)		Yes	Yes
OPERATING CURRENT		30 mA	30 mA
REPEATABILITY		≤ 0.01 mm	≤ 0.01 mm
HYSTERESIS		1-15% (5% typical)	1-15% (5% typical)
SWITCHING FREQUENCY		100 Hz	200 Hz
WELD FIELD IMMUNE		No	No
DATA BITS	*D0*	Sensor output	Sensor output
	D1	Target too far away output	Not used
	D2	Oscillator monitor	Not used
	D3	Target too close output	Not used
PARAMETER BIT	*P0*	15 ms activation delay on*/off	15 ms activation delay on*/off
	P1	N.O.*/N.C. programming	N.O.*/N.C. programming
PROFILE	*S-I0.ID.ID1.ID2*	S-0.A.7.E	S-0.A.7.E
PROTECTION (IEC)		IP67	IP67
TEMPERATURE RANGE	*WORKING*	-13 °F to +158 °F (-25 °C to +70 °F)	-13 °F to +158 °F (-25 °C to +70 °F)
	STORAGE	-40 °F to +185 °F (-40 °C to +85 °F)	-40 °F to +185 °F (-40 °C to +85 °F)
HOUSING MATERIAL		PBT/stainless steel	Nickel-plated brass
WEIGHT		57 g (2 oz)	142 g (5 oz)
APPROVALS		CE	CE
ELECTRICAL CONNECTION		M12 quick disconnect	M12 quick disconnect

* Default setting

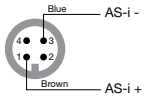
Stocked item
Consult factory for all other models

Wiring Diagrams

Quick Disconnect

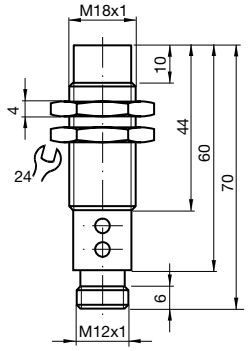
Note: Wiring diagrams show quick disconnect pin numbers

Male Receptacle End View

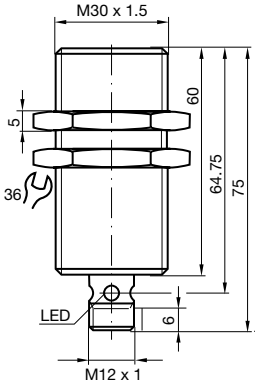


Dimensions (mm)

NCN8-18GM60-B3B-V1



NBB15-30GM60-B3B-V1



Accessories

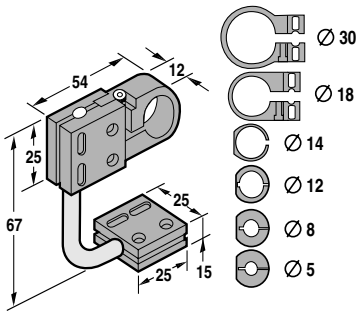
(Dimensions in mm)

Universal Bracket
Model No. BF 5-30

- Holds inductive, photoelectric, and ultrasonic sensors of all diameters
- Easy installation
- Simple adjustment
- Secure fastening
- Flexible
- Durable

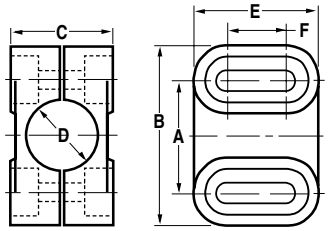
The BF 5-30 handles standard sensor sizes from 5 mm to 30 mm in diameter and provides 360° rotation on 2 axes.

Model Number
BF5-30



Adjustable Bracket

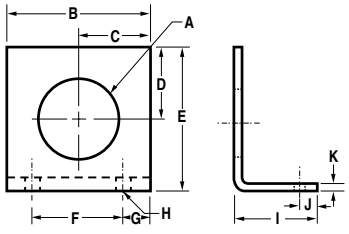
Brackets are available for cylindrical sensors of all diameters. Made of tough Crastin, the mounting bracket simplifies mounting and sensor adjustment. Order bracket by model number shown.



Model No.	Sensor Diameter	A	B	C	D	E	F	Slot Width	Mounting Screws
BF12	12 mm	24	36	19	12	30	16	4.5 mm	#8-32
BF18	18 mm	30	44	24	18	40	26	5.5 mm	#10-24
BF30	30 mm	40	56	36	30	40	24	5.5 mm	#10-24

Right Angle Bracket

Angle brackets are available in three diameter sizes and made of stainless steel. Sensors can be adjusted by using lock nuts supplied with sensor. Order by model number shown.



See pages 201-216 for complete AS-Interface accessory listing.

Model No. and Sensor Dia.	Sensor Hole Dia. A	B	C	D	E	F	G	Mounting Dia. 2 Places H	I	J	K
AB12 12 mm	12.70 (1/2")	31.75 (1-1/4")	15.87 (5/8")	17.46 (11/16")	31.75 (1-1/4")	19.05 (3/4")	6.35 (1/4")	4.76 (3/16")	25.40 (1")	5.56 (7/32")	3.17 (1/8")
AB18 18 mm	19.05 (3/4")	34.92 (1-3/8")	17.46 (11/16")	19.84 (25/32")	38.10 (1-1/2")	22.22 (7/8")	6.35 (1/4")	4.76 (3/16")	25.40 (1")	5.56 (7/32")	3.17 (1/8")
AB30 30 mm	30.96 (1-7/32")	50.80 (2")	25.40 (1")	36.91 (1-29/64")	63.50 (2-1/2")	31.75 (1-1/4")	9.52 (3/8")	6.35 (1/4")	38.10 (1-1/2")	9.52 (3/8")	3.17 (1/8")

Limit Switch
Inductive Proximity Sensors

- 5-way rotatable head
- Easy AS-Interface connection with terminal compartment
- Oscillator monitoring
- Normally open/normally closed programmable
- Programmable activation delay filter

Limit Switch Sensors Overview

AS-Interface limit switch inductive sensors mount in the same footprint as traditional mechanical limit switches. Their sensing ranges extend from 20 mm to 40 mm. External power connections are made through a terminal compartment, and all are normally open/normally closed programmable.

All intelligent limit switch sensors are 2.1 compatible, and offer oscillator monitoring and input filtering. The 20 mm limit switch (NBB20+U1+B3B) is available in a shielded version and may be flush mounted. The NBN30+U1+B3B and the NBN40+U1+B3B are unshielded versions and cannot be flush mounted.

The housing of the sensor is made of PBT, which is resistant to abrasion and has excellent mechanical properties. Additionally, these limit switch sensors have a sensing face that is rotatable to any one of five positions, from front to top, to both sides, and to bottom.

See pages 158-159 for Limit Switch Sensors wiring and dimensions.



Specifications

SENSING RANGE		20 mm	30 mm	40 mm
SHIELDED		Yes	No	No
MODEL NUMBER(S)		**NBB20+U1+B3B**	**NBN30+U1+B3B**	**NBN40+U1+B3B**
EXTENDED ADDRESSING (62 NODES)		Yes	Yes	Yes
OPERATING CURRENT		30 mA	30 mA	30 mA
REPEATABILITY		≤ 0.01 mm	≤ 0.01 mm	≤ 0.01 mm
HYSTERESIS		1-15% (5% typical)	1-15% (5% typical)	1-15% (5% typical)
SWITCHING FREQUENCY		150 Hz	150 Hz	150 Hz
WELD FIELD IMMUNE		No	No	No
DATA BITS	*D0*	Sensor output	Sensor output	Sensor output
	D1	Not used	Not used	Not used
	D2	Oscillator monitor	Oscillator monitor	Oscillator monitor
	D3	Not used	Not used	Not used
PARAMETER BIT	*P0*	15 ms activation delay on*/off	15 ms activation delay on*/off	15 ms activation delay on*/off
	P1	N.O.*/N.C. programming	N.O.*/N.C. programming	N.O.*/N.C. programming
PROFILE	*S-I0.ID.ID1.ID2*	S-0.A.7.E	S-0.A.7.E	S-0.A.7.E
PROTECTION (IEC)		IP68	IP68	IP68
TEMPERATURE RANGE	*WORKING*	-13 ºF to +158 ºF (-25 ºC to +70 ºF)	-13 ºF to +158 ºF (-25 ºC to +70 ºF)	-13 ºF to +158 ºF (-25 ºC to +70 ºF)
	STORAGE	-40 ºF to +185 ºF (-40 ºC to +85 ºF)	-40 ºF to +185 ºF (-40 ºC to +85 ºF)	-40 ºF to +185 ºF (-40 ºC to +85 ºF)
HOUSING MATERIAL		PBT	PBT	PBT
WEIGHT		200 g (7 oz)	200 g (7 oz)	200 g (7 oz)
APPROVALS		CE	CE	CE
ELECTRICAL CONNECTION		Terminal housing	Terminal housing	Terminal housing

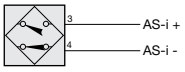
* Default setting

⚡ Stocked item
Consult factory for all other models

Wiring Diagrams

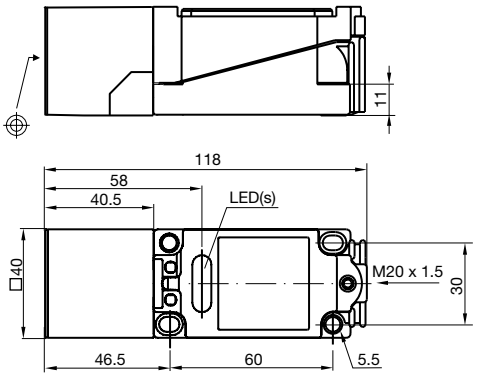
Terminal Connection

Normally Open or
Normally Closed



Dimensions (mm)

NBB20+U1+B3B
NBN30+U1+B3B
NBN40+U1+B3B



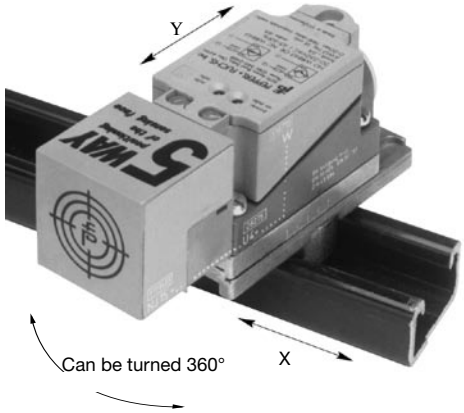
Accessories

(Dimensions in mm)

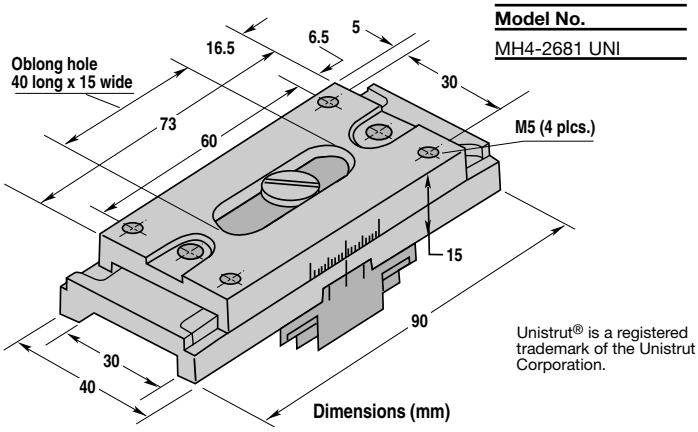
Adjustable Unistrut® Bracket

The adjustable Unistrut type mounting bracket is especially designed for the limit switch style sensors and can be adjusted up to 20 mm along the Y axis. It can be rotated 360° in increments of 1.87° and fits into the Unistrut. The bracket can be moved along the X axis to the full length of the Unistrut. The bracket is furnished with four M5x20 mm screws and two headless screws. The Unistrut mounting track can be ordered in lengths of 2 feet.

To order, specify model number **MH4-2681 UNI**.



Model No.
MH4-2681 UNI



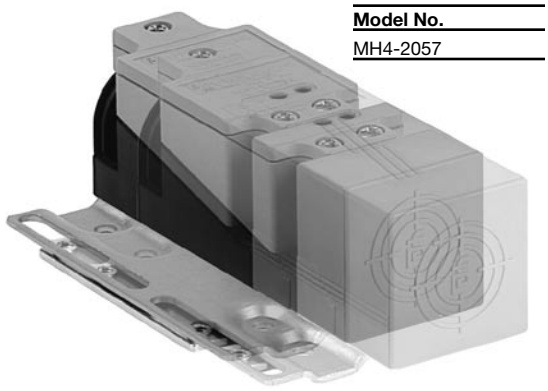
Unistrut® is a registered trademark of the Unistrut Corporation.

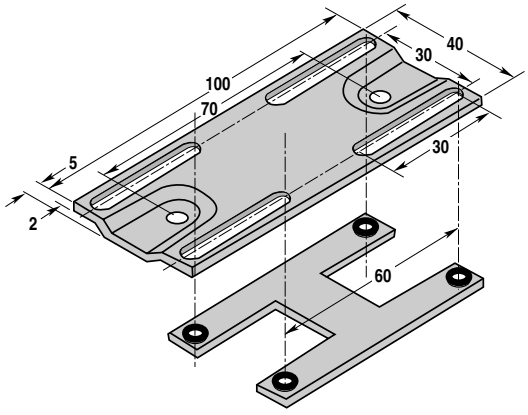
Adjustable Slide Bracket

With this bracket, the completely mounted and wired sensor can be moved up to 30 mm. When the M5-16 mm sensor mounting screws are loosened, the sensor can be moved back and forth easily. This allows precise adjustment of the sensing point. The sensor can be secured in the proper position by tightening the mounting screws. The bracket is made of aluminum to resist corrosion.

To order, specify model number **MH4-2057**.

Model No.
MH4-2057





VAZ-T1-FK-M20
Flat cable to M20x1.5 adapter

See pages 201-216 for complete AS-Interface accessory listing.

Rhino™
Inductive Proximity Sensors

- 25-position rotating head
- Oscillator monitoring
- Normally open/normally closed programmable
- Programmable activation delay filter
- M12 quick disconnect AS-Interface connection

Rhino Sensors Overview

The popular Rhino series utilizes a durable, die-cast metal mounting bracket. Rhinos feature a “Quick-Pivot” sensing head, allowing tool-free configuration of the sensing face to any position. Rhino models offer sensing ranges and mounting “foot-prints” identical to inductive limit switches, but require only 1/3 the mounting space.

All of our intelligent Rhino sensors are 2.1 compatible, and offer oscillator monitoring, input filtering, and are normally open/normally closed programmable. The Rhino has a sensing range up to 30 mm. The 20 mm Rhino (NBB20-L2-B3B-V1) is available in a shielded version and may be flush mounted. The NBN30-L2-B3B-V1 and the NBN40-L2-B3B-V1 are unshielded versions and cannot be flush mounted.

See page 161 for Rhino Sensors wiring and dimensions.



Specifications

SENSING RANGE		20 mm	30 mm	40 mm
SHIELDED		Yes	No	No
MODEL NUMBER(S)		**NBB20-L2-B3B-V1**	**NBN30-L2-B3B-V1**	**NBN40-L2-B3B-V1**
EXTENDED ADDRESSING (62 NODES)		Yes	Yes	Yes
OPERATING CURRENT		30 mA	30 mA	30 mA
REPEATABILITY		≤ 0.01 mm	≤ 0.01 mm	≤ 0.01 mm
HYSTERESIS		1-15% (5% typical)	1-15% (5% typical)	1-15% (5% typical)
SWITCHING FREQUENCY		100 Hz	100 Hz	100 Hz
WELD FIELD IMMUNE		No	No	No
DATA BITS	*D0*	Sensor output	Sensor output	Sensor output
	D1	Not used	Not used	Not used
	D2	Oscillator monitor	Oscillator monitor	Oscillator monitor
	D3	Not used	Not used	Not used
PARAMETER BIT	*P0*	15 ms activation delay on*/off	15 ms activation delay on*/off	15 ms activation delay on*/off
	P1	N.O.*/N.C. programming	N.O.*/N.C. programming	N.O.*/N.C. programming
PROFILE	*S-I0.ID.ID1.ID2*	S-0.A.7.E	S-0.A.7.E	S-0.A.7.E
PROTECTION (IEC)		IP67	IP67	IP67
TEMPERATURE RANGE	*WORKING*	-13 ºF to +158 ºF (-25 ºC to +70 ºF)	-13 ºF to +158 ºF (-25 ºC to +70 ºF)	-13 ºF to +158 ºF (-25 ºC to +70 ºF)
	STORAGE	-40 ºF to +185 ºF (-40 ºC to +85 ºF)	-40 ºF to +185 ºF (-40 ºC to +85 ºF)	-40 ºF to +185 ºF (-40 ºC to +85 ºF)
HOUSING MATERIAL		PBT	PBT	PBT
WEIGHT		150 g (5 oz)	150 g (5 oz)	150 g (5 oz)
APPROVALS		CE	CE	CE
ELECTRICAL CONNECTION		M12 quick disconnect	M12 quick disconnect	M12 quick disconnect

* Default setting

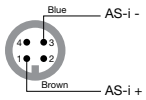
⚡ Stocked item
Consult factory for all other models

Wiring Diagrams

Quick Disconnect

Note: Wiring diagrams show quick disconnect pin numbers

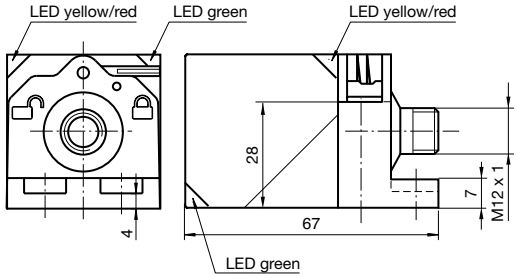
Male Receptacle End View

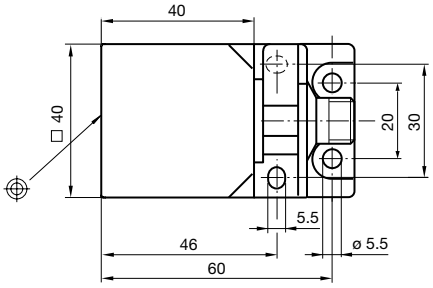


See pages 201-216 for complete AS-Interface accessory listing.

Dimensions (mm)

NBB20-L2-B3B-V1
NBN30-L2-B3B-V1
NBN40-L2-B3B-V1





Rectangular
Inductive Proximity Sensors

- Mounting holes in small flat housing
- Oscillator monitoring
- Normally open/normally closed programmable
- 2 m PVC cable for AS-Interface connection

Rectangular Sensors Overview

Pepperl+Fuchs offers a compact surface-mount AS-Interface intelligent sensor that is only 12 mm thick, yet offers all of the features available in sensors twice the size. The NBB6-F-B3B offers oscillator monitoring, input filtering, and all are programmable (normally open/normally closed). This sensor is a shielded version and may be flush mounted. It has a protection rating of IP67.

The sensor's housing is made of PBT, which retains its dimensional stability. This rugged material is resistant to abrasion, has excellent mechanical properties, and exceptional resistance to chemicals, oils, fats, and most aqueous media.

See page 163 for Rectangular Sensors wiring and dimensions.

Specifications

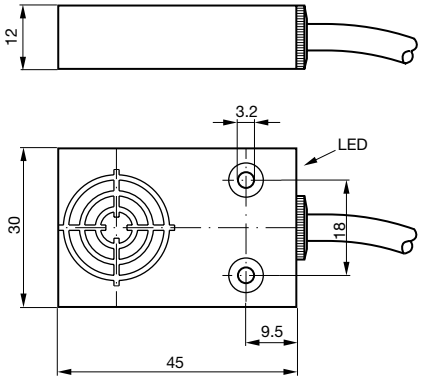
SENSING RANGE		6 mm
SHIELDED		Yes
MODEL NUMBER(S)		NBB6-F-B3B
EXTENDED ADDRESSING (62 NODES)		Yes
OPERATING CURRENT		20 mA
REPEATABILITY		≤ 0.01 mm
HYSTERESIS		1-15% (5% typical)
SWITCHING FREQUENCY		≥ 500 (P3=0), ≥ 100 (P3=1)
WELD FIELD IMMUNE		No
DATA BITS	*D0*	Sensor output
	D1	Not used
	D2	Oscillating monitor
	D3	Not used
PARAMETER BIT	*P0*	10 ms activation delay on*/off
	P1	NO*/NC programming
PROFILE	*S-I0.ID.ID1.ID2*	S-0.A.7.E
PROTECTION (IEC)		IP67
TEMPERATURE RANGE	*WORKING*	-13 ºF to +158 ºF (-25 ºC to +70 ºF)
	STORAGE	-40 ºF to +185 ºF (-40 ºC to +85 ºF)
HOUSING MATERIAL		PBT
WEIGHT		90 g (3 oz)
APPROVALS		CE
ELECTRICAL CONNECTION		2-meter cable, PVC covered, 2-conductor, #24AWG

* Default setting

Stocked item
Consult factory for all other models

Dimensions (mm)

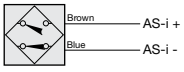
NBB6-F-B3B



Wiring Diagrams

Cable Connection

Normally Open or Normally Closed



See pages 201-216 for complete AS-Interface accessory listing.

Flat Pack
Inductive Proximity Sensors

- Easy AS-Interface connection with M12 quick disconnect
- Oscillator monitoring
- Normally open/normally closed programmable
- Programmable 15 ms activation delay

Flat Pack Overview

Pepperl+Fuchs' surface mount, flat pack inductive proximity sensors offer the longest available sensing ranges—extending to 50 mm—for your AS-Interface network. Additionally, they are offered in shielded (flush-mounted) or unshielded (nonflush-mounted) models and have an extended addressing range for up to 62 modules on one network. LEDs display power, switching state, and fault indication.

All of the intelligent flat pack sensors are 2.1 compatible, offer oscillator monitoring, input filtering, and are normally open/normally closed programmable.

See page 165 for Flat Pack Sensors wiring and dimensions.



