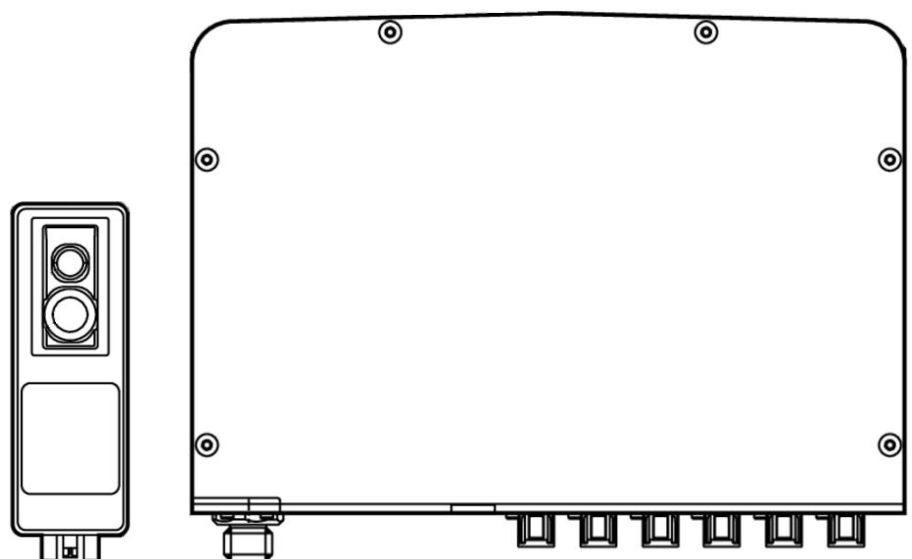




Description
Siemens S7-1500
Function block
OVP8x_TCP_ODS-ProtV1_1

Version 0.1

Obstacle Detection System (ODS)
with protocol version V1.1
via TCP





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1. Preliminary note

The function block *OVP8x_TCP_ODS-ProtV1_1* is intended to simplify data exchange in the user program of an S7 1500 controller via the TCP interface with the PLC server application of a Video Processing Unit (VPU) series OVP8xx from ifm electronic gmbh. The function block was created in SCL using the TIA Portal software V16 in the editing language English (USA).

This document

- describes the function module and its parameters in detail
- describes the use of the function block in the S7 program

The function block is provided as a demo program. It is only intended to serve as an example for the user. Any use of this function block for machine control is at your own risk. The designers and holders of rights of this code package exclude any liability for malfunction or incompatibility of this demo version.

For reasons of copyright this program may only be passed on free of charge.

The function block is not encrypted. Its code can be extended and customised to suit your own requirements.

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1. The software created and used has been put together by ifm especially for the customer using modular software components made by ifm for numerous applications (standard software modules) and adapted to the contractual service required (customer-specific application program).
2. Upon full payment of the purchase price for the customised application program, ifm transfers the non-exclusive right of use to the customer, without the customer acquiring any rights to the standard software module on which the individual or customised adaptation is based. Notwithstanding these provisions, ifm reserves the right to create and offer customised software solutions of the same type for other customers on the basis of other reference conditions. In any case, ifm retains a non-exclusive right to use the customised solution for internal purposes.
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2. System requirements

- Ifm Video Processing Unit (VPU) of the OVP8xx series with PLC server application and Obstacle Detection System (ODS) with protocol version V1.1
- Siemens S7-1500 CPU with firmware V2.6 or higher
- Cycle time of the S7-CPU < 20ms
- Siemens TIA Portal Software V16 or higher



3. Description of the function block

Version

Version V1.0

Intended use

Simplification of the interface in protocol V1.1 of an Obstacle Detection System (ODS) of a Video Processing Unit (VPU) of the OVP8xx series in the user program of the PLC

Overview of functions

- Establishing a TCP connection to the PLC server of the VPU
- Monitoring the connection to the PLC server
- Receiving the ODS result data and displays at the outputs
- Sending the zone sets to be activated

