# WEBER ULTRASONICS

# RS485PROFIXCONV INTERFACE CONVERTER

## OPERATING MANUAL
## FIRMWARE VERSION 1.04

**MULTI PURPOSE
SURFACE TECHNOLOGY**

**Production, sales and service:**

| | |
|---|---|
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# 1 Introduction

*This chapter contains information on the manufacturer, the product and this operating manual.*

## 1.1 Weber Ultrasonics AG

**Success through customer-oriented ultrasonic solutions**

Weber Ultrasonics AG develops, produces and markets solutions and components for the industrial deployment of ultrasonic technology. It specialises in cleaning, welding and cutting with ultrasound as well as on other special fields of application.

The company is certified in line with DIN EN ISO 9001:2008 and has already won multiple awards for exemplary corporate management. The family-run medium-sized company with its headquarters in Karlsbad, Germany, employs 130 employees world-wide. Weber Ultrasonics AG has a subsidiary in the USA as well as Weber Entec GmbH & Co. KG based in Waldbronn, which specialises in ultrasound-based technology for biogas and sewage treatment plants.

Made by Weber Ultrasonics – quality you should never go without.



*Fig. 1:     Weber Ultrasonics AG in Karlsbad, Germany*

## 1.2    Validity of the operating manual

| NOTE |
|------|
| **§** This operating manual refers exclusively to the specific product(s) with which it was supplied. <br><br> No claims of any kind with regard to other products purchased may be derived from it or its contents. |

This operating manual applies to

**type RS485ProfiXConv-N**
**type RS485ProfiXConv-B**
**type RS485ProfiXConv-EC**

# 1.3      About this document

## 1.3.1      Purpose

This document contains a general introduction, as well as a description of the technical features and the intended use of the device.

Readers of this document should be familiar with programming a PLC and setting up fieldbus systems.

When using this device, it is important to ensure that all performance and safety requirements are met, including all applicable legislation, regulations, codes and standards.

In the interests of its customers, Weber Ultrasonics continually develops and refines its equipment. For this reason, Weber Ultrasonics reserves the right to make technical modifications without prior notice that may deviate from the information stated in this operating manual.

## 1.3.2      Target groups

This operating manual is aimed at specialist personnel who are responsible for the assembly, installation and maintenance of the product.

Specialist personnel are classed as employees that have attended specialist training and possess the requisite experience and knowledge to assess the tasks they have been assigned, recognise potential hazards and thereby introduce appropriate countermeasures.

| **NOTE** |
| --- |
| Read the safety instructions and the entire operating manual before assembling and commissioning the equipment! <br><br> Please store the operating manual in a place where it is accessible to all users at any time. <br><br> The operating manual must be complete and kept in a perfectly readable state at all times. |

## 1.3.3      General structure

**Instructions**    The instructions comprise:

Objective

    ☐      Prerequisites, if applicable.

    1.      Step 1

    2.      Step 2

    3.      Further steps

    ☑      Interim result, if applicable.

    4.      Further steps

    ☑      **Result of steps performed.**

### 1.3.4    Hexadecimal and decimal values

Presentation of hexadecimal values in the format 0xABCD.
ABCD corresponds to the hexadecimal value.

Presentation of decimal values in the format ABCD.
ABCD corresponds to the decimal value.

### 1.3.5    Abbreviations used

HF = high frequency, operating frequency of the generator

US = ultrasound/ultrasonic

LED = light-emitting diode

### 1.3.6    Signal words used

| | |
|---|---|
| **DANGER** | Immediate danger of serious injury or death. |
| **WARNING** | Potentially dangerous situation with the risk of serious injury or death. |
| **CAUTION** | Potential risk resulting in minor injuries. |
| **ATTENTION** | Risk of material damage to equipment and products, as well as harm to the environment. |
| **PLEASE NOTE** | Important information, failure to comply results in loss of warranty. |
| **INFO** | Additional information to aid understanding. |

### 1.3.7    Pictograms and safety instructions

**Safety instructions**  Please observe all safety instructions on the equipment itself and in all safety instructions in this document.

| Warning sign | Meaning | Warning sign | Meaning |
|---|---|---|---|
|  | General warning regarding a hazardous location or situation |  | Danger from electric current |
|  | Warning regarding hot surfaces or heat |  | Warning regarding hot liquids |
|  | Wear ear protection |  | Use eye protection |

*Tab. 1:    Pictograms used for identifying hazards*

# 2    Safety

*This chapter provides information on the safe assembly, commissioning and operation of the equipment. It also includes information on the intended use and conditions of use.*

## General safety instructions

Before starting up the device, please read through the following instructions carefully, both for your own safety and for the safety of the product.

- Depending on the type and use of the transducers, ambient sound levels may arise which necessitate the wearing of ear protection in line with current legal requirements.

- Some animal species can perceive frequencies that come about when operating ultrasonic transducers. Domestic and companion animals are therefore to be removed from the workroom.

### Risk to life from electric current

- Any contact with live wires or components presents a risk to life!

- Before cleaning the equipment or opening the housing, the equipment must be switched off and disconnected from the power supply.

### The transducers can also present dangers:

- When using transducers that are supplied with a housing, always observe the polarity of the transducer connection.
  Positive connection = red or brown conductor or red conductor sleeve, negative connection = blue conductor or blue conductor sleeve.
  **In the event of voltage reversal and insufficient potential equalisation, there is a risk of electric shock!**

- The ultrasonic power output of our products is greater than on equipment designed for medical and therapeutic purposes.

- Parts activated by ultrasound transfer ultrasonic energy when touched. Contact can result in painful inflammations.

- **Parts activated by ultrasonic energy heat up!**

- **Danger of burns in the event of contact!**

- The heat transfer to the converter casing is reduced to a minimum by design. Yet despite this, conducted heat can still cause parts of the converter to reach high temperatures, especially when used continuously for longer periods of time.

- The equipment is RFI suppressed. For technical reasons, there is a stray magnetic field of only a few metres. This is permitted, although it can impair the function of special medical equipment. This should be taken into account when installing and operating the device.

- The electromagnetic compatibility corresponds to the given standards, provisions and regulations.

## 2.1     Safety concept of the manufacturer

The unit has been designed and built based on a risk analysis and in accordance with applicable harmonised EU directives, standards and further technical specifications. The unit corresponds to the state of the art and offers reliable operation and the highest level of safety.

| **NOTE** |
| :---: |
| §      Observe the warnings attached to the ultrasonic generator! |

## 2.2     Conditions of use

The device is designed for indoor use in a closed and dry building.

## 2.3     Responsibility of the operator

The safety of the equipment can only be ensured in real-world applications when all measures necessary for this have been put in place. The operator of the equipment is required to show due diligence in planning and implementing these measures, as well as continually monitoring their compliance. The operator has the necessary knowledge with regard to the operations and their hazard potential.

**Electrical connection**     The relevant DIN EN/VDE regulations or country-specific regulations must be observed.

**Care and maintenance**     The operator is responsible for observing and complying with the applicable provisions and technical rules.

## 2.4     Responsibility of the operating staff

Personnel are obliged to immediately report faults or irregularities that occur during operation to the person in charge and have them rectified.

## 2.5     Environmental protection and emissions

No emissions can occur during normal operation.

## 2.6      Purpose of the equipment

The interface converter RS485ProfiXConv connects devices to PROFINET or PROFIBUS via their serial interface. The RS485ProfiXConv is a slave on the fieldbus but assumes the role of master for the serial interface to the field de-vice. Typical applications include coupling of devices with serial interface to a PLC via fieldbus.

| NOTE |
|---|
| § | The operator bears sole responsibility for any damage caused by not using the equipment in accordance with its intended use!<br><br>Weber Ultrasonics cannot acknowledge any claims for losses, costs or damages caused by improper use/operation. No claims may be asserted for compensation relating to damage caused as a result of a defect, insofar as this is legally permissible.<br><br>The device does not contain any replaceable parts.<br><br>Opening the housing voids the manufacturer warranty. |

# 3      Warranty

*The period and scope of the warranty are defined in the terms of delivery as part of the general terms and conditions (valid at the time of purchase) or in the sales contract / order confirmation, should any special agreements have been made.*

## 3.1      Exclusion of warranty

| NOTE |
| --- |

| | The following cases are not covered by warranty: |
| --- | --- |
| **§** | <ul><li>damage caused by improper operation,</li><li>use of the equipment for purposes other than which it was designed for,</li><li>improper alterations or modifications made without prior authorisation from the manufacturer,</li><li>damage caused by extreme influences such as jolts, falls, moisture and dirt,</li><li>damage resulting from modifications made to the operating instructions,</li><li>damage resulting from unauthorised access to areas only accessible to administrators (service staff of Weber Ultrasonics),</li><li>Opening the device.</li></ul> |

# 4        Description of device

*This chapter provides information on the design and functional principle of the device, as well as general technical information.*

The RS485ProfiXConv interface converter is intended for converting the RS-485 protocol to PROFINET/PROFIBUS. This device can adapt the following generators to PROFINET/PROFIBUS:

- ▪ SONIC FULL DIGITAL + RS485 MULTI PURPOSE
  as of firmware version 10.07.x

- ▪ SONIC FULL DIGITAL + RS485 SURFACE TECHNOLOGY
  as of firmware version 7.17

Depending on the configuration, one MULTI PURPOSE generator or up to six SURFACE TECHNOLOGY generators can be connected to the electrically isolated RS-485 connector of the interface converter.

| **NOTE** | |
|---|---|
| **§** | Only the SONIC FULL DIGITAL + RS485 generators from Weber Ultrasonics may be operated on the interface converter. |
| | The operator bears sole responsibility for any damage caused by not using the equipment in accordance with its intended use. |
| | Weber Ultrasonics accepts no liability for material damage or bodily injury that can be attributed to improper use of the equipment. |

**Type description**

**type RS485ProfiXConv-N**
**type RS485ProfiXConv-B**
**type RS485ProfiXConv-EC**

*Please refer to chapter 6 "Specifications"*

# 4.1    Housing

## 4.1.1    Control elements and connections on the front panel of the device

The interface converter is supplied in a plastic housing.

- Installation on a standard rail EN 60715 (35 x 7.5 mm).

- All connections are designed as plug-in connections.

