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Version: 1.1
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1. Introduction

The "ETCio 100" EtherCAT IO module permits the simple, quick connection of analog and digital input and output signals to EtherCAT systems – whether in component test benches, mobile applications, or in the area of industrial automation as a universally applicable interface.

In the ETCio 100, you have purchased a high-quality electronic component that has been developed and manufactured according to the latest technological state of the art. The ETCio 100 was developed according to the EtherCAT specification V1.0.2 and the EtherCAT Protocol Enhancements version 1.0.0.

This manual should help you gain familiarity with the ETCio 100. Please read this manual before using the unit for the first time.

1.1 Features

Power supply voltage and power consumption
- Power supply voltage 6-32 V DC
- Current consumption about 80 mA at 12 V

EtherCAT- Interface
- RJ45 plug connector with port-IN and port-OUT

EtherCAT- cycle time
- Minimum cycle time: 150 µs

Plug connectors
- Power supply: 2-pin Phoenix-Contact plug RM 3,5
- I/O signals: 16-pin connection for digital and analog Signals, Phoenix-Contact plug RM 3,81

Inputs and outputs
- 6 digital inputs
- 4 digital outputs, high-side switch, short circuit resistant
- 2 analog inputs, 12-bit, 0 … +10 V
- 2 analog outputs, 12-bit, max. 20 mA

Output voltage ranges programmable via software:
0 … +5 V
0 … +10 V
0 … +10.8 V
Introduction

**CAN interface (optional, not installed in the standard version)**
- ISO 11898-2 CAN bus coupling, galvanically decoupled
- CAN-2.0B-Controller, High-Speed CAN-Interface
- CAN isolation working voltage:
  - 130 V AC/DC (continuous)
  - 1000 V DC (1 second)
- CAN-Transceiver: Texas Instruments SN65HVD251

**LIN interface (optional, not installed in the standard version)**
- LIN Transceiver: TJA1020T

**User Interface - LEDs**
- 1 LED for EtherCAT-status
- 2 LEDs for special functions (user LEDs)
- 1 LED for power supply display

**Temperature range and humidity**
- Temperature range: -40 °C up to +70 °C
- Humidity: 10-95%, not condensing

**Housing and protection class**
- Robust aluminum housing, IP40

**Dimensions**
- 100 x 79 x 31 mm

**Weight** (with housing)
230 g
1.2 Variants of the unit

The ETCio 100 is available in the following variants:

<table>
<thead>
<tr>
<th>Order number</th>
<th>Variants of the unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.01.0250.20001</td>
<td>ETCio 100 (in aluminum housing)</td>
</tr>
<tr>
<td>1.01.0250.21001</td>
<td>ETCio 100 (board-level product)</td>
</tr>
<tr>
<td>Upon request</td>
<td>ETCio 100 with CAN-Interface (board-level product)</td>
</tr>
<tr>
<td>Upon request</td>
<td>ETCio 100 with LIN-Interface (board-level product), upon request only</td>
</tr>
<tr>
<td>Upon request</td>
<td>ETCio 100 with CAN and LIN interface (board-level product), upon request only</td>
</tr>
</tbody>
</table>

Accessories

<table>
<thead>
<tr>
<th>Order number</th>
<th>Variants of the unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.04.0086.00000</td>
<td>Mounting clip for ETCio 100 (for DIN rail tophat rails and wall mounting)</td>
</tr>
</tbody>
</table>

1.3 EtherCAT

"EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany."
2. Plug pinout

2.1 Plug (PWR) power supply, 6-32 VDC

The ETCio 100 is supplied with direct current of 6-32V. The plug used is of the following type: Phoenix Contact plug part 2-pin MC1,5/2-STF-3,5 - 1847055.

![Figure 1: Front side with the position of connections and LEDs](image)

2.2 Inputs and outputs

![Figure 2: Pinout of the I/O plug](image)
The plug is of the following type: Phoenix Contact plug part 16-pin MC1,5/16-ST-3,81 - 1803714.

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signals</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>2</td>
<td>DIGOUT1</td>
<td>Digital output 1</td>
</tr>
<tr>
<td>3</td>
<td>DIGOUT2</td>
<td>Digital output 2</td>
</tr>
<tr>
<td>4</td>
<td>DIGOUT3</td>
<td>Digital output 3</td>
</tr>
<tr>
<td>5</td>
<td>DIGOUT4</td>
<td>Digital output 4</td>
</tr>
<tr>
<td>6</td>
<td>DIGIN1</td>
<td>Digital input 1</td>
</tr>
<tr>
<td>7</td>
<td>DIGIN2</td>
<td>Digital input 2</td>
</tr>
<tr>
<td>8</td>
<td>DIGIN3</td>
<td>Digital input 3</td>
</tr>
<tr>
<td>9</td>
<td>DIGIN4</td>
<td>Digital input 4</td>
</tr>
<tr>
<td>10</td>
<td>DIGIN5</td>
<td>Digital input 5</td>
</tr>
<tr>
<td>11</td>
<td>DIGIN6</td>
<td>Digital input 6</td>
</tr>
<tr>
<td>12</td>
<td>ANAIN1</td>
<td>Analog input 1</td>
</tr>
<tr>
<td>13</td>
<td>ANAIN2</td>
<td>Analog input 2</td>
</tr>
<tr>
<td>14</td>
<td>ANAOUT1</td>
<td>Analog output 1</td>
</tr>
<tr>
<td>15</td>
<td>ANAOUT2</td>
<td>Analog output 2</td>
</tr>
<tr>
<td>16</td>
<td>GND</td>
<td>Ground</td>
</tr>
</tbody>
</table>
2.3 Schematic diagram of the digital outputs

2.4 Schematic diagram of the digital inputs
3. Displays

The ETCio 100 has 4 LED displays
- PWR = Power supply voltage
- USER1 = Programmable with EtherCAT messages
- USER2 = Programmable with EtherCAT messages
- STAT = EtherCAT-status

Depending on the mode of the ETCio 100, the LED displays act as follows:

**PWR-LED**
The power LED (PWR) lights in green when the ETCio 100 is connected to power.

**USER1- and USER2-LED**
These freely programmable LED displays can be switched using messages. You can find more information in Chapter 5.10.20.

**STAT-LED**
The STAT LED reflects the status of the EtherCAT state machine and the error status. It is a multicolor display. The green color handles the EtherCAT status, while the red color indicates a possible error. There are three possible states for this display (off/red/green). Red and green cannot be active simultaneously. In case of a conflict, red takes priority. The following tables show the flash codes of the colors.

<table>
<thead>
<tr>
<th>Run Status - Green</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="off" alt="off" /></td>
</tr>
<tr>
<td>![200 ms](200 ms)</td>
</tr>
<tr>
<td>![200/1000 ms](200/1000 ms)</td>
</tr>
<tr>
<td>![50 ms](50 ms)</td>
</tr>
<tr>
<td>![50 ms](50 ms)</td>
</tr>
</tbody>
</table>

Table 3-1: STAT LED: green

---

**Error status - Red**
4. Functional description

4.1 Power supply

The ETCio 100 is supplied with direct current from 6-32 V and is protected against polarity errors as well as low and high voltage. In case of a polarity error or low voltage, it turns off. For overvoltage, an internal fuse may blow. In the case that the internal fuse has blown, the ETCio 100 is no longer ready to operate and must be returned to IXXAT for repair.

4.2 Digital outputs

The digital outputs work with a high-side switch that is supplied from the power supply (PWR). Output voltages are therefore available depending on the power supply voltage. The digital outputs can be loaded with a current up to 2 A. The total current through all outputs should not exceed 2 A in order to ensure error-free operation. The outputs are protected against excessive current, overheating, and short circuit.

The digital outputs and the digital inputs are operated together from the power supply (PWR). It must therefore be noted that any change in the power supply voltage (PWR) will influence the output voltage on the digital outputs as well as the switching voltage of the digital inputs.

4.3 Digital inputs

The digital inputs work with a comparator that is supplied with half the power supply voltage (PWR). The input voltage can be varied over a range from 6-32 V, making the switching voltage 3-16 V depending on the power supply voltage.
**Example:**
If the power supply voltage (PWR) is 12V, then the switching voltage is \( \frac{1}{2} \times 12 \text{ V} = 6 \text{ V} \).

Input voltages on the digital input of less than 6 V are shown as "0". Input voltages on the digital input of more than 6 V are shown as "1".

