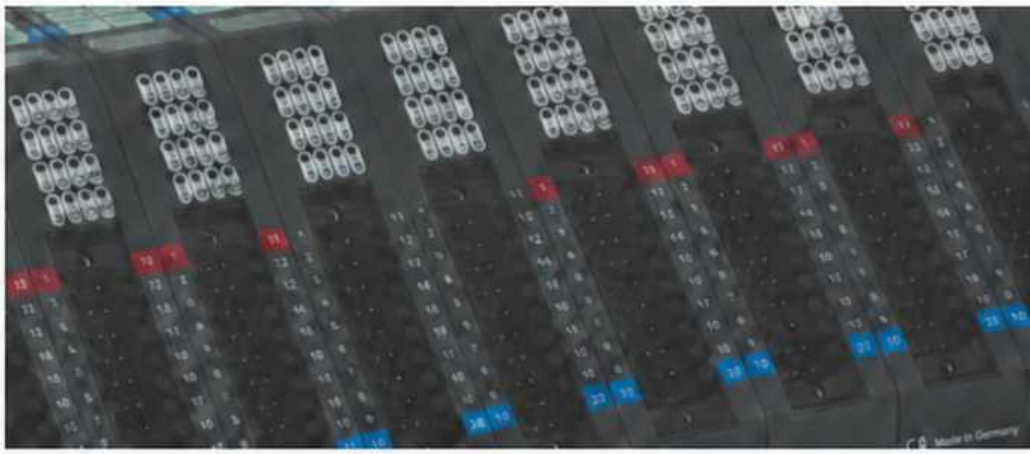
INSEVIS





Manual
S7-IIoT Protocol Converter & Edge-HMI

- S7-Panel PLC
- S7-Compakt PLC
- S7-Panels/HMI
- Peripherals
- Software
- Energy management
- S7-IIoT Protocol Converter & Edge-HMI

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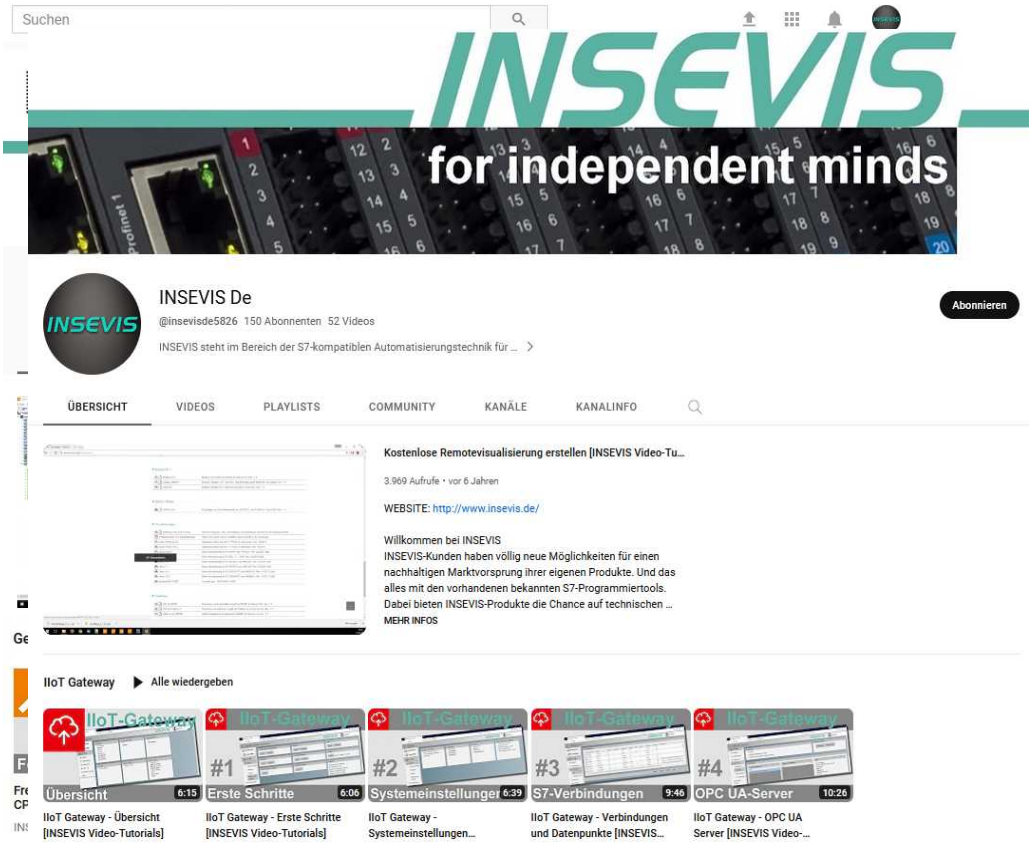
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Hint for better understanding by application videos

In the English YouTube-channel INSEV IS En we supply different playlists with handling videos for single details referring to functions, described in this manual. This will help you to get familiar with INSVEIS much faster – PLEASE use it beside this manual!



General instructions

Safety instructions

This manual contains instructions to avoid material damage and must be carefully attended for your own safety. These instructions are identified with a warning triangle with a note of exclamation inside and a signal word *(Signal word)* below.

Danger	Death, heavy bodily harm or material damage will appear, if appropriated precautions are not taken over.
Warning	Death, heavy bodily harm or material damage will appear, if appropriated precautions are not taken over.
Caution	Bodily harm or material damage will appear, if appropriated precautions are not taken over.
Attention	means, that a not wished results or states can occur, if the appropriated instruction is not noticed.
Important	means the commitment to a special behaviour or operation for the safe treatment of the controller / machine.

Qualified personnel

All devices described in this manual may only be used, built up and operated together with this documentation. Installation, initiation and operation of these devices might only be done by instructed personnel with certified skills, who can prove their ability to install and initiate electrical and mechanical devices, systems and current circuits in a generally accepted and admitted standard.

Operation according to regulations



This device might be only used for this operation written in this manual and only in combination with other certified external devices. For a correct operation a proper transportation, storage, initiation and maintenance is necessary.
All valid safety instructions and regulations for the prevent of industrial accidents are to be attended carefully.
The power supply must be connected to a central ground potential in a star likely wiring.

Maintenance



Modifications / repairs of an INSEVIS device might be done only by special educated and trained personnel of INSEVIS in an ESD safe area. Every unauthorized opening might cause damages and will terminate all warranty claims.

Data security

Each customer is responsible by himself for protecting his IT-environment against illegal external attacks. INSEVIS shall not be held liable for any direct, indirect or consequential damages respect to any claims arising from the possible illegal external access to their PLCs or HMIs by Ethernet. If you are not sure, how to protect your environment ask for help at professional legal IT-companies.

Copyright

This and all other documentation and software, supplied or hosted on INSEVIS web sites to download are copyrighted. Any duplicating of these data in any way without express approval by INSEVIS GmbH is not permitted.
All property and copy rights of theses documentation and software and every copy of it are reserved to INSEVIS GmbH.

Trade Marks

INSEVIS refers that all trade marks of particular companies used in own documentation as e.g.
- STEP®, SIMATIC® and other as reserved trade mark of Siemens AG.
- CANopen® and other as reserved trade mark of CAN in Automation eG
- WINDOWS® and other as reserved trade mark of MICROSOFT AG

and more reserved trade marks are property of the particular owners and are subjected to common protection of trade marks.

Disclaimer

All technical details in this documentation were created by INSEVIS with highest diligence. Anyhow mistakes could not be excluded, so no responsibility is taken by INSEVIS for the complete correctness of this information. This documentation will reviewed regulary and necessary corrections will be done in next version.

With publication of this manual all other versions are no longer valid.

Essential knowledge and experiences

To understand this documentation basic knowledge and experiences of the automation technology in general and the programming with STEP®7 are essential.

About INSEVIS

S7-system components for industrial automation technology

The range of INSEVIS- product families enables an integrated solution and easy to handle for small and medium automation application with latest technology, very high quality level and with additional interfaces like CANopen® and Modbus, to be configured easily.

The easy integration of INSEVIS-products into the S7-world meanwhile is famous and exemplary. Complex communication settings will be assigned easily and intuitively, so that these properties expand the common S7-world by far. A large and multilingual visualization in a modern design is done by a few clicks and the work flow is known by every WinCCflex user. It can be simulated on the visualization PC and is accessible remote.

The S7-CPUs -V and -P are the base of the successfully INSEVIS product families with Profibus DP Master/Slave.
With the new S7-CPU-T Panel-PLCs and Compact-PLCs are available with Profinet IO Controller.

Step®7-Programmability

INSEVIS-S7-CPUs are programmable by STEP 7® - AWL, KOP, FUP, S7-SCL, S7-Graph from Siemens and in general command-compatible to Siemens-CPU S7-315-2PNDP. Some special INSEVIS blocks expand the functionality and allow outstanding solutions. The S7-programming will be done by good known tools SIMATIC®-Manager or by TIA-Portal® from Siemens always.

Independence

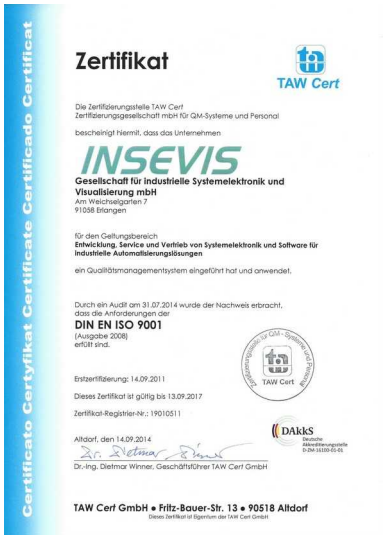
INSEVIS-products does not base on Windows or Linux, they have an own firmware. Thereby the hard- and software can be exactly designed for a perfect co-ordination with this firmware and a low power consumption. Booting times of less than 4 seconds and completely no software licenses and a current drain of <100mA @ 24V are the result of these facts.

