

## 5. SIRIUS® measurement modules

### 5.1. Data transfer overview

Dewesoft offers SIRIUS® slices that can use different data-transfer technologies:

- USB
  - high data-throughput allows for high sampling rates (up to 1 MS/s)
  - extra connectors for power and synchronisation required
  - direct connection to USB ports on the PC
- Standard EtherCAT®
  - only one single cable needed for data, synchronisation and power
  - Data-throughput allows for sampling rates up to 20 kS/s
  - direct connection to standard Ethernet port on the PC possible
- DS-EtherCAT+
  - this is a Dewesoft enhancement to the EtherCAT® standard, so that we can combine the advantages of Standard Ethernet and USB data-transfer

#### 5.1.1. USB data transfer

USB is a high speed data bus being able to transmit full speed data for all channels to the measurement PC. The SIRIUS® USB slices allow sampling rates of up to 1 MHz (high-speed) and can be directly connected to native USB ports on the measurement PC (or SBOX). In comparison to the EtherCAT® version, the SIRIUS®-USB slices need extra connectors for power supply and synchronisation.

#### 5.1.2. EtherCAT® data transfer

EtherCAT® - Ethernet for Control Automation Technology - is a 100 Mbit/s Ethernet-based fieldbus system. The protocol is standardized in IEC 61158 and is suitable for both hard and soft real-time requirements. EtherCAT® can be used for applications that require short data update times with low communication jitter (for precise synchronisation purposes).



#### **Important**

When connecting EtherCAT® devices to the computer please make sure that you connect the EtherCAT® cable directly to the Ethernet card of your PC without the use of network switches or hubs.



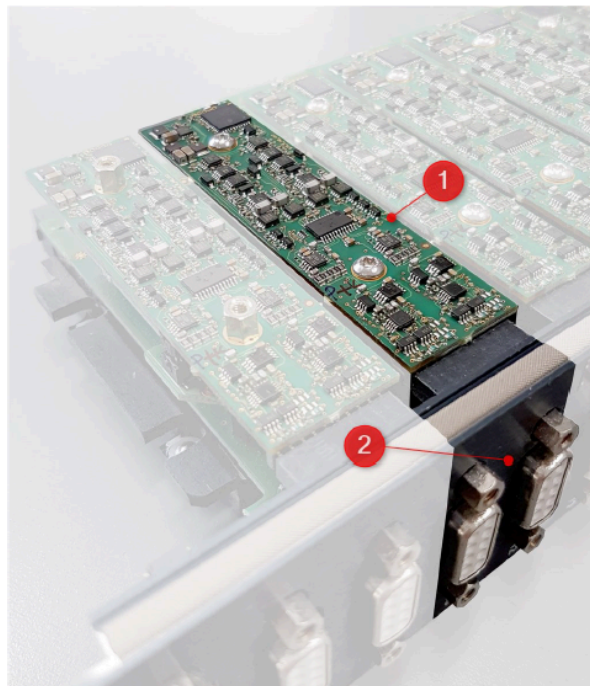
#### **Important**

The EtherCAT version of SIRIUS works with a range of 9 - 36V, and not up to 48V, even though the range is up to 48V for other product lines with EtherCAT.

## 5.2. Technology overview

### Module

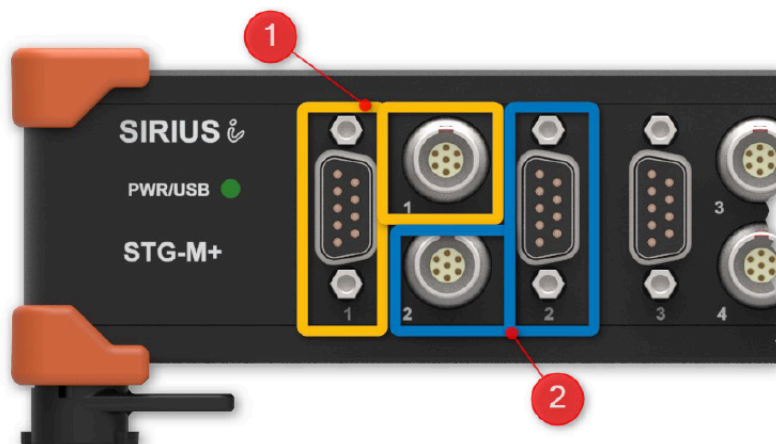
Each SIRIUS® slice can contain up to 8 measurement modules. The illustration below “SIRIUS-HD module” shows an open SIRIUS® HD measurement slice. The highlighted green PCB ① is a single measurement module. You can see ② that this HD slice has 2 connectors (and thus 2 channels) which are both connected to the same measurement module.



