



Bonded in Trust  
– With Resistance Welding

*Sinius*

Weld Processors

HARMS | WENDE | HWH

## Weld Processors SiniusHWI and SiniusAC



## Application Examples (see pages 11-16)



## COMPANY PROFILE

Harms+Wende is your specialist in resistance welding and joining technologies. With headquarters in Hamburg, we develop and produce products and systems for customers around the world: of the highest quality – for the highest quality.

For more than six decades we have been developing solutions for the ever-evolving requirements in resistance welding technology and quality assurance. With the dependability that comes with many years of tradition, and the flair of successful innovation, we offer both the exceptional as well as the proven. And since we know from experience that genuine success comes through concerted effort, treating our customers like partners is a very high priority for us.

Only through joint applied action can successful systems be developed and made ready for production. The focus on controls, systems and inverters with quality assurance features to regulate and monitor the welding process is a reflection of our experience.



### CONTENTS

03	<b>COMPANY PROFILE</b>
04+05	<b>BASIS FUNCTIONS</b>
06+07	<b>BASIC PRINCIPLE &amp; OPTIONS</b>
08+09	<b>NETWORKING &amp; CASCADING</b>
09	<b>MEASURING SYSTEM</b>
10	<b>WELDING SEQUENCE &amp; TIMING</b>
11-16	<b>SYSTEM EXAMPLES</b>
17+18	<b>PRODUCT OVERVIEW</b>

## BASIS FUNCTIONS

Technical components which are used for production or working processes in an industrial company must adapt to the individual conditions – and not vice versa. At least, that is how the decision-makers and developers at Harms+Wende see it. For more than 60 years, individuality according to customer needs plays just as an important role for the traditional company from Hamburg as does constantly striving

to achieve premium products in the segment of joining technology.

Based on this principle, with *Sinius*, Harms+Wende has developed a new series of weld processors which meet the practical requirements of the field through comprehensive and powerful basis functionality.

**HARMS+WENDE** HWH

Deutschlands  
Kundenchampions  
2008 impulse

**PERFORMING WELDING APPLICATIONS** With *Sinius* weld processors you can perform all applications in the area of resistance welding: spot welding, mesh welding, seam welding and much more.

Read more about this in the section “Basic Principle & Options”.



**THYRISTOR UNITS (SCR) SELECTABLE** Different thyristor units (SCR) are available for *Sinius* for each kind of welding task: for 10,000 hertz high frequency, 1,000 hertz medium frequency and 50/60 hertz mains frequency.

Read more about this in the section “Basic Principle & Options”.



**NETWORKING SINIUS WELD PROCESSORS** Each *Sinius* weld processor can be connected to the PLC through an external interface. For this *Sinius* supports Profibus, EtherCAT, CANopen and other field bus systems.

Read more about this in the section “Networking & Cascading”.



**CASCADING SINIUS WELD PROCESSORS** A CAN-Bus interface is integrated in each *Sinius* weld processor through which up to 16 *Sinius* can be easily networked internally together through a simple plug-in connection.

Read more about this in the section “Networking & Cascading”.





**RECORDING MEASURED VALUES** *Sinius* weld processors optionally have an integrated measuring system with which you can record values relevant to the welding process such as current, voltage and force.

Read more about this in the section "Measuring System".



**CONTROL OF THE PROPORTIONAL VALVE** If desired, *Sinius* can also control a proportional valve synchronous to the welding sequence to regulate force on the welding guns.

Read more about this in the section "Measuring System".



**PARAMETERIZING WELDING SEQUENCES** Realize complex welding sequences just as easily as smaller welding tasks. *Sinius* offers eight weld schedules, each with ten time segments, which can be universally and flexibly parameterized.

Read more about this in the section "Welding Sequence & Timing".



**REGULATING THE CONSTANT CURRENT** Specify individually when the constant current regulation is to be activated or deactivated – even during the active welding sequence.

Read more about this in the section "Welding Sequence & Timing".



**SPECIFYING THE SET VALUE OF CURRENT** With *Sinius* you can specify the set value of current in analogue form during the entire welding sequence – or only during a certain period of time.

Read more about this in the section "Welding Sequence & Timing".



**TRIGGERING WELDING PROCESSES EXTERNALLY** Realize special welding tasks like welding with very low cycle times with an external welding start signal through a digital input of the *Sinius*.

Read more about this under "System Example 3".



