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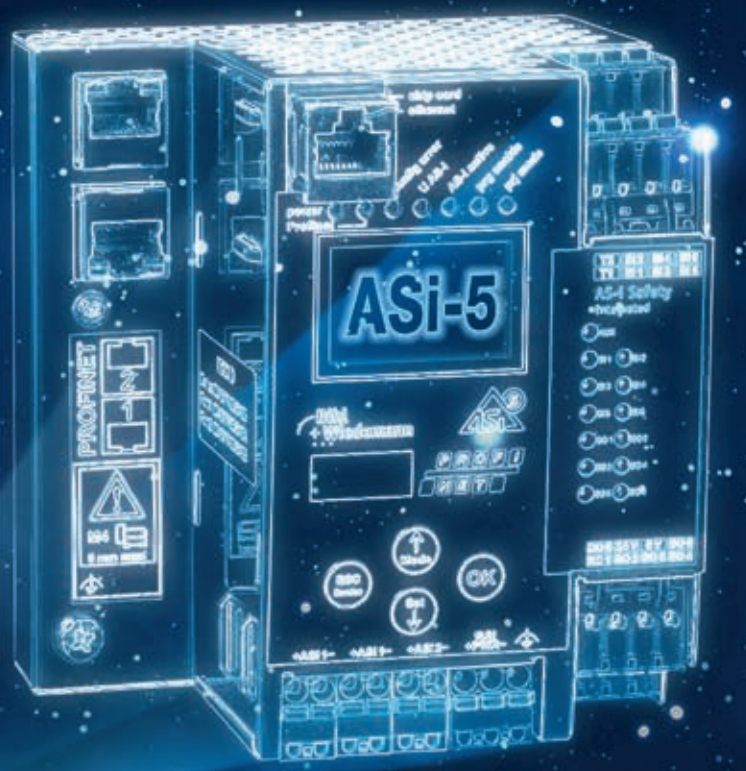
AS-INTERFACE MASTER NEWS

THE BIHL+WIEDEMANN MAGAZINE



INTERVIEW

“The digital evolution”

FIRST ASi-5 PRODUCTS

READY FOR TAKE-OFF

SPECIAL EDITION

ENTERING NEW DIMENSIONS WITH ASi-5

ASi 5

Bihl + Wiedemann

THE AS-INTERFACE MASTERS

ENTERING NEW DIMENSIONS WITH ASi-5

For more than 20 years AS-Interface has been setting ever newer standards in the efficient networking of sensors and actuators through permanent optimization. With the introduction of ASi-5 this global leading system at the automation base now sets the course to the next dimension of digitalization. In fact, significantly involved in this future-oriented development has been the same company that also introduced the first certified ASi master back in 1994: Bihl+Wiedemann.

Hollywood legend Billy Wilder is known as the originator of some good witticisms, one of which applies perfectly to the dramaturgy of the success story of AS-Interface: “You have truly written the script to absolute perfection“, the multiple Oscar winner is said to have remarked to one of his authors. He then left the author stunning by adding the following sentence: “And now we will make it better“.

In a figurative sense this is exactly what has happened several times during the 20-year history of AS-Interface. ASi has always remained true to itself – while at the same time becoming ever more powerful. Otherwise, the breathtaking triumph of the system would have been hardly imaginable. In the meantime, there are 37 million standard devices and 8 million safety devices in use, with more than 2000 certified products for all kinds of applications – mainly in factory automation, material handling and building automation.

The typical yellow cable is and will always be a symbol of efficiency

When the system came on the market in the mid-1990’s, there was at first of course little to nothing that one could have done to improve it. Up to that point actuators and sensors had to be wired cumbersomely in parallel – and suddenly there was a bus available that transported both data and power on one single cable, that offered absolute freedom of topology, and that could be easily integrated into higher level fieldbuses. Moreover, the system offered cost-effectiveness, simple installation and operation as well as flexible possibilities for expansion. The typical yellow cable quickly became a symbol of efficiency, and AS-Interface quickly became de facto standard around the world on the lowest level of automation.

In safety technology as well AS-Interface represented a true quantum leap: With ASi Safety at Work it has been possible since around the turn of the millennium to transmit both safe and non-safe signals on one and the same cable. Now the last bastion of anachronistic parallel wiring was finally being displaced. The trade magazine IEE celebrated the clearing of cost-intensive cable forests as a “clear cutting in safety technology.”