Specifications

SENSING RANGE		40 mm	50 mm	50 mm
SHIELDED		Yes	Yes	No
MODEL NUMBER(S)		**NBB40-FP-B3B-P1-V1**	**NBB50-FP-B3B-P1-V1**	**NBN50-FP-B3B-P1-V1**
EXTENDED ADDRESSING (62 NODES)		Yes	Yes	Yes
OPERATING CURRENT		30 mA	30 mA	30 mA
REPEATABILITY		≤ 0.01mm	≤ 0.01 mm	≤0.01 mm
HYSTERESIS		1-15% (5% typical)	1-15% (5% typical)	1-15% (5% typical)
SWITCHING FREQUENCY		80 Hz	80 Hz	80 Hz
WELD FIELD IMMUNE		No	No	No
DATA BITS	*D0*	Sensor output	Sensor output	Sensor output
	D1	Not used	Not used	Not used
	D2	Oscillator monitor	Oscillator monitor	Oscillator monitor
	D3	Not used	Not used	Not used
PARAMETER BIT	*P0*	15 ms activation delay on*/off	15 ms activation delay on*/off	15 ms activation delay on*/off
	P1	N.O.*/N.C. programming	N.O.*/N.C. programming	N.O.*/N.C. programming
PROFILE	*S-I0.ID.ID1.ID2*	S-0.A.7.E	S-0.A.7.E	S-0.A.7.E
PROTECTION (IEC)		IP67	IP67	IP67
TEMPERATURE RANGE	*WORKING*	-13 ºF to +158 ºF (-25 ºC to +70 ºF)	-13 ºF to +158 ºF (-25 ºC to +70 ºF)	-13 ºF to +158 ºF (-25 ºC to +70 ºF)
	STORAGE	-40 ºF to +185 ºF (-40 ºC to +85 ºF)	-40 ºF to +185 ºF (-40 ºC to +85 ºF)	-40 ºF to +185 ºF (-40 ºC to +85 ºF)
HOUSING MATERIAL		PBT	PBT	PBT
WEIGHT		200 g (7 oz)	200 g (7 oz)	200 g (7 oz)
APPROVALS		CE AS-i	CE AS-i	CE AS-i
ELECTRICAL CONNECTION		M12 quick disconnect	M12 quick disconnect	M12 quick disconnect

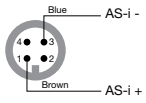
* Default setting

Stocked item
Consult factory for all other models

Wiring Diagrams

Terminal Connection

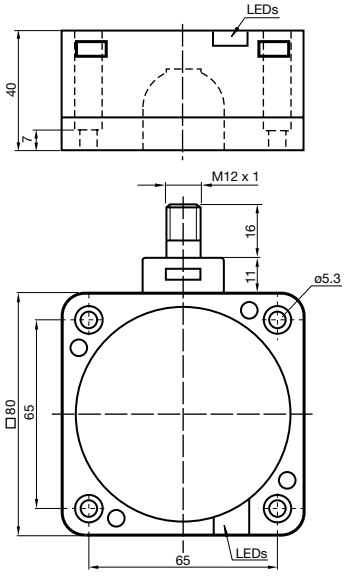
Male Receptacle End View



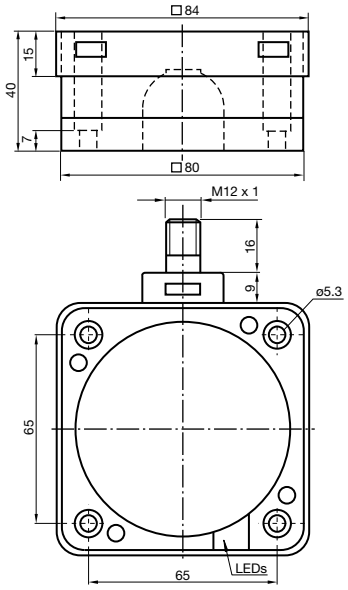
See pages 201-216 for complete AS-Interface accessory listing.

Dimensions (mm)

NBB40-FP-B3B-P1-V1
NBN50-FP-B3B-P1-V1



NBB50-FP-B3B-P1-V1



Valve Positioning
Inductive Proximity Sensors

- 2 integrated sensors and AS-Interface powered solenoid driver
- Lead breakage and short-circuit monitoring of the solenoid
- LED indication for inputs and output

Valve Positioning Overview

Discrete position sensors offer valve position and AS-Interface all in a single housing. Units are available that allow up to 62 intelligent valve position indicators can be put on one AS-Interface network (2.1 compatible) and then be brought back to a controller.

This is a dual inductive sensor and solenoid driver used to indicate and control valve position. This dual sensor uses two screws to mount directly on the quarter-turn valve and requires no additional adjustment. It connects to the AS-Interface with a micro (M12x1) quick disconnect. The D1 data bit monitors the solenoid for lead breakage and short circuit. Yellow LEDs display the current switch conditions. A dual LED displays the current solenoid status, and error indication.

See pages 167-168 for Valve Positioning wiring and dimensions.

Specifications

NUMBER OF INPUTS		3 mm	3 mm
SHIELDED		Yes	Yes
MODEL NUMBER(S)		**NCN3-F31-B3B-V1-K**	**NCN3-F31-B3B-V1-V1**
EXTENDED ADDRESSING (62 NODES)		Yes	Yes
OPERATING CURRENT		50-150 mA	50-150 mA
REPEATABILITY		≤ 0.01 mm	≤ 0.01 mm
HYSTERESIS		1-15% (5% typical)	1-15% (5% typical)
SWITCHING FREQUENCY		100 Hz	100 Hz
WELD FIELD IMMUNE		No	No
OUTPUTS (SOLENOID DRIVER)			
SUPPLY VOLTAGE		from AS-Interface	from AS-Interface
POWER		2.5 W	2.5 W
DATA BITS	*D0*	Solenoid driver output	Solenoid driver output
	D1	Leak breakage/ short-circuit solenoid driver	Leak breakage/ short-circuit solenoid driver
	D2	Sensor 1	Sensor 1
	D3	Sensor 2	Sensor 2
PARAMETER BIT	*P0*	Watchdog on*/off	Watchdog on*/off
	P1	N.O./N.C.* programming sensor 1	N.O./N.C.* programming sensor 1
	P2	N.O./N.C.* programming sensor 2	N.O./N.C.* programming sensor 2
PROFILE	*S-I0.ID.ID1.ID2*	S-D.A.7.E	S-D.A.7.E
PROTECTION (IEC)		IP67	IP67
TEMPERATURE RANGE	*WORKING*	-13 ºF to +158 ºF (-25 ºC to +70 ºF)	-13 ºF to +158 ºF (-25 ºC to +70 ºF)
	STORAGE	-40 ºF to +185 ºF (-40 ºC to +85 ºF)	-40 ºF to +185 ºF (-40 ºC to +85 ºF)
HOUSING MATERIAL		PBT	PBT
WEIGHT		150 g (5 oz)	150 g (5 oz)
APPROVALS		CE	CE
ELECTRICAL CONNECTION		M12 quick disconnect and 500 mm cable for solenoid driver	M12 quick disconnect

* Default setting

Stocked item
Consult factory for all other models

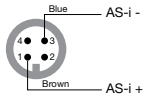
Wiring Diagrams

Quick Disconnect

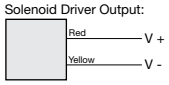
Note: Wiring diagrams show quick disconnect pin numbers

NCN3-F31-B3B-V1-K

Male Receptacle End View

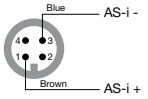


Solenoid Driver Output:

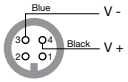


NCN3-F31-B3B-V1-V1

Male Receptacle End View

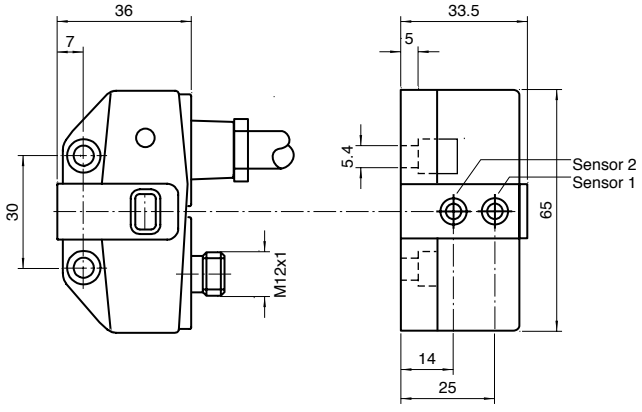


Female Receptacle End View
Solenoid Driver Output:

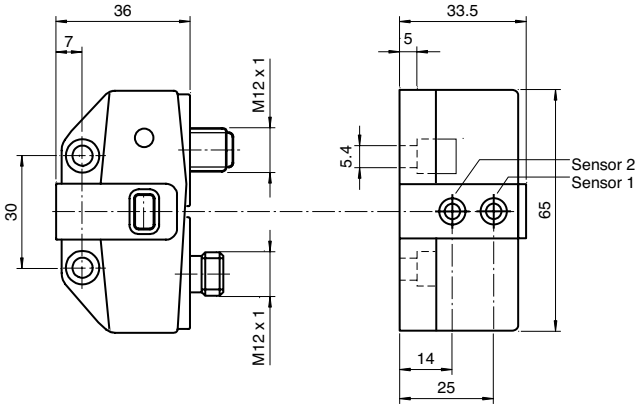


Dimensions (mm)

NCN3-F31-B3B-V1-K



NCN3-F31-B3B-V1-V1

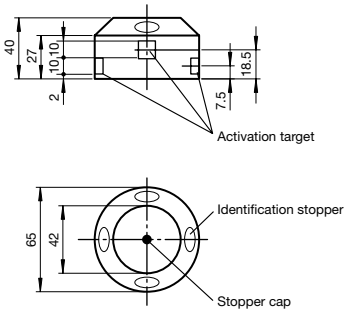


Accessories

BT 65

65 mm diameter valve positioning puck

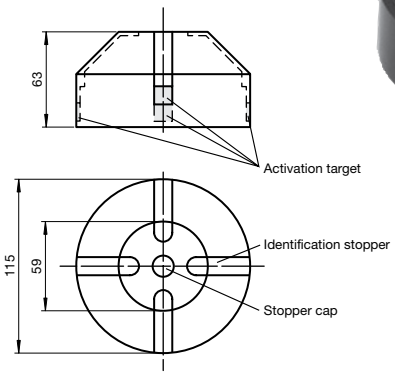
- *Shaft diameter < 58 mm*
- *Shaft height 20 mm or 30 mm*
- *Fixing hole pattern 30 mm x 80 mm*



BT 115A

115 mm diameter valve positioning puck

- *Shaft diameter < 90 mm*
- *Shaft height 30 mm or 50 mm*
- *Fixing hole pattern 30 mm x 130 mm*



See pages 201-216 for complete AS-Interface accessory listing.

Series 28
Photoelectric Sensors

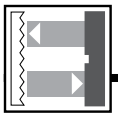
- Extreme low temperature operation (-40 °C/F) available
- Status LEDs visible from 15 m (50')
- Extended addressing with up to 62 addresses

Diffused Mode with Background Suppression

See page 170

Features:
- Sharp sensing range cut-off
- Thru-hole or dovetail mounting

Sensing Ranges: 700 mm

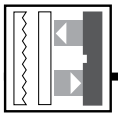


Retro-Reflective Mode

See page 171

Features:
- Reliable detection of even the shiniest material
- Weak signal output available

Sensing Ranges: 17 m, 30 m

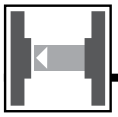


Retro-Reflective Mode with Foreground Suppression

See page 172

Features:
- Glossy targets not erroneously identified as the reflector up to 200 mm away
- Reliable detection of shrink-wrapped pallets

Sensing Range: 13 m



Thru-Beam Mode

See page 173

Features:
- Alignment LED visible through lens for faster setup
- Laser light source for long-range sensing

Sensing Range: 300 m

Diffused Mode with Background Suppression

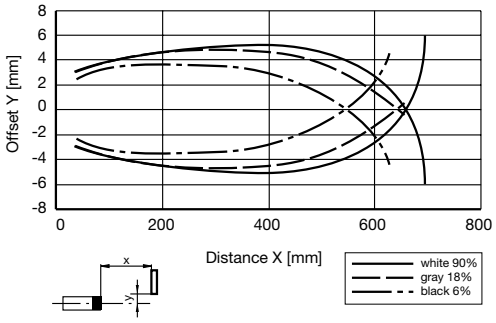
Specifications

SENSING RANGE		**20-700 mm**
SENSITIVITY ADJUSTMENT		Yes
MODEL NUMBER(S)		**RL28-8-H-700-RT-B3B/73c**
OUTPUT	*-B3B*	AS-Interface
SUPPLY VOLTAGE		from AS-Interface
LED(s)		Yes (3)
OPERATING MODE		Light on/dark on
RESPONSE TIME		≤ 2 ms
TIMER FUNCTION		One-shot (50 ms) through AS-Interface
SWITCHING FREQUENCY		250 Hz
STANDARDS		EN 60947-5-2
PROTECTION (IEC)		IP67
LIGHT SPOT DIAMETER		≈ 15 mm at a range of 700 m
LIGHT BEAM ANGLE		< 1.2º transmitter/< 2º receiver
LIGHT SOURCE		Visible red LED 660 nm
AMBIENT LIGHT RESISTANCE		≤ 50,000 lux
TEMPERATURE RANGE	*WORKING*	-40 ºF to +140 ºF (-40 ºC to +60 ºC)
	STORAGE	-40 ºF to +167 ºF (-40 ºC to +75 ºC)
HOUSING MATERIAL		ABS
	LENS	Plastic
WEIGHT		2.5 oz
APPROVALS		CE cULus
ELECTRICAL CONNECTION		M12 quick disconnect

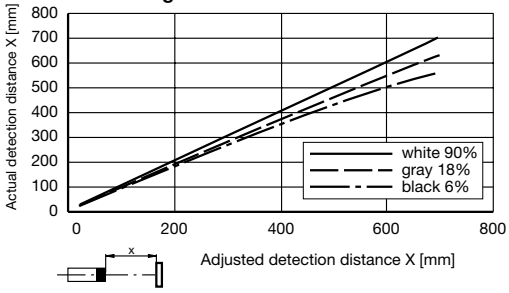
Stocked item
Consult factory for all other models

Sensing Characteristics

Movement Characteristics RL28-8-H-700-RT



Effect of Target Color on Sensing Distance RL28-8-H-700-RT



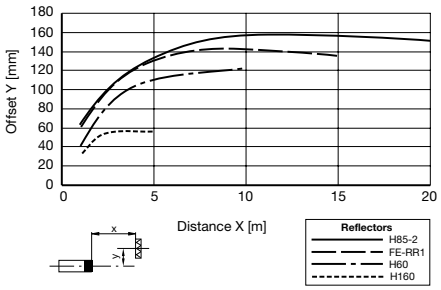
Retro-Reflective Mode

Specifications		Laser*
SENSING RANGE	**0-17 m**	**0-30 m**
SENSITIVITY ADJUSTMENT	Yes	Yes
REFLECTOR DISTANCE	50 mm-17 m	300 mm-30 m
POLARIZED FILTER	Yes	Yes
MODEL NUMBER(S)	**RL28-55-B3B/73c**	**RL28-55-LAS-B3B/73c**
OUTPUT *-B3B*	AS-Interface	AS-Interface
SUPPLY VOLTAGE	from AS-Interface	from AS-Interface
VOLTAGE RIPPLE	–	≤ 10%
LED(s)	Yes (3)	Yes (3)
OPERATING MODE	Light on/dark on	Light on/dark on
RESPONSE TIME	≤ 0.5 ms	≤ 0.5 ms
TIMER FUNCTION	One-shot (50 ms) through AS-Interface	One-shot (50 ms) through AS-Interface
SWITCHING FREQUENCY	1 kHz	1 kHz
TRANSMITTER FREQUENCY	≈ 6-20 kHz	≈ 6-20 kHz
STANDARDS	EN 60947-5-2	EN 60947-5-2
PROTECTION (IEC)	IP67	IP67
LIGHT SPOT DIAMETER	≈ 290 mm at a range of 17 m	≈ 45 mm at a range of 30 m
LIGHT BEAM ANGLE	< 1.2° transmitter < 2° receiver	< 0.1° transmitter < 2° receiver
LIGHT SOURCE	Visible red LED 660 nm	Visible red laser 650 nm Class 1
AMBIENT LIGHT RESISTANCE	≤ 80,000 lux	≤ 50,000 lux
TEMPERATURE RANGE *WORKING*	-40 °F to +140 °F (-40 °C to +60 °C)	+14 °F to +122 °F (-10 °C to +50 °C)
STORAGE	-40 °F to +167 °F (-40 °C to +75 °C)	-4 °F to +167 °F (-20 °C to +75 °C)
HOUSING MATERIAL	ABS	ABS
LENS	Plastic	Plastic
WEIGHT	2.5 oz	2.8 oz
APPROVALS	CE cULus AS-i	CE cULus AS-i
ELECTRICAL CONNECTION	M12 quick disconnect	M12 quick disconnect

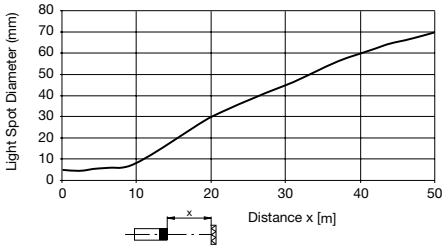
*Micro-structure corner-cube reflectors are recommended with laser retro-reflective mode sensors.

Sensing Characteristics

Movement Characteristics RL28-55

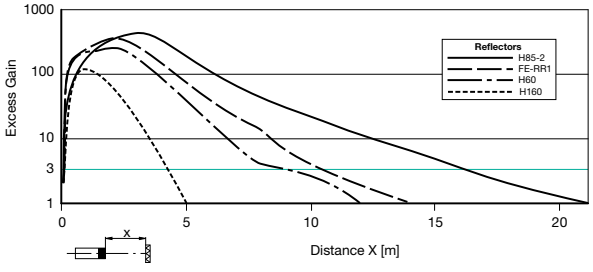


Light Spot Diameter RL28-55-LAS

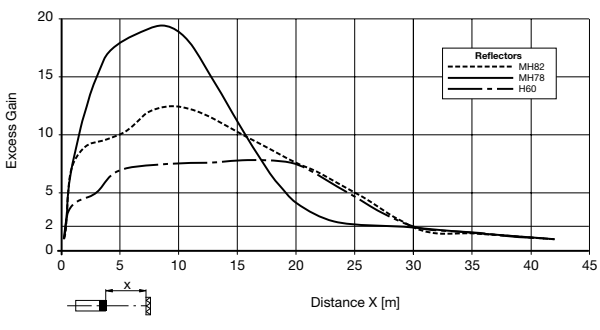


Stocked item
Consult factory for all other models

Excess Gain vs. Sensing Range RL28-55



Excess Gain vs. Sensing Range RL28-55-LAS



Retro-Reflective Mode with Foreground Suppression

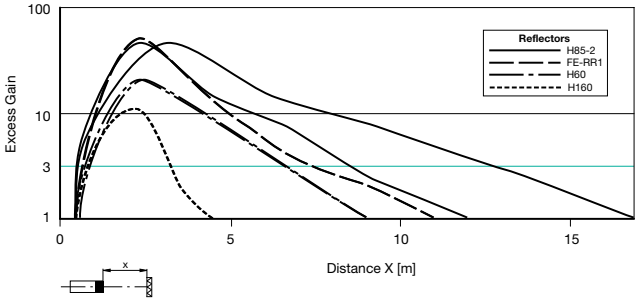
Specifications

SENSING RANGE		**200 mm-13 m**
SENSITIVITY ADJUSTMENT		Yes
FOREGROUND SUPPRESSION RANGE		0-200 mm
REFLECTOR DISTANCE		500 mm-13 m
POLARIZED FILTER		Yes
MODEL NUMBER(S)		**RL28-55-V-B3B/73c**
OUTPUT	*-B3B*	AS-Interface
SUPPLY VOLTAGE		from AS-Interface
VOLTAGE RIPPLE		10%
LED(s)		Yes (3)
OPERATING MODE		Light on/dark on
RESPONSE TIME		≤ 0.5 ms
TIMER FUNCTION		One-shot (50 ms) through AS-Interface
SWITCHING FREQUENCY		1 kHz
STANDARDS		EN 60947-5-2
PROTECTION (IEC)		IP67
LIGHT SPOT DIAMETER		≈ 220 mm at a range of 13 m
LIGHT BEAM ANGLE		1.2° transmitter/2° receiver
LIGHT SOURCE		Visible red LED
AMBIENT LIGHT RESISTANCE		≤ 80,000 lux
TEMPERATURE RANGE	*WORKING*	-40 °F to +140 °F (-40 °C to +60 °C)
	STORAGE	-40 °F to +167 °F (-40 °C to +75 °C)
HOUSING MATERIAL		ABS
	LENS	Plastic
WEIGHT		2.5 oz
APPROVALS		CE cULus
ELECTRICAL CONNECTION		M12 quick disconnect

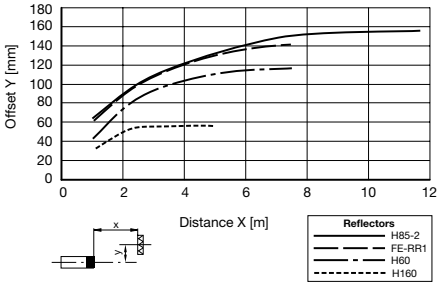
Stocked item
Consult factory for all other models

Sensing Characteristics

Excess Gain vs. Sensing Range RL28-55-V



Movement Characteristics RL28-55-V



Thru-Beam Mode

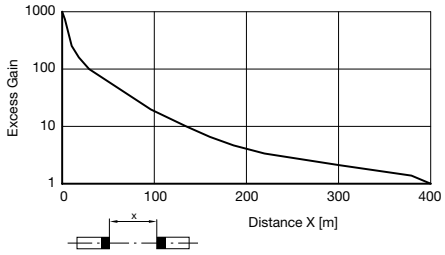
Specifications		Laser*
SENSING RANGE		0-300 m
SENSITIVITY ADJUSTMENT		Yes
MODEL NUMBER(S)	*Transmitter*	LD28-LAS-F1-B3B/73c
	Receiver	LV28-LAS-F1-B3B/73c
OUTPUT	*-B3B*	AS-Interface
SUPPLY VOLTAGE		from AS-Interface
LED(s)		Yes (3) plus alignment LED
OPERATING MODE		Light on/dark on
RESPONSE TIME		≤ 0.5 ms
TIMER FUNCTION		One-shot (50 ms) through AS-Interface
SWITCHING FREQUENCY		1 kHz
TRANSMITTER FREQUENCY		F1=25 kHz
STANDARDS		NEMA ICS5-2000
PROTECTION (IEC)		IP67
LIGHT SPOT SIZE		≈ 1 x 4.5 mm at a range of 0.1 m, ≈ 6 mm at a range of 5 m, ≈ 75 x 300 mm at a range of 300 m (parallel to housing)
LIGHT BEAM ANGLE		0.06º transmitter/5º receiver
LIGHT SOURCE		Visible red laser 650 nm Class 2
AMBIENT LIGHT RESISTANCE		≤ 50,000 lux
TEMPERATURE RANGE	*WORKING*	+14 ºF to +122 ºF (-10 ºC to +50 ºC)
	STORAGE	-4 ºF to +167 ºF (-20 ºC to +75 ºC)
HOUSING MATERIAL		ABS
	LENS	Plastic
WEIGHT		2.8 oz per housing
APPROVALS		CE cULus
ELECTRICAL CONNECTION		M12 quick disconnect

*Micro-structure corner-cube reflectors are recommended with laser retro-reflective mode sensors.

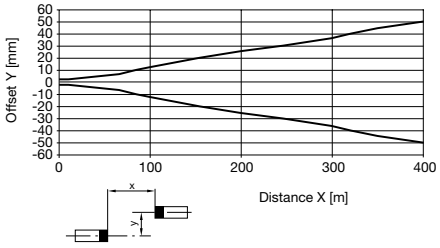
Stocked item
Consult factory for all other models

Sensing Characteristics

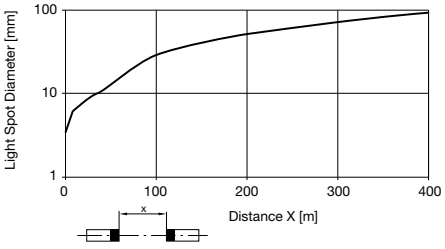
Excess Gain vs. Sensing Range LD28/LV28-LAS

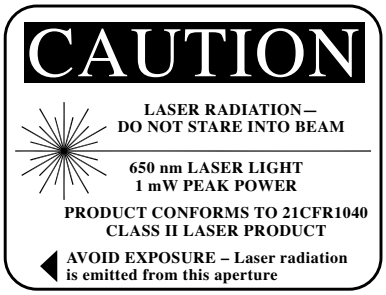


Movement Characteristics LD28/LV28-LAS



Light Spot Diameter LD28/LV28-LAS



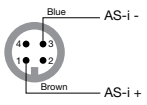


Wiring Diagrams

Quick Disconnect

Note: Wiring diagrams show quick disconnect pin numbers

Male Receptacle End View



AS-Interface Programming

Address preset to 00; can be changed via the master or with a hand-held addressing device.