A hysteresis of about 50 mV ensures the error-free function of the switching threshold. The digital inputs have a low-pass filter to minimize interference. A simple first-degree filter with one RC circuit set to a boundary frequency (3 dB) of about 1 kHz is used as the filter.

The digital outputs and the digital inputs are operated together from the power supply (PWR). It must therefore be noted that any change in the power supply voltage (PWR) will influence the output voltage on the digital outputs as well as the switching voltage of the digital inputs.

### 4.4 Analog inputs

The ETCio 100 has two analog inputs with an input amplifier that can be queried using an EtherCAT message. You can find more information about this in Section 5.1.6.

The analog inputs work over a voltage range from 0-10 V with a 12-bit analog/digital converter. The voltage is measured between the two connections ANAINx and ground (GND).

The inputs are protected up to 60 V. The inputs have a low-pass filter to minimize interference. A simple first-degree filter with one RC circuit set to a boundary frequency (3 dB) of about 1 kHz is used as the filter. The input resistance is about 100 kΩ.

The voltage on the input for an input range of 0-10 V can be calculated from the AD value:

\[
U_{\text{ANAIN}} = \frac{\text{AD-value} \times 3.30}{100 \times 33} \text{ [V]}
\]

Simplified:

\[
V_{\text{ANAIN}} = \text{AD value} \times 2.6593 \text{ [mV]}
\]

With:
- \( V_{\text{ANAIN}} \): Voltage on the analog input
- \( \text{AD-value} \): Value of the analog input in the EtherCAT message.
  - The AD value is always set from 0 to 4095.

The analog input thus has a resolution of 2.6593 mV.

The ETCio 100 is a high-quality instrument for the measurement of voltage. To increase the precision in the application, the ETCio 100 may require calibration.
To do this, the user must measure and record a number of different voltage values for each channel, and use them to calculate a correction curve or table.

### 4.5 Analog outputs

The ETCio 100 has two channels with a resolution of 12 bits. The analog outputs can be set using EtherCAT messages. You can find more information about this in Section 5.1.4.1

The internal reference voltage source and the DAC itself have an accuracy of 0.2%. The output current is limited to 20 mA. If this current is exceeded, then the corresponding output is turned off. Software can be used to switch the following output ranges for each individual analog output: +5 V, +10 V, +10.8 V.

The voltage on the output can be calculated using the following formulas:

\[ V_{\text{ANAOUT}}: \quad \frac{\text{AD value}}{4096} \times \text{output range} \; [V] \]

With: 
- \( V_{\text{ANAOUT}} \): Voltage on the analog output
- AD-value: Value of the analog output in the message.
- The AD value is always set from 0 to 4095.
- Output range: 5, 10 or 10.8
5. Software

It is assumed that the reader of this document is familiar with the EtherCAT standard. So the usual EtherCAT mechanisms will not be described or will be described only superficially.

Abbreviations / definitions in this chapter:
- 0xnn: Hexadecimal numbers
- AO: Analog output
- ARRAY: EtherCAT object whose subindexes are of identical data types. Subindex 0 is generally excepted from this rule.
- DI: Digital input
- DO: Digital output
- IO: Inputs and outputs
- RECORD: EtherCAT object whose subindexes are of different data types.
- RO: Read access
- RW: Read and write access
- SI: Subindex
- STRING: Character string
- UINT16: Unsigned 16-bit value
- UINT32: Unsigned 32-bit value
- UINT8: Unsigned 8-bit value
- VAR: EtherCAT object consisting of exactly one value
- WO: Write access
- AI: Analog input

5.1 Device Description File

The Device Description File is an XML file. It contains information for an EtherCAT master that describes the ETCio 100. Further information can be found in the following document:
„EtherCAT Slave Information, Specification“ (ETG)

5.2 Device profile

The ETCio 100 has the device profile "Generic I/O Device". Thus the ETCio 100 is based on the CANopen device profile 401. Further information can be found in the following document:
“CANopen, Device profile for generic I/O modules” (CiA)
5.3 ESI EEPROM

The ESI EEPROM contains the "Slave Information Interface Area (SII)". This defines, among other things, settings for the connection between the EtherCAT slave controller and the microcontroller. The content of this buffer can be configured from the EtherCAT master. An incorrect configuration in the parameters "PDI Control" and "PDI Configuration" can lead to the ETCio 100 no longer being addressable using EtherCAT mechanisms. Thus every time it starts, the device checks whether the correct value is in these fields. If not, the complete EEPROM is described with the following standard values:

- PDI Control: 0x3205
- PDI Configuration: 0x0003
- Checksum: Correct checksum
- Vendor ID: 0x00000004
- Product Code: 0x00000006
- Version No: 0x00010001
All other values are set to 0.

This ensures that even if the configuration is incorrect the ETCio 100 is still reachable. These values, except for the serial number field, correspond to the factory settings.

5.3.1 Factory settings

The following steps describe how the ESI EEPROM can be reset to the factory settings.

1. PDI Control (word address 0x0000) described with a value not equal to 0x3205, for example: 0x0000.
2. Carry out a power cycle.
3. Convert the device's serial number without the leading "HW" into a hexadecimal number, for example: HW123456 → 0x1E240
4. Enter the calculated value into the field "Serial Number" (word address 0x000E).
5. Configure the I/Os with the default values corresponding to chapter 5.7.2.
5.4 Protocols supported
The following mailbox protocols are supported:
- CoE (CAN application protocol over EtherCAT services)
- FoE (File access with EtherCAT services)
FoE is only supported in Bootstrap status. See Section 5.9.

5.5 Synchronization
The following synchronization protocols are supported:
- Free Run
- SM Synchronous

5.6 EtherCAT-status
The following EtherCAT states are supported:
- Init
- Preop
- Safeop
- Op
- Bootstrap

5.7 Input /Output

5.7.1 Values
Access to the IOs can take place by SDO access or through the PDOs. Table 5-1 shows the corresponding CoE objects.
Section 5.8 describes the process data in more detail.
Section 5.10 describes the CoE objects in more detail.

<table>
<thead>
<tr>
<th>Index</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x6000</td>
<td>Read input 8 bit</td>
<td>The value of all digital inputs, summarized as an 8-bit value.</td>
</tr>
<tr>
<td>0x6200</td>
<td>Write output 8-bit</td>
<td>The value of all digital outputs, summarized as an 8-bit value.</td>
</tr>
<tr>
<td>0x6401</td>
<td>Read analog input 16-bit</td>
<td>Values from the analog inputs.</td>
</tr>
<tr>
<td>0x6411</td>
<td>Write analog output 16-bit</td>
<td>Values from the analog outputs.</td>
</tr>
</tbody>
</table>

Table 5-1: Objects for IO configuration
5.7.2 Configuration

The IOs can be configured. The objects listed in Table 5-2 are available for this purpose. A more detailed description of the objects can be found in Section 5.10.

For each category of IO, the number of channels can be configured. In the following sections, additional special configuration options will be explained for each category.

The last configuration saved will be accepted the next time the device starts. If an invalid configuration is detected, the following default configuration will be used and a diagnostic message output. The diagnostic message is described in Section 5.7.3.

- Number of DI: 6
- Sample time for each DI: 1 ms
- Number of DO: 4
- Standard value of each DO: 0
- Number of AI: 2
- Number of AO: 2
- Standard value of each AO: 0
- Voltage range of each AO: 0 V up to 10 V

<table>
<thead>
<tr>
<th>Index</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x2000</td>
<td>Config Digital Inputs</td>
<td>Configuration of digital inputs. See Section 5.10.16.</td>
</tr>
<tr>
<td>0x2001</td>
<td>Config Digital Outputs</td>
<td>Configuration of the digital outputs. See Section 5.10.17.</td>
</tr>
<tr>
<td>0x2002</td>
<td>Config Analog Inputs</td>
<td>Configuration of the analog inputs. See Section 5.10.18.</td>
</tr>
<tr>
<td>0x2003</td>
<td>Config Analog Outputs</td>
<td>Configuration of the analog outputs. See Section 5.10.19.</td>
</tr>
<tr>
<td>0x2004</td>
<td>Store Parameters</td>
<td>Save the current configuration. See Section 5.10.20.</td>
</tr>
<tr>
<td>0x2005</td>
<td>Restore Parameters</td>
<td>Load the last configuration saved. See Section 5.10.21.</td>
</tr>
</tbody>
</table>

Table 5-2: Objects for IO configuration

5.7.2.1 Digital inputs

For each digital input, the sample time can be configured in 10 µs steps. The value of a digital input is considered a valid value once three identical values are read separated by the sample time. Figure 5-1 shows an example:
5.7.2.2 Digital outputs
For each digital output, a default value can be configured. This remains valid until another value is defined via SDO or PDO. Thus the value is defined when the device starts.
The default value equates the safe state.

