



OPERATION MANUAL

DIGIFORCE® 9311 EtherCAT Manual

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Valid from: **15.02.2024**
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4509-BA9311ECEN-5799-021526

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1 For your safety

1.1 Symbols used in the instruction manual

1.1.1 Signal words



The following signal words are used in the operation manual according to the specified hazard classification.

| |
|---|
|  <b style="font-size: 24px; margin-left: 20px;">DANGER |
| <p>High degree of risk: indicates a hazardous situation which, if not avoided, will result in death or serious injury.</p> |
|  <b style="font-size: 24px; margin-left: 20px;">WARNING |
| <p>Moderate degree of risk: indicates a hazardous situation which, if not avoided, may result in death or serious injury.</p> |
|  <b style="font-size: 24px; margin-left: 20px;">CAUTION |
| <p>Low degree of risk: indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.</p> |
| <b style="font-size: 24px; margin-left: 20px;">NOTICE |
| <p>Property damage to the equipment or the surroundings will result if the hazard is not avoided.</p> |


Note: It is important to heed these safety notices in order to ensure you handle the DigiFo® 2x11 correctly.

Important: Follow the information given in the operation manual.

1.1.2 Pictograms

| Symbol | Description |
|---|---|
|  | <p>Warning concerning the use and installation of the device and software.</p> |
|  | <p>Observe the advice for protecting the instrument.</p> |

1.2 Symbols and precautionary statements on the instrument

| Symbol | Description |
|---|--|
|  | Hazard warning Disconnect the power plug before opening – Follow safety instructions – Professional servicing only |
| Warning ! To prevent electrical shock do not open device. | Warning of electrical shock hazard Do not open the unit. |
| To prevent fire replace only with same type and rating of fuse ! | Warning of fire hazard Always replace the fuse with a fuse of the same type and rating. |

1.2.1 Conventions used in the instruction manual

| Designation | Description |
|-------------|---|
| [Fx] | Function keys F1 to F3 on the touchscreen display |
| [Text] | Buttons on the touchscreen display |
| "Term" | Terms used in the instrument menus |

1.3 Intended use

The DIGIFORCE® 9311 is an instrument for monitoring repetitive production processes. Its core function is to record and analyze signals from processes in which physical variables, such as force, pressure or torque, vary as a function of displacement, angle or time according to a defined curve. The resultant measurement curve is analyzed using graphical evaluation elements such as windows, envelopes and thresholds. The result of the analysis is classified as "OK" or "NOT OK" (NOK) and can be retrieved from various interfaces.

The instrument is not a substitute for a safety device; for instance it cannot be used as an emergency stop device in a press for when the pressure exceeds a set limit.

2 Trademarks and Patents

EtherCat® is a registered trademark and patented technology of Beckhoff Automation GmbH, Germany

Patents:

The EtherCAT Technology is covered, including but not limited to the following patent applications and patents: EP1590927, EP1789857, DE102004044764, DE102007017835 with corresponding applications or registrations in various other countries.

3 Technical data

3.1 Supported EtherCAT Services

- Process Data Object (PDO)
- Service Data Object (SDO)

You will find further information about EtherCAT at: www.ethercat.org.

3.2 Model 9311 device data

| | |
|---------------|------------------|
| Bus connector | RJ45 |
| EDS file | burster_9311.xml |

4 Installation

Please note that you can download various documents such as installation guidelines and specifications about EtherCAT at www.ethercat.org

4.1 Connection of fieldbus lines

burster devices with a EtherCAT option have two **RJ 45** connectors for the fieldbus connection.

4.2 Meaning of LEDs states



| LED | Status | Description |
|------|-----------------|---|
| LA | OFF | Port closed |
| | ON / Flickering | Port open |
| RN | OFF | The device is in state INIT |
| | Blinking | The device is in state PRE-OPERATIONAL |
| | Single flash | The device is in state SAFE-OPERATIONAL |
| | ON | The device is in state OPERATIONAL |
| ER | OFF | No error |
| | Blinking | Invalid configuration, general configuration error |
| | Single flash | Local error |
| | Double flash | Process data watchdog timeout / EtherCAT watchdog timeout |
| BOOT | Blinking | During boot process (internal communication between EtherCAT-fieldbus-processor and DIGIFORCE® 9311 main processing unit) |

The status of the LEDs is corresponding to EtherCAT specification (for detailed information please see <http://www.ethercat.de/default.htm> "EtherCAT Indicator and Labeling ETG.1300 S (R) V1.1.0").

4.3 Configuration menu in DIGIFORCE® 9311

To access the menu

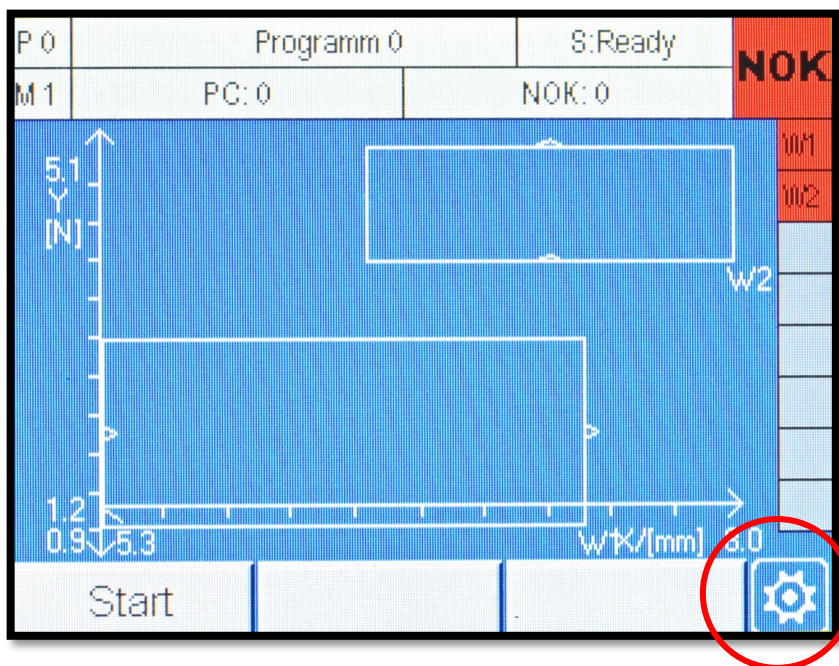
Start in measurement mode. After power on the measurement mode is always set. The display will look differently dependent on your settings or your last measurements.

You can go to "Configuration Main Menu" in measurement mode by pressing the **settings** button

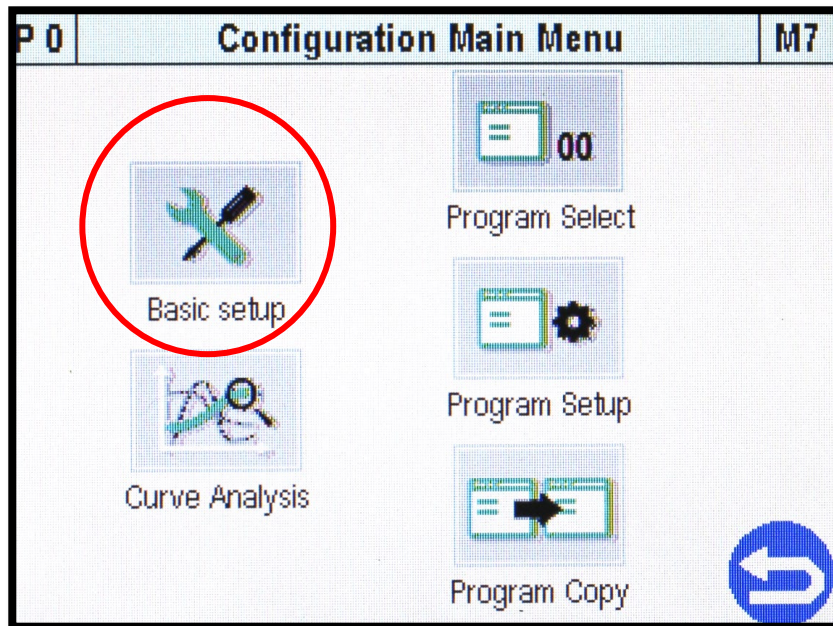


This is how it works

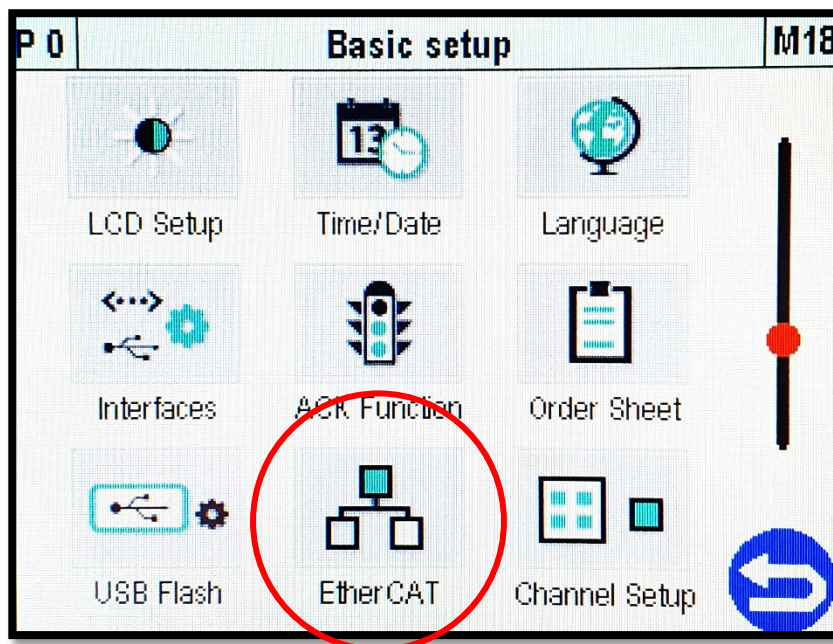
1. In measurement mode, press the **settings** button (gear wheel symbol)




- 2.
3. Go to "Basic setup menu"



- 4.
5. Scroll down to "EtherCAT" menu:



| P 0 | EtherCAT | M75 |
|---------------|-------------|-----|
| SW-version | EC-V202300 | |
| Serial number | 12345678910 | |
| Control via | EtherCAT | |
| State machine | | OP |
| Device ID | | 5 |



Parameters

| | |
|----------------------|--|
| SW-version | Version of the field bus card software |
| Serial number | Serial number of the fieldbus card |
| Control via | <p>EtherCAT: DIGIFORCE® 9311 responds solely to control signals (inputs) on the EtherCAT interface</p> <p>PLC: DIGIFORCE® 9311 responds solely to control signals (inputs) on the PLC I/O interface.</p> <p>When controlled via PLC I/O, data is still transferred in the cyclical EtherCAT Process Data Objects (PDO)</p> |
| State machine | <p>Status of the EtherCAT fieldbus state machine</p> <p>INIT The device is in state INIT</p> <p>PRE-OP The device is in state PRE-OPERATIONAL</p> <p>SAFE-OP The device is in state SAFE-OPERATIONAL</p> <p>OP The device is in state OPERATIONAL</p> |
| Device ID | Device Identification Value can be set here (used for slave identification, 0 is not valid) |

5 EtherCAT – General information

5.1 General information on EtherCAT data transfer

The DIGIFORCE® 9311 with EtherCAT uses for the data transfer the EtherCAT technology CoE (CANopen over EtherCAT). There are two types of data – data which are transferred with each cycle (PDO – Process Data Objects) and data which are transferred on demand only (SDO – Service Data Objects). The SDO-Data are addressed via a combination of Index and Subindex which you will find in the tables below.

The device (Slave) is controlled using the data transferred from Master to Slave. This data always consists of three bytes for the DIGIFORCE® 9311 unit. The function of these three bytes is explained in chapter chapter “**PLC inputs – Transfer from Master to Slave**”

The DIGIFORCE® 9311 sends cyclic 92 bytes to Master. This packet contains PLC status, evaluation information and 30 measurement values, which are user selectable within the 9311 configuration and the live values of max. 3 active measurement channels.

Strings should be transferred with String-Ende (null terminated string)!

You will find further information about EtherCAT at: www.ethercat.org

5.2 Explicit Device Identification

The DIGIFORCE® 9311 supports both types of Explicit Device Identification: SII Configured Station Alias and Device Identification Value (ID Value). The SII configured station alias can be set by a Slave or a configuration tool. This value is stored in the device and is loaded at power-on into the register 0x0012:0x0013. The Device Identification Value (ID Value) can be set directly in the EtherCAT menu of a display device (please refer to Configuration menu in DIGIFORCE® 9311) or with our PC Software DigiControl for a black box device. This value is loaded into the register 0x0134 on the Slave request.

5.3 ESI file

The EtherCAT Slave Information (ESI) file `burster_9311.xml` can be downloaded from the section **Fieldbus** on our website: <https://www.burster.com/en/download-area>. This ESI file contains the EtherCAT configuration information for the DIGIFORCE® 9311.

The structure, contents and encoding of this device description data is standardized so that any EtherCAT devices can be configured using configuration tools from various manufacturers.

The ESI file does not specify what data is transferred or how this data should be interpreted. The user must glean this information from the operating manual and program their Controller accordingly.

5.4 Data conversion

5.4.1 Description of the data formats in this manual

The terms PLC inputs and PLC outputs refer to the DIGIFORCE® 9311 unit. These terms are reversed when referred to the EtherCAT Master (PLC).

The function of the PLC-In / PLC-Out bits is identical to the parallel PLC I/O ports on the unit itself and can be found within the DIGIFORCE® 9311 operating manual.

The floating-point numbers ("float") mentioned are four bytes long (32 bits) and are based on the IEEE-754 standard.

Numbers that are not specifically labeled or are labeled with "d" or "dec" are decimal numbers. (Example: 1234, 1234dec, dec1234, 1234d)

Numbers that are labeled with "0x" or "hex" are hexadecimal numbers. (Example: 0x1234, hex1234, 1234hex, 1234h)

Numbers that are labeled with "b" or "bin" are binary numbers. (Example: b1100, bin1100, 1100b, 1100bin).

5.4.2 Handling problems that arise when reading floating-point numbers

This only concerns cases in which floating-point numbers need to be read from the DIGIFORCE® 9311 unit.

Floating-point numbers (data type REAL), according to IEEE 754, are encoded as four bytes for transfer. This may create problems depending on the type of PLC used.

Cause

In the DIGIFORCE® 9311, the sign byte is transferred first if using acyclic data transfer (see 6. Unconnected Explicit Messaging) and last while cyclic data transmission. Some PLCs expect this byte in the highest of the four addresses not in the lowest address. This inevitably leads to misinterpretation of the numeric value. In this case the order of the four bytes has to be changed by the PLC as shown in the figure.