*SIRIUS-HD module*

The next illustration below “SIRIUS-STGM+ module” shows SIRIUS front with two STG-M+ modules in different colours. The first module ① is surrounded by yellow boxes, the 2nd module ② is highlighted with blue boxes. Each module has a DSUB-9 connector for the analog signals and a LEMO connector for the digital signals.

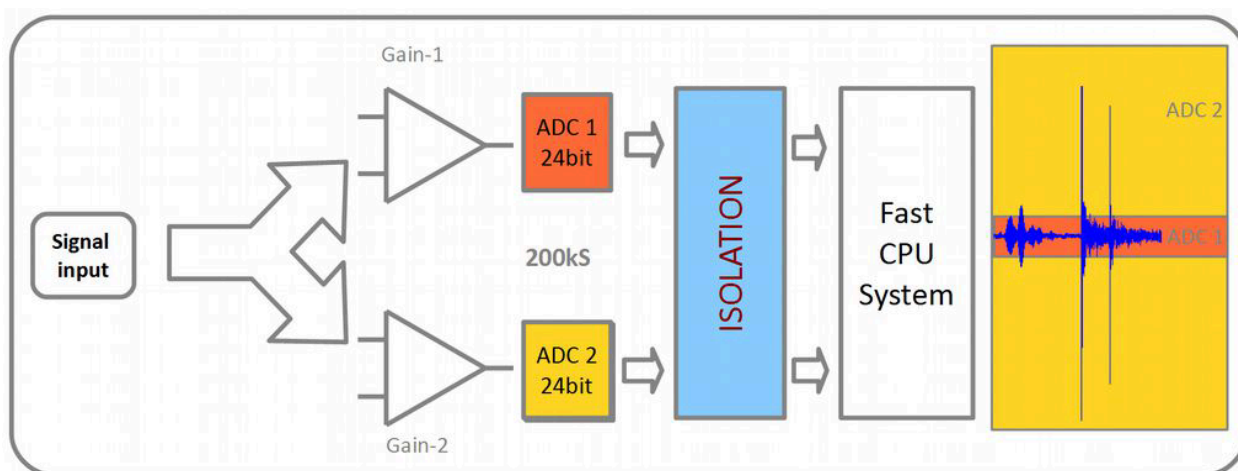
Note that the STGM (DSUB-9 female) & CNT (7-pin LEMO female) connectors for the 2 modules share the common electronic circuit inside. Thus you must always configure these modules as pairs.



*SIRIUSi-STGM+ module*

### 5.2.1. SIRIUS® DUAL CORE series: high dynamic (up to 160 dB)

This new technology solves the often faced problem, that the signal is just much higher than expected and therefore clipped. Dewesoft DUAL CORE ADC technology always gives you the full possible measuring range, because the signal is measured with a high and a low gain at the same time.

