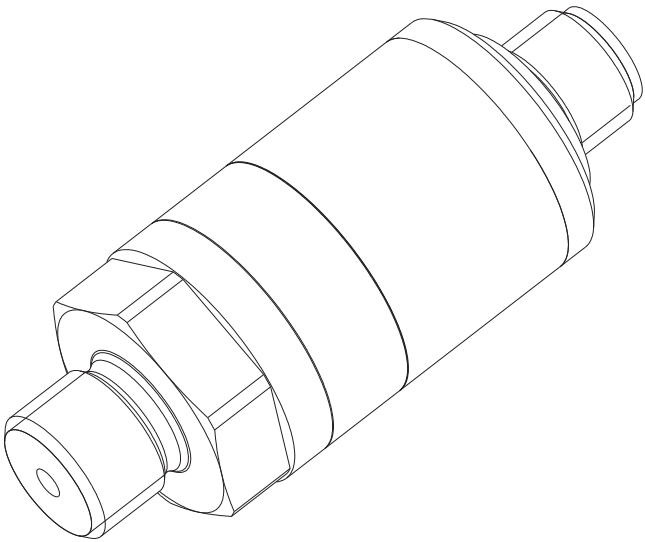
BAKER HUGHES
a GE company

DPS 5000 Series

CAN bus Pressure Transducer

Instruction Manual



Safety

WARNING Do not apply pressure greater the maximum safe working pressure to the sensor.

The manufacturer has designed this sensor to be safe when operated using the procedures detailed in this manual. Do not use this sensor for any other purpose than that stated.

This publication contains operating and safety instructions that must be followed for safe operation and to maintain the sensor in a safe condition. The safety instructions are either warnings or cautions issued to protect the user and the equipment from injury or damage.

Use qualified* personnel and good engineering practice for all procedures in this publication.

Toxic Materials

There are no known toxic materials used in this sensor.

Maintenance

The sensor must be maintained using the manufacturer's procedures and these should be carried out by authorized service agents or the manufacturer's service departments.

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For technical advice contact the manufacturer.

* A qualified technician must have the necessary technical knowledge, documentation, special test equipment and tools to carry out the required work on this equipment.

Symbols

Symbol	Description
CE	This equipment meets the requirements of all relevant European safety directives. The equipment carries the CE mark.
	This symbol, on the equipment, indicates a warning and that the user should refer to the user manual.
	Do not dispose of this product as household waste. Use an approved organization that collects and/or recycles waste electrical and electronic equipment. For more information, contact one of these: - Our customer service department: **www.gemeasurement.com** - Your local government office.

Abbreviations

The abbreviations in this publication are as follows:

Abbreviation	Description
a	Absolute (Pressure version)
ADC	Analogue-to-Digital Converter
A/F	Across the Flats (Dimension data)
AP	Applied Pressure
ASCII	American Standard Code for Information Interchange
°C	Celsius (Degrees)
CAN	Controller Area Network
CANopen	A set of standards that defines the operation of devices across a CAN system.
CiA	CAN in Automation international users and manufacturers group (CiA e.V.)
COB	Communication Object (CAN Message): Data is sent across a CAN Network inside a COB.
COB-ID	COB-Identifier. Identifies a COB uniquely in a Network and determines the priority of the COB.
d	Differential (Pressure version)
DC	Direct Current
DPS	Digital Pressure Sensor
EEC	European Economic Community
EMC	Electromagnetic Compatibility
EN	European Norm
°F	Fahrenheit (Degrees)

Abbreviation	Description
FP	Floating Point
FS	Full-scale. Refers to a full-scale value from a transducer or instrument.
FV	Field Value
g	Acceleration of Gravity
g	Gauge (Pressure version)
g	Gram
Hz	Hertz
ID	Identifier
kbits/s	Kilobits per second
LSS	Layer Setting Services
Max	Maximum
mbar	Millibar
MIL-STD	Military Standard
Min	Minimum
mm	Millimetre
ms	Millisecond
MΩ	Megohm
NMT	Network Management: One of the service elements of the CAN Application Layer
NPT	National Pipe Taper (a thread standard)
PDO	Process Data Object
PIN	Personal Identification Number
psi	Pound-force per square inch
PV	Process Value
SDO	Service Data Object
SDS	Sales Data Sheet
SI	Système International
S/N	Serial Number
UNF	Unified Fine (a thread standard)
V dc	Volts Direct Current

Contents

1. Introduction

The transducers in the DPS 5000 series measure absolute pressure or gauge to produce fast, accurate pressure data through a Controller Area Network (CAN) bus interface. All these transducers include:

- CANopen software standards.
- Digital output.
- CAN bus serial communications interface.

Note: The prerequisites for this instruction manual are prior knowledge of the CANopen protocols and standards. See Appendix C., “Bibliography,” on page 55 for more details.

1.1 Applications

The DPS 5000 series is for automated systems using a CAN bus network and CANopen software standards. The pressure transducers in the DPS 5000 series are ideal for automated systems with:

- A large amount of digital pressure data.
- A high level of accuracy over a wide temperature range.
- A sophisticated level of software control.

1.2 Summary of Facilities

Because all the transducers in the DPS 5000 series use CANopen software standards, each transducer includes a CANopen Object Dictionary. Use the CANopen Object Dictionary to do these primary tasks:

- Monitor the current pressure and temperature data.
- Tag the type of data. For example: Oil-mbar, H2O-mbar.
- Read the factory defined operating data. For example, the pressure range, and the type of sensor.
- Set the update frequency for the pressure and temperature data.
- Set the pressure units.
- Monitor the current status.
- Read and set the last and next calibration date.
- Set new calibration values.
- Set local pressure and temperature limits for use with the internal out-of-limit counters.
- Monitor the number of times the pressure is not in the specified limits.
- Monitor the number of times the temperature is not in the specified limits.
- Restore all the factory default values for the CANopen Object Dictionary.

Use a standard CANopen software package to access the contents of the CANopen Object Dictionary.

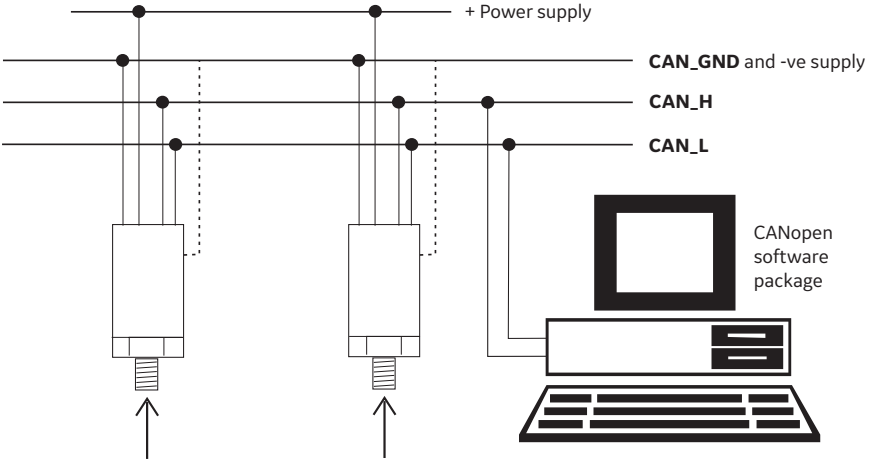
1.3 Summary of the CANopen Set of Functions

Function	Comment
NMT	Slave
Error Control	Node Guarding or Heartbeat.
Node ID	LSS (DSP-305 V1.0)
Number of PDO	4 transmit PDOs, no receive PDOs.
PDO Modes	Event triggered or Remotely requested.
PDO Linking	Yes
PDO Mapping	Default
Emergency Message	Yes
CANopen Version	DS-301 V4.01
Framework	No
Certified	No
Device Profile	DSP-404 V1.0
Maximum Baud Rate	1 Mbit/s

2. Installation

This section details installation of the pressure transducer, when complete the pressure transducer can be prepared for operation (refer to Chapter 3., “Operation,” on page 5).

2.1 Example CAN bus System



CAN_X Identifies the signal line connections on the CAN bus.
Cable screen to CAN_GND or an applicable earth.
Represents the different pressure conditions in the example system.