While AS-Interface was conquering production plants on every continent in fast-motion, the simplest bus system in the world was at the same time being continually optimized. By the mid-2000’s the International Association of ASi manufacturers took one of the greatest technological steps with their innovation step 3.0, which among other things enabled improved slave profiles. But even independent of new specifications development proceeded at a rapid pace: Now the user had for instance ever more diagnostic capabilities and ever more intelligent networking options. And the range of gateways with which two complete ASi networks can be incorporated into the higher level fieldbus - as easily as a completely normal slave - became ever greater as well.

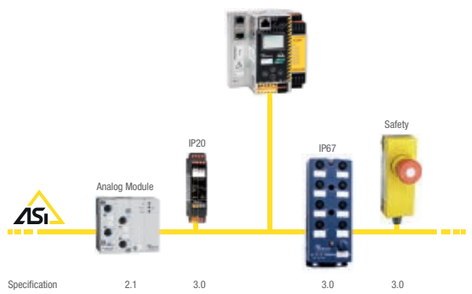
With a sustainable evolution leap into the digital future

Not least for these three aspects the name of that company which brought the first certified ASi master to the market at the beginning of the AS-Interface era gained fo-

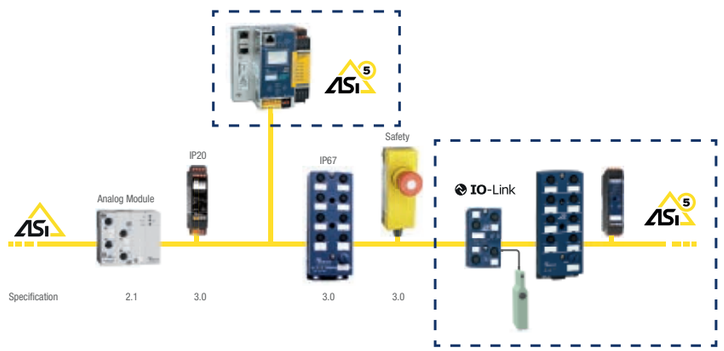
cus with regularity: Bihl+Wiedemann. Thus, it is no coincidence at all that the automation specialists from Mannheim are now also playing an essential role in the development of the technological strategy of the future from the very beginning. Together with many well-known manufacturers of AS-Interface and three leading research institutions Bihl+Wiedemann first became involved in a project which ended in the decision to further develop AS-Interface into ASi-5. The manufacturers of AS-Interface recognized that a sustained evolutionary leap would be called for to make the most widely used system for automation ready for the future. This insight already came at a time when modern Ethernet solutions were gaining ever more ground in automation technology, the call for more data through smart sensors got louder and – although the keyword hadn't yet been invented – developments related to the digitalized factory of tomorrow were picking up speed towards the vision of industry 4.0.

A glance at the first strategic cornerstones of the developing technological concept shows how much foresight the project group founded back then brought to their task. The fact that the digital transformation increasingly accelerated the pace over the succeeding years still changed nothing in the basic considerations of those ASi-5 pioneers. Beyond dispute from the very outset was for example the requirement that the unique character of AS-Interface had to remain intact even with the next step of innovation: its simplicity, ruggedness and its economy just as much as the superior electromechanics, the freedom of topology and the interoperability. And of course the backward compatibility within the system: it had to be ensured, in other words, that the current and new ASi components would work together on one and the same cable and in one and the same network.

Before ASi-5



With ASi-5



Intensive development work for absolute security of investment

Consensus was also quickly found in defining the levers that needed pulling in order to optimally prepare AS-Interface for the digital future. In addition to improving the capabilities of integrating IO-Link sensors, increasing the data bandwidth and maximum number of slaves as well as shortening the cycle times became the focus. Furthermore, the new ASi masters should be able to poll their slaves simultaneously and not one after the other.

Once the involved companies under the technical leadership of Bernhard Wiedemann, Managing Director of the AS-Interface Masters from Mannheim, had invested several years of intensive development work in the next generation of the market-leading system at the automation base, the first operable test setup was presented at the members assembly of the AS-International association in December 2016. External publication finally followed at the fair SPS IPC Drives 2018 in Nuremberg – under the motto "ASi-5 – The Shuttle to Digitalization". This is perhaps the most important message that AS-Interface sends to its users with this premiere: regardless of what demands will be placed on the smart factory of tomorrow – thanks to ASi-5, AS-Interface with its increased performance, more intelligent communication and increased flexibility will in any case remain the perfect shuttle bus from the actuator and sensor level to all higher level interfaces, providing absolute security of investment into the age of the digital conversion.