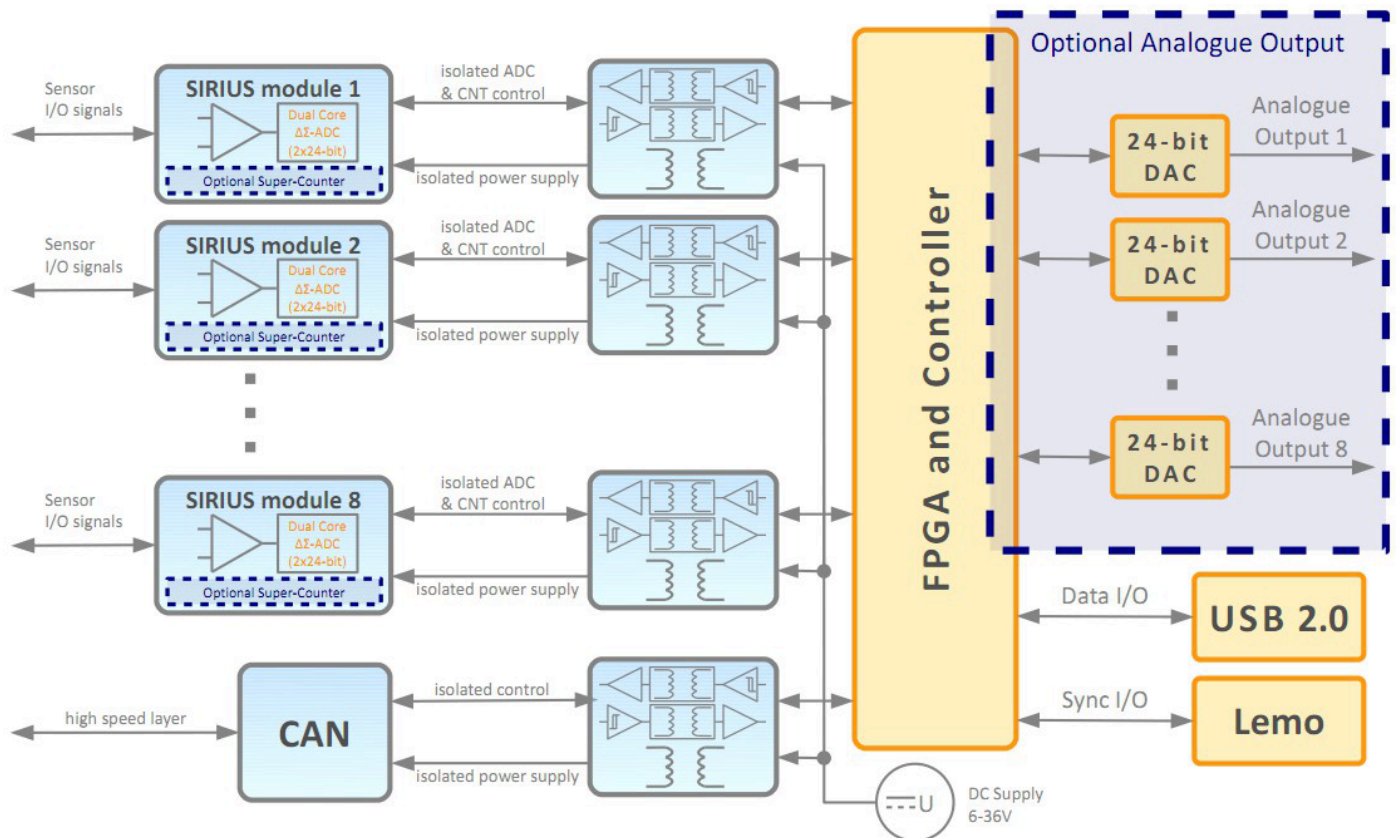


*SIRIUS Dual Core*

### 5.2.5. Isolated version: USB

The (standard) SIRIUSi modules are isolated between each other and the main board. Some modules generate power for electronics and for external pins: this power supply is again isolated against other modules, the main board and the housing.

Inside of one module, the power supply pins, counter and analog inputs are not isolated between themselves (they have the same ground) that is available on the GND connector pin (e.g. The analog input and the counter of one ACC+ module share the same GND).



*Isolated motherboard*



#### Warning

Be careful with voltages >25 VAC or >35 VDC! These voltages are already high enough in order to get a perilous electric shock by touching the wiring.

## 5.3. SIRIUS® slice configuration

SIRIUS is available in different versions and enclosures: as a standalone single slice or integrated in a Boxed Solution, Rack, etc.