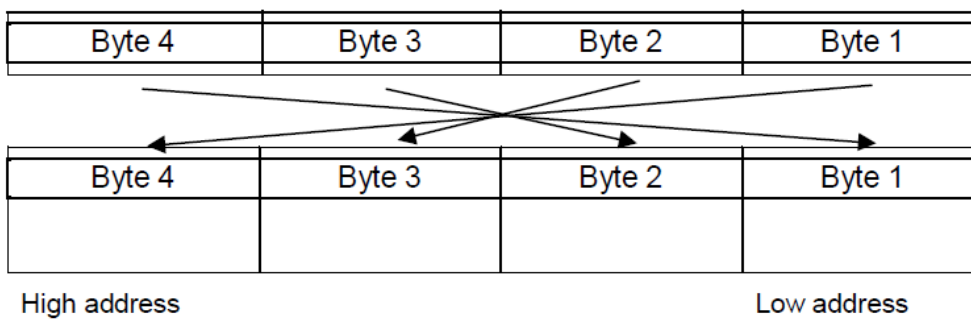


Diagram 1: Exchange of the order of bytes caused by misinterpretation of the numeric value

6 EtherCAT data protocol (PDO - Process Data Objects)

6.1 Meaning of the content of the cyclic data packet from device to the controller

Overview of the packet content:

| Content | Length/Bytes | Bytes |
|--|--------------|------------|
| PLC output status | 2 | Σ 92 bytes |
| Evaluation info | 2 | |
| 20 evaluation values (float) , user defined values** | 20x4 | |
| 2 live values (X, Y) *1 | 2x4 | |

* The user defined values contain values which are defined within the DIGIFORCE® 9311 device. The following values are available:

- General curve data
- Evaluation results of each evaluation element (e.g. window entry/exit window extended evaluation results like Min/Max window limits Xmin, Xmax, Ymin, Ymax threshold crossing point)

** The live values of the sensor channels are updated at a rate of 100 Hz. The values are only updated when the DIGIFORCE® 9311 is ready to record measurements or is actively taking a measurement.


How to define user defined values: The parameterization of the user defined values is done in the main setup menu "Setup user defined values" (Note that this setting is specific for each measurement program. For details refer to the DIGIFORCE® 9311 operation manual, section 6.3.8 User defined values.)

6.2 PLC inputs – Transfer from Master to Slave

Three bytes of PLC-In data for the DIGIFORCE® 9311 are always transferred from the EtherCAT Master to the DIGIFORCE® 9311. These bits have the same function as the parallel PLC inputs to the DIGIFORCE® 9311 unit. (See detailed documentation of these signals within the DIGIFORCE® 9311 operation manual, section 5.3.9 Assigning PLC outputs).

6.2.1 PLC inputs byte 1 - Master to Slave (DIGIFORCE® 9311)

| PLC inputs Byte 1 - Master to Slave (DIGIFORCE® 9311) | | |
|---|--------------------------|-----------|
| Valid values: | adjustable input #1 (P4) | Bit 0 LSB |
| | adjustable input #2 (P5) | Bit 1 |
| Set reserved bits to '0' | adjustable input #3 (P6) | Bit 2 |
| | IN_STROBE | Bit 3 |
| | IN_AUTO | Bit 4 |
| | reserved | Bit 5 |
| | reserved | Bit 6 |
| | reserved | Bit 7 MSB |



NOTICE

Note that the adjustable PLC inputs #1, #2, #3 (Pin 4, 5, 6) can be assigned with different functions. The assignment can be changed within the DIGIFORCE® 9311 “Basic setup” menu (M18) under “Assignment of the PLC inputs” (for further information see DIGIFORCE® model 9311 operation manual chapter 6.1.3 “PLC inputs”).

6.2.2 PLC inputs byte 2 - Master to Slave (DIGIFORCE® 9311)

| PLC inputs Byte 2 - Master to Slave (DIGIFORCE® 9311) | | |
|---|----------|-----------|
| Valid values: | IN_PROG0 | Bit 0 LSB |
| | IN_PROG1 | Bit 1 |
| Set reserved bits to '0' | IN_PROG2 | Bit 2 |
| | IN_PROG3 | Bit 3 |
| | reserved | Bit 4 |
| | reserved | Bit 5 |
| | reserved | Bit 6 |

| | | |
|--|----------|-----------|
| | reserved | Bit 7 MSB |
|--|----------|-----------|

6.2.3 PLC inputs byte 3 - Master to Slave (DIGIFORCE® 9311)

| PLC inputs Byte 3 - Master to Slave (DIGIFORCE® 9311) | | |
|---|----------|-----------|
| Valid values: | IN_START | Bit 0 LSB |
| | reserved | Bit 1 |
| Set reserved bits to '0' | reserved | Bit 2 |
| | reserved | Bit 3 |
| | reserved | Bit 4 |
| | reserved | Bit 5 |
| | reserved | Bit 6 |
| | reserved | Bit 7 MSB |

6.3 PLC outputs – Transfer from Slave (DIGIFORCE® 9311) to Master

The data refers to the PLC output of the DIGIFORCE® 9311. The data described here is the data transferred from the DIGIFORCE® 9311 to the EtherCAT controller.

The function of the PLC-In / PLC-Out bits is identical to the parallel PLC I/O ports on the unit itself and can be found within the DIGIFORCE® 9311 operation manual for the unit. Also the signal timing is available within the DIGIFORCE® 9311 operation manual.

6.3.1 PLC outputs byte 1

| PLC outputs Byte 1 - Slave (DIGIFORCE® 9311) to Master | | |
|--|----------------------------|-----------|
| Valid values: | OUT_READY | Bit 0 LSB |
| | OUT_OK | Bit 1 |
| | OUT_NOK | Bit 2 |
| | OUT_NOK_ONL | Bit 3 |
| | OUT_S1 | Bit 4 |
| | OUT_S2 | Bit 5 |
| | adjustable output #1 (P20) | Bit 6 |
| | adjustable output #6 (P25) | Bit 7 MSB |

6.3.2 PLC outputs byte 2

| PLC outputs Byte 2 - Slave (DIGIFORCE® 9311) to Master | | |
|--|----------------------------|-----------|
| Valid values: | adjustable output #2 (P21) | Bit 0 LSB |
| | adjustable output #3 (P22) | Bit 1 |
| | adjustable output #4 (P23) | Bit 2 |
| | adjustable output #5 (P24) | Bit 3 |
| | reserved | Bit 4 |
| | reserved | Bit 5 |
| | reserved | Bit 6 |
| | reserved | Bit 7 MSB |



NOTICE

Note that PLC outputs [6..1] could be assigned with different functions. The assignment could be changed within the DIGIFORCE® 9311 basic setup menu "Assignment of the PLC outputs"(see DIGIFORCE® 9311 operation manual chapter 6.1.2 PLC outputs).

6.3.3 Default assignment of adjustable PLC inputs and outputs

| 9311 adjustable PLC inputs default assignment | | |
|--|----------------------------|--------------|
| | adjustable input #1 (P4) | IN_TARA_X |
| | adjustable input #2 (P5) | IN_RES_STAT |
| | adjustable input #3 (P6) | IN_STEST |
| 9311 adjustable PLC outputs default assignment | | |
| | adjustable output #1 (P20) | OUT_OK_STEST |
| | adjustable output #2 (P21) | OUT_STROBE |
| | adjustable output #3 (P22) | OUT_PROG0 |
| | adjustable output #4 (P23) | OUT_PROG1 |
| | adjustable output #5 (P24) | OUT_PROG2 |
| | adjustable output #6 (P25) | OUT_MEAS_ACT |

NOTICE



Note that PLC inputs and outputs can be assigned with different functions. The assignment can be changed within the DIGIFORCE® 9311 “Basic setup” menu (M18) under "Assignment of the PLC inputs" or "Assignment of the PLC outputs"(see DIGIFORCE® model 9311 operation manual chapter 6.1.2 “PLC outputs”; 6.1.3 “PLC inputs”).

6.4 Evaluation info – Transfer from Slave (DIGIFORCE® 9311) to Master

The evaluation info (2 bytes) contains the evaluation result of each element.

6.4.1 Evaluation info byte 1

| Evaluation info byte 1 - Slave (DIGIFORCE® 9311) to Master | | |
|--|-----------------|-----------|
| Valid values: | Global_NOK | Bit 0 LSB |
| | Overload_NOK | Bit 1 |
| | Window_1_NOK | Bit 2 |
| | Window_2_NOK | Bit 3 |
| | Window_3_NOK | Bit 4 |
| | Threshold_1_NOK | Bit 5 |
| | Threshold_2_NOK | Bit 6 |
| | Trapezoid_1_NOK | Bit 7 MSB |

6.4.2 Evaluation info byte 2

| Evaluation info byte 2 - Slave (DIGIFORCE® 9311) to Master | | |
|--|-----------------------|-----------|
| Valid values: | Trapezoid_2_NOK | Bit 0 LSB |
| | Envelope_NOK | Bit 1 |
| | Measurement w/o READY | Bit 2 |
| | USB logging error | Bit 3 |
| | reserved | Bit 4 |
| | reserved | Bit 5 |
| | reserved | Bit 6 |
| | reserved | Bit 7 MSB |

6.5 Byte reference list

Data from Master to Slave (DIGIFORCE® 9311)

| Byte | Function | Section | Comments |
|------|-------------------|---------|----------|
| 0 | PLC inputs Byte 1 | | |
| 1 | PLC inputs Byte 2 | | |
| 2 | PLC inputs Byte 3 | | |

Data from Slave (DIGIFORCE® 9311) to Master

| Byte | Function | Section | Comments |
|------|---------------------------------|--|--|
| 0 | PLC outputs Byte 1 | | |
| 1 | PLC outputs Byte 2 | | |
| 2 | Evaluation info Byte 1 | | |
| 3 | Evaluation info Byte 2 | | |
| 4 | User-defined value_1 (1st Byte) | see DIGIFORCE® 9311 operation manual 6.3.8 User defined values | User defined value in DIGIFORCE® 9311 (32-Bit float) |
| 5 | User-defined value_1 (2nd Byte) | see above | |
| 6 | User-defined value_1 (3rd Byte) | see above | |
| 7 | User-defined value_1 (4th Byte) | see above | |
| 8 | User-defined value_2 (1st Byte) | see above | User defined value in DIGIFORCE® 9311 (32-Bit float) |
| 9 | User-defined value_2 (2nd Byte) | see above | |
| 10 | User-defined value_2 (3rd Byte) | see above | |
| 11 | User-defined value_2 (4th Byte) | see above | |
| 12 | User-defined value_3 (1st Byte) | see above | User defined value in DIGIFORCE® 9311 (32-Bit float) |
| 13 | User-defined value_3 (2nd Byte) | see above | |
| 14 | User-defined value_3 (3rd Byte) | see above | |
| 15 | User-defined value_3 (4th Byte) | see above | |
| 16 | User-defined value_4 (1st Byte) | see above | User defined value in DIGIFORCE® 9311 (32-Bit float) |
| 17 | User-defined value_4 (2nd Byte) | see above | |
| 18 | User-defined value_4 (3rd Byte) | see above | |
| 19 | User-defined value_4 (4th Byte) | see above | |

| Byte | Function | Section | Comments |
|------|--|-----------|--|
| 20 | User-defined value_5 (1 st Byte) | see above | |
| 21 | User-defined value_5 (2 nd Byte) | see above | User defined value in DIGIFORCE® 9311 (32-Bit float) |
| 22 | User-defined value_5 (3 rd Byte) | see above | |
| 23 | User-defined value_5 (4 th Byte) | see above | |
| 24 | User-defined value_6 (1 st Byte) | see above | |
| 25 | User-defined value_6 (2 nd Byte) | see above | User defined value in DIGIFORCE® 9311 (32-Bit float) |
| 26 | User-defined value_6 (3 rd Byte) | see above | |
| 27 | User-defined value_6 (4 th Byte) | see above | |
| 28 | User-defined value_7 (1 st Byte) | see above | |
| 29 | User-defined value_7 (2 nd Byte) | see above | User defined value in DIGIFORCE® 9311 (32-Bit float) |
| 30 | User-defined value_7 (3 rd Byte) | see above | |
| 31 | User-defined value_7 (4 th Byte) | see above | |
| 32 | User-defined value_8 (1 st Byte) | see above | |
| 33 | User-defined value_8 (2 nd Byte) | see above | User defined value in DIGIFORCE® 9311 (32-Bit float) |
| 34 | User-defined value_8 (3 rd Byte) | see above | |
| 35 | User-defined value_8 (4 th Byte) | see above | |
| 36 | User-defined value_9 (1 st Byte) | see above | |
| 37 | User-defined value_9 (2 nd Byte) | see above | User defined value in DIGIFORCE® 9311 (32-Bit float) |
| 38 | User-defined value_9 (3 rd Byte) | see above | |
| 39 | User-defined value_9 (4 th Byte) | see above | |
| 40 | User-defined value_10 (1 st Byte) | see above | |
| 41 | User-defined value_10 (2 nd Byte) | see above | User defined value in DIGIFORCE® 9311 (32-Bit float) |
| 42 | User-defined value_10 (3 rd Byte) | see above | |
| 43 | User-defined value_10 (4 th Byte) | see above | |
| 44 | User-defined value_11 (1 st Byte) | see above | |
| 45 | User-defined value_11 (2 nd Byte) | see above | User defined value in DIGIFORCE® 9311 (32-Bit float) |
| 46 | User-defined value_11 (3 rd Byte) | see above | |
| 47 | User-defined value_11 (4 th Byte) | see above | |
| 48 | User-defined value_12 (1 st Byte) | see above | |

| Byte | Function | Section | Comments |
|------|----------------------------------|-----------|--|
| 49 | User-defined value_12 (2nd Byte) | see above | User defined value in DIGIFORCE® 9311 (32-Bit float) |
| 50 | User-defined value_12 (3rd Byte) | see above | |
| 51 | User-defined value_12 (4th Byte) | see above | |
| 52 | User-defined value_13 (1st Byte) | see above | User defined value in DIGIFORCE® 9311 (32-Bit float) |
| 53 | User-defined value_13 (2nd Byte) | see above | |
| 54 | User-defined value_13 (3rd Byte) | see above | |
| 55 | User-defined value_13 (4th Byte) | see above | |
| 56 | User-defined value_14 (1st Byte) | see above | User defined value in DIGIFORCE® 9311 (32-Bit float) |
| 57 | User-defined value_14 (2nd Byte) | see above | |
| 58 | User-defined value_14 (3rd Byte) | see above | |
| 59 | User-defined value_14 (4th Byte) | see above | |
| 60 | User-defined value_15 (1st Byte) | see above | User defined value in DIGIFORCE® 9311 (32-Bit float) |
| 61 | User-defined value_15 (2nd Byte) | see above | |
| 62 | User-defined value_15 (3rd Byte) | see above | |
| 63 | User-defined value_15 (4th Byte) | see above | |
| 64 | User-defined value_16 (1st Byte) | see above | User defined value in DIGIFORCE® 9311 (32-Bit float) |
| 65 | User-defined value_16 (2nd Byte) | see above | |
| 66 | User-defined value_16 (3rd Byte) | see above | |
| 67 | User-defined value_16 (4th Byte) | see above | |
| 68 | User-defined value_17 (1st Byte) | see above | User defined value in DIGIFORCE® 9311 (32-Bit float) |
| 69 | User-defined value_17 (2nd Byte) | see above | |
| 70 | User-defined value_17 (3rd Byte) | see above | |
| 71 | User-defined value_17 (4th Byte) | see above | |
| 72 | User-defined value_18 (1st Byte) | see above | User defined value in DIGIFORCE® 9311 (32-Bit float) |
| 73 | User-defined value_18 (2nd Byte) | see above | |
| 74 | User-defined value_18 (3rd Byte) | see above | |
| 75 | User-defined value_18 (4th Byte) | see above | |
| 76 | User-defined value_19 (1st Byte) | see above | User defined value in DIGIFORCE® 9311 (32-Bit float) |
| 77 | User-defined value_19 (2nd Byte) | see above | |

| Byte | Function | Section | Comments |
|------|--|-----------|---|
| 78 | User-defined value_19 (3 rd Byte) | see above | |
| 79 | User-defined value_19 (4 th Byte) | see above | |
| 80 | User-defined value_20 (1 st Byte) | see above | User defined value in DIGIFORCE® 9311 (32-Bit float) |
| 81 | User-defined value_20 (2 nd Byte) | see above | |
| 82 | User-defined value_20 (3 rd Byte) | see above | |
| 83 | User-defined value_20 (4 th Byte) | see above | |
| 84 | Live value Channel X (1 st Byte) | | (32-Bit float) Channel X live value Updating rate of the live values ¹⁰⁰ /sec. |
| 85 | Live value Channel X (2 nd Byte) | | |
| 86 | Live value Channel X (3 rd Byte) | | |
| 87 | Live value Channel X (4 th Byte) | | |
| 88 | Live value Channel Y (1 st Byte) | | (32-Bit float) Channel Y live value Updating rate of the live values ¹⁰⁰ /sec. |
| 89 | Live value Channel Y (2 nd Byte) | | |
| 90 | Live value Channel Y (3 rd Byte) | | |
| 91 | Live value Channel Y (4 th Byte) | | |

7 SDO – Service Data Objects

The services are described from the point of view of the Master.

