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Automation systems S7-300, ET 200M
8xIQ Sense module

Product Information for the ProTool sample project

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Automation systems S7-300, ET 200M

ProTool sample project for 8xIQ-Sense modules

Preface

This product information contains important information about the ProTool sample project for 8xIQ Sense modules. This product info should be considered a separate component and, in case of uncertainty, overrides other specifications in manuals and catalogs.

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1 Introduction

Documentation for ProTool

The entire user documentation is supplied with ProTool. Setup automatically installs all required Online Help systems (based on the scope of installation) when you install ProTool.

For the next chapters, we presume that users have sufficient knowledge on the use of ProTool, otherwise we refer to the ProTool user documentation.

Documentation for S7-300, ET 200M and the 8xIQ Sense module

See the *Automation systems S7-300, ET 200M: 8xIQ Sense module* manual and the reference manuals listed there.

We also presume sufficient knowledge of (SIMATIC) automation systems and of programming in *STEP 7*.

Documentation for Sonar-BERO M18 IQ ultrasonic sensors

Sees the *Ultrasonic sensor Sonar-BERO M18 IQ* manual and the operating instructions supplied with the sensor *Ultrasonic Sonar-BERO M18 IQ*.

2 Content of the ProTool sample project

STEP 7 function blocks for IQ-Sense devices

The sample project contains the function blocks

- FB IQ-Sense Opto Channel
- FB IQ-Sense Ultrasonic

ProTool sample visualization for IQ-Sense device

The sample project contains the sample visualization for PG/PC or TP 270, in accordance with

- IQ profile ID 1 for optoelectronic sensors (“IQ-Sense Opto”)
- IQ profile ID 128 for ultrasonic sensors (“IQ-Sense Ultrasonic IQ profile ID 128”)
- IQ profile ID 128 for Sonar-BERO M18 IQ ultrasonic sensors (“IQ-Sense Sonar-BERO Siemens 3SF6...”)

Organization block

The sample project also contains the organization blocks

- OB100
- OB1.

3 Purpose of the ProTool sample project

Providing *STEP 7* function blocks for IQ-Sense devices

The 8xIQ Sense module provides all properties / functionality to the IQ Sense devices (sensors, actuators) at the *STEP 7* programming interface, namely the function block.

Providing a sample visualization for application in the target project

You can apply the sample visualization for PG/PC or TP 270 used to access IQ-Sense devices (Opto, Ultrasonic) to the visualization system of the target project. You can apply individual screens, or the entire ProTool sample project.

Providing direct access to IQ-Sense devices

You can use the included sample visualization for direct access to all IQ-Sense devices (Opto, Ultrasonic) on a *STEP 7* CPU.

4 Requirements for using the sample project

Requirements:

- *STEP 7* V4.02 or higher must be available
- ProTool Pro CS and / or ProTool RT V6.0 SP2 or higher must be available.

5 Using the sample project

Procedure

Steps to take when using the sample project:

1. On your programming PC, create your configuration (central / distributed structure) in *STEP 7* with the connected IQ-Sense devices (sensors / actuators.)
2. Install ProTool / Pro CS on your programming PC (only necessary in case you want to edit the sample visualization.)
3. Install ProTool / Pro Runtime on the operator device (PG / PC).
4. According to your configuration, implement a function block "IQ-Sense Opto Channel" (= FB20) with DB20 for ProTool visualization into your application program (OB1).

Please note:

- Call the visualization block for IQ-Sense Opto **without** configuring its parameter data, see Table 1.

Table 1 Call of the visualization block for IQ-Sense Opto

STL	Explanation
CALL FB20,DB20	Call of FB "IQ-Sense Opto Channel" with instance DB 20 (default)
REQ :=	
CH_ADDR :=	
WR_TEACH_VAL :=	
START_TEACH :=	
TEACH_VAL_IN :=	
ERROR_STATE :=	
CH_STATE :=	
BUSY :=	
Q_CH :=	
TEACH_VAL_OUT :=	

5. According to your configuration, implement a function block "IQ-Sense Ultrasonic" (= FB21) with DB21 for ProTool visualization into your application program (OB1).