Get your software rid of licenses

INSEVIS stands for a clear and honest license policy, what gives the customer sustainable cost benefits. Because of the ownership of BIOS, firmware and PC-software for visualization, configuration and remote access INSEVIS can offer its products completely without licenses.

Made in Germany

Development, PCB-design and -production, test and mounting of all INSEVIS-products - all this is made in Germany. So every product is a proof for the combination of German engineering and economy and is available with a certification of German origin.


Certificato Certyfikat Certificate Certificado Certificat

Zertifikat

TAW Cert

Die Zertifizierungsstelle TAW Cert
Zertifizierungsgesellschaft mbH für QM-Systeme und Personal

bescheinigt hiermit, dass das Unternehmen

INSEVIS
Gesellschaft für industrielle Systemelektronik und Visualisierung mbH
Am Weichselgarten 7
91058 Erlangen

für den Geltungsbereich
Entwicklung, Service und Vertrieb von Systemelektronik und Software für industrielle Automatisierungslösungen

ein Qualitätsmanagementsystem eingeführt hat und anwendet.

Durch ein Audit am 31.07.2014 wurde der Nachweis erbracht, dass die Anforderungen der
DIN EN ISO 9001
(Ausgabe 2008)
erfüllt sind.

Erstzertifizierung: 14.09.2011

Dieses Zertifikat ist gültig bis 13.09.2017

Zertifikat-Registrier-Nr.: 19010511

DAkkS

Altdorf, den 14.09.2014

Dr.-Ing. Dietmar Winner, Geschäftsführer TAW Cert GmbH

TAW Cert GmbH • Fritz-Bauer-Str. 13 • 90518 Altdorf

INSEVIS operates a yearly certified quality management system ref. to DIN EN ISO 9001.

All suppliers of INSEVIS obligate to this quality management and contribute to the high quality level of INSEVIS-products.

Already during planning these families one goal was indicated as most important: to design highest quality and ergonomics into all products.

These products were put into comprehensive validation tests before they were produced in selected and certified production lines.

INSEVIS - Made in Germany

Product family S7-IIoT Protocol Converters

INSEVIS-S7-IIoT-Protocol Converter – compatible but independent up to the cloud



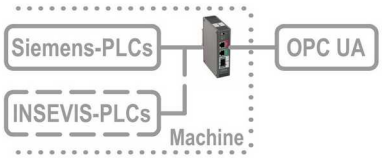
INSEVIS is known for independent and sustainable solutions in the S7-world. With the IIoT-Protocol Converters these experience should be broadened to the „Industrial Internet of Things“ or „Industry 4.0“. The large know-how for S7-technology, combined with most modern security-, communication- and operation philosophy allow optimal combination of S7-solutions with the big-data-world on one side and, secure connections between S7-islands completely without a portal or a cloud.

Referring to the „Reference architecture model Industry 4.0 – RAMI4.0“ INSEVIS supplies all configuration shells onboard, so that a single browser is enough to assign and configure all the settings. But not for anyone, because a sophisticated user management cares for a considerably protection and allows released connections only. External access is possible by openVPN in a safe way. An internal project and version management guarantees a better overview.

With huge projections by the implemented „NodeRed“ you can let you imagination run; create tweeds, emails or convert text to speech and get it read to you by an artificial voice. The integrated project- and version management cares for a better overview or backups of previous versions.

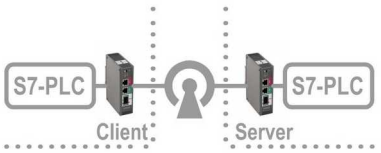
Fields of application

Add S7-controllers by OPC UA-interface to I4.0



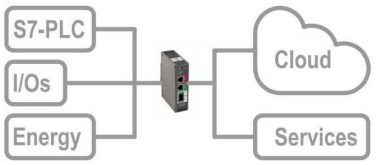
Secure integrating of the S7- Welt by OPC UA to MES, HMI, SCADA ref. to RAMI4.0 (administration shell)

Secure connection of PLC-islands without Cloud/Portal



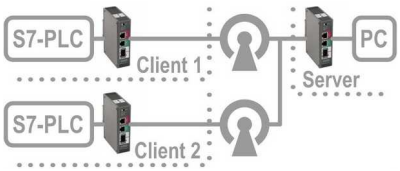
By Site-To-Site-open-VPN directly and secure client/server connection of two S7-islands without need of a clouds or portal

Data acquisition, -processing and -forwarding by IIoT



Data acquisition in S7- and field-layer and transfer by OPC UA or MQTT into cloud or by FTP, email, Twitter, etc.

Secure remote maintenance of multiple systems



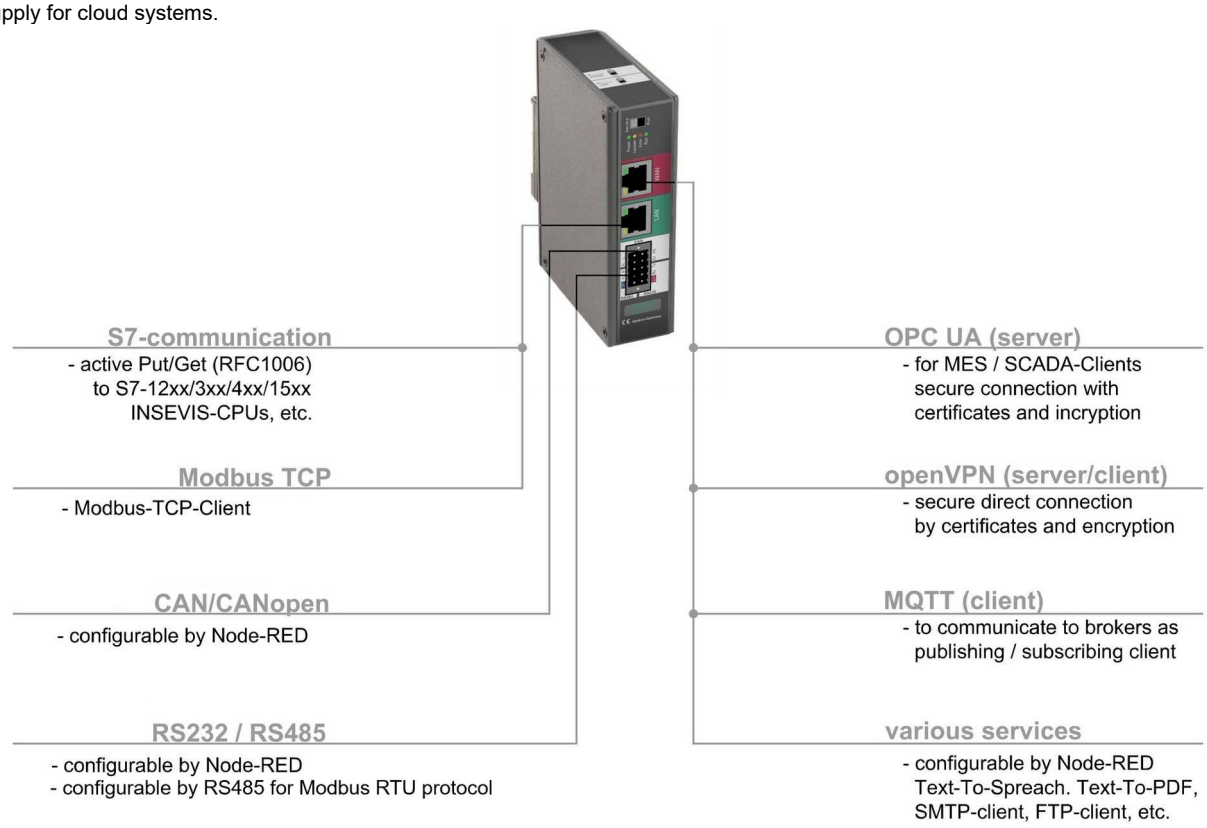
Secure remote maintenance of multiple S7-islands by openVPN from a central station

Product family S7-IIoT Protocol Converters

Communication in LAN and WAN

The S7-IIoT-Protocol Converter communicates to control- and field-level by Ethernet RFC1006 (S7-communication, active Put/Get) and Modbus-TCP.
Other interfaces like CAN/ CANopen, RS485 and RS232 may be configured by Node-RED.

At the WAN-side a firewall protects the device against unauthorized communication attempts. The IIoT-Protocol Converter offers OPC UA-server functionality for data exchange with SCADA-, MES- or other management systems. The MQTT-client functionality allows the process data supply for cloud systems.



Most important properties at a glance

S7-variables import and register mapping

Import S7-variables from Simatic-Manager or TIA-Portal including symbols and supply it as data point.
Map Modbus registers to OPC UA-data points.

Web-Configuration

One onboard-configuration tool saves all external PC-tools
Secure access control by integrated user-management, comprehensive backup-, restore- and update functionalities

LAN @Node-RED: CAN, RS485 and RS232

Activated by Node-RED: Easy data exchange by additional protocols to communicate to different kinds of field devices like energy meters, decentral I/Os, FCs, etc.