5.7.2.3 Analog inputs
Aside from the number of channels, there are no special configuration options.

5.7.2.4 Analog outputs
For each analog output, a default value can be configured. This remains valid until another value is defined via SDO or PDO. Thus the value is defined when the device starts.
The voltage range can also be defined. Table 5-3 shows the possible voltage ranges and the conversion of the calculated values into a voltage.
The default value equates the safe state.

<table>
<thead>
<tr>
<th>Value</th>
<th>Voltage range</th>
<th>Conversion</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0 V up to 5 V</td>
<td>$U_{AO} = \frac{DO\times 5}{4096}$</td>
</tr>
<tr>
<td>1</td>
<td>0 V up to 10 V</td>
<td>$U_{AO} = \frac{DO\times 10}{4096}$</td>
</tr>
<tr>
<td>2</td>
<td>0 V up to 10.7 V</td>
<td>$U_{AO} = \frac{DO\times 10.7}{4096}$</td>
</tr>
</tbody>
</table>

Table 5-3: AO Voltage range
5.7.3 Diagnostic message
When the device starts, it checks whether the configuration is valid. It can for example be invalid if more than the maximum number of channels are configured.

If the configuration is invalid, then a diagnostic message of type "Error" with the message content "Incorrect configuration" is output.

With the ETCio 100, only this single diagnostic message can occur. This permits it easily to be checked whether the current configuration is valid or not:
- If no diagnostic message is present after the device starts, then the configuration is valid.
- If a diagnostic message is present after the device starts, then the configuration is invalid.

5.8 Process data
The values of the IOs can be accessed through the process data.
The CoE objects listed in Table 5-4 define the mapping of the process data. Section 5.10 shows the contents of these objects and thus the definition of the PDOs.

The mapping is static. The PDOs are always the same, regardless of the IO configuration.

<table>
<thead>
<tr>
<th>Index</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x1600</td>
<td>1st receive PDO Mapping</td>
<td>Mapping DO</td>
</tr>
<tr>
<td>0x1601</td>
<td>2nd receive PDO Mapping</td>
<td>Mapping AO</td>
</tr>
<tr>
<td>0x1A00</td>
<td>1st transmit PDO Mapping</td>
<td>Mapping DI</td>
</tr>
<tr>
<td>0x1A01</td>
<td>2nd transmit PDO Mapping</td>
<td>Mapping DO</td>
</tr>
</tbody>
</table>

Table 5-4: Process data Mapping

5.9 Firmware-Update
A firmware update can take place in BOOSTRAP status. To do this, the FoE protocol is used to transmit a file to the ETCio 100.
The ETCio 100 will only accept a file with the following name: "ECATFW__"
A file is only accepted in BOOTSTRAP mode.
A newly loaded firmware only becomes active after a power cycle has been carried out.
The version of the firmware is in object 0x100A: "Manufacturer Software Version" (see Section 5.10.3)
### 5.10 CoE-Objects

Table 5-5 lists the entire CoE object module of the ETCio 100. The following sections will describe the objects. Objects 0x1000 to 0x1FFFh are not completely described here. For a complete description, we refer to the EtherCAT standard.

<table>
<thead>
<tr>
<th>Index</th>
<th>SI</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x1000</td>
<td>-</td>
<td>Device Type</td>
</tr>
<tr>
<td>0x1008</td>
<td>-</td>
<td>Manufacturer Device Name</td>
</tr>
<tr>
<td>0x100A</td>
<td>-</td>
<td>Manufacturer Software Version</td>
</tr>
<tr>
<td>0x1018</td>
<td>0</td>
<td>Identity Object</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Vendor ID:</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Product Code</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Revision Number</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Serial Number</td>
</tr>
<tr>
<td>0x10F3</td>
<td>0</td>
<td>Diagnosis History</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Maximum Messages</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Newest Message</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Newest Acknowledge Message</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>New Messages Available</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Flags</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Diagnosis message</td>
</tr>
<tr>
<td>0x10F8</td>
<td>-</td>
<td>Timestamp Object</td>
</tr>
<tr>
<td>0x1600</td>
<td>0</td>
<td>1st receive PDO Mapping</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>PDO Object 1</td>
</tr>
<tr>
<td>0x1601</td>
<td>0</td>
<td>2nd receive PDO Mapping</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>PDO Object 1</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>PDO Object 2</td>
</tr>
<tr>
<td>0x1A00</td>
<td>0</td>
<td>1st transmit PDO Mapping</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>PDO Object 1</td>
</tr>
<tr>
<td>0x1A01</td>
<td>0</td>
<td>2nd transmit PDO Mapping</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>PDO Object 1</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>PDO Object 2</td>
</tr>
<tr>
<td>0x1C00</td>
<td>0</td>
<td>Sync Manager Communication Type</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>0x1C12</td>
<td>0</td>
<td>Sync Manager 2 PDO Assignment</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>0x1C13</td>
<td>0</td>
<td>Sync Manager 3 PDO Assignment</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>--------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>0x1C32</td>
<td>Sync Manager Synchronization</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Synchronization Type</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Cycle Time</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Shift Time</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Synchronization Types supported</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Minimum Cycle Time</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Calc and Copy Time</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Minimum Delay time</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Get Cycle Time</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Delay Time</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Sync0 Cycle Time</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>SM-Event missed</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Cycle Time Too Small</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Shift Time Too Short</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Sync error</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x1C33</td>
<td>Sync Manager Synchronization</td>
</tr>
<tr>
<td>0</td>
<td>Synchronization Type</td>
</tr>
<tr>
<td>1</td>
<td>Cycle Time</td>
</tr>
<tr>
<td>2</td>
<td>Shift Time</td>
</tr>
<tr>
<td>3</td>
<td>Synchronization Types supported</td>
</tr>
<tr>
<td>4</td>
<td>Minimum Cycle Time</td>
</tr>
<tr>
<td>5</td>
<td>Calc and Copy Time</td>
</tr>
<tr>
<td>6</td>
<td>Minimum Delay time</td>
</tr>
<tr>
<td>7</td>
<td>Get Cycle Time</td>
</tr>
<tr>
<td>8</td>
<td>Delay Time</td>
</tr>
<tr>
<td>9</td>
<td>Sync0 Cycle Time</td>
</tr>
<tr>
<td>10</td>
<td>SM-Event missed</td>
</tr>
<tr>
<td>11</td>
<td>Cycle Time Too Small</td>
</tr>
<tr>
<td>12</td>
<td>Shift Time Too Short</td>
</tr>
<tr>
<td>13</td>
<td>Sync error</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x2000</td>
<td>Config Digital Inputs</td>
</tr>
<tr>
<td>0</td>
<td>Number of DI</td>
</tr>
<tr>
<td>1</td>
<td>DI1 debouncing time</td>
</tr>
<tr>
<td>2</td>
<td>DI2 debouncing time</td>
</tr>
<tr>
<td>3</td>
<td>DI3 debouncing time</td>
</tr>
<tr>
<td>4</td>
<td>DI4 debouncing time</td>
</tr>
<tr>
<td>5</td>
<td>DI5 debouncing time</td>
</tr>
<tr>
<td>6</td>
<td>DI6 debouncing time</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x2001</td>
<td>Config Digital Outputs</td>
</tr>
<tr>
<td>0</td>
<td>Number of DO</td>
</tr>
<tr>
<td>1</td>
<td>DO1 default value</td>
</tr>
<tr>
<td>Offset</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>0x2002</td>
<td>Config Analog Inputs</td>
</tr>
<tr>
<td>0x2003</td>
<td>Config Analog Outputs</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Store Parameters</td>
</tr>
<tr>
<td></td>
<td>Restore Parameters</td>
</tr>
<tr>
<td></td>
<td>USER LED 1</td>
</tr>
<tr>
<td></td>
<td>USER LED 2</td>
</tr>
<tr>
<td></td>
<td>Additional informations</td>
</tr>
<tr>
<td></td>
<td>Bootloader version</td>
</tr>
<tr>
<td>0x2008</td>
<td>SW-Reset</td>
</tr>
<tr>
<td>0x6000</td>
<td>Read input 8 bit</td>
</tr>
<tr>
<td></td>
<td>Write output 8-bit</td>
</tr>
<tr>
<td></td>
<td>Read analog input 16-bit</td>
</tr>
<tr>
<td></td>
<td>Write analog output 16-bit</td>
</tr>
</tbody>
</table>