Additional program blocks required

- Siemens system function block TRCV_C
- Siemens system function block TSEND

Function block layout



Figure 1



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Input parameter

Table 1

Name	Data type	Description
<i>LocIF_ID</i>	HW_INTERFACE	Hardware identifier of the Ethernet interface used on the PLC (see chapter 5.3) <ul style="list-style-type: none"> default value 64 and hidden as long as no other value or variable is assigned
<i>LocPortNo</i>	UInt	TCP port number of the CPU for this TCP connection <ul style="list-style-type: none"> 0 = the FB uses <i>LocPortNo</i> = 3000 + <i>RemIPAddr4</i>, otherwise [2000..5000] recommended default value 0 and hidden as long as no other value or variable is assigned
<i>RemIPAddr1..4</i>	USInt	IP address of the Video Processing Unit (VPU)
<i>RemPortNo</i>	UInt	Port no. of the PLC server application of the Video Processing Unit (VPU)
<i>ConnID</i>	CONN_OUC	unique number for internal identification of this connection <ul style="list-style-type: none"> 0 = the FB uses <i>ConnID</i> = 3000 + <i>RemIPAddr4</i>, otherw. [1..4095] applies default value 0 and hidden as long as no other value or variable is assigned
<i>Connect</i>	Bool	<ul style="list-style-type: none"> TRUE establishes a TCP connection to the PLC server of the VPU FALSE terminates the TCP connection to the PLC server of the VPU
<i>PresetID</i>	USInt	ID of the preset to be activated in the ODS



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Output parameter

Table 2

Name	Data type	Description
<i>Connected</i>	Bool	TCP connection to the PLC server of the VPU established
<i>ComErrorCode</i>	Word	Communication error code (see Table 3)
<i>ODS</i>	Struct	ODS results data
<i>ResultAge</i>	USInt	Indicator of the age of the results (incremented with the age of the results data, max value: 255)
<i>Timestamp</i>	LDT	Timestamp of the ODS algorithm when the result is created
<i>ZoneConfigID</i>	UDInt	ID of the zone configuration currently in use
<i>Zone1occ</i>	Bool	Zone 1 occupied
<i>Zone2occ</i>	Bool	Zone 2 occupied
<i>Zone3occ</i>	Bool	Zone 3 occupied
<i>DiagData</i>	Array[0..19] of Struct	Diagnostic data
<i>Source</i>	USInt	Source of the diagnostics
<i>Active</i>	USInt	active
<i>DiagnosticID</i>	UDInt	Diagnostic ID
<i>ActivatePresetSuccess</i>	Bool	Activation of the preset succeeded
<i>ActivatePresetFailed</i>	Bool	Activation of the preset failed

4. Using the function block in the user program

4.1. Integrating the function block into the user program

The *OVP8x_TCP_ODS-ProtV1_1* function block uses the *TRCV_C* version V3.2 and *TSEND* version V4.0 blocks from the integrated *Open user communication* V7.0 library (see Figure 2).

If you use other versions of these Siemens blocks in your project, this can lead to errors when translating the *OVP8x_TCP_ODS-ProtV1_1* function block. To avoid this, set the version of the *Open user communication* library V7.0 in your project before inserting the function block or use a library version that contains the above-mentioned versions of *TRCV_C* and *TSEND*.

Note: The *Instructions* tab is only visible when you open any code block in your program.

Alternatively, you can also edit the function block *OVP8x_TCP_ODS-ProtV1_1* after inserting it and update the declarations and calls of the *TRCV_C* and *TSEND* blocks. Please note that other versions of these modules may behave differently.



Figure 2

- Copy the function block *OVP8x_TCP_ODS-ProtV1_1* into your TIA Portal project.
- Translate the function block.
- Create an instance of the function block *OVP8x_TCP_ODS-ProtV1_1*. If you want to use several ODSs, create a separate instance of the function block in the user program for each ODS.

4.2. Setting the connection parameters

The PLC and the Video Processing Unit (VPU) can only communicate in the network if they are in the same subnet. The most commonly used subnet mask is 255.255.255.0. This means that the first three parts of the IP-address must be the same for all devices in this subnet, and the last part must be different and unique for each device.

- Set the IP-address and the subnet mask in the Video Processing Unit. There are various ways to do this, for example with the help of the VisionAssistant software you can download from www.ifm.com.
- Set the IP-address and the subnet mask of the Ethernet interface of the S7 CPU (see chapter 5.2).



The TCP connection between the PLC and ODS of the VPU is only created and set up in the user program of the PLC. Do not configure this connection in the Devices & networks area of the TIA Portal project.

- Define the end points of the TCP connection between the PLC and ODS. To do this, assign fixed values to the following connection parameters for each instance of the function block. Make sure that multiple instances do not communicate with one ODS.