The SDO EtherCAT services allow access to following DIGIFORCE® 9311 functions:

- Complete device configuration
- Transfer of component/worker/job data for logging
- Retrieval of large amounts of process and curve data
- For further information please contact our service department at service@burster.com

Note: The current EtherCAT specification does not have any error codes in case the device cannot perform a command due to its current state, e.g. an optional analogue card is not build-in. If you write some data into the device, it is recommended to read the value back and compare it with the set value to be sure the device has accepted your parameter. Additionally, the device sends an emergency message if a parameter cannot be read or written. EtherCAT Master can read out these emergency messages. One message consists of 5 bytes: **CFGERR** and means **Configuratiuon Error**. Please also use them with read commands, especially if the expected value is a 0 (zero). If the device fails to return data due to its current state, it sets all data bytes to zero and sends an emergency message.

Abbreviations

| | |
|---------|--|
| WO | Write Only |
| RO | Read Only |
| RW | Read and Write |
| Event! | Writing an arbitrary byte initiates action |
| BOOL | Data type Boolean |
| FLT | Data type Float, floating point number according to IEEE754, Length = 4 Byte |
| STR n | Data type String, String of n Bytes |
| U8 | Data type Unsigned 8, Length = 1 Byte |
| U16 | Data type Unsigned 16, Length = 2 Byte |
| U32 | Data type Unsigned 32, Length = 4 Byte |

7.1 Instrument configuration

7.1.1 Index 0x2000: Master Outputs

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|-------------|-------|------------------|------|-----|-----|
| 0x2000 | 1 | IN_ADJ1 | 0 | Set | U8 | 1 | WO |
| | | | 1 | Not set | | | |
| 0x2000 | 2 | IN_ADJ2 | 0 | Set | U8 | 1 | WO |
| | | | 1 | Not set | | | |
| 0x2000 | 3 | IN_ADJ3 | 0 | Set | U8 | 1 | WO |
| | | | 1 | Not set | | | |
| 0x2000 | 4 | IN_STROBE | 0 | Set | U8 | 1 | WO |
| | | | 1 | Not set | | | |
| 0x2000 | 5 | IN_AUTO | 0 | Set | U8 | 1 | WO |
| | | | 1 | Not set | | | |

| | | | | | | | |
|---------------|----|----------|--------|----------------|----|---|----|
| 0x2000 | 9 | IN_PROG0 | 0 1 | Set Not set | U8 | 1 | WO |
| 0x2000 | 10 | IN_PROG1 | 0 1 | Set Not set | U8 | 1 | WO |
| 0x2000 | 11 | IN_PROG2 | 0 1 | Set Not set | U8 | 1 | WO |
| 0x2000 | 12 | IN_PROG3 | 0 1 | Set Not set | U8 | 1 | WO |
| 0x2000 | 17 | IN_START | 0 1 | Set Not set | U8 | 1 | WO |

7.1.2 Index 0x2001: Master Inputs

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|---------------|-----------|---------------------|-----------|------------------|------|-----|-----|
| 0x2001 | 1 | OUT_READY | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 2 | OUT_OK | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 3 | OUT_NOK | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 4 | OUT_NOK_ONL | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 5 | OUT_S1 | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 6 | OUT_S2 | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 7 | OUT_ADJ1 | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 8 | OUT_ADJ6 | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 9 | OUT_ADJ2 | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 10 | OUT_ADJ3 | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 11 | OUT_ADJ4 | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 12 | OUT_ADJ5 | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 17 | OUT_Global_NOK | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 18 | OUT_Overload_NOK | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 19 | OUT_Window_1_NOK | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 20 | OUT_Window_2_NOK | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 21 | OUT_Window_3_NOK | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 22 | OUT_Threshold_1_NOK | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 23 | OUT_Threshold_2_NOK | 0xff 0 | Set Not set | U8 | 1 | RO |

| | | | | | | | |
|---------------|----|---------------------------|-----------|----------------|-----|---|----|
| 0x2001 | 24 | OUT_Trapezoid_1_NOK | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 25 | OUT_Trapezoid_2_NOK | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 26 | OUT_Envelope_NOK | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 27 | OUT_Measurement_w_o_READY | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 28 | OUT_USB_logging_error | 0xff 0 | Set Not set | U8 | 1 | RO |
| 0x2001 | 33 | OUT_User_defined_Value_1 | 0xff 0 | Set Not set | FLT | 4 | RO |
| 0x2001 | 34 | OUT_User_defined_Value_2 | 0 1 | Set Not set | FLT | 4 | RO |
| 0x2001 | 35 | OUT_User_defined_Value_3 | 0 1 | Set Not set | FLT | 4 | RO |
| 0x2001 | 36 | OUT_User_defined_Value_4 | 0 1 | Set Not set | FLT | 4 | RO |
| 0x2001 | 37 | OUT_User_defined_Value_5 | 0 1 | Set Not set | FLT | 4 | RO |
| 0x2001 | 38 | OUT_User_defined_Value_6 | 0 1 | Set Not set | FLT | 4 | RO |
| 0x2001 | 39 | OUT_User_defined_Value_7 | 0 1 | Set Not set | FLT | 4 | RO |
| 0x2001 | 40 | OUT_User_defined_Value_8 | 0 1 | Set Not set | FLT | 4 | RO |
| 0x2001 | 41 | OUT_User_defined_Value_9 | 0 1 | Set Not set | FLT | 4 | RO |
| 0x2001 | 42 | OUT_User_defined_Value_10 | 0 1 | Set Not set | FLT | 4 | RO |
| 0x2001 | 43 | OUT_User_defined_Value_11 | 0 1 | Set Not set | FLT | 4 | RO |
| 0x2001 | 44 | OUT_User_defined_Value_12 | 0 1 | Set Not set | FLT | | RO |
| 0x2001 | 45 | OUT_User_defined_Value_13 | 0 1 | Set Not set | FLT | 4 | RO |
| 0x2001 | 46 | OUT_User_defined_Value_14 | 0 1 | Set Not set | FLT | 4 | RO |
| 0x2001 | 47 | OUT_User_defined_Value_15 | 0 1 | Set Not set | FLT | 4 | RO |
| 0x2001 | 48 | OUT_User_defined_Value_16 | 0 1 | Set Not set | FLT | 4 | RO |
| 0x2001 | 49 | OUT_User_defined_Value_17 | 0 1 | Set Not set | FLT | 4 | RO |
| 0x2001 | 50 | OUT_User_defined_Value_18 | 0 1 | Set Not set | FLT | 4 | RO |
| 0x2001 | 51 | OUT_User_defined_Value_19 | 0 1 | Set Not set | FLT | 4 | RO |
| 0x2001 | 52 | OUT_User_defined_Value_20 | 0 1 | Set Not set | FLT | 4 | RO |
| 0x2001 | 53 | OUT_Channel_X_Live_Value | 0 1 | Set Not set | FLT | 4 | RO |
| 0x2001 | 54 | OUT_Channel_Y_Live_Value | 0 1 | Set Not set | FLT | 4 | RO |

7.1.3 General settings (Index 0x2030)

Index 0x2030, Attributes 0 to 18

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|---|---------------------------|--|-------|-----|-----|
| 0x2030 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2030 | 1...9 | Reserved | - | Not possible | | | X |
| 0x2030 | 10 | Device detection | <i>Digiforce Typ 9311</i> | | STR18 | 18 | RO |
| 0x2030 | 11 | Serial number | <i>12345678</i> | | STR11 | 11 | RO |
| 0x2030 | 12 | Software version | <i>V202300</i> | | STR25 | 25 | RO |
| 0x2030 | 13 | Version boot loader software | <i>V201500</i> | | STR25 | 25 | RO |
| 0x2030 | 14 | Software version Field bus interface | <i>EC-V202300</i> | | STR25 | 25 | RO |
| 0x2030 | 15 | Optional analog interface enabled | 0 1 2 3 | Strain gauge+Potent. Piezo+Potentiometer Strain gauge+Increm. Piezo+Incremental | U16 | 2 | RO |
| 0x2030 | 16 | Info: Calibration date analog interface | <i>08.09.2023</i> | | STR10 | 10 | RO |
| 0x2030 | 17 | Station name | <i>Stat14 right</i> | | STR15 | 15 | RW |
| 0x2030 | 18 | reserved | - | - | - | - | - |

Index 0x2030, Attributes 19 to 35

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|---|----------------------------|---|-------|-----|-----|
| 0x2030 | 19 | Language | 0 1 2 3 4 5 | German English French Spanish Italian Chinese | U16 | 2 | RW |
| 0x2030 | 20 | Date | <i>[dd.mm.yyyy]</i> | e.g.: 21.09.2016 | STR10 | 10 | RW |
| 0x2030 | 21 | Time | <i>[hh:mm:ss], 24h</i> | e.g.: 16:15:00 | STR8 | 8 | RW |
| 0x2030 | 22 | LCD brightness | <i>1 ... 10</i> | Integer value (10 max.) | U16 | 2 | RW |
| 0x2030 | 23 | Measurement menu function key definition F1 | 0 1 2 3 4 5 | Off Meas. program incremental Meas. program decremental Tare X Tare Y | U16 | 2 | RW |

| | | | | | | | |
|---------------|----|--|--|--|-----|---|----|
| | | | 6 7 8 9 | Measurement Start/Stop Acknowledge OK parts Acknowledge NOK parts Sensor test Edit mode | | | |
| 0x2030 | 24 | Measurement menu function key definition F2 | 0 1 2 3 4 5 6 7 8 9 | Off Meas. program incremental Meas. program decremental Tare X Tare Y Measurement Start/Stop Acknowledge OK parts Acknowledge NOK parts Sensor test Edit mode | U16 | 2 | RW |
| 0x2030 | 25 | Measurement menu function key definition F3 | 0 1 2 3 4 5 6 7 8 9 | Off Meas. program incremental Meas. program decremental Tare X Tare Y Measurement Start/Stop Acknowledge OK parts Acknowledge NOK parts Sensor test Edit mode | U16 | 2 | RW |
| 0x2030 | 26 | Display mode of function Keys | 0 1 | Fade out Always on | U16 | 2 | RW |
| 0x2030 | 27 | Meas. menu display control GRAPHIC | 0 1 | Meas. menu disabled Meas. menu enabled | U16 | 2 | RW |
| 0x2030 | 28 | Meas. menu display control GENERAL CURVE DATA | 0 1 | Meas. menu disabled Meas. menu enabled | U16 | 2 | RW |
| 0x2030 | 29 | Meas. menu display control TOTAL (Off/Smiley/text) | 0 1 2 | Meas. menu disabled Smiley Text | U16 | 2 | RW |
| 0x2030 | 30 | Meas. menu display control ENTRY/EXIT VALUES | 0 1 | Meas. menu disabled Meas. menu enabled | U16 | 2 | RW |
| 0x2030 | 31 | Meas. menu display control USER DEFINED MEAS. VALUES | 0 1 | Meas. menu disabled Meas. menu enabled | U16 | 2 | RW |
| 0x2030 | 32 | Meas. menu display control STATISTICS | 0 1 | Meas. menu disabled Meas. menu enabled | U16 | 2 | RW |
| 0x2030 | 33 | Meas. menu display control ORDER SHEET | 0 1 | Meas. menu disabled Meas. menu enabled | U16 | 2 | RW |

| | | | | | | | |
|---------------|----|--|---|--|-----|---|----|
| 0x2030 | 34 | Show/Hide of Live Values | 0 1 | Show Live Values Hide Live Values | U16 | 2 | RW |
| 0x2030 | 35 | Display the measurement menu, read the currently displayed measurement menu | 101 102 103 104 105 106 107 | M1 Displaying meas. curves M2 General curve data M3 Total Result M4 Entry/Exit M5 User defined values M6 Statistics M7 Order sheet | U16 | 2 | RW |
| | | <p>Note: The menu is selected here, but not yet displayed. Display only occurs through access to Index 0x2030/68.</p> | | | | | |