First ASi-5 Products

READY FOR TAKE-OFF

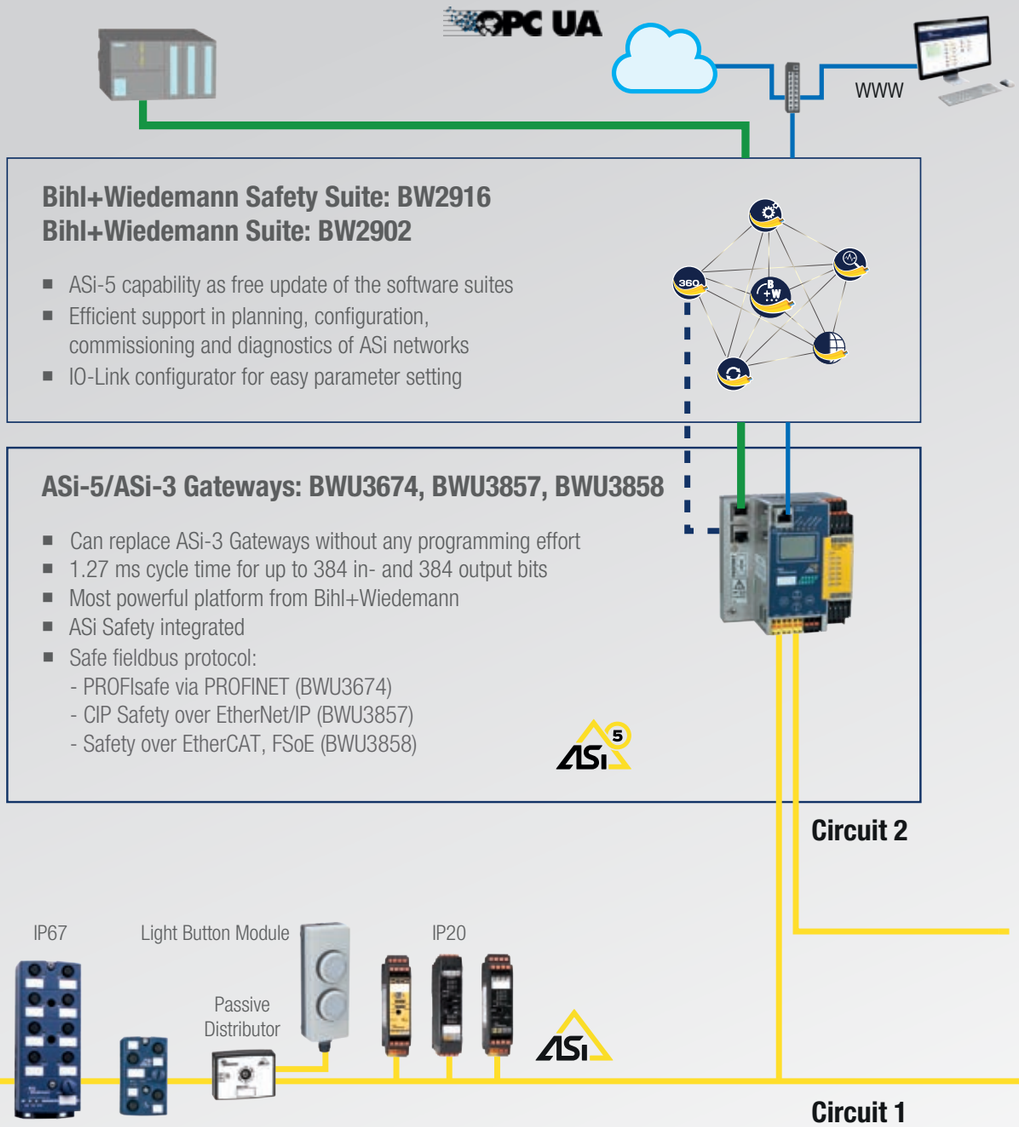
The artificial fog had just lifted from the great ASi-5 premiere at SPS IPC Drives, when Bihl+Wiedemann pulled the first examples of the most modern AS-Interface generation out of their sleeve. With three combined ASi-5/ASi-3 Gateways, three digital I/O modules, one counter module and one ASi-5 Slave / IO-Link Master – respectively in IP67 and IP20 – and a free update of the Bihl+Wiedemann software suites, users were immediately shown the path to the future of efficiency.

