

AS-INTERFACE MASTER NEWS

THE BIHL+WIEDEMANN MAGAZINE

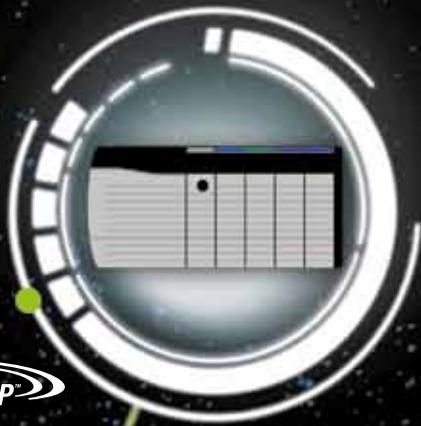


sercos
the automation bus

Modbus

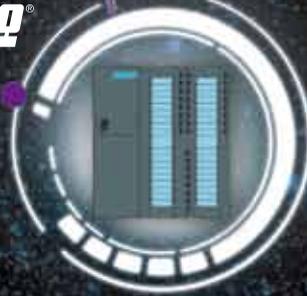
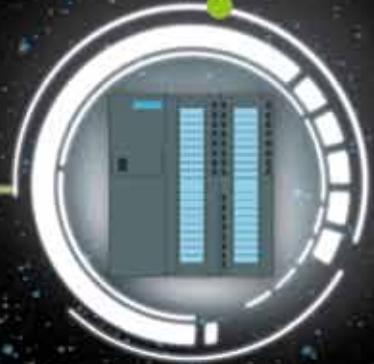


PROFIBUS
PROCESS FIELD BUS



EtherNet/IP

PROFINET
INDUSTRIAL ETHERNET



COST COMPARISON WITH STANDARD I/Os

The sign of three

INTERVIEW

“In the right place at the right time”

SAFELINK

Alliance of the Future



SafeLink

Alliance of the Future

Perfect interaction with all the commonly used automation systems has always been one of the primary strengths of AS-i Safety. Now Bihl+Wiedemann has given the AS-Interface safety concept even more team player qualities: SafeLink means not only that multiple AS-i networks can be efficiently linked – this innovative feature makes it even possible to network the safety technology of systems with each other when they operate in the standard, non-safe area with different controllers.

“Industry 4.0”: Even the title of the German federal government’s project for the future makes one think of an epochal development. The meaning behind it makes the historic dimension even clearer: the name is intended to express nothing more or less

What this means for manufacturing in practice was summarized in one striking sentence by Dr. Kurt D. Bettenhausen, Chairman of the VDI/VDE-Gesellschaft Mess- und Automatisierungstechnik at the Automation 2012 Congress in Baden-Baden: “The increasing networking of devices and systems as well as the availability of every kind of information will make industrial equipment even more complex.” The trade media have been even more specific: “Automation specialists struggle with complexity,” was a heading for example at the web service computer-automation.de.



than the beginning of the fourth industrial revolution. Following the age of mechanization, of mass production and the use of electronics for automating production, we are now entering the era of the intelligent factory.