## Weld Processor SinusHWI



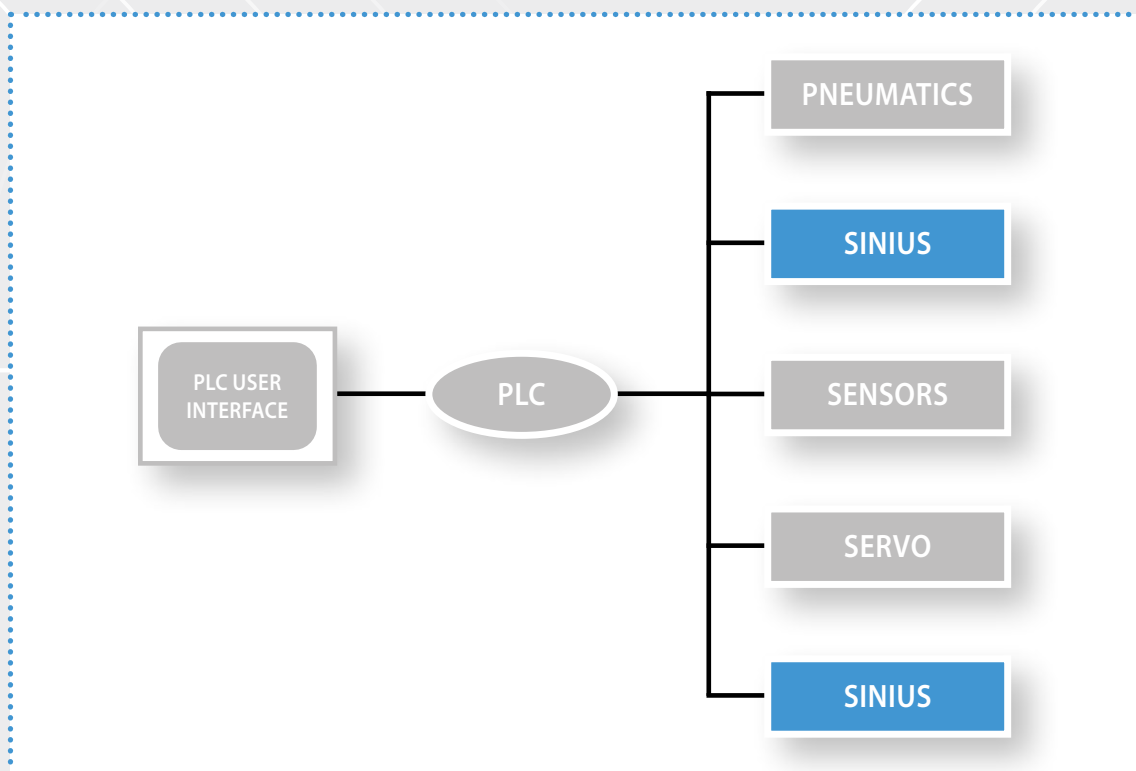
### BASIC PRINCIPLE & OPTIONS

The field bus oriented weld processors of the *Sinius* product line are extremely reliable, have customizable application capabilities and adapt ideally to an existing welding system. Because it concentrates on the core area of welding, *Sinius* is an investment that is just as powerful as it is economical.

With the new *Sinius* weld processors from Harms+Wende you can create a resistance (welding) process system of your own, tailored to your individual needs. For this you can use the PLC that you

already have, which your staff are already familiar with, in order to visualize and control the welding process sequences in production.

This not only provides you with advantages related to the control and programming of welding tasks, but also copy protection of your know-how. You need not concern yourself with the expense of training for a completely new system because your team can continue to work unrestrictedly in the familiar environment. Moreover: Because the entire functionality of



**FIGURE** Programmable Logic Controller (PLC) with various components and *Sinius* weld processors.



## Weld Processor SinusAC

your welding sequence is still stored on your PLC, all of your valuable knowledge stays in your company.

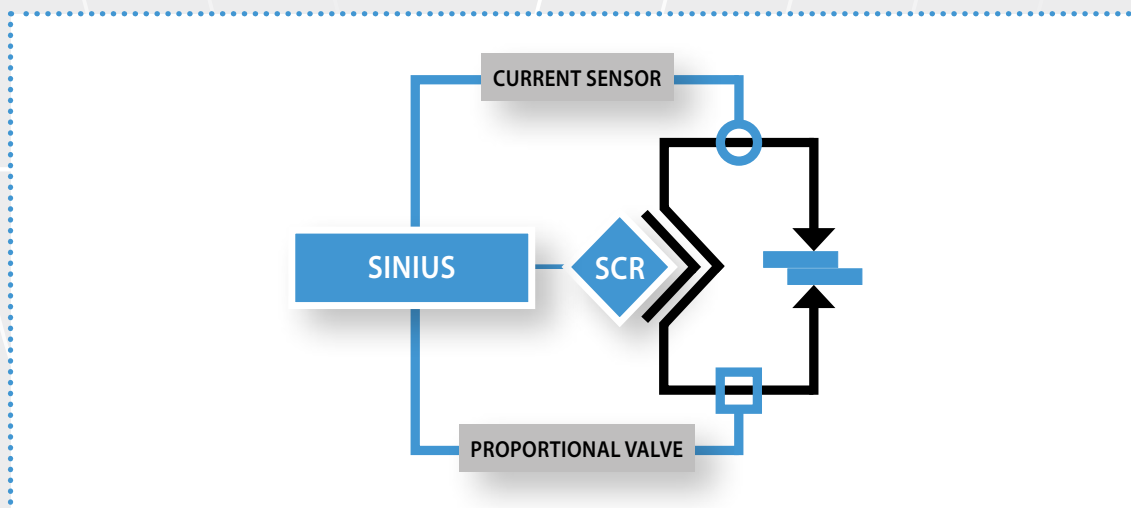
As new interface between the PLC and the thyristor units (SCR), *Sinius* weld processors manage the precise and reliable execution of the selected welding process. The desired weld technology, whether 10,000 hertz high frequency, 1,000 hertz medium frequency or 50/60 hertz mains frequency, can be individually selected and subsequently replaced.