- Connectors with screw terminals for the power supply and a serial interface are included as standard.
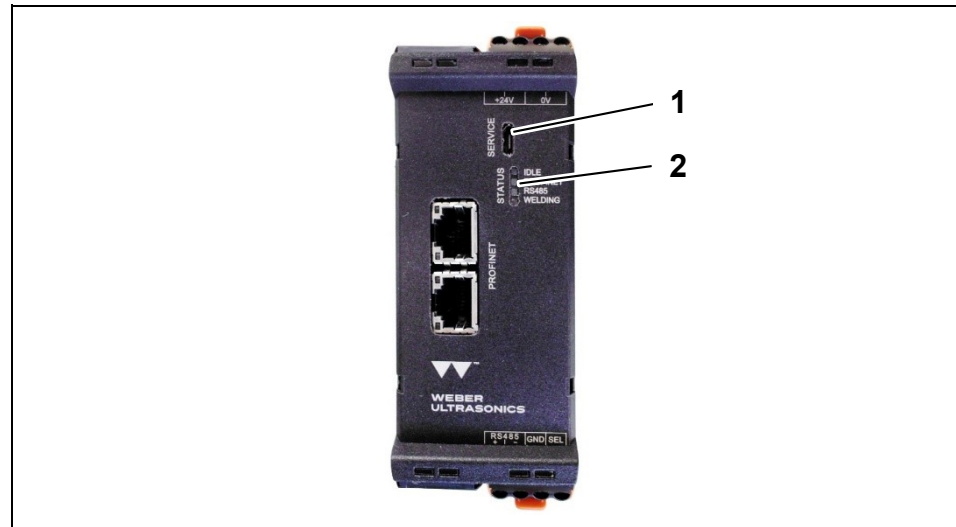


*Fig. 2:    Control elements on the front panel of the device*

1) Service connector
2) Status display

**Service connector**    The micro USB connector is for service purposes.

**Status display**   The LEDs show the following status conditions:

| | | |
|---|---|---|
| **IDLE** | LED flashes at approx. 1 Hz | The interface converter is ready for use. |
| **PROFIBUS** RS485ProfiXConv-B | LED flashes (on briefly / off for a longer period) | There is no PROFIBUS connection. |
| | LED an | There is a PROFIBUS connection. |
| **PROFINET** RS485ProfiXConv-N | LED flashes (on briefly / off for a longer period) | There is no PROFINET connection. |
| | LED on | There is a PROFINET connection. |
| **EtherCAT** RS485ProfiXConv-EC | LED blinkt (kurz an/lang aus) | There is no EtherCAT connection. |
| | LED on | There is a EtherCAT connection. |
| **RS485** | LED flashes (on briefly / off for a longer period) | The RS-485 connection to at least one generator is faulty. |
| | LED on | There is an RS-485 connection with all generators. |
| **WELDING** | LED off | Interface converter is configured for operation with SONIC FULL DIGITAL + RS485 SURFACE TECHNOLOGY (*see chapter 4.1.4*). |
| | LED on | Interface converter is configured for operation with SONIC FULL DIGITAL + RS485 MULTI PURPOSE (*see chapter 4.1.4*). |
| | LED flashes at approx. 2 Hz | Configuration was changed during operation. Restart of the interface converter is necessary. |

## 4.1.2    Connections
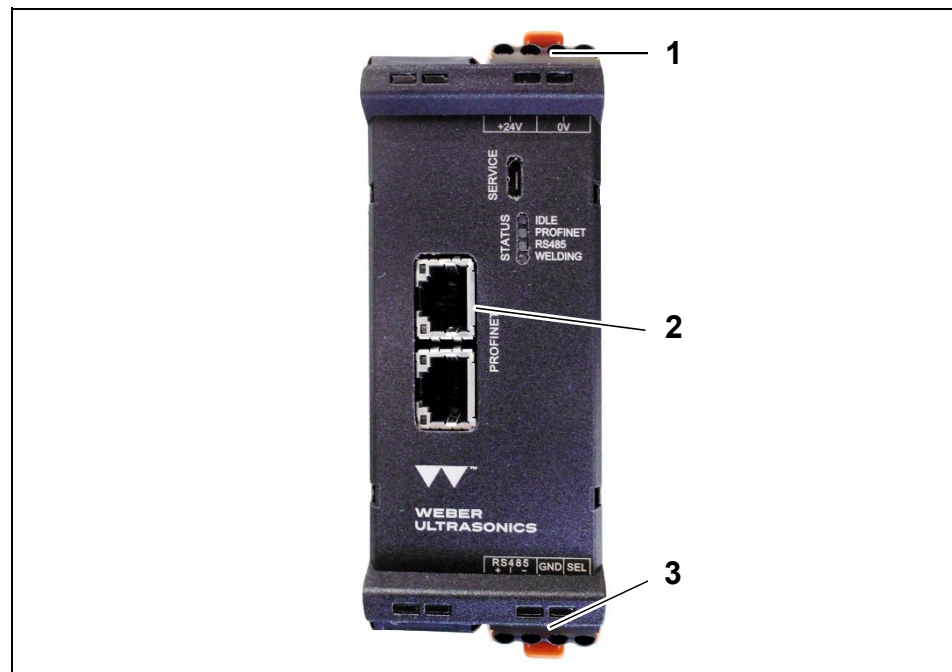


*Fig. 3:     Connections of the RS485ProfiXConv-N*

1) Supply voltage connection 24 V DC (*see chapter 4.1.3*)
2) PROFINET connection
3) RS485 and configuration connection (*see chapter 4.1.4*)

*Fig. 4:　Connections of the RS485ProfiXConv-EC*

1) Supply voltage connection 24 V DC (*see chapter 4.1.3*)
2a) EtherCat connection (Out)
2b) EtherCat connection (In)
3) RS485 and configuration connection (*see chapter 4.1.4*)
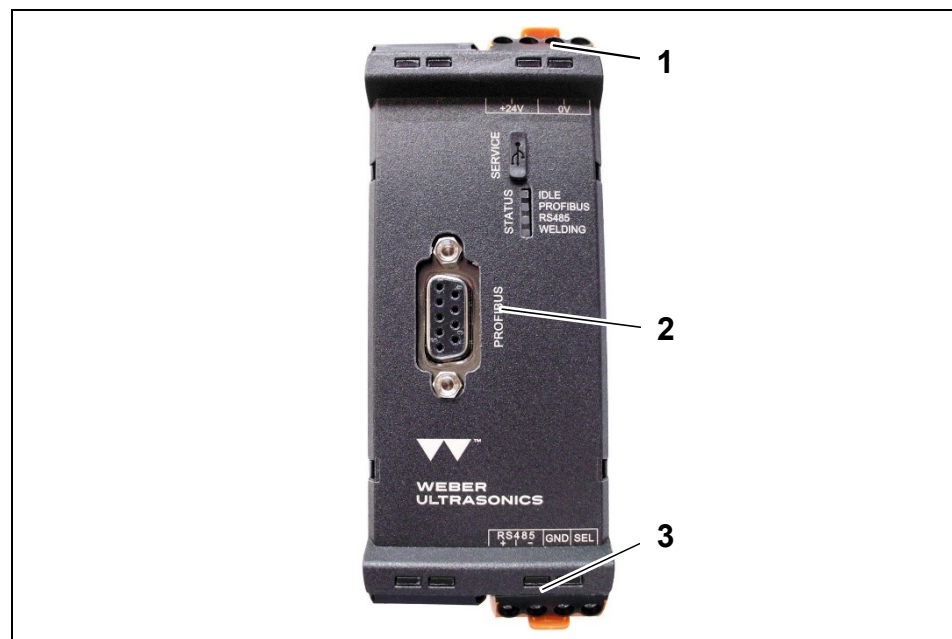


*Fig. 5:　Connections of the RS485ProfiXConv-B*

1) Supply voltage connection 24 V DC (*see chapter 4.1.3*)
2) PROFIBUS connection
3) RS485 and configuration connection (*see chapter 4.1.4*)

### 4.1.3    Pin assignment, supply voltage connection 24 V DC
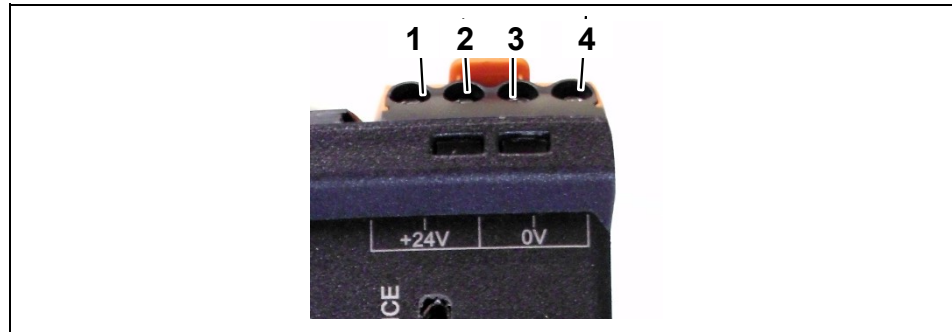


Fig. 6:    Pin assignment, supply voltage connection 24 V DC
           Connector type: Weidmüller BHZ 5.00/04/90LH BK/OR

1) 24 V DC
2) 24 V DC
3) Ref 24 V
4) Ref 24 V

### 4.1.4    Pin assignment, RS-485 and configuration connection



Fig. 7:    Pin assignment, RS-485 and configuration connection
           Connector type: Weidmüller BHZ 5.00/04/90LH BK/OR

1) RS485 +
2) RS484 -
3) GND (for select line)
4) SEL: select line

Connection SEL-GND closed:    Operation on SONIC FULL DIGITAL + RS485
                              SURFACE TECHNOLOGY generator

Connection SEL-GND open:      Operation on SONIC FULL DIGITAL + RS485
                              MULTI PURPOSE generator

# 4.2     RS485 interface

The MULTI PURPOSE generator or up to six SURFACE TECHNOLOGY generators are connected to the interface converter via the RS485 interface. The pin assignment of the plugs in the generator is detailed in the relevant operating manuals. A connecting cable is available from Weber Ultrasonics for generators with a 9-pole D-SUB connection for the RS485 interface. On some SURFACE TECHNOLOGY generator models (e.g. HS), RS485 signals are located together with other control signals on the 15-pole D-SUB connector plug. A corresponding connector plug with screw terminal connector is available for these generators from Weber Ultrasonics AG.
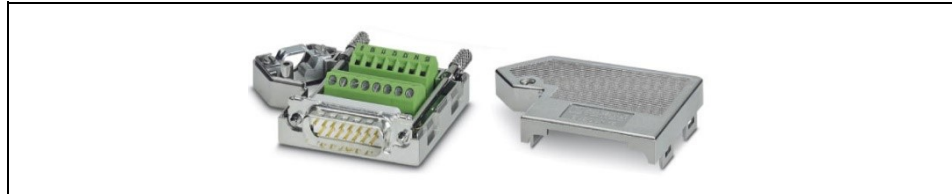


*Fig. 8:      15-pole D-SUB plug with screw connector*

Some specimen circuits are shown below:
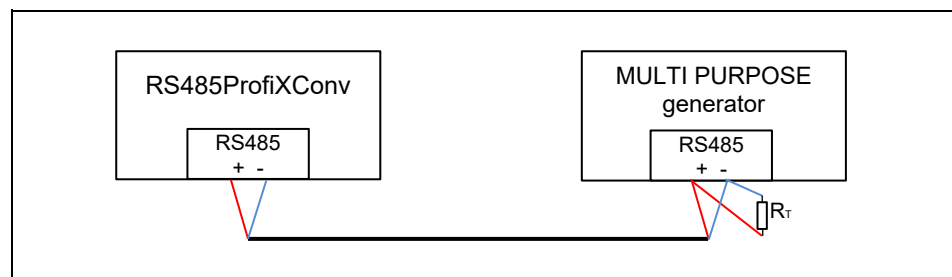


*Fig. 9:      Connection of SURFACE TECHNOLOGY generators to the RS485ProfiXConv*
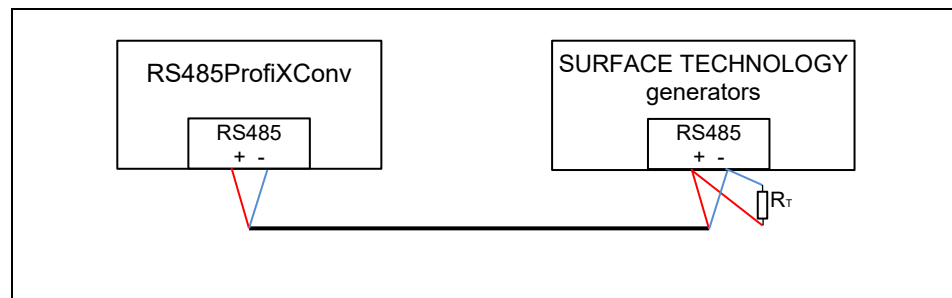