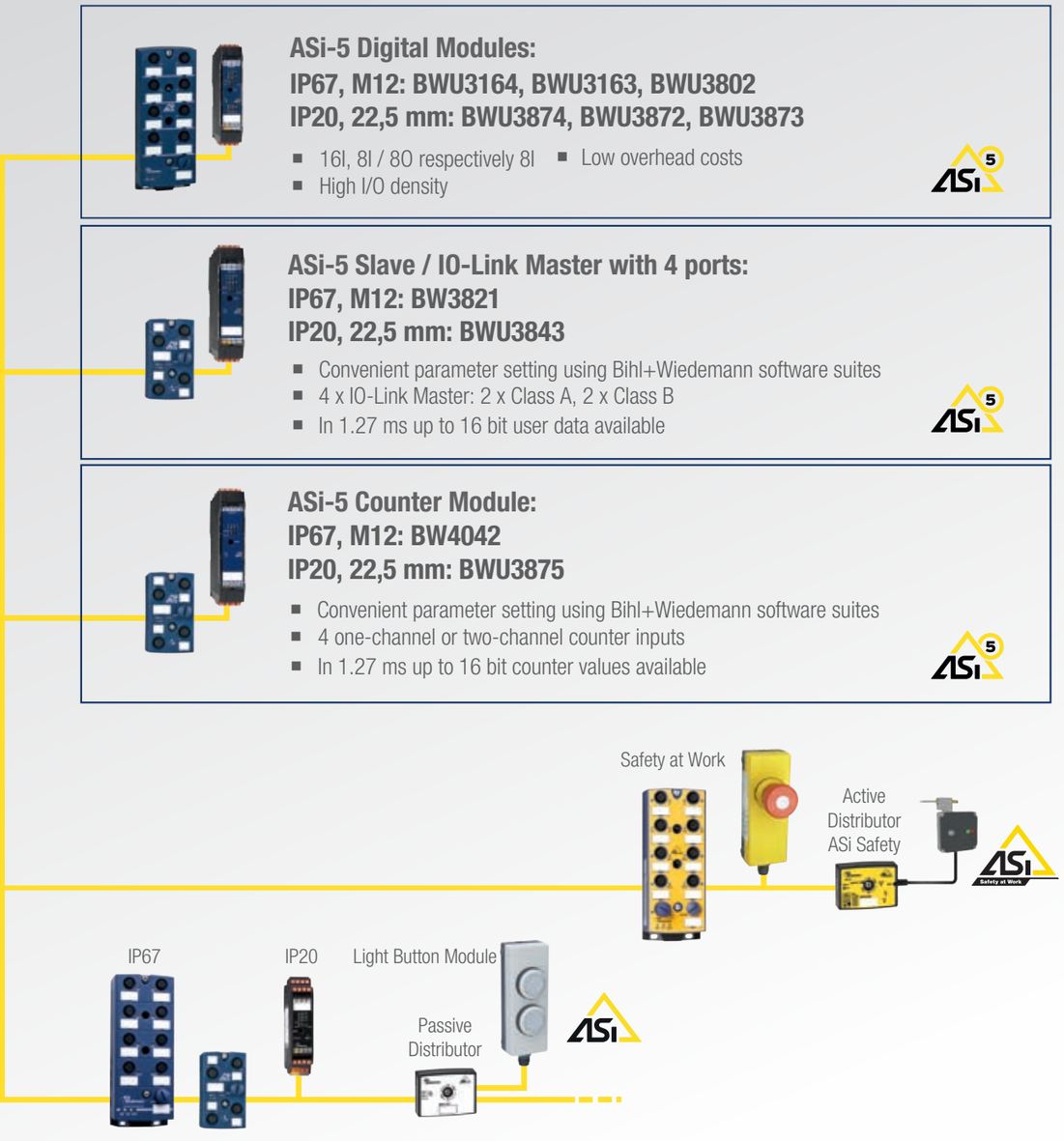
Of course at this point one could set off fireworks in the form of impressive numbers: fourfold shorter cycle time of 1.27 milliseconds with up to 384 input and 384 output bits or a quadrupling of the data bandwidth up to 16 bits to 32 bytes per slave.