The *Sinius* weld processors from Harms+Wende are just as flexible in terms of multiple settings' capabilities as they are in terms of the selection of the welding method: Spot welding, projection welding, wire welding, flash butt welding, mesh welding and other

special welding methods are only a few of the possible applications in the area of resistance welding.

*Sinius* weld processors can be integrated easily into existing or planned control cabinets of welding systems. For this, Harms+Wende provides full service: in the form of switch cabinet construction according to specific customer requirements or according to the HWH standard.

But Harms+Wende is more than simply a system supplier. Regardless whether before, during or after the purchase of our weld processors, we are at your side with excellent service in addition to excellent products for the entire welding system.



**FIGURE** *Sinius* weld processor with current detector for constant current regulation as well as proportional valve for adjusting the force of the weld guns.

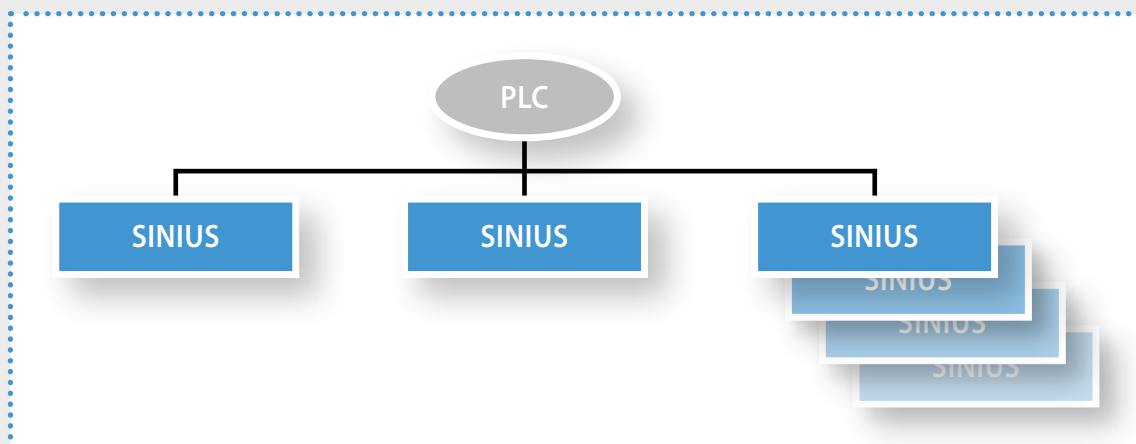
## NETWORKING & CASCADING

The weld processors of the *Sinius* series are both solo as well as team players. The specific requirements in the production facilities at your location determine whether you need to use one single or several *Sinius* weld processors. An important basic motivation behind the design, planning and the definition of the *Sinius*, from its initial conception on, was the smooth integration in the welding process sequences of the customers. In order to realize this aim in planning, construction and production, we simply involved our customers from the start.

Harms+Wende makes integration in the different machine systems possible through the unrestricted choice of data transmission: Exchange of data between *Sinius* weld processors, the PLC and the thyristor units (SCR) is flexible with *Sinius*. It's the customer's choice whether Profibus, CANopen or EtherCAT is to be used for communications.

Harms+Wende has designed two ways to connect multiple weld processors. On one hand, *Sinius* weld processors can be individually networked directly through the existing field bus system with the PLC. Here, each weld processor is directly connected to the field bus. For this variation, each *Sinius* requires an additionally integrated interface for the field bus communication.

The second way to connect multiple *Sinius* weld processors is by interconnecting them in a cascade: To cascade up to 16 weld processors Harms+Wende has placed special emphasis on user-friendly handling and convenient start-up: a standard feature of each *Sinius* is the *Sinius* CAN-Bus. This way, connecting the individual devices in a cascade can be accomplished in only two steps and with only one cable per weld processor.



**FIGURE** The figure shows the schematic structure of several *Sinius* weld processors with external networking and internal cascading.





And to round off the high level of customizability, both methods of networking can be combined. Naturally we will be pleased to advise you about which form of networking and which of the various

methods of data transmission are most appropriate for you and will develop, together with you, the optimal solution for your welding task.