**Table 5-5: CoE-Objects**
5.10.1 0x1000: Device Type
This object specifies the device type and device profile.
- Object type: VAR
- Value: See Table 5-7

<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>UINT32</td>
<td>RO</td>
<td>Device Type</td>
</tr>
</tbody>
</table>

Table 5-6: 0x1000: Device Type

<table>
<thead>
<tr>
<th>Bit</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15</td>
<td>401</td>
<td>Device profile</td>
</tr>
<tr>
<td></td>
<td></td>
<td>401 = generic I/O module</td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>Digital inputs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 = implemented</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 = not implemented</td>
</tr>
<tr>
<td>17</td>
<td>1</td>
<td>Digital outputs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 = implemented</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 = not implemented</td>
</tr>
<tr>
<td>18</td>
<td>1</td>
<td>Analog inputs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 = implemented</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 = not implemented</td>
</tr>
<tr>
<td>19</td>
<td>1</td>
<td>Analog outputs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 = implemented</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 = not implemented</td>
</tr>
<tr>
<td>20-22</td>
<td>0</td>
<td>Reserved</td>
</tr>
<tr>
<td>23</td>
<td>0</td>
<td>Mapping</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 = PDO mapping according to device profile</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 = device-specific PDO mapping</td>
</tr>
</tbody>
</table>

Table 5-7: 0x1000: Device Type: Value

5.10.2 0x1008: Manufacturer Device Name
This object contains the device name.
- Object type: VAR
- Value: “ETCi 100”

<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>STRING</td>
<td>RO</td>
<td>Manufacturer Device Name</td>
</tr>
</tbody>
</table>

Table 5-8: 0x1008: Manufacturer Device Name
5.10.3 0x100A: Manufacturer Software Version
This object contains the software version.
- Object type: VAR
- Value: Version of the software in format A.BB.CC (see Table 5-10).

<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>STRING</td>
<td>RO</td>
<td>Manufacturer Device Name</td>
</tr>
</tbody>
</table>

Table 5-9: 0x100A: Manufacturer Software Version

<table>
<thead>
<tr>
<th>Char</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>for example “1”</td>
<td>A: Version number based on large changes.</td>
</tr>
<tr>
<td>1</td>
<td>“.”</td>
<td>Separator</td>
</tr>
<tr>
<td>2-3</td>
<td>for example “00”</td>
<td>BB: Version number indicating small changes visible externally.</td>
</tr>
<tr>
<td>4</td>
<td>“.”</td>
<td>Separator</td>
</tr>
<tr>
<td>5-6</td>
<td>for example “00”</td>
<td>CC: Version number indicating small changes not visible externally.</td>
</tr>
</tbody>
</table>

Table 5-10: 0x100A: Manufacturer Software Version: Value

5.10.4 0x1018: Identity Object
This object contains general information about the EtherCAT device.
- Object type: RECORD

<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
<td>Identity Object</td>
<td>Number of the highest subindex of this object.</td>
</tr>
<tr>
<td>1</td>
<td>UINT32</td>
<td>RO</td>
<td>Vendor ID:</td>
<td>4 (= IXXAT)</td>
</tr>
<tr>
<td>2</td>
<td>UINT32</td>
<td>RO</td>
<td>Product Code</td>
<td>6 (= ETCio 100)</td>
</tr>
<tr>
<td>3</td>
<td>UINT32</td>
<td>RO</td>
<td>Revision Number</td>
<td>0x00010001</td>
</tr>
<tr>
<td>4</td>
<td>UINT32</td>
<td>RO</td>
<td>Serial Number</td>
<td>Serial number</td>
</tr>
</tbody>
</table>

Table 5-11: 0x1018: Identity Object

5.10.5 0x10F3: Diagnosis History
This object can include a diagnostic view.
See also Section 5.7.3.
- Object type: RECORD
<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
<td>Diagnosis History</td>
</tr>
<tr>
<td>1</td>
<td>UINT8</td>
<td>RO</td>
<td>Maximum Messages</td>
</tr>
<tr>
<td>2</td>
<td>UINT8</td>
<td>RO</td>
<td>Newest Message</td>
</tr>
<tr>
<td>3</td>
<td>UINT8</td>
<td>RW</td>
<td>Newest Acknowledge Message</td>
</tr>
<tr>
<td>4</td>
<td>BOOL</td>
<td>RO</td>
<td>New Messages Available</td>
</tr>
<tr>
<td>5</td>
<td>UINT16</td>
<td>RW</td>
<td>Flags</td>
</tr>
<tr>
<td>6</td>
<td>STRING</td>
<td>RO</td>
<td>Diagnosis message</td>
</tr>
</tbody>
</table>

Table 5-12: 0x10F3: Diagnosis History

5.10.5.1 SI0: Diagnosis History
Number of the highest subindex of this object.

5.10.5.2 SI1: Maximum Messages
Maximum number of diagnostic messages. Since the ETCio 100 outputs at most one diagnostic message, the value of this subindex is 1.

5.10.5.3 SI2: Newest Message
Subindex of the latest diagnostic message. Table 5-13 shows the possible values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No diagnostic message</td>
</tr>
<tr>
<td>6</td>
<td>A diagnostic message</td>
</tr>
</tbody>
</table>

Table 5-13: 0x10F3: Newest Message: Value

5.10.5.4 SI3: Newest Acknowledge Message
This subindex can be used to acknowledge the diagnostic message. Table 5-14 shows the possible values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No message acknowledged</td>
</tr>
<tr>
<td>6</td>
<td>Diagnostic message acknowledged</td>
</tr>
</tbody>
</table>

Table 5-14: 0x10F3: Newest Acknowledge Message: Value

5.10.5.5 SI4: New Messages Available
Specifies whether the latest diagnostic message has already been read.
### Table 5-15: 0x10F3: Newest Acknowledge Message: Value

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Latest message already read</td>
</tr>
<tr>
<td>1</td>
<td>Latest message not read</td>
</tr>
</tbody>
</table>

**5.10.5.6 SI5: Flags**

Settings for the diagnostic message object. Write access is possible for some bits. Table 5-18 describes this in more detail.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Value</th>
<th>Access</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>RO</td>
<td>0: Device does not support the &quot;Emergency sending&quot; functionality.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1: New diagnostic messages are sent as &quot;Emergency message&quot;.</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>RW</td>
<td>0: Diagnostic messages of type &quot;Info&quot; are saved.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1: Diagnostic messages of type &quot;Info&quot; are not saved and thus suppressed.</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>RW</td>
<td>0: Diagnostic messages of type &quot;Warning&quot; are saved.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1: Diagnostic messages of type &quot;Warning&quot; are not saved and thus suppressed.</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>RO</td>
<td>0: Diagnostic messages of type &quot;Error&quot; are saved.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1: Diagnostic messages of type &quot;Error&quot; are not saved and thus suppressed.</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>RO</td>
<td>0: Overwrite Mode. Old messages are overwritten by new messages when the memory is full.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1: Acknowledge mode. New messages only overwrite messages that have already been acknowledged.</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>RO</td>
<td>If the value is 1, an unacknowledged message has been overwritten. This cannot happen in the ETCio 100 because at most one diagnostic message can appear.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>reserved</td>
</tr>
</tbody>
</table>

**5.10.5.7 SI6: Diagnosis message**

If present: There is a diagnostic message.
If not present: There is no diagnostic message.
5.10.6 0x10F8: Timestamp Object
This object contains the local time of the ETCio 100.
- Object type: VAR
- Value: Local time value of the ETCio 100 in ns.