Figure 2-1: An Example CAN bus System

This shows the pressure transducers in an example CAN bus system and must have these items:

- A CAN bus with an applicable input/output device for the signal lines (applicable to the electrical connection on the pressure transducer).
- Power supply: 5 V dc to 30 V dc.
- All applicable tools to connect the pressure and electrical connections, as detailed in the applicable system installation manual.

2.2 Installation – Before Starting

Make sure to use the correct pressure transducer (refer to Chapter 1., “Introduction,” on page 1).

Read all relevant instructions and procedures in the applicable system installation manual.

Read the following installation procedures before installing the pressure transducer.

2.3 Installation – Procedures

WARNING Do not interchange transducers between an oil system and a system that uses fuel or gas. This can cause an explosion that can cause death or injury, and/or damage to equipment.

High pressures and temperatures are dangerous (refer to sales data sheet or customer specified drawing). De-pressurize and allow to cool components in a system that has high operating pressures and temperatures.

Note: Until installation, keep the unit in the original container with all the covers in position. The container and covers prevent contamination and damage. When not in use, keep the connections clean at all times, and put the covers on the open connections.

2.3.1 Pressure Connections (Absolute)

Connect the pressure transducer connection to the pressure system and torque tighten the connection (refer to System Installation Manual).

2.3.2 Electrical Connections

Refer to the sales data sheet or customer specified drawing.

2.3.3 Completing the Installation

Do all the applicable tests and checks (refer to System Installation Manual).

After completing installation, the pressure transducer is ready for use.

3. Operation

This section includes:

- The procedures to start and change the operation of the pressure transducer.
- The available data from the pressure transducer.

Note: 0x identifies a hexadecimal value. Object 0x1800 02 = Index 0x1800, Sub-index 0x02 (refer to Appendix A., “CANopen Object Dictionary,” on page 19).

3.1 Start Operating

After a successful installation (refer to Chapter 3., “Operation,” on page 5) and to start operating requires:

- A CANopen software package to access the CANopen Object Dictionary.
- Operation of the CANopen network, including the Network Initialization Process (the Boot-up process) and/or the applicable configuration procedures.

3.2 Procedures

1. Complete the boot-up procedure (defined in the CANopen standard) for the CAN bus network. After boot-up the pressure transducer enters a “pre-operational” mode and in this mode responds to SDO and LSS messages.
2. The pressure transducer must be set to its operational state to respond to sync messages and to be fully operational.

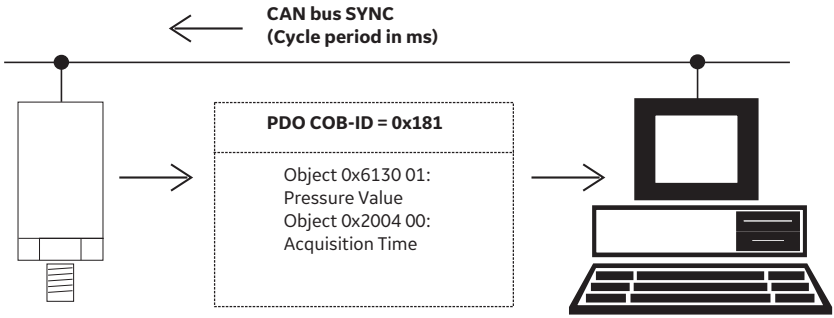


Figure 3-1: Default ‘Transmit PDO’ Operation

Note: This shows how the pressure transducer uses the default values to transmit a Process Data Object (PDO).

The readings can be filtered by a range of preset finite impulse response (FIR) filters. (refer to “0x220D to 0x2218 – The Filter System” on page 10).

Use the CANopen software package to receive the PDO and get access to the CANopen Object Dictionary.

Use the CANopen software package to change these values:

- Values set with the Layer Setting Services (LSS).
- Values in the CANopen Object Dictionary.

3.3 Quick Start

Get the current pressure and temperature values by using object 0x6130:

- Sub-item 01 returns the pressure value in the default pressure units.
- Sub-item 02 returns the temperature in degrees Celsius.

3.4 Primary Objects

The following procedures identify the primary objects that can be changed and monitored. Refer to Appendix A., “CANopen Object Dictionary,” on page 19 for a complete list.

3.5 To Change the Operation - Node ID and Baud Rate

Use the CANopen Layer Setting Services (LSS) to change these primary objects in the pressure transducer:

Note: To respond to LSS messages the pressure transducer must be in pre-operational mode.

- The node ID (default value = 2).
- The baud rate (default value = 250 kbits/s).

In addition, object 0x210C can be used to modify the node ID. Object 0x210D holds the baud rate.

To make changes to these and other data dictionary objects permanent, save them and cycle the power to the sensor.

When using the LSS, the device must be identified. Object 0x1018 (identity) contains the identification data. Refer to Appendix C., “Bibliography,” on page 55.

3.6 To Change the Operation - Objects: 0x1000 - 0x1FFFF

3.6.1 0x100C to 0x100E - Error Control: Node Guarding Option

To use Node Guarding for error control, set applicable values for these objects:

- 0x100C (Guard Time).
- 0x100D (Life Time Factor).

Refer to Appendix C., “Bibliography,” on page 55.

3.6.2 0x1017 – Error Control: Heartbeat Option

To use Heartbeat for error control, set applicable value for this object:

- 0x1017 (Heartbeat Time).

Refer to Appendix C., “Bibliography,” on page 55.

3.6.3 0x1010 01 – To Save Changes to the Data Dictionary

Use object 0x1010 01 (Store Parameter Field) to save the data dictionary to non-volatile storage.

Example:

Set the value to 0x65766173 = evas (in ASCII)

Note: This does not overwrite the factory data and the sensor can be returned to its factory state by using 0x1011 as described below.

3.6.4 0x1011 01 – To Re-apply the Factory Values

Use object 0x1011 01 (Restore Default Parameters) to re-apply all the factory values.

Example:

Set the value to 0x64616F6C = daol (in ASCII)

Having re-applied the factory values, the sensor should be power cycled for the values to be applied.

3.6.5 0x1800 02 – The PDO Transmission (Type or Period)

Use object 0x1800 02 (Transmission Type) to change the type of PDO transmission or the period between each PDO transmission (refer to Appendix C., “Bibliography,” on page 55).

3.6.6 0x1A00 – The Data in the ‘Transmit PDO’

Use object 0x1A00 (Transmit PDO Mapping) to change the data sent in the ‘Transmit PDO’ (maximum size = 8 bytes).

To change the transmit PDO, set bit 31 of 0x 1800 1 “COB-ID” to 1 and set 0x IA00 1 to 0.

After changing the PDO the process should be reversed.

Example:

To monitor the current status of the pressure value, set Sub-index 0x02 to 0x61500108 = Object 0x6150 01, 1 byte of data.

Status	Description
0	The value is in the limits of 0x6148 and 0x6149.
1	The value is more than the limit of 0x6149.
2	The value is less than the limit of 0x6148.

3.6.7 0x1F80 - NMT Start-up

Use object 0x1F80 to set the start-up mode of the sensor.

Status	Description
0	Sensor power-up in pre-operational mode.

3.7 To Change the Operation – Objects: 0x2000 – 0x2FFFF

3.7.1 0x210C– Node ID

Valid node ID can be in the range 0x01 to 0x7F. Changes to this value do not take effect unless saved and the power cycled.

3.7.2 0x210D – Bit Rate

The bit rate at which the sensors communicate can be one of the following values:

Value	Baud Rate
10	10 kbit/s
20	20 kbit/s
50	50 kbit/s
125	125 kbit/s
250	250 kbit/s
500	500 kbit/s
800	800 kbit/s
1000	1000 kbit/s

Changes to the bit rate value does not take effect unless saved and the power cycled.

3.7.3 0x2200 – To Change the Calibration Data

To write new calibration values in objects 0x2201 to 0x220A, set object 0x2200 (Calibration Access Pin) to 4118.

To prevent accidental changes to the calibration data, set the value to 0 after completing all the changes.

3.7.4 0x2201 to 0x2203 – The Last Calibration Year, Month, Day

Refer to “0x2200 – To Change the Calibration Data” on page 8. The initial values identify the date of the factory calibration. After each calibration, set a new date (refer to Chapter 4., “Maintenance,” on page 15).