#### Field bus systems supported by *Sinius*:

- > Profibus
- > EtherCAT
- > CANopen
- > other field bus systems on request

## MEASURING SYSTEM

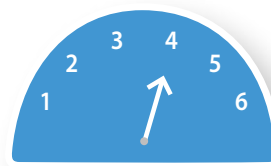
With the measuring system integrated in certain *Sinius* weld processors you can record all data relevant to the welding process – such as current and voltage (with inverter technology) of the currently active welding process. The measured current and effective values are passed through the field bus to the PLC and evaluated.

The *Sinius* measuring system makes it possible for the customer to realize his own monitoring and diagnosis functions. On one hand, the regulating function

based on the measurements of current during the welding process sequence ensures the required quality of the welding. On the other hand material waste can be reduced to a minimum through the direct response to deviations. Adjustment of force of the welding guns through the proportional valve makes manual regulation redundant and is especially useful for welding processes with frequently changing materials.



V



A



## WELDING SEQUENCE & TIMING

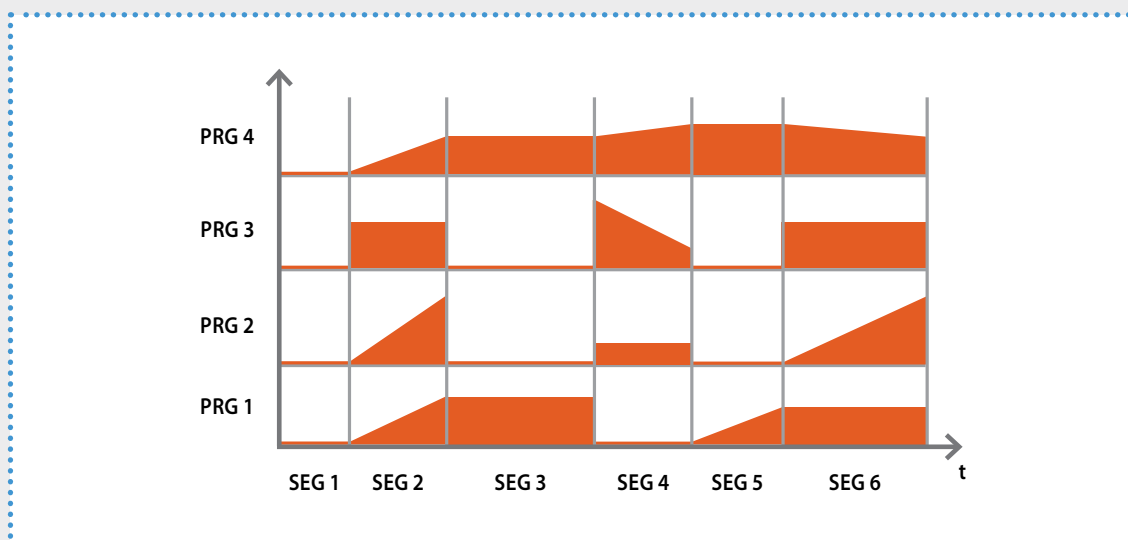
Various ways of presetting parameters are possible with the *Sinius* weld processors. This allows full flexibility and many variants for the user. To configure the welding process sequence the following parameters can be assigned to ten time segments:

- > Start current
- > Last current
- > Heat time
- > Proportional valve control
- > Further regulating functions such as mains voltage compensation and regulation of constant current

With these parameters, the following current profiles can be set in each time segment:

- > Upsloping current
- > Downsloping current
- > Constant current
- > No current

*Sinius* weld processors provide you with the ability to make changes to the set value of current during the welding sequence. Besides that, you can define the current profile before the sequence through the joining of time segments into a weld schedule. At the beginning of the welding sequence you simply select the weld schedule through the PLC and then start it. It is possible to store up to eight weld schedule presets. This ensures a precise welding sequence independent of the PLC cycle time. This high level of combination variety allows you easy realization of small as well as complex and quick welding sequences.

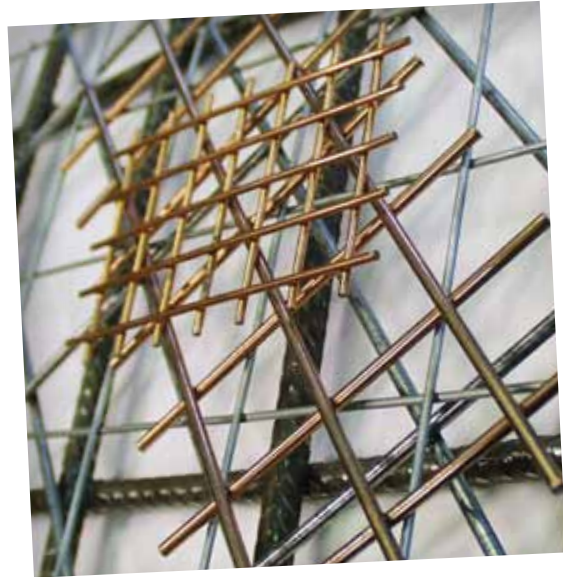


**FIGURE** Welding process sequence with the *Sinius* weld processor. The welding sequence consists of a chain of several weld schedules and different current profiles.