"That would be entirely correct on one hand, since it is evident that ASi-5 has prepared AS-Interface for all the demands of digitalization," notes Bernhard Wiedemann, Managing Director of Bihl+Wiedemann. "But it could also lead to a misunderstanding, namely that ASi-5 can only be used by itself and not in mixed operation with ASi-3 on the same network. Yet it is just this backward compatibility that was written in bold and underscored in the target specifications during development."

As the technical head of a cross-manufacturer and scientifically supported team and critically involved in the development of ASi-5 (see also page 2: "Entering new dimensions with ASi-5"), no one knows better than Bernhard Wiedemann that the greater data bandwidth at a shorter cycle time makes AS-Interface the perfect team player for digitalizing the automation world. But as a man of practice he also knows: especially now at the beginning of the ASi-5 age users will need increased performance mainly only in particular areas of their system. In all other areas, thanks to backward compatibility they can continue using their existing ASi-3 components. And so the ideal prerequisites for an especially cost-efficient entry into the digitalized future are assured.

Bihl+Wiedemann is already offering the first all-rounders in their portfolio: the three new ASi-5/ASi-3 Gateways for PROFINET, for EtherNet/IP and for EtherCAT each have two ASi-5/ASi-3 Master and are therefore able to communicate as an ASi-5 and ASi-3 Master





simultaneously in two ASi networks. The onboard webserver also enables simple diagnostics, whereas the integrated OPC UA server allows a simple incorporation into industry 4.0 applications.

The three new standard modules with 16 inputs, with 8 in- and outputs each or with 8 inputs, each in IP67 and IP20, which Bihl+Wiedemann is also offering already in this dawning of the ASi-5 age, are true economic miracles. These not only allow signals to be collected cost-effectively in the field. In some cases they even make an expensive PROFINET controller unnecessary and thereby significantly reduce overhead costs.

Also new in the portfolio are the ASi-5 counter modules in IP67 and IP20. It is possible to configure the modules that way that the status of the up to four one-channel or two-channel counters will be updated in the controller every 1.27 ms.

The technologically most advanced of all the developments that Bihl+Wiedemann is introducing for the ASi-5 era is the new ASi-5 Slave / IO-Link Master with 2 Class A and 2 Class B ports. But the possibility of even more efficient incorporation of intelligent sensors in AS-Interface was worth the effort in the view of Bernhard Wiedemann: "This aspect played an important role already at the early conception stage of ASi-5, because intelligent sensors will be playing an increasingly important role as digitalization continues and their data can be perfectly bundled and prepared for passing to the host controller."

The perfect match for this dream team of AS-Interface and IO-Link are ASIMON360 and the new ASi Control Tools360, that are already known as all carefree software package which among other things enable live configuration of intelligent sensors. One critical advantage of the live option: the user learns directly which specific effects the updated settings have and can further optimize the configuration immediately if necessary.

After a free update, the Bihl+Wiedemann software suites can also be used to configure all ASi-5 applications – just as intuitively and conveniently as has been the case with ASi-3 networks. Included in the highlights of the current software versions are for example the integrated hardware configuration, whereby the user simply selects the devices used from a list, and the online bus information, which allows one to easily address the slaves and then monitor the in- and outputs live.

Interview with Dr. Marcel Hilsamer, Product Manager at Bihl+Wiedemann

“The digital evolution”

Dr. Marcel Hilsamer is Product Manager at Bihl+Wiedemann

Much has been written in the preceding pages of the magazine about the exciting development history and the enormous growth in performance of ASi-5. But how exactly can AS-Interface users profit from this technological quantum leap? Dr. Marcel Hilsamer, Product Manager at Bihl+Wiedemann, has concrete answers even to highly practical questions in a discussion with ASi MASTER NEWS.

ASi MASTER NEWS: Dr. Hilsamer, we would like to begin with a nit-picking question: According to Adam Riese ASi-3 should have been followed by ASi-4. Why is the newest innovation step in AS-Interface called ASi-5?