Please note:

- Call the visualization block for IQ-Sense Ultrasonic, then edit **only** its timer parameter by assigning it free timers, see table 2.

Table 2 Call of the visualization block for IQ-Sense Ultrasonic

STL		Explanation
CALL	FB21,DB21	Call of FB "IQ-Sense Ultrasonic" with instance DB 21 (default)
REQ	:=	
LADDR	:=	
CH_ADDR	:=	
FUNC_SELECT	:=	
SP00	:=	
SP01	:=	
SP10	:=	
SP11	:=	
START_FUNC	:=	
SCALE	:=	
DATA_IN	:=	
TIM_WD	:=T20	Timer T20 (= a free timer!) can be used as watchdog timer 1
TIM_POLL	:=T21	Timer T21 (= a free timer!) can be used as watchdog timer 2
ERROR_STATE	:=	
BUSY	:=	
Q_CHO	:=	
Q_CH1	:=	
DISTANCE	:=	
CH_STATE	:=	
DATA_OUT	:=	

- Copy OB100 to your application program. If it already contains an OB100, copy these commands from the supplied OB100 to the block:

```
CLR
= DB21.DBX148.0
```

- Integrate the ProTool sample visualization TP_270_V1 for Touch Panel 270 and / or PC_V1 for PC into your *STEP 7* project:
 - Copy the object TP_270_V1 and / or PC_V1 from the sample project to the destination project by means of drag-and-drop.
 - You may also drag-and-drop individual screens or objects into an existing visualization.

8. In the sample project, edit the default settings for communication with the *STEP 7* CPU as required.
The default setting is based on a configuration with the operator panel set at address 4, for communication with a partner station (CPU) at address 2 via MPI at 187.5 kbps.
To edit the default setting of communication with the CPU:
 - in the ProTool project view, select the “Control” object.
 - Select the control from the right screen section with double-click, or right-click to open the shortcut menu and select “Properties.”
 - Enable the “Parameter” button.
 - On the next dialog box, enter the corresponding parameters in the “OP parameters”, “Network parameters” and “Partner parameters” areas.
 - Save your ProTool sample project.
 - Download the ProTool sample project to the CPU.

Note

The specified DB20 or DB21 are set by default for using this sample visualization. You may not use these DBs otherwise if you integrate them in your sample visualization.

Corresponding knowledge of ProTool assumed, however, you may edit the assignment between the DB and the ProTool sample project:

1. In the ProTool project view, select the “Variables” object.
2. Select the first variable from the right screen section with double-click, or right-click to open the shortcut menu and select “Properties.”
3. Select the “General” tab.
4. From the “Area:” box, select “DB”.
5. Type in the relevant DB number into the “DB:” box.
6. Repeat steps 2 to 5 for **all** variables belonging to DB20 or DB21.
7. Save your ProTool sample project.
8. Download the ProTool sample project to the CPU.

Still applicable is, however: You may not use the DBs of your sample visualization otherwise.

6 Running the sample project

After you have completed the steps described earlier:


Touch Panel 270:

1. Download the ProTool sample project TP_270_V1 to your TP 270. The start screen opens automatically (see also the documentation for TP 270.)

PC:

1. Click the relevant sample project TP_270_V1 or PC_V1.
2. Right-click to open the shortcut menu, then select "Start runtime." The first screen of your sample project appears.

Or

1. Double-click the relevant ProTool sample project TP_270_V1 or PC_V1.
2. On the toolbar, click the  "Start ProTool/Pro RT" icon. The first screen of your sample project appears.