LAN: S7-Ethernet and Modbus-TCP

Communicate by RFC1006 (S7-communication, active Put/Get) easily and with all Siemens-S7-CPUs
Integrate energy meters into your system by Modbus-TCP.

openVPN: secure S7-communication

Setup of openVPN-connections including certificate-management by onboard-configuration to connect 2 S7-islands completely without portal or cloud. Or as simple secure remote maintenance.

MQTT: onboard configuration

Data handling with MQTT-brokers as (pubishing or subscribing) client.

Services @ NodeRED: Create own value

Use imported data points in available Node-RED-nodes to multiple different services and create a unique selling proposition and added value

Dashboard @ NodeRED: web visualization for free

Visualize imported data points in available Node-RED-nodes as dashboard and provide it as free web visualization

Create WebVisu from the VisuStage

Create a visualisation that runs in the browser from the existing visualisation with just a few mouse clicks. No HTML or Java Script skills required.

RS485: Modbus RTU

For connecting serial Modbus RTU fieldbus components

Product family S7-IIoT Protocol Converters

Technical data

S7-IIoT-Protocol Converter for 35mm DIN-rail

Standard configuration:

RS232
(for Node-RED-projects)

RS485
(for Modbus-RTU or Node-RED-projects)
- with switchable teminate resistors for RS485

CAN
- with switchable teminate resistors)

Ethernet with
- RFC1006 (S7-communication, Send/ Receive (active)
- Modbus-TCP

Switch
for operation mode

State LEDs for
Power, Update, Error, Run

Inserting stripes
(for Logo and identification)
- thereby customized adaption possible easy

Scope of delivery:
- Grounding terminal
- Technical data sheet

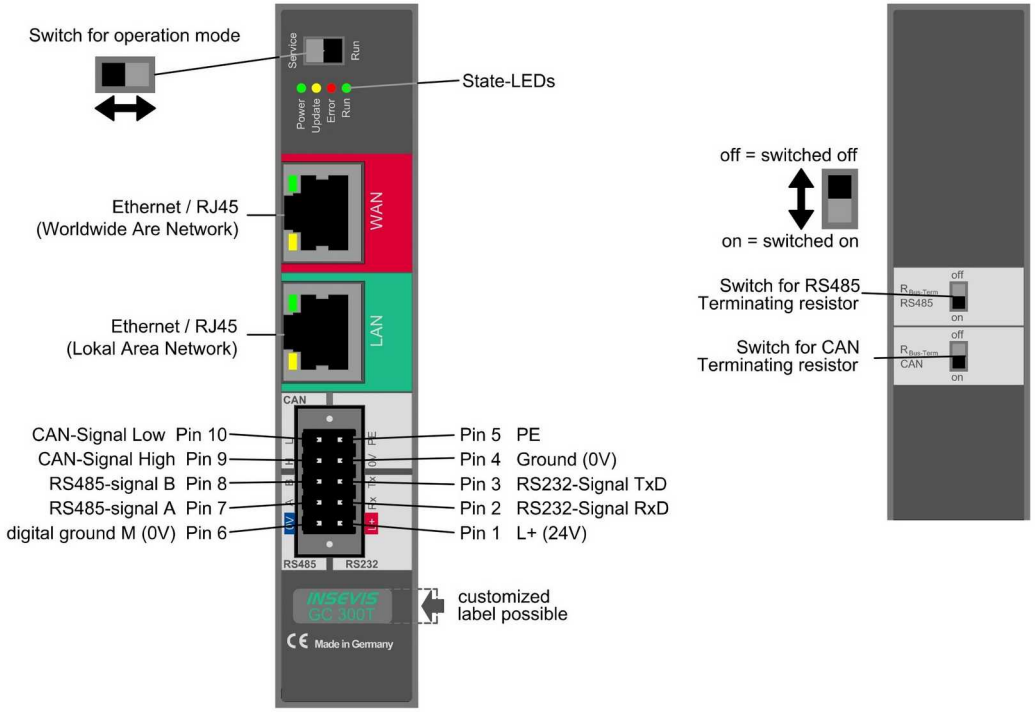


Image: view of GC300T

Technical data

Technical data	
Dimensions W x H x D (mm) Cut out W x H (mm) Protection class Weight	28 x 116 x 84 35mm DIN rail IP41 ca. 350g
Operating temperature range Storage temperature range	-20°C ... +60°C (without condensation) -30°C ... +80°C
Connection technology	removable connector with 2 bolt flanges aside (cage clamp technology) for cross section up to max. 1,5mm^2
Load voltage L+	24V DC (11 V ... 30V DC)
Start-up current	< 3A

Product family S7-IIoT Protocol Converters

Technical data

Technical data	CPU
CPU-type	**Typ T** (GC300**T**)
Working memory	256 MByte
internal memory	4 GByte, thereof ca. 1 GByte for user data (visualizations, etc)
Programming languages Programming system	JavaScript Node-RED
Serial interfaces (protocols)	COM1: RS 232 (via Node-RED) COM2: RS 485 (via Node-RED or Modbus RTU)
Ethernet (protocols)	ETHERNET: 10/100 MBit S7-communication (active put/get), Modbus-TCP (more by Node-RED)
OPC UA Server SecurityPolicy	Predefined namespace,compatible to S7-1500 + max. 100 user-variables alternatively user defined namespace with external modeler (via binary data export) optionally OPC UA DI able to provide datapoints from all other interfaces including history history configurable in sample time and number of samples subscriptions: max. 8 monitored items per subscription: max. 200 monitored items total: max. 500 none / Basic 256 Sha 256 sign / Basic 256 Sha 256 sign & encrypt (can be enabled and disabled separately)
MQTT	Client (subscriber / publisher)
Node-RED	performance limit approx. 50 variables actualise cyclic data points from all other interfaces
CAN (protocols)	Baudrate 10 kBaud ... 1 MBaud – via Node-RED
Data security	open source packages OpenSSH and OpenVPN

Important information on the transmission direction of up- and down-load processes:

Starting from the PC the IIoT-Protocol Converter is situated in the internet, so the data will be

- send there by **UPLOAD** from the PC and
- received from there by **DOWNLOAD** into the PC.



Starting from PC the HMI / PLC are situated in the control- or field layer; so the data will be

- send there by **DOWNLOAD** from the PC and
- received from there by **UPLOAD** into the PC.

Commissioning

The IIoT-Protocol Converter is shipped with LAN-address 192.168.80.60. If the own net differs from it, act as follows:



- Connect LAN-interface of the IIoT-Protocol Converter (Do not mix it with the WAN-interface) with the LAN- interface of your computer.
- Assign your PC an IP-address in the subnet of the IIoT-Protocol Converter (for example 192.168.80.65).
- For the first configuration of the IIoT-Protocol Converter open a compatible browser (see technical data sheet) in your computer. and enter the IP-address of the IIoT-Protocol Converter
- If the browser informs about a security risk, add an exceptional rule.

The login credentials for the first login are

Name	admin
Password	admin



ATTENTION:

The Admin-password must be changed for security reasons immediately after first login!

Change now the IP-address of the IIoT-Protocol Converter as written below:

- Navigate to : **System / Network** and
- insert at **LAN Address** a new IP-address, which fits into your local net.
- By **Save to device** (lower right) the new settings will be applied.

Restore IP-address

It is easy to detect a forgotten IP-address:

- Switch from run → service mode to
- restart by power OFF/ON (boots 1-2min).
- in service mode the LAN IP address of the IIoT Protocol Converter is always 192.168.80.60
- on the default address 192.168.80.60 that mask (below) appears.
  If not → clear the browser cache or reload the page in your browser!
- Left at “Network” is displayed the assigned LAN-address (here: 192.168.80.60),
- than switch service → run mode,
- restart by power OFF/ON or press the button right in „Restart Protocol Converter“ (boots 1-2min),
- insert right IP-address in your browser and ready!

Restore password

If the admin - password has been lost, a reset of the device with all data is necessary.
To be able to enter a “super-password” now and all will be fine, this IIoT-Protocol Converter would have a “backdoor”.
→ **But it hasn't.**

- boot device in service mode
- Press button “Restore” in „Restore factory settings“ field.
- All will be reset and user data will be deleted completely.
- The IIoT-Protocol Converter is now empty and available at 192.168.80.60 with login „admin“ and password „admin“.

Update firmware

Hint: Create a backup before start to update the firmware!
In general, however, all settings - unless it is a new or modified function - are retained.

Firmware update via network:

Requirement:

- Internet connection via WAN-port and DHCP-server
  During the update, the WAN port is reconfigured via DHCP (!) regardless of any settings made before.

The "Changelog" button can be used to request release information from the server at any time

Update in **service-mode** :
In Service Mode, the WAN port is temporarily switched to DHCP, regardless of the settings in Run Mode.
This allows to check

- in the browser with **"Check for updates"**

whether the INSEVIS update server is accessible and which version is kept there.
If the update server cannot be reached, the update process should NOT be started either, because the IIoT Protocol Converter will then never again be accessible via the web interface.

Start the update:

- in the browser at **“Update Firmware”**

update in **run-mode**
If an update is to take place without physical access to the device, the update can and must be started in run mode.
It must be ensured, however, that the IIoT Protocol Converter gets Internet access via DHCP over the WAN port mentioned above - regardless of current WAN Port settings.
Even in run mode, the INSEVIS update server can be checked for new versions:

- in the browser at „System“ - „Backup and Update“ - and „**Check for updates“**

However, the current WAN settings are used (valid settings assumed). This does not tell us whether the update server can be found in update mode.