3.7.5 0x2204 to 0x2206 – The Next Calibration Year, Month, Day

Refer to “0x2200 – To Change the Calibration Data” on page 8. The initial values identify the date of the factory calibration + one year. After each calibration, set a new date (refer to Chapter 4., “Maintenance,” on page 15).

3.7.6 0x2207 – The Pressure Calibration Gain

Refer to "0x2200 – To Change the Calibration Data" on page 8. Use 0x2207 (Pressure Gain) to apply a correction to the compensated source pressure (refer to Chapter 4., "Maintenance," on page 15).

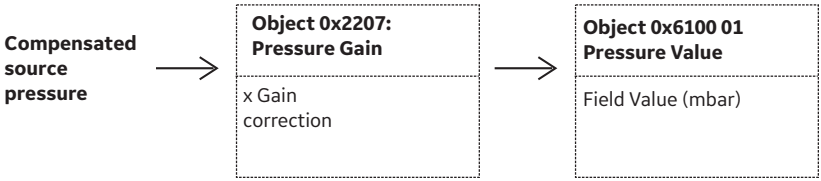


Figure 3-2: Pressure Calibration Gain

3.7.7 0x2208 – The Pressure Calibration Offset

Refer to "0x2200 – To Change the Calibration Data" on page 8. Use 0x2208 (Pressure Offset) to apply a correction to the compensated source pressure (refer to Chapter 4., "Maintenance," on page 15).

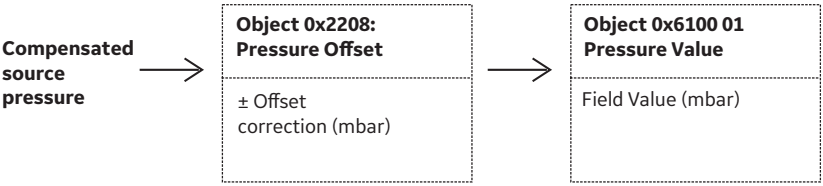


Figure 3-3: Pressure Calibration Offset

3.7.8 0x2209 – The Temperature Calibration Gain

Refer to "0x2200 – To Change the Calibration Data" on page 8. Use 0x2209 (Temperature Gain) to apply a correction to the compensated source temperature.

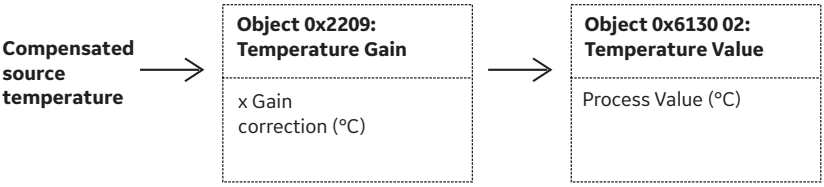


Figure 3-4: Temperature Calibration Gain

3.7.9 0x220A – The Temperature Calibration Offset

Refer to “0x2200 – To Change the Calibration Data” on page 8. Use 0x220A (Temperature Offset) to apply a correction to the compensated source temperature.

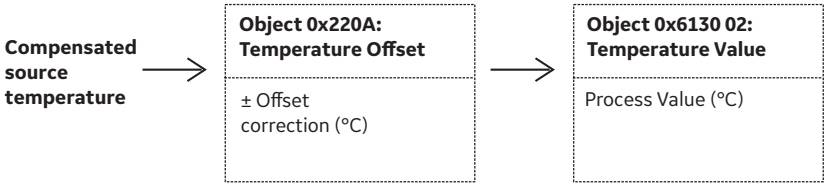


Figure 3-5: Temperature Calibration Offset

3.7.10 0x220D to 0x2218 – The Filter System

The DPS 5000 sensor can support a wide range of sample rates and filters to give a choice of speed and accuracy. There are five filters, preset to a selection of values. Each filter is built of two parts; a pre-scaler and a group of coefficients. It is beyond the scope of this manual to describe the creation of these values.

The data dictionary item “Selected FIR Filter” at 0x2217 is used to choose a filter. When changing to another filter, be aware of the 3 dB settling times below before taking new values.

Filter Preset	Filter Type	Cut-off Frequency	3 dB Settling Time
0	No filter.	1400 Hz	0.7 ms
1	Averaging 10 samples.	44.3 Hz	22 ms
2[a]	Averaging 50 samples.	8.86 Hz	100 ms
3	Butterworth low pass.	1 Hz	1000 ms
4	Butterworth low pass.	10 Hz	100 ms
5	Butterworth low pass.	17.18 Hz	60 ms

a. Factory set default filter setting.

3.7.11 0x2304 – The Tag for the Type of Data

Use object 0x2304 (Tag) to identify the type of data that the pressure transducer supplies (maximum: 10 characters). For example: Oil-mbar.

3.8 To Change the Operation – Objects: 0x6000 – 0x6FFFF

3.8.1 0x6120 to 0x6124 – The Scale Data for Pressure and Temperature Output

The pressure transducer uses a two-point calibration to calculate the pressure output. The two-point calibration includes the relation between the Field Value (FV) units and the Process Value (PV) units. To change the relation between FV and PV, use the scale-factor

objects and the zero offset. This allows the reading of the pressure output in one of the alternative pressure units.

Example:

Set object 0x6123 01 to 100 (the scale-factor for pascal).

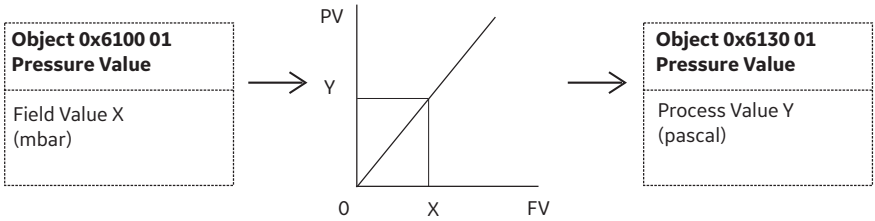


Figure 3-6: Scale of Pressure and Temperature Output

For a list of values of the alternative pressure units, refer to Appendix B., “Alternative Pressure Units,” on page 53.

To change the scale data for temperature use the information above but with sub-index 02 replacing 01.

3.8.2 0x6131 01 – The Units for the Pressure Output

Use object 0x6131 01 (Pressure Value) to change the units for the pressure output.

Example:

Set Sub-index 0x01 to 0x00220000 = CANopen value for pascal.

For a list of values of the alternative pressure units, refer to Appendix B., “Alternative Pressure Units,” on page 53.

3.8.3 0x6148 – The Local Limits (Minimum Pressure and Temperature)

Use object 0x6148 (Span Start – FP) to set the local limits for the pressure transducer operation. Set the applicable minimum values for the pressure and temperature (refer to “0x2007 – The Count: Pressure is Less than the Limit” on page 12 and “0x2009 – The Count: Temperature is Less than the Limit” on page 13).

3.8.4 0x6149 – The Local Limits (Maximum Pressure and Temperature)

Use object 0x6149 (Span End – FP) to set the local limits for the pressure transducer operation. Set the applicable maximum values for the pressure and temperature (refer to “0x2006 – The Count: Pressure is More than the Limit” on page 12 and “0x2008 – The Count: Temperature is More than the Limit” on page 13).

- Sub-index 01 sets the pressure.
- Sub-index 02 sets the temperature limit.

3.9 To Monitor the Operation – Objects: 0x1000 – 0x1FFFF

3.9.1 0x1001 – The Status of the Unit

Use object 0x1001 (Error Register) to monitor the current status of the unit. Also see "0x6150 – The Pressure and Temperature Status" on page 13.

3.10 To Monitor the Operation – Objects: 0x2000 – 0x2FFFF

3.10.1 0x2006 – The Count: Pressure is More than the Limit

Use object 0x2006 (Pressure Span Overflow Count) to monitor the pressure history. The count increments one each time the process value is more than the span end value.

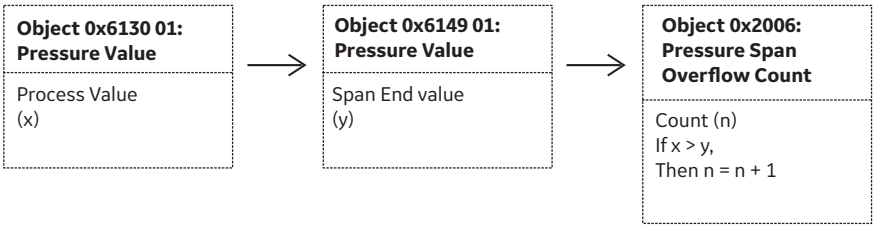


Figure 3-7: Pressure Span Overflow Count

Reset the count when applicable. For example, after calibration.