*Fig. 10:     Connection of a housing with up to six SURFACE TECHNOLOGY generators on the RS485ProfiXConv*
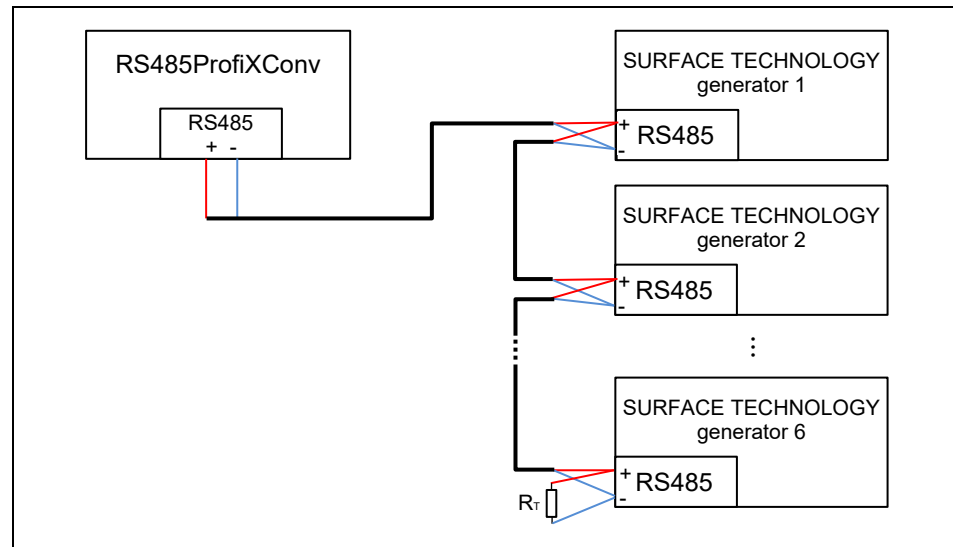
*Fig. 11:     Connection of up to six SURFACE TECHNOLOGY generators in individual housings (e.g. HS) on the RS485ProfiXConv*

## 4.2.1     Termination

In order to minimise malfunctions on the bus line, terminating resistors should be fitted and a twisted cable should preferably be used. The value of the terminating resistors is dependent on the characteristic wave impedance of the cable used and its length.

A value of $R_T$=120 Ω between D+ and D- indicates a good result in most cases.
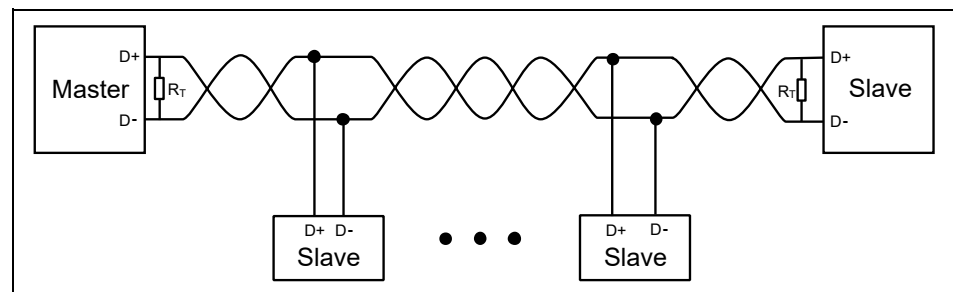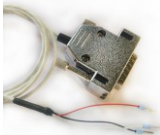


*Fig. 12:     Specimen circuit, RS-485 2-wire bus*

The stubs to the individual slaves should be kept as short as possible.

## 4.2.2 Preassembled cables and adapters

The following preassembled cables/adapters are available as an alternative to the connector with screwed connections:

| Article | | Article number 9-pole | Article number 15-pole |
|---|---|---|---|
| Terminating resistor | | 6091000032 | 6091000042 |
| Connecting cable 1m Generator / RS485ProfiXConv cable assignment:<br><br>Red     RS485 +<br>White   RS485 -<br>Black   GND | | 6631000016 | 6631000028 |
| Bus adapter cable 1m generator / generator | | 6631000026 | 6631000027 |

*Tab. 2:    Preassembled cables and adapters*
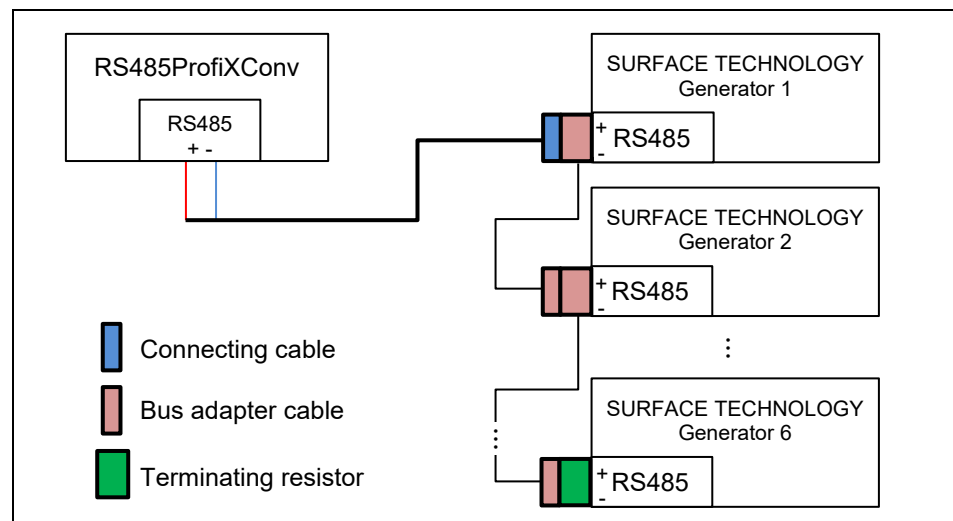


*Fig. 13:    Connection of up to six SURFACE TECHNOLOGY generators in individual housings (e.g. HS) to the RS485ProfiXConv using preassembled cables and adapters*

# 4.3 PROFINET serial remote control interface

The device can be integrated in a PROFINET bus system via the 2-port PROFINET connector. The communication module meets PROFINET IO conformance class B. Using the integrated 2-port switch, the generator can be deployed in a star or linear topology. Components of the PROFINET network are connected with CAT-5e network cables (RJ45 plugs).
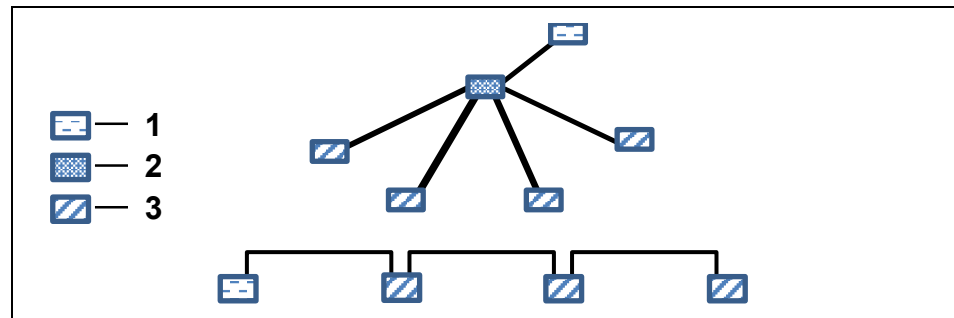


*Fig. 14:   PROFINET star topology (above) and linear topology (below)*

1) PROFINET master, e.g. PLC
2) PROFINET switch
3) PROFINET slave, e.g. RS485ProfiXConv-N
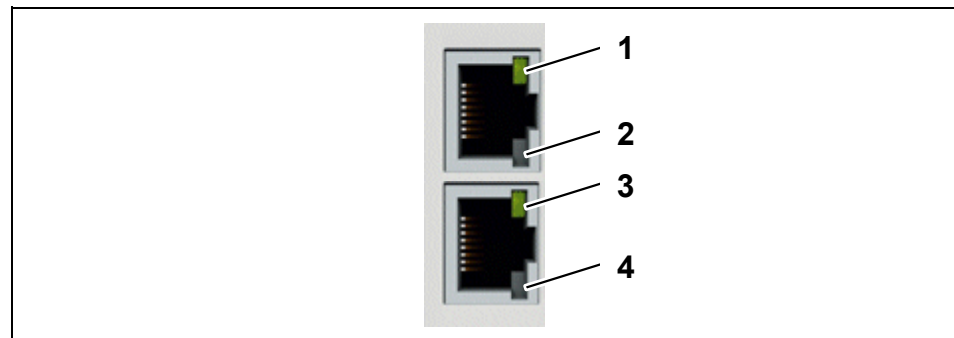


*Fig. 15:   2-port PROFINET connection*

1) Activity LED port 1
2) Not used
3) Activity LED port 2
4) Not used

## 4.4     PROFIBUS serial remote control interface

The device can be integrated in a PROFIBUS bus system via the 9-pole D-SUB socket. The PROFIBUS cabling (topology, cables, plugs, terminating resistors) must correspond to the PROFIBUS standard (EN 50170).
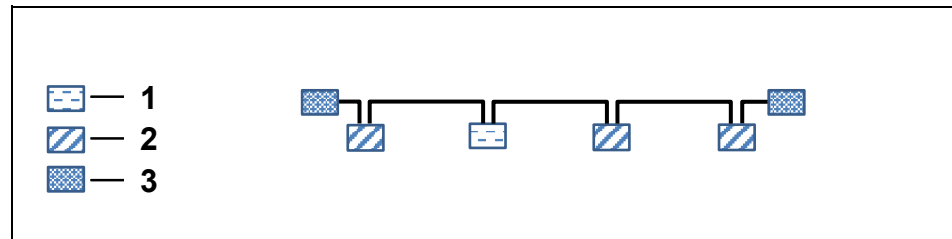


*Fig. 16:     PROFIBUS topology*

1) PROFIBUS master, e.g. PLC
2) PROFIBUS slave, e.g. RS485ProfiXConv-B
3) PROFIBUS terminating resistor

# 4.5    EtherCAT fieldbus interface

The generator can be integrated into an EtherCAT bus system via the 2-port EtherCAT connection. EtherCAT supports virtually all topologies. Bus or line structures, star structures, as well as combinations of lines and branch or stub lines are all possible. Components in the EtherCAT network are connected via CAT5e network cables (RJ45 plugs).
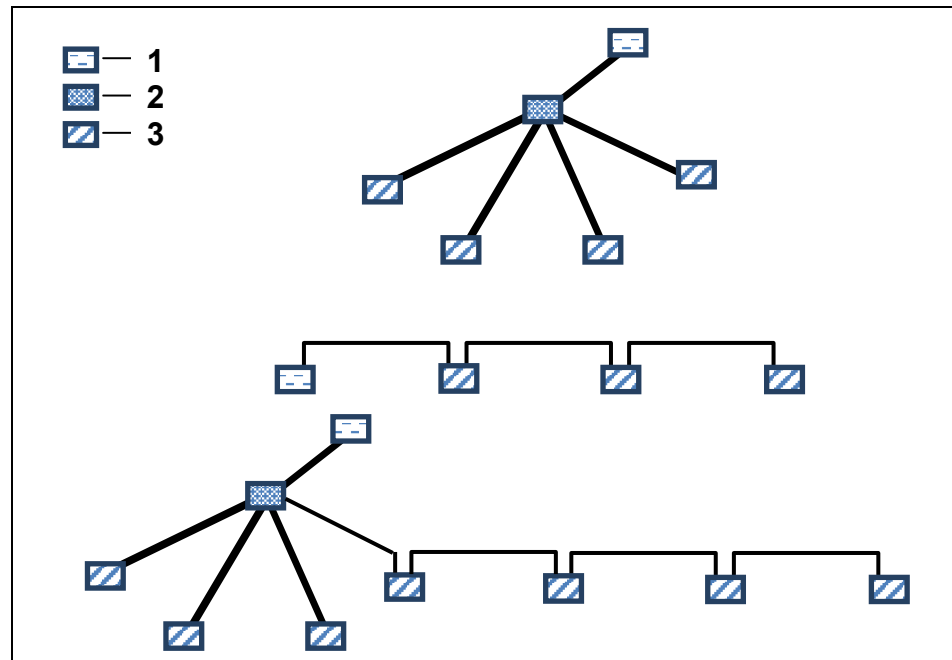