Dr. Marcel Hilsamer: There are essentially two reasons for this. First, we wanted to emphasize the extent of this development step. Secondly, we also wanted to avoid the impression that this innovation has been designed only for the visionary overall concept of industry 4.0, which is an important driver for ASi-5 but not the only one. Overall, the concept behind ASi-5 was to make it as simple as possible for AS-Interface users to benefit from digitalization – and not have to wait for the so-called smart factory of tomorrow, but rather enjoy the benefits right now while on the path to the future.

ASi MASTER NEWS: What does that mean specifically?

Dr. Marcel Hilsamer: The already long familiar trend towards the integration of intelligent sensors and the emerging solutions based on the industry 4.0 model are placing increasing demands in machines as far as speed and the amount of data is concerned. Thanks to ASi-5, AS-Interface is now ideally prepared for this challenging future while continuing to offer the user absolute security of investment. And even in the many applications where the highest performance is not necessarily required, ASi-5 can generate significant added value – for example from expanded precise diagnostics down to the individual sensor or actuator or from the cost-effective realization of high I/O density in the field. With our new ASi-5 Digital Module BWU3164 it is now possible to simply and efficiently collect data from up to 16 sensors exactly where they arise using just one ASi slave.

ASi MASTER NEWS: So ASi-5 is accompanying the user at his own pace as he shapes his digitalized world?

Dr. Marcel Hilsamer: Exactly. “The digital evolution” might be the right header. Anyone who is already using AS-Interface in his machines as a wiring system can look without concern into the future. He can use new ASi-5 slaves in system parts with heightened requirements while otherwise continuing to use his existing ASi-3 slaves. This is where AS-Interface shows its greatest strength as an overall system especially in mixed networks consisting of ASi-3 and ASi-5. This capability is exemplified by aspects such as the simplest wiring scheme with just one cable for both power and data, the ability to connect slaves to any desired location of the yellow profile cable, and the high flexibility due to the use of application-specific slaves.

ASi MASTER NEWS: What are the prerequisites that have to be met for using ASi-3 and ASi-5 in the same network?

Dr. Marcel Hilsamer: For existing systems only an ASi-5/ASi-3 Gateway needs be used. Otherwise there are no restrictions. ASi-5 devices can always and without major preparation be used together with ASi-3 devices in an existing or new ASi network. When needed you may also replace individual ASi-3 slaves with an ASi-5 equivalent.

ASi MASTER NEWS: Is any special software needed for planning, configuration and parameter setting of ASi-5 networks?

Dr. Marcel Hilsamer: No, the software is basically the same as the one for ASi-3. In order to use it for ASi-5 a simple, free update is all that is necessary. We have already implemented the majority of the modifications to meet the demands of the new innovation level in the most recent software updates for ASIMON360 and the ASi Control Tools360. This applies by the way as well to a whole series of additional product improvements over the past years which have already been adapted for ASi-5 as well.

ASi MASTER NEWS: In what applications is it worthwhile to switch to ASi-5 right now?

Dr. Marcel Hilsamer: From our perspective that would be, above all, applications characterized by high transmission speeds or elevated data quantities – for example at locations where much I/O data needs to be collected in a tight space. ASi-5 also makes incorporating intelligent sensors - such as IO-Link sensors - much easier. And the new, high-performance standard modules with up to 16 inputs can replace one or another expensive fieldbus solution in the field.

ASi MASTER NEWS: We have already mentioned the backward compatibility of the system. But is manufacturer-neutral interoperability still a characteristic of ASi-5?

Dr. Marcel Hilsamer: Of course. As before AS-Interface in its ASi-5 expression remains a standard which guarantees compatibility between components of any manufacturer, not just the development partner. Any product with the ASi logo can work together with all the others in a common network and communicate seamlessly. Thus, for each problem there continues to be an ASi solution.

ASi MASTER NEWS: AS-Interface is also well known for its safety applications. Do the ASi safety concepts have to be revised with the introduction of the new innovation step?

Dr. Marcel Hilsamer: ASi Safety is already integrated in the new ASi-5/ASi-3 Gateways from Bihl+Wiedemann. This means there is definitely no need for changes of any kind to existing safety concepts, rather one can continue to use all the existing components while parallelly connecting ASi-5 standard slaves.