3.10.2 0x2007 – The Count: Pressure is Less than the Limit

Use object 0x2007 (Pressure Span Underflow Count) to monitor the pressure history. The count increments one each time the process value is less than the span start value.

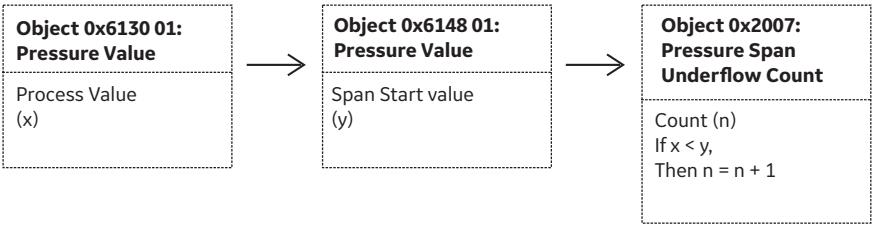


Figure 3-8: Pressure Span Underflow Count

Reset the count when applicable. For example, after calibration.

3.10.3 0x2008 – The Count: Temperature is More than the Limit

Use object 0x2008 (Temperature Span Overflow Count) to monitor the temperature history. The count increments one each time the process value is more than the span end value.

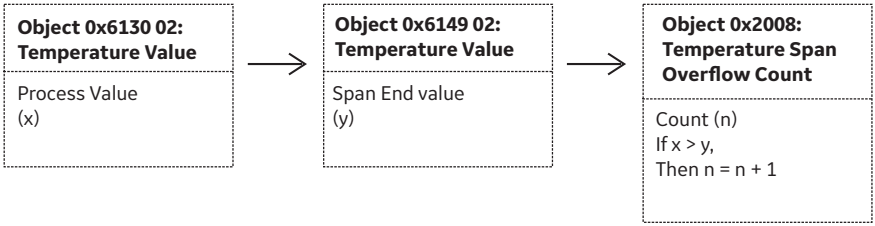


Figure 3-9: Temperature Span Overflow Count

Reset the count when applicable. For example, after calibration.

3.10.4 0x2009 – The Count: Temperature is Less than the Limit

Use object 0x2009 (Temperature Span Underflow Count) to monitor the temperature history. The count increments one each time the process value is more than the span end value.

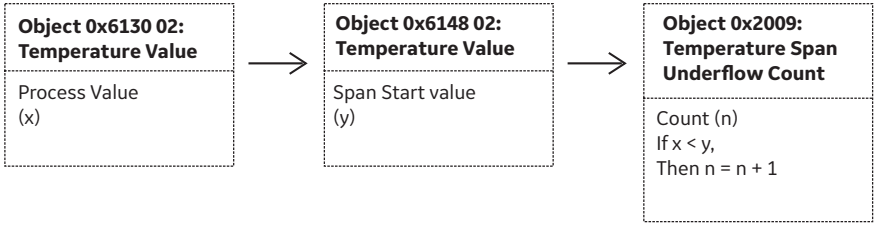


Figure 3-10: Temperature Span Underflow Count

Reset the count when applicable. For example, after calibration.

3.11 To Monitor the Operation – Objects: 0x6000 – 0x6FFFF

3.11.1 0x6130 01/0x6130 02 – The Pressure and Temperature

Use object 0x6130 01 (Pressure Value) and object 0x6130 02 (Temperature Value) to monitor the current process values. The process values include the calibration corrections (objects 0x2207 to 0x220A), and the applicable scale-factor (object 0x6123 01).

Use object 0x1A00 (Transmit PDO Mapping) to put the applicable data in the 'Transmit PDO'.

3.11.2 0x6150 – The Pressure and Temperature Status

Use object 0x6150 (Status) to monitor the current status of the pressure and temperature output.

The individual bits of the status byte are used as follows:

- Data is not valid.
- Value more than the limit.

- Value less than the limit.

The status of the pressure is linked to the temperature. If the temperature is out of range, bit 0 of the pressure status will be set.

Status	Description
0	The value is in the limits of 0x6148 and 0x6149.
1	The value is more than the limit of 0x6149.
2	The value is less than the limit of 0x6148.

4. Maintenance

WARNING High pressures and temperatures are dangerous and can cause injury (Refer to pressure limits in the sales data sheet). Be careful when working on components connected to lines that have high pressures and heat. Use the applicable protection and obey all safety precautions.

Note: Until installation, keep the unit in the original container with all the covers in position. The container and covers prevent contamination and damage. When not in use, keep the connections clean at all times, and put the covers on the open connections.

4.1 Maintenance Tasks

- Identify faults from the software.
- Clean the unit.
- Recalibrate the unit.

Note: BHGE can provide a calibration service that is traceable to international standards.

Return the unit to the supplier for these items:

- For all repairs.
- For changes or upgrades to the internal software.

4.2 Maintenance – From the Software

Note: 0x identifies a hexadecimal value. Object 0x1800 02 = Index 0x1800, Sub-index 0x02 (refer to Appendix A., “CANopen Object Dictionary,” on page 19).

4.2.1 The Status of the Unit

To monitor the current status of the unit, use these sources of error data:

- The Error Register (object 0x1001) (refer to Appendix A., “CANopen Object Dictionary,” on page 19).

If there is an error:

- Do the Network Initialization Process (the boot-up process) again.
- Examine the electrical connections. Do all the applicable tests and checks (refer to the System Installation Manual).
- If necessary, install a new pressure transducer.

4.3 Maintenance – Cleaning

CAUTION Do not use high-pressure gas to remove dirt from the unit. This can damage the sensor in the unit.

1. If necessary, remove the unit.
2. Clean the unit with a lint-free cloth and a soft brush. If necessary, make the cloth moist with a weak solution of detergent.
3. Allow the unit to dry before use.

4.4 Maintenance – Calibration

BHGE supplies a calibration certificate with the pressure transducer. When it is necessary to recalibrate the pressure transducer, use the procedure that appears below (BHGE recommends a minimum interval of once a year).

Note: BHGE can provide a calibration service that is traceable to international standards.

4.4.1 Calibration – Equipment

BHGE recommends the use of these items of equipment to calibrate the unit:

- Pressure source - minimum accuracy: 0.01% of reading
- Digital thermometer - minimum accuracy: 1 °C
- A CANopen software package to get access to the contents of the CANopen Object Dictionary (refer to Appendix A., “CANopen Object Dictionary,” on page 19).

4.4.2 Two-Point Pressure Calibration – Procedure

Note: 0x identifies a hexadecimal value. Object 0x1800 02 = Index 0x1800, Sub-index 0x02 (refer to Appendix A., “CANopen Object Dictionary,” on page 19).

To get accurate results, calibrate in conditions where the pressure and temperature are stable.

1. Record the current values for the calibration data:
    - Object 0x2207 00 (Pressure Gain) = GAIN

      Default value = 1
    - Object 0x2208 00 (Pressure Offset) = OFFSET

      Default value = 0 mbar
2. First calibration point:
    a. Apply Pressure (AP1) at 10% of the full-scale pressure (in mbar) and allow the pressure to become stable.
    b. Record the Field Value (FV1) that appears in object 0x6100 01 (Pressure Value). Record the value in mbar.
3. Second calibration point:

a. Apply Pressure (AP2) at 90% of the full-scale pressure (in mbar) and allow the pressure to become stable.
b. Record the Field Value (FV2) that appears in object 0x6100 01 (Pressure Value). Record the value in mbar.