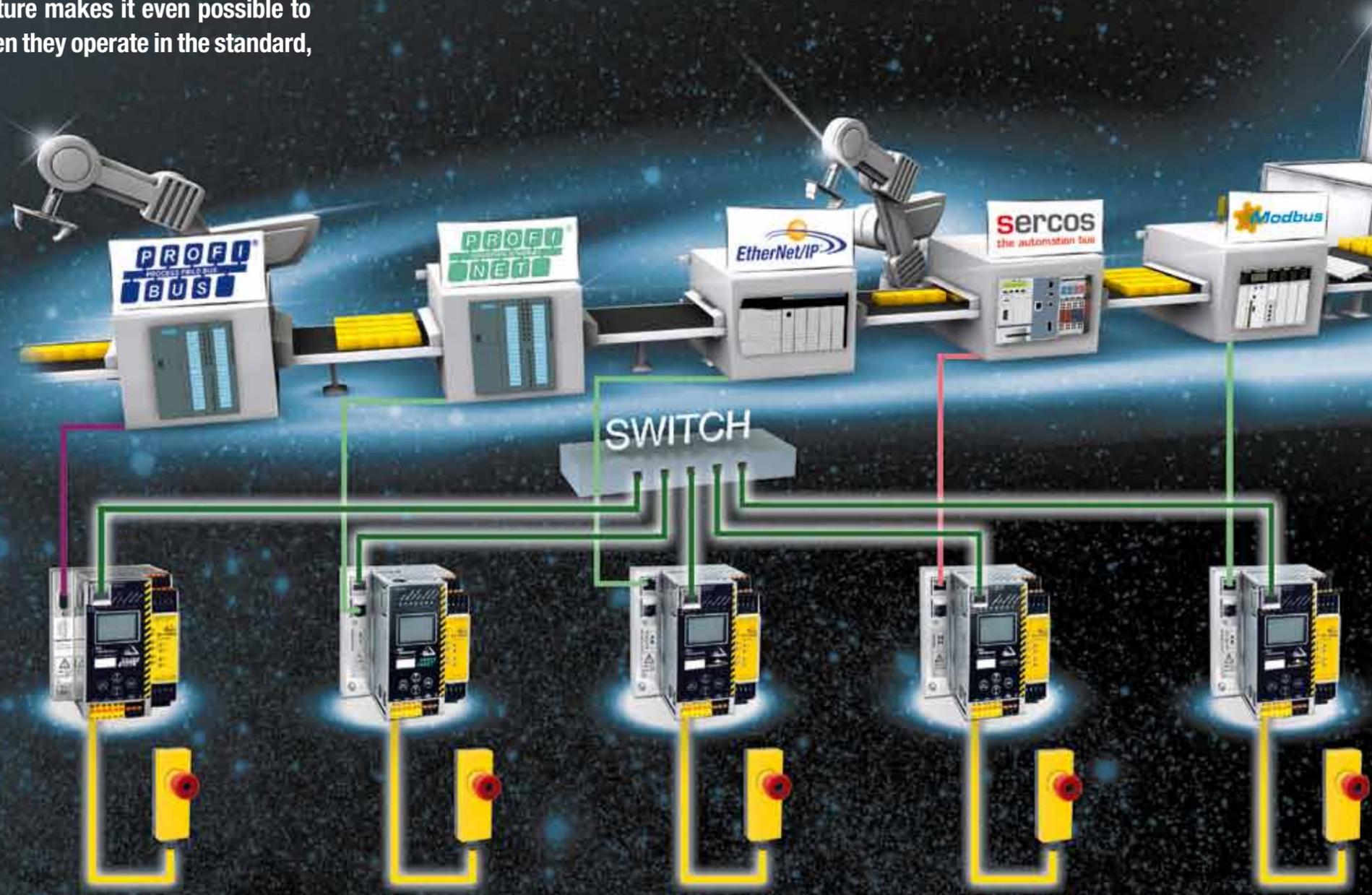
SafeLink: A simple yet innovative response to the trend towards ever more complex systems

These are precisely the current challenges that Bihl+Wiedemann turns into opportunities in the field of safety technology. The AS-Interface pioneers from Mannheim have an answer to the trend towards ever larger, distributed production systems that is as simple as it is innovative: “SafeLink” is the magic word. Behind it lies the ability to connect multiple safe AS-i networks together in an especially efficient manner and to integrate them into complex applications. One

highlight: the ‘team building’ concept even works when different controllers have command over the respective system in specific areas.

“Both machine builders and users are often forced to run machines in the standard area with different automation systems,” notes Bihl+Wiedemann CEO Jochen Bihl.

“Or sometimes it happens that you want to convert a large system to a newer control technology in steps rather than all at once: in all these cases it’s a great relief when



SafeLink in a system having different controllers

at least the safety technology can be configured uniformly. With our AS-i Gateways with integrated Safety Monitor and SafeLink this is accomplished quite simply and conveniently.”

But also in any other complex and distributed system that works with a uniform automation system or a fail-safe controller, the new technology offers significant efficiency benefits. Although it has been possible for some time to link safe AS-i networks together, all of the conventional options come with certain limitations. When coupling over floating contacts, for example, you are dealing essentially with a kind of parallel wiring. That makes this approach only useful when only a few more than the 62 slaves need to be incorporated, which can be directed by a double master. If more safe signals needed to be coupled, a direct connection through AS-Interface was the solution. But this meant sacrificing one AS-i network per Gateway for the coupling.