Addresses 1A-31A and 1B-31B are available

IO-Code 3

ID-Code A

ID2 1

Data bits

Bit	Function	Description
D0	switch output	0 = no light received (with P1=1), 0=light received (with P1=0), 1 = no light received (with P1=0), 1=light received (with P1=1)
D1*	weak signal output	0 = alarm 1 = no alarm
D2	test input	0 = transmitter active 1 = transmitter deactivated
D3	not used	

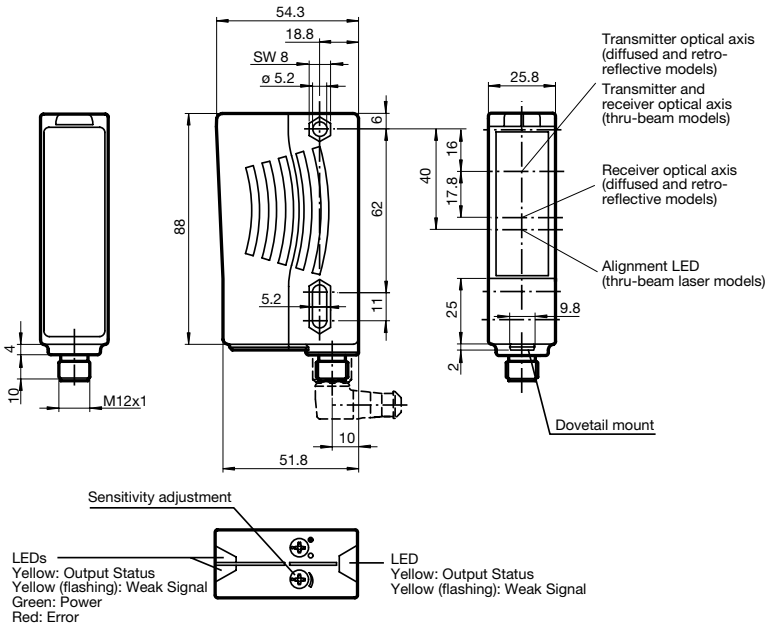
Parameter bits

Bit	Function (1/0)	
P0	not used	
P1	light on/dark on mode	(0=dark on, 1=light on)
P2	50 ms one shot timer	(0=timer on, 1=timer off)
P3	not used	

* not used for RL28-8-H models

Dimensions (mm)

RL28-8-H-700-RT-B3B/73c
RL28-55-B3B/73c
RL28-55-LAS-B3B/73c
RL28-55-V-B3B/73c
LD28-LAS-F1-B3B/73c
LV28-LAS-F1-B3B/73c

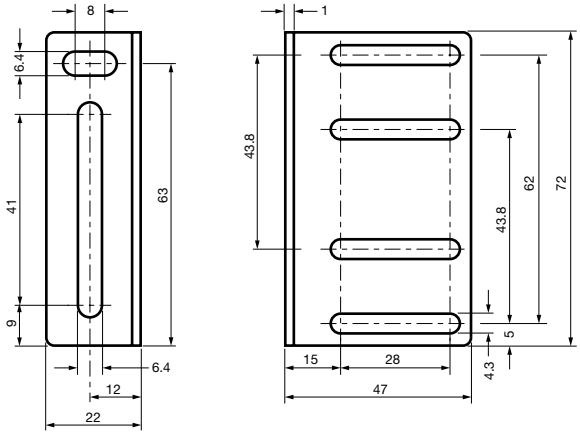


Transmitter models have LED Green: Power only

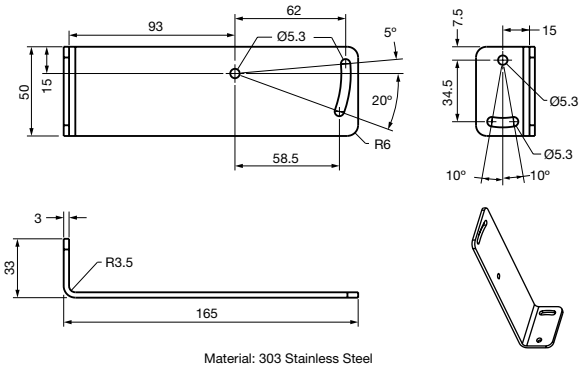
Accessories

(Dimensions in mm)

Mounting Bracket Model OMH-RL25
Right angle mounting bracket

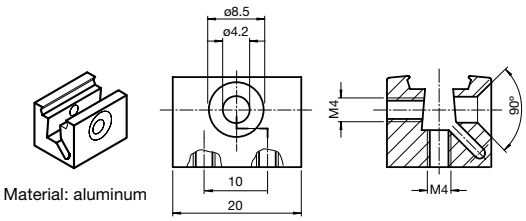


Mounting Bracket Model OMH-21-T
High-profile right angle mounting bracket



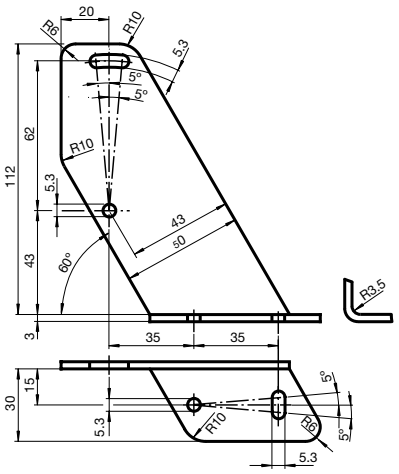
Material: 303 Stainless Steel

Dovetail Mounting Clamp Model OMH-MLV11-K

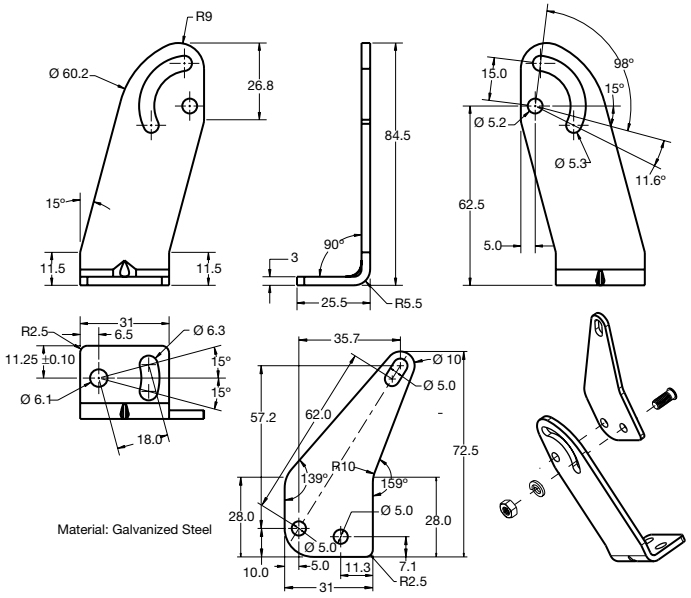


Material: aluminum

Mounting Bracket Model OMH-21
Right angle mounting bracket



Mounting Bracket Model OMH-RL2-H
Hinged right angle mounting bracket



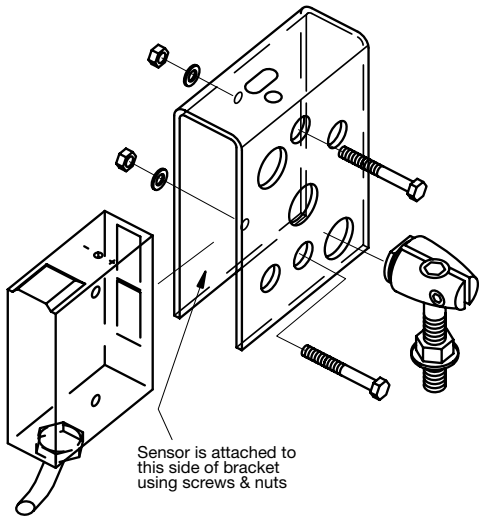
Material: Galvanized Steel

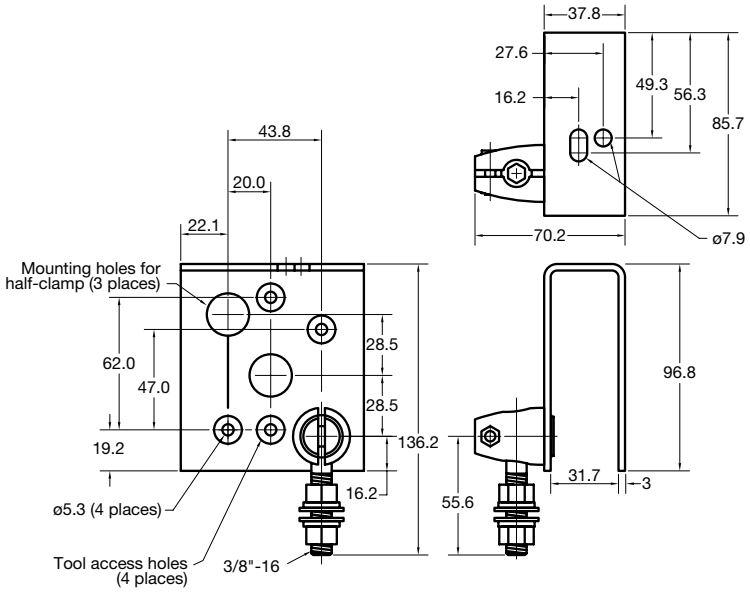
See pages 201-216 for complete AS-Interface accessory listing.

Accessories (cont.)

(Dimensions in mm)

Mounting Bracket Model OMH-RL2-S
Protective shroud bracket with 360° rotatability half-clamp

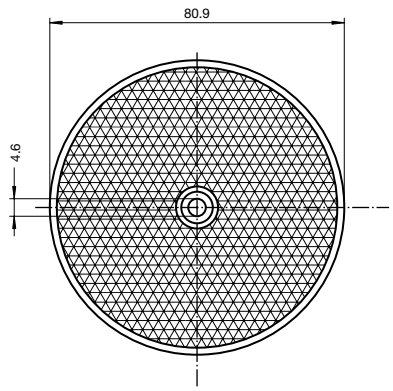




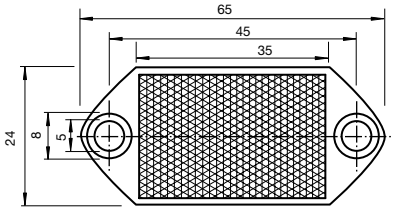
Material: Stainless steel shroud, nickel-plated zinc half-clamp, zinc-plated steel screws and nuts.

Reflectors

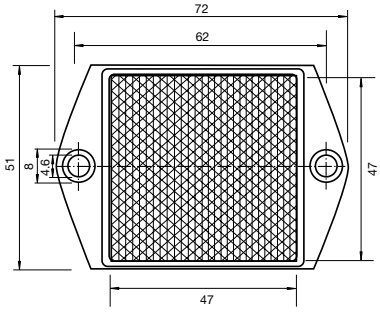
Thru-hole



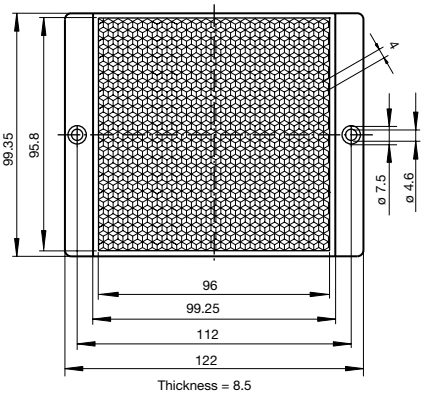
FE-RR1
Round, corner-cube reflector
Temperature range -4 °F to +150 °F



REFLECTOR H32
Rectangular, corner-cube reflector
Temperature range -4 °F to +185 °F



REFLECTOR H51x72
Rectangular, corner-cube reflector
Temperature range -4 °F to +140 °F



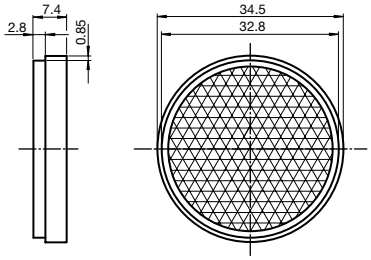
REFLECTOR H100
Square, corner-cube reflector
Temperature range -4 °F to +158 °F

Reflectors continued on next page...

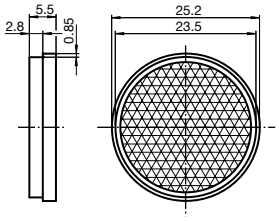
Accessories (cont.)

(Dimensions in mm)

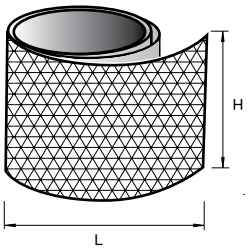
Self Adhesive



REFLECTOR A35
Round, corner-cube reflector
Temperature range -4 °F to +150 °F



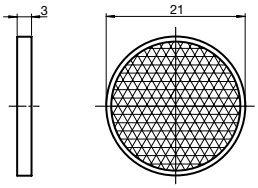
REFLECTOR A25
Round, corner-cube reflector
Temperature range -4 °F to +150 °F



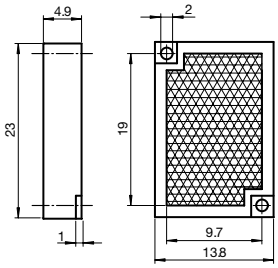
Pre-cut, corner-cube reflective tape.
Reflective tapes can be cut.
150' rolls are available. Contact P+F
Temperature range -40 °F to 180 °F

MODEL	H	L
RT1 X 100	1.0"	100"
RT1 X 2	1.0"	2.0"
RT2 X 100	2.0"	100"
RT3 X 100	3.0"	100"

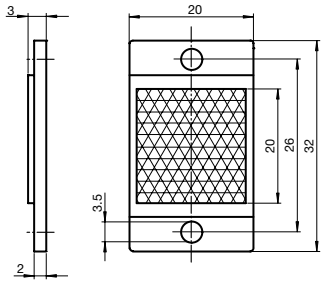
Microstructure



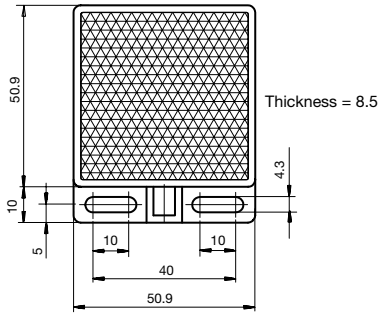
REFLECTOR MA21
Round, microstructure, corner-cube reflector. Self-adhesive mounting.
Temperature range -4 °F to +185 °F



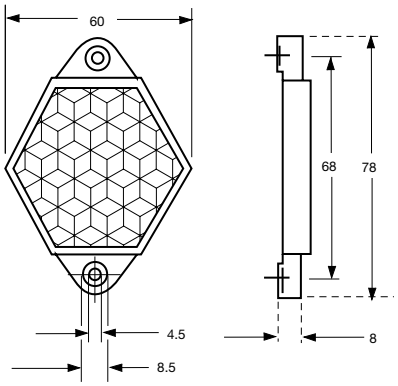
REFLECTOR MH23
Rectangular, microstructure corner-cube reflector. Through-hole mounting.
Temperature range -4 °F to +185 °F



REFLECTOR MH20
Square, microstructure corner-cube reflector. Through-hole mounting.
Temperature range -4 °F to +185 °F



REFLECTOR MH50
Square, microstructure corner-cube reflector. Through-hole mounting.
Temperature range -4 °F to +185 °F



REFLECTOR MH78
Rectangular, microstructure, corner-cube reflector. Through-hole mounting.
Temperature range -4 °F to +185 °F

See pages 201-216 for complete AS-Interface accessory listing.

BVS58/BVM58 Series
Absolute Rotary Encoders

- Industrial standard 58 mm diameter housing
- Single or multi-turn
- Uses 4 AS-Interface slaves
- IP65
- Servo flange and 6 mm shaft or clamping flange and 10 mm shaft

Pepperl+Fuchs' BVS58 and BVM58 series absolute encoders communicate via AS-Interface. They are available in either single-turn with 13-bit resolution, or multi-turn with 16-bit resolution versions. The position value is output to the master within a single cycle via the 4 integrated AS-Interface chips. Each slave address can be individually set. These encoders are rated IP65 and feature a rugged aluminum housing.

Order Code

BV 58N- AVR0NN-

Type
S Single-turn
M Multi-turn

Shaft option/flange style
011 Ø 10 mm x 20 mm with clamping flange
032 Ø 6 mm x 10 mm with servo flange

Resolution

Single-turn	Number of Revolutions	Steps per Revolutions
0013	1	8192
Multi-turn	**Number of Revolutions**	**Steps per Revolutions**
0313	8	8192
0412	16	4096
0511	32	2048
0610	64	1024
0709	128	512
0808	256	256
0907	512	128
1006	1024	64
1105	2048	32
1204	4096	16

Example: BVS58N-032AVR0NN-0013

Technical Specifications

Electrical

SUPPLY VOLTAGE		29.5-31.6 VDC
CURRENT CONSUMPTION	*Starting*	≤ 155 mA
	Operational	≤ 65 mA
OUTPUT CODE		Programmable gray or binary
LINEARITY		±1 LSB
COUNTING DIRECTION *(Shaft End View)*		Programmable
INTERFACE	*Type*	AS-Interface
	Transfer rate	≤ 0.167 MBaud
RESOLUTION	*Bits/steps per turn*	13-bit / ≤ 8192
	Bits/number of turns	12-bit / ≤ 4096
OVERALL RESOLUTION	*Single-turn*	13-bit
	Multi-turn	16-bit
STANDARD CONFORMITY		AS-Interface
CERTIFICATES		CE

Mechanical

MATERIAL	*Housing*	Powder-coated aluminum
	Flange	Aluminum
	Shaft	Stainless steel
	Code disc	Glass
WEIGHT	*BVS58*	≈ 12 oz
	BVM58	≈ 13 oz
ROTATIONAL SPEED	*BVS58*	≤ 12,000 rpm
	BVM58	≤ 6,000 rpm
MOMENT OF INERTIA		≤ 4.3 x 10^{-4} oz-in-sec^2
STARTING TORQUE AT 20 °C		≤ 2.1 in-oz
SHAFT LOADING	*Axial - BVS*	9.8 lbs at 12,000 rpm
	BVM	40 lbs at 6,000 rpm
	Radial - BVS	13.3 lbs at 12,000 rpm
	BVM	40 lbs at 6,000 rpm
BEARING WORKING LIFE		> 4 x 10^8 revolutions

Environmental

STORAGE TEMPERATURE	-25 °C to +85 °C (-13 °F to +185 °F)
OPERATING TEMPERATURE	-20 °C to +70 °C (-4 °F to +158 °F)
HUMIDITY	98% RH non-condensing
SHOCK RESISTANCE	100 g for 3 ms
VIBRATION RESISTANCE	10 g, 10-2,000 Hz
ENCLOSURE RATING	IP65

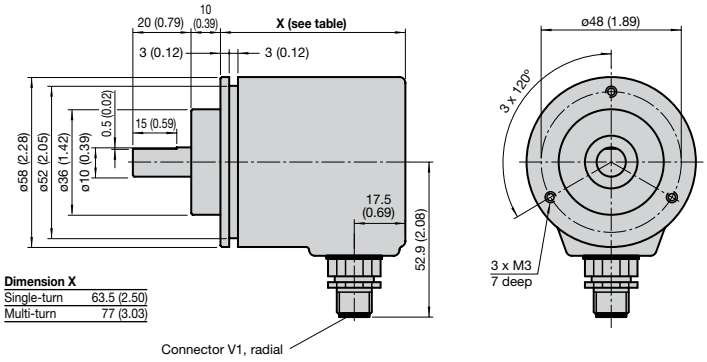
Connection Types

CONNECTOR	Type V1, M12, 4-Pin

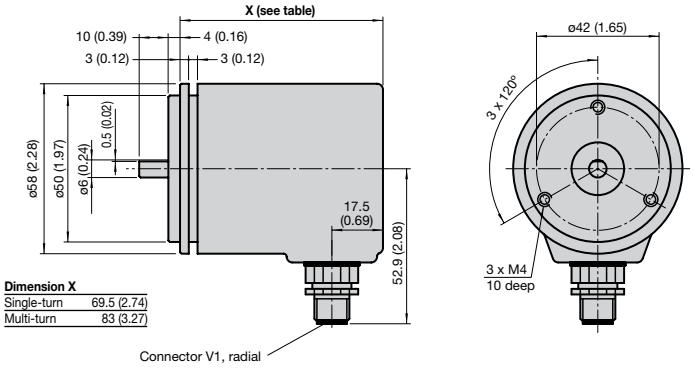
Dimensions

mm (in.)

Shaft option/flange style 011
Ø 10 mm x 20 mm with clamping flange



Shaft option/flange style 032
Ø 6 mm x 10 mm with servo flange



Electrical Connection

Signal	Type V1, 4-pin quick disconnect	Description
AS-i +	1	
Reserved	2	Not wired
AS-i -	3	
Reserved	4	Not wired
		

Programming

Addresses

	Slave A	Slave B	Slave C	Slave D
Preset address	1	2	3	4
IO code	7	0	0	0
ID code	F	F	F	F

⚠ When using an AS-Interface master or handheld programmer to change the slave addresses, it is absolutely essential to assign a different address to each of the four slaves.

Parameter Bits

The four parameter bits of slave A are used to set the parameters of the encoder. The parameter bits of slave B, C and D are not used.

Status of parameter bit	Slave A			
	P0	P1	P2	P3
0	Gray code	Transfer with flag bits	Count down with clockwise rotation	Not used
1	Binary code	Transfer without flag bits	Count up with clockwise rotation	Not used

Data Bits

From the AS-Interface master to the encoder

Data from the AS-Interface master is transferred to the encoder via slave A, which works bidirectionally. Slaves B, C and D operate unidirectionally and can only send data.

When data bits D2 and D3 are changed from 01 to 10 or vice-versa, the position data is saved in the encoder.

Status of D0/D1 or D2/D3	Slave A	
	D0/D1	D2/D3
00	Normal mode	Position data is not saved
01	Rotary encoder is set to 1/4 of the single turn resolution	Position data is saved
10	Rotary encoder is set to 0	Position data is saved
11	Normal mode	Position data is not saved

From the encoder to the AS-Interface master

Parameter bit P1 of slave A is used to determine if the encoder transfers data to the AS-Interface master with or without flag bits.

P1 = 1: Transfer without flag bits

Slave A				Slave B				Slave C				Slave D			
D0	D1	D2	D3	D0	D1	D2	D3	D0	D1	D2	D3	D0	D1	D2	D3
Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Not used!		

P1 = 0: Transfer with flag bits MA, MB, MC, MD

Slave A				Slave B				Slave C				Slave D			
D0	D1	D2	D3	D0	D1	D2	D3	D0	D1	D2	D3	D0	D1	D2	D3
Bit 0	Bit 1	Bit 2	MA	Bit 0	Bit 1	Bit 2	MB	Bit 0	Bit 1	Bit 2	MC	Bit 0	Bit 1	Bit 2	MD

Programming (continued)

Operating Modes

Address assignments for the four slaves

The AS-Interface master accesses all slaves sequentially within an AS-Interface cycle to transfer output data to slave A or to read input data from the slaves. The single-turn absolute encoder uses four AS-Interface chips to transfer a position of 13 bits using 4 slave addresses.

These four slaves are queried sequentially and data may originate from any one of four different sampling times. To minimize this effect, sequential addresses (n, n+1, n+2, and n+3) should be assigned to slaves A, B, C, and D.

In addition, slave A is responsible for controlling the encoder's functions. If the order of slaves is changed (D=n, C=n+1, B=n+2, A=n+3), the output word, which is supposed to be transmitted by the function control module of the absolute encoder, will not be transmitted until slaves D, C and B have been read in. A memory command would then only take effect for slave A. The command would not affect the slaves that had already been read until the next read cycle. This change of slave order will result in data inconsistency.