<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>UINT64</td>
<td>RO</td>
<td>Timestamp Object</td>
</tr>
</tbody>
</table>

Table 5-17: 0x10F8: Timestamp Object

5.10.7 10x1600: 1st receive PDO Mapping
This object defines the mapping for the first receive PDO. This contains the values from the digital outputs.
See also Section 5.8.
- Object type: RECORD

<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
<td>1st receive PDO Mapping</td>
</tr>
<tr>
<td>1</td>
<td>UINT32</td>
<td>RO</td>
<td>PDO Object 1</td>
</tr>
</tbody>
</table>

Table 5-18: 0x1600: 1st receive PDO Mapping

5.10.7.1 SI0: 1st receive PDO Mapping
Number of the highest subindex of this object.

5.10.7.2 SI1: PDO Object 1
This subindex describes the mapping of this PDO. Table 5-19 shows the content.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7</td>
<td>0x08</td>
<td>Length in the PDO in bits.</td>
</tr>
<tr>
<td>8-15</td>
<td>0x01</td>
<td>Subindex of the mapped object.</td>
</tr>
<tr>
<td>16-31</td>
<td>0x6200</td>
<td>Index of the mapped object: Write output 8-bit</td>
</tr>
</tbody>
</table>

Table 5-19: 0x1600: PDO Object 1: Wert

5.10.8 0x1601: 2nd receive PDO Mapping
This object defines the mapping for the second receive PDO. This contains the values from the analog outputs.
See also Section 5.8.
- Object type: RECORD
<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
<td>2nd receive PDO Mapping</td>
</tr>
<tr>
<td>1</td>
<td>UINT32</td>
<td>RO</td>
<td>PDO Object 1</td>
</tr>
<tr>
<td>2</td>
<td>UINT32</td>
<td>RO</td>
<td>PDO Object 2</td>
</tr>
</tbody>
</table>

Table 5-20: 0x1601: 2nd receive PDO Mapping

5.10.8.1 SI0: 2nd receive PDO Mapping
Number of the highest subindex of this object.

5.10.8.2 SI1: PDO Object 1
This subindex describes the mapping of this PDO. Table 5-21 shows the content.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7</td>
<td>0x10</td>
<td>Length in the PDO in bits.</td>
</tr>
<tr>
<td>8-15</td>
<td>0x01</td>
<td>Subindex of the mapped object.</td>
</tr>
<tr>
<td>16-31</td>
<td>0x6411</td>
<td>Index of the mapped object: Write analog output 16-bit</td>
</tr>
</tbody>
</table>

Table 5-21: 0x1601: PDO Object 1: Value

5.10.8.3 SI2: PDO Object 2
This subindex describes the mapping of this PDO. Table 5-22 shows the content.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7</td>
<td>0x10</td>
<td>Length in the PDO in bits.</td>
</tr>
<tr>
<td>8-15</td>
<td>0x02</td>
<td>Subindex of the mapped object.</td>
</tr>
<tr>
<td>16-31</td>
<td>0x6411</td>
<td>Index of the mapped object: Write analog output 16-bit</td>
</tr>
</tbody>
</table>

Table 5-22: 0x1601:PDO Object 2: Value

5.10.9 0x1A00: 1st transmit PDO Mapping
This object defines the mapping for the first transmit PDO. This contains the values from the digital inputs.
See also Section 5.8.
- Object type: RECORD

<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
<td>1st transmit PDO Mapping</td>
</tr>
<tr>
<td>1</td>
<td>UINT32</td>
<td>RO</td>
<td>PDO Object 1: Maximum Messages</td>
</tr>
</tbody>
</table>

Table 5-23: 0x1A00: 1st transmit PDO Mapping
5.10.9.1 SI0: 1st transmit PDO Mapping
Number of the highest subindex of this object.

5.10.9.2 SI1: PDO Object 1
This subindex describes the mapping of this PDO. Table 5-24 shows the content.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7</td>
<td>0x08</td>
<td>Length in the PDO in bits.</td>
</tr>
<tr>
<td>8-15</td>
<td>0x01</td>
<td>Subindex of the mapped object.</td>
</tr>
<tr>
<td>16-31</td>
<td>0x6000</td>
<td>Index of the mapped object: Read input 8 bit</td>
</tr>
</tbody>
</table>

Table 5-24: 0x1A00: PDO Object 1: Value

5.10.10 0x1A01: 2nd transmit PDO Mapping
This object defines the mapping for the second transmit PDO. This contains the values from the analog inputs.
See also Section 5.8.
- Object type: RECORD

<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
<td>2nd transmit PDO Mapping</td>
</tr>
<tr>
<td>1</td>
<td>UINT32</td>
<td>RO</td>
<td>PDO Object 1</td>
</tr>
<tr>
<td>2</td>
<td>UINT32</td>
<td>RO</td>
<td>PDO Object 2</td>
</tr>
</tbody>
</table>

Table 5-25: 0x1A01: 2nd transmit PDO Mapping

5.10.10.1 SI0: 2nd transmit PDO Mapping
Number of the highest subindex of this object.

5.10.10.2 SI1: PDO Object 1
This subindex describes the mapping of this PDO. Table 5-26 shows the content.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7</td>
<td>0x10</td>
<td>Length in the PDO in bits.</td>
</tr>
<tr>
<td>8-15</td>
<td>0x01</td>
<td>Subindex of the mapped object.</td>
</tr>
<tr>
<td>16-31</td>
<td>0x6401</td>
<td>Index of the mapped object: Read analog input 16-bit</td>
</tr>
</tbody>
</table>

Table 5-26: 0x1A01: PDO Object 1: Value
5.10.10.3  *SI2: PDO Object 2*  
This subindex describes the mapping of this PDO. Table 5-27 shows the content.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7</td>
<td>0x10</td>
<td>Length in the PDO in bits.</td>
</tr>
<tr>
<td>8-15</td>
<td>0x02</td>
<td>Subindex of the mapped object.</td>
</tr>
<tr>
<td>16-31</td>
<td>0x6401</td>
<td>Index of the mapped object: Read analog input 16-bit</td>
</tr>
</tbody>
</table>

Table 5-27: 0x1A01: PDO Object 2: Value

5.10.11  *0x1C00: Sync Manager Communication Type*  
This object defines the number and type of communication channels.
- Object type: ARRAY

<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
<td>Number of the highest subindex of this object.</td>
</tr>
<tr>
<td>1</td>
<td>UINT8</td>
<td>RO</td>
<td>1: mailbox receiver (Master -&gt; Slave)</td>
</tr>
<tr>
<td>2</td>
<td>UINT8</td>
<td>RO</td>
<td>2: mailbox send (Slave -&gt; Master)</td>
</tr>
<tr>
<td>3</td>
<td>UINT8</td>
<td>RO</td>
<td>3: process data output (Master -&gt; Slave)</td>
</tr>
<tr>
<td>4</td>
<td>UINT8</td>
<td>RO</td>
<td>4: process data input (Slave -&gt; Master)</td>
</tr>
</tbody>
</table>

Table 5-28: 0x1C00: Sync Manager Communication Type

5.10.12  *0x1C12: Sync Manager 2 PDO Assignment*  
This object is used to assign a sync manager to the PDOs.
- Object type: ARRAY

<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
<td>Number of the highest subindex of this object.</td>
</tr>
<tr>
<td>1</td>
<td>UINT16</td>
<td>RO</td>
<td>0x1600: RxPDO 1</td>
</tr>
<tr>
<td>2</td>
<td>UINT16</td>
<td>RO</td>
<td>0x1601: RxPDO 2</td>
</tr>
</tbody>
</table>

Table 5-29: 0x1C12: Sync Manager 2 PDO Assignment

5.10.13  *0x1C13: Sync Manager 3 PDO Assignment*  
This object is used to assign a sync manager to the PDOs.
- Object type: ARRAY
<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
<td>Number of the highest subindex of this object.</td>
</tr>
<tr>
<td>1</td>
<td>UINT16</td>
<td>RO</td>
<td>0x1A00: TxPDO 1</td>
</tr>
<tr>
<td>2</td>
<td>UINT16</td>
<td>RO</td>
<td>0x1A01: TxPDO 2</td>
</tr>
</tbody>
</table>