*Fig. 17:    EtherCAT star topology (top), line topology (centre) and example of combined star and line topology (bottom)*

1) EtherCAT master, e.g. PLC
2) EtherCAT-capable switch
3) EtherCat slave, e.g. RS485ProfiXConv-EC
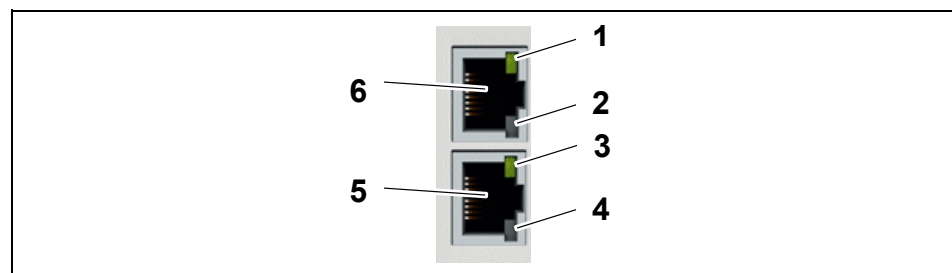


*Fig. 18:    2-Port EtherCAT connection*

1) Link/activity LED IN port
2) Not used
3) Link/activity LED OUT port
4) Not used
5) Out port
6) In port

# 5      Installation and connection

**Checking the delivery for completeness**

Use the delivery note or packaging slip to check that the delivery is complete.

If anything is missing, please contact Weber Ultrasonics without delay.

Please also report any transport damage immediately to the delivery company. It is vital to request written confirmation of the damage from the delivery company in these cases.

If the nature of the damage is such that it is not possible to operate the devices safely, they must not be put into operation.

**Place of installation**

The RS485ProfixConv module corresponds to protection rating IP20 and is thus intended for use in a closed control cabinet or control box with the protection rating IP24 or higher.

**Assembly**

You can snap the RS485ProfixConv module onto the DIN rail without a tool.

**Disassembly**

To disassemble the RS485ProfixConv module you only need a standard tool (e.g. screwdriver with a blade width of 2.5 mm).

**Minimum distances**

The minimum distances to heat-dissipating components (e.g. control cabinet heaters) can be found in the manufacturer's instructions for these devices.

The distance maintained from heat-dissipating components should ensure that the temperature measured on the unit does not exceed the maximum permissible operating temperature (max. 40 °C).

The required space for laying the cables depends on the number of cables to be laid and must be taken into account.

**Installation work steps:**

1.   Snap the device into position on the rail

2.   Establish the network connections

3.   Connect the RS-485 network

4.   Connect the power supply

5.   Switch on the power supply

☑    **The device is now ready to run**

| **Info** |
|---|
| Avoid temperatures above 40 °C at the installation location. |

# 5.1    Power supply

## 5.1.1    Supply ratings

The RS485ProfiXConv module is run with safety extra-low voltage.

- Nominal voltage: 24 V DC
- Permitted voltage range 19 V DC … 30 V DC

## 5.1.2    Cable quality and cable routing

Only use shielded cables for the RS-485 cabling and CAT5e cables for the PROFINET cabling.

For the PROFIBUS cabling, use cables that correspond to the PROFIBUS standard (EN61158).

Avoid laying control cables in the direct vicinity of current-carrying components or cables.

# 6 Specifications

## 6.1 RS485ProfiXConv

| Data area: | RS485ProfiXConv |
| --- | --- |
| **Power consumption max.** | 3 W |
| **Supply voltage** | 24 V DC |
| **Permitted voltage range** | 19 V DC … 30 V DC |
| **Reverse polarity protection** | Yes |
| **Short-circuit protection** | Yes |
| **Ambient temperature operating range** | 10 °C to 40 °C, non-condensing |
| **Ambient temperature range for storage** | 0 °C to 65 °C, non-condensing |
| **Protection class** | IP 20 |
| **Subnet connections** | Electrically isolated |
| **Weight** | 0.5 kg |
| **Dimensions (W x H x D)** | 45 x 120 x 115 mm |
| **Material of housing, connectors** | PA66, GF30 |
| **Fitting location** | Any |
| **Installation on rail (35 x 7.5 mm)** | EN 60715 |

*Tab. 3:     Specifications of the RS485ProfiXConv*

## 6.2 Rating plate and product assignment

The rating plate is located on the side of the device.



*Fig. 19:     Rating plate (example)*

## 6.3 MAC address
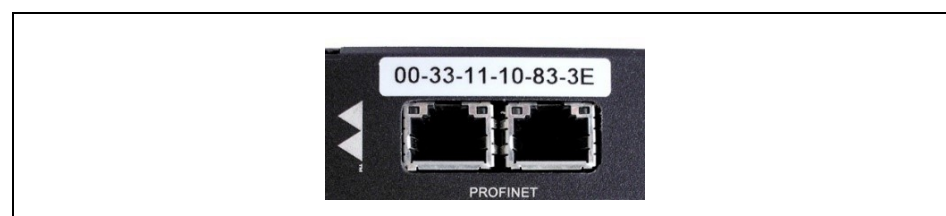


*Fig. 20:     MAC addresses of the PROFINET interface*

# 7     PROFINET/PROFIBUS process data

Der Typ der Feldbusschnittstelle – PROFIBUS, PROFINET oder EtherCAT – ist abhängig vom verwendeten Schnittstellenumsetzer. Nachfolgend werden die Protokolldaten der Feldbusschnittstellen beschrieben.

The structure of process data differs depending on the configuration. For description of the functions of the process data elements, see also the operating manual of the respective generator.

## 7.1     Process data structure of the MULTI PURPOSE configuration

In this configuration, a MULTI PURPOSE generator can be connected to the interface converter via RS-485.

| NOTE |
|---|
| §     All input and output process data must be incorporated into the PLC. |

### 7.1.1     PROFINET/PROFIBUS process data interface

#### 7.1.1.1     Output process data

The output process data is defined by the following bytes:

| Byte 0: Generator control (generator firmware version < 14.00) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Bit 7** | **Bit 6** | **Bit 5** | **Bit 4** | **Bit 3** | **Bit 2** | **Bit 1** | **Bit 0** |
| 0 | 0 | 0 | 0 | Error quit | Frequency scan | Start | 0 |

| Byte 0: Generator control (generator firmware version >= 14.00) | | | | |
|---|---|---|---|---|
| **Bit 7** | **Bit 6** | **Bit 5** | **Bit 4** | **Bit 3-0** |
| 0 | 0 | 0 | 0 | Control ID |

*Tab. 4:     Output process data byte 0: Generator control*

The function of byte 0 depends on the firmware version of the MULTI PURPOSE generator.

**Firmware version < 14.00**

**start**     Bit 1: HF generator
- 0 = Deactivate
- 1 = Activate

**frequency scan**     Bit 2: frequency scan
- 0 = Deactivate
- 1 = Activate

**error quit**     Bit 3: error handling:
- 0 = Standard state
- 1 = Acknowledge error

**Firmware version >= 14.00**

| Control ID | 0 | = | Read gen. state / Interrupts active function: query generator status / all functions are inactive |
|---|---|---|---|
| | 1 | = | Set parameter: the output process data byte 1-34 is transferred from the generator. The tool number byte 35 is transferred separately |
| | 2 | = | Start generator: activate generator HF |
| | 3 | = | Start scan: activate frequency scan |
| | 4 | = | Error quit: acknowledge error |
| | 5 | = | Change tool to X: transfer tool number |
| | 6 | = | Start teach-in: activate teach-in |

| Byte 1: Setpoint amplitude ||
|---|---|
| **Bit 7** | **Bit 6-0** |
| 0 | x |

*Tab. 5:     Output process data byte 1: Setpoint amplitude*

The amplitude is given in per cent; the entry is made in hexadecimal form.

Range for x: Please refer to the operating manual for the generator.

Example:    Amplitude = 50 %        Hex value: 0x32
            Amplitude = 65 %        Hex value: 0x41

| Byte 3,2: Trigger delay ||
|---|---|
| **Bit 15-10** | **Bit 9-0** |
| 0 | x |

*Tab. 6:     Output process data byte 3,2: Trigger delay*

Trigger delay in 0.01 s; the entry is made in hexadecimal form.

Range for x: 0.00 s – 9.99 s

Example:    Delay = 1.23 s    = 123 x 0.01 s    Hex value: 0x007B
            Delay = 8.99 s    = 899 x 0.01 s    Hex value: 0x0383

| Byte 4: Application mode ||
|---|---|
| **Bit 7-2** | **Bit 1-0** |
| 0 | Mode |

*Tab. 7:     Output process data byte 4: Application mode*

| mode | Application modes: |
|---|---|

- 0 = Remote
- 1 = Time
- 2 = Energy mode
- 3 = Peak power

| Byte 6,5: Time (Application) | |
| --- | --- |
| **Bit 15-10** | **Bit 9-0** |
| 0 | x |

*Tab. 8:    Output process data byte 6,5: Time (Application)*

Welding time in 0.01 s; the entry is made in hexadecimal form.

Range for x: 0.00 s – 9.99 s in 0.01 s increments

Example:      Welding time = 1.23 s      Hex value: 0x007B
              Welding time = 8.99 s      Hex value: 0x0383

| Byte 8,7: Energy (Application) |
| --- |
| **Bit 15-0** |
| x |

*Tab. 9:    Output process data byte 8,7: Energy (Application)*

Energy in Ws; the entry is made in hexadecimal form.

Range for x: 1 Ws – 65,000 Ws in 1 Ws increments

Example:      Energy = 1000 Ws      Hex value: 0x03E8
              Energy = 12,000 Ws    Hex value: 0x2EE0

| Byte 10,9: PeakPower (Application) | |
| --- | --- |
| **Bit 15-10** | **Bit 9-0** |
| 0 | x |

*Tab. 10:   Output process data byte 10,9: PeakPower (Application)*

Maximum output in W; the entry is made in hexadecimal form.

Range for x: 1 W – 9000 W in 1 W increments

Example:      Maximum output = 1000 W      Hex value: 0x03E8
              Maximum output = 4500 W      Hex value: 0x1194

| Byte 12,11: T-window low | |
| --- | --- |
| **Bit 15-10** | **Bit 9-0** |
| 0 | x |

*Tab. 11:   Output process data byte 12,11: T-window low*

| Byte 14,13: T-window high | |
|---|---|
| **Bit 15-10** | **Bit 9-0** |
| 0 | x |

*Tab. 12:  Output process data byte 14,13: T-window high*

T-window low/high in 0.01 s; the entry is made in hexadecimal form.

Range for x: 0.00 s – 9.99 s in 0.01 s increments

Example:    Time = 1.23 s        Hex value: 0x007B
            Time = 8.99 s        Hex value: 0x0383

| Byte 16,15: P-window low | |
|---|---|
| **Bit 15-10** | **Bit 9-0** |
| **0** | **x** |

*Tab. 13:  Output process data byte 16,15: P-window low*

| Byte 18,17: P-window high | |
|---|---|
| **Bit 15-10** | **Bit 9-0** |
| **0** | **x** |

*Tab. 14:  Output process data byte 18,17: P-window high*

P-window low/high in W; the entry is made in hexadecimal form.