### 5.3.1. Standard slice

#### 5.3.1.1. SIRIUSi 8xACC



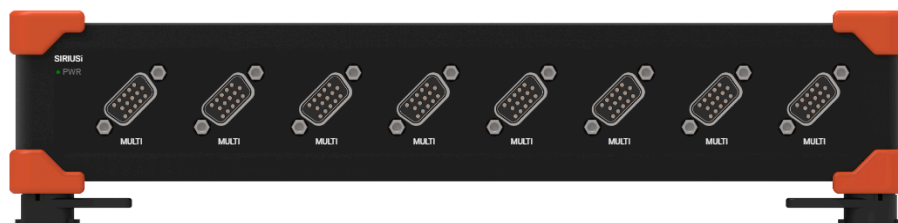
*SIRIUSi-8xACC*

#### 5.3.1.2. SIRIUSi 6xACC, 2xACC+



*SIRIUSi-6xACC-2xACC+*

#### 5.3.1.3. SIRIUSi 8xMULTI



*SIRIUSi-8xMULTI*

#### 5.3.1.4. SIRIUSi 8xSTGM



*SIRIUSi-8xSTGM*

#### 5.3.1.5. SIRIUSi 8xSTG



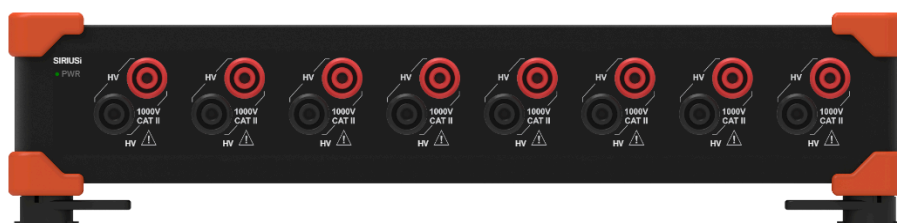
*SIRIUSi-8xSTG*

#### 5.3.1.6. SIRIUSi 8xSTG-L2B10f



*SIRIUSi-8xSTG-L2B10f*

#### 5.3.1.7. SIRIUSi 8xHV



*SIRIUSi-8xHV*

## 5.4. SIRIUS® Dual Core specifications

|                                                                           | UNI                                                          | STG                                            | STGM                                                   | MULTI                                                  | ACC                                        |
|---------------------------------------------------------------------------|--------------------------------------------------------------|------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|--------------------------------------------|
| Connectors                                                                | DSUB-9, L2B10f                                               | DSUB-9, L2B7f, L2B10f                          | DSUB-9, L2B7f, L2B10f                                  | DSUB-15, L2B16f                                        | BNC, TNC                                   |
| Counter version                                                           | ✓                                                            | ✓                                              | ✓                                                      | ✓                                                      | ✓                                          |
| Isolated version                                                          | ✓                                                            | ✓                                              | ✓                                                      | ✓                                                      | ✓                                          |
| Differential version                                                      | ✓                                                            | ✓                                              | ✓                                                      | ✓                                                      | ✓                                          |
| EtherCAT version                                                          | ✓                                                            | ✓                                              | ✓                                                      | ✓                                                      | ✓                                          |
| Rack version                                                              | ✓                                                            | ✓                                              | ✓                                                      | ✓                                                      | ✓                                          |
| Fanless version                                                           | ✗                                                            | ✗                                              | ✓                                                      | ✗                                                      | ✓                                          |
| Channels per slice                                                        | 8                                                            | 8                                              | 8                                                      | 8                                                      | 8                                          |
| Data rate / channel                                                       | 200 kS/sec USB, 20 kS/sec EtherCAT                           | 200 kS/sec USB, 20 kS/sec EtherCAT             | 200 kS/sec USB, 20 kS/sec EtherCAT                     | 200 kS/sec USB, 20 kS/sec EtherCAT                     | 200 kS/sec USB, 20 kS/sec EtherCAT         |
| Resolution                                                                | 24-bit dual core                                             | 24-bit dual core                               | 24-bit dual core                                       | 24-bit dual core                                       | 24-bit dual core                           |
| Bandwidth                                                                 | 70 kHz                                                       | 70 kHz                                         | 70 kHz                                                 | 70 kHz                                                 | 70 kHz                                     |
| Voltage ranges                                                            | ±100 V, ±10 V, ±1 V, ±100 mV, ±10 mV                         | ±50 V, ±10 V, ±1 V, ±100 mV                    | ±10 V, ±1 V, ±100 mV, ±10 mV                           | ±10 V, ±1 V, ±100 mV, ±50 mV                           | ±10 V, ±500 mV                             |
| Input coupling                                                            | DC, AC 0.3 Hz / 0.16 Hz (1, 3, 5, 10, 20 Hz SW)              | DC, AC 1 Hz (3, 10 Hz SW)                      | DC                                                     | DC                                                     | DC, AC 0.1 Hz, 1 Hz                        |
| Sensor excitation                                                         | 0..20 V max. 0.8 W, 0..60 mA max 0.5 W, IEPE 2..20 mA        | 0..20 V max. 0.8 W, 0..60 mA max 0.5 W         | 0..15 V max. 44 mA                                     | 0..12 V max. 44 mA                                     | IEPE 2, 4, 8, 12, 16, 20 mA                |
| Bridge connection                                                         | Full, ½, ¼ 350 Ω, ¼ 120 Ω 3, 4 wire                          | Full, ½, ¼ 350 Ω, ¼ 120 Ω 3, 4 wire            | Full, ½, ¼ 350 Ω, ¼ 120 Ω 3 wire                       | Full, ½, ¼ 350 Ω, ¼ 120 Ω 3 wire                       | ✗                                          |
| Programmable shunt                                                        | 59.88 kΩ, 175 kΩ bipolar                                     | 59.88 kΩ, 175 kΩ bipolar                       | 100 kΩ bipolar                                         | 59.88 kΩ                                               | ✗                                          |
| IEPE input                                                                | ✓                                                            | DSI-ACC                                        | DSI-ACC                                                | DSI-ACC                                                | ✓                                          |
| Resistance                                                                | ✓                                                            | ✓                                              | ✗                                                      | ✗                                                      | ✗                                          |
| Temperature (PTx)                                                         | ✓                                                            | ✓                                              | DSI-RTD                                                | DSI-RTD                                                | ✗                                          |
| Thermocouple                                                              | DSI-TH                                                       | DSI-TH                                         | DSI-TH                                                 | DSI-TH                                                 | ✗                                          |
| Current                                                                   | ext. shunt, DSI                                              | ext. shunt, DSI                                | ext. shunt, DSI                                        | ext. shunt, DSI                                        | ext. shunt                                 |
| Potentiometer                                                             | ✓                                                            | ✓                                              | ✓                                                      | ✓                                                      | ✗                                          |
| LVDT                                                                      | DSI-LVDT                                                     | DSI-LVDT                                       | DSI-LVDT                                               | DSI-LVDT                                               | ✗                                          |
| Charge                                                                    | DSI-CHG                                                      | DSI-CHG                                        | DSI-CHG                                                | DSI-CHG                                                | ✗                                          |
| TEDS                                                                      | ✓                                                            | ✓                                              | ✓                                                      | ✓                                                      | ✓                                          |
| Isolation voltage                                                         | 1000 V                                                       | 1000 V                                         | 1000 V                                                 | 1000 V                                                 | 1000 V                                     |
| Power consumption per channel                                             | 2 W/ch                                                       | 2 W/ch                                         | 1.3 W/ch                                               | 1.3 W/ch                                               | 1 W/ch                                     |
| Advanced functions                                                        | Supports all strain types, IEPE sensors and high input range | Supports all strain types and high input range | Low power, sensor and amplifier balance, bipolar shunt | Analog Output, Low power, sensor and amplifier balance | Sensor error detection, high dynamic range |
| (I) Fanless operation only for BNC or Banana version (without excitation) |                                                              |                                                |                                                        |                                                        |                                            |