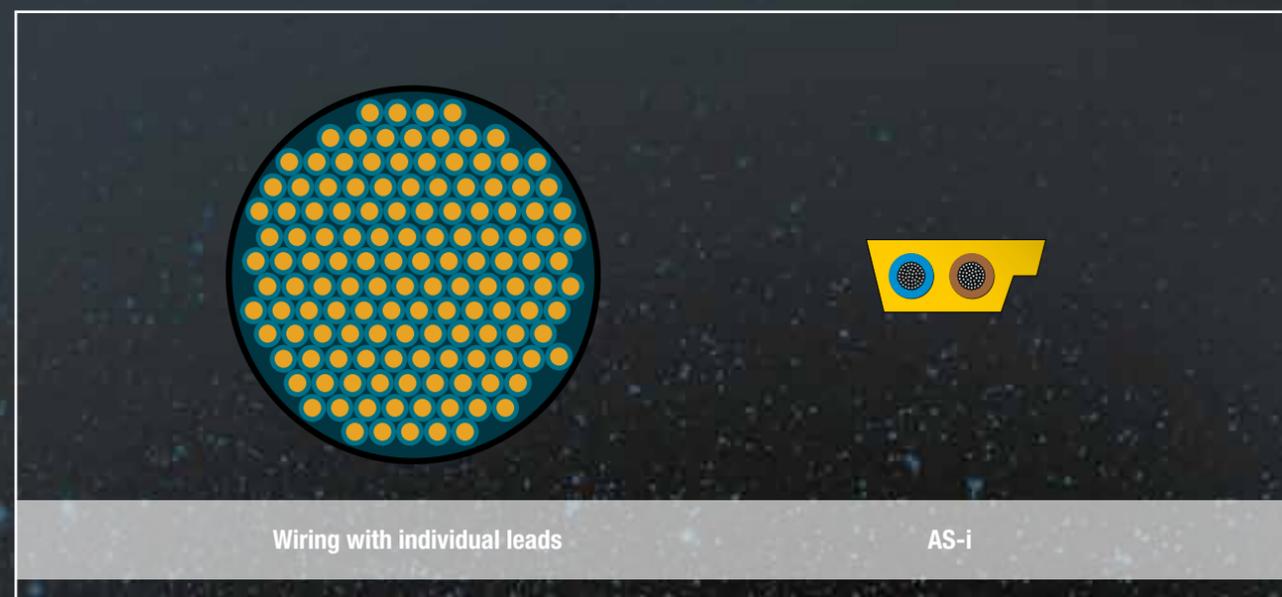
**Communication via Ethernet:
Nearly 2000 AS-i Slaves in direct connection – without regard to the system concept**

With SafeLink nearly 2000 slaves can now communicate with each other directly through all the connected AS-i networks, regardless of the overall technological concept behind the system. You have direct access to the input and output data of all the participating machines. These innovative devices exchange the values with each other automatically and make them available to the respective program. Overall, this approach makes it possible to couple up to 31 of the new Gateways with integrated Safety Monitor with each other – without losing performance at any point and without the use of additional hardware.

SafeLink is implemented using a simple standard Ethernet network. In applications

that work with traditional fieldbuses, safe information is exchanged over the Ethernet diagnostic interface of the AS-i Gateways with integrated Safety Monitor. Until now this feature was “only” there to pass along the diagnostic information gathered in the entire network and to enable access for remote maintenance via Web Server – but in addition this interface can provide up to 31 safe bits per Gateway to other devices. In other words, all the modules in the mutually linked AS-i networks listen to all safe signals and are thereby able to respond directly to new information – without the use of a fail-safe controller. In short: The safety application becomes even more flexible, more transparent and of course even more economical.

It gets even simpler when an industrial Ethernet derivative is being used as the fieldbus: Then the AS-i networks can when desired be coupled through the fieldbus interface of the Gateways, and communi-



cation takes place over the already existing Ethernet rail. “User preferences do vary widely here,” affirms Bihl+Wiedemann Product Manager Johanna Schüßler. “Some prefer to have the safety technology for their production equipment connected to the company network to enable for example remote maintenance – others would rather keep office and production communication completely separate from each other. Our solutions make both possible.”

is a demand for links to other systems, we are happy to respond very quickly to equip our other Gateways with the new feature as well.”