Range for x: 1 W – 9000 W in 1 W increments

Example:    Power output = 1000 W    Hex value: 0x03E8
            Power output = 4500 W    Hex value: 0x1194

| Byte 20,19: E-window low |
|---|
| **Bit 15-0** |
| x |

*Tab. 15:  Output process data byte 20,19: E-window*

| Byte 22,21: E-window high |
|---|
| **Bit 15-0** |
| x |

*Tab. 16:  Output process data byte 22,21: E-window*

E-window low/high in Ws; the entry is made in hexadecimal form.

Range for x: 1 Ws – 65,000 Ws in 1 Ws increments

Example:    Energy = 1000 Ws     Hex value: 0x03E8
            Energy = 12,000 Ws   Hex value: 0x2EE0

| Byte 24,23: Holding time ||
|---|---|
| **Bit 15-10** | **Bit 9-0** |
| 0 | x |

*Tab. 17:  Output process data byte 24,23: Holding time*

Holding time in 0.01 s; the entry is made in hexadecimal form.

Range for x: 0.00 s – 9.99 s in 0.01 s increments

Example:      Holding time = 1.23 s    Hex value: 0x007B
                   Holding time = 8.99 s    Hex value: 0x0383

| Byte 26,25: After burst delay ||
|---|---|
| **Bit 15-10** | **Bit 9-0** |
| 0 | x |

*Tab. 18:  Output process data byte 26,25: After burst delay*

After burst delay in 0.01 s; the entry is made in hexadecimal form.

Range for x: 0.00 s – 9.99 s in 0.01 s increments

Example:    Delay = 1.23 s         Hex value: 0x007B
             Delay = 8.99 s         Hex value: 0x0383

| Byte 28,27: After burst duration ||
|---|---|
| **Bit 15-10** | **Bit 9-0** |
| 0 | x |

*Tab. 19:  Output process data byte 28,27: After burst duration*

After burst duration in 0.01 s; the entry is made in hexadecimal form.

Range for x: 0.00 s – 30.00 s in 0.01 s increments

Example:    Pulse time = 1.23 s    Hex value: 0x007B
             Pulse time = 8.99 s    Hex value: 0x0383

| Byte 30,29: F-start |
|---|
| **Bit 15-0** |
| x |

*Tab. 20:  Output process data byte 30,29: F-start*

Start frequency in Hz; the entry is made in hexadecimal form.

Range for x: 15,000 Hz – 65,000 Hz in 1 Hz increments

Example:    Start frequency = 20 kHz    Hex value: 0x4E20
             Start frequency = 35 kHz    Hex value: 0x88B8

| Byte 32,31: F-stop |
| --- |
| Bit 15-0 |
| x |

*Tab. 21:   Output process data byte 32,31: F-stop*

Stop frequency in Hz; the entry is made in hexadecimal form.

Range for x: 15,000 Hz – 65,000 Hz in 1 Hz increments

Example:     Stop frequency = 20 kHz   Hex value: 0x4E20
             Stop frequency = 35 kHz   Hex value: 0x88B8

**The following output process data is only supported on MULTI PURPOSE generators with a firmware version of 14.00 or higher.**

| Byte 34,33: F-offset |
| --- |
| Bit 15-0 |
| x |

*Tab. 22:   Output process data byte 34,33: F-offset*

Offset frequency in Hz; the entry is made in hexadecimal form.

Range for x: 0 Hz – 500 Hz in 1 Hz increments

Example:     Offset frequency = 20 Hz   Hex value: 0x0014
             Offset frequency = 123 Hz Hex value: 0x007B

| Byte 35: Tool no. |
| --- |
| Bit 7-0 |
| x |

*Tab. 23:   Output process data byte 35: Tool no.*

The tool number is transferred separately; see byte 0 (control mode).

Number of the tool to be activated; the entry is made in hexadecimal form.

Range for x: 1 – 100

Example:     Tool = 20          Hex value: 0x14
             Tool = 99          Hex value: 0x63

### 7.1.1.2   Input process data

The input process data is presented via the following bytes:

| Byte 0: Communication status | | | |
|---|---|---|---|
| **Bit 7-3** | **Bit 2** | **Bit 1** | **Bit 0** |
| 0 | Error | Timeout | OK |

*Tab. 24:   Input process data byte 0: Communication status*

**OK**          Bit 0 = 1: RS-485 communication to generator OK

**Timeout**     Bit 1 = 1: RS-485 communication to generator faulty

**Error**       Bit 2 = 1: RS-485 communication to generator faulty, data record error

| Byte 1: Generator status (generator firmware version < 14.00) | | | |
|---|---|---|---|
| **Bit 7-3** | **Bit 2** | **Bit 1** | **Bit 0** |
| 0 | Error occurred | Scan active | Sonic active |

| Byte 1: Generator status (generator firmware version >= 14.00) | | | | | |
|---|---|---|---|---|---|
| **Bit 7-5** | **Bit 4** | **Bit 3** | **Bit 2** | **Bit 1** | **Bit 0** |
| 0 | Teach-in active | Error occurred | Scan active | Sonic active | Parameter set |

*Tab. 25:   Input process data byte 1: Status generator*

The function of byte 1 depends on the firmware version of the
MULTI PURPOSE generator.

**Firmware version < 14.00**

**Sonic active**       Bit 0 = 1: Generator emits HF

**Scan active**        Bit 1 = 1: Scan in generator active

**Error occurred**     Bit 2 = 1: Generator defect, for description see generator error code

**Firmware version >= 14.00**

**Parameter set**      Bit 0 = 1: Parameters in generator are set

**Sonic active**       Bit 1 = 1: Generator emits HF

**Scan active**        Bit 2 = 1: Scan in generator active

**Error occurred**     Bit 3 = 1: Generator defect, for description see generator error code

**Teach-in active**    Bit 4 = 1: Teach-in in generator active

| **Byte 2: Generator error code** |
| :---: |
| **Bit 7-0** |
| error code |

*Tab. 26: Input process data byte 2: Generator error code*

**error code**    Error number of the error detected in the generator

| **Byte 3: Reserve** |
| :---: |
| **Bit 7-0** |
| Reserve |

*Tab. 27: Input process data byte 3: Status res*

**Reserve**    Currently not used

| **Byte 5,4: Working frequency** |
| :---: |
| **Bit 15-0** |
| x |

*Tab. 28: Input process data byte 5-4: Working frequency*

Display of the current operating frequency in Hz; the entry is made in hexadecimal form.

Range for x: please refer to the operating manual for the generator.

Example:    Hex value: 0x639C     Actual frequency = 25,500 Hz
            Hex value: 0xC800     Actual frequency = 51,200 Hz

| **Byte 6: Current temperature** |
| :---: |
| **Bit 7-0** |
| x |

*Tab. 29: Input process data byte 6: Current temperature*

Display of the current generator temperature in degrees Celsius; the entry is made in hexadecimal form.

Range for x: 0 °C – 80 °C in 1 °C increments

Example:    Hex value: 0x18       Actual temperature = 24 °C
            Hex value: 0x40       Actual temperature = 64 °C

| **Byte 8,7: Current power** |
| :---: |
| **Bit 15-0** |
| x |

*Tab. 30: Input process data byte 8-7: Current power*

Displays the current power output in [W].
The entry is made in hexadecimal form.

Range for x: please refer to the operating manual for the generator.

Example:    Hex value: 0x3E8     Emitted power output = 1000 W
            Hex value: 0x79E     Emitted power output = 1950 W

| Byte 10,9: max. power reached |
|---|
| Bit 15-0 |
| x |

*Tab. 31:  Input process data byte 10-9: Max. power reached*

Display of the maximum emitted power output in [W]; the entry is made in hexa-decimal form.

Range for x: Please refer to the operating manual for the generator.

Example:    Hex value: 0x3E8      Max. emitted power output = 1000 W
            Hex value: 0x79E      Max. emitted power output = 1950 W

| Byte 12,11: Duration |
|---|
| Bit 15-0 |
| x |

*Tab. 32:  Input process data byte 12,11: Duration*

Display of the maximum welding time in 0.01 s; the entry is made in hexadecimal form.

Range for x: 0.00 s – 9.99 s in 0.01 s increments

Example:    Hex value: 0x007B      Maximum welding time = 1.23 s
            Hex value: 0x0383      Maximum welding time = 8.99 s

| Byte 14,13: energy |
|---|
| Bit 15-0 |
| x |

*Tab. 33:  Input process data byte 14-13: Energy*

Display of energy in [Ws]; the entry is made in hexadecimal form.

Range for x: 1 Ws – 65,000 Ws in 1 Ws increments

Example:    Hex value: 0x03E8      Energy = 1000 Ws
            Hex value: 0x2EE0      Energy = 12,000 Ws

| Byte 15: Int./Ext. amplitude |
|---|
| Bit 7-0 |
| x |

*Tab. 34:  Input process data byte 15: Int./Ext. amplitude*

Display of amplitude set in per cent; the entry is made in hexadecimal form.

Range for x: please refer to the operating manual for the generator.

Example:    Hex value: 0x32      Amplitude = 50 %
            Hex value: 0x41      Amplitude = 65 %

| Byte 17,16: Current start frequency |
|:---:|
| **Bit 15-0** |
| x |

*Tab. 35:   Input process data byte 17-16: Current start frequency*

Display of the start frequency in Hz; the entry is made in hexadecimal form.

Range for x: Please refer to the operating manual for the generator.

Example:   Start frequency = 25,500 Hz   Hex value: 0x639C
           Start frequency = 51,200 Hz   Hex value: 0xC800

| Byte 18: Active tool no. |
|:---:|
| **Bit 7-0** |
| x |

*Tab. 36:   Input process data byte 18: Active tool no.*

Number of the active tool; the entry is made in hexadecimal form.

Firmware version < V14.00: Output = 0
Firmware version >= V14.00: Range for x: 1 – 100

Range for x: 1 – 100

Example:     Tool = 20          Hex value: 0x14
             Tool = 99          Hex value: 0x63

| Byte 22,21,20,19: Firmware version of control board |
|:---:|
| **Bit 31-0** |
| x |

*Tab. 37:   Input process data byte 22-19:*
*           Firmware version of control board*

Display of the firmware version of the generator; the entry is made in hexadecimal form.

Firmware version < V14.00: Output = 0
Firmware version >= V14.00:
Example:     Hex value: 0xD59FE4      Version = 14.00.01.00

| Byte 26,25,24,23: Firmware version of RS485/tooling module |
|:---:|
| **Bit 31-0** |
| x |

*Tab. 38:   Input process data byte 26-23:*
*           Firmware version of RS485/tooling module*

Display of the firmware version of the tooling module; the entry is made in hexadecimal form.

Firmware version < V14.00: Output = 0
Firmware version >= V14.00:
Example: Hex value: 0xD59FE4   Version = 14.00.01.00

| Byte 28,27: Max. possible power |
|---|
| **Bit 15-0** |
| x |

*Tab. 39:   Input process data byte 28,27: Max. possible power*

Display of the maximum possible power output in W; the entry is made in hexadecimal form.

Firmware version < V14.00: Output = 0
Firmware version >= V14.00:
Range for x: Please refer to the operating manual for the generator.

Example: Hex value: 0x3E8        Max. possible power output = 1000 W
               Hex value: 0x79E        Max. possible power output = 1950 W

| Byte 30,29: F-min |
|---|
| **Bit 15-0** |
| x |

*Tab. 40:   Input process data byte 30,29: F-min*

Display of the minimum possible operating frequency in Hz; the entry is made in hexadecimal form.