LocIF_ID

- Enter the hardware ID of the Ethernet interface used on the PLC (see chapter 5.3).

This parameter of the function block is preset with the value 64. This corresponds to the hardware identifier of the first Ethernet interface of most standard CPUs. The parameter is hidden as long as the default setting is not changed. If you are using a different CPU or interface, show the parameter and change the assignment according to your hardware.

LocPortNo

- Enter the TCP port number that the PLC should use internally for the connection to the ODS.



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This parameter of the function block is preset with the value 0. With this setting, the function block calculates the locally used port number from 3000 + the value of the input parameter *RemIPAddr4*. However, the module cannot check whether the calculated local port number is still free.

The parameter is hidden as long as the default setting is not changed. If you want to define the local port yourself, show the parameter and change the assignment according to your selection. For classic CPUs, Siemens has released the local port numbers 2000 to 5000 for use by the user. Enter a port number that has not yet been used.

Tip: When using a classic CPU, set *LocPortNo* = 0 on all instances of the *OVP8x_TCP_ODS-ProtV1_1* function block.

RemIPAddr1 .. RemIPAddr4

- Enter the IP-address of the VPU that is executing the ODS.

RemPortNo

- Enter the TCP port number of the process interface of the ODS.

ConnID

- Assign a unique identification number to the connection. This is used as an internal reference in the S7 station. Please note that connections to other devices can also occupy an ID.

This parameter of the function block is preset with the value 0. With this setting, the function block calculates the identification number from 3000 + the value of the input parameter *RemIPAddr4*. However, the module cannot check whether the calculated identification number is still available.

The parameter is hidden as long as the default setting is not changed. If you want to define the identification number yourself, show the parameter and assign a unique value from the range between 1 and 4095 to the parameter.

Tip: Set *ConnID* = 0 on all instances of the *OVP8x_TCP_ODS-ProtV1_1* function block.

4.3. Calling the instances of the function block in the user program

- Call all instances of the *OVP8x_TCP_ODS-ProtV1_1* function block in the cyclical program once per PLC cycle.

4.4. Controlling the ODS using the function block *OVP8x_TCP_ODS-ProtV1_1*

Establishing the connection to the ODS

- Set the signal at the *Connect* input parameter = TRUE.

The function block

- Establishes a TCP connection with the set connection parameters
- Initialises the data in the outputs of the *DiagDatastructure* once
- Shows TRUE in the *Connected* output if the connection exists
- Indicates communication errors in the *ComErrorCode* output
- Automatically attempts to re-establish the connection in the event of communication errors
- Receives the data sent by the ODS and displays the individual values in the outputs
- Displays the diagnostic data sent by the VPU



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Terminating the connection

- Set the signal at the *Connect* input parameter = FALSE.

The function block

- Terminates the TCP connection
- Shows in the outputs *Connected* = FALSE and *ComErrorCode* = 0x0000
- Displays initial values in the outputs of the *ODS* structure

The values in the outputs of the *DiagData* structure are retained.

Activating a zone set in the ODS

The zone sets are stored in the ODS and labelled with an index.

- Set the index of the zone set you want to activate at the *PresetID* input parameter.

The function block

- Sends the command to activate the specified zone set when the value of the *PresetID* input parameter is changed
- Sends the command to activate the specified zone set each time the connection to the PLC server of the VPU is established
- Repeats the command periodically if it was previously rejected by the PLC server
- Shows in the *ActivatePresetSuccess* output = TRUE if the command was accepted by the PLC server of the VPU
- Shows in the *ActivatePresetFailed* output = TRUE if the command was rejected by the PLC server of the VPU or a communication error occurred during transmission



A positive acknowledgement of the command does not mean that the zone set is already active in the ODS. The configuration used to determine the zone assignment is always displayed in the *ODS.ZoneConfigID* output.