The established Bihl+Wiedemann portfolio of Gateways with integrated Safety Monitor has become so wide-ranging that AS-i Safety can offer its unique team-player qualities in connection with virtually any commonly used automation system. This simplest safety bus in the world scores undisputed efficiency points on the actuator/sensor

level even in systems having fail-safe controllers. A simple calculation clarifies the enormous savings potential that results even just from the drastically reduced wiring complexity: To collect data from 31 safety sensors for example, the traditional decentralized peripheral of a fail-safe controller requires at least four times as many, i.e. 124, wires from the switch panel to the field. When door interlocks are involved, the number is even significantly greater. With AS-i Safety at Work the same application uses just the familiar yellow cable.

**Gateways from Bihl+Wiedemann:
A continuously growing portfolio,
oriented on the demands of the market**

The question of which interface to use can be answered with flexibility and not much effort – the program remains the same. The concept of SafeLink works independent of the host controller and always fits perfectly. This is ensured by the continuously growing range of AS-i Gateways with integrated Safety Monitor and SafeLink from Bihl+Wiedemann: These multi-talents are currently available for PROFIBUS and PROFINET as well as for sercos, EtherNet/IP and Modbus TCP. “And of course we watch the market very carefully,” as Jochen Bihl tells the strategic inside story. “As soon as there



Gateways from Bihl+Wiedemann to all common fieldbuses

Facts about SafeLink

- Up to 31 Gateways networked in a group
- Up to 1922 safe AS-i slaves in maximum configuration
- Ethernet-based safe protocol
- SafeLink available for:
 - Ethernet diagnostic interface
 - Fieldbus interface for PROFINET and EtherNet/IP
- Link to the controller through all common fieldbuses:
 - PROFIBUS, PROFINET, EtherNet/IP+Modbus TCP, sercos

Interview with Thomas Müller, Commercial Director at Bihl+Wiedemann

“In the right place at the right time”

Analyze the problem, design a custom-tailored solution – and then get down to brass tacks: This is the strategy that Bihl+Wiedemann uses to take on the challenges of their customers while thinking on its own behalf as well. For example in the decision for a physical expansion of the company, which after many years of success became ever more urgent. The Commercial Director Thomas Müller tells why only the old location made sense as the new main facility.



AS-i MASTER NEWS: Mr. Müller, how hard is it for a numbers guy to make the decision to build additional production and office space right in such a relatively expensive city as Mannheim?

Thomas Müller: If we had placed our focus mainly on the square meter cost, we may have chosen somewhere else in the world, the state or at least in the region. But in fact of course many other

aspects played an equal role in the decision. Starting with the opportunities for recruiting highly qualified personnel, then considering important company values such as proximity to customers, and finally

taking into account the planning of internal engineering and production processes. And so it was a true stroke of luck that we were offered the land adjacent to our headquarters here in Mannheim. Now we can realize our ideas exactly at the right time and in the right place.

AS-i MASTER NEWS: It makes sense that a talented engineer would generally prefer Mannheim to somewhere in the countryside. But on the other hand, isn't the competition among employers quite strong especially in metropolitan areas?

Thomas Müller: That's true. But we have good cards to play. For one thing, we can offer the attractive opportunity to grow with us – our national and international leadership positions are held almost entirely by people whose careers began with us. And in addition, we have an excellent network at our disposal at the local universities, since Jochen Bihl and Bernhard Wiedemann both got their degrees here in the region before founding the company.

AS-i MASTER NEWS: You mentioned customer proximity as a second important criterion in selecting the location. That almost sounds like you meant “only” the short shipping distances.

Thomas Müller: Actually you missed the point. Of course logistics costs figure into the equation, but for us, customer proximity has always meant much more than that. What our partners especially appreciate is for example our support, which assists them in the form of high-level involvement when equipment fails, even if our products are not at all responsible for the problem. And even that does not define the full dimension of the concept.

For us, proximity to the customer is also an important part of our market research: The closer our contact with users, the better we understand their problems, and the more accurately we can develop solutions. It is mainly a matter of personal relationships, but physical proximity allows us to cultivate that more intensely. And since many of our customers in the world of machine tools or the automobile industry have their headquarters in Germany, we are ideally situated here in Mannheim.

AS-i MASTER NEWS: But your products have become widely used all over the world, haven't they?

Thomas Müller: Yes, and of course we serve our international customers as well in the truest sense of the word – with a long list of subsidiaries: in several European countries, in Turkey and in China.