Firmware version < V14.00: Output = 0
Firmware version >= V14.00:
Range for x: Please refer to the operating manual for the generator.

Example: Hex value: 0x639C  Minimum possible operating frequency = 25,500 Hz
               Hex value: 0xC800  Minimum possible operating frequency = 51,200 Hz

| Byte 32,31: F-max |
|---|
| **Bit 15-0** |
| x |

*Tab. 41:   Input process data byte 32,31: F-max*

Display of the maximum possible operating frequency in Hz; the entry is made in hexadecimal form.

Firmware version < V14.00: Output = 0
Firmware version >= V14.00:
Range for x: Please refer to the operating manual for the generator.

Example: Hex value: 0x639C  Maximum possible operating frequency = 25,500 Hz
               Hex value: 0xC800  Maximum possible operating frequency = 51,200 Hz

| Byte 36,35,34,33: serial number generator |
|---|
| **Bit 31-0** |
| x |

*Tab. 42:   Input process data byte 36-33:*
*           The generator's serial number generator*

Display of the serial number of the generator; the entry is made in hexadecimal form, the letters S and W are not transferred.

Firmware version < V14.00: Output = 0
Firmware version >= V14.00:
Example: Hex value: 0x3E90272 Serial number = (S)656(W)02162

| Byte 40,39,38,37: firmware version of converter |
|---|
| **Bit 31-0** |
| x |

*Tab. 43:   Input process data byte 40-37:*
*           Firmware version of the interface converter*

Display of the firmware version of the interface converter; the entry is made in hexadecimal form.

Example: Hex value: 0xF9190      Version = 1.02.03.04

## 7.1.2    EtherCAT process data

The EtherCAT fieldbus interface is supported from firmware version 1.03 onwards. The values of the I/Os can be accessed via the process data. The CoE objects stated in Tables 44 and 45 define the mapping of the process data. The content of these objects, and thereby the definition of the PDOs, is shown in Chapter 7.1.1. The mapping is static.

### 7.1.2.1  PDO mapping register

| Index | Subindex | Rights | Name | Description/value |
|---|---|---|---|---|
| **0x1600** | 0 | RO | Number of entries | 36 |
| | 1 | RO | Output data object 1 | Index 0x2001 Subindex 0 |
| | 2 | RO | Output data object 2 | Index 0x2002 Subindex 0 |
| | 3 | RO | Output data object 3 | Index 0x2003 Subindex 0 |
| | 4 | RO | Output data object 4 | Index 0x2004 Subindex 0 |
| | 5 | RO | Output data object 5 | Index 0x2005 Subindex 0 |
| | 6 | RO | Output data object 6 | Index 0x2006 Subindex 0 |
| | 7 | RO | Output data object 7 | Index 0x2007 Subindex 0 |
| | 8 | RO | Output data object 8 | Index 0x2008 Subindex 0 |
| | 9 | RO | Output data object 9 | Index 0x2009 Subindex 0 |
| | 10 | RO | Output data object 10 | Index 0x200A Subindex 0 |
| | 11 | RO | Output data object 11 | Index 0x200B Subindex 0 |
| | 12 | RO | Output data object 12 | Index 0x200C Subindex 0 |
| | 13 | RO | Output data object 13 | Index 0x200D Subindex 0 |
| | 14 | RO | Output data object 14 | Index 0x200E Subindex 0 |
| | 15 | RO | Output data object 15 | Index 0x200F Subindex 0 |
| | 16 | RO | Output data object 16 | Index 0x2010 Subindex 0 |
| | 17 | RO | Output data object 17 | Index 0x2011 Subindex 0 |
| **0x1A00** | 0 | RO | Number of entries | 41 |
| | 1 | RO | Input data object 1 | Index 0x2012 Subindex 0 |
| | 2 | RO | Input data object 2 | Index 0x2013 Subindex 0 |
| | 3 | RO | Input data object 3 | Index 0x2014 Subindex 0 |
| | 4 | RO | Input data object 4 | Index 0x2015 Subindex 0 |
| | 5 | RO | Input data object 5 | Index 0x2016 Subindex 0 |
| | 6 | RO | Input data object 6 | Index 0x2017 Subindex 0 |
| | 7 | RO | Input data object 7 | Index 0x2018 Subindex 0 |
| | 8 | RO | Input data object 8 | Index 0x2019 Subindex 0 |
| | 9 | RO | Input data object 9 | Index 0x201A Subindex 0 |
| | 10 | RO | Input data object 10 | Index 0x201B Subindex 0 |
| | 11 | RO | Input data object 11 | Index 0x201C Subindex 0 |
| | 12 | RO | Input data object 12 | Index 0x201D Subindex 0 |
| | 13 | RO | Input data object 13 | Index 0x201E Subindex 0 |
| | 14 | RO | Input data object 14 | Index 0x201F Subindex 0 |
| | 15 | RO | Input data object 15 | Index 0x2020 Subindex 0 |
| | 16 | RO | Input data object 16 | Index 0x2021 Subindex 0 |
| | 17 | RO | Input data object 17 | Index 0x2022 Subindex 0 |

*Tab. 44:  PDO mapping register*

### 7.1.2.2  PDO register

| Index | Subindex | Rights | Name | Description/value |
|---|---|---|---|---|
| **0x2001** | 0 | RO | Number of entries | 1 |
| | 1 | RO | Generator control | Output process data byte 0 |
| **0x2002** | 0 | RO | Number of entries | 1 |
| | 1 | RO | Setpoint amplitude | Output process data byte 1 |
| **0x2003** | 0 | RO | Number of entries | 2 |
| | 1 | RO | Trigger delay | Output process data byte 2-3 |
| **0x2004** | 0 | RO | Number of entries | 1 |
| | 1 | RO | Application mode | Output process data byte 4 |
| **0x2005** | 0 | RO | Number of entries | 2 |
| | 1 | RO | Time (Application) | Output process data byte 5-6 |
| **0x2006** | 0 | RO | Number of entries | 2 |
| | 1 | RO | Energy (Application) | Output process data byte 7-8 |
| **0x2007** | 0 | RO | Number of entries | 2 |
| | 1 | RO | PeakPower (Application) | Output process data byte 9-10 |
| **0x2008** | 0 | RO | Number of entries | 4 |
| | 1 | RO | Time window | Output process data byte 11-14 |
| **0x2009** | 0 | RO | Number of entries | 4 |
| | 1 | RO | Power window | Output process data byte 15-18 |
| **0x200A** | 0 | RO | Number of entries | 4 |
| | 1 | RO | Energy window | Output process data byte 19-22 |
| **0x200B** | 0 | RO | Number of entries | 2 |
| | 1 | RO | Holding time | Output process data byte 23-24 |
| **0x200C** | 0 | RO | Number of entries | 2 |
| | 1 | RO | After Burst delay | Output process data byte 25-26 |
| **0x200D** | 0 | RO | Number of entries | 2 |
| | 1 | RO | After Burst duration | Output process data byte 27-28 |
| **0x200E** | 0 | RO | Number of entries | 2 |
| | 1 | RO | F-start | Output process data byte 29-30 |
| **0x200F** | 0 | RO | Number of entries | 2 |
| | 1 | RO | F-stop | Output process data byte 31-32 |
| **0x2010** | 0 | RO | Number of entries | 2 |
| | 1 | RO | F-offset [V14] | Output process data byte 33-34 |
| **0x2011** | 0 | RO | Number of entries | 1 |
| | 1 | RO | Active tool no. [V14] | Output process data byte 35 |
| **0x2012** | 0 | RO | Number of entries | 4 |
| | 1 | RO | Generator status | Input process data byte 0-3 |

| Index | Subindex | Rights | Name | Description/value |
|-------|----------|--------|------|-------------------|
| **0x2013** | 0 | RO | Number of entries | 2 |
| | 1 | RO | Working frequency | Input process data byte 4-5 |
| **0x2014** | 0 | RO | Number of entries | 1 |
| | 1 | RO | Current temparature | Input process data byte 6 |
| **0x2015** | 0 | RO | Number of entries | 2 |
| | 1 | RO | Current power | Input process data byte 7-8 |
| **0x2016** | 0 | RO | Number of entries | 2 |
| | 1 | RO | Max. power reached | Input process data byte 9-10 |
| **0x2017** | 0 | RO | Number of entries | 2 |
| | 1 | RO | Duration | Input process data byte 11-12 |
| **0x2018** | 0 | RO | Number of entries | 2 |
| | 1 | RO | Energy | Input process data byte 13-14 |
| **0x2019** | 0 | RO | Number of entries | 1 |
| | 1 | RO | Int./Ext. amplitude | Input process data byte 15 |
| **0x201A** | 0 | RO | Number of entries | 2 |
| | 1 | RO | Current start frequency | Input process data byte 16-17 |
| **0x201B** | 0 | RO | Number of entries | 1 |
| | 1 | RO | Active tool no. [V14] | Input process data byte 18 |
| **0x201C** | 0 | RO | Number of entries | 4 |
| | 1 | RO | Firmware version of controlboard [V14] | Input process data byte 19-22 |
| **0x201D** | 0 | RO | Number of entries | 4 |
| | 1 | RO | Firmware version of RS485/tooling module [V14] | Input process data byte 23-26 |
| **0x201E** | 0 | RO | Number of entries | 2 |
| | 1 | RO | Max. possible power [V14] | Input process data byte 27-28 |
| **0x201F** | 0 | RO | Number of entries | 2 |
| | 1 | RO | F-min [V14] | Input process data byte 29-30 |
| **0x2020** | 0 | RO | Number of entries | 2 |
| | 1 | RO | F-max [V14] | Input process data byte 31-32 |
| **0x2021** | 0 | RO | Number of entries | 4 |
| | 1 | RO | Serial number generator [V14] | Input process data byte 33-36 |
| **0x2022** | 0 | RO | Number of entries | 4 |
| | 1 | RO | Firmware version of converter | Input process data byte 37-40 |

*Tab. 45: PDO register*

# 7.2 Process data structure of the SURFACE TECHNOLOGY configuration

In this configuration, up to six SURFACE TECHNOLOGY generators can be connected to the interface converter via RS-485. Communication with the individual generators must be enabled in the respective *control* output process data byte. The RS-485 address assigned to the individual generators is incorporated in the respective *status* input process data value. **This address must be set as the IP address on the generator in the SETTINGS menu.**

Standard address assignment

| Generator | Address |
|:---:|:---:|
| 1 | **65** |
| 2 | **66** |
| 3 | **67** |
| 4 | **68** |
| 5 | **69** |
| 6 | **70** |

*Tab. 46: RS-485 address assigned to generators*

Should other addresses be required, please contact the Service department of Weber Ultrasonics.

| NOTE |
|---|
| §     Input and output process data must be incorporated into the PLC for all 6 generators. |

## 7.2.1 PROFINET/PROFIBUS process data interface

### 7.2.1.1 Output process data

The output process data of the individual generators are assigned to the following bytes:

| Byte | Meaning |
|------|---------|
| 0 | Generator control generator 1 |
| 1 | Setpoint power generator 1 |
| 2 | Setpoint frequency generator 1 |
| 3 | Generator control generator 2 |
| 4 | Setpoint power generator 2 |
| 5 | Setpoint frequency generator 2 |
| 6 | Generator control generator 3 |
| 7 | Setpoint power generator 3 |
| 8 | Setpoint frequency generator 3 |
| 9 | Generator control generator 4 |
| 10 | Setpoint power generator 4 |
| 11 | Setpoint frequency generator 4 |
| 12 | Generator control generator 5 |
| 13 | Setpoint power generator 5 |
| 14 | Setpoint frequency generator 5 |
| 15 | Generator control generator 6 |
| 16 | Setpoint power generator 6 |
| 17 | Setpoint frequency generator 6 |

*Tab. 47: Output process data of the generators*

| Generator control | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Bit 7** | **Bit 6** | **Bit 5** | **Bit 4** | **Bit 3** | **Bit 2** | **Bit 1** | **Bit 0** |
| Com. enable | 0 | 0 | 0 | 0 | Error quit | Start search | Start generator |

*Tab. 48: Output process data byte "Generator control"*

**Start generator**    Bit 0: HF generator

- 0 = Deactivate
- 1 = Activate

**Start search**    Bit 1: Frequency scan (only for rod transducers)

- 0 = Deactivate
- 1 = Activate

**Error quit**    Bit 2: Error handling:

- 0 = Standard state
- 1 = Acknowledge error

**Com. enable**    Bit 7: Control of the RS-485 communication with this generator. The interface converter only establishes a connection to this generator if communication has been enabled.