Table 5-30: 0x1C13: Sync Manager 3 PDO Assignment

5.10.14 0x1C32: Sync Manager Synchronization
This object makes information available about the synchronization. The synchronization can also be configured using this object. The parameters are not described completely in Table 5-31. For a complete description, we refer to the EtherCAT standard.
- Object type: RECORD
<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
<td>Sync Manager Synchronization</td>
<td>Number of the highest subindex of this object.</td>
</tr>
<tr>
<td>1</td>
<td>UINT16</td>
<td>RW</td>
<td>Synchronization Type</td>
<td>0x00: Free Run 0x01: Synchronous</td>
</tr>
</tbody>
</table>
| 2  | UINT32 | RW     | Cycle Time                  | If Synchronization Type = 0x00: Time between two local timer events in ns.  
                        | If Synchronization Type = 0x01: Minimum time between two SM2 events in ns. |
| 3  | UINT32 | RO     | Shift Time                  | Time between event and assigned action in ns.                        |
| 4  | UINT16 | RO     | Synchronization Types       | Bit 0, Value 0: Free run not supported.  
                        | Bit 0, Value 1: Free run supported.  
                        | Bit 1, Value 0: Sync mode not supported.  
                        | Bit 1, Value 1: Sync mode supported.  
                        | Bit 2-4, Value 0: DC not supported.  
                        | Bit 5-6, Value 0: Shift not supported.  
                        | Bit 14, Value 0: The cycle time is fixed.  
                        | Values other than those listed are not needed. Other bits are either unneeded or reserved. |
| 5  | UINT32 | RO     | Minimum Cycle Time          | Minimum cycle time supported by the ETCio 100. Value in ns. Only used in Sync mode. |
| 6  | UINT32 | RO     | Calc and Copy Time          | Time for local processing of process data in ns.                     |
| 7  | UINT32 | RO     | Minimum Delay time          | Not needed for the ETCio 100.                                        |
| 8  | UINT16 | RW     | Get Cycle Time              | Bit 0, Value 0: Measurement of local cycle time stopped.  
                        | Bit 0, Value 1: Measurement of local cycle time started.  
                        | Bit 1, Value 1: Reset of error counter.  
<pre><code>                    | Other bits: reserved                                                                 |
</code></pre>
<table>
<thead>
<tr>
<th></th>
<th>Type</th>
<th>Access</th>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
<td>Sync Manager Synchronization</td>
<td>Number of the highest subindex of this object.</td>
</tr>
</tbody>
</table>
| 1 | UINT16  | RW     | Synchronization Type         | 0x00: Free Run  
0x01: Synchronous                                                      |
| 2 | UINT32  | RW     | Cycle Time                   | Same value as in object index 0x1C32, subindex 2.                    |
| 3 | UINT32  | RO     | Shift Time                   | Time between event and assigned action in ns.                        |
| 4 | UINT16  | RO     | Synchronization Types supported | Bit 0, Value 0: Free run not supported.  
Bit 0, Value 1: Free run supported.  
Bit 1, Value 0: Sync mode not supported.  
Bit 1, Value 1: Sync mode supported.  
Other bits are either unneeded or reserved. |
| 5 | UINT32  | RO     | Minimum Cycle Time           | Same value as in object index 0x1C32, subindex 5.                    |

Table 5-31: 0x1C32: Sync Manager Synchronization

5.10.15 0x1C33: Sync Manager Synchronization

This object makes information available about the synchronization. The synchronization can also be configured using this object. The parameters are not described completely in Table 5-34. For a more detailed description, we refer to the EtherCAT specification.

- Object type: RECORD
### 5.10.16 0x2000: Config Digital Inputs

This object is responsible for the configuration of the digital inputs. See also Section 5.7.2.

- **Object type:** RECORD
- **Backup object**

#### Table 5-33: 0x2000: Config Digital Inputs

<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
<td>Config Digital Inputs</td>
</tr>
<tr>
<td>1</td>
<td>UINT8</td>
<td>RW</td>
<td>Number of DI</td>
</tr>
<tr>
<td>2</td>
<td>UINT8</td>
<td>RW</td>
<td>DI1 debouncing time</td>
</tr>
<tr>
<td>3</td>
<td>UINT8</td>
<td>RW</td>
<td>DI2 debouncing time</td>
</tr>
<tr>
<td>4</td>
<td>UINT8</td>
<td>RW</td>
<td>DI3 debouncing time</td>
</tr>
<tr>
<td>5</td>
<td>UINT8</td>
<td>RW</td>
<td>DI4 debouncing time</td>
</tr>
<tr>
<td>6</td>
<td>UINT8</td>
<td>RW</td>
<td>DI5 debouncing time</td>
</tr>
<tr>
<td>7</td>
<td>UINT8</td>
<td>RW</td>
<td>DI6 debouncing time</td>
</tr>
</tbody>
</table>

Table 5-32: 0x1C33: Sync Manager Synchronization

<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>UINT32</td>
<td>RO</td>
<td>Calc and Copy Time</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Time for local processing of process data in ns.</td>
</tr>
<tr>
<td>7</td>
<td>UINT32</td>
<td>RO</td>
<td>Minimum Delay time</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Reserved</td>
</tr>
<tr>
<td>8</td>
<td>UINT16</td>
<td>RW</td>
<td>Get Cycle Time</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Same value as in object index 0x1C32, subindex 8.</td>
</tr>
<tr>
<td>9</td>
<td>UINT32</td>
<td>RO</td>
<td>Delay Time</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Not needed for the ETCio 100.</td>
</tr>
<tr>
<td>10</td>
<td>UINT32</td>
<td>RW</td>
<td>Sync0 Cycle Time</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Same value as in object index 0x1C32, subindex 10.</td>
</tr>
<tr>
<td>11</td>
<td>UINT16</td>
<td>RO</td>
<td>SM-Event missed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Same value as in object index 0x1C32, subindex 11.</td>
</tr>
<tr>
<td>12</td>
<td>UINT16</td>
<td>RO</td>
<td>Cycle Time Too Small</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Same value as in object index 0x1C32, subindex 12.</td>
</tr>
<tr>
<td>13</td>
<td>UINT16</td>
<td>RO</td>
<td>Shift Time Too Short</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Same value as in object index 0x1C32, subindex 13.</td>
</tr>
<tr>
<td>32</td>
<td>BOOL</td>
<td>RO</td>
<td>Sync error</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Same value as in object index 0x1C32, subindex 32.</td>
</tr>
</tbody>
</table>
5.10.16.1 \textit{SI0: Config Digital Inputs}
Number of the highest subindex of this object.

5.10.16.2 \textit{SI1: Number of DI}
Number of digital inputs.
Unused digital inputs always show the value '0'.

<table>
<thead>
<tr>
<th>Value</th>
<th>Digital outputs used</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td>DIGIN1</td>
</tr>
<tr>
<td>2</td>
<td>DIGIN1, DIGIN2</td>
</tr>
<tr>
<td>3</td>
<td>DIGIN1, DIGIN2, DIGIN3</td>
</tr>
<tr>
<td>4</td>
<td>DIGIN1, DIGIN2, DIGIN3, DIGIN4</td>
</tr>
<tr>
<td>5</td>
<td>DIGIN1, DIGIN2, DIGIN3, DIGIN4, DIGIN5</td>
</tr>
<tr>
<td>6</td>
<td>DIGIN1, DIGIN2, DIGIN3, DIGIN4, DIGIN5, DIGIN6,</td>
</tr>
</tbody>
</table>

Table 5-34: \textit{0x2000: Number of DI: Value}

5.10.16.3 \textit{SI2-7}
Sample time for a digital input in units of 10 µs.
Sample time = Value $\times$ 10 µs

5.10.17 \textit{0x2001: Config Digital Outputs}
This object is responsible for the configuration of the digital outputs.
See also Section 5.7.2.
- Object type: RECORD
- Backup object

<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
<td>Config Digital Outputs</td>
</tr>
<tr>
<td>1</td>
<td>UINT8</td>
<td>RW</td>
<td>Number of DO</td>
</tr>
<tr>
<td>2</td>
<td>BOOL</td>
<td>RW</td>
<td>DO1 default value</td>
</tr>
<tr>
<td>3</td>
<td>BOOL</td>
<td>RW</td>
<td>DO2 default value</td>
</tr>
<tr>
<td>4</td>
<td>BOOL</td>
<td>RW</td>
<td>DO3 default value</td>
</tr>
<tr>
<td>5</td>
<td>BOOL</td>
<td>RW</td>
<td>DO4 default value</td>
</tr>
</tbody>
</table>

Table 5-35: \textit{0x2001: Config Digital Outputs}
5.10.17.1 **SI0: Config Digital Outputs**  
Number of the highest subindex of this object.

5.10.17.2 **SI1: Number of DO**  
Number of the digital outputs.  
Unused digital outputs are set to '0' and the value cannot be changed by PDO or SDO.