The engineering work however is best done in Germany – and best of all over the shortest possible decision-making paths, ideally in the same building. And when we talk about engineering, we mean the whole range up to and including large series production. This means no matter how fast we grow, we want to be able to continue producing all our products at our headquarters so as to have an overview of all the eventualities. For example, our plant in Antalya does only production of large quantities where on one hand no nasty surprises are likely and on the other the cost pressures are especially high.

AS-i MASTER NEWS: And so the expansion in Mannheim serves more the range of products and not so much production efficiency?

Thomas Müller: No, the expansion of our headquarters benefits both. If for no other reason than because we can combine the individual steps of production and of the departments related to production such as test equipment engineering and quality assurance in an even closer space than before. The greatest benefit to our customers certainly has to do with the fact that we will be shortening our delivery times even more after completion of the new construction and can offer many more products off-the-shelf than was possible before.

AS-i MASTER NEWS: To wrap up, let's take a look at the actual numbers. How large an expansion are we talking about? And over what kind of time frame?

Thomas Müller: The acquired property is around 7500 square meters, and as a first step we will be building about 1400 square meters of production area and 600 meters of office area. The building is scheduled for opening at the end of this year.

AS-i MASTER NEWS: And looking at the ratio of land to building area, aren't you looking all too pessimistically into the future?

Thomas Müller: To be honest, that would not be very smart in view of our ongoing rapid growth over the past few years. Our internal planning assumes that the acquisition of the new property will provide space for new ideas for at least the next ten years.

AS-i MASTER NEWS: Thank you for speaking with us, Mr. Müller.

Cost comparison with standard I/Os

The sign of three

The number three plays a key role when it comes to coming up with the most cost-efficient solution for networking actuators and sensors. Even with just three or more I/O modules in the field or three I/O stations in the control cabinet, AS-Interface offers cost advantages over all other fieldbus systems.

Who or what is efficiency killer Number 1 in connecting actuators and sensors has been known around the world for quite some time: Conventional wiring holds the user back from currently available possibilities not only when it comes to performance, but also represents a significant waste of money. That there are also essential differences between various bus systems when doing the calculation is also something that many users did not focus on in the past.

Most of them blindly assumed more or less that the use of AS-Interface only makes economic sense in applications having a larger number of standard in- and outputs on the actuator/sensor level. But a concrete analytical glance at the costs of the number of components needed dispenses with this prejudice once and for all. In truth, using AS-i offers considerable savings potentials in the IP67 area with just three or more I/O modules, and in IP20 environments with three or more I/O stations.

With conventional fieldbuses not only is a dedicated bus coupler required for each individual I/O station in the control cabinet, but also a fieldbus plug, which usually involves cumbersome assembly as well. But with AS-Interface a single Gateway suffices for the entire system. And that can be

Control cabinet modules in IP20 from Bihl+Wiedemann are cost-effective starting at 3 I/O stations

Other systems

Advantages: With Bihl+Wiedemann no fieldbus plugs and bus couplers needed, many different I/O modules just 22.5 mm wide are available

Bihl+Wiedemann

... up to 1000 I/Os

Comparing I/O stations in the control cabinet	
Bihl+Wiedemann	Other systems
1 Gateway	3 Bus couplers
	3 Power supply modules
1 IP20 Fieldbus plug	3 IP20 Fieldbus plugs
9 IP20 4I/4O Modules	9 IP20 4I Modules
	9 IP20 4O Modules
	18 Terminal modules

located right where it is actually needed, thereby providing reduced wiring effort and cost at the same time. In addition to cost savings, the use of AS-Interface also saves control cabinet space: Especially with the combi-modules from Bihl+Wiedemann, which combine up to eight inputs and eight outputs in a housing just 22.5 mm wide.

AS-Interface wins the efficiency comparison in the field hands-down as well – and that not only because the IP67 slaves in conventional fieldbus systems are generally much more expensive than their counterparts for AS-Interface. Significant hardware savings also play an important role. For example, connecting a fieldbus module generally requires two plugs and additional cables for the supply voltage plus two often hard-to-assemble fieldbus plugs. AS-i modules by contrast can be connected simply using piercing technique with the famous yellow cable.