Start the update:

- in the browser at "System” - „Backup and Update“ - **„Update Firmware via Internet“**

update procedure:

- The IIoT Protocol Converter is thus set to firmware update mode and boots a standard configuration with DHCP on the WAN port and loads the firmware via it (i.e. the settings under System - Network are irrelevant)
- The yellow LED flashes for ~5..10 min about 50x in irregular speed.
  (Devices delivered from Sept. 2020 on additionally flash green with ~ 1 Hz)
- When the update is completed the IIoT Protocol Converter will boot back into run or service mode, depending on the switch position.
  i.e. RUN = green LED permanently on / SRV = yellow LED permanently on



ATTENTION:

If the WAN network also randomly operates in the address range 192.168.80.0, the LAN and WAN port of the IIoT Protocol Converter must be connected to the network.

Firmware update from file:

Prerequisite:

- The appropriate firmware file for the device is required; this can be downloaded from the download area of the INSEVIS website.
- Perform update in run mode

Start the update:

- in the browser under "System" - "Backup and Update" - select "**Update Firmware from File**"

Update procedure:

- After selecting the file, it is transferred to the device; this process takes approx. 3 minutes.
  This process can be cancelled by pressing the "Reload button" of the browser.
- The IIoT Protocol Converter is then set to firmware update mode and boots a standard configuration and installs the firmware
- The yellow LED flashes about 50 times at irregular intervals for ~15 minutes.
  (Devices delivered from Sept. 2020 also flash green at ~ 1 Hz)
- When the update is complete, the IIoT Protocol Converter boots back into run or service mode, depending on the switch setting.
  i.e. RUN = green LED permanently on / SRV = yellow LED permanently on



ATTENTION:

If an error occurs during the update process, i.e. the device no longer starts, the device goes into automatic update mode via the network. The firmware is then loaded and installed by connecting to a DHCP network connected to the Internet at the WAN port.

Example project

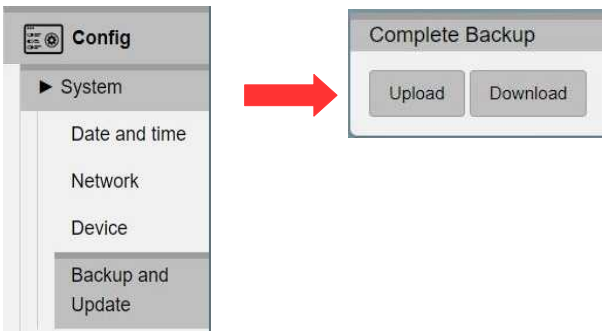
VIDEO-Tutorial available
For this example you find a link to a instructional YouTube® video in the download section of Insevis.com

The variables in the demo project correspond to the variables in the demo visualisations for the Insevis HMIs, Panel-PLCs and Remote visualizations.
We recommend to keep a device with such a demo visualisation, or at least a PLC with PUT/GET enabled, in the same LAN network as the IIoT-Protocol Converter

You can download the demo-project at www.insevis.com/downloads under the section **Protocol Converter.**

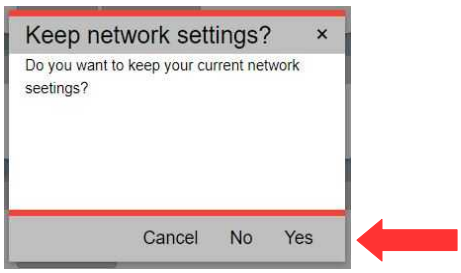
After the download has finished you can log in and navigate to **System / Backup and Update**.

This section is only accessible as the user admin. Now press the button **Upload** in the tile **Complete Backup** to upload the demo project.



In the popup dialog you can choose to keep your network settings.

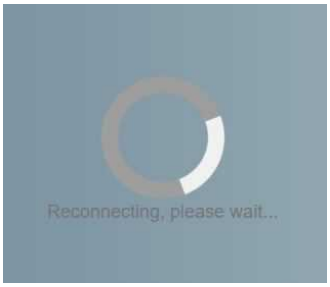
The demo project comes with the LAN IP 192.168.80.60. If this differs from your settings choose Yes



Now navigate to the demo project and confirm.

The project is now being processed and the IIoT-Protocol Converter will restart itself.

This may take 1-2 minutes.



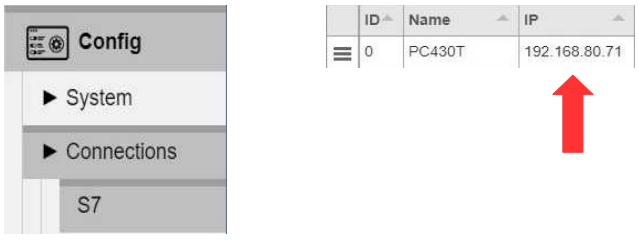
After the restart has finished you can login with the standard credentials (admin : admin).

You will find now a pre-configuration including connections and data points.



First check if the IP address of the defined connection corresponds to the address of the PLC in your network. If it differs from the configuration change the settings of the PLC or the settings in the IIoT-Protocol Converter.

To adjust the IIoT-Protocol Converter navigate to **Connections / S7** and alter the address in the ip column in the table.
Save your changes with Save to device (bottom right)



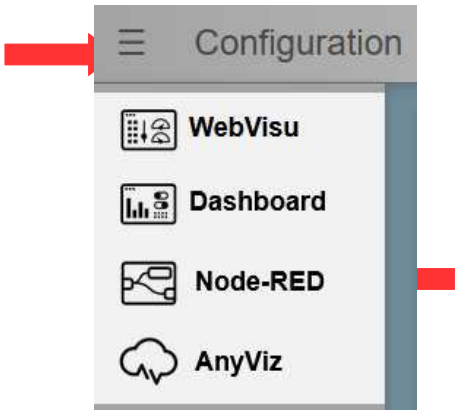
The IIoT-Protocol Converter is now able to get data from the PLC and pass them on to Node-RED, MQTT and OPC UA .

Example project

Dashboard-Visualisation

An Example for the Node-RED dashboard is also included an is already being executed.

To access the dashboard open the sidebar menue (the three horizontal bars) and select **Dashboard**



The dashboard will open in a new tab.

The structure of the dasboard corresponds to the deomo visualisations for the Insevis HMIs and Panel-PLCs.



Example project

OPC UA-Server

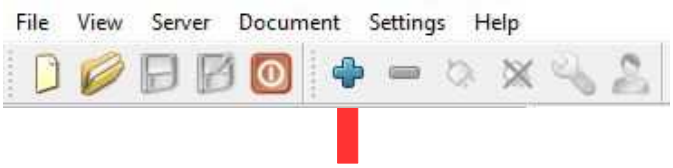
The OPC UA server is also already accessible with a corresponding client. We demonstrate this here by the example of **UA-Expert**.

You will find the program at www.unified-automation.com. Instructions on how to download the software are provided on the website.

When you open UA-Expert for the first time you have to create a client certificate. To do so follow the instructions and fill out all requested fields.

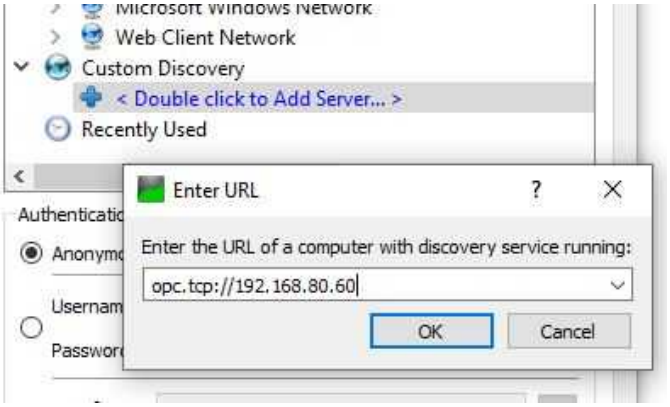


To connect to the OPC UA server on the IIoT-Protocol Converter add the server with a click on the **+** Symbol



Choose in the popup menue

Custom Discovery / + < Double click to Add Server... >.



Now enter the IP address of the IIoT-Protocol Converter

opc.tcp://192.168.80.60

and submit it.
The server is now added to the list below.

Open the server with the **>** symbol
and the underlying entry aswell.



Now choose the encryption.

Select here: **Basic256Sha256 - Sign & Encrypt (uatcp-uasc-uabinary).**

Example project

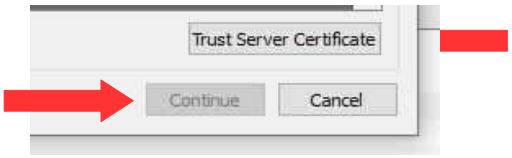
OPC UA-Server

The server has now been added to the project tree on the left side.
To connect to the server select it and choose from the menue bar **Server / Connect**.



In the following popup you are beeing warned that the certificate from the server is not trustworthy.

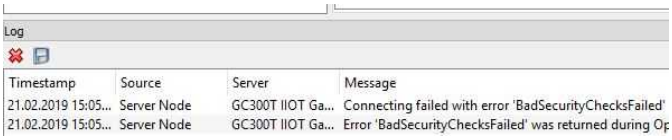
Select **Trust Server Certificate** and **Continue** after that.



In the log output at the bottom window a new error message will show up:

Connecting failed with error 'BadSecurityChecksFailed'.