Index 0x2030, Attributes 36 to 51

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|---------------|-----------|---|--------|---|------|-----|-----|
| 0x2030 | 36 | Access authorisation Password protection on/off | 0 1 | Password protection on Password protection off | U16 | 2 | RW |
| 0x2030 | 37 | Access authorisation BASIC SETUP MENU | 0 1 | Access level disabled Access level enabled | U16 | 2 | RW |
| 0x2030 | 38 | Access authorisation PROGRAM SELECTION | 0 1 | Access level disabled Access level enabled | U16 | 2 | RW |
| 0x2030 | 39 | Access authorisation COPY PROGRAMS | 0 1 | Access level disabled Access level enabled | U16 | 2 | RW |
| 0x2030 | 40 | Access authorisation CURVE ANALYSIS | 0 1 | Access level disabled Access level enabled | U16 | 2 | RW |
| 0x2030 | 41 | Access authorisation CHANNEL SETTINGS | 0 1 | Access level disabled Access level enabled | U16 | 2 | RW |
| 0x2030 | 42 | Access authorisation MEASUREMENT MODE | 0 1 | Access level disabled Access level enabled | U16 | 2 | RW |
| 0x2030 | 43 | Access authorisation EVALUATION | 0 1 | Access level disabled Access level enabled | U16 | 2 | RW |
| 0x2030 | 44 | Access authorisation REALTIME SWITCHPOINTS | 0 1 | Access level disabled Access level enabled | U16 | 2 | RW |
| 0x2030 | 45 | Access authorization TEST OPERATION | 0 1 | Access level disabled Access level enabled | U16 | 2 | RW |
| 0x2030 | 46 | Access authorisation SENSOR TEST | 0 1 | Access level disabled Access level enabled | U16 | 2 | RW |
| 0x2030 | 47 | Access authorisation USER DEFINED VALUES | 0 1 | Access level disabled Access level enabled | U16 | 2 | RW |

| | | | | | | | |
|---------------|----|--|------------------|---|-----|---|----|
| 0x2030 | 48 | Access authorisation EXTERNAL MEMORY | 0 1 | Access level disabled Access level enabled | U16 | 2 | RW |
| 0x2030 | 49 | Master password | 0000 ... 9999 | | U16 | 2 | RW |
| 0x2030 | 50 | Set master password to default | <i>EVENT!</i> | Writing an arbitrary byte initiates action | U8 | 1 | WO |
| 0x2030 | 51 | User password | 0000 ... 9999 | | U16 | 2 | RW |

Index 0x2030, Sub-Index 52 (Assignment adjustable PLC output 1)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|---------------|-----------|-------------------------|-------|------------------|------|-----|-----|
| 0x2030 | 52 | adj. PLC output 1 (P20) | 0 | OUT_OK_STEST | U16 | 2 | RW |
| 0x2030 | 52 | adj. PLC output 1 (P20) | 1 | OUT_STROBE | U16 | 2 | RW |
| 0x2030 | 52 | adj. PLC output 1 (P20) | 2 | OUT_PROG0 | U16 | 2 | RW |
| 0x2030 | 52 | adj. PLC output 1 (P20) | 3 | OUT_PROG1 | U16 | 2 | RW |
| 0x2030 | 52 | adj. PLC output 1 (P20) | 4 | OUT_PROG2 | U16 | 2 | RW |
| 0x2030 | 52 | adj. PLC output 1 (P20) | 5 | OUT_PROG3 | U16 | 2 | RW |
| 0x2030 | 52 | adj. PLC output 1 (P20) | 6 | OUT_MEAS_ACT | U16 | 2 | RW |
| 0x2030 | 52 | adj. PLC output 1 (P20) | 7 | OUT_S3 | U16 | 2 | RW |
| 0x2030 | 52 | adj. PLC output 1 (P20) | 8 | OUT_S4 | U16 | 2 | RW |
| 0x2030 | 52 | adj. PLC output 1 (P20) | 9 | OUT_S5 | U16 | 2 | RW |
| 0x2030 | 52 | adj. PLC output 1 (P20) | 10 | OUT_S6 | U16 | 2 | RW |
| 0x2030 | 52 | adj. PLC output 1 (P20) | 11 | OUT_TEST_OP | U16 | 2 | RW |
| 0x2030 | 52 | adj. PLC output 1 (P20) | 12 | OUT_ERROR | U16 | 2 | RW |
| 0x2030 | 52 | adj. PLC output 1 (P20) | 13 | OUT_WARN_TARE | U16 | 2 | RW |
| 0x2030 | 52 | adj. PLC output 1 (P20) | 14 | OUT_CONFIG | U16 | 2 | RW |
| 0x2030 | 52 | adj. PLC output 1 (P20) | 15 | OUT_ACK_ALARM | U16 | 2 | RW |
| 0x2030 | 52 | adj. PLC output 1 (P20) | 16 | OUT_ACK_LOCK | U16 | 2 | RW |
| 0x2030 | 52 | adj. PLC output 1 (P20) | 17 | OUT_ACK_OK | U16 | 2 | RW |
| 0x2030 | 52 | adj. PLC output 1 (P20) | 18 | OUT_ACK_NOK | U16 | 2 | RW |
| 0x2030 | 52 | adj. PLC output 1 (P20) | 19 | OUT_PC_LOG | U16 | 2 | RW |

Index 0x2030, Attributes 53 to 57 (Assignment adjustable PLC outputs 2 to 6)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|-------------------------|------------------------|------------------|------|-----|-----|
| 0x2030 | 53 | adj. PLC output 2 (P21) | <i>see subindex 52</i> | | U16 | 2 | RW |
| 0x2030 | 54 | adj. PLC output 3 (P22) | <i>see subindex 52</i> | | U16 | 2 | RW |
| 0x2030 | 55 | adj. PLC output 4 (P23) | <i>see subindex 52</i> | | U16 | 2 | RW |
| 0x2030 | 56 | adj. PLC output 5 (P24) | <i>see subindex 52</i> | | U16 | 2 | RW |
| 0x2030 | 57 | adj. PLC output 6 (P25) | <i>seesubindex 52</i> | | U16 | 2 | RW |

Index 0x2030, Sub-Index 58 (Assignment adjustable PLC input 1)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|-----------------------|-------|------------------|------|-----|-----|
| 0x2030 | 58 | adj. PLC input 1 (P4) | 0 | IN_TARE_X | U16 | 2 | RW |
| 0x2030 | 58 | adj. PLC input 1 (P4) | 1 | IN_TARE_Y | U16 | 2 | RW |
| 0x2030 | 58 | adj. PLC input 1 (P4) | 2 | IN_TARE_X+Y | U16 | 2 | RW |
| 0x2030 | 58 | adj. PLC input 1 (P4) | 3 | IN_RES_STAT | U16 | 2 | RW |
| 0x2030 | 58 | adj. PLC input 1 (P4) | 4 | IN_STEST | U16 | 2 | RW |
| 0x2030 | 58 | adj. PLC input 1 (P4) | 5 | IN_TEST_OP | U16 | 2 | RW |
| 0x2030 | 58 | adj. PLC input 1 (P4) | 6 | IN_ACK | U16 | 2 | RW |
| 0x2030 | 58 | adj. PLC input 1 (P4) | 7 | IN_ACK_OK | U16 | 2 | RW |
| 0x2030 | 58 | adj. PLC input 1 (P4) | 8 | IN_ACK_NOK | U16 | 2 | RW |
| 0x2030 | 58 | adj. PLC input 1 (P4) | 9 | IN_ACK_ERROR | U16 | 2 | RW |

Index 0x2030, Attributes 59 to 60 (Assignment PLC inputs 2 to 3)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|-----------------------|------------------------|------------------|------|-----|-----|
| 0x2030 | 59 | adj. PLC input 2 (P5) | <i>see subindex 58</i> | | U16 | 2 | RW |

| | | | | | | | |
|---------------|----|-----------------------|------------------------|--|-----|---|----|
| 0x2030 | 60 | adj. PLC input 3 (P6) | <i>see subindex 58</i> | | U16 | 2 | RW |
|---------------|----|-----------------------|------------------------|--|-----|---|----|

Index 0x2030, Attributes 61 to 71

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|---------------|-----------|--|------------------------|--|-------|-----|-----|
| 0x2030 | 61 | Order sheet: Operator | <i>Michael_Mueller</i> | | STR64 | 64 | RW |
| 0x2030 | 62 | Order sheet: Order number | <i>AN_123456</i> | | STR64 | 64 | RW |
| 0x2030 | 63 | Order sheet: Batch | <i>BATCH_257-3</i> | | STR64 | 64 | RW |
| 0x2030 | 64 | Order sheet: Component | <i>Cylinder_rig ht</i> | | STR64 | 64 | RW |
| 0x2030 | 65 | Order sheet: Serial number 1 | <i>SN_123456789</i> | | STR64 | 64 | RW |
| 0x2030 | 66 | Order sheet: Serial number 2 | <i>SN_987654321</i> | | STR64 | 64 | RW |
| 0x2030 | 67 | Acknowledgement function on/off | 0 1 | Acknowledgement function off Acknowledgement function on | U16 | 2 | RW |
| 0x2030 | 68 | Acknowledgement function: Acknowledge OK parts on/off | 0 1 | Not active User has to confirm OK parts (F-Key or PLC input) | U16 | 2 | RW |
| 0x2030 | 69 | Acknowledgement function: Acknowledge NOK parts on/off | 0 1 | Not active User has to confirm NOK parts (F-Key or PLC input) | U16 | 2 | RW |
| 0x2030 | 70 | Acknowledgement function: Buzzer volume | 0 ... 10 | 10: max. volume | U16 | 2 | RW |
| 0x2030 | 71 | Update display (refresh view) | <i>Event!</i> | Writing an arbitrary byte initiates action | U8 | 1 | WO |

7.1.4 Communication: Change menu, display update, fault indication (Index 0x2031)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|---------------|-----------|------------------------------------|---------------|--|------|-----|-----|
| 0x2031 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2031 | 1 - 9 | Reserved | - | - | x | x | x |
| 0x2031 | 10 | Go to menu | 0 1 | Meas. Menu Graphical test menu | U16 | 2 | WO |
| 0x2031 | 11 | Initiate update of the LCD display | <i>EVENT!</i> | Writing an arbitrary byte initiates action | U8 | 1 | WO |

| | | | | | | | |
|------------|--|---------------------|------------|---|-----|---|----|
| 0x2031 | 12 | Device fault status | 0x00000001 | PREFIX addressing fault | U32 | 4 | RO |
| | | | 0x00000002 | Enquiry received in Device mode | U32 | 4 | RO |
| | | | 0x00000004 | Blockcheck error | U32 | 4 | RO |
| | | | 0x00000008 | Command fault | U32 | 4 | RO |
| | | | 0x00000010 | Parameter error | U32 | 4 | RO |
| | | | 0x00000020 | Timeout Receive Timer | U32 | 4 | RO |
| | | | 0x00000040 | Timeout Response Timer | U32 | 4 | RO |
| | | | 0x00000080 | Invalid ! or ? | U32 | 4 | RO |
| | | | 0x00000100 | Invalid configuration | U32 | 4 | RO |
| | | | 0x00000400 | No valid measurements are available | U32 | 4 | RO |
| | | | 0x00004000 | Reading out the measurement curve was interrupted by the beginning of a new measurement | U32 | 4 | RO |
| | | | 0x00080000 | No TEDS or TEDS is not valid | U32 | 4 | RO |
| | | | 0x00100000 | TEDS voltage too low | U32 | 4 | RO |
| | | | 0x00200000 | TEDS ID not valid | U32 | 4 | RO |
| | | | 0x00400000 | TEDS Version not valid | U32 | 4 | RO |
| | | | 0x00800000 | Strain gauge sensor connected but another sensor selected | U32 | 4 | RO |
| | | | 0x01000000 | Standard signal sensor connected but another sensor selected | U32 | 4 | RO |
| | | | 0x02000000 | Unknown error | U32 | 4 | RO |
| | | | 0x04000000 | Sensor type is not valid | U32 | 4 | RO |
| | | | 0x08000000 | Potentiometer sensor connected but another sensor selected | U32 | 4 | RO |
| 0x10000000 | Direction of strain gauge is not valid | U32 | 4 | RO | | | |
| 0x20000000 | USB Flash Error | U32 | 4 | RO | | | |

7.1.5 Program Selection/Renaming & Statistics reset (Index 0x2032)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|--|---------------------|---|-------|-----|-----|
| 0x2032 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2032 | 1 – 9 | Reserved | - | - | x | x | x |
| 0x2032 | 10 | Set program number | 0 ... 15 | | U16 | 2 | RW |
| 0x2032 | 11 | Writing/Reading of the current program name | <i>Program name</i> | | STR20 | 20 | RW |
| 0x2032 | 12 | Reset statistics of a measurement program | 0 ... 15 | EVENT! Selection through writing the program number | U16 | 2 | WO |
| 0x2032 | 13 | Reset statistics in all measurement programs | <i>EVENT!</i> | Writing an arbitrary byte initiates action | U8 | 1 | WO |

7.1.6 General channel settings (Index 0x2033)

| Class | Attr. | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-------|--|--------------------------------------|---|------|-----|-----|
| 0x2033 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2033 | 1 - 9 | Reserved | - | - | | | X |
| 0x2033 | 10 | Channel settings channel X Note: First make the settings in Attributes 10, 11 then initiate with index 12! | 0 1 2 3 4 5 | Terminals: A, Potentiometer A, standard signal B, strain gauge B, standard signal B, Piezo Time | U16 | 2 | RW |
| 0x2033 | 11 | Channel settings channel Y Note: First make the settings in Attributes 10, 11 then initiate with index 12! | 0 1 2 3 4 5 | Terminals: A, Potentiometer A, standard signal B, strain gauge B, standard signal B, Piezo Time | U16 | 2 | RW |
| 0x2033 | 12 | Accept channel settings | <i>Event!</i> | The settings from Attributes 10, 11 are being stored. Writing an arbitrary byte initiates action. | U8 | 1 | WO |
| 0x2033 | 13 | Filter channel X Note: Not available for the channel settings "Piezo" | 0 1 2 3 4 5 6 7 | Off 5 Hz filter 10 Hz filter 25 Hz filter 50 Hz filter 100 Hz filter 200 Hz filter 400 Hz filter | U16 | 2 | RW |

| Class | Attr. | Description | Value | Meaning of value | Type | Len | R/W |
|---------------|-------|---|--|--|------|-----|-----|
| | | | 8 | 800 Hz filter | | | |
| 0x2033 | 14 | Filter channel Y Notes: Not available for the channel settings "Piezo" | 0 1 2 3 4 5 6 7 8 | Off 5 Hz filter 10 Hz filter 25 Hz filter 50 Hz filter 100 Hz filter 200 Hz filter 400 Hz filter 800 Hz filter | U16 | 2 | RW |
| 0x2033 | 15 | Transmitter supply channel X Note: Entry is not available for the channel settings "Piezo" Only for 'BlackBox' devices | 0 1 | Transmitter supply off Transmitter supply on | U16 | 2 | RW |
| 0x2033 | 16 | Transmitter supply channel Y Note: Entry is not available for the channel settings "Piezo" Only for 'BlackBox' devices | 0 1 | Transmitter supply off Transmitter supply on | U16 | 2 | RW |
| 0x2033 | 17 | Set unit channel X Note: Entry is not available for the channel settings "Time" | 0 1 2 3 4 5 6 7 8 9 10 11 12 | User defined unit 1 User defined unit 2 User defined unit 3 mm N kN Nm Ncm grd bar V s ms | U16 | 2 | RW |
| 0x2033 | 18 | Set unit channel Y Note: Entry is not available for the channel settings "Time" | 0 1 2 3 4 5 6 7 8 | User defined unit 1 User defined unit 2 User defined unit 3 mm N kN Nm Ncm grd | U16 | 2 | RW |

| Class | Attr. | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-------|--|---------------------|--|------|-----|-----|
| | | | 9 10 11 12 | bar V s ms | | | |
| 0x2033 | 19 | Set user defined unit 1 | abcd | | STR4 | 4 | RW |
| 0x2033 | 20 | Set user defined unit 2 | abcd | | STR4 | 4 | RW |
| 0x2033 | 21 | Set user defined unit 3 | ijkl | | STR4 | 4 | RW |
| 0x2033 | 22 | Returns the measured value on channel X Note: Entry is not available for the channel settings "Time" | EVENT! | | FLT | 4 | RO |
| 0x2033 | 23 | Returns the measured value on channel Y Note: Entry is not available for the channel settings "Time" | EVENT! | | FLT | 4 | RO |
| 0x2033 | 24 | Channel to be scaled | 0 1 | Channel X Channel Y | U 16 | 2 | WO |
| 0x2033 | 25 | Lower scale value | | Concerns the channel selected under index 24 | FLT | 4 | RW |
| 0x2033 | 26 | Upper scale value | | Concerns the channel selected under index 24 | FLT | 4 | RW |
| 0x2033 | 27 | Lower calibration value | | Concerns the channel selected under index 24 | FLT | 4 | RW |
| 0x2033 | 28 | Upper calibration value | | Concerns the channel selected under index 24 | FLT | 4 | RW |
| 0x2033 | 29 | Perform scaling (as per index 25 ... 29) | EVENT | Entry is not available for the channel settings "Off" and "Time" | U8 | 1 | WO |
| 0x2033 | 30 | Switch between program depending and global channel settings | 0 1 | Program depending Global Note: If changing to global settings, the individual channel setting will get lost | U16 | 2 | RW |