The lowest cost per input in the field is achieved of course when using AS-Interface 8I modules. The greatest price advantage of AS-i solutions compared with all other fieldbus systems is realized however it is possible to use modules having four in- or outputs – simply because the high overhead costs for the fieldbus connection in this case are distributed over fewer in- or outputs, making the case for a conventional fieldbus even weaker.

IP67 fieldbus modules from Bihl+Wiedemann pay for themselves with 3 modules or more

Other systems

Advantages: With Bihl+Wiedemann no plugs for 24 V connection and bus connection needed. Even greater cost benefits when using 4I modules.

Bihl+Wiedemann

Simple piercing technique

Comparing I/O modules in the field	
Bihl+Wiedemann	Other systems
1 Gateway	
1 IP20 Fieldbus plug	
3 IP67 8I Modules	3 IP67 8I Modules
3 Substructure modules	3 IP67 Fieldbus terminal blocks
	5 IP67 Fieldbus plugs
	5 IP67 Connectors for 24 V supply
	1 IP67 Bus terminator

Organized installation with AS-i modules from Bihl+Wiedemann

Other systems

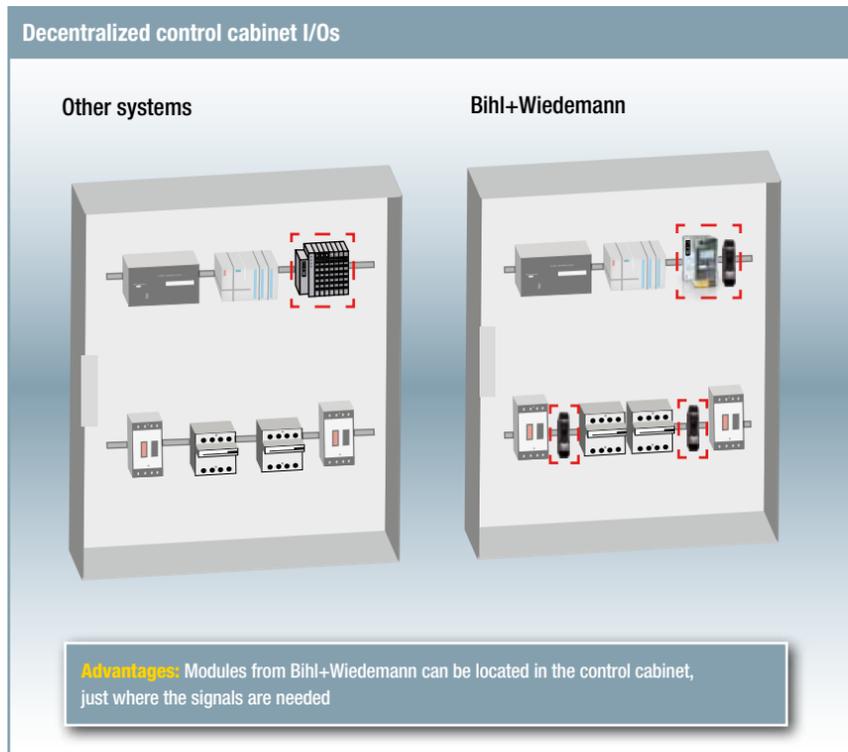
Line structure: No stubs possible

Bihl+Wiedemann

Advantage: Tree structure makes stubs possible

There is another plus for AS-Interface which cannot always be expressed in Euros and Cents, but which in any case is easy to define. It's well known that conventional fieldbus modules have to be installed in a line topography, i.e. each module must be connected to the preceding and following one through a direct cable.

But with AS-i any number of stubs off the primary trunk are possible. This results in significant savings, especially in systems containing offset modules, but true advantage for the user even when this is not the case: Because thanks to AS-i the network of actuators and sensors is significantly more transparent and better organized, which also represents benefits when troubleshooting a system.