5. Appendix

5.1. Indications in the output parameter *ComErrorCode*

Table 3

<i>ComErrorCode</i>	Description
0x0000	No error
Error codes of the Siemens system function block TRCV_C The complete list of error codes for the function block can be found in the Siemens documentation for the function block. Here is an excerpt of the most common error codes:	
0x8085	the value of the LEN or DATA parameter was changed after the first call
0x8086	parameter <i>ConnID</i> is outside the permissible value range
0x8087	maximum number of connections reached, no further connection possible
0x8091	maximum nesting depth exceeded
0x809B	parameter <i>LocIF_ID</i> does not correspond to the CPU Ethernet interface
0x80A1	<ul style="list-style-type: none"> - connection or port is already in use by the user - the specified connection has not yet been established - the specified connection is being terminated - the interface is being reinitialised
0x80A4	IP address at parameter <i>RemIPAddr</i> invalid or equal to the local IP address
0x80C3	<ul style="list-style-type: none"> - all connection resources are occupied - a block with this ID is already being processed in another priority group
0x80C4	<ul style="list-style-type: none"> - the connection cannot be established - the connection is being established
0x80C5	Connection terminated by the communication partner
0x80C6	The remote partner cannot be reached (network error)
0x80C7	Timeout during execution
0x8922	Parameter data range invalid, range does not exist in DB
0x8932	Parameter data DB number too large
0x8A3A	Parameter data no access to the data area (e.g. DB does not exist)
0x9205	Timeout data reception from ODS
0x9500	Protocol error during data transmission
0x9501	Data does not correspond to ODS protocol version V1.1

Error! Use the Home tab to apply Überschrift 1 to the text that you want to appear here.

5.2. Setting the IP-address of the CPU in the TIA Portal

- Open the device configuration of the S7-station
- Switch to the *device view* and select the CPU.
- Double-click on the Ethernet interface used on the CPU to open the *properties* of the Ethernet interface.
- Open the *General* tab.
- In the *Ethernet addresses* folder, set the IP-address and the subnet mask.

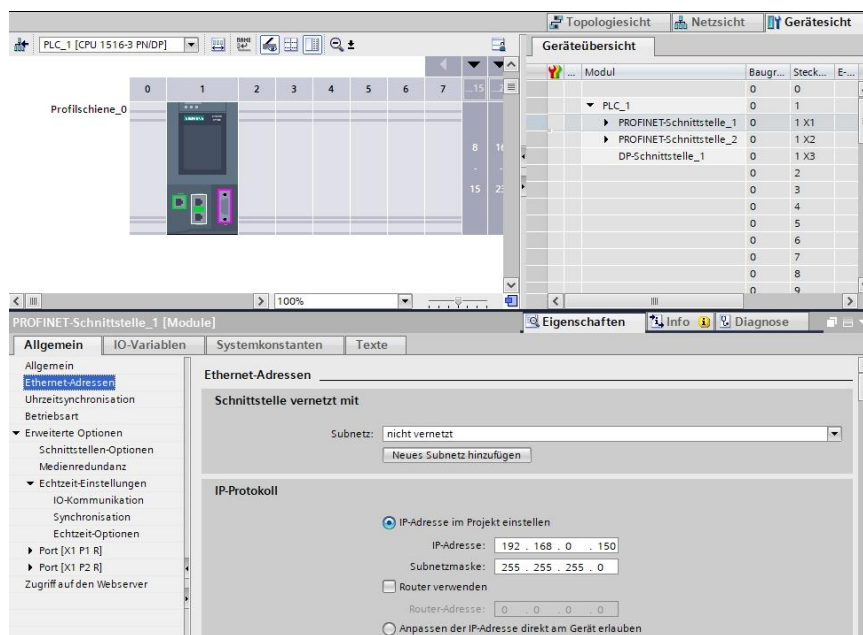


Figure 3

5.3. Display the hardware identifier of the CPU Ethernet interface in the TIA Portal

- Open the *properties* of the Ethernet interface as described in chapter [5.2](#)
- Open the *System constants* tab.

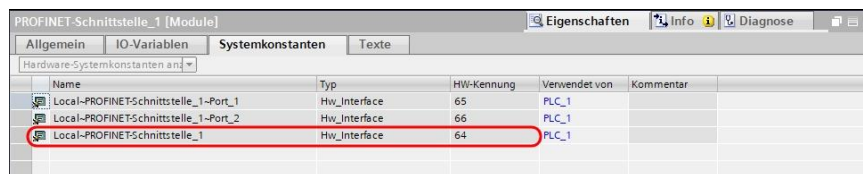


Figure 4

The hardware identifier of the Ethernet interface is displayed here. Specify this identifier on the instance of the OVP8x_TCP_ODS-ProtV1_1 function block at the LocIF_ID input parameter.