7.1.7 Channel settings “Standard signal” (Index 0x2034)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|---------------------------------|--------|-------------------------------------|------|-----|-----|
| 0x2034 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2034 | 1 - 9 | Reserved | - | - | | | X |
| 0x2034 | 10 | Standard signal input channel X | 0 1 | 5 V input range 10 V input range | U16 | 2 | RW |
| 0x2034 | 11 | Standard signal input channel Y | 0 1 | 5 V input range 10 V input range | U16 | 2 | RW |

7.1.8 Channel settings “Strain gauge” (Index 0x2035)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|---------------------------------------|-----------------------|---|------|-----|-----|
| 0x2035 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2035 | 1 - 9 | Reserved | - | - | | | X |
| 0x2035 | 10 | Strain gauge input range channel X | 0 1 2 3 4 | 2 mV/V input range 4 mV/V input range 10 mV/V input range 20 mV/V input range 40 mV/V input range | U16 | 2 | RW |
| 0x2035 | 11 | Strain gauge input range channel Y | 0 1 2 3 4 | 2 mV/V input range 4 mV/V input range 10 mV/V input range 20 mV/V input range 40 mV/V input range | U16 | 2 | RW |
| 0x2035 | 12 | Strain gauge sensitivity channel X | 0.01 ... 100.0 | IEEE754 Float | FLT | 4 | RW |
| 0x2035 | 13 | Strain gauge sensitivity channel Y | 0.01 ... 100.0 | IEEE754 Float | FLT | 4 | RW |
| 0x2035 | 14 | Level (elect.) strain gauge channel X | 0.01 ... 100.0 | IEEE754 Float | FLT | 4 | RO |
| 0x2035 | 15 | Level (elect.) strain gauge channel Y | 0.01 ... 100.0 | IEEE754 Float | FLT | 4 | RO |

7.1.9 Channel settings “Piezo” (Index 0x2036)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|---------------|-----------|-------------------------------------|--|--|------|-----|-----|
| 0x2036 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2036 | 1 - 9 | Reserved | - | - | | | X |
| 0x2036 | 10 | Piezo input range channel X | 0 1 2 3 4 5 6 7 8 9 | 1nC range 2nC range 5nC range 10nC range 20nC range 40nC range 80nC range 200nC range 400nC range 1uC range | U16 | 2 | RW |
| 0x2036 | 11 | Piezo input range channel Y | 0 1 2 3 4 5 6 7 8 9 | 1nC range 2nC range 5nC range 10nC range 20nC range 40nC range 80nC range 200nC range 400nC range 1uC range | U16 | 2 | RW |
| 0x2036 | 12 | Piezo short-circuit on/to channel X | 0 1 | Do not short-circuit piezo input Short-circuit piezo input | U16 | 2 | WO |
| 0x2036 | 13 | Piezo short-circuit on/to channel Y | 0 1 | Do not short-circuit piezo input Short-circuit piezo input | U16 | 2 | WO |

7.1.10 Tare (Index 0x2037)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|-----------------------------------|---|--|------|-----|-----|
| 0x2037 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2037 | 1 .. 9 | Reserved | - | - | | | X |
| 0x2037 | 10 | Tare at meas. start channel X | 0 1 | off on | U16 | 2 | RW |
| 0x2037 | 11 | Tare at meas. start channel Y | 0 1 | off on | U16 | 2 | RW |
| 0x2037 | 12 | Standard value for tare channel X | <i>between -9999999.0 and 9999999.0</i> | Float value, Float according to IEEE754 | FLT | 4 | RW |
| 0x2037 | 13 | Standard value for tare channel Y | <i>between -9999999.0 and 9999999.0</i> | Float value, Float according to IEEE754 | FLT | 4 | RW |
| 107 | 14 | Tare warning on/off channel X | 0 1 | off on | U16 | 2 | RW |
| 107 | 15 | Tare warning on/off channel Y | 0 1 | off on | U16 | 2 | RW |
| 107 | 16 | Set tare warning limit channel X | <i>between 1.0 and 20.0</i> | Float value, Float according to IEEE754 | FLT | 4 | RW |
| 107 | 17 | Set tare warning limit channel Y | <i>between 1.0 and 20.0</i> | Float value Float according to IEEE754 | FLT | 4 | RW |
| 107 | 18 | Tare channel X | <i>EVENT!</i> | Writing an arbitrary byte initiates action | U8 | 1 | WO |
| 107 | 19 | Delete tare channel X | <i>EVENT!</i> | Writing an arbitrary byte initiates action | U8 | 1 | WO |
| 107 | 20 | Tare channel Y | <i>EVENT!</i> | Writing an arbitrary byte initiates action | U8 | 1 | WO |
| 107 | 21 | Delete tare channel Y | <i>EVENT!</i> | Writing an arbitrary byte initiates action | U8 | 1 | WO |

7.1.11 Measurement mode (Index 0x2038)

| Class | Attr. | Description | Value | Meaning of value | Type | Len | R/W |
|--------|--------|---|---|---|------|-----|-----|
| 0x2038 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2038 | 1 .. 9 | Reserved | - | - | | | X |
| 0x2038 | 10 | X sampling off/on | 0 1 | off on | U16 | 2 | RW |
| 0x2038 | 11 | X sample rate | <i>between 0.0 and 9999999.0</i> | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2038 | 12 | Y sampling off/on | 0 1 | off on | U16 | 2 | RW |
| 0x2038 | 13 | Y sample rate | <i>between 0.0 and 9999999.0</i> | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2038 | 14 | Time sampling off/on | 0 1 | off on | U16 | 2 | RW |
| 0x2038 | 15 | Time sample rate | <i>between 0.0 and 9999999.0</i> | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2038 | 16 | Set reference of curve Note: "Underrun" is not permitted if the channel concerned is set to time. | 0 1 2 3 4 5 | Absolute Final force Y reference line overrun Y reference line underrun Y trigger overrun Y trigger underrun | U16 | 2 | RW |
| 0x2038 | 17 | Set reference line Y | <i>between -9999999.0 and 9999999.0</i> | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2038 | 18 | Set trigger line Y | <i>between -9999999.0 and 9999999.0</i> | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2038 | 19 | Set return point | 0 1 2 3 | XMIN XMAX YMIN YMAX | U16 | 2 | RW |
| 0x2038 | 20 | Set "Record curve to" | 0 1 | Complete curve Up to return point | U16 | 2 | RW |
| 0x2038 | 21 | Set start mode | 0 1 2 3 4 | External X internal overrun X internal underrun Y internal overrun Y internal underrun | U16 | 2 | RW |

| Class | Attr. | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-------|--|---|--|------|-----|-----|
| 0x2038 | 22 | Set stop mode | 0 1 2 3 4 5 6 | External X internal overrun X internal underrun Y internal overrun Y internal underrun Timeout Defined number of measured values | U16 | 2 | RW |
| 0x2038 | 23 | Set X start value for internal start | <i>between -9999999.0 and 9999999.0</i> | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2038 | 24 | Set Y start value for internal start | <i>between -9999999.0 and 9999999.0</i> | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2038 | 25 | Set X stop value for internal stop | <i>between -9999999.0 and 9999999.0</i> | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2038 | 26 | Set Y stop value for internal stop | <i>between -9999999.0 and 9999999.0</i> | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2038 | 27 | Set the "stop" timeout value | <i>between 0 and 9999999.0</i> | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2038 | 28 | Set the "stop" number of measured values | <i>0 bis 5000</i> | Integer value | U16 | 2 | RW |

7.1.12 Evaluation window 1 (Index 0x2039)

| Class | Attr. | Description | Value | Meaning of value | Type | Len | R/W |
|--------|--------|---|---|---|------|-----|-----|
| 0x2039 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2039 | 1 .. 9 | Reserved | - | - | | | X |
| 0x2039 | 10 | Window 1 off/on | 0 1 | off on | U16 | 2 | RW |
| 0x2039 | 11 | Window 1 limit Xmin Note: At the end, entry must be adopted through index 15. | <i>between -9999999.0 and 9999999.0</i> | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2039 | 12 | Window 1 limit Xmax Note: At the end, entry must be adopted through index 15. | <i>between -9999999.0 and 9999999.0</i> | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2039 | 13 | Window 1 limit Ymin | <i>between</i> | Float value Float according to IEEE754 | FLT | 4 | RW |

| Class | Attr. | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-------|--|---|--|------|-----|-----|
| | | Note: At the end, entry must be adopted through index 15. | -9999999.0 and 9999999.0 | | | | |
| 0x2039 | 14 | Window 1 limit Ymax Note: At the end, entry must be adopted through index 15. | between -9999999.0 and 9999999.0 | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2039 | 15 | Window 1 copy limit Note: Values entered into Attributes 11, 12, 13,14 are adopted | EVENT! | Writing an arbitrary byte initiates action | U8 | 1 | WO |
| 0x2039 | 16 | Window 1 entry left Note: At the end, entry must be adopted through index 24. | 0 1 | no yes | U16 | 2 | RW |
| 0x2039 | 17 | Window 1 entry right Note: At the end, entry must be adopted through index 24. | 0 1 | no yes | U16 | 2 | RW |
| 0x2039 | 18 | Window 1 entry bottom Note: At the end, entry must be adopted through index 24. | 0 1 | no yes | U16 | 2 | RW |
| 0x2039 | 19 | Window 1 entry top Note: At the end, entry must be adopted through index 24. | 0 1 | no yes | U16 | 2 | RW |
| 0x2039 | 20 | Window 1 exit left Note: At the end, entry must be adopted through index 24. | 0 1 | no yes | U16 | 2 | RW |
| 0x2039 | 21 | Window 1 exit right Note: At the end, entry must be adopted through index 24. | 0 1 | no yes | U16 | 2 | RW |
| 0x2039 | 22 | Window 1 exit bottom Note: At the end, entry must be adopted through index 24. | 0 1 | no yes | U16 | 2 | RW |
| 0x2039 | 23 | Window 1 exit top Note: At the end, entry must be adopted through index 24. | 0 1 | no yes | U16 | 2 | RW |

| Class | Attr. | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-------|---|-----------------------|---|------|-----|-----|
| 0x2039 | 24 | Copy window entry/exit Note: Values entered into Attributes 16 - 23 are adopted | <i>EVENT!</i> | | U8 | 1 | WO |
| 0x2039 | 25 | Window 1 curve segment for evaluation | 0 1 2 | Forward Return Complete curve | U16 | 2 | RW |
| 0x2039 | 26 | Window 1 online evaluation | 0 1 2 3 4 | Off left - right right - left bottom - top top - bottom | U16 | 2 | RW |
| 0x2039 | 27 | Window 1 Online signal level | 0 1 | Low active High active | U16 | 2 | RW |

7.1.13 Evaluation window 2 (Index 0x2040)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|-----------------------|-------|------------------|------|-----|-----|
| 0x2040 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2040 | 1 .. 9 | Reserved | - | - | | | X |
| 0x2040 | 10 ... | See Index 0x2039 | | | | | |

7.1.14 Evaluation window 3 (Index 0x2041)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|-----------------------|-------|------------------|------|-----|-----|
| 0x2041 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2041 | 1 .. 9 | Reserved | - | - | | | X |
| 0x2041 | 10 ... | See Index 0x2039 | | | | | |

7.1.15 Evaluation trapezoid window 1 (Index 0x2042)

| Class | Attr. | Description | Value | Meaning of value | Type | Len | R/W |
|--------|--------|--|---|--|------|-----|-----|
| 0x2042 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2042 | 1 .. 9 | Reserved | - | - | | | X |
| 0x2042 | 10 | Trapezoid 1 off/on | 0 1 | off on | U16 | 2 | RW |
| 0x2042 | 11 | Trapezoid type X/Y | 0 1 | Type X-Trapezoid Type Y-Trapezoid | | | |
| 0x2042 | 12 | Trapezoid 1 limit Type X: Xmin | <i>between</i> <i>-9999999.0</i> <i>and</i> | Float value Float according to IEEE754 | FLT | 4 | RW |

| Class | Attr. | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-------|--|---|--|------|-----|-----|
| | | Type Y: Ymin Note: At the end, entry must be adopted through index 18 | 9999999.0 | | | | |
| 0x2042 | 13 | Trapezoid 1 limit Type X: Xmax Type Y: Ymax Note: At the end, entry must be adopted through index 18 | <i>between</i> -9999999.0 <i>and</i> 9999999.0 | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2042 | 14 | Trapezoid 1 limit Type X: Ymin left Type Y: Xmin bottom Note: At the end, entry must be adopted through index 18 | <i>between</i> -9999999.0 <i>and</i> 9999999.0 | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2042 | 15 | Trapezoid 1 limit Type X: Ymax left Type Y: Xmax bottom Note: At the end, entry must be adopted through index 18 | <i>between</i> -9999999.0 <i>and</i> 9999999.0 | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2042 | 16 | Trapezoid 1 limit Type X: Ymin right Type Y: Xmin top Note: At the end, entry must be adopted through index 18 | <i>between</i> -9999999.0 <i>and</i> 9999999.0 | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2042 | 17 | Trapezoid 1 limit Type X: Ymax right Type Y: Xmax top Note: At the end, entry must be adopted through index 18 | <i>between</i> -9999999.0 <i>and</i> 9999999.0 | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2042 | 18 | Trapezoid 1 copy the limits | EVENT | Writing an arbitrary byte initiates action | U8 | 1 | WO |

| Class | Attr. | Description | Value | Meaning of value | Type | Len | R/W |
|---------------|-------|--|--------------|--|------|-----|-----|
| | | Note: Values entered into Attributes 12 - 17 are adopted | | | | | |
| 0x2042 | 19 | Trapezoid 1 entry Type X: entry left Type Y: entry bottom Note: At the end, entry must be adopted through index 23 | 0 1 | no yes | U16 | 2 | RW |
| 0x2042 | 20 | Trapezoid 1 entry Type X: entry right Type Y: entry top Note: At the end, entry must be adopted through index 23 | 0 1 | no yes | U16 | 2 | RW |
| 0x2042 | 21 | Trapezoid 1 exit Type X: exit left Type Y: exit bottom Note: At the end, entry must be adopted through index 23 | 0 1 | no yes | U16 | 2 | RW |
| 0x2042 | 22 | Trapezoid 1 exit Type X: exit right Type Y: exit top Note: At the end, entry must be adopted through index 23 | 0 1 | no yes | U16 | 2 | RW |
| 0x2042 | 23 | Trapezoid 1 copy entry/exit Note: Values entered into Attributes 19- 22 are adopted. | <i>EVENT</i> | Writing an arbitrary byte initiates action | U8 | 1 | WO |
| 0x2042 | 24 | Trapezoid 1 curve segment for evaluation | 0 1 2 | Forward Return Complete curve | U16 | 2 | RW |