Bihl+Wiedemann news at HMI



CIP Safety Gateway over EtherNet/IP or sercos

■ Available soon ■ CIP Safety for 2 AS-i networks: ✓ Indicate AS-i Safety input slave over CIP Safety ✓ Switch AS-i Safety output slave over CIP Safety ■ 2 AS-i 3.0 Master (including

expanded diagnostic functions such as recognition of duplicate AS-i addresses, integrated AS-i Earth Fault Detector and AS-i Noise Detector) ■ Version "1 Gateway, 1 Power Supply for 2 AS-i networks" ■ With Ethernet diagnostic interface ■ Switch 6 safe outputs SIL3/Cat4 on-board in the device using CIP Safety ■ Support of safe outputs in both AS-i networks ■ Chip Card for storing configuration data ■ AS-i 3.0 EtherNet/IP+Modbus TCP Gateway with integrated Safety Monitor, CIP Safety over EtherNet/IP (BWU2742) ■ AS-i 3.0 sercos Gateway with integrated Safety Monitor, CIP Safety over sercos (BWU2758)



New digital Input Modules in IP20

■ Enhance the line of Digital Modules AS-i in IP20 ■ 22.5 mm wide housing ■ Inputs powered out of AUX ■ AS-i 4I Modules, IP20 (BWU2723): ✓ 4 digital inputs ✓ 1 AB Slave ■ AS-i 8I Modules, IP20 (BWU2721): ✓ 8 digital inputs ✓ 2 AB Slaves



AS-i 3.0 EtherCAT Gateway, 2 Master, with Ethernet diagnostic interface, Version "1 Gateway, 1 Power Supply for 2 AS-i networks" (BWU2720)

■ In addition to Gateways for PROFIBUS, PROFINET and EtherNet/IP+Modbus TCP now also the AS-i 3.0 EtherCAT Gateways with Ethernet diagnostic interface are available ■ Advantages of Ethernet diagnostic interface: ✓ Access to all available diagnostic functions of the AS-i 3.0 EtherCAT Gateways through full integration of AS-i Control Tools and Web Server in the network ✓ Physical distance between device and user not a factor for diagnostic ■ Expanded diagnostic functions including recognition of duplicate AS-i addresses as well as AS-i Noise Detector and AS-i Fault Detector ■ Version "1 Gateway, 1 Power Supply for 2 AS-i networks"



AS-i Safety Input Module, IP20, for floating contacts (BWU2724)

■ Expands the portfolio of AS-i Safety In-

put Modules for optoelectronic protective devices, safety mats or floating contacts in IP20 ■ 22.5 mm wide housing ■ Provides 2 / 1 safe inputs for floating contacts ■ Ideal for decentralized control cabinet mounting: ✓ Safe inputs and conventional semiconductor outputs (for controlling up to 2 indicator lights), powered out of AS-i ✓ No auxiliary power needed ■ Ideal addition to the AS-i Safety Monitors and AS-i 3.0 Gateways with integrated Safety Monitor ■ Supports applications up to SIL3/Cat4/PLe

BWU2619 BWU2547



New digital 4I/4O and 8I/8O Modules in IP67

■ Enhance the portfolio of Digital Modules AS-i in IP67, M12 ■ Mixed in- and output slave ■ AS-i 4I/4O Modules, IP67, M12 (BWU2547): ✓ 4 digital inputs and 4 short circuit and overload protected outputs ✓ 1 AB Slave ✓ In housing with four M12 female connectors ■ AS-i 8I/8O Modules, IP67, M12 (BWU2619): ✓ 8 digital inputs und 8 short circuit and overload protected outputs ✓ M12 Y wiring ✓ 2 AB Slaves ✓ In housing with eight M12 female connectors

BWU2770 BWU2725



New digital Input Modules in IP67

■ Expand the portfolio of Digital Modules AS-i in IP67, M12 ■ Inputs powered out of AUX: provide a sensor supply of up to 1 A ■ AS-i 4I Modules, IP67, M12 (BWU2725): ✓ 4 digital inputs ✓ M12 Single wiring ✓ 1 AB Slave ✓ In housing with four M12 female connectors ■ AS-i 8I Modules, IP67, M12 (BWU2770): ✓ 8 digital inputs ✓ M12 Y wiring ✓ 2 AB Slaves ✓ In housing with eight M12 female connectors

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Potentials for savings in safety technology

Safety Basic Monitor
with switchable AS-i
Master - the new cost
brake for 3 safe
signals or more

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SafeLink over Ethernet



- SafeLink over Ethernet: The simplest way of coupling many safe signals
- Optimal PLC connection via fieldbus, all diagnostic data in the controller, safety and standard signals mixed
- Universally expandable with Safety I/O Modules + Standard I/O Modules in IP20 or IP67, Speed Monitors for up to 40 axis, Safety Relay Output Modules



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