Temporary storage and transfer with flag bits

If any data from the rotary encoder is interrupted during transmission, it is possible that some of the data transferred to the controller originates from a different position in the data word. The controller can check the data integrity for a single data word by comparing the four flag bits. Each slave can transfer one flag bit making it possible for the control module to check which position data set an individual data set belongs to by comparing the 4 bits. Data bit D2 is used for this purpose. Using the flag bits reduces the size of the usable data from 16 bits to 12 bits.

	Slave A	Position data			
Cycle	Data bit D2	Slave A	Slave B	Slave C	Slave D
1	0	XXX0	XXX0	XXX0	XXX0
2	1	XXX1	XXX1	XXX1	XXX1
3	0	XXX0	XXX0	XXX0	XXX0
4	1	XXX1	XXX1	XXX1	XXX1
etc.					

See pages 201-216 for complete AS-Interface accessory listing.

BSS58/BSM58 Series
Absolute Rotary Encoders

- Industrial standard 58 mm diameter housing
- Single or multi-turn
- Uses 4 AS-Interface slaves
- IP65
- 10 mm or 12 mm recessed hollow shaft

Pepperl+Fuchs' BSS58 and BSM58 series absolute encoders feature recessed hollow shafts and communicate via AS-Interface. Available in either single-turn with 13 bit resolution, or multi-turn with 16 bit resolution versions. The position value is output to the master within a single cycle via the 4 integrated AS-Interface chips. Each slave address can be individually set. These encoders are rated IP65 and feature a rugged aluminum housing.

Order Code

BS 58N- AVR0NN-

Type
S Single-turn
M Multi-turn

Shaft option
01A Ø 10 mm x 21 mm recessed hollow shaft
02A Ø 12 mm x 21 mm recessed hollow shaft

Resolution

Single-turn	Number of Revolutions	Steps per Revolutions
0013	1	8192
Multi-turn	**Number of Revolutions**	**Steps per Revolutions**
0313	8	8192
0412	16	4096
0511	32	2048
0610	64	1024
0709	128	512
0808	256	256
0907	512	128
1006	1024	64
1105	2048	32
1204	4096	16

Example: BVS58N-032AVR0NN-0013

Technical Specifications

Electrical

SUPPLY VOLTAGE		29.5-31.6 VDC
CURRENT CONSUMPTION	*Starting*	≤ 155 mA
	Operational	≤ 65 mA
OUTPUT CODE		Programmable gray or binary
LINEARITY		±1 LSB
COUNTING DIRECTION *(Shaft End View)*		Programmable
INTERFACE	*Type*	AS-Interface
	Transfer rate	≤ 0.167 MBaud
RESOLUTION	*Bits/steps per turn*	13-bit / ≤ 8192
	Bits/number of turns	12-bit / ≤ 4096
OVERALL RESOLUTION	*Single-turn*	13-bit
	Multi-turn	16-bit
STANDARD CONFORMITY		AS-Interface
CERTIFICATES		CE

Mechanical

MATERIAL	*Housing*	Powder-coated aluminum
	Flange	Aluminum
	Shaft	Stainless steel
	Code disc	Glass
WEIGHT		≈ 12 oz
ROTATIONAL SPEED	*BSS58*	≤ 10,000 rpm
	BSM58	≤ 6,000 rpm
MOMENT OF INERTIA		≤ 4.3 x 10^{-4} oz-in-sec^2
STARTING TORQUE AT 20 °C		≤ 2.1 in-oz
SHAFT LOADING	*Angle offset*	1°
	Axial offset	≤ 1 mm
BEARING WORKING LIFE		> 4 x 10^{10} revolutions

Environmental

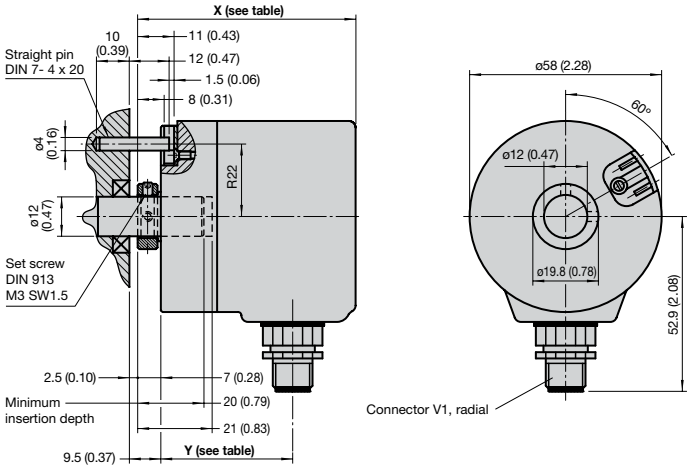
STORAGE TEMPERATURE	-25 °C to +85 °C (-13 °F to +185 °F)
OPERATING TEMPERATURE	-20 °C to +70 °C (-4 °F to +158 °F)
HUMIDITY	98% RH non-condensing
SHOCK RESISTANCE	100 g for 3 ms
VIBRATION RESISTANCE	10 g, 10-2,000 Hz
ENCLOSURE RATING	IP65

Connection Types

CONNECTOR	Type V1, M12, 4-Pin

Dimensions

mm (in.)



	Dimension X	Dimension Y
Single-turn	67 (2.64)	41 (1.61)
Multi-turn	94 (3.70)	68 (2.68)

Electrical Connection

Signal	Type V1, 4-pin quick disconnect	Description
AS-i +	1	
Reserved	2	Not wired
AS-i -	3	
Reserved	4	Not wired
		

Programming

Addresses

	Slave A	Slave B	Slave C	Slave D
Preset address	1	2	3	4
IO code	7	0	0	0
ID code	F	F	F	F

⚠ When using an AS-Interface master or handheld programmer to change the slave addresses, it is absolutely essential to assign a different address to each of the four slaves.

Parameter Bits

The four parameter bits of slave A are used to set the parameters of the encoder. The parameter bits of slave B, C and D are not used.

Status of parameter bit	Slave A			
	P0	P1	P2	P3
0	Gray code	Transfer with flag bits	Count down with clockwise rotation	Not used
1	Binary code	Transfer without flag bits	Count up with clockwise rotation	Not used

Data Bits

From the AS-Interface master to the encoder

Data from the AS-Interface master is transferred to the encoder via slave A, which works bidirectionally. Slaves B, C and D operate unidirectionally and can only send data.

When data bits D2 and D3 are changed from 01 to 10 or vice-versa, the position data is saved in the encoder.

Status of D0/D1 or D2/D3	Slave A	
	D0/D1	D2/D3
00	Normal mode	Position data is not saved
01	Rotary encoder is set to 1/4 of the single turn resolution	Position data is saved
10	Rotary encoder is set to 0	Position data is saved
11	Normal mode	Position data is not saved

From the encoder to the AS-Interface master

Parameter bit P1 of slave A is used to determine if the encoder transfers data to the AS-Interface master with or without flag bits.

P1 = 1: Transfer without flag bits

Slave A				Slave B				Slave C				Slave D			
D0	D1	D2	D3	D0	D1	D2	D3	D0	D1	D2	D3	D0	D1	D2	D3
Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Not used!		

P1 = 0: Transfer with flag bits MA, MB, MC, MD

Slave A				Slave B				Slave C				Slave D			
D0	D1	D2	D3	D0	D1	D2	D3	D0	D1	D2	D3	D0	D1	D2	D3
Bit 0	Bit 1	Bit 2	MA	Bit 0	Bit 1	Bit 2	MB	Bit 0	Bit 1	Bit 2	MC	Bit 0	Bit 1	Bit 2	MD

Programming (continued)

Operating Modes

Address assignments for the four slaves

The AS-Interface master accesses all slaves sequentially within an AS-Interface cycle to transfer output data to slave A or to read input data from the slaves. The single-turn absolute encoder uses four AS-Interface chips to transfer a position of 13 bits using 4 slave addresses.

These four slaves are queried sequentially and data may originate from any one of four different sampling times. To minimize this effect, sequential addresses (n, n+1, n+2, and n+3) should be assigned to slaves A, B, C, and D.

In addition, slave A is responsible for controlling the encoder's functions. If the order of slaves is changed (D=n, C=n+1, B=n+2, A=n+3), the output word, which is supposed to be transmitted by the function control module of the absolute encoder, will not be transmitted until slaves D, C and B have been read in. A memory command would then only take effect for slave A. The command would not affect the slaves that had already been read until the next read cycle. This change of slave order will result in data inconsistency.

Temporary storage and transfer with flag bits

If any data from the rotary encoder is interrupted during transmission, it is possible that some of the data transferred to the controller originates from a different position in the data word. The controller can check the data integrity for a single data word by comparing the four flag bits. Each slave can transfer one flag bit making it possible for the control module to check which position data set an individual data set belongs to by comparing the 4 bits. Data bit D2 is used for this purpose. Using the flag bits reduces the size of the usable data from 16 bits to 12 bits.

	Slave A	Position data			
Cycle	Data bit D2	Slave A	Slave B	Slave C	Slave D
1	0	XXX0	XXX0	XXX0	XXX0
2	1	XXX1	XXX1	XXX1	XXX1
3	0	XXX0	XXX0	XXX0	XXX0
4	1	XXX1	XXX1	XXX1	XXX1
etc.					

See pages 201-216 for complete AS-Interface accessory listing.

Notes

Cordsets

Cordsets

To simplify your installation, P+F offers a complete line of Nano and Micro cordsets along with extension cables in a wide variety of protective jacket options to ensure reliable operation in mechanically and chemically abusive environments.

Tough, heavy-duty, oil- and weather-resistant PVC and PUR cable jackets provide superior protection and ensure a safe connection. Oil, water, metal shavings, grime, and other common contaminants cannot penetrate the molded, one-piece connector head and cable. Integrated cable stress relief allows cables to withstand heavy flexing and physical abuse without decreasing cable life.

Gray PVC Micro Cordsets

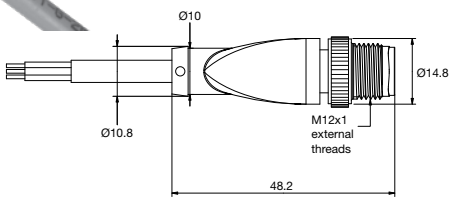
12 mm receptacle DC sensor compatibility

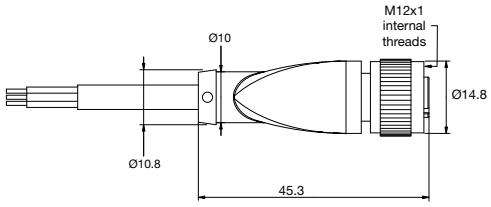
- Single key
- Gray PVC cable jacket
- #22 AWG
- Female or male connection
- 4- and 5-pin

Specifications

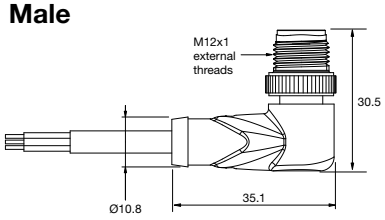
MATERIAL DATA	
MOLDED HEAD	Green TPU
INSERT	PUR
CABLE TYPE	Gray, flexible PVC jacket
CONTACTS	Machined copper and tin over gold
CONTACT PLATING	Copper and tin over nickel
SHELL	N/A
WIRE GAUGE	#22 AWG
COUPLING NUT	Copper and tin over nickel
CABLE OUTER DIAMETER	4.5 mm
ELECTRICAL DATA	
CONTACT RESISTANCE	≤ 5 mΩ
ELECTRICAL ISOLATION	1500 VAC
CURRENT RATING	4 A
VOLTAGE RATING (4/5 pole)	300 VDC/60 VDC
ENVIRONMENT DATA	
PROTECTION CLASSES	IP68/69K
TEMPERATURE RANGE	-13 °F to +212 °F

Dimensions (mm)

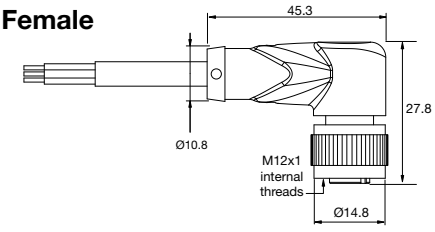




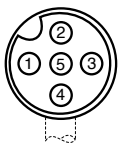
Male



Female



Model Number Selection

Face View (female)	Color Code	Length (m)	Female Straight	Female Right Angle	Male Straight	Male Right Angle
	1. Brown 2. White 3. Blue 4. Black 5. Not used	2 5 10 15 20	V1-G-2M-PVC ⚡ V1-G-5M-PVC ⚡ V1-G-10M-PVC ⚡ V1-G-15M-PVC ● V1-G-20M-PVC ●	V1-W-2M-PVC ⚡ V1-W-5M-PVC ⚡ V1-W-10M-PVC ⚡ V1-W-15M-PVC ● V1-W-20M-PVC ●	V1S-G-2M-PVC ⚡ V1S-G-5M-PVC ⚡ V1S-G-10M-PVC ●	V1S-W-2M-PVC ⚡ V1S-W-5M-PVC ⚡ V1S-W-10M-PVC ●
	1. Brown 2. White 3. Blue 4. Black 5. Grey	2 5 10	V15-G-2M-PVC ⚡ V15-G-5M-PVC ⚡ V15-G-10M-PVC ⚡	V15-W-2M-PVC ⚡ V15-W-5M-PVC ⚡ V15-W-10M-PVC ⚡	V15S-G-2M-PVC ⚡ V15S-G-5M-PVC ⚡ V15S-G-10M-PVC ●	

⚡ Stocked item
● Typical delivery 4 weeks or less
Consult factory for all other models

Yellow PVC Micro Cordsets

12 mm receptacle DC sensor compatibility

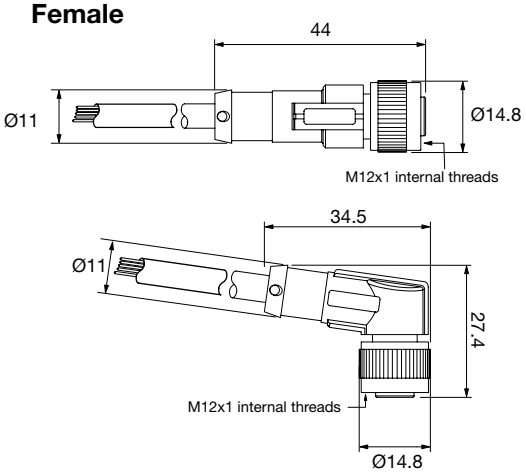
- Single key
- Yellow PVC cable jacket
- Female or male connection
- #22 AWG
- SPEEDCON compatible

Specifications

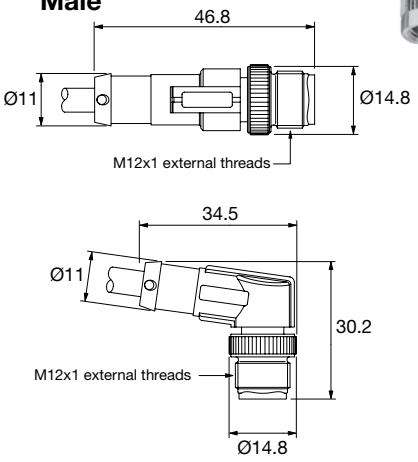
MATERIAL DATA	
MOLDED HEAD	Yellow TPU
CABLE OUTER JACKET	Yellow PVC
CONTACTS	Brass (nickel & gold plated)
CONTACT CARRIER	TPU with 20% glass fiber
COUPLING NUT	Nickel-plated diecast zinc
WIRE GAUGE	22 AWG
CABLE OUTER DIAMETER	5.5 mm
ELECTRICAL DATA	
NOMINAL CURRENT	4 A
RATED VOLTAGE (4/5 pole)	300 V/125 V
CONTACT RESISTANCE	≤ 5 mΩ
ENVIRONMENT DATA	
PROTECTION CLASSES	IP68/69K
TEMPERATURE RANGE	-22 °F to +221 °F

Dimensions (mm)

Female

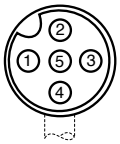


Male



Model Number Selection

- ϟ Stocked item
- ● Typical delivery 4 weeks or less
  Consult factory for all other models

Face View (female)	Color Code	Length (m)	Female Straight	Female Right Angle	Male Straight	Male Right Angle
	1. Brown 2. White 3. Blue 4. Black 5. Not used	2 5 10 20	V1-G-YE2M-PVC ϟ V1-G-YE5M-PVC ϟ V1-G-YE10M-PVC ϟ V1-G-YE20M-PVC ϟ	V1-W-YE2M-PVC ϟ V1-W-YE5M-PVC ϟ V1-W-YE10M-PVC ϟ V1-W-YE20M-PVC ϟ	V1-G-S-YE2M-PVC ϟ V1-G-S-YE5M-PVC ϟ	V1-W-S-YE2M-PVC ϟ V1-W-S-YE5M-PVC ϟ
	1. Brown 2. White 3. Blue 4. Black 5. Grey	2 5	V15-G-YE2M-PVC ϟ V15-G-YE5M-PVC ϟ	V15-W-YE2M-PVC ϟ V15-W-YE5M-PVC ϟ		

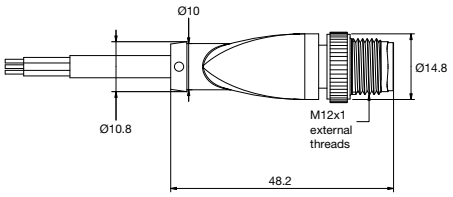
Gray PVC or PUR DC Micro Extension Cables

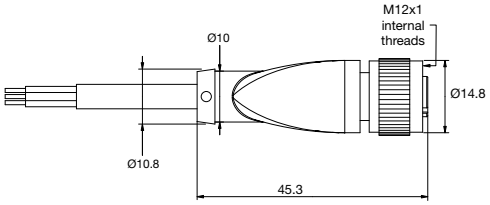
- Single key
- Gray PVC or PUR (halogen-free) cable jacket
- #22 AWG
- Male to female
- Straight or right angle heads
- 4-pin

Specifications

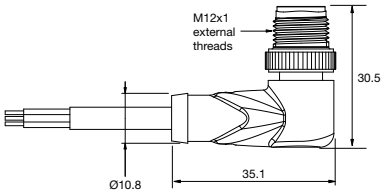
MATERIAL DATA	
BODY	Green TPU
INSERT	PUR
CABLE TYPE	Gray, flexible PVC or PUR jacket
CONTACTS	Machined copper and tin over gold
CONTACT PLATING	Copper and tin over nickel
SHELL	N/A
WIRE GAUGE	#22 AWG
COUPLING NUT	Copper and tin over nickel
CABLE OUTER DIAMETER	4.5 mm
ELECTRICAL DATA	
CONTACT RESISTANCE	≤ 5 mΩ
ELECTRICAL ISOLATION	1500 VAC
CURRENT RATING	4 A
VOLTAGE RATING	250 VDC
ENVIRONMENT DATA	
PROTECTION CLASSES	IP68
TEMPERATURE RANGE	-40 °F to +176 °F

Dimensions (mm)

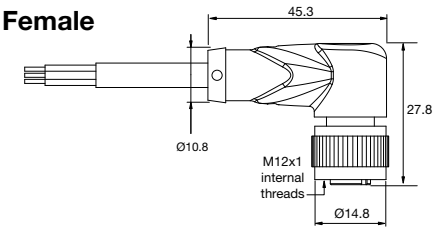




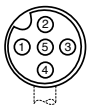
Male



Female



Model Number Selection

Face View (female)	Color Code	Length (m)	Female Straight to Male Straight	Female Straight to Male Right Angle	Female Right Angle to Male Straight
	1. Brown 2. White 3. Blue 4. Black 5. Not used	2 5 10	V1-G-2M-PVC-V1-G ϟ V1-G-5M-PVC-V1-G ϟ V1-G-10M-PVC-V1-G ●	V1-G-2M-PVC-V1-W ϟ V1-G-5M-PVC-V1-W ϟ V1-G-10M-PVC-V1-W ●	V1-W-2M-PVC-V1-G ϟ V1-W-5M-PVC-V1-G ϟ V1-W-10M-PVC-V1-G ●
		2 5 10 0.5 to 2.5 (coiled)	V1-G-2M-PUR-V1-G ϟ V1-G-5M-PUR-V1-G ϟ V1-G-10M-PUR-V1-G ● V1-G-0.5/2.5M-PUR-V1-G ϟ	V1-G-2M-PUR-V1-W ϟ V1-G-5M-PUR-V1-W ϟ V1-G-10M-PUR-V1-W ●	V1-W-2M-PUR-V1-G ϟ V1-W-5M-PUR-V1-G ϟ V1-W-10M-PUR-V1-G ● V1-W-0.5/2.5M-PUR-V1-G ϟ

ϟ Stocked item
● Typical delivery 4 weeks or less
Consult factory for all other models

Yellow PVC DC Micro Extension Cables

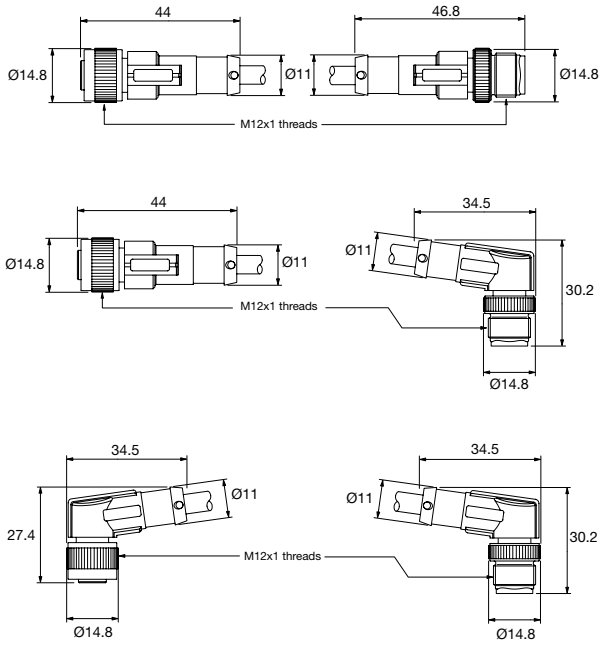
- Single key
- Yellow PVC cable jacket
- #22 AWG
- Male to female
- Straight or right angle heads
- SPEEDCON compatible

c UL us

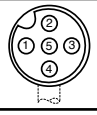
Specifications

MATERIAL DATA	
MOLDED HEAD	Yellow TPU
CABLE OUTER JACKET	Yellow PVC
CONTACTS	Brass (nickel & gold plated)
CONTACT CARRIER	TPU with 20% glass fiber
COUPLING NUT	Nickel-plated diecast zinc
WIRE GAUGE	22 AWG
CABLE OUTER DIAMETER	5.5 mm
ELECTRICAL DATA	
NOMINAL CURRENT	4 A
RATED VOLTAGE	300 V
CONTACT RESISTANCE	≤ 5 mΩ
ENVIRONMENT DATA	
PROTECTION CLASSES	IP68/69K
TEMPERATURE RANGE	-22 °F to +221 °F

Dimensions (mm)



Model Number Selection

Face View (female)	Color Code	Length (m)	Female Straight to Male Straight	Female Straight to Male Right Angle	Female Right Angle to Male Right Angle
	1. Brown 2. White 3. Blue 4. Black 5. Not used	2 5 10	V1-G-YE2M-PVC-V1-G ⚡ V1-G-YE5M-PVC-V1-G ⚡ V1-G-YE10M-PVC-V1-G ●	V1-G-YE2M-PVC-V1-W ⚡ V1-G-YE5M-PVC-V1-W ⚡ V1-G-YE10M-PVC-V1-W ●	V1-W-YE2M-PVC-V1-W ⚡ V1-W-YE5M-PVC-V1-W ⚡ V1-W-YE10M-PVC-V1-W ●

⚡ Stocked item
● Typical delivery 4 weeks or less
Consult factory for all other models