ASi MASTER NEWS: In addition to the three combined ASi-5/ASi-3 Gateways Bihl+Wiedemann introduces with three digital I/O modules, one counter module and one ASi-5 Slave / IO-Link Master – respectively in IP67 and IP20 – a whole series of new products directly following the premiere of ASi-5. To finish, could you give us a quick look at your development pipeline?

Dr. Marcel Hilsamer: Gladly. At the very top of our agenda are on the one hand additional modules with high data capacity. On the other hand our development department is of course also working on additional ASi-5/ASi-3 Gateway versions for incorporating into other fieldbuses.

ASi MASTER NEWS: Dr. Hilsamer, thank you for the discussion.

ASi-5 HIGHLIGHTS

ASi-5/ASi-3 Gateways:

✓ Can replace ASi-3 Gateways without any programming effort
✓ Most powerful platform from Bihl+Wiedemann
✓ ASi Safety integrated
✓ Safe fieldbus protocol

ASi-5/ASi-3 PROFIsafe via PROFINET Gateway with integrated Safety Monitor (BWU3674)

- ASi-5 Master and ASi-3 Master in one device
- 1 Gateway, 1 Power Supply for 2 ASi networks
- Simultaneous communication of ASi-5 and ASi-3 in 2 ASi networks
- Integrated webserver for simple diagnostics / remote maintenance
- OPC UA Server as interface for OPC UA communication
- 3 two-channel safe inputs built-in, expandable by up to 62 two-channel safe inputs
- Chip Card for storing configuration data
- 6 fast electronic safe outputs
- Applications up to SIL3, PLe

- PROFIsafe, Safe Link and ASi Safety in one device

ASi-5/ASi-3 CIP Safety over EtherNet/IP+Modbus TCP Gateway with integrated Safety Monitor (BWU3857)

- CIP Safety, Safe Link and ASi Safety in one device

ASi-5/ASi-3 EtherCAT Gateway, Safety over EtherCAT (FSoE), with integrated Safety Monitor (BWU3858)

- Safety over EtherCAT, Safe Link and ASi Safety in one device

ASi-5 Slave / IO-Link Master:

✓ Comfortable parameter setting of the connected IO-Link sensors using Bihl+Wiedemann software suites
✓ Protection rating IP67 respectively IP20

ASi-5 Slave / IO-Link Master with 4 Ports:
IP67, M12 (BW3821)
IP20, 22,5 mm (BWU3843)

- 4 x IO-Link Master
- 2 x IO-Link Port Class A and 2 x IO-Link Port Class B in one housing
- Input voltage provided from ASi
- Output voltage provided from ASi, additional external voltage supply from AUX (24 V auxiliary power)
- Convenient parameter setting using Bihl+Wiedemann software suites
- In 1.27 ms up to 16 bit user data available

ASi-5 Digital Modules:

✓ High I/O density
✓ Low overhead costs
✓ 1 ASi-5 slave
✓ Protection rating IP67 respectively IP20

ASi-5 Digital Module:
16I, IP67, M12 (BWU3164)
16I, IP20, 22,5 mm (BWU3874)

- Data from up to 16 sensors can be transmitted with just one ASi slave
- 16 digital inputs
- Input voltage provided from ASi (BWU3164) respectively AUX (BWU3874)

ASi-5 Digital Module:
8I/8O, IP67, M12 (BWU3163)
8I/8O, IP20, 22,5 mm (BWU3872)

- Data from up to 8 sensors and 8 actuators can be transmitted with just one ASi slave
- 8 digital inputs
- 8 electronic outputs
- Input voltage provided from ASi (BWU3163) respectively AUX (BWU3872)
- Output voltage provided from AUX (24 V auxiliary power)

ASi-5 Digital Module:
8I, IP67, M12 (BWU3802)
8I, IP20, 22,5 mm (BWU3873)

- Data from up to 8 sensors can be transmitted with just one ASi slave
- 8 digital inputs
- Input voltage provided from ASi (BWU3802) respectively AUX (BWU3873)

ASi-5 Counter Modules:

✓ 1 ASi-5 slave
✓ Protection rating IP67 respectively IP20

IP67, M12 (BW4042)
IP20, 22,5 mm (BWU3875)

- 4 two-channel inputs respectively 4 one-channel inputs
- Input voltage provided from ASi
- Convenient parameter setting using Bihl+Wiedemann software suites
- In 1.27 ms up to 16 bit counter values available

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ASi-5

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