7 Notes on operation

In addition to the general reference we made to the ProTool Online Help, here some notes on operation:

- The I/O boxes are assigned the name of the corresponding variable of the function block, e.g. "channel address (CH_ADDR)". For information on those variables, refer to the *8xIQ Sense module* manual.
- Click "IQ-Opto IQ profile 1" or "IQ Ultrasonic IQ profile 128"/"Sonar-BERO 3SF6...", in order to toggle between the ProTool screens "IQ-Sense Opto" and "IQ-Sense Ultrasonic."
- The function you selected from the "Function selection" area is executed automatically. You only need to click "Run" if you want to repeat execution of this function again.
- If the color of the bar in the "Function selection" area is red instead of green, the execution of this function has failed. The text inside the bar provides information about the error cause.
- Click "Print" to output the current screen content of the sample project to a printer.
- Click "Exit" to close the sample project.

8 “IQ-Sense Ultrasonic” screens

The sample project contains two screens for ultrasonic sensors (IQ profile ID 128), namely for

- Ultrasonic sensors (“IQ-Sense Ultrasonic IQ profile 128”)
- Ultrasonic sensors Sonar-BERO M18 IQ (“IQ-Sense Sonar-BERO Siemens 3SF6...”).

The ultrasonic sensors Sonar-BERO M18 IQ 3SF6 contain a sublayer of properties defined in IQ profile ID 128. The major difference is:

IQ profile ID 128 supports two logic channels Q_CH0 and Q_CH1 and the corresponding switching positions SP0.0, SP0.1, SP1.0 and SP1.1. Of those, the Sonar-BERO M18 IQ 3SF6 device uses only logic channel Q_CH0.

Any further differences in the parameters of the ultrasonic sensor screens are indicated in the relevant section of this documentation.

Start screen “IQ-Sense Ultrasonic IQ profile 128”

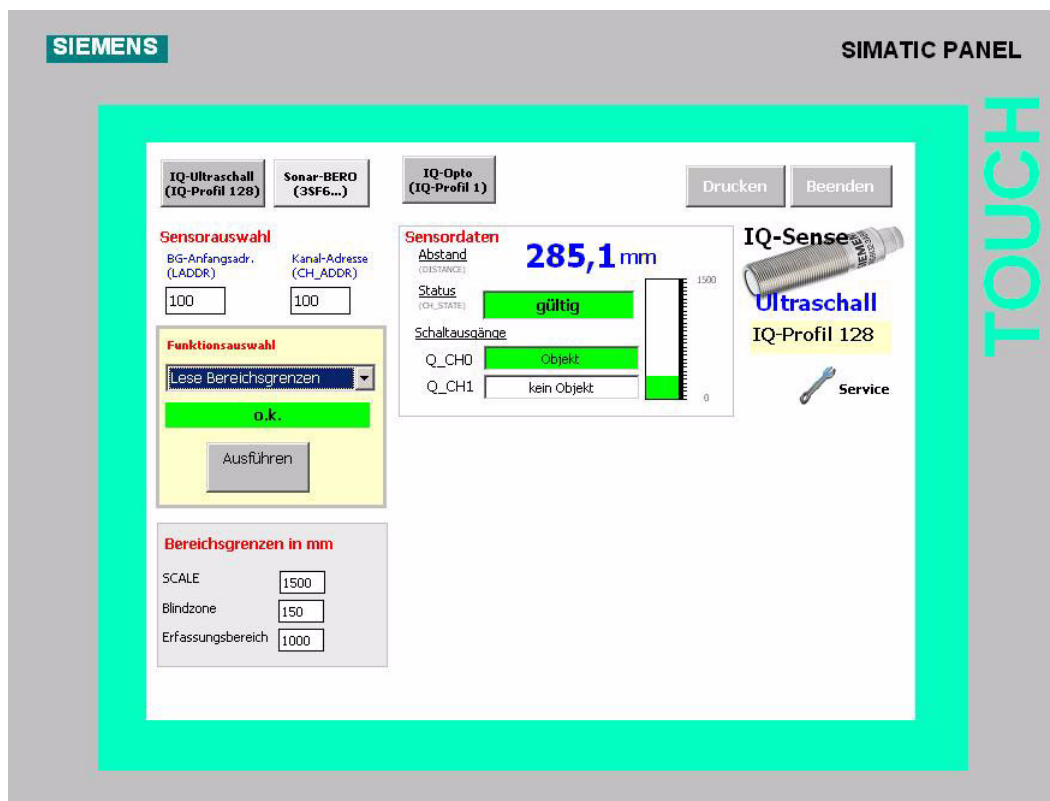


Figure 1 Start screen IQ-Sense Ultrasonic IQ profile 128”