## SYSTEM EXAMPLE I

**THE TASK** The customer's planned mesh welding installation, which is to use an alternating current, is to be made operational with a suitable weld timer. For this welding task the customer does not want a regulated weld current but would like to continue to use the existing Profibus. It must be possible to individually parameterize the welding spots.

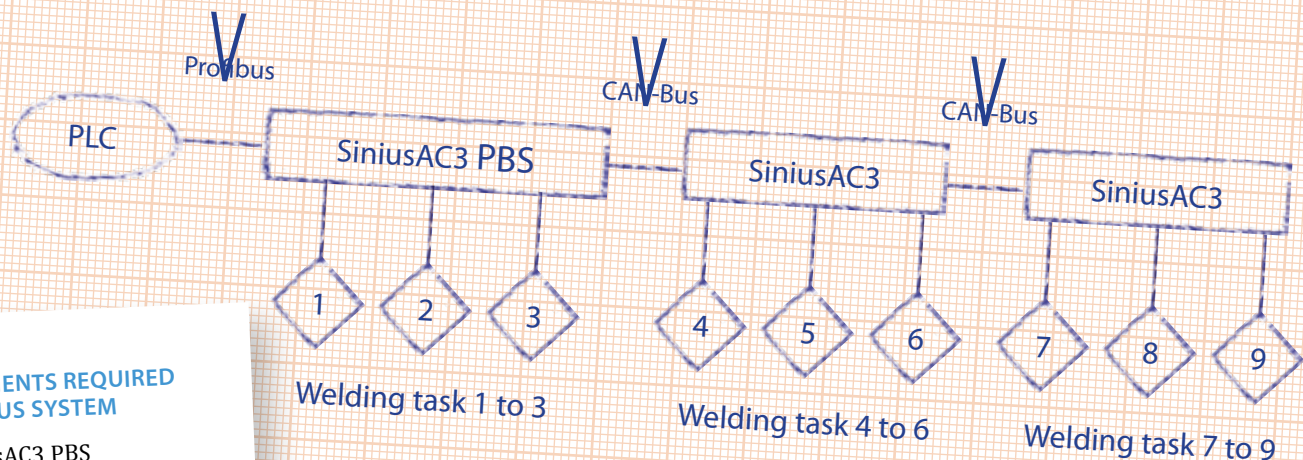
**THE SOLUTION** All three *Sinius* weld processors are cascaded internally through the standard integrated *Sinius* CAN-Bus. In order also to keep costs down, the external networking of the weld processor *SiniusAC3* PBS with the PLC is to be realized through the existing Profibus. Administration of the continuous cascade is managed by the *Sinius* weld processors.



### Mesh welding in continuous cascade operation

**FIGURE** The figure shows the general structure of a mesh welding system with nine weld stations. Three thyristor units (SCR) each are controlled by one *Sinius* weld processor. The parameterization of each weld circuit can be specified individually; starting is simultaneous. The three *SiniusAC3*s are controlled in a continuous cascade to minimize the process time.

## Sketch of Solution



### COMPONENTS REQUIRED FOR SINIUS SYSTEM

- 1 x SinusAC3 PBS
- 2 x SinusAC3
- 9 x thyristor unit (SCR)

## SYSTEM EXAMPLE II

**THE TASK** The customer's mesh welding system, conceived with inverter technology, is to be made operational with suitable current sources and weld processors. The customer would like constant current regulation for his welding task and has not specified any particular field bus to be used.