- 0 = Communication not enabled
- 1 = Communication enabled

| Setpoint power | |
|---|---|
| **Bit 7** | **Bit 6-0** |
| 0 | x |

*Tab. 49: Output process data byte "Setpoint power"*

The target power output is given in per cent; the entry is made in hexadecimal form.

Range for x: Please refer to the operating manual for the generator.

Example:     Target power output = 45 %     Hex value: 0x2D
                Target power output = 65 %     Hex value: 0x41

| Setpoint frequency | |
|---|---|
| **Bit 7** | **Bit 6-0** |
| 0 | x |

*Tab. 50: Output process data byte "Setpoint frequency"*

Nominal frequency is given in kHz; the entry is made in hexadecimal form.

Range for x: Please refer to the operating manual for the generator.

Example:     Operating frequency = 25 kHz     Hex value: 0x19
                Operating frequency = 50 kHz     Hex value: 0x32

### 7.2.1.2   Input process data

The input process data of the individual generators is assigned to the following bytes:

| Byte | Meaning |
|------|---------|
| 3-0 | Status generator 1 |
| 5-4 | Actual power generator 1 |
| 9-6 | Actual frequency generator 1 |
| 10 | Temperature generator 1 |
| 14-11 | Status generator 2 |
| 16-15 | Actual power generator 2 |
| 20-17 | Actual frequency generator 2 |
| 21 | Temperature generator 2 |
| 25-22 | Status generator 3 |
| 27-26 | Actual power generator 3 |
| 31-28 | Actual frequency generator 3 |
| 32 | Temperature generator 3 |
| 36-33 | STATUS generator 4 |
| 38-37 | Actual power generator 4 |
| 42-39 | Actual frequency generator 4 |
| 43 | Temperature generator 4 |
| 47-44 | Status generator 5 |
| 49-48 | Actual power generator 5 |
| 53-50 | Actual frequency generator 5 |
| 54 | Temperature generator 5 |
| 58-55 | Status generator 6 |
| 60-59 | Actual power generator 6 |
| 64-61 | Actual frequency generator 6 |
| 65 | Temperature generator 6 |
| 69-66 | Firmware version |

*Tab. 51:   Input process data of the generators*

| Status byte 0 (Communication status) | | | |
|---|---|---|---|
| **Bit 7-3** | **Bit 2** | **Bit 1** | **Bit 0** |
| 0 | Error | Timeout | OK |

*Tab. 52: Input process data status byte 0*

**OK**     Bit 0 = 1: RS-485 communication to generator OK

**Timeout**     Bit 1 = 1: RS-485 communication to generator faulty

**Error**     Bit 2 = 1: RS-485 communication to generator faulty, data record error

| Status byte 1 (Generator status) | | | |
|---|---|---|---|
| **Bit 7-3** | **Bit 2** | **Bit 1** | **Bit 0** |
| 0 | Error | Search active | Sonic active |

*Tab. 53: Input process data status byte 1*

**Sonic active**     Bit 0 = 1: Generator emits HF

**Search active**     Bit 1 = 1: Search in generator active

**Error**     Bit 2 = 1: Generator defect, for description see status byte 2

| Status byte 2 (Generator error code) |
|---|
| **Bit 7-0** |
| Error code |

*Tab. 54: Input process data status byte 2*

**Error code**     Error number of the error detected in the generator

| Status byte 3 (Generator address) |
|---|
| **Bit 7-0** |
| Address |

*Tab. 55: Input process data status byte 3*

**Address**     RS-485 address of the generator. This address must be entered as the IP address on the generator in the SETTINGS menu.

| Current power |
|:---:|
| **Bit 15-0** |
| x |

*Tab. 56:   Input process data "Current power"*

Display of the currently emitted power output in [W]; the entry is made in hexadecimal form.

Range for x: Please refer to the operating manual for the generator.

Example:     Hex value: 0x3E8     Emitted power output = 1000 W
                    Hex value: 0x79E     Emitted power output = 1950 W

| Working frequency |
|:---:|
| **Bit 31-0** |
| x |

*Tab. 57:   Input process data "Working frequency"*

Display of the current operating frequency in Hz; the entry is made in hexadecimal form.

Range for x: Please refer to the operating manual for the generator.

Example: Hex value: 0x639C     Actual frequency = 25,500 Hz
                Hex value: 0xC800     Actual frequency = 51,200 Hz

| Current temperature |
|:---:|
| **Bit 7-0** |
| x |

*Tab. 58:   Input process data "Current temperature"*

Display of the current generator temperature in degrees Celsius; the entry is made in hexadecimal form.

Range for x: 0 °C – 80 °C in 1 °C increments

Example: Hex value: 0x18     Actual temperature = 24 °C
                Hex value: 0x40     Actual temperature = 64 °C

| Firmware version of converter |
|:---:|
| **Bit 23-0** |
| x |

*Tab. 59:   Input process data "Firmware version of converter"*

Display of the firmware version of converter; the entry is made in hexadecimal form.

Range for x: Please refer to the operating manual for the generator.

Example:     Version = 1.02.03.04     Hex value: 0xF9190

## 7.2.2    EtherCAT process data

The EtherCAT fieldbus interface is supported from firmware version 1.03 onwards. The values of the I/Os can be accessed via the process data. The CoE objects stated in Tables 60 and 61 define the mapping of the process data. The content of these objects, and thereby the definition of the PDOs, is shown in Chapter 7.2.1. The mapping is static.

### 7.2.2.1    PDO mapping register

| Index | Subindex | Rights | Name | Description/value |
|-------|----------|--------|------|-------------------|
| 0x1600 | 0 | RO | Number of entries | 18 |
| | 1 | RO | Output data object 1 | Index 0x2001 Subindex 0 |
| | 2 | RO | Output data object 2 | Index 0x2002 Subindex 0 |
| | 3 | RO | Output data object 3 | Index 0x2003 Subindex 0 |
| | 4 | RO | Output data object 4 | Index 0x2004 Subindex 0 |
| | 5 | RO | Output data object 5 | Index 0x2005 Subindex 0 |
| | 6 | RO | Output data object 6 | Index 0x2006 Subindex 0 |
| | 7 | RO | Output data object 7 | Index 0x2007 Subindex 0 |
| | 8 | RO | Output data object 8 | Index 0x2008 Subindex 0 |
| | 9 | RO | Output data object 9 | Index 0x2009 Subindex 0 |
| | 10 | RO | Output data object 10 | Index 0x200A Subindex 0 |
| | 11 | RO | Output data object 11 | Index 0x200B Subindex 0 |
| | 12 | RO | Output data object 12 | Index 0x200C Subindex 0 |
| | 13 | RO | Output data object 13 | Index 0x200D Subindex 0 |
| | 14 | RO | Output data object 14 | Index 0x200E Subindex 0 |
| | 15 | RO | Output data object 15 | Index 0x200F Subindex 0 |
| | 16 | RO | Output data object 16 | Index 0x2010 Subindex 0 |
| | 17 | RO | Output data object 17 | Index 0x2011 Subindex 0 |
| | 18 | RO | Output data object 18 | Index 0x2012 Subindex 0 |

| Index | Subindex | Rights | Name | Description/value |
|-------|----------|--------|------|-------------------|
| 0x1A00 | 0 | RO | Number of entries | 70 |
| | 1 | RO | Input data object 1 | Index 0x2013 Subindex 0 |
| | 2 | RO | Input data object 2 | Index 0x2014 Subindex 0 |
| | 3 | RO | Input data object 3 | Index 0x2015 Subindex 0 |
| | 4 | RO | Input data object 4 | Index 0x2016 Subindex 0 |
| | 5 | RO | Input data object 5 | Index 0x2017 Subindex 0 |
| | 6 | RO | Input data object 6 | Index 0x2018 Subindex 0 |
| | 7 | RO | Input data object 7 | Index 0x2019 Subindex 0 |
| | 8 | RO | Input data object 8 | Index 0x201A Subindex 0 |
| | 9 | RO | Input data object 9 | Index 0x201B Subindex 0 |
| | 10 | RO | Input data object 10 | Index 0x201C Subindex 0 |
| | 11 | RO | Input data object 11 | Index 0x201D Subindex 0 |
| | 12 | RO | Input data object 12 | Index 0x201E Subindex 0 |
| | 13 | RO | Input data object 13 | Index 0x201F Subindex 0 |
| | 14 | RO | Input data object 14 | Index 0x2020 Subindex 0 |
| | 15 | RO | Input data object 15 | Index 0x2021 Subindex 0 |
| | 16 | RO | Input data object 16 | Index 0x2022 Subindex 0 |
| | 17 | RO | Input data object 17 | Index 0x2023 Subindex 0 |
| | 18 | RO | Input data object 18 | Index 0x2024 Subindex 0 |
| | 19 | RO | Input data object 19 | Index 0x2025 Subindex 0 |
| | 20 | RO | Input data object 20 | Index 0x2026 Subindex 0 |
| | 21 | RO | Input data object 21 | Index 0x2027 Subindex 0 |
| | 22 | RO | Input data object 22 | Index 0x2028 Subindex 0 |
| | 23 | RO | Input data object 23 | Index 0x2029 Subindex 0 |
| | 24 | RO | Input data object 24 | Index 0x202A Subindex 0 |
| | 25 | RO | Input data object 25 | Index 0x202B Subindex 0 |