Procedure

1. Select the sensor you want to visualize.
To do so, enter the module start address of the 8xIQ-Sense ("Module start address LADDR") and the I/O address of the relevant channel ("channel address CH_ADDR") in the "Sensor selection" boxes.
2. Select the functions you want to run on the selected channel.
Procedures as follows.

Object status logging

The process value is always detected and then provided at the IQ-Sense interface. This basic functionality is also available without "assignment of dynamic parameters."

"Sensor data" view

This view contains the following boxes:

- DISTANCE:
Specifies the process value (distance...) in [mm].
- Status CH_STATE:
Status information indicating whether the process value is valid or not.
- Switching outputs Q_CH0 and Q_CH1:
Indicates whether an object is detected at switching output 0 or 1 of the selected channel of the 8xIQ Sense module or not.

This is a display range. You can not edit these data.

Teach-in

1. On the "Function selection" area, select the list box and the switching position you want to teach ("Teach-in SP0.0" to "Teach-in SP1.1"). The following applies:
 - SP0.0 = start of the range of switching output Q_CH0
 - SP0.1 = end of the range of switching output Q_CH0
 - SP1.0 = start of the range for switching output Q_CH1
("IQ profile 128" only; not supported by Sonar-BERO M18 IQ 3SF6)
 - SP1.1 = end of the range for switching output Q_CH1
("IQ profile 128" only; not supported by Sonar-BERO M18 IQ 3SF6)
2. On the "Function selection" area, click "Run" to execute the Teach-in function.
3. When Teach-in is completed: The current switching positions are indicated in the "Read" column of the "Switching positions in mm" area.

IntelliTeach

1. On the “Function selection” area, open the list box, then select either the switching position for the IntelliTeach task (“IntelliTeach SP0.0” to “IntelliTeach SP1.1”), or enable the “IntelliTeach all” function. The following applies:
 - SP0.0 = start of the range of switching output Q_CH0
 - SP0.1 = end of the range of switching output Q_CH0
 - SP1.0 = start of the range for switching output Q_CH1 (“IQ profile 128” only; not supported by Sonar-BERO M18 IQ 3SF6)
 - SP1.1 = end of the range for switching output Q_CH1 (“IQ profile 128” only; not supported by Sonar-BERO M18 IQ 3SF6)
2. In the “Write” input boxes of the “Switching positions in mm” area, enter the switching positions to be applied to the sensor.
3. On the “Function selection” area, click “Run” to transfer the switching positions to the sensor.
4. When IntelliTeach is completed: The current switching positions are indicated in the “Read” column of the “Switching positions in mm” area.

Reading switching position data

1. On the “Function selection” area, open the list box and enable the “Read switching positions” function.
The “Read” boxes of the “Switching positions in mm” area shows the current switching positions of the sensor.

Reading the range limits of the sensor

1. On the “Function selection” area, open the list box and enable the “Range limits” function.
The “Range limits in mm” area indicates the range limits of the sensor:
 - Scaling range SCALE:
Process value output range, with a resolution of 16 bits.
 - Blind zone:
Area between the sensor surface and the start of the detection range in which echoes can not be evaluated due to physical reasons.
 - Detection range:
Object detection range of the sensor.

This is a display range. You can not edit these data.

Read diagnostics data

1. On the “Function selection” area, open the list box and enable the “Read diagnostics data” function.
The “Diagnostics data” shows the following diagnostics data:

Table 3 Diagnostics data for IQ profile 128 and Sonar-BERO M18 IQ 3SF6...