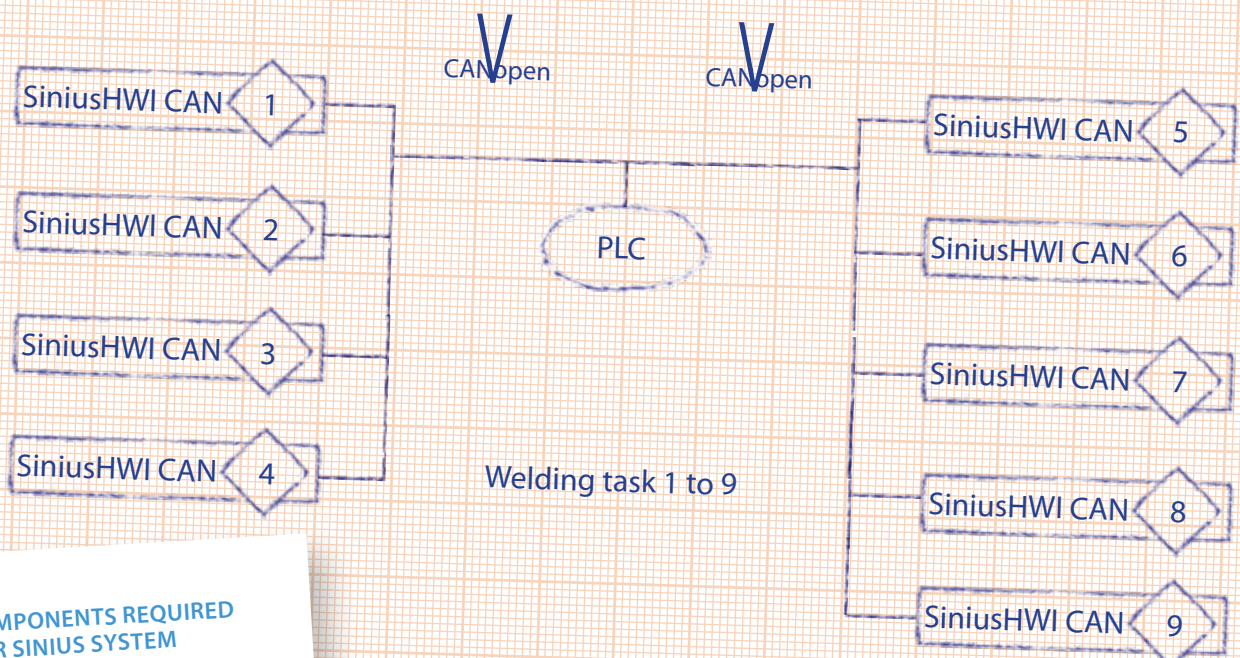
**THE SOLUTION** For this medium frequency application nine *SiniusHWI* CAN will be used. The switch cabinet, built completely by Harms+Wende, comprises the *Sinius* weld processors including protection and main circuit breaker of the required power class. Networking of the *SiniusHWI* weld processors with the integrated thyristor units (SCR) to the PLC is done directly through the CANopen bus.



### Medium frequency system regulated with nine weld stations

**FIGURE** The figure shows the general structure of a mesh welding system with nine weld stations. Nine *SiniusHWI* CAN are used. The *Sinius* weld processors with integrated inverters (thyristor units/SCR) are directly connected to the PLC; each inverter can be programmed individually.

## Sketch of Solution



### COMPONENTS REQUIRED FOR SINIUS SYSTEM

9 x SinusHWI CAN  
(integrated thyristor units/SCR)

### SYSTEM EXAMPLE III

**THE TASK** Quick welding of small parts with a cycle time of ten milliseconds. The customer has already a *SiniusHWI* medium frequency inverter. Data communication with the PLC is implemented through the Profibus field bus.

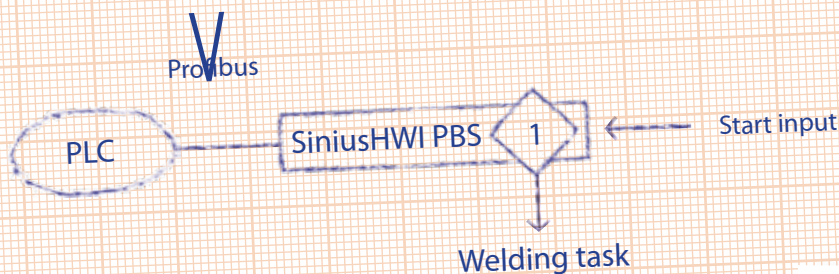
**THE SOLUTION** The cycle time of ten milliseconds cannot be realized through the PLC and the Profibus. In order to avoid this difficulty, the weld start input on the *SiniusHWI* weld processor will be used. Prior to weld, the welding parameters are loaded into the *Sinius*; the welding sequence begins with the start signal through the digital input.



Quick welding of small parts with welding start input

**FIGURE** The figure shows the general structure of a welding process sequence with one thyristor unit (SCR). The start of the welding sequence is done through the digital input of the *Sinius* weld processor. By this way it is possible to achieve cycle times of less than ten milliseconds.

### Sketch of Solution



**COMPONENTS REQUIRED FOR SINIUS SYSTEM**

- 1 x SinusHWI PBS (integrated thyristor unit/SCR)

## SYSTEM EXAMPLE IV

**THE TASK** In addition to realizing two different welding tasks in the area of small parts/non-ferrous metal – welding at mains frequency with constant current regulation as well as welding at medium frequency – the customer wants additional diagnosis functions. Field bus used by the customer: EtherCAT (ECT).