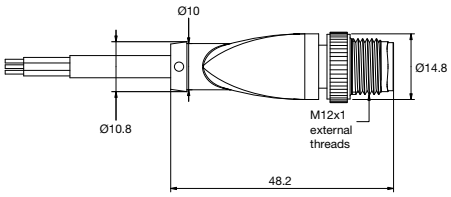
Gray PVC DC 3-Pin Micro Extension Cables

- Single key
- Gray PVC (halogen-free) cable jacket
- #22 AWG
- Male to female
- Straight heads
- 3-pin

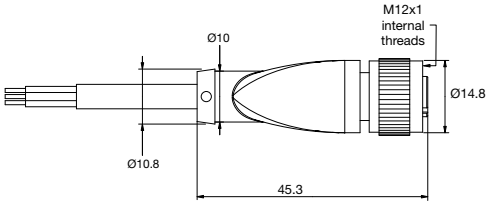
Specifications

MATERIAL DATA	
BODY	Green TPU
INSERT	PUR
CABLE TYPE	Gray, flexible PVC jacket
CONTACTS	Machined copper and tin over gold
CONTACT PLATING	Copper and tin over nickel
SHELL	N/A
WIRE GAUGE	#22 AWG
COUPLING NUT	Copper and tin over nickel
CABLE OUTER DIAMETER	4.5 mm
ELECTRICAL DATA	
CONTACT RESISTANCE	≤ 5 mΩ
ELECTRICAL ISOLATION	1500 VAC
CURRENT RATING	4 A
VOLTAGE RATING	250 VDC
ENVIRONMENT DATA	
PROTECTION CLASSES	IP68
TEMPERATURE RANGE	-40 °F to +176 °F

Dimensions (mm)

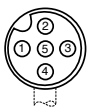


Male



Female

Model Number Selection

Face View (female)	Color Code	Length (m)	Female Straight to Male Straight
	1. Brown 2. Not used 3. Blue 4. Black 5. Not used	1 2 3 4 5 6 7 8 10	V11-G-1M-PVC-V11-G ϟ V11-G-2M-PVC-V11-G ϟ V11-G-3M-PVC-V11-G ϟ V11-G-4M-PVC-V11-G ϟ V11-G-5M-PVC-V11-G ϟ V11-G-6M-PVC-V11-G ϟ V11-G-7M-PVC-V11-G ϟ V11-G-8M-PVC-V11-G ϟ V11-G-10M-PVC-V11-G ϟ

ϟ Stocked item
● Typical delivery 4 weeks or less
Consult factory for all other models

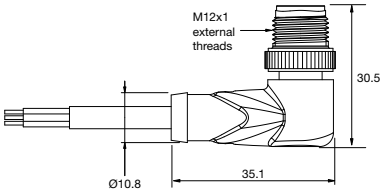
Gray PVC DC 3-Pin Crossed Micro Extension Cables

- Single key
- Gray PVC (halogen-free) cable jacket
- #22 AWG
- Male to female
- Right angle heads
- 3-pin

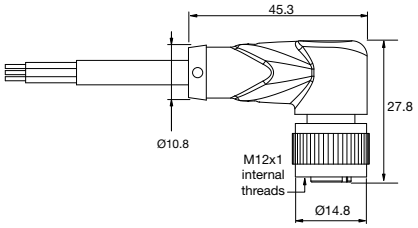
Specifications

MATERIAL DATA	
BODY	Green TPU
INSERT	PUR
CABLE TYPE	Gray, flexible PVC jacket
CONTACTS	Machined copper and tin over gold
CONTACT PLATING	Copper and tin over nickel
SHELL	N/A
WIRE GAUGE	#22 AWG
COUPLING NUT	Copper and tin over nickel
CABLE OUTER DIAMETER	4.5 mm
ELECTRICAL DATA	
CONTACT RESISTANCE	≤ 5 mΩ
ELECTRICAL ISOLATION	1500 VAC
CURRENT RATING	4 A
VOLTAGE RATING	250 VDC
ENVIRONMENT DATA	
PROTECTION CLASSES	IP68
TEMPERATURE RANGE	-40 °F to +176 °F

Dimensions (mm)

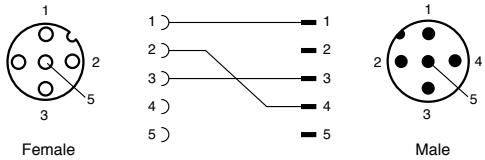


Male



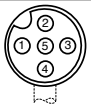
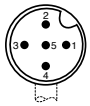
Female

Wiring Diagram



Stocked item
Typical delivery 4 weeks or less
Consult factory for all other models

Model Number Selection

Face View (female)	Color Code	Length (m)	Female Right Angle to Male Right Angle	Face View (male)	Color Code
	1. Brown 2. Black 3. Blue 4. Not used 5. Not used	2 5	V1-W-42-2M-PVC-V11-W V1-W-42-5M-PVC-V11-W		1. Brown 2. Not used 3. Blue 4. Black 5. Not used

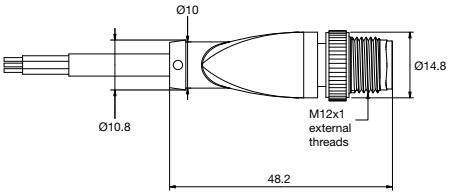
Gray DC 4-Pin Nano to Micro Adapter Cables

- Single key
- Gray PVC or PUR (halogen-free) cable jacket
- #22 AWG
- Male to female
- Straight or right angle heads

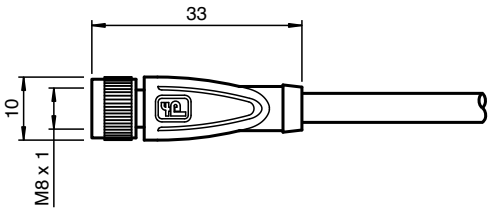
Specifications

MATERIAL DATA	
BODY	Green TPU
INSERT	PUR
CABLE TYPE	Gray, flexible PVC or PUR jacket
CONTACTS	Machined copper and tin over gold
CONTACT PLATING	Copper and tin over nickel
SHELL	N/A
WIRE GAUGE	#22 AWG
COUPLING NUT	Copper and tin over nickel
CABLE OUTER DIAMETER	4.5 mm
ELECTRICAL DATA	
CONTACT RESISTANCE	≤ 5 mΩ
ELECTRICAL ISOLATION	1500 VAC
CURRENT RATING	4 A
VOLTAGE RATING	250 VDC
ENVIRONMENT DATA	
PROTECTION CLASSES	IP68
TEMPERATURE RANGE	-40 °F to +176 °F

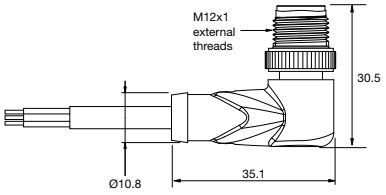
Dimensions (mm)



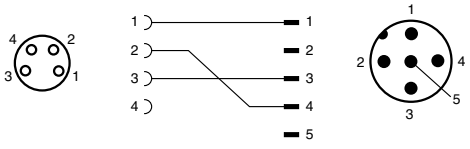
Female



Male

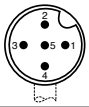


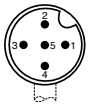
Wiring Diagram (...-42... models)



Stocked item
Typical delivery 4 weeks or less
Consult factory for all other models

Model Number Selection

Face View (female)	Color Code	Length (m)	Female Straight to Male Straight	Face View (male)	Color Code
	1. Brown 2. White 3. Blue 4. Black	0.1	V31-GM-0.1M-PUR-V1-G ●		1. Brown 2. White 3. Blue 4. Black 5. Not used

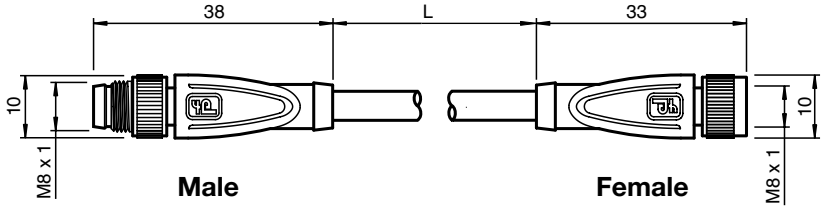
Face View (female)	Color Code	Length (m)	Female Straight to Male Right Angle	Face View (male)	Color Code
	1. Brown 2. White 3. Blue 4. Not used	2	V31-GM-42-2M-PVC-V11-W ●		1. Brown 2. Not used 3. Blue 4. Black 5. Not used

Gray PUR DC Nano Extension Cables

- Single key
- Gray PUR cable jacket
- #24 AWG
- Male to female
- 3-pin
- Straight connection

Specifications

MATERIAL DATA	
BODY	Green TPU
INSERT	PUR
CABLE TYPE	Gray, flexible PUR jacket
CONTACTS	Machined copper and tin
CONTACT PLATING	Gold
SHELL	N/A
WIRE GAUGE	#22 AWG
COUPLING NUT	Die-cast zinc
CABLE OUTER DIAMETER	4.8 mm
ELECTRICAL DATA	
CONTACT RESISTANCE	≤ 5 mΩ
ELECTRICAL ISOLATION	1500 VAC
CURRENT RATING	4 A
VOLTAGE RATING	60 VDC
ENVIRONMENT DATA	
PROTECTION CLASSES	IP68
TEMPERATURE RANGE	-22 °F to +212 °F



Model Number Selection

Face View (female)	Color Code	Length (m)	Female Straight to Male Straight
	1. Brown 3. Blue 4. Black	1 2 5 10	V3-GM-1M-PUR-V3-GM V3-GM-2M-PUR-V3-GM ϟ V3-GM-5M-PUR-V3-GM ϟ V3-GM-10M-PUR-V3-GM ϟ

ϟ Stocked item
● Typical delivery 4 weeks or less
Consult factory for all other models

Nano Cordsets

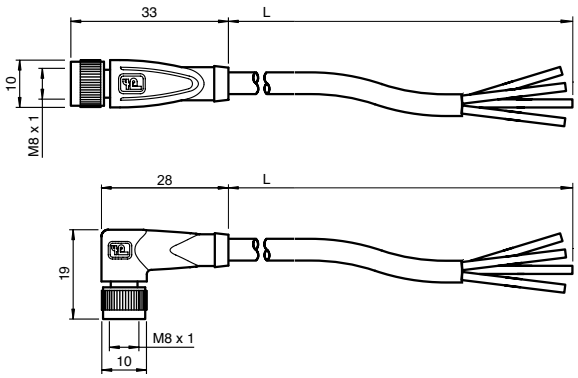
8 mm receptacle
DC sensor compatibility

- Single key
- Gray PVC or PUR cable jacket
- #24 AWG
- Female version
- 3- and 4-pin
- Straight or right angle connection

Specifications

MATERIAL DATA	
BODY	Green TPU
INSERT	PVC
CABLE TYPE	Gray, flexible PVC or PUR jacket
CONTACTS	Machined copper and tin
CONTACT PLATING	Gold
SHELL	N/A
WIRE GAUGE	#22 AWG
COUPLING NUT	Die-cast zinc
CABLE OUTER DIAMETER	4.8 mm
ELECTRICAL DATA	
CONTACT RESISTANCE	≤ 5 mΩ
ELECTRICAL ISOLATION	1500 VAC
CURRENT RATING	4 A
VOLTAGE RATING	60 VDC
ENVIRONMENT DATA	
PROTECTION CLASSES	IP68
TEMPERATURE RANGE	-22 °F to +212 °F

Dimensions (mm)



Model Number Selection

ϟ Stocked item
● Typical delivery 4 weeks or less
Consult factory for all other models

Face View (female)	Color Code	Length (m)	Straight (PVC)	Right Angle (PVC)	Straight (PUR)	Right Angle (PUR)
	1. Brown 3. Blue 4. Black	2 5 10	V3-GM-2M-PVC ϟ V3-GM-5M-PVC ϟ V3-GM-10M-PVC ●	V3-WM-2M-PVC ϟ V3-WM-5M-PVC ϟ V3-WM-10M-PVC ●	V3-GM-2M-PUR ϟ V3-GM-5M-PUR ϟ V3-GM-10M-PUR ●	V3-WM-2M-PUR ϟ V3-WM-5M-PUR ϟ V3-WM-10M-PUR ●
	1. Brown 2. White 3. Blue 4. Black	2 5 10	V31-GM-2M-PVC ϟ V31-GM-5M-PVC ϟ V31-GM-10M-PVC ●	V31-WM-2M-PVC ϟ V31-WM-5M-PVC ϟ V31-WM-10M-PVC ●	V31-GM-2M-PUR ϟ V31-GM-5M-PUR ϟ V31-GM-10M-PUR ●	V31-WM-2M-PUR ϟ V31-WM-5M-PUR ϟ V31-WM-10M-PUR ●

Thread-Lock Nano Cordsets

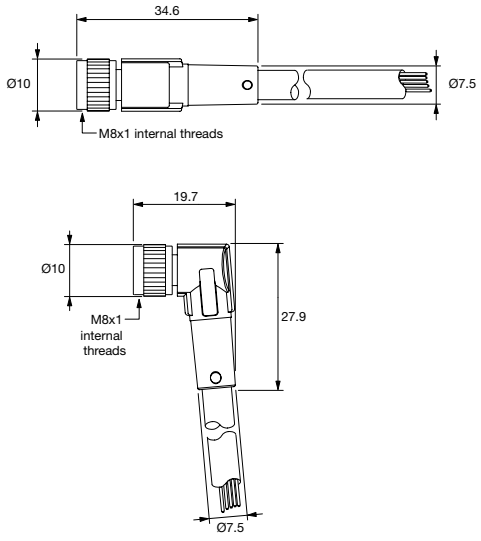
8 mm receptacle
DC sensor compatibility

- Yellow PVC cable jacket
- Female version
- #24 AWG
- 3- and 4-pin
- Straight and right angle connection

Specifications

MATERIAL DATA	
MOLDED HEAD	Yellow TPU
CABLE OUTER JACKET	Yellow PVC
CONTACTS	Brass (nickel & gold plated)
CONTACT CARRIER	TPU with 20% glass fiber
COUPLING NUT	Nickel-plated diecast zinc
WIRE GAUGE	24 AWG
ELECTRICAL DATA	
NOMINAL CURRENT	4 A
RATED VOLTAGE	125 V
CONTACT RESISTANCE	≤ 5 mΩ
ENVIRONMENT DATA	
PROTECTION CLASSES	IP68/69K
TEMPERATURE RANGE	-22 °F to +221 °F

Dimensions (mm)



⚡ Stocked item
● Typical delivery 4 weeks or less
Consult factory for all other models

Model Number Selection

Face View (female)	Color Code	Outer Diameter (mm)	Length (m)	Straight	Right Angle
	1. Brown 3. Blue 4. Black	5.0	2 5 10	V3-GM-YE2M-PVC ⚡ V3-GM-YE5M-PVC ⚡ V3-GM-YE10M-PVC ●	V3-WM-YE2M-PVC ⚡ V3-WM-YE5M-PVC ⚡ V3-WM-YE10M-PVC ●
	1. Brown 2. White 3. Blue 4. Black	5.2	2 5 10	V31-GM-YE2M-PVC ⚡ V31-GM-YE5M-PVC ⚡ V31-GM-YE10M-PVC ●	V31-WM-YE2M-PVC ⚡ V31-WM-YE5M-PVC ⚡ V31-WM-YE10M-PVC ●

DC Micro Dual-Port Junction Blocks

12 mm receptacle

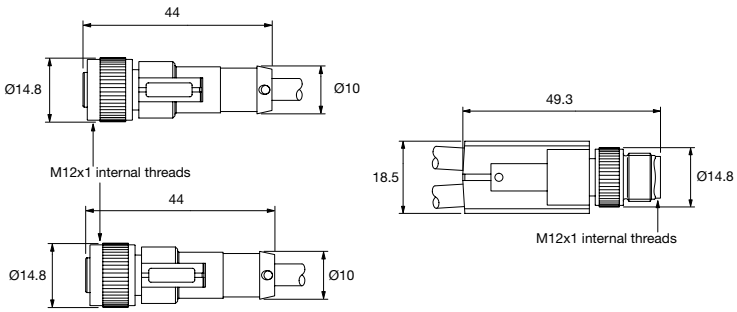
- Single key
- PVC cable jacket
- #18 AWG
- 4-pin

c UL us

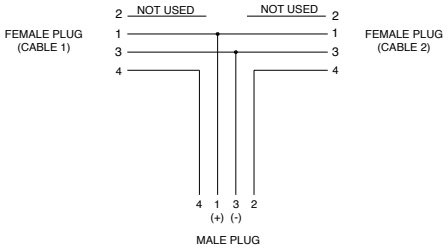
Specifications

MATERIAL DATA	
MOLDED HEAD	Yellow TPU
CABLE OUTER JACKET	Irradiated PUR
CONTACTS	Brass (nickel & gold plated)
CONTACT CARRIER	TPU with 20% glass fiber
COUPLING NUT	Nickel-plated diecast zinc
WIRE GAUGE	22 AWG
CABLE OUTER DIAMETER	5.2 mm
ELECTRICAL DATA	
NOMINAL CURRENT	3 A
RATED VOLTAGE	300 V
CONTACT RESISTANCE	≤ 5 mΩ
ENVIRONMENT DATA	
PROTECTION CLASSES	IP68/IP69K
TEMPERATURE RANGE	-40 °F to +176 °F

Dimensions (mm)



Wiring Diagram



Model Number Selection

Face View (female)	Color Code	Length (m)	Model Number
	1. Brown 2. White 3. Blue 4. Black 5. Not Used	.3	V1-G-.3M-T-0M-V1-G ϟ

ϟ Stocked item
● Typical delivery 4 weeks or less
Consult factory for all other models

DC Micro Dual-Port Junction Blocks

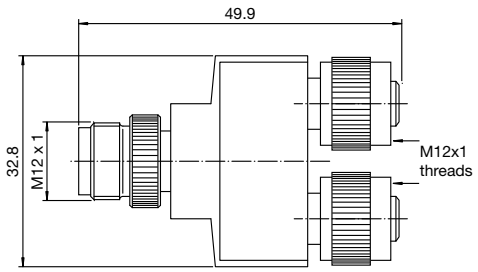
12 mm receptacle

- Single key
- For dual-input multiport junction blocks
- 5-pin

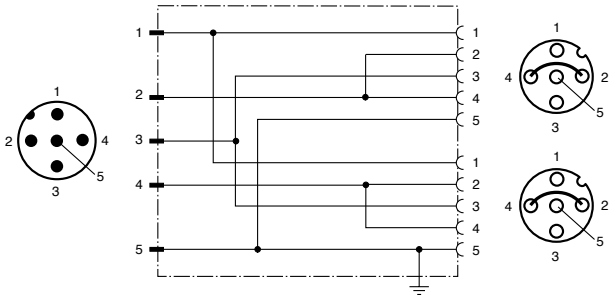
Specifications

MATERIAL DATA	
CONNECTOR	TPU
CONTACTS	Brass (nickel & gold plated)
CONTACT CARRIER	TPU with 20% glass fiber
COUPLING NUT	Nickel-plated diecast zinc
ELECTRICAL DATA	
NOMINAL CURRENT	3 A
RATED VOLTAGE	24 V
CONTACT RESISTANCE	≤ 5 mΩ
ENVIRONMENT DATA	
PROTECTION CLASSES	IP67
TEMPERATURE RANGE	-13 °F to +194 °F

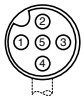
Dimensions (mm)



Wiring Diagram



Model Number Selection

Face View (female)	Color Code	Model Number
	1. Brown 2. White 3. Blue 4. Black 5. Grey	V15S-T-V15 ⚡

⚡ Stocked item
● Typical delivery 4 weeks or less
Consult factory for all other models

DC Micro Network Splitters

12 mm receptacle

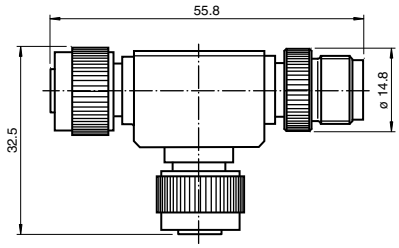
- Single key
- One male input and two female outputs
- 5-pin

Specifications

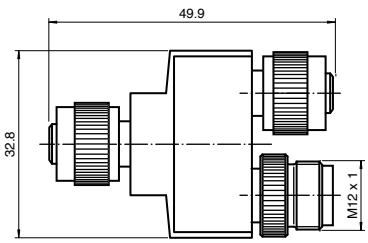
MATERIAL DATA	
CONNECTOR	TPU
CONTACTS	Brass (nickel & gold plated)
CONTACT CARRIER	TPU with 20% glass fiber
COUPLING NUT	Nickel-plated diecast zinc
ELECTRICAL DATA	
NOMINAL CURRENT	3 A
RATED VOLTAGE	24 V
CONTACT RESISTANCE	≤ 5 mΩ
ENVIRONMENT DATA	
PROTECTION CLASSES	IP67
TEMPERATURE RANGE	-13 °F to +194 °F

Dimensions (mm)

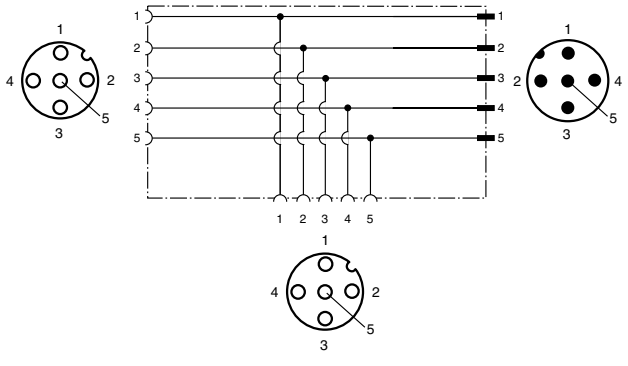
V15S-TEE-V15



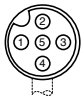
V15S-YEE-V15



Wiring Diagram



Model Number Selection

Face View (female)	Color Code	Model Number
	1. Brown 2. White 3. Blue 4. Black 5. Grey	V15S-TEE-V15 V15S-YEE-V15

Stocked item
● Typical delivery 4 weeks or less
Consult factory for all other models

Accessories

Accessories

Pepperl+Fuchs offers a complete line of accessories for your AS-Interface network—everything from cordsets and connectors to AS-Interface flat cable, and module bases. As a guarantee of our quality, our products are produced according to the ISO 9001 International Standard and carry all of the national and international certifications and registrations. That means that every Pepperl+Fuchs product, from a part as simple as a wiring tee to a hand-held AS-Interface addressing device, will meet the demands of your most challenging applications, no matter where you are.

Whether it is for a replacement component or a complete AS-Interface system, Pepperl+Fuchs has the right part and the right solution. Get the parts you need at Pepperl+Fuchs.

Handheld Programmer

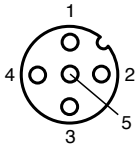
The handheld programmer can be used to program any IO module on the network. It can also be used as a diagnostic tool to read the slave profile, set parameters, read inputs, and set outputs.