7.1.16 Evaluation trapezoid window 2 (Index 0x2043)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|-----------------------|-------|------------------|------|-----|-----|
| 0x2043 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2043 | 1 .. 9 | Reserved | - | - | | | X |
| 0x2043 | 10 ... | See Index 0x2042 | | | | | |

7.1.17 Evaluation threshold 1 (Index 0x2044)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|--|---|--|------|-----|-----|
| 0x2044 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2044 | 1 .. 9 | Reserved | - | - | | | X |
| 0x2044 | 10 | Threshold 1 off/on | 0 1 | off on | U16 | 2 | RW |
| 0x2044 | 11 | Threshold 1 type of threshold | 0 1 | Type X (vertical) Type Y (horizontal) | U16 | 2 | RW |
| 0x2044 | 12 | Threshold 1 position Type X: X value Type Y: Y value Note: At the end, entry must be adopted through index 15. | <i>between -9999999.0 and 9999999.0</i> | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2044 | 13 | Threshold 1 limit Type X: Ymin Type Y: Xmin Note: At the end, entry must be adopted through index 15. | <i>between -9999999.0 and 9999999.0</i> | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2044 | 14 | Threshold 1 limit Type X: Ymax Type Y: Xmax Note: At the end, entry must be adopted through index 15. | <i>between -9999999.0 and 9999999.0</i> | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2044 | 15 | Threshold 1 copy position and limits Note: Values entered into Attributes 11 - 14 are adopted | <i>EVENT</i> | Writing an arbitrary byte initiates action | U8 | 1 | WO |
| 0x2044 | 16 | Threshold 1 passage | 0 1 | no yes | U16 | 2 | RW |

| | | | | | | | |
|---------------|----|---|--------------|--|-----|---|----|
| | | Type X: left > right Type Y: bottom > top Note: At the end, entry must be adopted through index 18. | | | | | |
| 0x2044 | 17 | Threshold 1 passage Type X: right > left Type Y: top > bottom Note: At the end, entry must be adopted through index 18. | 0 1 | no yes | U16 | 2 | RW |
| 0x2044 | 18 | Threshold 1 Copy passage Note: Values entered into Attributes 16 - 17 are adopted | <i>EVENT</i> | Writing an arbitrary byte initiates action | U8 | 1 | WO |
| 0x2044 | 19 | Threshold 1 Curve segment for evaluation | 0 1 2 | Forward Return Complete curve | U16 | 2 | RW |

7.1.18 Evaluation threshold 2 (Index 0x2045)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|---------------|-----------|-----------------------|-------|------------------|------|-----|-----|
| 0x2045 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2045 | 1 .. 9 | Reserved | - | - | | | X |
| 0x2045 | 10 ... | See Index 0x2044 | | | | | |

7.1.19 Evaluation envelope (Index 0x2047 to 0x2050)

Index/index data on request

7.1.20 Tolerance band for evaluation elements (Index 0x2051)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|---|----------------------------------|--|------|-----|-----|
| 0x2051 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2051 | 1 .. 9 | Reserved | - | - | | | X |
| 0x2051 | 10 | Tolerance band X Note: At the end, entry must be adopted through index 12. | <i>between 0.0 and 9999999.0</i> | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2051 | 11 | Tolerance band Y Note: At the end, entry must be adopted through index 12. | <i>between 0.0 and 9999999.0</i> | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2051 | 12 | Store tolerance bands Note: Values entered into Attributes 10 - 11 are adopted. | <i>EVENT</i> | Writing an arbitrary byte initiates action | U8 | 1 | WO |

7.1.21 Realtime switchpoints S1 (Index 0x2052)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|---|---|--|------|-----|-----|
| 0x2052 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2052 | 1 .. 9 | Reserved | - | - | | | X |
| 0x2052 | 10 | Switchpoint S1 value Note: At the end, entry must be adopted through index 14. | <i>between -9999999.0 and 9999999.0</i> | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2052 | 11 | Switchpoint S1 channel Note: At the end, entry must be adopted through index 14. | <i>0 1</i> | Channel X Channel Y | U16 | 2 | RW |
| 0x2052 | 12 | Switchpoint S1 level Note: At the end, entry must be adopted through index 14. | <i>0 1</i> | Low active High active | U16 | 2 | RW |
| 0x2052 | 13 | Switchpoint 1 reference Note: At the end, entry must be adopted through index 14. | <i>0 1</i> | Absolute reference Trigger reference | U16 | 2 | RW |
| 0x2052 | 14 | Switchpoint 1 Copy settings Note: Values entered into Attributes 10 - 13 are adopted. | <i>EVENT</i> | Writing an arbitrary byte initiates action | U8 | 1 | WO |

7.1.22 Realtime switchpoints S2 (Index 0x2053)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|-----------------------|-------|------------------|------|-----|-----|
| 0x2053 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2053 | 1 .. 9 | Reserved | - | - | | | X |
| 0x2053 | 10.. | See Index 0x2052 | | | | | |

7.1.23 Realtime switchpoints S3 (Index 0x2054)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|-----------------------|-------|------------------|------|-----|-----|
| 0x2054 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2054 | 1 .. 9 | Reserved | - | - | | | X |
| 0x2054 | 10.. | See Index 0x2052 | | | | | |

7.1.24 Realtime switchpoints S4 (Index 0x2055)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|-----------------------|-------|------------------|------|-----|-----|
| 0x2055 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2055 | 1 .. 9 | Reserved | - | - | | | X |
| 0x2055 | 10.. | See Index 0x2052 | | | | | |

7.1.25 Realtime switchpoints S5 (Index 0x2056)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|-----------------------|-------|------------------|------|-----|-----|
| 0x2056 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2056 | 1 .. 9 | Reserved | - | - | | | X |
| 0x2056 | 10.. | See Index 0x2052 | | | | | |

7.1.26 Realtime switchpoints S6 (Index 0x2057)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|-----------------------|-------|------------------|------|-----|-----|
| 0x2057 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2057 | 1 .. 9 | Reserved | - | - | | | X |
| 0x2057 | 10.. | See Index 0x2052 | | | | | |

7.1.27 Sensortest (Index 0x2058)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Le n | R/W |
|--------|-----------|---|---|--|------|---------|-----|
| 0x2058 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2058 | 1 .. 9 | Reserved | - | - | | | X |
| 0x2058 | 10 | Sensor test Channel X on/off | 0 1 | off on | U16 | 2 | RW |
| 0x2058 | 11 | Sensor test Channel Y on/off | 0 1 | off on | U16 | 2 | RW |
| 0x2058 | 12 | Sensor test Channel X measure reference value | EVENT | Writing an arbitrary byte initiates action | U8 | 1 | WO |
| 0x2058 | 13 | Sensor test Channel Y measure reference value | EVENT | Writing an arbitrary byte initiates action | U8 | 1 | WO |
| 0x2058 | 14 | Sensor test Channel X reference value | between -9999999.0 and 9999999.0 | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2058 | 15 | Sensor test Channel Y reference value | between -9999999.0 and 9999999.0 | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2058 | 16 | Sensor test Channel X tolerance | between 0.0 and 9999999.0 | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2058 | 17 | Sensor test Channel Y tolerance | between 0.0 and 9999999.0 | Float value Float according to IEEE754 | FLT | 4 | RW |
| 0x2058 | 18 | Initiate sensor test Note: Read access initiates the sensor test and delivers the result. | 0 1 | NOK OK | U16 | 2 | RO |

7.1.28 Setup user-defined values (Index 0x2059)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|------------------------------|----------------------|-------------------------------|------|-----|-----|
| 0x2059 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2059 | 1 .. 9 | Reserved | - | - | | | X |
| 0x2059 | 10 | User-defined values value 1 | <i>Integer value</i> | See operand table in appendix | U16 | 2 | RW |
| 0x2059 | 11 | User-defined values value 2 | <i>Integer value</i> | See operand table in appendix | U16 | 2 | RW |
| 0x2059 | 12 | User-defined values value 3 | <i>Integer value</i> | See operand table in appendix | U16 | 2 | RW |
| 0x2059 | 13 | User-defined values value 4 | <i>Integer value</i> | See operand table in appendix | U16 | 2 | RW |
| 0x2059 | 14 | User-defined values value 5 | <i>Integer value</i> | See operand table in appendix | U16 | 2 | RW |
| 0x2059 | 15 | User-defined values value 6 | <i>Integer value</i> | See operand table in appendix | U16 | 2 | RW |
| 0x2059 | 16 | User-defined values value 7 | <i>Integer value</i> | See operand table in appendix | U16 | 2 | RW |
| 0x2059 | 17 | User-defined values value 8 | <i>Integer value</i> | See operand table in appendix | U16 | 2 | RW |
| 0x2059 | 18 | User-defined values value 9 | <i>Integer value</i> | See operand table in appendix | U16 | 2 | RW |
| 0x2059 | 19 | User-defined values value 10 | <i>Integer value</i> | See operand table in appendix | U16 | 2 | RW |
| 0x2059 | 20 | User-defined values value 11 | <i>Integer value</i> | See operand table in appendix | U16 | 2 | RW |
| 0x2059 | 21 | User-defined values value 12 | <i>Integer value</i> | See operand table in appendix | U16 | 2 | RW |
| 0x2059 | 22 | User-defined values value 13 | <i>Integer value</i> | See operand table in appendix | U16 | 2 | RW |
| 0x2059 | 23 | User-defined values value 14 | <i>Integer value</i> | See operand table in appendix | U16 | 2 | RW |
| 0x2059 | 24 | User-defined values value 15 | <i>Integer value</i> | See operand table in appendix | U16 | 2 | RW |
| 0x2059 | 25 | User-defined values value 16 | <i>Integer value</i> | See operand table in appendix | U16 | 2 | RW |
| 0x2059 | 26 | User-defined values value 17 | <i>Integer value</i> | See operand table in appendix | U16 | 2 | RW |
| 0x2059 | 27 | User-defined values value 18 | <i>Integer value</i> | See operand table in appendix | U16 | 2 | RW |
| 0x2059 | 28 | User-defined values value 19 | <i>Integer value</i> | See operand table in appendix | U16 | 2 | RW |
| 0x2059 | 29 | User-defined values value 20 | <i>Integer value</i> | See operand table in appendix | U16 | 2 | RW |

7.1.29 Copy/initialize measurement programs (Index 0x2060)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|---|----------|--|------|-----|-----|
| 0x2060 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| | 1 .. 9 | Reserved | - | - | | X | X |
| 0x2060 | 10 | Meas. program number source Note: The settings from Attributes 10 - 12 are being adopted through Attributes 13, 14 or 15. | 0 ... 15 | | U16 | 2 | WO |
| 0x2060 | 11 | Meas. program number Target start Note: The settings from Attributes 10 - 12 are being adopted through Attributes 13, 14 or 15. | 0 ... 15 | | U16 | 2 | WO |
| 0x2060 | 12 | Meas. program number Target end Note: The settings from Attributes 10 - 12 are being adopted through Attributes 13, 14 or 15. | 0 ... 15 | | U16 | 2 | WO |
| 0x2060 | 13 | Copy whole program setup Note: Copy according to entries in Attributes 10 - 12. | EVENT | Writing an arbitrary byte initiates action | U8 | 1 | WO |
| 0x2060 | 14 | Copy sensor setup Note: Copy according to entries in Attributes 10 - 12. | EVENT | Writing an arbitrary byte initiates action | U8 | 1 | WO |
| 0x2060 | 15 | Initialize selected programs Note: Initializing according to Attributes 11 - 12. | EVENT | Writing an arbitrary byte initiates action | U8 | 1 | WO |
| 0x2060 | 16 | Initialize all measurement programs and device parameters | EVENT | Writing an arbitrary byte initiates action | U8 | 1 | WO |

7.1.30 Reference curve (Index 0x2061 to 0x2063)

Index/index data on request

7.1.31 Test operation (Index 0x2064)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|-------------------------------------|--------------------|----------------------------|------|-----|-----|
| 0x2064 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2064 | 1...9 | Reserved | | | | | |
| 0x2064 | 10 | Current measurement value channel X | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2064 | 11 | Current measurement value channel Y | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |

7.1.32 Zoom and autoscale (Index 0x2065)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|---|--------------------|--|------|-----|-----|
| 0x2065 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2065 | 1...9 | Reserved | - | - | | X | X |
| 0x2065 | 10 | Switching autoscale/fix scale | 0 1 | Autoscale off Autoscale on | U16 | 2 | RW |
| 0x2065 | 11 | Fix scale Xmin Note: At the end, entry must be adopted through index 15. | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RW |
| 0x2065 | 12 | Fix scale Xmax Note: At the end, entry must be adopted through index 15. | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RW |
| 0x2065 | 13 | Fix scale Ymin Note: At the end, entry must be adopted through index 15. | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RW |
| 0x2065 | 14 | Fix scale Ymax Note: At the end, entry must be adopted through index 15. | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RW |
| 0x2065 | 15 | Store fix scale Note: Values entered into Attributes 11 - 14 are adopted. | <i>EVENT!</i> | Writing an arbitrary byte initiates action | U8 | 1 | WO |

7.1.33 USB-Logging (Index 0x2066)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|--------------------------|-----------------------|--|-----------|-----|-----|
| 0x2066 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2066 | 1...9 | Reserved | - | - | | X | X |
| 0x2066 | 10 | USB-Logging on/off | 0 1 | off on | U16 | 2 | RW |
| 0x2066 | 11 | Designation of file name | 0 1 | Program name Order sheet | U16 | 2 | RW |
| 0x2066 | 12 | State of USB-Drive | 0 1 2 3 | State couldn't be read Not attached Attached but not mounted Attached and mounted | U16 | 2 | RO |
| 0x2066 | 13 | Free space on USB-Drive | String | If USB Drive is not attached or not mounted (see subindex 12) "0,000 MB" will be returned | STR 15 | 15 | RO |
| 0x2066 | 14 | Format USB Drive | String "formatusb" | "formatusb" works as a password here | STR 9 | 9 | WO |
| 0x2066 | 15 | READY-Control | 0 1 | off on | U16 | 2 | RW |