4. Calculate the new values for the calibration data:
   - NEW GAIN = [GAIN] * [(AP1 - AP2) / (FV1 - FV2)]
   - NEW OFFSET = [(OFFSET) - FV1] + [(AP1) * [(AP1 - AP2) / (FV1 - FV2)]]

     The value for the NEW OFFSET is in mbar.
5. Write the new values for the calibration data back to the CANopen Object Dictionary:
   a. Set object 0x2200 00 (calibration access pin) to 4118.
   b. Set object 0x2207 00 (pressure gain) to the NEW GAIN value.
   c. Set object 0x2208 00 (pressure offset) to the NEW OFFSET value. The value for the NEW OFFSET is in mbar.
   d. Set object 0x2200 00 (calibration access pin) to 0.
6. Confirm that the new values for the calibration data are correct:
   a. Repeat steps 2 and 3.
7. Write the new values for the last and next calibration dates back to the CANopen Object Dictionary:
   a. Set object 0x2200 00 (Calibration Access Pin) to 4118.
   b. Set objects 0x2201 00 to 0x2203 00 to the new values for the last calibration year, month, day.
   c. Set objects 0x2204 00 to 0x2206 00 to the new values for the next calibration year, month, day.
   d. Set object 0x2200 00 (Calibration Access Pin) to 0.
8. If applicable, reset the values for the out-of-limit counters (objects 0x2006 to 0x2009).

4.4.3 Two-Point Pressure Calibration – Results

For correct operation, the value for the NEW GAIN is in the range 0.9 to 1.1. If the value is not in this range, this shows either a defective unit or defective calibration equipment.

4.5 Approved Service Agents

Find the approved service agents at: **www.gemeasurement.com**

Appendix A. CANopen Object Dictionary

This appendix contains data for the primary objects that appear in the following areas of the CANopen Object Dictionary:

Index	Area
0x1000 to 0x1FFF	Communications profile area.
0x2000 to 0x2FFF	Manufacturer specific profile area.
0x6000 to 0x6FFF	Standardized device profile area.

A.1 Communication Segment

A.1.1 Object 1000h: Device Type

The device type specifies the kind of device. The lower 16-bit contain the device profile number and the upper 16-bit an additional information.

OBJECT DESCRIPTION

INDEX	1000
Name	Device Type
Object Code	Variable
Data Type	UNSIGNED32

ENTRY DESCRIPTION

Access	CONST
PDO Mapping	No
Default Value	0x00020194

A.1.2 Object 1001h: Error Register

The error register is a field of 8-bits, each for a certain error type. If an error occurs the bit has to be set.

Bit	Meaning
0	Generic error.
1	Current
2	Voltage
3	Temperature
4	Communication error (overrun, error state).
5	Device profile specific.
6	Reserved
7	Manufacturer specific.

OBJECT DESCRIPTION

INDEX	1001
Name	Error Register
Object Code	Variable
Data Type	UNSIGNED8

ENTRY DESCRIPTION

Access	RO
PDO Mapping	No
Default Value	0x00

A.1.3 Object 1003h: Pre-defined Error Field

This object holds errors that have occurred on the device and have been signaled via Emergency Object. It is an error history. Writing to sub-index 0 deletes the entire error history.

OBJECT DESCRIPTION

INDEX	1003
Name	Pre-defined Error Field
Object Code	Array
Data Type	UNSIGNED32

ENTRY DESCRIPTION

Sub-Index	000
Description	Number of Errors
Access	RW
PDO Mapping	No

Default Value	0x00000000
Sub-Index	001
Description	Standard Error Field
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0x00000000

A.1.4 Object 1005h: COB-ID SYNC

COB-ID of the Synchronization object. The device generates a SYNC message if bit 30 is set. The meaning of other bits is equal to the other communication objects.

OBJECT DESCRIPTION

INDEX	1005
Name	COB-ID SYNC
Object Code	Variable
Data Type	UNSIGNED32

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x080

A.1.5 Object 1007h: Synchronous Window Length

It contains the length of the time window for synchronous messages in µs. When not used it is 0.

OBJECT DESCRIPTION

INDEX	1007
Name	Synchronous Window Length
Object Code	Variable
Data Type	UNSIGNED32

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x00000000
Unit	µs

A.1.6 Object 1008h: Manufacturer Device Name

Contains the device name.

OBJECT DESCRIPTION

INDEX	1008
Name	Manufacturer Device Name
Object Code	Variable
Data Type	VISIBLE_STRING

ENTRY DESCRIPTION

Access	CONST
PDO Mapping	No
Default Value	DPS5000 CAN DK465 V00.00

A.1.7 Object 100Ch: Guard Time

This entry contains the guard time in milli-seconds. When not used it is 0.

OBJECT DESCRIPTION

INDEX	100C
Name	Guard Time
Object Code	Variable
Data Type	UNSIGNED16

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x00000000

A.1.8 Object 100Dh: Life Time Factor

The life time factor multiplied with the guard time gives the life time for the device. When not used it is 0.

OBJECT DESCRIPTION

INDEX	100D
Name	Life Time Factor
Object Code	Variable
Data Type	UNSIGNED8

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x0

A.1.9 Object 1010h: Store Parameter Field

This entry supports saving of parameters in non volatile memory. With a read access the device provides information about its saving capabilities.

The following parameter group is distinguished:

Sub-Index	Parameter Groups
1	All parameters.

For saving the signature “save” (0x65766173) must be written.

OBJECT DESCRIPTION

INDEX	1010
Name	Store Parameter Field
Object Code	Array
Data Type	UNSIGNED32

ENTRY DESCRIPTION

Sub-Index	000
Description	Number of Entries
Access	RO
PDO Mapping	No
Default Value	0x1
Sub-Index	001
Description	Save all Parameters
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x1

A.1.10 Object 1011h: Restore Default Parameters

This entry supports restoring of default parameters. With a read access the device provides information about its capabilities to restore these values.

The following group is distinguished.

Sub-Index	Parameter Group
1	All parameters.

For restoring the signature “load” (0x64616f6c) must be written.

OBJECT DESCRIPTION

INDEX	1011

Name	Restore Default Parameters
Object Code	Array
Data Type	UNSIGNED32

ENTRY DESCRIPTION

Sub-Index	000
Description	Number of Entries
Access	RO
PDO Mapping	No
Default Value	0x1

Sub-Index	001
Description	Restore all Default Parameters
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x0

A.1.11 Object 1012h: COB-ID Time Stamp

COB-ID of the Time Stamp Object (TIME). If bit 31 is set the device consumes the Time Stamp message and if bit 30 is set the device produces the Time Stamp message. The meaning of the other bits is equal to the other communication objects.

OBJECT DESCRIPTION

INDEX	1012
Name	COB-ID Time Stamp
Object Code	Variable
Data Type	UNSIGNED32

ENTRY DESCRIPTION

Access	RO
PDO Mapping	No
Default Value	0x0100

A.1.12 Object 1014h: COB-ID EMCY

COB-ID used for emergency message (emergency producer).

OBJECT DESCRIPTION

INDEX	1014
Name	COB-ID EMCY
Object Code	Variable
Data Type	UNSIGNED32

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x82

A.1.13 Object 1015h: Inhibit Time Emergency

Inhibit Time used for emergency message (emergency producer). The time has to be a multiple of 100 µs.

OBJECT DESCRIPTION

INDEX	1015
Name	Inhibit Time Emergency
Object Code	Variable
Data Type	UNSIGNED16

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x0000

A.1.14 Object 1017h: Producer Heartbeat Time

The producer heartbeat time defines the cycle time of the heartbeat. When not used, the time is 0. The time has to be a multiple of 1 msec.

OBJECT DESCRIPTION

INDEX	1017
Name	Producer Heartbeat Time
Object Code	Variable
Data Type	UNSIGNED16

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x00000000

A.1.15 Object 1018h: Identity Object

This object contains general information about the device.

Sub-Index	Identity Object
1	Contains a unique value allocated each manufacturer.
2	Identifies the manufacturer specific product code (device version).
3	Contains the revision number. Bit 31-16 is the major revision number and bit 15-0 the minor revision number.
4	Identifies a manufacturer specific serial number.

OBJECT DESCRIPTION

INDEX	1018
Name	Identity Object
Object Code	Variable
Data Type	UNSIGNED16

ENTRY DESCRIPTION

Sub-Index	000
Description	number of entries
Access	RO
PDO Mapping	No
Default Value	0x4
Sub-Index	001
Description	Vendor Id
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0x50
Sub-Index	002
Description	Product Code
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0x1388
Sub-Index	003
Description	Revision number
Data Type	UNSIGNED32

Access	RO
PDO Mapping	No
Default Value	0xB

Sub-Index	004
Description	Serial number
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0x22B8

A.1.16 Object 1019h: Synchronous Counter Overflow Value

The synchronous counter defines if a counter is mapped into the SYNC message and the highest value the counter can reach.