<table>
<thead>
<tr>
<th>Value</th>
<th>Digital outputs used</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td>DIGOUT1</td>
</tr>
<tr>
<td>2</td>
<td>DIGOUT1,DIGOUT2</td>
</tr>
<tr>
<td>3</td>
<td>DIGOUT1,DIGOUT2,DIGOUT3</td>
</tr>
<tr>
<td>4</td>
<td>DIGOUT1,DIGOUT2,DIGOUT3, DIGOUT4</td>
</tr>
</tbody>
</table>

**Table 5-36: 0x2001: Number of DO: Value**

5.10.17.3 **SI2-5: DO1 default value**  
Default value of a digital output.

5.10.18 **0x2002: Config Analog Inputs**  
This object is responsible for the configuration of the analog inputs.  
See also Section 5.7.2.  
- Object type: RECORD  
- Backup object

<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
<td>Config Analog Inputs</td>
</tr>
<tr>
<td>1</td>
<td>UINT8</td>
<td>RW</td>
<td>Number of AI</td>
</tr>
</tbody>
</table>

**Table 5-37: 0x2002 - Config Analog Inputs**

5.10.18.1 **SI0: Config Analog Inputs**  
Number of the highest subindex of this object.
5.10.18.2 SI1: Number of AI

Number of analog inputs.
Unused analog inputs always show the value '0'.

<table>
<thead>
<tr>
<th>Value</th>
<th>Digital outputs used</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td>ANAIN1</td>
</tr>
<tr>
<td>2</td>
<td>ANAIN1, ANAIN2</td>
</tr>
</tbody>
</table>

Table 5-38: 0x2002: Number of AI: Value

5.10.19 0x2003: Config Analog Outputs

This object is responsible for the configuration of the analog outputs.
See also Section 5.7.2.
- Object type: RECORD
- Backup object

<table>
<thead>
<tr>
<th>SL</th>
<th>Type</th>
<th>Access</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
<td>Config Analog Outputs</td>
</tr>
<tr>
<td>1</td>
<td>UINT8</td>
<td>RW</td>
<td>Number of AO</td>
</tr>
<tr>
<td>2</td>
<td>UINT16</td>
<td>RW</td>
<td>AO1 default value</td>
</tr>
<tr>
<td>3</td>
<td>UINT16</td>
<td>RW</td>
<td>AO2 default value</td>
</tr>
<tr>
<td>4</td>
<td>UINT16</td>
<td>RW</td>
<td>AO3 default value</td>
</tr>
<tr>
<td>5</td>
<td>UINT16</td>
<td>RW</td>
<td>AO4 default value</td>
</tr>
</tbody>
</table>

Table 5-39: 0x2003: Config Analog Outputs

5.10.19.1 SI0: Config Analog Outputs

Number of the highest subindex of this object.

5.10.19.2 SI1: Number of AO

Number of analog outputs.
Unused analog outputs are set to '0' and the value cannot be changed by PDO or SDO.

<table>
<thead>
<tr>
<th>Value</th>
<th>Digital outputs used</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td>ANAOUT1</td>
</tr>
<tr>
<td>2</td>
<td>ANAOUT1, ANAOUT2</td>
</tr>
</tbody>
</table>

Table 5-40: 0x2003: Number of AO: Value
5.10.19.3 SI2-5
Default value of an analog output.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-11</td>
<td>Value of the analog output</td>
</tr>
<tr>
<td>12-15</td>
<td>Value is not used</td>
</tr>
</tbody>
</table>

Table 5-41: 0x2003: SI2-5: Value

5.10.20 0x2004: Store Parameters
This object can be used to store backup objects. Each IO configuration object is a backup object. This object can thus be used to save the IO configuration.
- Object type: ARRAY

<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
</tr>
<tr>
<td>1</td>
<td>UINT32</td>
<td>RW</td>
</tr>
</tbody>
</table>

Table 5-42: 0x2004: Store Parameters

5.10.20.1 SI0: Store Parameters
Number of the highest subindex of this object.

5.10.20.2 SI1: Store Parameters
If the value defined in Table 5-43 is entered, then the ETCio 100 saves all backup objects in a non-volatile memory.
A write access is only possible in pre-op mode. See also Section 5.7.2.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x65766173</td>
<td>The value corresponds to the character string &quot;save&quot;. If this value is written, then all backup objects are stored in non-volatile storage.</td>
</tr>
<tr>
<td>Every other</td>
<td>No effect.</td>
</tr>
</tbody>
</table>

Table 5-43: 0x2004: Store Parameters: Value

5.10.21 0x2005: Restore Parameters
This object can be used to reset the values of backup objects to the last values saved.
- Object type: ARRAY
<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
<td>The value corresponds to the character string &quot;load&quot;. If this value is entered, then the contents of all backup objects are set to the last value saved.</td>
</tr>
<tr>
<td>1</td>
<td>UINT32</td>
<td>RW</td>
<td>Every other No effect.</td>
</tr>
</tbody>
</table>

Table 5-44: 0x2005: Restore Parameters

5.10.21.1 SI0: Restore Parameters
Number of the highest subindex of this object.

5.10.21.2 SI1: Restore Parameters
If the value defined in Table 5-36 is entered, then the contents of all backup objects are set to the last value saved.
See also Section 5.7.2.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x64616F6C</td>
<td>The value corresponds to the character string &quot;load&quot;. If this value is entered, then the contents of all backup objects are set to the last value saved.</td>
</tr>
</tbody>
</table>

Table 5-45: 0x2005: Restore Parameters: Value

5.10.22 0x2006: USER LEDs
This object is responsible for the controlling of the USER LEDs. An EtherCAT master can thus turn the USER LEDs on or off and define the color.
- Object type: RECORD

<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
<td>USER LEDs</td>
</tr>
<tr>
<td>1</td>
<td>UINT8</td>
<td>RW</td>
<td>USER LED 1</td>
</tr>
<tr>
<td>2</td>
<td>UINT8</td>
<td>RW</td>
<td>USER LED 2</td>
</tr>
</tbody>
</table>

Table 5-46: 0x2006: USER LEDs

5.10.22.1 SI0: USER LEDs
Number of the highest subindex of this object.

5.10.22.2 SI1: USER LED 1
Settings for the LED colors according to the following table.
### 5.10.22.3 SI2: USER LED 2

Settings for the LED colors according to the following table.

<table>
<thead>
<tr>
<th>Value</th>
<th>LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>red</td>
</tr>
<tr>
<td>2</td>
<td>green</td>
</tr>
</tbody>
</table>

Table 5-47: 0x2006: USER LED 1: Value

### 5.10.23 0x2007: Additional informations

This object provides additional device information.

<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
<td>Additional informations</td>
</tr>
<tr>
<td>1</td>
<td>STRING</td>
<td>RO</td>
<td>Bootloader version</td>
</tr>
</tbody>
</table>

Table 5-49: 0x2007: Additional informations

#### 5.10.23.1 SI0: Additional informations

Number of the highest subindex of this object.

#### 5.10.23.2 SI1: Bootloader version

Version of the bootloader in the format: A.BB.CC (see Table 5-50). The bootloader is responsible for ensuring that a newly loaded firmware is used the next time the device starts. See Section 5.9. The bootloader itself cannot be updated.