IQ profile 128	Sonar-BERO M18 IQ 3SF6...
Parameter assignment error	Parameter assignment error
Error	Error
External error	External error
Maintenance request	Maintenance request
Specific operating state	Teach-in is busy
Simulation mode	–
–	Wrong sensor
–	Operating mode not supported
–	Invalid static parameters
–	Invalid switching position SP0.x

Reading sensor identification data

1. On the “Function selection” area, open the list box and enable the “Identification” function.
The “Sensor identification” area indicates the sensor identification data:
 - Manufacturer
 - Sensor ID
 - IQ profile ID
 - Software and hardware release versions.

This is a display range. You can not edit these data.

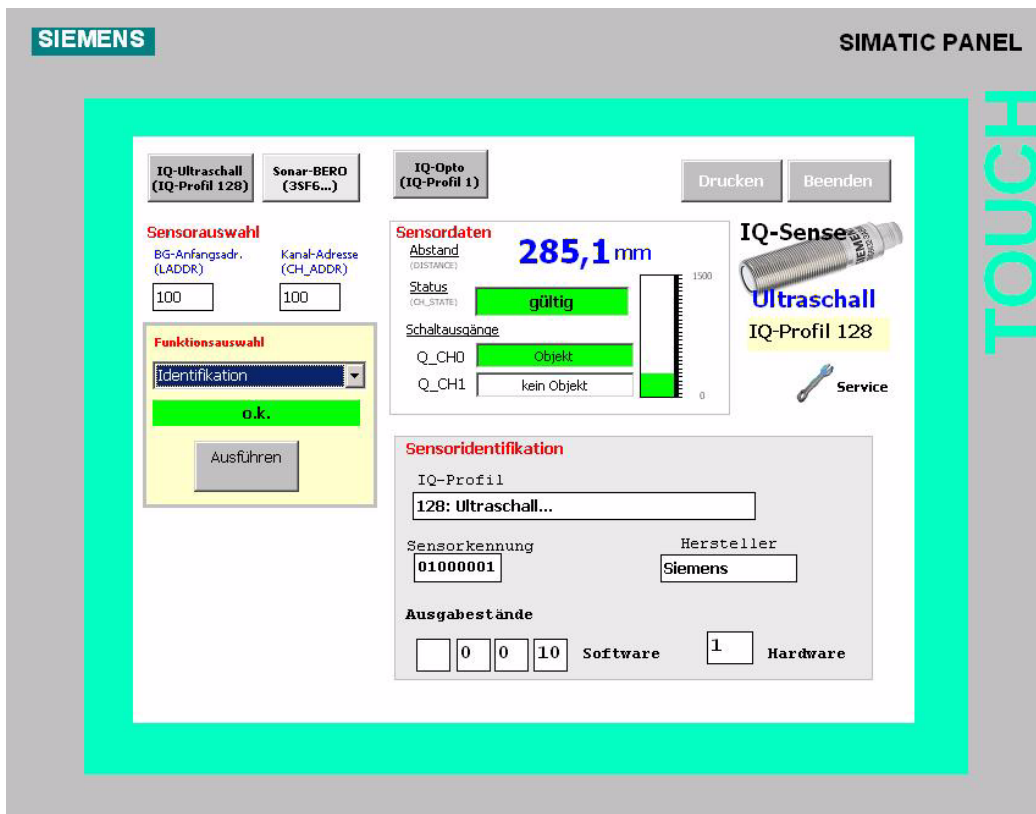


Figure 2 IQ-Sense Ultrasonic IQ profile 128, “Sensor identification” screen

Reading the sensor order number

1. On the “Function selection” area, open the list box and enable the “Order number” function.
The “Order number” area shows the order number of the sensor.

This is a display range. You can not edit these data.

Reading the static parameter of the sensor

1. On the “Function selection” area, open the list box and enable the “Read static parameters” function.

The “Static parameters” area indicates the static parameters of the sensor.

Table 4 shows the static parameters for IQ profile 128 and Sonar-BERO M18 IQ 3SF6... .

This is a display range. You can not edit these data.