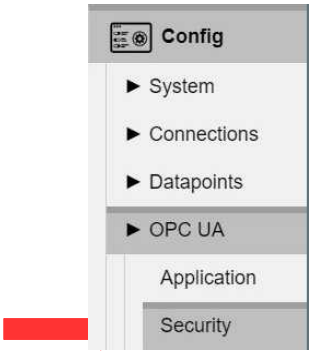
This means the server has rejected the client certificate



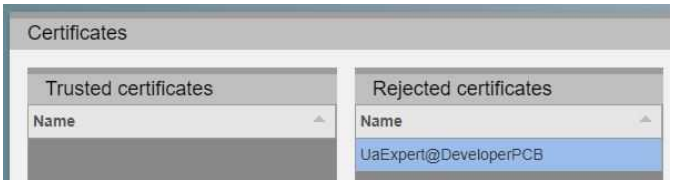
Example project

OPC UA-Server

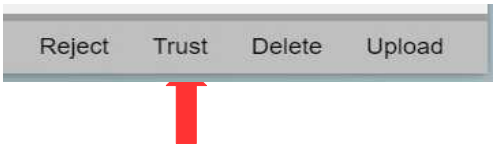
To trust the client certificate navigate in the web config to **OPC UA / Security.**



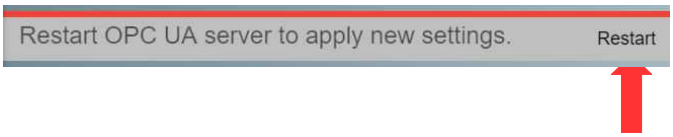
Under **Certificates** in the list **Rejected certificates** the certificate of the client is listed.



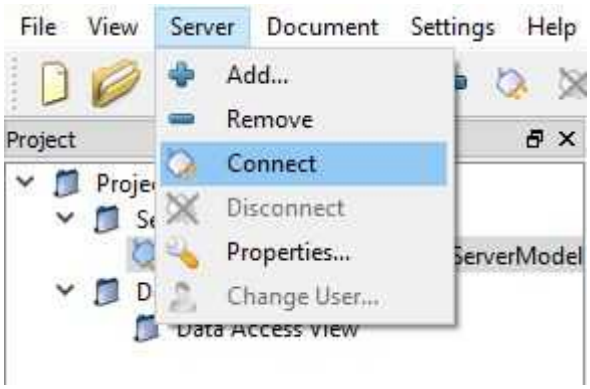
Select now the certificate and trust it with the **Trust** button in the function bar below. Save your changes with **Save settings to device** (bottom right)



Now restart the OPC UA server to apply your changes. To do so select **Restart** in the red popup at the top.



Back in UA Expert try to connect again to the server (menu bar **Server / Connect**)



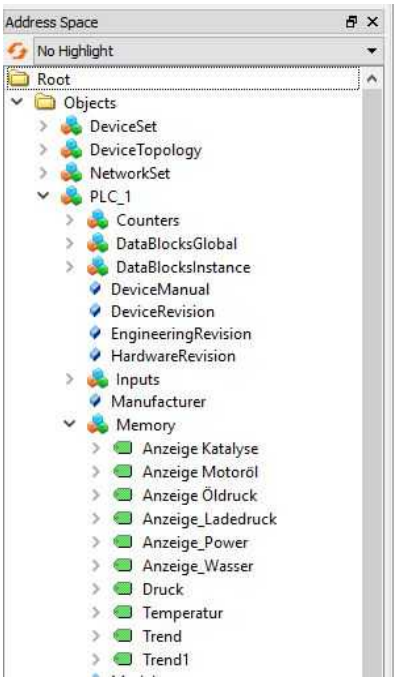
Example project

OPC UA Server

UA Expert is now connected to the server.

In the bottom left window below the project tree you can see the namespace of the server.

At **Root / Objects / PLC_1 / Memory** are all variables listed which are configured for this example.



To read the variables just drag and drop them to the middle section where they can be observed and controlled.

Data Access View

#	Server	Node Id	Display Name	Value	Datatype	ource Timestamp	Server Timestamp	Statuscode
1	GC300T IIOT Ga...	NS3|String|Anze...	Anzeige Katalyse	28	Int16	15:53:26.632	15:53:26.632	Good
2	GC300T IIOT Ga...	NS3|String|Anze...	Anzeige Motoröl	73	Int16	15:53:26.731	15:53:26.731	Good
3	GC300T IIOT Ga...	NS3|String|Anze...	Anzeige Öldruck	58	Int16	15:53:26.841	15:53:26.841	Good
4	GC300T IIOT Ga...	NS3|String|Anze...	Anzeige_Ladedruck	40	Int16	15:53:26.939	15:53:26.939	Good
5	GC300T IIOT Ga...	NS3|String|Anze...	Anzeige_Power	32	Int16	15:53:27.053	15:53:27.053	Good
6	GC300T IIOT Ga...	NS3|String|Anze...	Anzeige_Wasser	61	Int16	15:53:27.161	15:53:27.161	Good
7	GC300T IIOT Ga...	NS3|String|Druck	Druck	0	Int16	15:53:27.261	15:53:27.261	Good
8	GC300T IIOT Ga...	NS3|String|Tem...	Temperatur	0	Int32	15:53:27.372	15:53:27.372	Good
9	GC300T IIOT Ga...	NS3|String|Trend	Trend	65	Int16	15:55:22.836	15:55:22.836	Good
10	GC300T IIOT Ga...	NS3|String|Trend1	Trend1	353	Int16	15:55:22.842	15:55:22.842	Good

System settings

Date and time

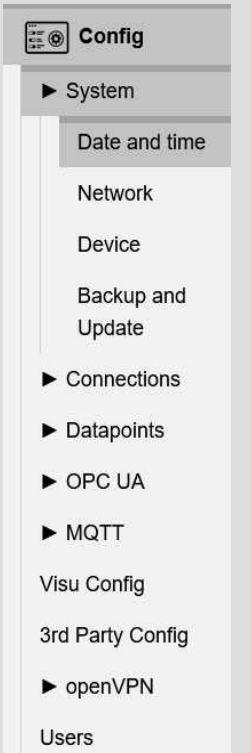
VIDEO-Tutorial available
For this menue you find a link to a instructional YouTube® video in the download section of Insevis.com

In this menue you can adjust the date and time for the IIoT-Protocol Converter. These settings are persistent to restarts and power loss and are beeing updated by the included real time clock.

Warnung

Caution:

If the IIoT-Protocol Converter has a established internet connection date and time are beeing set automatically and manual input will be ignored.



Set the system time hours:minutes:seconds



Set the system time hours:minutes:seconds



Set the time zone.
Open the list of available time zones with the arrow v and search for your time zone in the search bar



Write the PCs time and date to the IIoT-Protocol Converter.



Network

VIDEO-Tutorial available
For this menue you find a link to a instructional YouTube® video in the download section of Insevis.comr.

Under Network you can access the network settings for the device. Applying these settings can take a few seconds and are only possible if all inputs are correct.



The name server is required for all URLs that are not (numerical) IP addresses. As a rule, the Internet router is also the name server.	
This address is used to communicate with all devices that are neither in the LAN nor in the WAN network. (= connection to the Internet) Usually the Internet router	
If there is no Internet connection, a local NTP server is useful Without input, the Debian NTP pool is used.	
WAN connection address, with which the device communicates "to the outside".	
WAN connection netmask, suitable for the WAN subnet default: 255.255.255.0	
Dynamic Host Configuration Protocol, by switching on the client automatically receives its network configuration.	
LAN connection address, with which the device communicates in the internal network (This Config interface is only available in the LAN network.)	
LAN connection netmask, suitable for the LAN subnet default: 255.255.255.0	

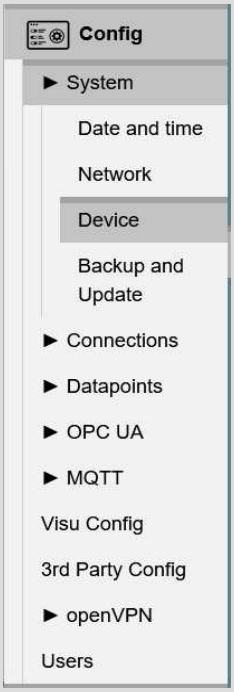


Tricky:
When the IoT Protocol Converter sends data, the LAN or WAN address and the destination address are logically ANDed with the respective MASK. If the result is identical, the data is sent to the respective LAN or WAN port.
Otherwise, the data is forwarded to the set Protocol Converter.
This definition of mutually exclusive IP address ranges separates the WAN and LAN.
The LAN and WAN addresses MUST differ within the defined masks.
Otherwise, no assignment is possible and all data is sent via the LAN connection.

Device

VIDEO tutorial available
For this example, a link to a corresponding video on YouTube® is available on the INSEVIS download pages. video available on YouTube®.

Im Menüpunkt Device werden Geräteeinstellungen vorgenommen.

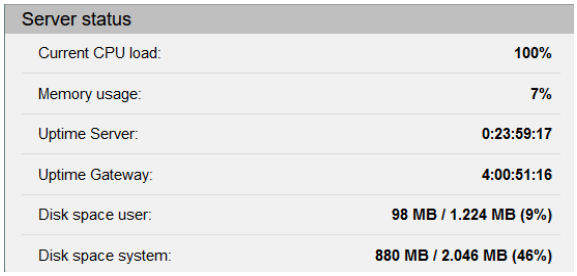


The system-internal device name may be passed on to the name server with DHCP.

The device domain is part of the of the device FQN and is stored in certificates and name servers.
default: local



Displays the server status.
For a firmware update of a file, approx. 350 MB must be free in both disc spaces.