Model	Description
VBP-HH1-110V ⚡	Handheld programming and diagnostic tool, runs on battery and included power supply
VAZ-PK-1.5M-V1-G ⚡	Cable to connect handheld to module with programming jack. All G2, G12, KE, KE1, KE2, PM and A type bases support this cable
V1-G-2M-PVC-V1-G ⚡	Cable to connect handheld to module with male M12 quick disconnect, 2m long. All G16, photoeyes, cylindrical inductive, F85A and L2 type modules use this cable
V1S-G-2M-PVC ⚡	Cable with flying leads to connect programmer to devices with only AS-i terminal connections (eg. CB1 module)
VAZ-9VDC-CHRG ⚡	Replacement battery charger

⚡ Stocked item
Consult factory for all other models

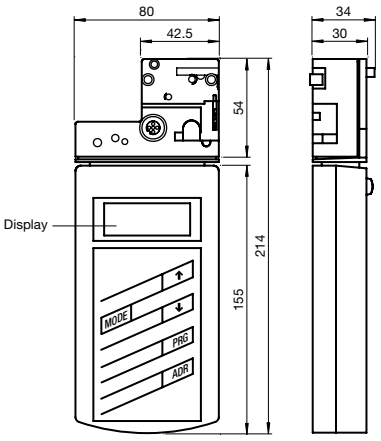
Specifications

PROTECTION (IEC)		IP20
TEMPERATURE RANGE	*Working*	32 ºF to +104 ºF (0 ºC to +40 ºC)
	Storage	-4 ºF to +104 ºF (-20 ºC to +40 ºC)



1 AS-Interface +
2 reserved (do not connect)
3 AS-Interface -
4 reserved (do not connect)
5 reserved (do not connect)

Dimensions in mm



Buttons

↑: Moves up to select options like data, address, and parameter
↓: Moves down to select options like data, address, and parameter
PRG: Sets address, temporarily sets parameter, sets ID1 code, sets outputs
ADR: Searches for AS-i slaves, reads inputs, turns programmer on, scans network
MODE: Selects between mode of operation (ADDR, ID, IO, ID1, ID2, PERI, PARA, Data)

Modes of Operation

ADDR: Read all AS-i addresses on network, program AS-i node address
ID: Read ID code of selected address
ID1: Read ID1 code of selected address. This code can also be written
ID2: Read ID2 code of selected address
PERI: Show the state of the peripheral fault bit sent by the AS-i master
PARA: Reads and writes parameters of selected address, all parameter setting is temporary
DATA: Reads inputs and sets outputs on the selected address

Display

Shows addresses 1-29, 1-29a, 1-29b, all modes of operation, 2-7 segment display for data read/write

Software and Cables

All Pepperl+Fuchs software need only be purchased one time. As newer versions are available and features are added, an updated copy can be sent from the factory to you free of charge. The Control Tools software includes all cables required to connect to the K20 AS-Interface gateways. Extra cable is required when using this software with the Compact I/O or ControlLogix cards. The safety software also includes a cable to connect directly to the safety monitor.

Control Tools Software and Cables

Features

- Configuration screen to setup network
- Diagnostic counters for network troubleshooting
- Fault detector shows extra diagnostics
- Address Assistant to aid in configuring nodes
- Safety monitor diagnostic interface
- Stand-alone control programming/simulating tool (Gateways must support it or have purchased VAZ-CTR unlock code.)

Model	Description
VAZ-SW-ACT32 ϟ	Control Tools diagnostic and configuration software for all gateways except SST-ASI-SLC. RS-232 cable for all K20, K30 and K31 gateways included.
K-ADP2 ϟ	Cable required to use Control Tools with ControlLogix (VBM-CLX-DM) or Compact I/O (VBM-MLX/CPLX) cards

ϟ Stocked item
Consult factory for all other models

Safety Software and Cables

Features

- Easy Programming of e-stops, light curtains, and gate switches
- OR, AND, Logic devices available
- On delay and Off delay safe time functions
- Supports safe coupling to other networks
- Supports debounced safety contacts
- 1 (SIMON) or 16 (SIMON+) safe output channels
- Device index assignment
- Selection of 1, 2, or 3 simulated slaves
- Start via standard or safety slave, monitor input or automatic
- Safety devices with local acknowledge and startup test
- Immediate stop or on time delay for safe shutdown

Model	Description
VAZ-SW-SIMON ϟ	Safety software for use with all VAS-...A1L-K12 type safety monitors, up to 48 programming blocks available, includes VAZ-SIMON-R2 cable
VAZ-SIMON-R2 ϟ	Replacement cable for upload, download, and diagnostic connections to monitor, included with software
VAZ-SIMON-RJ45 ϟ	Cable to connect two monitors together in the event one has failed. Automatically transfers data from unpowered failed monitor to replacement monitor. Replacement monitor must be new or have program that is not validated.
VAZ-SW-SIMON+ ϟ	Safety software for use with all ...-4A16L-... safety monitors. Up to 256 programming blocks available
VAZ-SIMON+-R2-1.8M-PS/2 ϟ	Replacement serial cable with PS/2 on one side and DB9 on other. Used for all K20, K30, K31 gateways with RS-232 port.

ϟ Stocked item
Consult factory for all other models

Diagnostic Tools

The network analyzer is used to determine the quality of the network. It is indispensable tool for diagnosing problems and troubleshooting the network. Two modes of operation allow you to get online statistics to gauge the health of the network or trace the network to look at individual AS-Interface transactions. Kit includes analyzer, USB to serial adapter, screwdriver and software.

Analyzer Features

- RS-232 connection for PC
- Trigger input, 24V
- Trigger output, TTL level
- Statistical mode for easy health status of network
- Advanced Trace mode for details of traffic analysis

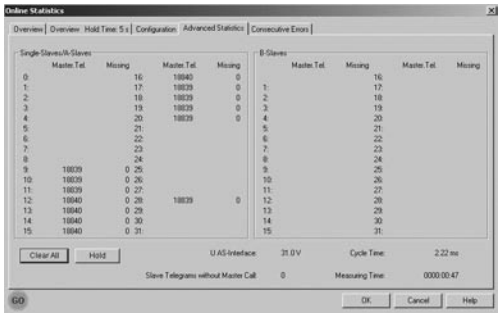
Model	Description
VAZ-ANALYZER ϟ	AS-i network analyzing tool to make sure that network was routed and wired correctly during installation

Analyzer Specifications

OPERATING CURRENT		70 mA
POWER SUPPLY		from AS-i
AS-i CONNECTOR		Terminals
MEMORY		256,000 AS-i telegrams
PROTECTION (IEC)		IP20
TEMPERATURE RANGE	*Working*	+32 ºF to +131 ºF (0 ºC to +55 ºC)
	Storage	-13 ºF to +158 ºF (-25 ºC to +70 ºC)

ϟ Stocked item
Consult factory for all other models

There are two modes of operation. The first is online statistics where the overall health of the network is read. The second is trace mode where individual AS-i telegrams are recorded, filtered, and viewed for later analysis. This mode is often used to track down specific input, output or timing problems.



Online Statistics

Advance statistics (check for)
- Little or no missing telegrams
- No slave telegrams without master call

Consecutive errors
- Make sure consecutive errors are kept to a minimum. (6x = configuration error)

Network overview
- Check to make sure all connected nodes are green

I/O data
- Verify that the input and output data is correct
- Find out if a certain input is flickering or turning on for a short time by running a trace on that input

Master Simulators

These simulators can emulate or convert a network like DeviceNet, PROFIBUS, or RS-485 for easy connection to your PC. These devices can be useful when trying to see how the I/O is mapped or exchanged on the network or as a simple diagnostic tool to make sure the upper level bus connection on the gateway is still functioning. These can be used with any PROFIBUS, DeviceNet or RS-485 device like RFID controllers, I/O modules, network couplers, encoders or any device that can connect to the network. The DeviceNet and PROFIBUS simulators also come with a simple software package and convenient drivers for use with a PC. If using AS-Interface gateways, Control Tools software must also be purchased separately.

Model	Description
VAZ-DN-SIM-USB	DeviceNet to USB converter, connects any DeviceNet slave to a PC, simulator software included
VAZ-PB-SIM	PROFIBUS to RS-232 converter, connects any PROFIBUS slave to a PC, simulator software included
VAZ-R4-R2	RS-485 to RS-232 converter, connects any RS-485 device to a PC

⚡ Stocked item
Consult factory for all other models

DeviceNet Specifications

OPERATING CURRENT		< 60 mA
POWER SUPPLY		5 V from USB
MAX CABLE LENGTH		< 2 m DeviceNet
DEVICENET CONNECTOR		9-pin D-sub connector
BAUD RATES SUPPORTED		125, 250, or 500 kbps
TEMPERATURE RANGE	*Working*	+32 ºF to +131 ºF (0 ºC to +55 ºC)
	Storage	-13 ºF to +158 ºF (-25 ºC to +70 ºC)

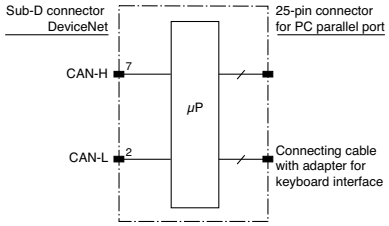
PROFIBUS Specifications

OPERATING CURRENT		< 60 mA
POWER SUPPLY		5 V from RS-232 port
MAX CABLE LENGTH		2 m RS-232, 2 m PROFIBUS
DEVICENET CONNECTOR		9-pin D-sub connector
BAUD RATES SUPPORTED		19200 bps
TEMPERATURE RANGE	*Working*	+32 ºF to +131 ºF (0 ºC to +55 ºC)
	Storage	-13 ºF to +158 ºF (-25 ºC to +70 ºC)

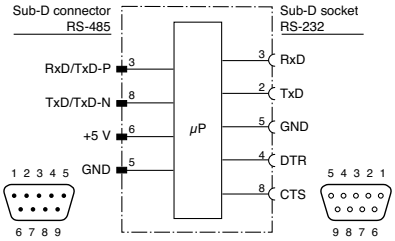
RS-485 Specifications

OPERATING CURRENT		< 60 mA
POWER SUPPLY		5 V from RS-232 port
MAX CABLE LENGTH		2m RS-232, 2m RS-485
DEVICENET CONNECTOR		9-pin DSUB connector
BAUD RATES SUPPORTED		up to 57600 bps
TEMPERATURE RANGE	*Working*	+32 ºF to +131 ºF (0 ºC to +55 ºC)
	Storage	-13 ºF to +158 ºF (-25 ºC to +70 ºC)

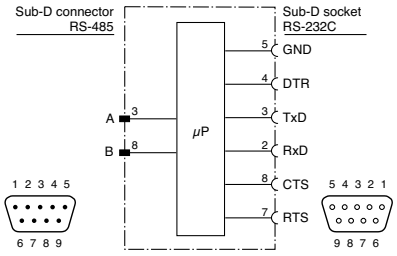
VAZ-DN-SIM-USB



VAZ-PB-SIM



VAZ-R4-R2



AS-Interface Terminator and Tuner

A number of AS-Interface tools are available to extend the network past the 100 m limit without the use of a repeater. The AS-Interface terminator is placed at the end of the network farthest away from the AS-Interface gateway/scanner and is used to stabilize the network when the cable length has been exceeded. Network segments can be extended to 200 m. The AS-Interface tuner, which has the terminator built-in, is also placed at the end of the network. It can extend the AS-Interface network segment up to 300 m. The terminator and tuner can only extend a network which is correctly wired, using specified AS-Interface cable, and is free from noise. We recommend using an analyzer to identify network problems (see page 202). If repeaters are used use only advanced repeaters. Their fast response times are required for long AS-i cable runs.

Model	Description
VAZ-TERM ⚡	AS-i Terminator, extends AS-i network up to 200 m, place at end
VAZ-TUNER ⚡	AS-i Tuner, extends AS-i network up to 300 m, place at end

⚡ Stocked item
Consult factory for all other models

Terminator Specifications

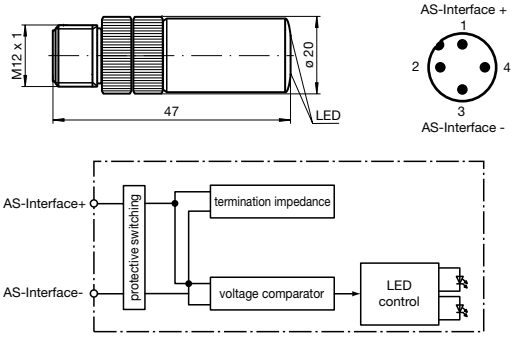
OPERATING CURRENT		10 mA
POWER SUPPLY		from AS-i
AS-i CONNECTOR		M12 connector male
PROTECTION (IEC)		IP65
TEMPERATURE RANGE	*Working*	+32 °F to +131 °F (0 °C to +55 °C)
	Storage	-13 °F to +167 °F (-25 °C to +75 °C)

Tuner Specifications

OPERATING CURRENT		60 mA
POWER SUPPLY		from AS-i
AS-i CONNECTOR		M12 connector female and flat cable
PROTECTION (IEC)		IP65
TEMPERATURE RANGE	*Working*	+32 °F to +131 °F (0 °C to +55 °C)
	Storage	-13 °F to +167 °F (-25 °C to +75 °C)

Dimensions in mm

VAZ-TERM



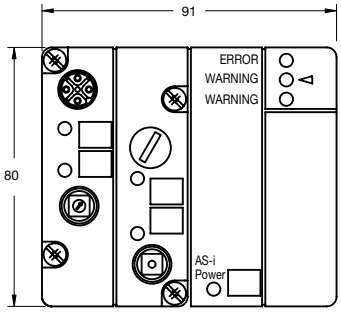
LEDs

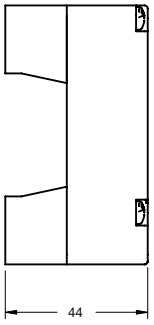
Green: AS-i voltage > 26 V

Yellow: AS-i voltage > 18.5 V

The VAR-KE3-TERM repeater has an integrated termination switch that can extend the total length of the network to 300 m. See page 67.

VAZ-TUNER





LEDs (diagnostic)

ERROR: Red: errors > 5% within 1 s or configuration error

WARNING: Yellow: errors < 1% but less than 5% within 1 s

GREEN: < 1% errors in 1 second

AS-I Power: Green (solid): AS-i powered
Green (blinking): Voltage low

Rotary Switch, MODE

0: Not tuning and no termination active

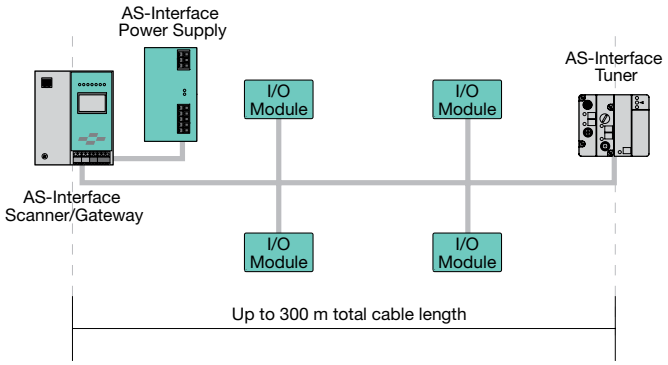
1: Use fixed termination, no tuning

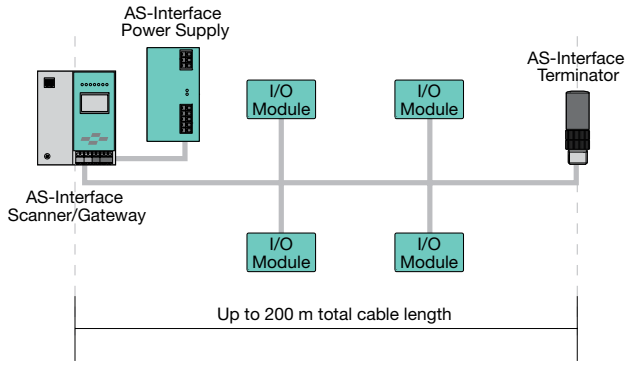
2: Tune the network (AS-i gateway/scanner must be in config. mode; Error, Warning and Green LEDs will strobe while tuning)

3: Run program, used after tuning is complete

Button

Set: Press and hold for > 5 s to tune (Must be in tune mode), press once to clear diagnostic LEDs





Bases

Bases are used to mount the AS-Interface module to the machine and also hold the flat cable in place. Most bases are sold separately so you can choose the version that best fits the application. The bases with addressing jacks, U-G1FA, U-G1FFA should be used where ever possible because of the ease of programming and diagnostics without having to remove the module from the base.

Model	Description
U-G3FF ϟ	Base to connect yellow and black cable to all 4 port G2 modules
U-G3FF-DIN	Base to connect yellow and black cable to all 4 port G2 modules, with DIN rail clip
U-G2FF ϟ	Base to connect yellow and black cable to all 8 port G2 modules
U-G2FF-DIN	Base to connect yellow and black cable to all 8 port G2 modules, with DIN rail clip
U-G1F ϟ	Connection of up to 2 yellow flat cables to any module that supports this base type
U-G1FA ϟ	Connection of up to 2 yellow flat cables to any module that supports this base type, with addressing jack
U-G1FF ϟ	Connection of 1 yellow and 1 black flat cable to any module that supports this base type
U-G1FFA ϟ	Connection of 1 yellow and 1 black flat cable to any module that supports this base type, with addressing jack
U-G1PP ϟ	Round cable base to connect AS-Interface and auxiliary power to any module that supports this base type
VAZ-DK-G1	Cover for any U-G1... base

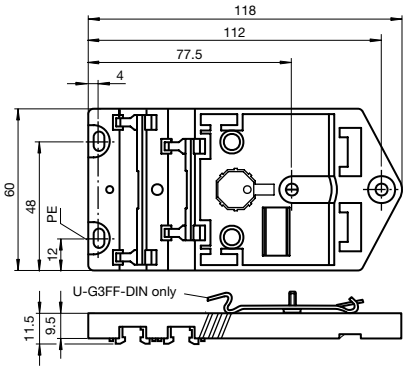
ϟ Stocked item
Consult factory for all other models

Base Specifications

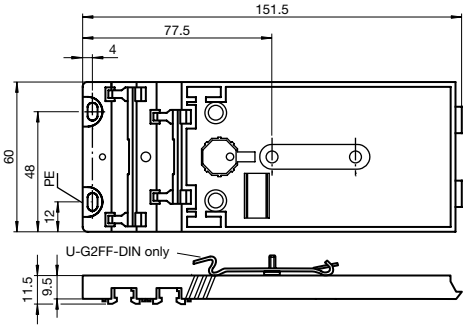
PROTECTION (IEC)		IP67 (with top connected)
HOUSING MATERIAL		PBT
TEMPERATURE RANGE	*Working*	-13 ºF to +131 ºF (-25 ºC to +60 ºC)
	Storage	-40 ºF to +185 ºF (-40 ºC to +85 ºC)

Dimensions in mm

U-G3FF
U-G3FF-DIN

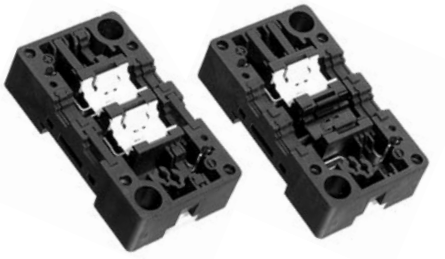


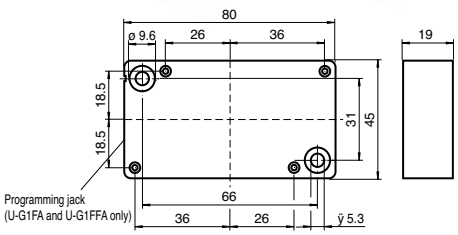
U-G2FF
U-G2FF-DIN



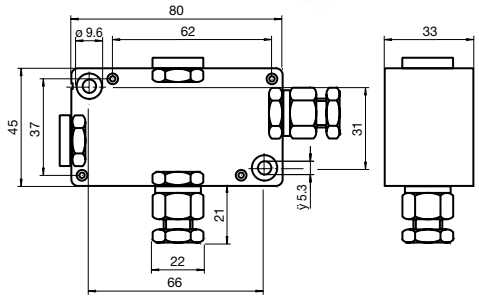
U-G1F
U-G1FA

U-G1FF
U-G1FFA





U-G1PP



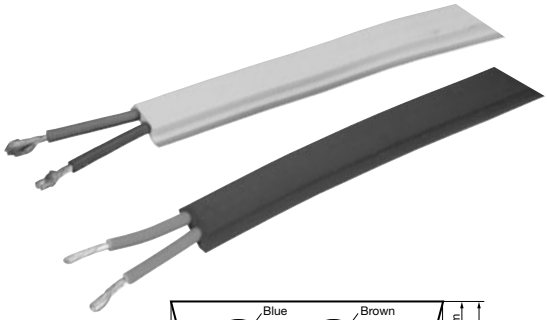
VAZ-DK-G1

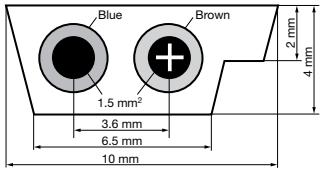
AS-Interface Cable

AS-Interface cable can either be flat or round and has certain impedance characteristics specifically for AS-Interface. AS-Interface was designed without a shield and for use with a flat cable profile. Flat cable piercing technology means no more stripping, cutting, or buying of special length AS-Interface cable. It is the least expensive network technology on the market and the quickest to install.

Model	Description
VAZ-FK-S-YE ⚡	Yellow flat cable with a standard rubber jacket, 100 m roll
VAZ-FK-S-BK ⚡	Black flat cable with a standard rubber jacket, 100 m roll
VAZ-FK-R-YE ⚡	Yellow flat cable with an oil resistant jacket, 100 m roll
VAZ-FK-R-YE-1000M ⚡	Yellow flat cable with an oil resistant jacket, 1000 m spool
VAZ-FK-R-BK ⚡	Black flat cable with an oil resistant jacket, 100 m roll
VAZ-FK-R-BK-1000M ⚡	Black flat cable with an oil resistant jacket, 1000 m spool
VAZ-FK-S-YE-SAFETY	Yellow flat cable with a standard rubber jacket, 100 m roll, Red "Safety" text included on jacket
VAZ-RK-PVC-Y904028 ⚡	4-conductor round cable with shield, 100 m roll
VAZ-FK-R-STRIPPER ⚡	Flat cable stripper for use with any flat cable type

⚡ Stocked item
Consult factory for all other models





Dimensions in mm

Flat Cable Specifications

WIRE GAUGE		16 AWG
CURRENT CARRYING CAPACITY		8 A
VOLTAGE RATING		300 V
JACKET MATERIAL	*VAZ-FK-S-...*	TPE, PVC
	VAZ-FK-R-...	Rubber compound
UV RESISTANCE		Only black cable is approved for use outdoors
BEND RADIUS		10 mm on broad side
CONDUCTORS		2, brown, blue
OPERATING TEMPERATURE	*At Standstill*	-40 °F to +185 °F (-40 °C to +85 °C)
	In Motion	-13 °F to +185 °F (-25 °C to +85 °C)
APPROVALS	*VAZ-FK-S-...*	CE
	VAZ-FK-R-...	CE

VAZ-RK-PVC-Y904028

Round Cable Specifications

WIRE GAUGE	16 AWG
OUTSIDE DIAMETER	0.318"
SHIELDING (for mechanical strength)*	Braided tinned copper shield 90% coverage
CURRENT CARRYING CAPACITY	> 8 A
VOLTAGE RATING	300 V
JACKET MATERIAL	Gray PVC jacket, insulation polyethylene
CONDUCTORS	4, black, white, red, green
OPERATING TEMPERATURE	167 °F (+75 °C)

* Because of shielding, the AS-Interface line should be limited to 70 m of total cable length.

VAZ-FK-R-STRIPPER

Any round cable will work for AS-Interface as long as it meets the following electrical characteristics. A two-conductor PLTC cable from Belden, 1035A for example, is often used for round cable applications. Electrical characteristics should be evaluated at 167 kHz, and shielding should be avoided if possible.

GAUGE	16 AWG
NOM. CONDUCTOR DC RESISTANCE	< 4.2 Ohm/1000 ft
NOM. CAPACITANCE CONDUCTOR TO CONDUCTOR	< 24 pF/ft
NOM. INDUCTANCE	0.121-0.395 µH/ft

Flat Cable Adapters and Splitters

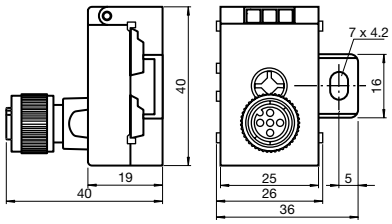
AS-Interface was designed around the flat cable concept. To make wiring easier, new and innovative flat cable adapters were designed to connect to IO modules, junction boxes, valves, and other devices on the network. All flat cable connections are watertight and tested and designed to AS-Interface specifications.