7.1.34 TEDS-Sensors (Index 0x2067)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|---|--------|--|------|-----|-----|
| 0x2067 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2067 | 1...9 | Reserved | - | - | | X | X |
| 0x2067 | 10 | Connector | 0 1 | A B | U16 | 2 | WO |
| 0x2067 | 11 | Direction Note: applicable for strain gauge sensors only | 0 1 | Preferred direction Against preferred direction | U16 | 2 | WO |
| 0x2067 | 12 | Read TEDS electronic data sheet from Connector specified at Sub-Index 10 with measurement direction according to Sub-Index 11 | EVENT! | Writing an arbitrary byte initiates action | U8 | 1 | WO |

7.1.35 Reserved Classes (Index 0x2068...0x2078)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|-------------------------|-----------|--------------|-------|------------------|------|-----|-----|
| 0x2076 ... 0x2078 | XX | Not possible | - | - | X | X | X |

7.2 Measurement results

7.2.1 Status of measurement (Index 0x2079)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|--|-----------------------------|---|------|-----|-----|
| 0x2079 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2079 | 1...9 | Reserved | | | | X | X |
| 0x2079 | 10 | Index of the last measured value of the current curve Caution: The number of the pair of values is shown on the display. The index begins at 0, the number at 1! | <i>16 Bit Integer value</i> | 0 means that there is no measurement curve | U16 | 2 | RO |
| 0x2079 | 11 | Running measurement curve counter [only relevant for Digicontrol usage] | <i>32 Bit Integer value</i> | This counter is incremented by 1 when a measurement curve is newly acquired in any menu | U32 | 4 | RO |
| 0x2079 | 12 | Amount of curves in current array of curves | <i>0...10</i> | Integer value between 0 and 10 | U16 | 2 | RO |

7.2.2 Further information for current measurement curve (Index 0x2080)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|--|---|---------------------------|-----------|-----|-----|
| 0x2080 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2080 | 1...9 | Reserved | - | - | | X | X |
| 0x2080 | 10 | Piece Counter | 32 Bit Integer value | | U32 | 4 | RO |
| 0x2080 | 11 | NOK counter (sum) | 32 Bit Integer value | | U32 | 4 | RO |
| 0x2080 | 12 | Total evaluation | 0 1 | NOK OK | U16 | 2 | RO |
| 0x2080 | 13 | Sub-Index of the curve's return point Caution: The number of the pair of values is shown on the display. The index begins at 0, the number at 1! | 16 Bit Integer value | | U16 | 2 | RO |
| 0x2080 | 14 | Index of the last measured value of the curve Caution: The number of the pair of values is shown on the display. The index begins at 0, the number at 1! | 16 Bit Integer value | | U16 | 2 | RO |
| 0x2080 | 15 | Status overdrive of the A/D converter | 0 1 | No overdrive Overdrive | U16 | 2 | RO |
| 0x2080 | 16 | Date of recording | String in format dd.mm.yyyy | | STR 10 | 10 | RO |
| 0x2080 | 17 | Time of recording hh:mm:ss | String in format hh:mm:ss | | STR 8 | 8 | RO |
| 0x2080 | 18 | Unit channel X | String with max. 4 characters, e.g. "N" or "inch" | | STR 4 | 4 | RO |
| 0x2080 | 19 | Unit channel Y | String with max. 4 characters, e.g. "N" or "inch" | | STR 4 | 4 | RO |

7.2.3 General curve data (Index 0x2081)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|---------------------------|--------------------|----------------------------|------|-----|-----|
| 0x2081 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2081 | 1...9 | Reserved | - | - | | X | X |
| 0x2081 | 10 | X-minimum, X-coordinate | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2081 | 11 | X-minimum, Y-coordinate | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2081 | 12 | X-maximum, X-coordinate | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2081 | 13 | X-maximum, Y-coordinate | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2081 | 14 | Y-minimum, X-coordinate | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2081 | 15 | Y-minimum, Y-coordinate | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2081 | 16 | Y-maximum, X-coordinate | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2081 | 17 | Y-maximum, Y-coordinate | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2081 | 18 | First value X-coordinate | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2081 | 19 | First value Y-coordinate | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2081 | 20 | Last value X-coordinate | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2081 | 21 | Last value Y-coordinate | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2081 | 22 | Return point X-coordinate | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2081 | 23 | Return point Y-coordinate | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |

7.2.4 Request measurement results of user-defined values (Index 0x2082)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|--|--|---|-----------|-----|-----|
| 0x2082 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2082 | 1...9 | Reserved | - | - | | X | X |
| 0x2082 | 10 | User-defined value 1 name | <i>String with the designator of the value</i> | Designator = "0" means that no value is defined for this value number | STR 16 | 16 | RO |
| 0x2082 | 11 | User-defined value 1 measurement value | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2082 | 12 | User-defined value 1 unit | <i>String with max. 4 characters,</i> | See operand table in appendix. | STR 4 | 4 | RO |

| | | | | | | | |
|---------------|----|--|--|---|-----------|----|----|
| | | | <i>e.g. "N" or "inch"</i> | | | | |
| 0x2082 | 13 | User-defined value 2 name | <i>String with the designator of the value</i> | Designator = "0" means that no value is defined for this value number | STR 16 | 16 | RO |
| 0x2082 | 14 | User-defined value 2 measurement value | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2082 | 15 | User-defined value 2 unit | <i>String with max. 4 characters, e.g. "N" or "inch"</i> | See operand table in appendix. | STR 4 | 4 | RO |
| 0x2082 | 16 | User-defined value 3 name | <i>String with the designator of the value</i> | Designator = "0" means that no value is defined for this value number | STR 16 | 16 | RO |
| 0x2082 | 17 | User-defined value 3 measurement value | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2082 | 18 | User-defined value 3 unit | <i>String with max. 4 characters, e.g. "N" or "inch"</i> | See operand table in appendix. | STR 4 | 4 | RO |
| 0x2082 | 19 | User-defined value 4 name | <i>String with the designator of the value</i> | Designator = "0" means that no value is defined for this value number | STR 16 | 16 | RO |
| 0x2082 | 20 | User-defined value 4 measurement value | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2082 | 21 | User-defined value 4 unit | <i>String with max. 4 characters, e.g. "N" or "inch"</i> | See operand table in appendix. | STR 4 | 4 | RO |
| 0x2082 | 22 | User-defined value 5 name | <i>String with the designator of the value</i> | Designator = "0" means that no value is defined for this value number | STR 16 | 16 | RO |
| 0x2082 | 23 | User-defined value 5 measurement value | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2082 | 24 | User-defined value 5 unit | <i>String with max. 4 characters, e.g. "N" or "inch"</i> | See operand table in appendix. | STR 4 | 4 | RO |
| 0x2082 | 25 | User-defined value 6 name | <i>String with the designator of the value</i> | Designator = "0" means that no value is defined for this value number | STR 16 | 16 | RO |
| 0x2082 | 26 | User-defined value 6 measurement value | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2082 | 27 | User-defined value 6 unit | <i>String with max. 4 characters,</i> | See operand table in appendix. | STR 4 | 4 | RO |

| | | | | | | | |
|---------------|----|---|--|---|-----------|----|----|
| | | | <i>e.g. "N" or "inch"</i> | | | | |
| 0x2082 | 28 | User-defined value 7 name | <i>String with the designator of the value</i> | Designator = "0" means that no value is defined for this value number | STR 16 | 16 | RO |
| 0x2082 | 29 | User-defined value 7 measurement value | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2082 | 30 | User-defined value 7 unit | <i>String with max. 4 characters, e.g. "N" or "inch"</i> | See operand table in appendix. | STR 4 | 4 | RO |
| 0x2082 | 31 | User-defined value 8 name | <i>String with the designator of the value</i> | Designator = "0" means that no value is defined for this value number | STR 16 | 16 | RO |
| 0x2082 | 32 | User-defined value 8 measurement value | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2082 | 33 | User-defined value 8 unit | <i>String with max. 4 characters, e.g. "N" or "inch"</i> | See operand table in appendix. | STR 4 | 4 | RO |
| 0x2082 | 34 | User-defined value 9 name | <i>String with the designator of the value</i> | Designator = "0" means that no value is defined for this value number | STR 16 | 16 | RO |
| 0x2082 | 35 | User-defined value 9 measurement value | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2082 | 36 | User-defined value 9 unit | <i>String with max. 4 characters, e.g. "N" or "inch"</i> | See operand table in appendix. | STR 4 | 4 | RO |
| 0x2082 | 37 | User-defined value 10 name | <i>String with the designator of the value</i> | Designator = "0" means that no value is defined for this value number | STR 16 | 16 | RO |
| 0x2082 | 38 | User-defined value 10 measurement value | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2082 | 39 | User-defined value 10 unit | <i>String with max. 4 characters, e.g. "N" or "inch"</i> | See operand table in appendix. | STR 4 | 4 | RO |
| 0x2082 | 40 | User-defined value 11 name | <i>String with the designator of the value</i> | Designator = "0" means that no value is defined for this value number | STR 16 | 16 | RO |
| 0x2082 | 41 | User-defined value 11 measurement value | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2082 | 42 | User-defined value 11 unit | <i>String with max. 4 characters,</i> | See operand table in appendix. | STR 4 | 4 | RO |

| | | | | | | | |
|---------------|----|---|--|---|-----------|----|----|
| | | | <i>e.g. "N" or "inch"</i> | | | | |
| 0x2082 | 43 | User-defined value 12 name | <i>String with the designator of the value</i> | Designator = "0" means that no value is defined for this value number | STR 16 | 16 | RO |
| 0x2082 | 44 | User-defined value 12 measurement value | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2082 | 45 | User-defined value 12 unit | <i>String with max. 4 characters, e.g. "N" or "inch"</i> | See operand table in appendix. | STR 4 | 4 | RO |
| 0x2082 | 46 | User-defined value 13 name | <i>String with the designator of the value</i> | Designator = "0" means that no value is defined for this value number | STR 16 | 16 | RO |
| 0x2082 | 47 | User-defined value 13 measurement value | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2082 | 48 | User-defined value 13 unit | <i>String with max. 4 characters, e.g. "N" or "inch"</i> | See operand table in appendix. | STR 4 | 4 | RO |
| 0x2082 | 49 | User-defined value 14 name | <i>String with the designator of the value</i> | Designator = "0" means that no value is defined for this value number | STR 16 | 16 | RO |
| 0x2082 | 50 | User-defined value 14 measurement value | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2082 | 51 | User-defined value 14 unit | <i>String with max. 4 characters, e.g. "N" or "inch"</i> | See operand table in appendix. | STR 4 | 4 | RO |
| 0x2082 | 52 | User-defined value 15 name | <i>String with the designator of the value</i> | Designator = "0" means that no value is defined for this value number | STR 16 | 16 | RO |
| 0x2082 | 53 | User-defined value 15 measurement value | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2082 | 54 | User-defined value 15 unit | <i>String with max. 4 characters, e.g. "N" or "inch"</i> | See operand table in appendix. | STR 4 | 4 | RO |
| 0x2082 | 55 | User-defined value 16 name | <i>String with the designator of the value</i> | Designator = "0" means that no value is defined for this value number | STR 16 | 16 | RO |
| 0x2082 | 56 | User-defined value 16 measurement value | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2082 | 57 | User-defined value 16 unit | <i>String with max. 4 characters,</i> | See operand table in appendix. | STR 4 | 4 | RO |

| | | | | | | | |
|---------------|----|---|--|---|--------|----|----|
| | | | e.g. "N" or "inch" | | | | |
| 0x2082 | 58 | User-defined value 17 name | String with the designator of the value | Designator = "0" means that no value is defined for this value number | STR 16 | 16 | RO |
| 0x2082 | 59 | User-defined value 17 measurement value | Float value | Float according to IEEE754 | FLT | 4 | RO |
| 0x2082 | 60 | User-defined value 17 unit | String with max. 4 characters, e.g. "N" or "inch" | See operand table in appendix. | STR 4 | 4 | RO |
| 0x2082 | 61 | User-defined value 18 name | String with the designator of the value | Designator = "0" means that no value is defined for this value number | STR 16 | 16 | RO |
| 0x2082 | 62 | User-defined value 18 measurement value | Float value | Float according to IEEE754 | FLT | 4 | RO |
| 0x2082 | 63 | User-defined value 18 unit | String with max. 4 characters, e.g. "N" or "inch" | See operand table in appendix. | STR 4 | 4 | RO |
| 0x2082 | 64 | User-defined value 19 name | String with the designator of the value | Designator = "0" means that no value is defined for this value number | STR 16 | 16 | RO |
| 0x2082 | 65 | User-defined value 19 measurement value | Float value | Float according to IEEE754 | FLT | 4 | RO |
| 0x2082 | 66 | User-defined value 19 unit | String with max. 4 characters, e.g. "N" or "inch" | See operand table in appendix. | STR 4 | 4 | RO |
| 0x2082 | 67 | User-defined value 20 name | String with the designator of the value | Designator = "0" means that no value is defined for this value number | STR 16 | 16 | RO |
| 0x2082 | 68 | User-defined value 20 measurement value | Float value | Float according to IEEE754 | FLT | 4 | RO |
| 0x2082 | 69 | User-defined value 20 unit | <i>String with max. 4 characters, e.g. "N" or "inch"</i> | See operand table in appendix. | STR 4 | 4 | RO |

7.2.5 Read-out X-coordinates of current measurement curve (Index 0x2083)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|--|----------------------------------|------------------|------|-----|-----|
| 0x2083 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2083 | 1...9 | Reserved | - | - | | X | X |
| 0x2083 | 10 | Index of the last coordinate; if 0, there is no curve | <i>Integer value</i> 0...4999 | | U32 | 4 | RO |
| 0x2083 | 11 | Read curve values The values are read as a binary array. The floating point numbers are encoded accordinally to IEEE754 und being transferred without any separators. The last curve index should be read at index 10. Number of curve values = last index + 1 | - | - | | | RO |

7.2.6 Read-out Y-coordinates of current measurement curve (Index 0x2084)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|-----------------------|-------|------------------|------|-----|-----|
| 0x2084 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2084 | 1...9 | Reserved | - | - | | X | X |
| 0x2084 | 10... | See Index 0x2083 | | | | X | X |