Restart Protocol Converter restarts the entire device and corresponds to a power off/on
Restart Server only restarts the web server software.
With both actions, the user is logged out of the Config interface.



Admin passwords
The admin name cannot be changed.
(The default password is admin and **should be changed immediately**)



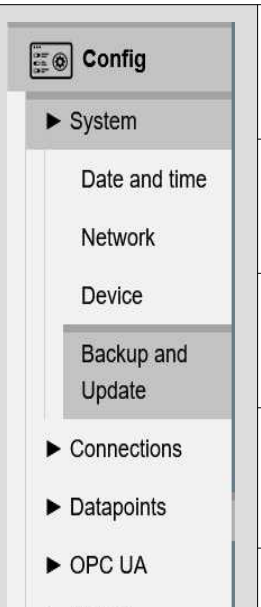
Backup & Update

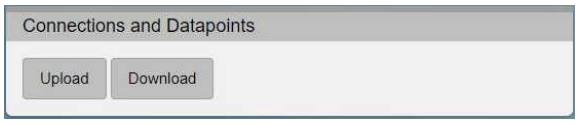
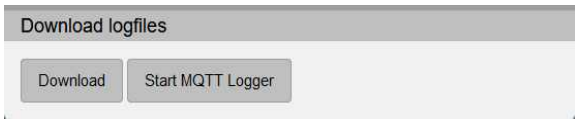
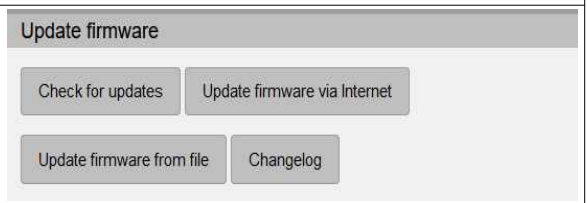
VIDEO tutorial available
For this example, a link to a corresponding video on YouTube® is available on the INSEVIS download pages.
video available on YouTube®.

The Backup & Update menu item is used to archive and restore the IIoT Protocol Converter.

ATTENTION:

Uploading files overwrites the current settings.
When **uploading** a complete backup, settings that do not exist in the backup are not deleted.
A restore factory settings is recommended beforehand for a clear recovery.



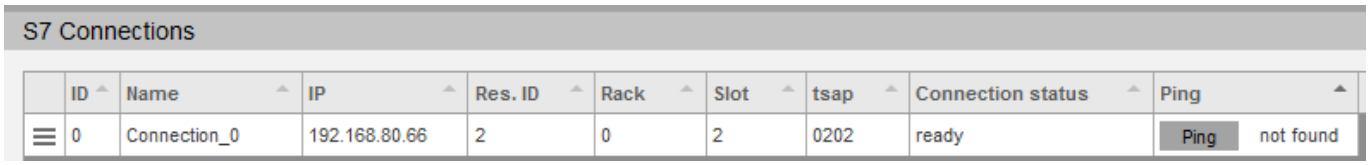
All connections and data points and their OPC UA and history settings	
All settings of the Config interface except connections, data points, users, admin, certificates and Node-RED projects.	
All users created under **Users**	
Contains the settings for the superuser (admin)	
Complete backup with all settings. Including connections, data points, users, admin, certificates and Node-RED projects.	
Complete deletion of all settings and configurations (The default LAN address is 192.168.80.60)	
Download the log files for analysis in the event of an error ,The MQTT logger can also record the internal communication for extended analysis	
see chapter "Firmware update"	
Displays the versions of the individual software components	

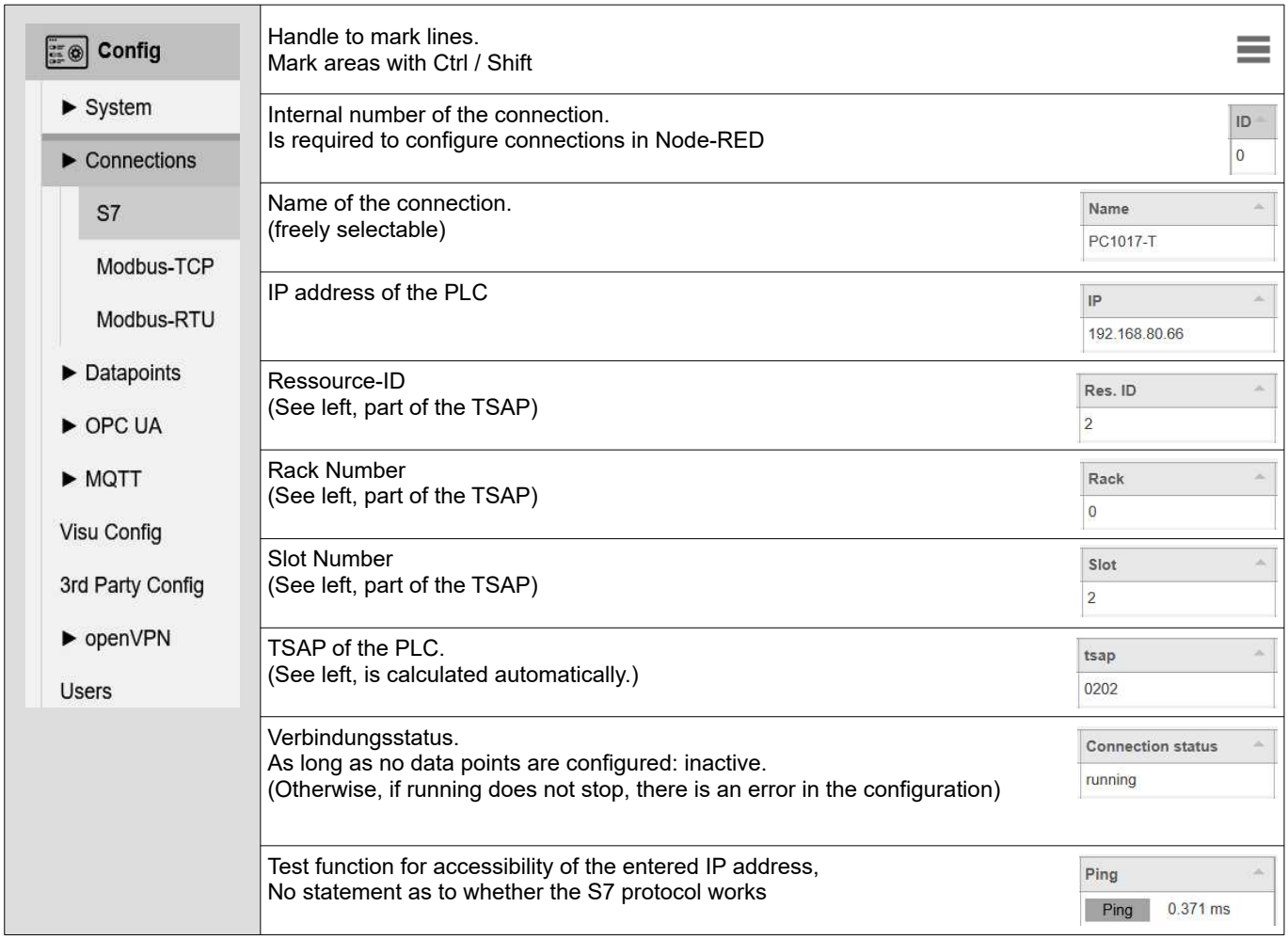
Connections

S7-Connections

VIDEO tutorial available
For this example, a link to a corresponding video on YouTube® is available on the INSEVIS download pages.

The connections between the IIoT Protocol Converter and S7 PLCs are managed in the S7 menu item.





Note 1:
The TSAP is formed from the rack no. and slot no. of the CPU as well as the connection resource number 00...FF(hex).
→ For Siemens CPUs 300/ 400 this is **02, 0, 2** by default,
→ for Siemens CPUs 1200/1500 this is **0, 1, 02** by default

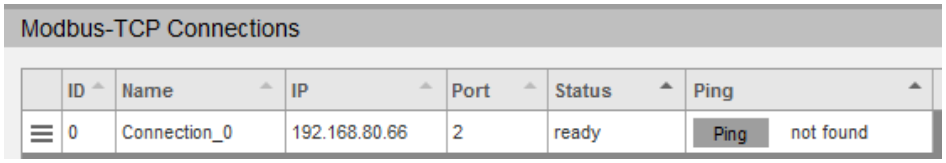
Hinweis 2:
For connections with the Siemens CPUs 1200/1500, the following must be activated in the TIA Portal
→ "Allow put/get" must be activated and
→ no optimised DBs may be used!

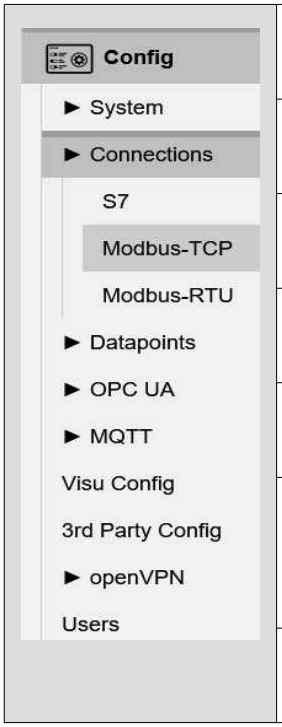
Modbus-TCP

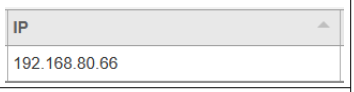
VIDEO tutorial available

For this example, the INSEVIS download pages contain a YouTube® link to a corresponding Video.