|                                                                           | MIC200                                   | CHG                                                     | HV                                 | LV                                                  |
|---------------------------------------------------------------------------|------------------------------------------|---------------------------------------------------------|------------------------------------|-----------------------------------------------------|
| Connectors                                                                | L1B7f                                    | BNC, TNC                                                | BANANA                             | DSUB-9, BNC, BANANA                                 |
| Counter version                                                           | ✗                                        | ✓                                                       | ✗                                  | ✓                                                   |
| Isolated version                                                          | ✓                                        | ✓                                                       | ✓                                  | ✓                                                   |
| Differential version                                                      | ✗                                        | ✗                                                       | ✗                                  | ✓                                                   |
| EtherCAT version                                                          | ✓                                        | ✓                                                       | ✓                                  | ✓                                                   |
| Rack version                                                              | ✓                                        | ✓                                                       | ✓                                  | ✓                                                   |
| Fanless version                                                           | ✓                                        | ✗                                                       | ✓                                  | ✓ (see 1)                                           |
| Channels per slice                                                        | 8                                        | 8                                                       | 8                                  | 8                                                   |
| Data rate / channel                                                       | 200 kS/sec USB, 20 kS/sec EtherCAT       | 200 kS/sec USB, 20 kS/sec EtherCAT                      | 200 kS/sec USB, 20 kS/sec EtherCAT | 200 kS/sec USB, 20 kS/sec EtherCAT                  |
| Resolution                                                                | 24-bit dual core                         | 24-bit dual core                                        | 24-bit dual core                   | 24-bit dual core                                    |
| Bandwidth                                                                 | 70 kHz                                   | 70 kHz                                                  | 70 kHz                             | 70 kHz                                              |
| Voltage ranges                                                            | ±10 V, ±500 mV                           | ±10 V, ±500 mV                                          | ±1200 V, ±50 V                     | ±200 V, ±10 V, ±1 V, ±100 mV                        |
| Input coupling                                                            | AC 0.35 Hz (3, 10 Hz SW)                 | DC, AC 0.1 Hz, 1 Hz, 10 Hz, 100 Hz                      | DC                                 | DC, AC 1 Hz (3, 10 Hz SW)                           |
| Sensor excitation                                                         | 14 V bipolar, 200 V polarization         | IEPE 4, 8, 12 mA                                        | ✗                                  | 2..30 V bipolar, 0..24 V unipolar, max. 0.2 A / 2 W |
| Bridge connection                                                         | ✗                                        | ✗                                                       | ✗                                  | Full                                                |
| Programmable shunt                                                        | ✗                                        | ✗                                                       | ✗                                  | ✗                                                   |
| IEPE input                                                                | ✗                                        | ✓                                                       | ✗                                  | DSI-ACC                                             |
| Resistance                                                                | ✗                                        | ✗                                                       | ✗                                  | ✗                                                   |
| Temperature (PTx)                                                         | ✗                                        | ✗                                                       | ✗                                  | DSI-RTD                                             |
| Thermocouple                                                              | ✗                                        | ✗                                                       | ✗                                  | DSI-TH                                              |
| Current                                                                   | ext. shunt                               | ext. shunt                                              | ✗                                  | ext. shunt, DSI                                     |
| Potentiometer                                                             | ✗                                        | ✗                                                       | ✗                                  | ✗                                                   |
| LVDT                                                                      | ✗                                        | ✗                                                       | ✗                                  | DSI-LVDT                                            |
| Charge                                                                    | ✗                                        | 100 k, 10 k pC                                          | ✗                                  | DSI-CHG                                             |
| TEDS                                                                      | ✓                                        | ✓                                                       | ✗                                  | ✓                                                   |
| Isolation voltage                                                         | 1000 V                                   | 1000 V                                                  | CAT II 1000 V                      | 1000 V                                              |
| Power consumption per channel                                             | 1.1 W/ch                                 | 1.2 W/ch                                                | 1 W/ch                             | 1.2 W/ch                                            |
| Advanced functions                                                        | Supports polarized condenser microphones | Sensor error detection in IEPE and CHG mode (injection) | High voltage, high isolation       | High sensor power and multi range                   |
| (1) Fanless operation only for BNC or Banana version (without excitation) |                                          |                                                         |                                    |                                                     |