Flat Cable to M12 Adapters

Model	Description
VAZ-T1-FK-V1 ⚡	Connects the AS-i yellow cable to an M12 quick disconnect
VAZ-2T1-FK-V1 ⚡	Connects the AS-i yellow and black cable to M12 quick disconnect
VAZ-2T5-G2	Connects the AS-i yellow and black cable to 5 M12 quick disconnects, base sold separately

⚡ Stocked item
Consult factory for all other models

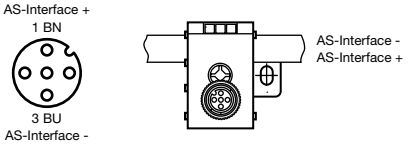
VAZ-T1-FK-V1
VAZ-2T1-FK-V1



VAZ-T1-FK-V1 AND VAZ-2T1-FK-V1 Specifications

RATED OPERATING CURRENT		4 A
PROTECTION (IEC)		IP69K
HOUSING MATERIAL		PA 6 GF 25 Ultramid
TEMPERATURE RANGE	*Working*	-13 ºF to +167 ºF (-25 ºC to +75 ºC)
	Storage	-13 ºF to +185 ºF (-25 ºC to +85 ºC)
SCREW MOUNTING TORQUE		7 in-lb
CONTACTS		Gold plated pins, 4 per tray
FLAT CABLE CONNECTIONS		T1(1), 2T1(2)

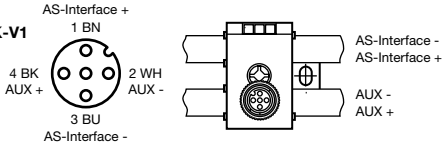
VAZ-T1-FK-V1



VAZ-2T5-G2 Specifications

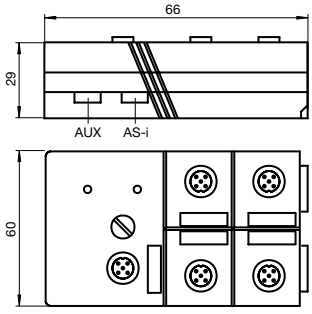
RATED OPERATING CURRENT		4 A per connector, 6 A total
BASE (PURCHASE SEPARATELY)		U-G3FF, U-G3FF-DIN
PROTECTION (IEC)		IP67
HOUSING MATERIAL		PBT
TEMPERATURE RANGE	*Working*	-13 ºF to +158 ºF (-25 ºC to +70 ºC)
	Storage	-13 ºF to +185 ºF (-25 ºC to +85 ºC)
CONTACTS		Gold plated pins, 4 per tray
FLAT CABLE CONNECTIONS		2

VAZ-2T1-FK-V1

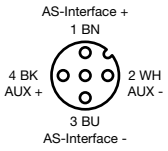


Dimensions in mm

VAZ-2T5-G2



5 quick disconnects M12x1



LED Indicators

AS-i: Green: AS-i powered
Red: Polarity reversed

AUX: Green: Auxiliary powered
Red: Polarity reversed

Flat Cable Adapters and Splitters (cont.)

Single Flat Yellow to Flying Lead

Model	Length
VAZ-T1-FK-2M-PUR ⚡	2 m

Single Flat Yellow to M12 Pigtail Straight

Model	Length
VAZ-T1-FK-0.3M-PUR-V1-G ⚡	300 mm
VAZ-T1-FK-1M-PUR-V1-G ⚡	1 m
VAZ-T1-FK-2M-PUR-V1-G ⚡	2 m

Single Flat Yellow to M12 Pigtail Right Angle

Model	Length
VAZ-T1-FK-0.5M-PUR-V1-W	500 mm
VAZ-T1-FK-1M-PUR-V1-W	1 m
VAZ-T1-FK-2M-PUR-V1-W	2 m

Single Flat Yellow to M8 Pigtail Right Angle

Model	Length
VAZ-T1-FK-0.5M-PUR-V3-WR	500 mm
VAZ-T1-FK-1M-PUR-V3-WR	1 m

Dual Flat Yellow and Black to M12 Pigtail Straight

Model	Length
VAZ-2T1-FK-1M-PUR-V1-G ⚡	1 m
VAZ-2T1-FK-2M-PUR-V1-G	2 m
VAZ-2T1-FK-3M-PUR-V1-G	3 m
VAZ-2T1-FK-4M-PUR-V1-G	4 m
VAZ-2T1-FK-5M-PUR-V1-G	5 m

Dual Flat Yellow and Black to M12 Pigtail Right Angle

Model	Length
VAZ-2T1-FK-0.3M-PUR-V1-W	300 mm
VAZ-2T1-FK-0.5M-PUR-V1-W	500 mm
VAZ-2T1-FK-1M-PUR-V1-W ⚡	1 m
VAZ-2T1-FK-2M-PUR-V1-W	2 m
VAZ-2T1-FK-5M-PUR-V1-W	5 m

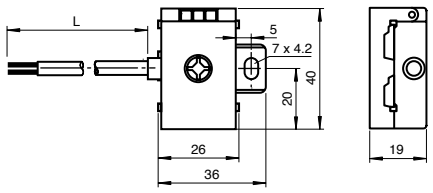
⚡ Stocked item
Consult factory for all other models

Specifications

RATED OPERATING CURRENT		4 A
PROTECTION (IEC)		IP69K
HOUSING MATERIAL		PA 6 GF 35
CABLE MATERIAL		PUR, gray
WIRE GAUGE		22 AWG
TEMPERATURE RANGE	*Working*	-13 ºF to +167 ºF (-25 ºC to +75 ºC)
	Storage	-13 ºF to +185 ºF (-25 ºC to +85 ºC)
SCREW MOUNTING TORQUE		7 in-lb
CONTACTS		Gold plated pins, 4 per tray
FLAT CABLE TRAYS		T1 (1), 2T1 (2)

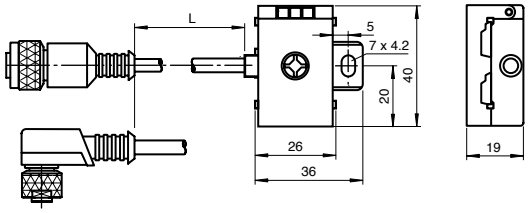
Dimensions in mm

VAZ-T1-FK-2M-PUR

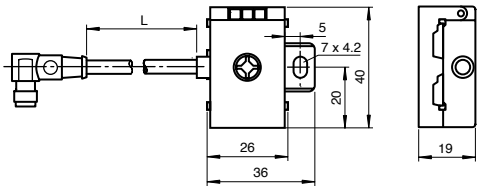


VAZ-T1-FK-...-PUR-V1-G
VAZ-2T1-FK-...-PUR-V1-G

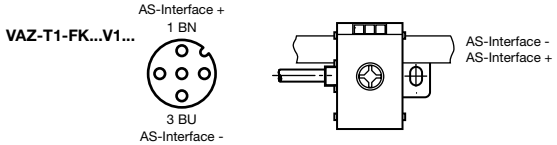
VAZ-T1-FK-...-PUR-V1-W
VAZ-2T1-FK-...-PUR-V1-W



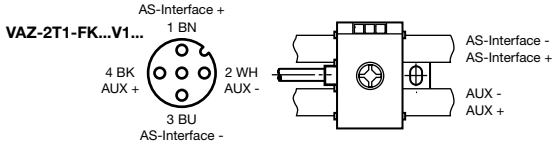
VAZ-T1-FK-...-PUR-V3-WR



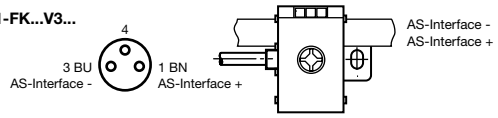
VAZ-T1-FK...V1...



VAZ-2T1-FK...V1...



VAZ-T1-FK...V3...



Flat Cable Adapters and Splitters (cont.)

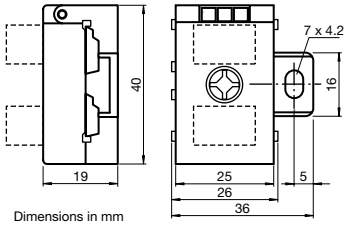
Splitters

Model	Description
VAZ-2FK-B3 ⚡	Flat cable splitter, two trays are connected together
VAZ-T1-FK-CLAMP1 ⚡	Flat cable splitter, two trays are connected together, also connects the flat cable to spring terminals
VAZ-2T1-FK-CLAMP1 ⚡	Connects both the yellow and black flat cable to spring terminals

⚡ Stocked item
Consult factory for all other models

VAZ-2FK-B3

VAZ-T1-FK-CLAMP1
VAZ-2T1-FK-CLAMP1

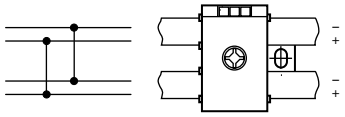


Dimensions in mm

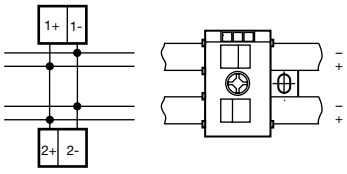
Specifications

RATED OPERATING CURRENT		8 A
PROTECTION (IEC)		IP69K, CLAMP1 style only IP20
HOUSING MATERIAL		PA 6 GF 35
TEMPERATURE RANGE	*Working*	-13 ºF to +167 ºF (-25 ºC to +75 ºC)
	Storage	-13 ºF to +185 ºF (-25 ºC to +85 ºC)
SCREW MOUNTING TORQUE		7 in-lb
WIRE GAUGE		CLAMP1 only (24 AWG - 16 AWG, strip 10 mm)
CONTACTS		Gold plated pins, 4 per tray
FLAT CABLE TRAYS		2

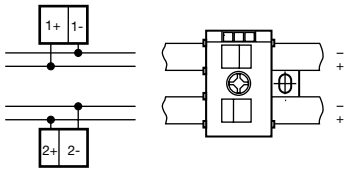
VAZ-2FK-B3



VAZ-T1-FK-CLAMP1



VAZ-2T1-FK-CLAMP1



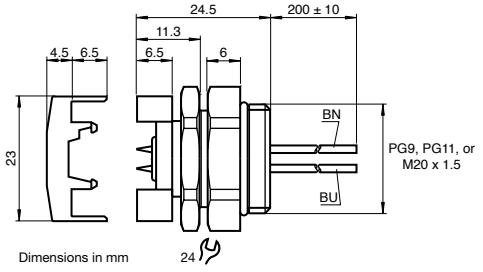
Bulkhead Connectors, Cordgrips, and Conduit Adapters

These accessories are often used to connect flat cable to a junction box or enclosure. Drill a hole with the appropriate mounting hole clearances and mount the accessory in the box.

Model	Description
VAZ-T1-FK-PG9	Flat cable bulkhead adapter with PG9 threads, 0.606" mounting hole clearance
VAZ-T1-FK-PG11	Flat cable bulkhead adapter with PG11 threads, 0.740" mounting hole clearance
VAZ-T1-FK-M20	Flat cable bulkhead adapter with M20 threads, 0.807" mounting hole clearance
PG11 CORD GRIP ⚡	Cord grip for round cable, PG11 threads, 0.740" mounting hole clearance
VAZ-PG11-FKD ⚡	Inserts to seal around flat cable, fits into PG11 cord grip, bag of 10
PG11-1/2NPT	Adapter to convert a PG11 opening like on U-G1PP to a 1/2" NPT opening

⚡ Stocked item
Consult factory for all other models

VAZ-T1-FK-PG9
VAZ-T1-FK-PG11
VAZ-T1-FK-M20



VAZ-T1-FK-... Specifications

RATED OPERATING CURRENT		2 A
PROTECTION (IEC)		IP67
HOUSING MATERIAL		PUR and Ni-Brass
TEMPERATURE RANGE	*Working*	-13 ºF to +140 ºF (-25 ºC to +60 ºC)
	Storage	-13 ºF to +185 ºF (-25 ºC to +85 ºC)
WIRE GAUGE		22 AWG
WIRE LENGTH		200 mm

PG11 CORD GRIP

VAZ-PG11-FKD

PG11-1/2NPT

Covers and Mounting Accessories

Model	Description
VAZ-V1-B ⚡	Dust cover to mount over a female connector on G2 and G12 type modules, M12 x 1
VAZ-V3-B ⚡	Dust cover to mount over a female connector, M8 x 1 (pack of 10)
VAZ-G4-B1 ⚡	Additional covers to plug unused ports on the G4 type housing, M12 x 1.5
VAZ-FK-ED+GLUE ⚡	Rubber covers (pack of 20) and glue (3 tubes) to terminate flat cable
VAZ-FK-ED ⚡	Extra rubber covers to terminate flat cable (pack of 20). Also used to terminate cable in G2 housing.
VAZ-FK-CL1 ⚡	Cable clip to attach 1 flat cable to machine
VAZ-2FK-CL2 ⚡	Cable clip to attach 1 or 2 flat cables to machine with super 3M adhesive
V1-CLIP	Attaches to M12 male once connected to IO block to protect against accidental removal
VAZ-FK-ED2 ⚡	Cord grip with flat cable profile to terminate flat cable (pack of 10)
VAZ-FK-ST1 ⚡	Shrink tube with epoxy to terminate flat cable (pack of 20)

⚡ Stocked item
Consult factory for all other models

VAZ-V1-B

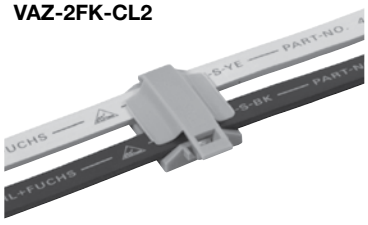
VAZ-V3-B

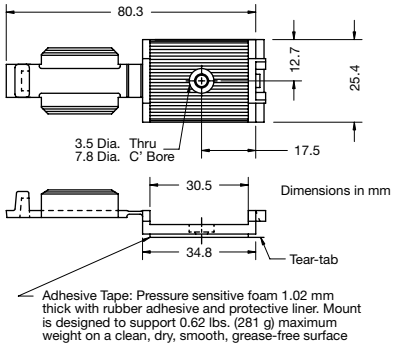
VAZ-G4-B1

VAZ-FK-ED+GLUE

VAZ-FK-CL1

VAZ-2FK-CL2





Adhesive Tape: Pressure sensitive foam 1.02 mm thick with rubber adhesive and protective liner. Mount is designed to support 0.62 lbs. (281 g) maximum weight on a clean, dry, smooth, grease-free surface

V1-CLIP

VAZ-FK-ED2

VAZ-FK-ST1

AC Input Accessories

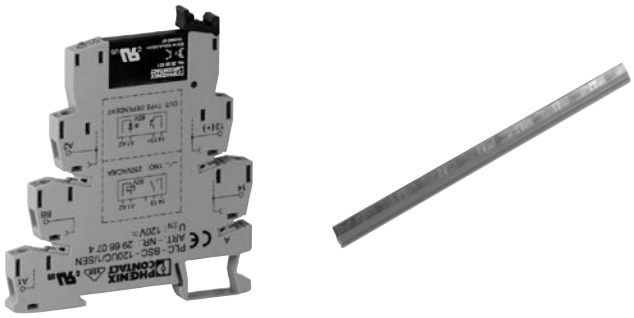
All standard IO modules in this catalog are for DC inputs. If you want AC inputs for a new project, or to retrofit a job, then these accessories are what you need. Inputs are for 120 VAC/DC inputs and outputs connect directly to the IO module. If multiple optocouplers are used, the shorting rail will save you a great deal of installation time. All of the DC positives and AC neutrals can be jumpered together.

Model	Description
VAZ-PLC-OSC-120UC/48DC/100/SEN ⚡	Optocoupler, converts 120 VAC inputs to DC for input to any AS-i module
VAZ-FBST 500-PLC GY ⚡	Shorting rail will connect AC Neutrals or AS-i + together on module, 500 mm long

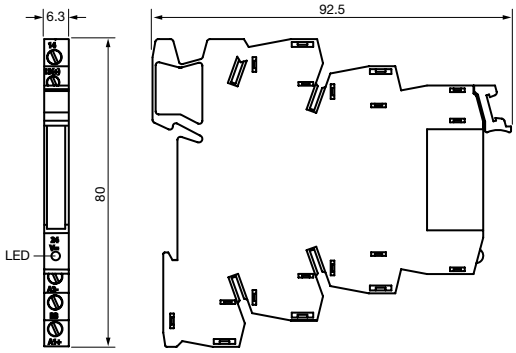
⚡ Stocked item
Consult factory for all other models

Specifications

INPUT DATA	
VOLTAGE RANGE	96-132 VAC / 88-121 VDC
CURRENT CONSUMPTION	3.5 mA
RESPONSE TIME	6 ms
TURN OFF TIME	10 ms
FREQUENCY	10 Hz
OUTPUT DATA	
VOLTAGE RANGE	3 VDC - 48 VDC
VOLTAGE DROP	≤ 1 V
CURRENT LIMIT	100 mA
CURRENT CONSUMPTION	≈ 0 mA

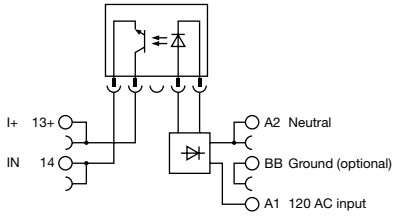


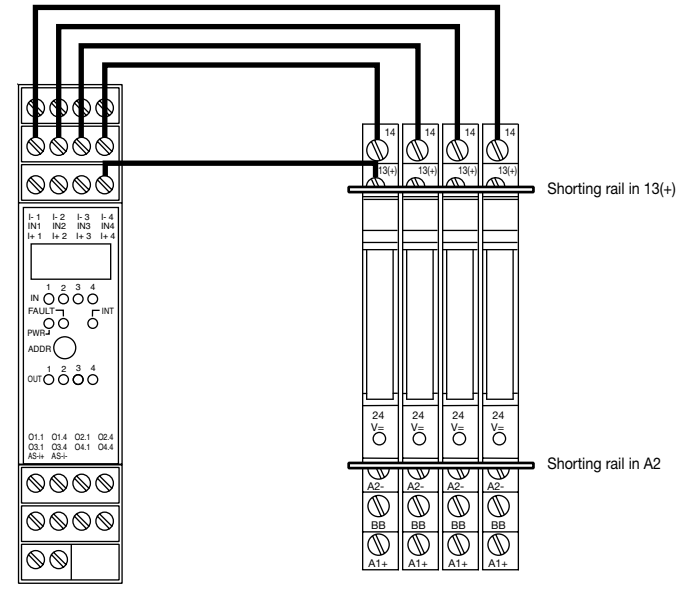
Dimensions in mm



LED Indicators

Yellow: Input on





VAA-4E4A-KE-ZE/R

4 x VAZ-PLC-OSC-120UC/48DC/100/SEN

Passive and Protected Tees

These protected and unprotected Tees allow for easy splitting of the AS-Interface round cable. The protected Tees will shut off the drop on overload or short circuit. The drop autorecovers when the short is removed. Each protected drop can be for up to one I/O module each.

Model	Description
VAZ-RK-TEE	Passive drop connector, 2 drops, trunk in, trunk out
VAZ-RK-4TEE	Passive drop connector, 4 drops, trunk in, trunk out
VAZ-RK-P-TEE	Protected drop connector, 1 drop, trunk in, trunk out
VAZ-RK-P-TEE-S	Protected drop connector, 1 drop, trunk in, trunk out, with disconnect switch
VAZ-RK-P-4TEE	Protected drop connector, 4 drop, trunk in, trunk out
VAZ-RK-P-4TEE-S	Protected drop connector, 4 drop, trunk in, trunk out, with disconnect switch

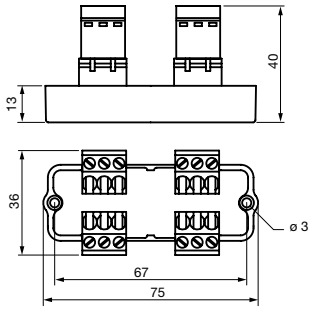
Stocked item
Consult factory for all other models

Specifications

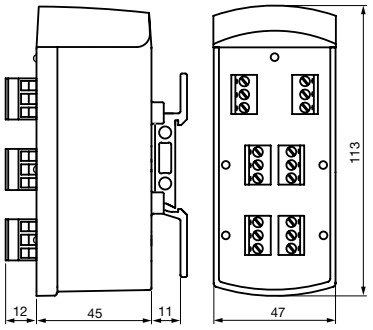
PASSIVE DROP CONNECTORS	
MAX CURRENT	8 A
PROTECTED DROP CONNECTORS	
MAX CURRENT (TRUNK)	8 A
TRIP CURRENT	240 mA
HOLDING CURRENT AFTER TRIP	28 mA
RESET CURRENT	< 28 mA
VOLTAGE DROP	< 1 V
TEMPERATURE RANGE	-40 ºF to +185 ºF (-40 ºC to +85 ºC)

Dimensions in mm

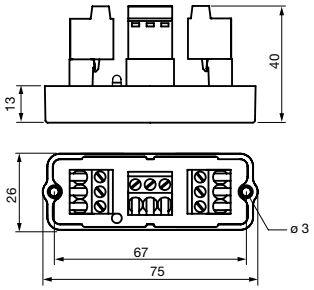
VAZ-RK-TEE



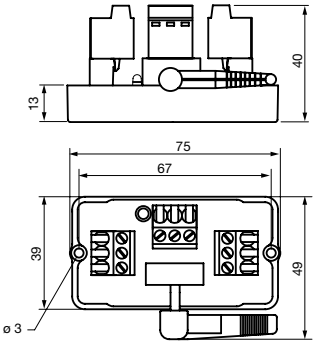
VAZ-RK-4TEE



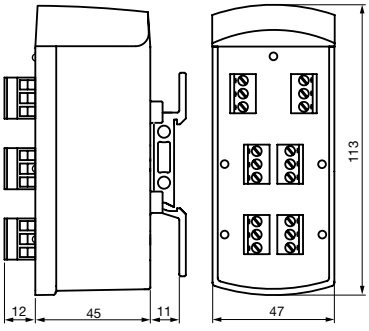
VAZ-RK-P-TEE



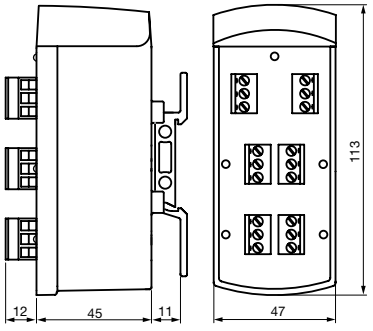
VAZ-RK-P-TEE-S



VAZ-RK-P-4TEE



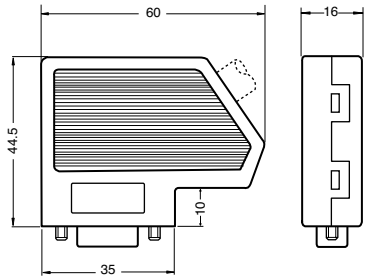
VAZ-RK-P-4TEE-S

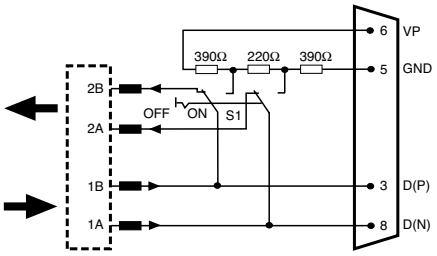


PROFIBUS Accessories

Model	Description
VAZ-PB-DB9-W ⚡	DB9 PROFIBUS connector with termination switch

⚡ Stocked item
Consult factory for all other models





Specifications

MATERIAL DATA	
BODY	Metal plated ABS
CABLE DIAMETER	Accepts cables from 7.6 mm…8.4 mm DIA
TERMINATION	Yes, switchable
ELECTRICAL DATA	
BAUD RATE	Max 12 Mbps
CURRENT RATING	4 A
VOLTAGE RATING	125 VDC
ENVIRONMENTAL DATA	
PROTECTION CLASS	IP40
TEMPERATURE RANGE	-4 °F to +158 °F (-20 °C to +70 °C)

Dimensions in mm

Glossary

Address
The identification number of a module. The default setting for AS-Interface modules is 0 and can be set to values between 1A-31A or 1B-31B. There is no limit to the number of times the address can be changed.