The connections between the IIoT Protocol Converter and Modbus TCP-capable devices are configured in the Modbus TCP menu item.





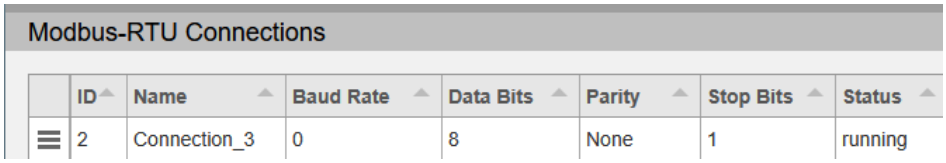
Handle to mark rows. Mark areas with Ctrl / Shift	
Internal number of the connection. Is required to configure connections in Node-RED	
Name of the connection. (freely selectable)	
IP-adress of the ModbusTCP-partners (Server).	
Port on partner device default: 502	
Connection status. As long as no data points are configured: inactive (if otherwise running does not stop), there is an error in the configuration)	
Test function for accessibility of the entered IP address, No statement as to whether the ModbusTCP protocol works	

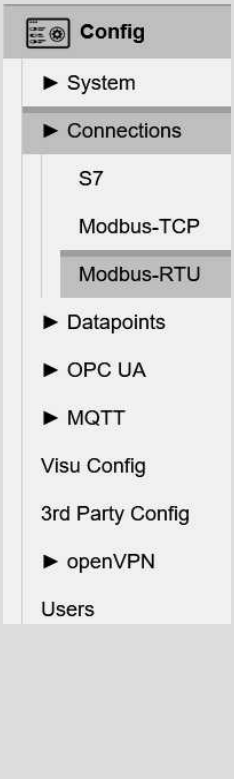
Modbus-RTU

VIDEO tutorial available

For this example, the INSEVIS download pages contain a YouTube® link to a corresponding Video.

Ihe connections between the IIoT Protocol Converter and Modbus RTU-capable devices are configured in the Modbus RTU menu item. For physical reasons, only one connection is possible.





Handle to select line. Mark areas with Ctrl / Shift

Internal number of the connection.
Is required to configure connections in Node-RED



Name der Verbindung.
(frei wählbar)



Baud rate. Selection menu for the different baud rates
(Baud rate 0 = Local Mode)



Serial data format, adjustable via data bits Parity and stop bits







Connection status.
As long as no data points are configured: inactive.
(Otherwise, if running does not stop, there is an error in the configuration)





Note Local Mode:

By setting the IP address 0.0.0.0 or baud rate 0(local), no physical connection is established, but a process image is simulated locally; this applies to all connections (S7, Modbus TCP and RTU).

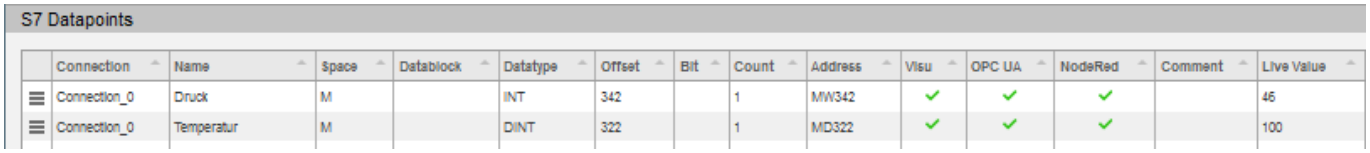
Datapoints

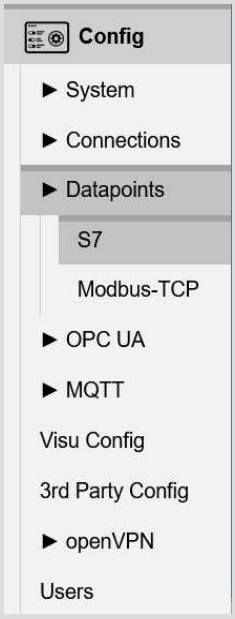
S7-variables

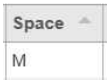
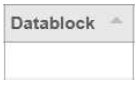
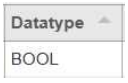
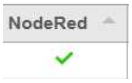
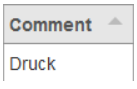
VIDEO tutorial available

For this example, the INSEVIS download pages contain a YouTube® link to a corresponding Video.

The data points of the connected S7 PLCs are managed in this menu item.



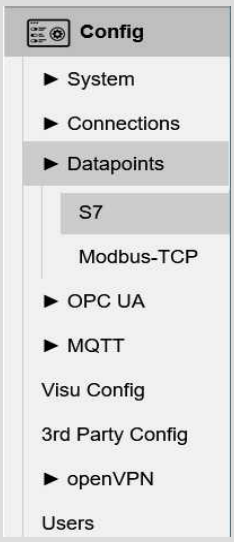


Handle to mark lines. Mark areas with Ctrl / Shift.	
Name der Verbindung, zu der die Variable gehört	 Connection: PC1017-T
Name of the variable. (selectable or specified by import)	 Name: Alarm 1
Memory area in the PLC	 Space: M
Number of the data block if Space = DB	 Datablock
S7-300 Datatype	 Datatype: BOOL
Adress-Offset	 Offset: 1
Bitindex if Datatype = BOOL	 Bit: 0
Number of variables. Values >1 create an array that is read consistently	 Count: 1
Calculated address from the information provided in S7-ANY-Pointer-Syntax	 Address: M1.0
Checkbox, is activated if variables have been imported from the WebVisu.	 Visu
Checkbox to publish the variable in OPC UA	 OPC UA
Checkbox to publish the variable in NodeRed	 NodeRed
Imported comment	 Comment: Druck
Live value of the variable, only updated if the variable is activated for Node Red or is active in the visualisation.	 Live Value

Importing S7 variables

As an alternative to manual configuration of the S7 variables, the import function makes work easier.

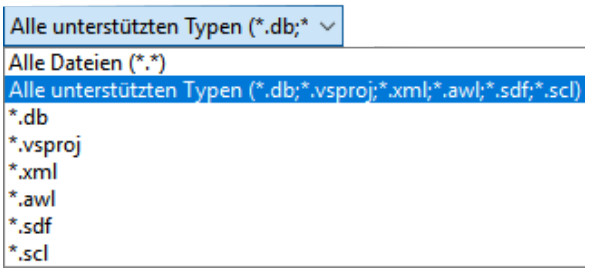
- Global variables of a Simatic Manager or TIA project can be exported as an sdf file and read in here.
- However, data structures in DBs are usually of interest. To do this, the relevant DBs must be exported as sources (for Simatic Manager as an awl file, TIA generates a db file) and imported here.
  Unfortunately, the DB number is lost for symbolic awl sources and the DB name for absolute awl sources. This information must be added manually later.
- If a visualisation has already been carried out with VisuStage and the relevant variables match, an import via the VisuStage project file *.vsproj can be useful.
  In general, the VisuStage import functions for variables including symbols (also from data blocks with just a few mouse clicks) are very convenient.
  However, a visualisation does not necessarily have to be created, after the variable import in the "VisuStage" program, an "empty" visualisation file *.vsproj also contains the information of all variables defined there, which are required here for the import of S7 variables.



In the S7 Datapoints window, individual or groups of variables can be added via "Import":

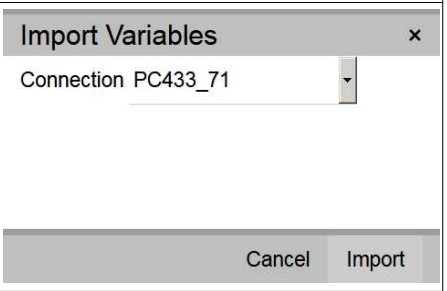


The following file formats can be imported:



The relevant S7 connection must be selected to which the variables to be imported are assigned.

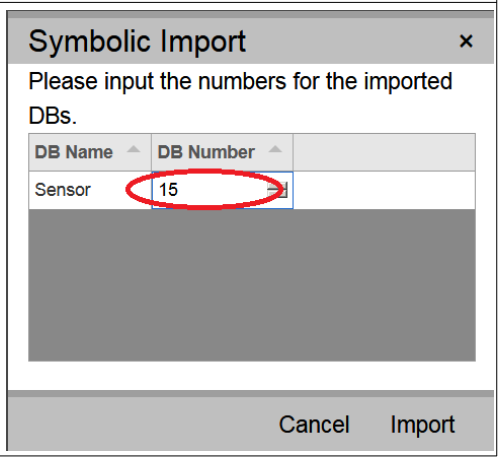
The import button is used to upload a file



Depending on the source, missing information may be requested.

When importing symbolic sources, the (correct!) DB number must be specified (DB number 15 in the example)

If an absolute awl source is imported, the DB names must be reassigned. (This is then "optics only", symbol names are freely selectable).