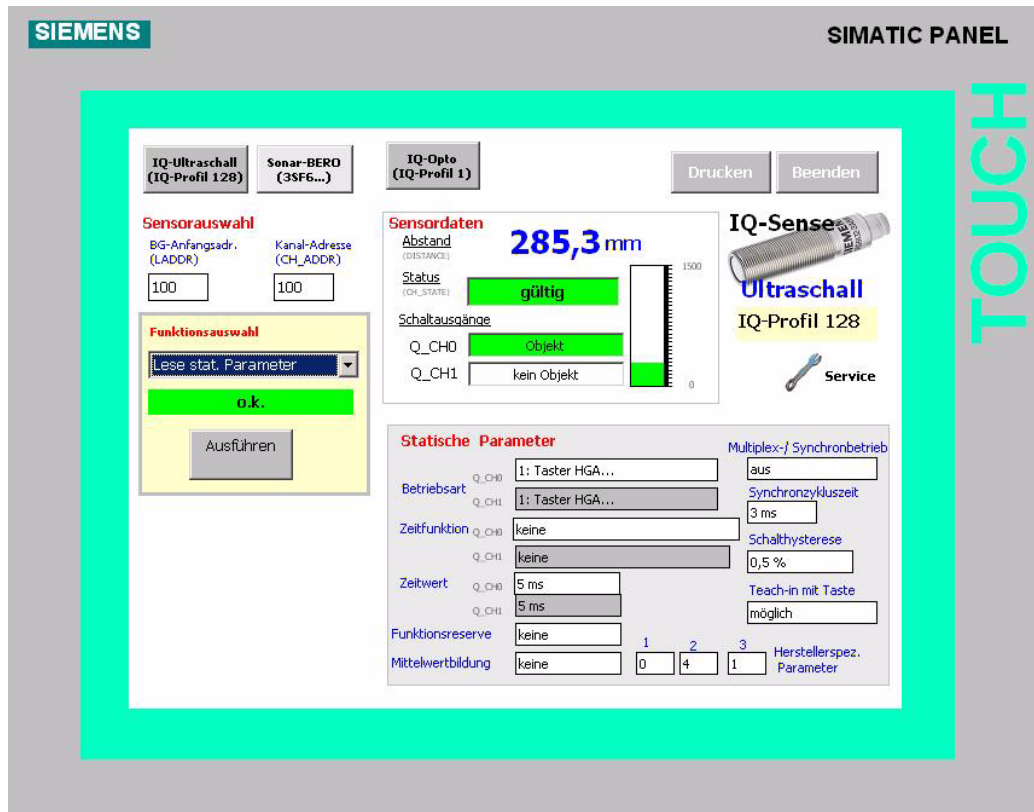


Figure 3 IQ-Sense Ultrasonic IQ profile 128, “Static parameters” screen

Table 4 Static parameters for IQ profile 128 and Sonar-BERO M18 IQ 3SF6...

IQ profile 128	Sonar-BERO M18 IQ 3SF6...
Operating mode Q_CH0 and Q_CH1	Operating mode Q_CH0
Time function Q_CH0 and Q_CH1	Time function Q_CH0
Time value Q_CH0 and Q_CH1	Time value Q_CH0
Functional reserve	–
Formation of mean value	Formation of mean value
Switching hysteresis	Switching hysteresis
Synchronous cycle time	Synchronous cycle time
Multiplex / Sync mode	Multiplex / Sync mode
Teach-in with button	Teach-in with button
Manufacturer-specific parameter 1	Attenuation
Manufacturer-specific parameter 2	Sensor ID
Manufacturer-specific parameter 3	Sensor ID

9 “IQ-Sense Opto” screen

The sample project contains a screen for optoelectronic sensors (IQ profile ID 1):