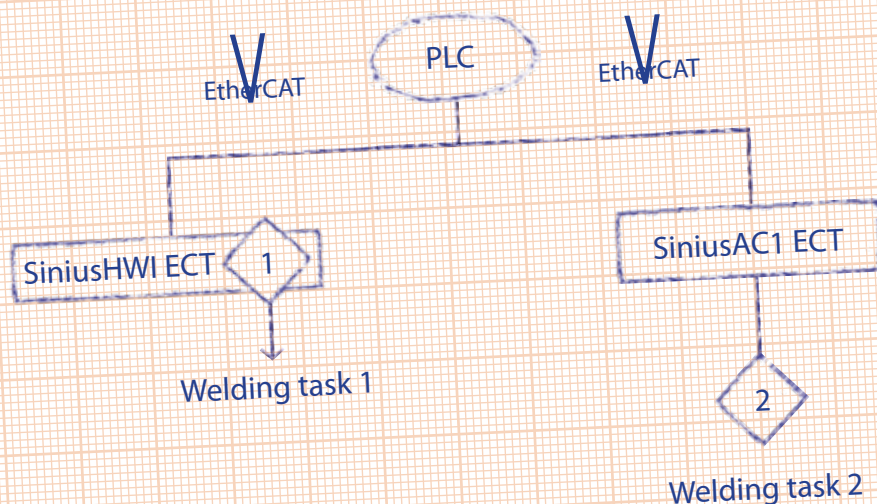
**THE SOLUTION** With the two weld processors, *SiniusHWI ECT* and *SiniusAC1 ECT*, all of the customer's requirements can be realized. With the *SiniusHWI ECT* the inverter thyristor unit (SCR) is integrated in the *Sinius* weld processor. For the *SiniusAC1 ECT* a thyristor unit (SCR) with dimensions appropriate for the welding application is required. Networking of both weld processors with the PLC is done through the existing EtherCAT field bus. After finishing one weld sequence the actual values are downloaded from the *Sinius* weld processor into the PLC and are displayed.



### Alternating and direct current system with diagnosis functions

**FIGURE** The figure shows the general structure of a welding process sequence with two different welding tasks. The weld processor *SiniusHWI ECT* welds at medium frequency and the *SiniusAC1 ECT* at mains frequency. Both *Sinius* weld processors record the actual current values on the welding circuits for the purpose of diagnosis and transfer them to the PLC.

## Sketch of Solution



### COMPONENTS REQUIRED FOR SINIUS SYSTEM

- 1 x SinusHWI ECT  
(integrated thyristor unit/SCR)
- 1 x SinusAC1 ECT
- 1 x thyristor unit (SCR)

## SYSTEM EXAMPLE V

**THE TASK** Seam welding with position-dependent and actual-value-dependent adjustment of current. The customer would like to use alternating current source as well as his existing EtherCAT field bus.

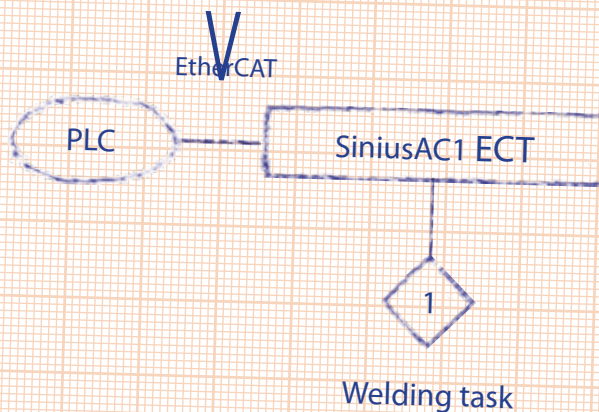
**THE SOLUTION** With *SiniusAC1* ECT the position-dependent adjustment of current can be achieved. The presetting of the set value of current is done synchronous to the PLC cycle time. The PLC varies the set value of current depending on the roll path. During the PLC cycle the PLC reads the actual current value from the *Sinius* weld processor and takes it into account when presetting the set value of current.



### Seam welding with position-dependent adjustment of the current

**FIGURE** The figure shows the general structure of a seam welding process. The weld processor *SiniusAC1* ECT constantly measures and regulates the weld current at the weld transformer.

## Sketch of Solution



### COMPONENTS REQUIRED FOR SINIUS SYSTEM

- 1 x *SiniusAC1* ECT
- 1 x thyristor unit (SCR)

## SYSTEM EXAMPLE VI

**THE TASK** The customer would like a weld timer that acts as solution for three independent welding tasks. The three weld spots are to be set consecutively and regulated with constant current regulation. The customer's existing PLC communicates through a Profibus (PBS).