7.2.7 Evaluation results window 1 (Index 0x2085)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|--|-----------------------------|----------------------------|------|-----|-----|
| 0x2085 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2085 | 1...9 | Reserved | - | - | | X | X |
| 0x2085 | 10 | Window 1 evaluation results OK/NOK | 0 1 | NOK OK | U16 | 2 | RO |
| 0x2085 | 11 | Window 1 NOK counter | 32bit-Integer value >= 0 | | U32 | 4 | RO |
| 0x2085 | 12 | Window 1 entry of curve X-coordinate | Float value | Float according to IEEE754 | FLT | 4 | RO |
| 0x2085 | 13 | Window 1 entry of curve Y-coordinate | Float value | Float according to IEEE754 | FLT | 4 | RO |
| 0x2085 | 14 | Window 1 exit of curve X-coordinate | Float value | Float according to IEEE754 | FLT | 4 | RO |
| 0x2085 | 15 | Window 1 exit of curve Y-coordinate | Float value | Float according to IEEE754 | FLT | 4 | RO |
| 0x2085 | 16 | Window 1 absolute maximum in window X-coordinate | Float value | Float according to IEEE754 | FLT | 4 | RO |
| 0x2085 | 17 | Window 1 absolute maximum in window Y-coordinate | Float value | Float according to IEEE754 | FLT | 4 | RO |
| 0x2085 | 18 | Window 1 absolute minimum in window X-coordinate | Float value | Float according to IEEE754 | FLT | 4 | RO |
| 0x2085 | 19 | Window 1 absolute minimum in window Y-coordinate | Float value | Float according to IEEE754 | FLT | 4 | RO |

7.2.8 Evaluation results window 2 (Index 0x2086)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|-----------------------|-------|------------------|------|-----|-----|
| 0x2086 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2086 | 1...9 | Reserved | - | - | | X | X |
| 0x2086 | 10... | See Index 0x2085 | | | | X | X |

7.2.9 Evaluation results window 3 (Index 0x2087)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|-----------------------|-------|------------------|------|-----|-----|
| 0x2087 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2087 | 1...9 | Reserved | - | - | | X | X |
| 0x2087 | 10... | See Index 0x2085 | | | | X | X |

7.2.10 Evaluation results threshold 1 (Index 0x2088)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|--|-----------------------------|----------------------------|------|-----|-----|
| 0x2088 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2088 | 1...9 | Reserved | - | - | | X | X |
| 0x2088 | 10 | Threshold 1 evaluation result OK/NOK | 0 1 | NOK OK | U16 | 2 | RO |
| 0x2088 | 11 | Threshold 1 NOK counter | 32bit-Integer value >= 0 | | U32 | 4 | RO |
| 0x2088 | 12 | Threshold intersection point X-coordinate | Float value | Float according to IEEE754 | FLT | 4 | RO |
| 0x2088 | 13 | Threshold intersection point Y-coordinate | Float value | Float according to IEEE754 | FLT | 4 | RO |

7.2.11 Evaluation results threshold 2 (Index 0x2089)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|-----------------------|-------|------------------|------|-----|-----|
| 0x2089 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2089 | 1...9 | Reserved | - | - | | X | X |
| 0x2089 | 10... | See Index 0x2088 | | | | X | X |

7.2.12 Evaluation results trapezoid window 1 (Index 0x2090)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|--|-----------------------------|----------------------------|------|-----|-----|
| 0x2090 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2090 | 1...9 | Reserved | - | - | | X | X |
| 0x2090 | 10 | Trapezoid 1 evaluation result OK/NOK | 0 1 | NOK OK | U16 | 2 | RO |
| 0x2090 | 11 | Trapezoid 1 NOK counter | 32bit-Integer value >= 0 | | U32 | 4 | RO |
| 0x2090 | 12 | Trapezoid 1 entry coordinate X-coordinate | Float value | Float according to IEEE754 | FLT | 4 | RO |
| 0x2090 | 13 | Trapezoid 1 entry coordinate Y-coordinate | Float value | Float according to IEEE754 | FLT | 4 | RO |
| 0x2090 | 14 | Trapezoid 1 exit coordinate X-coordinate | Float value | Float according to IEEE754 | FLT | 4 | RO |
| 0x2090 | 15 | Trapezoid 1 exit coordinate Y-coordinate | Float value | Float according to IEEE754 | FLT | 4 | RO |

7.2.13 Evaluation results trapezoid window 2 (Index 0x2091)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|-----------------------|-------|------------------|------|-----|-----|
| 0x2091 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2091 | 1...9 | Reserved | - | - | | X | X |
| 0x2091 | 10... | See Index 0x2090 | | | | X | X |

7.2.14 Evaluation results envelope (Index 0x2092)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|--|------------------------------------|----------------------------|------|-----|-----|
| 0x2092 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2092 | 1...9 | Reserved | - | - | | X | X |
| 0x2092 | 10 | Envelope 1 evaluation result OK/NOK | 0 1 | NOK OK | U16 | 2 | RO |
| 0x2092 | 11 | Envelope 1 NOK counter | <i>32bit-Integer value >= 0</i> | | U32 | 4 | RO |
| 0x2092 | 12 | Envelope 1 entry coordinate X-coordinate | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2092 | 13 | Envelope 1 entry coordinate Y-coordinate | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2092 | 14 | Envelope 1 exit coordinate X-coordinate | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |
| 0x2092 | 15 | Envelope 1 exit coordinate Y-coordinate | <i>Float value</i> | Float according to IEEE754 | FLT | 4 | RO |

7.2.15 Combined results (common curve data and evaluation elements – Index 0x2093)

| Index | Sub-Index | Description | Value | Meaning of value | Type | Len | R/W |
|--------|-----------|--|--|------------------|------------------|-----|-----|
| 0x2093 | 0 | Number of sub-indices | - | | U8 | 1 | RO |
| 0x2093 | 1...9 | Reserved | - | | | X | X |
| 0x2093 | 10 | Combined results: general curve data Y | <i>The data is bit coded and transmitted as STRUCT. X-minimum, X-coord. (FL) X-minimum, Y-coord. (FL) X-maximum, X-coord. (FL) X-maximum, Y-coord. (FL) Y-minimum, X-coord. (FL)</i> | | STRUCT OF FLOATS | 56 | RO |

| | | | | | | |
|---------------|----|----------------------------------|---|--|--------|-------|
| | | | Y-minimum, Y-coord.(FL) Y-maximum, X-coord. (FL) Y-maximum, Y-coord.(FL) First value X-coord. (FL) First value Y-coord. (FL) Last value X-coord. (FL) Last value Y-coord. (FL) Return point X-coord. (FL) Return point Y-coord. (FL) | | | |
| 0x2093 | 11 | Combined results: window 1 | <i>The data is bit coded and transmitted as STRUCT.</i> Evaluation result (UINT32): 0: NOK 1: OK Entry X-coordinate (FL) Entry Y-coordinate (FL) Exit X-coordinate (FL) Exit Y-coordinate (FL) Absolute max X-coord. (FL) Absolute max Y- coord.(FL) Absolute min X- coord. (FL) Absolute min Y- coord. (FL) Window Xmin coord. (FL) Window Xmax coord. (FL) Window Ymin coord. (FL) Window Ymax coord. (FL) | | STRUCT | 52 RO |
| 0x2093 | 12 | Combined results: window 2 | <i>See Subindex 11</i> | | STRUCT | 52 RO |
| 0x2093 | 13 | Combined results: window 3 | <i>See Subindex 11</i> | | STRUCT | 52 RO |
| 0x2093 | 14 | Combined results: threshold 1 | <i>The data is bit coded and transmitted as STRUCT:</i> Evaluation result (UINT32): 0: NOK 1: OK Threshold type (UINT32): 0: Type X-Threshold 1: Type Y-Threshold Threshold pass X (FL) Threshold pass Y (FL) Type X: Position X value (FL) Type Y: Position Y value (FL) Type X: Ymin value (FL) Type Y: Xmin value (FL) Type X: Ymax value (FL) Type Y: Xmax value (FL) | | STRUCT | 28 RO |
| 0x2093 | 15 | Combined results: threshold 2 | <i>See Subindex 14</i> | | STRUCT | 28 RO |

| | | | | | | |
|--------|----|---|--|--------|----|----|
| 0x2093 | 16 | Combined results: trapezoid window 1 | <p><i>The data is bit coded and transmitted as STRUCT:</i> Evaluation result (UINT32) 0: NOK 1: OK Threshold type (UINT32) 0: Type X-Trapezoid 1: Type Y-Trapezoid Entry X-coord. (FL) Entry Y-coord. (FL) Exit X-coord. (FL) Exit Y-coord. (FL) Type X: Xmin (FL) Type Y: Ymin (FL) Type X: Xmax (FL) Type Y: Ymax (FL) Type X: Ymin left (FL) Type Y: Xmin bottom (FL) Type X: Ymax left (FL) Type Y: Xmax bottom (FL) Type X: Ymin right (FL) Type Y: Xmin top (FL) Type X: Ymax right (FL) Type Y: Xmax top (FL)</p> | STRUCT | 48 | RO |
| 0x2093 | 17 | Combined results: trapezoid window 2 | <i>See Subindex 16</i> | STRUCT | 48 | RO |
| 0x2093 | 18 | Combined results: envelope | <p><i>The data is bit coded and transmitted as STRUCT:</i> Evaluation result (UINT32): 0: NOK 1: OK Entry X-coordinate (FL) Entry Y-coordinate (FL) Exit X-coordinate (FL) Exit Y-coordinate (FL) Envelope start (FL) Envelope end (FL) Delta min (FL) Delta max (FL)</p> | STRUCT | 36 | RO |

8 Appendix

8.1 Operand Table

| Number | ID of operand |
|--------|--|
| 0 | OFF |
| | |
| 100 | General curve data – Start X |
| 101 | General curve data – Start Y |
| 102 | General curve data – End X |
| 103 | General curve data – End Y |
| 104 | General curve data – Abs. Xmax X-coordinate |
| 105 | General curve data – Abs. Xmax Y-coordinate |
| 106 | General curve data – Abs. Xmin X-coordinate |
| 107 | General curve data – Abs. Xmin Y-coordinate |
| 108 | General curve data – Abs. Ymax X-coordinate |
| 109 | General curve data – Abs. Ymax Y-coordinate |
| 110 | General curve data – Abs. Ymin X-coordinate |
| 111 | General curve data – Abs. Ymin Y-coordinate |
| 112 | General curve data – Return point X-coordinate |
| 113 | General curve data – Return point Y-coordinate |
| | |
| 200 | Window 1 – Entry X |
| 201 | Window 1 – Entry Y |
| 202 | Window 1 – Exit X |
| 203 | Window 1 – Exit Y |
| 204 | Window 1 – Abs. minimum X |
| 205 | Window 1 – Abs. minimum Y |
| 206 | Window 1 – Abs. maximum X |
| 207 | Window 1 – Abs. maximum Y |
| 208 | Window 1 – Coordinate Xmin |
| 209 | Window 1 – Coordinate Xmax |

| | |
|------------|------------------------------|
| 210 | Window 1 – Coordinate Ymin |
| 211 | Window 1 – Coordinate Ymax |
| | |
| 300 | Window 2 – Entry X |
| 301 | Window 2 – Entry Y |
| 302 | Window 2 – Exit X |
| 303 | Window 2 – Exit Y |
| 304 | Window 2 – Abs. minimum X |
| 305 | Window 2 – Abs. minimum Y |
| 306 | Window 2 – Abs. maximum X |
| 307 | Window 2 – Abs. maximum Y |
| 308 | Window 2 – Coordinate Xmin |
| 309 | Window 2 – Coordinate Xmax |
| 310 | Window 2 – Coordinate Ymin |
| 311 | Window 2 – Coordinate Ymax |
| | |
| 400 | Window 3 – Entry X |
| 401 | Window 3 – Entry Y |
| 402 | Window 3 – Exit X |
| 403 | Window 3 – Exit Y |
| 404 | Window 3 – Abs. minimum X |
| 405 | Window 3 – Abs. minimum Y |
| 406 | Window 3 – Abs. maximum X |
| 407 | Window 3 – Abs. maximum Y |
| 408 | Window 3 – Coordinate Xmin |
| 409 | Window 3 – Coordinate Xmax |
| 410 | Window 3 – Coordinate Ymin |
| 411 | Window 3 – Coordinate Ymax |
| | |
| 500 | Trapezoid window 1 – Entry X |

| | |
|-----|---|
| 501 | Trapezoid window 1 – Entry Y |
| 502 | Trapezoid window 1 – Exit X |
| 503 | Trapezoid window 1 – Exit Y |
| 504 | Trapezoid window 1 – Coordinate Type X: Xmin Type Y: Ymin |
| 505 | Trapezoid window 1 – Coordinate Type X: Xmax Type Y: Ymax |
| 506 | Trapezoid window 1 – Coordinate Type X: Ymin left Type Y: Xmin bottom |
| 507 | Trapezoid window 1 – Coordinate Type X: Ymax left Type Y: Xmax bottom |
| 508 | Trapezoid window 1 – Coordinate Type X: Ymin right Type Y: Xmin top |
| 509 | Trapezoid window 1 – Coordinate Type X: Ymax right Type Y: Xmax top |
| | |
| 600 | Trapezoid window 2 – Entry X |
| 601 | Trapezoid window 2 – Entry Y |
| 602 | Trapezoid window 2 – Exit X |
| 603 | Trapezoid window 2 – Exit Y |
| 604 | Trapezoid window 2 – Coordinate Type X: Xmin Type Y: Ymin |
| 605 | Trapezoid window 2 – Coordinate Type X: Xmax Type Y: Ymax |
| 606 | Trapezoid window 2 – Coordinate Type X: Ymin left Type Y: Xmin bottom |
| 607 | Trapezoid window 2 – Coordinate Type X: Ymax left Type Y: Xmax bottom |
| 608 | Trapezoid window 2 – Coordinate Type X: Ymin right Type Y: Xmin top |
| 609 | Trapezoid window 2 – Coordinate Type X: Ymax right Type Y: Xmax top |
| | |
| 700 | Threshold 1 – Pass X |

| | |
|-----|--|
| 701 | Threshold 1 – Pass Y |
| 702 | Threshold 1 – Coordinate Type X: Position X value Type Y: Position Y value |
| 703 | Threshold 1 – Coordinate Type X: Ymin value Type Y: Xmin value |
| 704 | Threshold 1 – Coordinate Type X: Ymax value Type Y: Xmax value |
| | |
| 800 | Threshold 2 – Pass X |
| 801 | Threshold 2 – Pass Y |
| 802 | Threshold 2 – Coordinate Type X: Position X value Type Y: Position Y value |
| 803 | Threshold 2 – Coordinate Type X: Ymin value Type Y: Xmin value |
| 804 | Threshold 2 – Coordinate Type X: Ymax value Type Y: Xmax value |
| | |
| 900 | Envelope – Entry X |
| 901 | Envelope – Entry Y |
| 902 | Envelope – Exit X |
| 903 | Envelope – Exit Y |
| 904 | Envelope – Coordinate Start X |
| 905 | Envelope – Coordinate End X |

9 Error Codes

| Error Code | Description |
|------------|--|
| 0xC065003A | Subindex does not exist (read access) |
| 0xC0CF8013 | Subindex does not exist (write access) |
| 0xC0CF8006 | Object is read only and can not be written |
| 0xC0CF8010 | Data type does not match |
| 0xC0CF8011 | Data length is too long |
| 0xC0650028 | Timeout |
| 0xC065002F | Object is write only and can not be read |