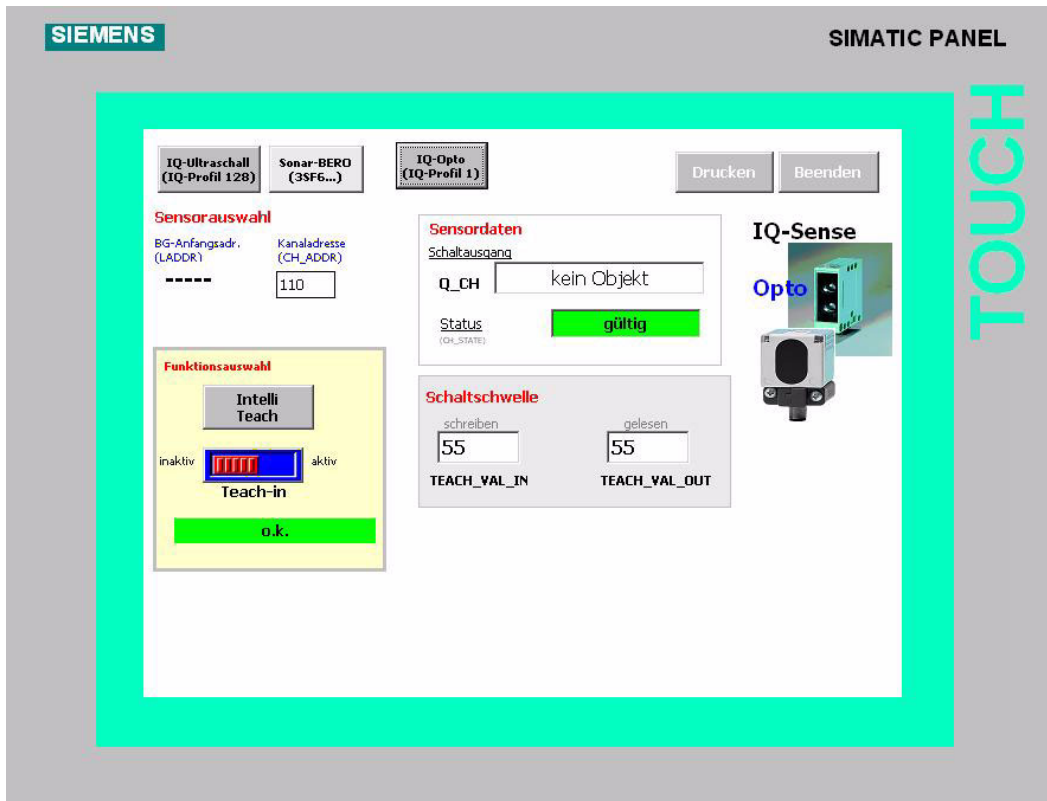


Figure 4 “IQ-Opto” screen

Procedure

1. Select the sensor you want to visualize.
On the “Sensor selection” input box, type in the I/O address of the channel (“Channel address CH_ADDR”).
2. Select the functions you want to run on the selected channel.
Procedures as follows.

Object status logging

The process value is always detected and then provided at the IQ-Sense interface. This basic functionality is also available without “assignment of dynamic parameters.”

“Sensor data”view

This view contains the following boxes:

- Switching output Q_CH:
Specifies whether an object is detected at the selected channel of the 8xIQ Sense module or not.
- Status CH_STATE:
Status information indicating whether the process value is valid or not.

This is a display range. You can not edit these data.

Teach-in

1. On the “Function selection” area, click “Teach-in” to execute the “Teach-in” function.
2. On the “Function selection” area, click “Teach-in” to terminate the “Teach-in” operation.
3. After the Teach-in operation is completed: On the “Switching threshold” area, check the “Read (TEACH_VAL_OUT)” box to view the sensitivity / range value currently used by the sensor.

IntelliTeach

1. In the “Write (TEACH_VAL_IN)” box of the “Switching threshold” area, enter the sensitivity / range value to be applied by the sensor.
2. On the “Function selection” area, click “IntelliTeach” to transfer the sensitivity / range value to be applied to the sensor.
3. Check the “Read (TEACH_VAL_OUT)” box to view the sensitivity / range value currently used by the sensor.

10 "Service" screen

1. Click the button  **Service**.

The service screen appears. This screen is only used to display service information.



Figure 5 "Service" screen