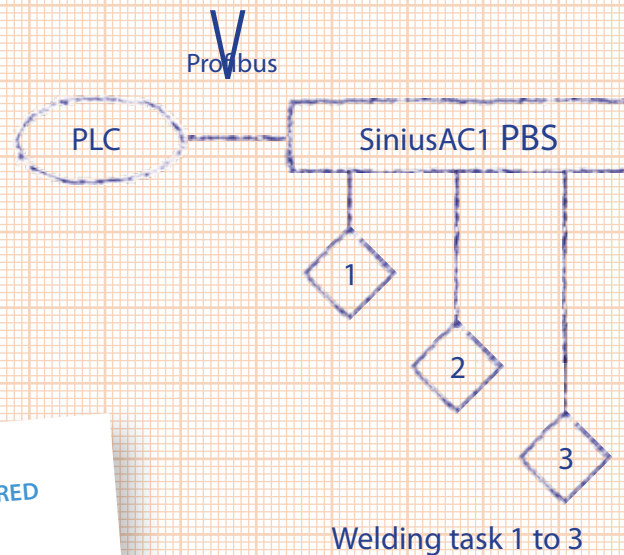
**THE SOLUTION** Harms+Wende solves the welding task with one single weld processor, the *SiniusAC1* PBS. Both the settings of each individual thyristor unit (SCR) as well as the time differences between the welding sequences can be parameterized through the customer's PLC.



### Alternating current system with regulated thyristor units (SCR)

**FIGURE** The figure shows the general structure of a *Sinius* weld processor with three thyristor units (SCR). The three welds are set at the same time or with programmed delay.

## Sketch of Solution



### COMPONENTS REQUIRED FOR SINIUS SYSTEM

- 1 x SinusAC1 PBS
- 3 x thyristor unit (SCR)



## PRODUCT OVERVIEW – *SiniusH<sup>WI</sup>*

The *Sinius* weld processors as medium frequency version, *SiniusH<sup>WI</sup>*, operate with 1,000 hertz inverter technology. The control electronics and the thyristor unit (SCR) are situated in one case. As with all *Sinius* weld processors, the connection to the PLC can be enabled with various field buses. For direct current welding with inverter technology you profit, among others, from an improvement in efficiency, from a weld current with low residual ripple as well as the smallest possible time units that can be regulated. Precise regulating and monitoring processes can be realized through the short cycle times.

The air or water cooled thyristor units (SCR) are available in different models: from 30 kVA up to over 500 kVA. With *SiniusH<sup>WI</sup>* weld processors proportional valves can be controlled synchronous to the welding process. Regardless whether you choose HWI or

AC technology: project planning and visualisation of your PLC is always identical.

### TECHNICAL DATA

#### *SiniusH<sup>WI</sup>*

- Type of current: direct current
- Frequency: 1,000 hertz medium frequency
- Additional functions:
  - Proportional valve control
  - Force monitoring
- 8 weld schedules
- Each weld schedule has 10 freely programmable current profiles
- Current profile can consist of
  - Upslope current
  - Downslope current
  - Constant current
  - No current
- Up to 16 modules can be set in one cascade (extendible by second bus module)
- Dimensions approx. 262 x 355 x 245 mm



## PRODUCT OVERVIEW – *SiniusAC*

*SiniusAC* is a weld processor system for 50/60 hertz alternating current which is notable for connecting operation at the PLC level. Up to three thyristor units (SCR) can be connected to one weld processor. Up to 48 welding tools can be operated through expansion processors. With the proportional valve output (0 to 10 Volt) different pressure courses can be set synchronous to the weld time. Because of their space-saving design, *SiniusAC* weld processors can be optimally stored on DIN rail in every switch cabinet.

Up to three thyristor units (SCR) can be connected to each *SiniusAC* weld processor. The *SiniusAC1* weld processor also features a constant current regulator. The *SiniusAC3* weld processor is designed for operation on a 3-phase installation. The three ignition outputs are shifted in terms of phasing by 120°. This also allows use on direct current machines.

Different thyristor units (SCR) with air or water cooling of 150 A to 5,000 A can be connected to all *SiniusAC* weld processors. The connection to the PLC can be made with different field bus variants.

### *SiniusAC1*


- Type of current: alternating current 50/60 hertz
- One ignition output (regulated)
- Two ignition outputs (controlled)
- Constant current regulation (can be switched off)
- Mains voltage compensation (can be switched off)
- 8 weld schedules
- Each weld schedule has 10 freely programmable current profiles
- Current profile can consist of
  - Upslope current
  - Downslope current
  - Constant current
  - No current
- Linking of weld schedules possible (1 weld schedule with 80 profiles)
- Up to 16 modules can be set in one cascade (extendible by second bus module)
- Dimensions approx. 45 x 120 x 135 mm

### TECHNICAL DATA

#### *SiniusAC3*

- Type of current: alternating current 50/60 hertz
- Three ignition outputs (controlled)
- All ignition outputs can be parameterized independently
- Mains voltage compensation (can be switched off)
- 8 weld schedules
- Each weld schedule has 10 freely programmable current profiles
- Current profile can consist of
  - Upslope current
  - Downslope current
  - Constant current
  - No current
- Linking of weld schedules possible (1 weld schedule with 80 profiles)
- Up to 16 modules can be set in one cascade (extendible by second bus module)
- Dimensions approx. 45 x 120 x 135 mm





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File name: 30548-01-000-en

Changes and errors excepted

- The Best Connections
- For Resistance Welding
  - For Quality Assurance
  - For Friction Welding

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