Value	Meaning
0	SYNC message transmitted with length 0.
1	Reserved
2 to 240	SYNC message transmitted with length 1, first data byte contains the counter value.
241 to 255	Reserved

OBJECT DESCRIPTION

INDEX	1019
Name	Synchronous counter overflow value
Object Code	Variable
Data Type	UNSIGNED8

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x00000000

A.1.17 Object 1800h to 1803h: Transmit PDO Communication Parameter 1

It contains the communication parameters of the current PDO the device is able to transmit. There are 4 PDOs available.

Sub-Index	Identity Object
0	Contains the number of PDO-parameters implemented.
1	Describes the COB-ID. If bit 31 is set the PDO is disabled. The transmission mode is defined by sub-index 2. An inhibit time can be defined on sub-index 3 in 100 µs. At the 5th sub-index can be defined a event time for asynchronous PDO's.

OBJECT DESCRIPTION

INDEX	1800 to 1803
Name	Transmit PDO Communication Parameter 1
Object Code	Record
Data Type	PDO_COMM_PAR

ENTRY DESCRIPTION

Sub-Index	000
Description	Number of Entries
Access	RO
PDO Mapping	No
Default Value	0x05
Sub-Index	001
Description	COB-ID
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0x00000180
Sub-Index	002
Description	Transmission Type
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Default Value	0x1

A.1.18 Object 1A00h to 1A03h: Transmit PDO Mapping Parameter 1

Contains the mapping for the PDO the device is able to transmit. There are 4 PDOs available.

The sub-index 0h contains the number of valid entries within the mapping record. This number of entries is also the number of the application variables which shall be transmitted with the corresponding PDO. The sub-index from 1h to number of entries contain the information about the mapped application variables. These entries describe the PDO contents by their index, sub-index and length. All three values are hexadecimal coded. The length entry contains the length of the object in bits (1 to 40h). This parameter can be used to verify the overall mapping length.

OBJECT DESCRIPTION

INDEX	1A00 to 1A03
Name	Transmit PDO Mapping Parameter 1
Object Code	Record
Data Type	PDO_MAPPING

ENTRY DESCRIPTION

Sub-Index	000
Description	Number of Entries
Access	RW
PDO Mapping	No
Default Value	0x02
Sub-Index	001
Description	Mapping Entry 1
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x61300120
Sub-Index	002
Description	Mapping Entry 2
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x20040020
Sub-Index	003
Description	Mapping Entry 3
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x00000000

Sub-Index	004
Description	Mapping Entry 4
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x00000000

A.1.19 Object 1F80h: NMT Start-up

Use object 0x1F80 to set the start-up mode of the sensor.

Status	Description
0	Sensor power-up in pre-operational mode.

OBJECT DESCRIPTION

INDEX	1F80h
Name	NMT Startup
Object Code	Variable
Data Type	UNSIGNED32

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x00000000

A.2 Manufacturer Segment

A.2.1 Object 2003h: Current Time

Current Time is 6 bytes TIME_OF_DAY.

OBJECT DESCRIPTION

INDEX	2003
Name	Current Time
Object Code	Variable
Data Type	UNSIGNED48

ENTRY DESCRIPTION

Access	RO
PDO Mapping	No
Default Value	0x00

A.2.2 Object 2004h: Acquisition Time

The time that the last sample was taken. This is in milliseconds since start-up.

OBJECT DESCRIPTION

INDEX	2004
Name	Acquisition Time
Object Code	Variable
Data Type	UNSIGNED32

ENTRY DESCRIPTION

Access	RO
PDO Mapping	Yes
Default Value	0x00

A.2.3 Object 2005h: Acquisition Interval

The length of time between the current and previous samples in milliseconds.

OBJECT DESCRIPTION

INDEX	2005
Name	Acquisition Interval
Object Code	Variable
Data Type	UNSIGNED16

ENTRY DESCRIPTION

Access	RO
PDO Mapping	No
Default Value	0x00

A.2.4 Object 2006h: Pressure Span Overflow Count

Used in the calculation of 6150 (AI Status).

OBJECT DESCRIPTION

INDEX	2006
Name	Pressure Span Overflow Count
Object Code	Variable
Data Type	UNSIGNED16

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x00

A.2.5 Object 2007h: Pressure Span Underflow Count

Used in the calculation of 6150 (AI Status).

OBJECT DESCRIPTION

INDEX	2007
Name	Pressure Span Underflow Count
Object Code	Variable
Data Type	UNSIGNED16

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x00

A.2.6 Object 2008h: Temperature Span Overflow Count

Used in the calculation of 6150 (AI Status).

OBJECT DESCRIPTION

INDEX	2008
Name	Temperature Span Overflow Count
Object Code	Variable
Data Type	UNSIGNED16

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x00

A.2.7 Object 2009h: Temperature Span Underflow Count

Used in the calculation of 6150 (AI Status).

OBJECT DESCRIPTION

INDEX	2009
Name	Temperature Span Underflow Count
Object Code	Variable
Data Type	UNSIGNED16

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x00

A.2.8 Object 210Ch: Node ID

The CAN node ID.

OBJECT DESCRIPTION

INDEX	210C
Name	Node ID
Object Code	Variable
Data Type	UNSIGNED8

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x2

A.2.9 Object 210Dh: Bit Rate

The CAN bit rate.

OBJECT DESCRIPTION

INDEX	210D
Name	Bit Rate
Object Code	Variable
Data Type	UNSIGNED16

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0xFA

A.2.10 Object 2200h: Calibration Access Pin

The PIN to enable calibration.

OBJECT DESCRIPTION

INDEX	2200
Name	Calibration Access Pin
Object Code	Variable
Data Type	UNSIGNED16

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x0

A.2.11 Object 2201h: Last Calibration Year

Requires calibration PIN (refer to “Object 2200h: Calibration Access Pin” on page 33).

OBJECT DESCRIPTION

INDEX	2201
Name	Last Calibration Year
Object Code	Variable
Data Type	UNSIGNED16

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x00

A.2.12 Object 2202h: Last Calibration Month

Requires calibration PIN (refer to “Object 2200h: Calibration Access Pin” on page 33).

OBJECT DESCRIPTION

INDEX	2202
Name	Last Calibration Month
Object Code	Variable
Data Type	UNSIGNED16

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x00

A.2.13 Object 2203h: Last Calibration Day

Requires calibration PIN (refer to “Object 2200h: Calibration Access Pin” on page 33).

OBJECT DESCRIPTION

INDEX	2203
Name	Last Calibration Day
Object Code	Variable
Data Type	UNSIGNED16

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x00

A.2.14 Object 2204h: Next Calibration Year

Requires calibration PIN (refer to “Object 2200h: Calibration Access Pin” on page 33).

OBJECT DESCRIPTION

INDEX	2204
Name	Next Calibration Year
Object Code	Variable
Data Type	UNSIGNED16

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x00

A.2.15 Object 2205h: Next Calibration Month

Requires calibration PIN (refer to “Object 2200h: Calibration Access Pin” on page 33).

OBJECT DESCRIPTION

INDEX	2205
Name	Next Calibration Month
Object Code	Variable
Data Type	UNSIGNED16

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x00

A.2.16 Object 2206h: Next Calibration Day

Requires calibration PIN (refer to “Object 2200h: Calibration Access Pin” on page 33).

OBJECT DESCRIPTION

INDEX	2206
Name	Next Calibration Day
Object Code	Variable
Data Type	UNSIGNED16

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x00

A.2.17 Object 2207h: Pressure Gain

Requires calibration PIN (refer to “Object 2200h: Calibration Access Pin” on page 33).

OBJECT DESCRIPTION

INDEX	2207
Name	Pressure Gain
Object Code	Variable
Data Type	REAL32

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	1.0

A.2.18 Object 2208h: Pressure Offset

Requires calibration PIN (refer to “Object 2200h: Calibration Access Pin” on page 33).

OBJECT DESCRIPTION

INDEX	2208
Name	Pressure Offset
Object Code	Variable
Data Type	REAL32

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0.0

A.2.19 Object 2209h: Temperature Gain

Requires calibration PIN (refer to “Object 2200h: Calibration Access Pin” on page 33).