<table>
<thead>
<tr>
<th>Char</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>for example „1“</td>
<td>A: Version number based on large changes.</td>
</tr>
<tr>
<td>1</td>
<td>„.“</td>
<td>Separator</td>
</tr>
<tr>
<td>2-3</td>
<td>for example „00“</td>
<td>BB: Version number indicating small changes visible externally.</td>
</tr>
<tr>
<td>4</td>
<td>„.“</td>
<td>Separator</td>
</tr>
</tbody>
</table>
5.10.24  0x2008: SW-Reset
This object can be used to carry out a software reset.
- Object type: RECORD

<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
<td>SW-Reset</td>
</tr>
<tr>
<td>1</td>
<td>UINT32</td>
<td>RW</td>
<td>Execute Reset</td>
</tr>
</tbody>
</table>

Table 5-51: 0x2008: SW-Reset

5.10.24.1  SI0: SW-Reset
Number of the highest subindex of this object.

5.10.24.2  SI1: Execute Reset
The ETCio 100 carries out a software reset once the value defined in Table 5-52 is written.
A write access is only possible in pre-op mode.
For a software reset, part of the hardware is also restarted. The Ethernet connections experience a link break.
When executing a software reset, it should be ensured that a link interruption will not have critical effects. For example, the EtherCAT master can ensure beforehand that all the other EtherCAT slave devices are in Init mode.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x20747372</td>
<td>The value corresponds to the character string &quot;rst&quot;. If this value is written, a software reset is carried out.</td>
</tr>
<tr>
<td>Every other</td>
<td>No effect.</td>
</tr>
</tbody>
</table>

Table 5-52: 0x2008: Execute Reset: Value

5.10.25  0x6000: Read input 8 bit
This object returns the values of the digital outputs.
- Object type: ARRAY
<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
</tr>
<tr>
<td>1</td>
<td>UINT32</td>
<td>RO</td>
</tr>
</tbody>
</table>

Table 5-53: 0x6000: Read input 8 bit

5.10.25.1 SI0: Read input 8 bit
Number of the highest subindex of this object.

5.10.25.2 SI1: Read input 8 bit
Value of the digital inputs as defined in Table 5-54.
Section 5.7.2.1 describes the mechanism by which values are read in.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Value of the digital input DIGIN1.</td>
</tr>
<tr>
<td>1</td>
<td>Value of the digital input DIGIN2.</td>
</tr>
<tr>
<td>2</td>
<td>Value of the digital input DIGIN3.</td>
</tr>
<tr>
<td>3</td>
<td>Value of the digital input DIGIN4.</td>
</tr>
<tr>
<td>4</td>
<td>Value of the digital input DIGIN5.</td>
</tr>
<tr>
<td>5</td>
<td>Value of the digital input DIGIN6.</td>
</tr>
<tr>
<td>6-7</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 5-54: Read input 8 bit: SI1: Value

5.10.26 0x6200: Write output 8-bit
This object defines the values of the digital outputs.
- Object type: ARRAY

<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
</tr>
<tr>
<td>1</td>
<td>UINT8</td>
<td>WO</td>
</tr>
</tbody>
</table>

Table 5-55: 0x6200: Write output 8-bit

5.10.26.1 SI0: Write output 8-bit
Number of the highest subindex of this object.
5.10.26.2 **SI1: Write output 8-bit**
Value of the digital outputs as defined in Table 5-56.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Value of the digital output DIGOUT1.</td>
</tr>
<tr>
<td>1</td>
<td>Value of the digital output DIGOUT2.</td>
</tr>
<tr>
<td>2</td>
<td>Value of the digital output DIGOUT3.</td>
</tr>
<tr>
<td>3</td>
<td>Value of the digital output DIGOUT4.</td>
</tr>
<tr>
<td>4-7</td>
<td>Not used.</td>
</tr>
</tbody>
</table>

Table 5-56: Write output 8-bit: SI1: Value

5.10.27 **0x6401: Read analog input 16-bit**
This object returns the values of the analog outputs.
- Object type: ARRAY

<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
</tr>
<tr>
<td>1</td>
<td>UINT16</td>
<td>RO</td>
</tr>
<tr>
<td>2</td>
<td>UINT16</td>
<td>RO</td>
</tr>
</tbody>
</table>

Table 5-57: 0x6401: Read analog input 16-bit

5.10.27.1 **SI0: Read analog input 16-bit**
Number of the highest subindex of this object.

5.10.27.2 **SI1: Read analog input 16-bit**
Value of the analog input as 12-bit value. See Table 5-60

<table>
<thead>
<tr>
<th>Bit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-11</td>
<td>Value of the analog input ANAIN1.</td>
</tr>
<tr>
<td>12-15</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 5-58: Read analog input 16-bit: SI1: Value
5.10.27.3  **SI2: Read analog input 16-bit**

Value of the analog input as 12-bit value. See Table 5-59

<table>
<thead>
<tr>
<th>Bit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-11</td>
<td>Value of the analog input ANAIN2.</td>
</tr>
<tr>
<td>12-15</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 5-59:  Read analog input 16-bit: SI2: Value

5.10.28  **0x6411: Write analog output 16-bit**

This object defines the values of the analog outputs.
- Object type: ARRAY

<table>
<thead>
<tr>
<th>SI</th>
<th>Type</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UINT8</td>
<td>RO</td>
</tr>
<tr>
<td>1</td>
<td>UINT16</td>
<td>WO</td>
</tr>
<tr>
<td>2</td>
<td>UINT16</td>
<td>WO</td>
</tr>
</tbody>
</table>

Table 5-60: 0x6411: Write analog output 16-bit

5.10.28.1  **SI0: Write analog output 16-bit**

Number of the highest subindex of this object.

5.10.28.2  **SI1: Write analog output 16-bit**

Value of the analog output as 12-bit value. See Table 5-61
Conversion of the 12-bit value into a voltage is carried out according to Table 5-3.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-11</td>
<td>Value of the analog output ANAOUT1.</td>
</tr>
<tr>
<td>12-15</td>
<td>Value is not used.</td>
</tr>
</tbody>
</table>

Table 5-61:  Write analog output 16-bit: SI1: Value
5.10.28.3  **SI2: Write analog output 16-bit**

Value of the analog output as 12-bit value. See Table 5-62

Conversion of the 12-bit value into a voltage is carried out according to Table 5-3.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-11</td>
<td>Value of the analog output ANAOUT2.</td>
</tr>
<tr>
<td>12-15</td>
<td>Value is not used.</td>
</tr>
</tbody>
</table>

**Table 5-62: Write analog output 16-bit: SI2: Value**
6. General note

6.1 Support
Additional information about our products as well as FAQ lists and installation tips, can be found in the support area on our home page (http://www.ixxat.de). You can also obtain information there about current product version and available updates.

6.2 Returning hardware
If it is necessary for you to send hardware back to us, please ask you to download the corresponding RMA form from our home page and proceed according to the instructions on that form.

6.3 Note on the disposal of old equipment
This product falls under the ElektroG and must be disposed separately of in accordance with the ElektroG. IXXAT products that fall under the ElektroG are equipment exclusively for commercial use and are marked with the symbol of a crossed-out waste bin.

As specified in the B2B regulations, disposal according to Section 10 (2) sentence 3 of the German Electrical and Electronic Equipment Act (ElektroG) in the March 16, 2005 version is specifically required by the General Terms of Business of IXXAT and its supplements.

The General Terms of Business and their supplements as well as additional instructions for the disposal of used equipment can be downloaded at www.ixxat.de.

6.4 Note on EMC
This product is a Category A device.

If the product is used in an office or residential area, it can cause radio interference in extreme cases.

To ensure problem-free operation of the product, the following things must be noted for electromagnetic compatibility:

- Use only the accessories included
- The shield for the interfaces must be connected both to the equipment plugs and to the opposite end
6.5  FCC Compliance

Declaration of conformity
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- this device must accept any interference received, including interference that may cause undesired operation

FCC Identifier of the built in Bluetooth module:
PVH0939

Test remit:  
FCC Rules 47 CFR Part 15 / 2010-01-09  
Subpart B - Class B / Section 15.107 and 15.109

in accordance with the procedures given in  
ANSI C63.4-2003 – 01/2004
6.6 EC declaration of conformity

IXXAT Automation declares that the product: ETCio 100

with article number(s):

1.01.0250.10001
1.01.0250.20001
1.01.0250.20101

satisfies the requirements of EC Directive 2004/108/EC.

Applicable harmonized standards:

EN 55022:2010
EN 61000-6-2:2005


[Signature]

IXXAT Automation GmbH
Leibnizstr. 15
88250 Weingarten
6.7 EtherCAT Conformance Test Certificate

Certificate
EtherCAT Conformance Test

IXXAT Automation GmbH
Leibnizstraße 15, 88250 Weingarten, Germany

EtherCAT Technology Group hereby confirms the above named company that the following device is successfully EtherCAT Conformance Tested.

Device under Test
Product Name: ETCio 100
Product Code: 0x6
Revision Number: 0x10001

Assigned Vendor ID: 0x4
Test Report Number: 0x4_002
EtherCAT Test Center: Beckhoff Automation GmbH, Nuremberg, Germany

The following tests were performed:
- EtherCAT Protocol Test (CTT Ver.1.20.60.0)
- Indicator Test
- Labeling Test
- Interoperability Test

Nuremberg, June 11, 2013

[Signature]
Martin Rosan, Executive Director
EtherCAT Technology Group