*Tab. 60:   PDO Mapping Register*

### 7.2.2.2    PDO register

| Index | Subindex | Rights | Name | Description/value |
|---|---|---|---|---|
| 0x2001 | 0 | RO | Number of entries | 1 |
| | 1 | RO | Generator control generator 1 | Output process data byte 0 |
| 0x2002 | 0 | RO | Number of entries | 1 |
| | 1 | RO | Setpoint power generator 1 | Output process data byte 1 |
| 0x2003 | 0 | RO | Number of entries | 1 |
| | 1 | RO | Setpoint frequency generator 1 | Output process data byte 2 |
| 0x2004 | 0 | RO | Number of entries | 1 |
| | 1 | RO | Generator control generator 2 | Output process data byte 3 |
| 0x2005 | 0 | RO | Number of entries | 1 |
| | 1 | RO | Setpoint power generator 2 | Output process data byte 4 |
| 0x2006 | 0 | RO | Number of entries | 1 |
| | 1 | RO | Setpoint frequency generator 2 | Output process data byte 5 |
| 0x2007 | 0 | RO | Number of entries | 1 |
| | 1 | RO | Generator control generator 3 | Output process data byte 6 |
| 0x2008 | 0 | RO | Number of entries | 1 |
| | 1 | RO | Setpoint power generator 3 | Output process data byte 7 |
| 0x2009 | 0 | RO | Number of entries | 1 |
| | 1 | RO | Setpoint frequency generator 3 | Output process data byte 8 |
| 0x200A | 0 | RO | Number of entries | 1 |
| | 1 | RO | Generator control generator 4 | Output process data byte 9 |
| 0x200B | 0 | RO | Number of entries | 1 |
| | 1 | RO | Setpoint power generator 4 | Output process data byte 10 |
| 0x200C | 0 | RO | Number of entries | 1 |
| | 1 | RO | Setpoint frequency generator 4 | Output process data byte 11 |
| 0x200D | 0 | RO | Number of entries | 1 |
| | 1 | RO | Generator control generator 5 | Output process data byte 12 |
| 0x200E | 0 | RO | Number of entries | 1 |
| | 1 | RO | Setpoint power generator 5 | Output process data byte 13 |
| 0x200F | 0 | RO | Number of entries | 1 |
| | 1 | RO | Setpoint frequency generator 5 | Output process data byte 14 |
| 0x2010 | 0 | RO | Number of entries | 1 |
| | 1 | RO | Generator control generator 6 | Output process data byte 15 |
| 0x2011 | 0 | RO | Number of entries | 1 |
| | 1 | RO | Setpoint power generator 6 | Output process data byte 16 |
| 0x2012 | 0 | RO | Number of entries | 1 |
| | 1 | RO | Setpoint frequency generator 1 | Input process data byte 17 |
| 0x2013 | 0 | RO | Number of entries | 4 |
| | 1 | RO | status generator 1 | Input process data byte 0-3 |
| 0x2014 | 0 | RO | Number of entries | 2 |
| | 1 | RO | actual power generator 1 | Input process data byte 4-5 |
| 0x2015 | 0 | RO | Number of entries | 4 |
| | 1 | RO | actual frequency generator 1 | Input process data byte 6-9 |
| 0x2016 | 0 | RO | Number of entries | 1 |
| | 1 | RO | temperature generator 1 | Input process data byte 10 |

| Index | Subindex | Rights | Name | Description/value |
|---|---|---|---|---|
| 0x2017 | 0 | RO | Number of entries | 4 |
| | 1 | RO | status generator 2 | Input process data byte 11-14 |
| 0x2018 | 0 | RO | Number of entries | 2 |
| | 1 | RO | actual power generator 2 | Input process data byte 15-16 |
| 0x2019 | 0 | RO | Number of entries | 4 |
| | 1 | RO | actual frequency generator 2 | Input process data byte 17-20 |
| 0x201A | 0 | RO | Number of entries | 1 |
| | 1 | RO | temperature generator 2 | Input process data byte 21 |
| 0x201B | 0 | RO | Number of entries | 4 |
| | 1 | RO | status generator 3 | Input process data byte 22-25 |
| 0x201C | 0 | RO | Number of entries | 2 |
| | 1 | RO | actual power generator 3 | Input process data byte 26-27 |
| 0x201D | 0 | RO | Number of entries | 4 |
| | 1 | RO | actual frequency generator 3 | Input process data byte 28-31 |
| 0x201E | 0 | RO | Number of entries | 1 |
| | 1 | RO | temperature generator 3 | Input process data byte 32 |
| 0x201F | 0 | RO | Number of entries | 4 |
| | 1 | RO | status generator 4 | Input process data byte 33-36 |
| 0x2020 | 0 | RO | Number of entries | 2 |
| | 1 | RO | actual power generator 4 | Input process data byte 37-38 |
| 0x2021 | 0 | RO | Number of entries | 4 |
| | 1 | RO | actual frequency generator 4 | Input process data byte 39-42 |
| 0x2022 | 0 | RO | Number of entries | 1 |
| | 1 | RO | temperature generator 4 | Input process data byte 43 |
| 0x2023 | 0 | RO | Number of entries | 4 |
| | 1 | RO | status generator 5 | Input process data byte 44-47 |
| 0x2024 | 0 | RO | Number of entries | 2 |
| | 1 | RO | actual power generator 5 | Input process data byte 48-49 |
| 0x2025 | 0 | RO | Number of entries | 4 |
| | 1 | RO | actual frequency generator 5 | Input process data byte 50-53 |
| 0x2026 | 0 | RO | Number of entries | 1 |
| | 1 | RO | temperature generator 5 | Input process data byte 54 |
| 0x2027 | 0 | RO | Number of entries | 4 |
| | 1 | RO | status generator 6 | Input process data byte 55-58 |
| 0x2028 | 0 | RO | Number of entries | 2 |
| | 1 | RO | actual power generator 6 | Input process data byte 59-60 |
| 0x2029 | 0 | RO | Number of entries | 4 |
| | 1 | RO | actual frequency generator 6 | Input process data byte 61-64 |
| 0x202A | 0 | RO | Number of entries | 1 |
| | 1 | RO | temperature generator 6 | Input process data byte 65 |
| 0x202B | 0 | RO | Number of entries | 4 |
| | 1 | RO | Firmware version of converter | Input process data byte 66-69 |

*Tab. 61:   PDO Register*

# 8      Status and error display, troubleshooting

*This chapter provides notes and information on actions that can be taken to eliminate errors and malfunctions.*

Diagnostics are performed with the LEDs of the status display on the RS485ProfiXConv. The following table describes the possible status/error displays and provides information on their cause and how they can be remedied.
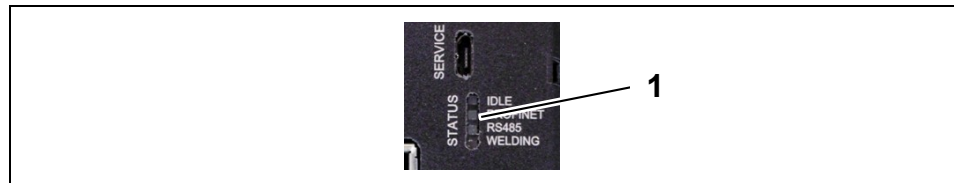


*Fig. 21:     Status LEDs on the front panel of the device*

1)   Status display

| LED | Behaviour | Meaning | Remedy |
|---|---|---|---|
| **IDLE** | Flashing frequency of LED approx. 1 Hz | The module is ready for operation. | |
| **PROFINET PROFIBUS EtherCAT** | LED flashes on briefly / off for a longer period | There is no field bus connection. | Check the field bus cable. Check the field bus master. MULTI PURPOSE: Check whether all input and output process data is incorporated into the PLC. SURFACE TECHNOLOGY: Check whether all input and output process data is incorporated into the PLC for all 6 generators. |
| | LED permanently on | Field bus connection is established. | |
| **RS485** | LED flashes on briefly / off for a longer period | The RS-485 connection to at least one generator is faulty. | Check the RS485 cable. Check whether the generator is switched on. SURFACE TECHNOLOGY: Check whether all generators enabled in the field bus control byte are switched on. |
| | LED on | There is an RS-485 connection. | |
| **WELDING** | Flashing frequency of LED approx. 1 Hz | The module configuration has been changed. | Check the configuration. Restart the module (switch the supply voltage off and on again). |
| | LED on | Module is configured for MULTI PURPOSE operation. | |
| | LED off | Module is configured for SURFACE TECHNOLOGY operation. | |

*Tab. 62:   Status and error display, troubleshooting*

# 9      Care and maintenance

The device does not contain any components requiring maintenance.

The device does not require any special care.

| NOTE |
|------|
| **§**     ▪    Do not use any aggressive cleaning agents. <br> ▪    Do not use ultrasound to clean the generator. <br> ▪    Remove dust and dirt regularly using a damp cloth. |

## 9.1      Maintenance

Defective components must always be replaced with original spare parts. Original spare parts must be used in order to comply with safety requirements.

1. Disconnect the connection cables on the device.
2. Replace the device/component.
3. Contact the connection cables.
☑ **The device is ready for use.**

## 9.2      Repair work

We recommend replacing defective devices.

When sending in equipment for inspection or repair work, please always provide the following information:

- ▪ type of error,
- ▪ surrounding circumstances,
- ▪ suspected cause of the error,
- ▪ any unusual events preceding the error.

# 10    Life cycle

*This chapter contains information relating to the individual life cycles from transport to disposal.*

## 10.1    Transport / Packaging

The transport route chosen plays a part in the type of packaging used. The de-vice is supplied in suitable packaging. For overseas shipping, it is protected from corrosion using a suitable casing.

| **NOTE** |
|:---:|
| §     The symbols on the packaging and applicable regulations must be observed. |

## 10.2    Installation

### 10.2.1    Unpacking and cleaning

Unpack the unit with care! If the packaging is not opened in a correct manner, components can be damaged and the function of the ultrasonic unit impaired or the unit rendered unusable.

- Take care when removing equipment from its packaging,

- avoid extended periods of outdoor storage, as environmental influences can soil and potentially even damage the ultrasonic equipment.
  The correct functioning of the system is then no longer ensured,

- do not use compressed air to clean the system.

### 10.2.2    Check for completeness

Use the delivery note or packaging slip to check that delivery is complete. Please notify Weber Ultrasonics without delay if the delivery was incomplete.

In case of transport damage, immediately have the damage confirmed by the trans-port company.

| **NOTE** |
|:---:|
| §     A sketch or photo of the damage would be very helpful and facilitate understanding. |

### 10.2.3   Installation site

The devices are designed for indoor use in a closed and dry hall.

When positioning the equipment, select a location which ensures that it is protected from:

- moisture,
- water and steam,
- aggressive vapours and chemically contaminated ambient air,
- alkaline environments,
- direct sunlight (UV light) and heat (maximum ambient temperature 40 °C),
- cold (minimum ambient temperature 10 °C),
- dust.

### 10.2.4   Installation and assembly

When installing the device, make sure that it is attached properly.

**Procedure**

1. Establish all screw connections, locking mechanisms and other connections properly.

☑   **The device is now fitted.**

| NOTE |
|---|
| All isolating and contact points (power supply, data cables) should be checked and, if necessary, re-contacted.<br><br>Cables should never be kinked. |

## 10.3   Supply and installation

### 10.3.1   Control cables and mains connections

All connections at the place of installation must comply with the applicable standards, directives and guidelines.

## 10.4   Commissioning

The following must be carried out during commissioning:

- check the installation,
- check the energy supply,
- switch on the complete system / ultrasonic generator units.

## 10.5    Temporary non-use

For temporary non-use of the ultrasonic generator, it must be ensured that the ambient conditions for storage are appropriate.

Procedures to be carried out prior to temporary non-use/storage:

- Disconnect the power supply.

- Disconnect the data lines.

- Protect the device from corrosion and store appropriately.

| **NOTE** |
|---|
| Following a period of temporary decommissioning, the equipment must be recommissioned. |

## 10.6    Decommissioning

Procedures to be carried out prior to decommissioning:

- switch off the ultrasonic generator,

- switch off the power supply and disconnect correctly,

- Disconnect the data lines properly.

## 10.7    Disposal

| **ATTENTION** |
|---|
| **The equipment must be disposed of according to the local regulations and directives for recycling.**<br><br>■ Information is provided by the relevant authorities and by authorised companies.<br><br>■ Should you have any questions relating to disposal, contact Weber Ultrasonics! |

# SERVICE

**Spare parts**

Spare parts and accessories can only be supplied if the serial number of the device is specified.

**Service hotline**

Should you still have any questions after having carefully read the operating instructions, call our service hotline.

Please have the following information to hand to help us answer your questions quickly:

Device type and serial number (Please refer to the rating plate on the device).

**Our service hotline number:**

# +49 7248 9207-0