## 5.7. General specification

The general specifications apply to all SIRIUS® measurement slices unless otherwise noted at the specific measurement slice.

| Power                        |                                                                                                                                              |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Power Supply                 | 9 - 36 V DC                                                                                                                                  |
| Power consumption            | Typ. 15 - 35 W                                                                                                                               |
| Environmental                |                                                                                                                                              |
| Operating Temperature        | -10 to 50 °C (40 °C for fanless series)                                                                                                      |
| Storage Temperature          | -40 to 85 °C                                                                                                                                 |
| Humidity                     | 5 to 95 % RH non condensing @ 60 °C                                                                                                          |
| IP rating                    | IP20 (IP50 for fanless series)                                                                                                               |
| Shock & Vibration            | Vibration sweep sinus (EN 60068-2-6:2008)<br>Vibration random (EN 60721-3-2: 1997 - Class 2M2)<br>Shock (EN 60068-2-27:2009)<br>MIL-STD-810D |
| Dimensions                   | 266 mm x 149 mm x 55 mm<br>266 mm x 149 mm x 69 mm (extended slice)                                                                          |
| Acquisition rate             |                                                                                                                                              |
| Time base accuracy           | Typical 5 ppm, Max: 20 ppm                                                                                                                   |
| Synchronisation              |                                                                                                                                              |
| Delay between slices         | 50 nsec                                                                                                                                      |
| Max. Sync-cable length       | 100 m (Master/Slave), 200 m (IRIG)                                                                                                           |
| EtherCAT®: Max. cable length | 100 m                                                                                                                                        |
| Sync Input / Output          |                                                                                                                                              |
| Level (Input/Output)         | TTL compatible                                                                                                                               |
| Max. Output Current          | ±24 mA (±50 mA for 1 sec)                                                                                                                    |