OBJECT DESCRIPTION

INDEX	2209
Name	Temperature Gain
Object Code	Variable
Data Type	REAL32

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	1.0

A.2.20 Object 220Ah: Temperature Offset

Requires calibration PIN (refer to “Object 2200h: Calibration Access Pin” on page 33).

OBJECT DESCRIPTION

INDEX	220A
Name	Temperature Offset
Object Code	Variable
Data Type	REAL32

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0.0

A.2.21 Object 220Dh: FIR Samples Size

The number of samples in the Finite Impulse Response filter.

Sub-Index	FIR Filter
1	FIR Filter 1.
2	FIR Filter 2.
3	FIR Filter 3.
4	FIR Filter 4.
5	FIR Filter 5.

OBJECT DESCRIPTION

INDEX	220D
Name	FIR Samples size
Object Code	Variable
Data Type	UNSIGNED8

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x00

A.2.22 Object 220Eh: FIR Sample Data

Data for the Finite Impulse Response filter.

OBJECT DESCRIPTION

INDEX	220E
Name	FIR Sample Data

Object Code	Variable
Data Type	DOMAIN

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	NULL

A.2.23 Object 2210h: FIR2 Sample Data

Data for the Finite Impulse Response filter.

OBJECT DESCRIPTION

INDEX	2210
Name	FIR2 Sample Data
Object Code	Variable
Data Type	DOMAIN

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	NULL

A.2.24 Object 2212h: FIR3 Sample Data

Data for the Finite Impulse Response filter.

OBJECT DESCRIPTION

INDEX	2212
Name	FIR3 Sample Data
Object Code	Variable
Data Type	DOMAIN

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	NULL

A.2.25 Object 2214h: FIR4 Sample Data

Data for the Finite Impulse Response filter.

OBJECT DESCRIPTION

INDEX	2214
Name	FIR4 Sample Data
Object Code	Variable

Data Type	DOMAIN

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	NULL

A.2.26 Object 2216h: FIR5 Sample Data

Data for the Finite Impulse Response filter.

OBJECT DESCRIPTION

INDEX	2216
Name	FIR5 Sample Data
Object Code	Variable
Data Type	DOMAIN

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	NULL

A.2.27 Object 2217h: Selected FIR Filter

OBJECT DESCRIPTION

INDEX	2217
Name	Selected FIR filter
Object Code	Variable
Data Type	UNSIGNED8

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x02

A.2.28 Object 2218h: FIR Pre-scaler

OBJECT DESCRIPTION

INDEX	2218
Name	FIR Prescaler
Object Code	Array
Data Type	UNSIGNED16

ENTRY DESCRIPTION

Sub-Index	000

Description	Number of Entries
Access	RO
PDO Mapping	No
Default Value	0x05
Sub-Index	001
Description	FIR pre-scaler
Data Type	UNSIGNED16
Access	RW
PDO Mapping	No
Default Value	0x0
Sub-Index	002
Description	FIR2 pre-scaler
Data Type	UNSIGNED16
Access	RW
PDO Mapping	No
Default Value	0x0
Sub-Index	003
Description	FIR3 pre-scaler
Data Type	UNSIGNED16
Access	RW
PDO Mapping	No
Default Value	0x0
Sub-Index	004
Description	FIR4 pre-scaler
Data Type	UNSIGNED16
Access	RW
PDO Mapping	No
Default Value	0x0
Sub-Index	005
Description	FIR5 pre-scaler
Data Type	UNSIGNED16
Access	RW
PDO Mapping	No
Default Value	0x0

A.2.29 Object 2300h: PDCR Min Pressure

OBJECT DESCRIPTION

INDEX	2300
Name	PDCR Min Press
Object Code	Variable
Data Type	INTEGER32

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x0

A.2.30 Object 2301h: PDCR Max Pressure

OBJECT DESCRIPTION

INDEX	2301
Name	PDCR Max Pressure
Object Code	Variable
Data Type	INTEGER32

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x14331

A.2.31 Object 2302h: PDCR Type

OBJECT DESCRIPTION

INDEX	2302
Name	PDCR Type
Object Code	Variable
Data Type	UNSIGNED8

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0x80

A.2.32 Object 2304h: PDCR Text

OBJECT DESCRIPTION

INDEX	2304

Name	PDCR Text
Object Code	Variable
Data Type	VISIBLE_STRING

ENTRY DESCRIPTION

Access	RW
PDO Mapping	No
Default Value	0

A.3 Device Profile Segment

A.3.1 Object 6100h: AI Input FV

This object represents the converted value of an analogue input module, it is not yet scaled to the physical measurement units. Scaling could be e.g. digits of the analog-to-digital converter or Ohms for Pt100 temperature measurement.

The value is left adjusted with the remaining bits to the right side of the LSB set to zero.

Value	Description
1	Pressure
2	Temperature

OBJECT DESCRIPTION

INDEX	6100
Name	AI Input FV
Object Code	Array
Data Type	REAL32

ENTRY DESCRIPTION

Sub-Index	000
Description	number of entries
Access	RO
PDO Mapping	No
Default Value	0.0

Sub-Index	001
Description	AI Input FV 1
Data Type	REAL32
Access	RO
PDO Mapping	Yes
Default Value	0.0

Sub-Index	002
Description	AI Input FV 2
Data Type	REAL32
Access	RO
PDO Mapping	Yes
Default Value	0.0

A.3.2 Object 6101h: AI Input Unit

OBJECT DESCRIPTION

INDEX	6101
Name	AI Input Unit
Object Code	Array
Data Type	UNSIGNED32

ENTRY DESCRIPTION

Sub-Index	000
Description	number of entries
Access	RO
PDO Mapping	No
Default Value	0x2

Sub-Index	001
Description	AI Input Unit 1
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0xfd4e0000

Sub-Index	002
Description	AI Input Unit 2
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0x00000000

A.3.3 Object 6110h: AI Sensor Type

Specifies the type of sensor connected to the analogue input.

OBJECT DESCRIPTION

INDEX	6110

Name	AI Sensor type
Object Code	Array
Data Type	UNSIGNED16

ENTRY DESCRIPTION

Sub-Index	000
Description	number of entries
Access	RO
PDO Mapping	No
Default Value	0x2

Sub-Index	001
Description	AI Sensor type 1
Data Type	UNSIGNED16
Access	RW
PDO Mapping	No
Default Value	0x5A

Sub-Index	002
Description	AI Sensor type 2
Data Type	UNSIGNED16
Access	RW
PDO Mapping	No
Default Value	0x64

A.3.4 Object 6120h: AI Input Scaling 1 FV

This object defines the field value of the first calibration point for the analogue input channel. It is scaled in physical unit of field value.

OBJECT DESCRIPTION

INDEX	6120
Name	AI Input scaling 1 FV
Object Code	Array
Data Type	REAL32

ENTRY DESCRIPTION

Sub-Index	000
Description	number of entries
Access	RO
PDO Mapping	No
Default Value	0.0

Sub-Index	001
Description	AI Input scaling 1 FV 1
Data Type	REAL32
Access	RW
PDO Mapping	No
Default Value	0.0

Sub-Index	002
Description	AI Input scaling 1 FV 2
Data Type	REAL32
Access	RW
PDO Mapping	No
Default Value	0.0

A.3.5 Object 6121h: AI Input Scaling 1 PV

This object defines the process value of the first calibration point for the analogue input channel. It is scaled in physical unit of the process value.

OBJECT DESCRIPTION

INDEX	6121
Name	AI Input scaling 1 PV
Object Code	Array
Data Type	REAL32

ENTRY DESCRIPTION

Sub-Index	000
Description	number of entries
Access	RO
PDO Mapping	No
Default Value	0.0

Sub-Index	001
Description	AI Input scaling 1 PV 1
Data Type	REAL32
Access	RW
PDO Mapping	No
Default Value	0.0

Sub-Index	002
Description	AI Input scaling 1 PV 2

Data Type	REAL32
Access	RW
PDO Mapping	No
Default Value	0.0

A.3.6 Object 6122h: AI Input Scaling 2 FV

This object defines the field value of the second calibration point for the analogue input channel. It is scaled in physical unit of field value.