Actuator
A simple output device that carries out a movement (e.g., contactor or valve control).

Analog Profile 7.3
A device profile that provides 4-16 bit analog signals to be transferred to or from the AS-Interface scanner. The scanner/gateway and the module must both support the Analog Profile 7.3 for communication to take place.

APM
An abbreviation for alternating pulse modulation. A stream of 2 bits on the AS-Interface cable where each bit represents a $\sin^2$ pulse. Each positive pulse follows a negative pulse and vice versa. Alternative pulse modulation is highly resistant to interference.

AS-Interface 2.0 specification
AS-Interface accommodates 31 I/O modules where each module uses one, complete address between 1 and 31.

AS-Interface 2.1 specification
Allows I/O modules to take up only one half of an address. Therefore, scanners/gateways that support this addressing scheme are able to communicate with up to 62 modules on a network.

AS-Interface 3.0 specification
The latest specification that amongst others includes profiles allowing up to 62 4 in/4 out modules on one network. All profiles of earlier specifications are supported.

ASIC
Application Specific Integrated Circuit. Every module contains an AS-Interface ASIC.

Automatic Addressing
With the system in operation, a new module can be connected to replace an existing module. The new module will automatically assume the address of the one it is replacing. The address of the new module must be 0 and auto addressing must be enabled.

Bit error rate
The statistical mean of the errors occurring during transmission.

Configuration data
The display of all current I/O modules determines the actual status of the network. The profiles (I/O, ID, ID1, ID2) are stored in the list of the detected slaves (LDS).

Cycle time
The time span between two I/O transfers on a single module. The fewer the nodes, the shorter the cycle time.

Data integrity
A measure of the error free operation of data transfer.

Enhanced logic functionality
In addition to providing additional logic operations, SafetyMonitors with enhanced versions offer increased functionality allowing users to create configurations with more complex rules and procedures.

Forward and backward compatibility
Any scanner/gateway can communicate with any type of node with the specifications of 2.0, 2.1, and 3.0.

Galvanic isolation
Transformer isolation between two AS-Interface segments.

Gateway
A device that controls all AS-Interface communications and is a single drop on a higher level bus system.

Ground fault detection
An AS-Interface cable must not be grounded under any circumstances. Grounding the cable would lead to faults that may cause the system to become unstable and disrupt the noise immunity of the network. All power supplies with EFD in their model number have ground fault detection. Any AS-i gateway with K20 in the model number can also detect this problem.

I/O code
The I/O code, stored in the module, specifies to the master/scanner how many inputs and outputs the module has.

I/O module
This device connects directly to AS-Interface and accepts up to 4 inputs and 4 outputs from standard devices.

ID-code
Identifies the type of module. The manufacturer sets this value.

ID1
Part of the device profile. A freely configurable code between 0 and F.

ID2
Part of the device subprofile. Determines how a module will act on the network.

Insulation displacement
An electrical connection to the AS-Interface flat cable made without the use of a cutting tool.

Intelligent sensor
A sensor with an AS-Interface ASIC that uses one address.

Interoperability
Two modules or scanner/modules from different manufacturers are able to work together.

Mechanical profile
Guarantees a correct connection of the yellow cable every time by eliminating the danger of reversing polarity.

Message
A complete group of bits that presents information.

Operating current
Current needed by the device for proper operation.

Glossary

OSSDs
Output signal switching devices (OSSDs), the safety relays in a SafetyMonitor.

Parameter bits
A four-bit code indicating how the I/O module will function. Examples: N.C./N.O., light-on/dark-on for photoelectric sensors. Parameter bits can be changed as needed and are set on power up.

Parity check
Simple error checking of the sum of the user bits contained in one telegram (address, data, control bits, parity bit) which must be even in AS-Interface.

Passive module
A device that connects one or more intelligent devices to AS-Interface. It does not require an address.

Plug and Play
Automatic installation of hardware components on Windows based operating systems.

Projected data
The current stored configuration of AS-Interface. The I/O and ID codes are permanently stored in the gateway/scanner. The gateway/scanner compares the current configuration and default configuration to detect improperly connected or missing modules.

Redundant piercing connection technology
Two flat cable pierce connections that nestle tightly and securely among the copper strands in the core of each of the conductors.

Release circuit
Release circuits are safe output contacts, controlled by logic in the AS-Interface SafetyMonitor. A single SafetyMonitor can up to 16 independent release circuits. This means that up to 16 independent shut-off states can be realized. Dependent release circuits operate in tandem.

Remaining error probability
Indicates the number of errors that could occur during a transmission based on the average of previous error detections.

Safe Remote Output
A set of safe contacts that are not located inside the SafetyMonitor but are mounted remotely on the network. Multiple safe remote outputs can switch simultaneously (dependent release circuits) or independently (independent release circuits)

Safety at Work
The safety components of AS-Interface in applications up to category 4, SIL 3.

SafetyMonitor
A monitoring device that contains output signal switching devices (OSSDs) replacing safety relays. Evaluates all data sent across the AS-Interface network.

SafetyNode
I/O modules constructed to satisfy the rules and regulations necessary to obtain the desired safety ratings.

Scanner Cards
Directly mounted in the PLC rack and appearing in the PLC configuration as large I/O cards. Also any PC card that connects to the ISA, PCI, or PC104 busses.

Sensor
A device that indicates the presence of something and relays the information back to a controller. Some of the most common types of sensors are inductive, capacitive, photoelectric, and ultrasonic.

Telegram
A message sent by the master and answered by an I/O module.

Transmission (Baud) rate
The transmission speed of a bit on the AS-Interface cable measured in bits per second (bps). AS-Interface's baud rate is approximately 167 kbps.

Watchdog
Switches outputs to their deenergized state when there is no communication for more than 40 ms on the AS-Interface network.

Trademark Information

Chemical Resistivity Charts

A= excellent B= good C= moderate D= nonresistive

METALS

This chemical resistance chart rates the effect of chemicals on metals used in the construction of Pepperl+Fuchs' products. Concentration of chemicals listed are 100%, unless otherwise specified.

	302/304 SS	316 SS	Hasteloy	Titanium	Aluminum	Tantulum
Citric acid	A	A	A	A	C	-
Copper chloride	C	D	A	A	D	-
Cresols 2	A	A	-	-	B	A
Detergents	A	A	-	-	A	A
Diesel fuel	A	A	-	-	A	-
Dyes	A	A	-	-	B	-
Ethyl acetate	A	A	B	-	B	-
Ferric chloride	D	D	B	A	D	-
Ferric sulfate	A	C	A	A	D	A
Formic acid	C	B	A	C	D	-
Fuel oils	A	A	A	A	A	A
Gasoline	A	A	A	D	A	-
Grease 4	A	A	-	-	A	-
Hydraulic oil	A	A	-	-	A	-
Hydrochloric acid (20%)	-	D	B	C	D	-
Hydrofluric acid(20%)	-	D	B	D	D	-
Hydrogen peroxide (10%)	-	C	A	C	A	-
Hydrogen sulfide (aqueous)	-	A	A	A	C	-
Isopropyl acetate	-	B	-	-	C	-
Kerosene 2	A	A	A	A	A	A
Lubricants	-	A	A	A	A	-
Magnesium sulfate	B		B	A	B	-
Methyl acetate	A	A	A	-	A	-
Methyl alcohol	A	A	A	B	A	-
Methylene chloride	B	B	B	B	A	-
Nitric acid (20%)	A	A	A	A	D	-
Oil (soybean)	A	A	A	A	B	A
Phosphoric acid (40%)	A	B	A	B	C	-
Potassium sulfide	B	A	-	A	-	-
Propane (liquified)	A	A	A	-	A	-
Sodium carbonate	B	A	A	A	D	-
Sodium hydroxide (20%)	B	A	B	A	D	-
Sodium sulfate	B	B	B	A	A	-
Sulfuric acid (10-75%)	D	D	B	D	D	-
Xylene	A	A	A	A	A	A

PLASTICS

This chemical resistance chart rates the effect of chemicals on plastics used in the construction of Pepperl+Fuchs' products. Concentration of chemicals listed are 100%, unless otherwise specified.

	PVC	PUR	Hypalon (CSM)	Teflon	Polyethylene	Polypropylene	Viton
Citric acid	B	A	A	A	B	B	A
Copper chloride	A	A	A	A	B	A	A
Cresols 2	D	D	D	A	D	C	A
Detergents	A	D	-	A	B	A	A
Diesel fuel	-	D	-	A	-	D	A
Dyes	B	-	-	-	-	-	A
Ethyl acetate	D	D	D	A	C	C	D
Ferric chloride	A	B	B	A	B	A	A
Ferric sulfate	A	-	A	A	-	A	A
Formic acid	D	-	-	A	B	A	B
Fuel oils	A	D	D	A	D	B	A
Gasoline	C	B	B	A	D	C	A
Grease 4	A	A	-	A	-	-	A
Hydraulic oil	A	-	B	A	-	D	A
Hydrochloric acid (20%)	A	-	A	A	A	A	A
Hydrofluric acid(20%)	D	B	A	A	C	A	A
Hydrogen peroxide (10%)	A	-	-	A	A	-	-
Hydrogen sulfide (aqueous)	A	-	B	A	B	A	B
Isopropyl acetate	B	D	-	-	-	-	D
Kerosene 2	A	B	-	A	D	D	A
Lubricants	A	C	D	A	-	A	A
Magnesium sulfate	A	-	A	A	B	A	A
Methyl acetate	-	-	D	A	-	-	D
Methyl alcohol	A	D	A	A	A	A	D
Methylene chloride	D	D	-	A	C	B	B
Nitric acid (20%)	A	D	D	A	C	A	A
Oil (soybean)	B	A	B	A	A	A	A
Phosphoric acid (40%)	A	A	-	A	A	A	A
Potassium sulfide	A	C	B	A	A	A	A
Propane (liquified)	A	D	B	-	C	B	A
Sodium carbonate		A	A	A	B	A	A
Sodium hydroxide (20%)	A	C	A	A	A	A	B
Sodium sulfate	A	A	A	A	A	A	A
Sulfuric acid (10-75%)	A	-	C	A	A	A	A
Xylene	D	D	D	A	C	C	A

These charts are a general guide and do not guarantee chemical compatibility.
Pepperl+Fuchs, Inc. assumes no responsibility for the use of this information.

IP Ratings

Definition:

The first numeral defines the amount of protection against penetration of solid objects into the housing.

The second numeral defines the amount of protection against liquids penetrating the housing.

Additional information on ratings can be found in the following chart or the 1976 IEC Publication, Classification of Degrees of Protection Provided by Enclosures.

Example: *What is IP67?*

Complete protection of live parts. Protection against the penetration of dust and water immersion.

Testing Criteria:

1. Test Class: IP67 test

   Conditions: 1 m head of water over the test piece for a duration of 30 minutes. Room temperature ± 5 °C

   Test: Insulation and operation

2. Test Class: IP68 test (Encapsulated products)

   Conditions: 1m head of water over the test piece for 24 hours of operation under water, with cyclical activation and deactivation under nominal loading. Cycle time 2 hours. Room temperature ± 5 °C

   Test: Insulation and operation

3. Test Class: IP69K test

   Conditions: Protection against ingress of water from jets at a pressure of 1450 psi and at temperatures of up to 80 °C. This is the level of pressure and temperature required for thorough cleaning of meat, fish, poultry and dairy precessing lines.

IP__ __

Degree of Protection Against Contact and Entrance of Solid Foreign Bodies

Numeral	*Degree of Protection*
0	No protection against contact or entry of solids
1	Protection against accidental contact by hand, but not deliberate contact. Protection against large objects.
2	Protection against contact by fingers. Protection against medium-size foreign objects.
3	Protection against contact by most tools, wires and small objects.
4	Protection against contact by small tools, wires and small objects.
5	Protection against contact with energized or moving parts, and against deposits of dust.
6	Protection from energized or moving parts, and against penetration of dust.

Degree of Protection Against Ingress of Liquid

Numeral	*Degree of Protection*
0	No protection
1	Protection against drops of condensed water. Condensed water falling on housing shall have no effect.
2	Protection against drops of liquid. Drops of falling liquid shall have no effect when housing is tilted to 15° from vertical.
3	Protection against rain. No harmful effect from rain at angle less than 60° from vertical.
4	Protection against splashing from any direction.
5	Protection against water jets from any direction.
6	Protection against conditions on ship decks. Water from heavy seas will not enter.
7	Protection against immersion in water for the stated conditions.
8	Protection against indefinite immersion in water at a specified pressure.
9K	Protection against high pressure, high temperature washdown.

Pepperl+Fuchs Warranty Terms and Conditions

WARRANTIES

Pepperl+Fuchs, Inc., (hereinafter "P+F") offers three (3) WARRANTIES to cover all Products sold. They are as follows:

1) A STANDARD 18-MONTH WARRANTY is available for the specific Products listed below — generally those not covered by the STANDARD 5-YEAR WARRANTY.
2) A STANDARD 5-YEAR WARRANTY is available for the specific Products listed below.
3) An optional LIFETIME WARRANTY is available for Products covered by the 5-YEAR STANDARD WARRANTY if the LIFETIME WARRANTY REGISTRATION is completed and returned to P+F as provided herein.

GENERAL TERMS AND CONDITIONS FOR ALL WARRANTIES

- STANDARD 18-MONTH WARRANTY,
- STANDARD 5-YEAR WARRANTY, and
- LIFETIME WARRANTY

Subject to the conditions and requirements set forth herein, P+F WARRANTS the Products covered by the respective WARRANTIES to be free from defects in material and workmanship under normal and proper usage for the respective time periods listed above from the date of shipment from P+F (or from an authorized Representative or Distributor of P+F). In addition, certain specific terms apply to various WARRANTIES.

THESE EXPRESS WARRANTIES ARE IN LIEU OF AND EXCLUDE ALL OTHER REPRESENTATIONS MADE — BOTH EXPRESS AND IMPLIED, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR THAT THE PRODUCTS ARE FREE OF ANY CLAIM OF ANY THIRD PERSON BY WAY OF INFRINGEMENT OR THE LIKE, and are also in lieu of and exclude any promise, description, affirmation of fact, sample model or representation, oral or written, which may be part of an order or made by a Representative of P+F or otherwise. These WARRANTIES do not apply to any Product which has been subject to misuse, negligence, or accident, or to any Product which has been modified or repaired, improperly installed, altered or disassembled (except according to P+F's written instructions) or any Product if the machinery, equipment, or production line to which the Product is originally connected or on which the Product is originally installed is abandoned, changed, substituted, moved or replaced or if the Product is removed from such machinery, equipment or production line or other original application.

These WARRANTIES are subject to the following conditions:

1) These WARRANTIES are limited to the electronic and mechanical performance only, as expressly detailed in the Product specifications and NOT to cosmetic performance.
2) These WARRANTIES shall not apply to any cables attached to, or integrated with the Product. However, the STANDARD 18-MONTH WARRANTY shall apply to cables sold separately by P+F.
3) These WARRANTIES shall not apply to any Products which are stored, or utilized, in harsh environmental or electrical conditions outside P+F's written specifications.
4) The WARRANTIES are applicable only to Products shipped from P+F subsequent to January 1, 1992.
5) All claims under these WARRANTIES must be made in writing within thirty (30) days of the date on which the defect is (or, with reasonable diligence, should have been) discovered.

PRODUCTS TO WHICH EACH WARRANTY APPLIES:

STANDARD 18-MONTH WARRANTY

For ultrasonic sensors, level controls, photoelectric sensors, zone scanners, read-write I.D. systems, encoders, counters, signal conditioners and all products with electro-mechanical relays or circuit breakers.

STANDARD 5-YEAR WARRANTY/LIFETIME WARRANTY

For inductive sensors, capacitive sensors, magnet operated sensors, networking products, read-only inductive I.D. systems, and I.S. barriers (without electro-mechanical components) sold to the Original User.

The following terms and conditions apply to the optional LIFETIME WARRANTY in addition to the General Terms and Conditions:

1) This LIFETIME WARRANTY is available only to an Original User and shall be valid only if the Product was purchased by the Original User from P+F, or from an authorized P+F Representative or Distributor, or was an integral part of machinery and equipment obtained by the Original User from an Original Equipment Manufacturer, which itself purchased the Product directly from P+F or from an authorized Representative or Distributor. (The term "Original User" means that person, firm, or corporation which first uses the Product on a continuous basis in connection with the operation of a production line, piece of machinery, equipment, or similar device.) In the event the ownership of the Product is transferred to a person, firm or corporation other than the Original User, this LIFETIME WARRANTY shall terminate.
2 This LIFETIME WARRANTY shall be effective only if the LIFETIME WARRANTY REGISTRATION has been completed, signed by the Original User and an authorized Representative or Distributor of P+F's Products and has been received by P+F not later than six (6) months after the Product (or the machinery or equipment in which the Product was installed) was delivered to the Original User, or two (2) years from the date the Product was shipped from P+F, whichever date first occurs. A LIFETIME WARRANTY REGISTRATION FORM is available from P+F or any authorized Representative or Distributor.

PURCHASER'S REMEDIES

This remedy shall apply to all WARRANTIES. If the Original User desires to make a WARRANTY Claim, he shall notify the authorized P+F Distributor from whom it was purchased or, if such Distributor is unknown, shall notify P+F and, if requested by P+F, ship the Product to P+F's factory in Twinsburg, Ohio, postage or freight prepaid. P+F shall, at its option, take either of the following two courses of action for any Products which P+F determines are defective in materials or workmanship:

1) Repair or replace the Product and ship the Product to the Original User or to the authorized P+F Distributor, postage or freight prepaid; or
2) Repay to the Original User that price received by P+F for the Product, provided that if the claim is made under the LIFETIME WARRANTY, and such Product is not then being manufactured by P+F, then the amount to be repaid by P+F to the Original User shall be reduced according to the following schedule:

NO. OF YEARS SINCE DATE OF PURCHASE BY ORIGINAL USER	% OF ORIGINAL PURCHASE PRICE TO BE PAID BY P+F
10	50%
15	25%
20	10%
More Than 20	5%

PURCHASER'S REMEDIES SHALL BE LIMITED EXCLUSIVELY TO THE RIGHT OF REPLACEMENT, REPAIR OR REPAYMENT AS PROVIDED ABOVE AND DOES NOT INCLUDE ANY LABOR COSTS OR REPLACEMENT AT ORIGINAL USER'S SITE. P+F SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL DAMAGES RESULTING FROM ANY BREACH OF ANY WARRANTY, EXPRESSED OR IMPLIED, APPLICABLE TO THE PRODUCT, INCLUDING, WITHOUT LIMITATION, ANY DAMAGES RESULTING FROM PROPERTY DAMAGE, PERSONAL INJURY OR BUSINESS INTERRUPTION.

CONSIDER SAFETY AND PROTECTION PRECAUTIONS

P+F takes great care to design and build reliable and dependable Products; however, some Products can fail eventually. You must take precautions to design your equipment to prevent property damage and personal injury in the unlikely event of failure. As a matter of policy, P+F does NOT recommend the installation of electronic controls as the ***sole*** device FOR THE PROTECTION OF PERSONNEL in connection with power driven presses, brakes, shears and similar equipment and, therefore, the customer should build in redundancy or dual control using approved safety devices for these applications.

Pepperl+Fuchs Warranty Terms and Conditions

PEPPERL+FUCHS, INC.
LIFETIME WARRANTY REGISTRATION INSTRUCTIONS
TO BE COMPLETED BY THE ORIGINAL (END) USER OF THE PRODUCT

STEP 1: Fill in all information below.

STEP 2: Have the Registration signed by an authorized Representative of the Original User and an authorized Representative of Pepperl+Fuchs, Inc. (“P+F”).

STEP 3: Return this Registration to P+F (keep a copy for your records).

LIFETIME WARRANTY REGISTRATION AVAILABLE ONLY FOR INDUCTIVE SENSORS, CAPACITIVE SENSORS, MAGNET OPERATED SENSORS, READ-ONLY INDUCTIVE I.D. SYSTEMS NETWORKING PRODUCTS, AND I.S. BARRIERS (WITHOUT ELECTRO-MECHANICAL COMPONENTS)

Please Print Date: _____

Company Name: _____

Division: _____ Dept: _____

Address: _____

City: _____ State: _____ ZIP: _____

Phone: (_____) _____ Your Name: _____

Your Title: _____

Industry (Items Manufactured or Service Performed at this Location): _____

_____

_____

Approximate Date Purchased: _____ Approximate Date Installed: _____

What is the General Application for this Product? _____

_____

Which OEM Supplied the Mechanical Equipment on which the Product is installed? Name: _____

Location: _____

P+F Products Installed:

Catalog Number	Description	Approximate Quantity

Why were P+F Products Specified for this Application? _____

_____

_____

Signature of Authorized Representative of P+F: _____ Date: _____

Signature of Authorized Representative of Original User: _____ Date: _____

Return to: Pepperl+Fuchs®, Inc.
1600 Enterprise Parkway
Twinsburg, Ohio 44087-2245
Attention: Warranty Registration Department
Phone: (330) 425-3555 • Telefax: (330) 425-4607

SPOTLIGHT on Identification Products

IDENT*Control* Solutions

Pepperl+Fuchs offers a wide selection of RFID readers for factory automation. IDENT*Control* is unique because of it's metal housing, graphical display, and universal connectivity to low frequency, high frequency and microwave type read heads.

- Metal housing IP67
- Over 50 different tags available
- 14 different read head styles
- EtherNet/IP and DeviceNet connectivity
- Modbus/TCP, TCP/IP, PROFINET, PROFIBUS, RS-232 supported
- Email notification / web page configuration
- IDENT*Control* compact 1- and 2-channel versions available

Handheld Solutions

Pepperl+Fuchs handheld solutions are rugged, light weight, and feature full graphical displays. They are often used for inventory management, offline write stations and cordless tracking systems.

- Read/write data to any P+F or ISO standard RFID tag
- Wireless
- Full graphical display with keyboard
- Will read 1-D or 2-D bar codes
- Includes RS-232 / PS2 / USB support

Applications In:

- Material handling, warehousing, and inventory control
- Printing, labeling, sorting, bulk mailing, and inserting
- Automotive and allied industries
- Pharmaceutical & medical instrumentation
- Factory automation & electronics




Need Help Solving a Tough Application?

Pepperl+Fuchs wants to ensure that you receive the service and support you need when you need it, 24 hours every day. You can find CAD drawings, download product data sheets, or request free literature. Get it all on the web at www.pepperl-fuchs.com.

Need More? Ask an Expert.

With a click of the mouse, you can get advice from engineers who are experts in AS-Interface technology, who are familiar with a wide range of applications, and who can help you solve your most challenging production requirements. For reliable advice, visit www.sensing.net/ask and ask an expert.

FACTORY AUTOMATION – SENSING YOUR NEEDS

Pepperl+Fuchs sets the standard in quality and innovative technology for the world of automation. Our expertise, dedication, and heritage of innovation have driven us to develop the largest and most versatile line of industrial sensor technologies and interface components in the world. With our global presence, reliable service, and flexible production facilities, Pepperl+Fuchs delivers complete solutions for your automation requirements—wherever you need us.

PEPPERL+FUCHS
SENSING YOUR NEEDS