OBJECT DESCRIPTION

INDEX	6122
Name	AI Input scaling 2 FV
Object Code	Array
Data Type	REAL32

ENTRY DESCRIPTION

Sub-Index	000
Description	number of entries
Access	RO
PDO Mapping	No
Default Value	0.0

Sub-Index	001
Description	AI Input scaling 2 FV 1
Data Type	REAL32
Access	RW
PDO Mapping	No
Default Value	1.0

Sub-Index	002
Description	AI Input scaling 2 FV 2
Data Type	REAL32
Access	RW
PDO Mapping	No
Default Value	1.0

A.3.7 Object 6123h: AI Input Scaling 2 PV

This object defines the process value of the second calibration point for the analogue input channel. It is scaled in physical unit of process value.

OBJECT DESCRIPTION

INDEX	6123
Name	AI Input scaling 2 PV
Object Code	Array
Data Type	REAL32

ENTRY DESCRIPTION

Sub-Index	000
Description	number of entries
Access	RO
PDO Mapping	No
Default Value	0.0
Sub-Index	001
Description	AI Input scaling 2 PV 1
Data Type	REAL32
Access	RW
PDO Mapping	No
Default Value	1.0
Sub-Index	002
Description	AI Input scaling 2 PV 2
Data Type	REAL32
Access	RW
PDO Mapping	No
Default Value	1.0

A.3.8 Object 6124h: AI Input Offset

This object defines the additional offset value for the analogue input channel. It is scaled in physical unit of process value.

OBJECT DESCRIPTION

INDEX	6124
Name	AI Input offset
Object Code	Array
Data Type	REAL32

ENTRY DESCRIPTION

Sub-Index	000
Description	number of entries
Access	RO

PDO Mapping	No
Default Value	0.0

Sub-Index	001
Description	AI Input offset 1
Data Type	REAL32
Access	RW
PDO Mapping	No
Default Value	0.0

Sub-Index	002
Description	AI Input offset 2
Data Type	REAL32
Access	RW
PDO Mapping	No
Default Value	0.0

A.3.9 Object 6130h: AI Input PV

This object represents the result of the input scaling block and gives the measured quantity scaled in the physical unit of process values (e.g. degrees centigrade, kg, kN, mm etc.).

OBJECT DESCRIPTION

INDEX	6130
Name	AI Input PV
Object Code	Array
Data Type	REAL32

ENTRY DESCRIPTION

Sub-Index	000
Description	number of entries
Access	RO
PDO Mapping	No
Default Value	0.0

Sub-Index	001
Description	AI Input PV 1
Data Type	REAL32
Access	RO
PDO Mapping	Yes
Default Value	0.0

Sub-Index	002
Description	AI Input PV 2
Data Type	REAL32
Access	RO
PDO Mapping	Yes
Default Value	0.0

A.3.10 Object 6131h: AI Physical Unit PV

This object assigns SI units and prefixes for the process values within the analogue input function block. The coding of the physical units listed in Appendix B., “Alternative Pressure Units,” on page 53.

OBJECT DESCRIPTION

INDEX	6131
Name	AI Physical unit PV
Object Code	Array
Data Type	UNSIGNED32

ENTRY DESCRIPTION

Sub-Index	000
Description	number of entries
Access	RO
PDO Mapping	No
Default Value	0x2

Sub-Index	001
Description	AI Physical unit PV 1
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0xFD4E0000

Sub-Index	002
Description	AI Physical unit PV 2
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x002D0000

A.3.11 Object 6148h: AI Span Start

This value specifies the lower limit where process values are expected. Process values, lower than this limit, are marked as negative overloaded.

OBJECT DESCRIPTION

INDEX	6148
Name	AI Span start
Object Code	Array
Data Type	REAL32

ENTRY DESCRIPTION

Sub-Index	000
Description	number of entries
Access	RO
PDO Mapping	No
Default Value	0.0
Sub-Index	001
Description	AI Span start 1
Data Type	REAL32
Access	RW
PDO Mapping	No
Default Value	0.0
Sub-Index	002
Description	AI Span start 2
Data Type	REAL32
Access	RW
PDO Mapping	No
Default Value	0.0

A.3.12 Object 6149h: AI Span End

This value specifies the upper limit where process values are expected. Process values exceeding this limit are marked as positive overloaded.

OBJECT DESCRIPTION

INDEX	6149
Name	AI Span end
Object Code	Array
Data Type	REAL32

ENTRY DESCRIPTION

Sub-Index	000
Description	number of entries
Access	RO
PDO Mapping	No
Default Value	0.0

Sub-Index	001
Description	AI Span end 1
Data Type	REAL32
Access	RW
PDO Mapping	No
Default Value	0.0

Sub-Index	002
Description	AI Span end 2
Data Type	REAL32
Access	RW
PDO Mapping	No
Default Value	0.0

A.3.13 Object 6150h: AI Status

This read-only object reflects the status of the analogue input channels. The combination of bit 1 and bit 2 has not to be possible.

OBJECT DESCRIPTION

INDEX	6150
Name	AI Status
Object Code	Array
Data Type	UNSIGNED8

ENTRY DESCRIPTION

Sub-Index	000
Description	number of entries
Access	RO
PDO Mapping	No
Default Value	0x02

Sub-Index	001
Description	AI Status 1

Data Type	UNSIGNED8
Access	RO
PDO Mapping	Yes
Default Value	0x0

Sub-Index	002
Description	AI Status 2
Data Type	UNSIGNED8
Access	RO
PDO Mapping	Yes
Default Value	0x0

Appendix B. Alternative Pressure Units

This appendix contains data for the alternative pressure units.

The basic operation of the pressure transducer uses mbar for the pressure calculations. BHGE uses the Customer Ordering Information to set the default units for the pressure output. The default units can be: mbar, bar, or psi.

The table below shows the values to get an output in one of the alternative pressure units.

Pressure Units		CANopen Value (Units) (Object: 0x6131 01)	Scale-Factor (Object: 0x6123 01)
mbar	millibar	0xFD4E0000	1
bar	bar	0x004E0000	0.001
Pa (N/m^2)	pascal (newton per square metre)	0x00220000	100
hPa	hectopascal	0x02220000	1
kPa	kilo pascal	0x03220000	0.1
Mpa	Mega pascal	0x06220000	0.0001
mmHg	millimetre of mercury	0x00A00000[a]	0.7500616
cmHg	centimetre of mercury	0x00A00000[a]	0.07500616
mHg	metre of mercury	0x00A00000[a]	0.0007500616
inHg	inch of mercury	0x00A00000[a]	0.02953
kg/cm^2	kilogram-force per square centimetre	0x00A00000[a]	0.001019716
kg/m^2	kilogram-force per square metre	0x00A00000[a]	10.19716
mmH_2O	millimetre of water	0x00A00000[a]	10.19716
cmH_2O	centimetre of water	0x00A00000[a]	1.019716
mH_2O	metre of water	0x00A00000[a]	0.01019716
torr	torr	0x00A00000[a]	0.7500616
atm	atmosphere	0x00A00000[a]	0.000986923
psi	pound-force per square inch	0x00A00000[a]	0.01450377
lb/ft^2	pound-force per square foot	0x00A00000[a]	2.088543
inH_2O 4°C	inch of water at 4 °C	0x00A00000[a]	0.4001775
inH_2O 60°F	inch of water at 60 °F	0x00A00000[a]	0.4021858
ftH_2O 4°C	foot of water at 4 °C	0x00A00000[a]	0.03345526
ftH_2O 60°F	foot of water at 60 °F	0x00A00000[a]	0.03351545

a. The CANopen value 0x00A00000 shows that the pressure unit is not an SI unit (refer to Appendix C., “Bibliography,” on page 55).

If other units are necessary, set the applicable values to agree with local conditions.

Appendix B. Alternative Pressure Units

Appendix C. Bibliography

For more data, refer to the following publications:

1. CANopen Application Layer and Communication Profile
   - CiA Draft Standard DS-301 (Version 4.01)
2. CANopen Device Profile for Measurement Devices and Closed Loop Controllers
   - CiA Draft Standard Proposal DSP-404 (Version 1.0)
3. CANopen Layer Setting Services and Protocol (LSS)
   - CiA Draft Standard Proposal DSP-305 (Version 1.0)
4. CANopen Representation of SI Units and Prefixes
   - CiA Draft Recommendation DRP-303-2 (Version 1.1)

Appendix C. Bibliography

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