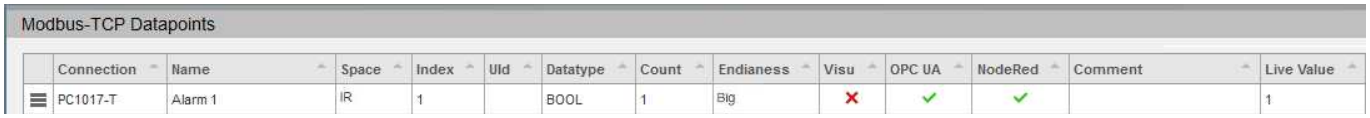


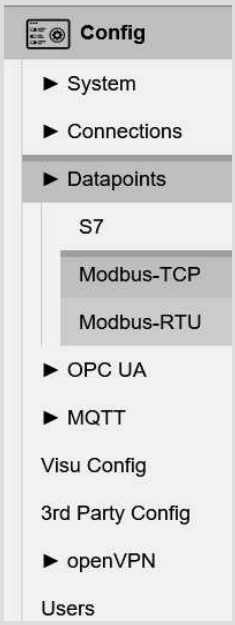
Modbus-RTU and -TCP

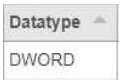
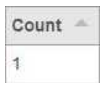
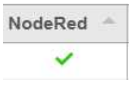
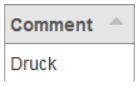
VIDEO tutorial available

For this example, the INSEVIS download pages contain a YouTube® link to a corresponding Video.

The data points of the connected Modbus RTU and TCP devices are managed in these menu items.
The settings work in the same way in both menus.





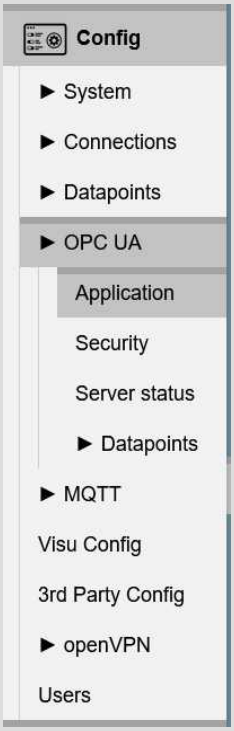
Handle to mark rows. Mark areas with Ctrl / Shift	
Name of the connection to which the variable belongs	
Name of the variable. (free selectable)	
Memory area in the Modbus partner: IR=Input Register, HR=Holding Register, DI=Discret Input, CL=Coil	
Data type of the variables for processing in the IIoT Protocol Converter	
Unit-ID corresponds to the node number of Modbus RTU FOR Modbus RTU, the valid node number must be set For Modbus TCP, check the relevance in the participant's manual.	
Word or bit index of the variable	
Number of words or bits. Values >1 create an array that is read consistently	
Word order of the variables Only for data types with 4 bytes (DINT, DWORD, REAL)	
Checkbox, is activated if variables have been imported from the WebVisu.	
Checkbox to publish the variable in OPC UA	
Checkbox to publish the variable in NodeRed	
Comment of the variable	
Live value of the variable, only updated if the variable is activated for Node Red or is active in the visualisation.	

OPC UA Server

Application

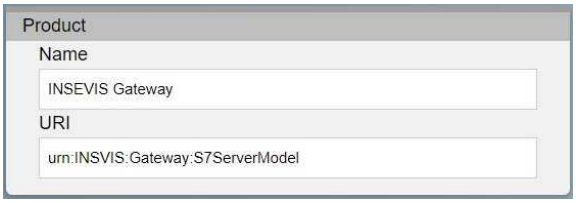
VIDEO tutorial available
For this example, the INSEVIS download pages contain a YouTube® link to a corresponding Video.

IThe application settings of the OPC UA server are managed in this menu item.

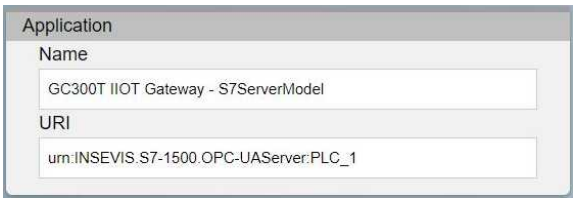


The URL with which the client connects to the server is stored here in the server. This is usually the IP address. The client can check the match. UA-Expert warns if there is no match, other clients interpret it as an error (and refuse the connection).

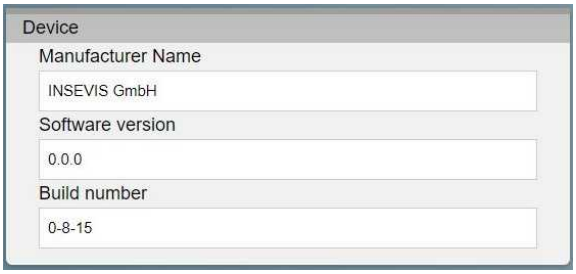
Product name and **product URI** are mapped under Server Status – Build Info and are freely selectable



The **Application Name** represents the name of the application in a human-readable format, whereas the **URI** must be globally unique for this application



Manufacturer Name
Software version and **Build number** are displayed under ServerStatus - BuildInfo and are freely selectable

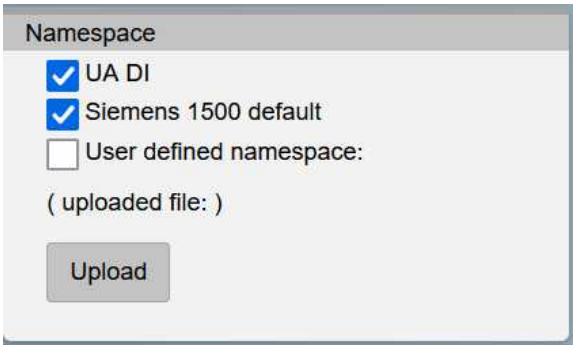


Activation of the integrated namespaces.

The **UA DI** namespace contains PLC-specific type definitions on which other namespaces can be based.

Siemens 1500 default emulates the namespace of the OPC UA server on an S7-1500 PLC.

User defined namespace activates a namespace uploaded by the user.



There is a documented demo on the subject of "User defined namespace" available for download in the download area of the INSEVIS homepage

Security

VIDEO tutorial availble

For this example, the INSEVIS download pages contain a YouTube® link to a corresponding Video.

The security settings of the OPC UA server are managed in this menu item.

ATTENTION:
An encrypted and signed connection is strongly recommended for the transfer of machine data.
The **Encryption none** setting allows unencrypted and unsigned connections to the OPC UA server and represents a serious security risk.
Use for development and test purposes only!



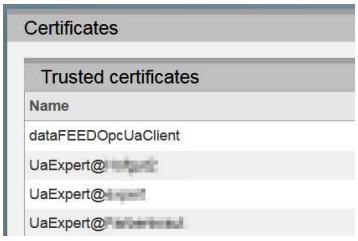
Defines the permitted connection types of the server.
none : kan encryption / signaturer
Basic – Sign : Signed
Basic – Sign & Encrypt : Encrypted and signed



Download the server certificate as an alternative to configuring a client.
Regenerate generates new server certificate This certificate must be stored again for all clients!
The certificate also contains the IP addresses, among other things. If access is made directly via the IP address, the certificate should be updated after changing it, otherwise the connection could be denied.



Trusted certificates contains a list of certificates that have been manually classified as trustworthy.

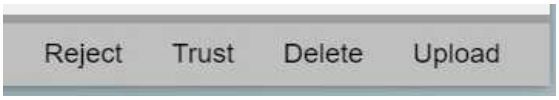


Rejected certificates contains a list of certificates that have been categorised as untrustworthy.
Every certificate that was transferred to the server for the first time is listed under **Rejected** and must be added manually to the **Trusted** list. (see below)

Click on a certificate to display more detailed information in this window



Marked certificates can be moved to the respective list with **Reject** and **Trust**.
Delete deletes the selected certificate and **Upload** allows a certificate to be uploaded manually



Security



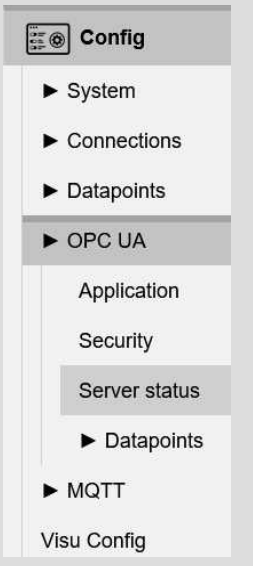
WARNING:
Before saving, make sure that the **Encryption none** setting is not activated, as this allows unencrypted and unsigned connections to the OPC UA server and represents a serious security risk.

Use for development and testing purposes only!

Server status

VIDEO-Tutorial avaible
For this example, the INSEVIS download pages contain a YouTube® link to a corresponding Video

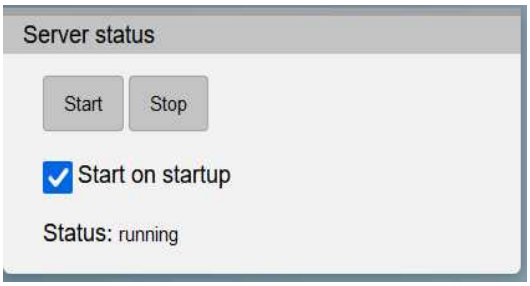
In this menu item, the status of the OPC UA server can be monitored and controlled



The OPC UA server can be controlled with **Start** and **Stop**.

Start on startup starts the server when the IIoT Protocol Converter boots up.

If the status display remains at Stop after starting the server, there is probably a configuration error. Error messages can be read out by downloading the log file.

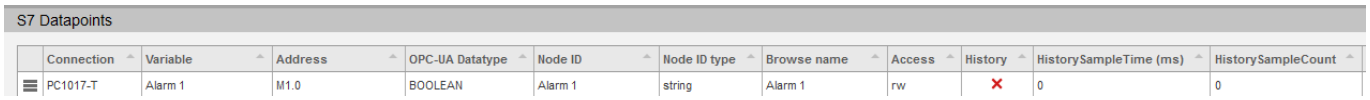


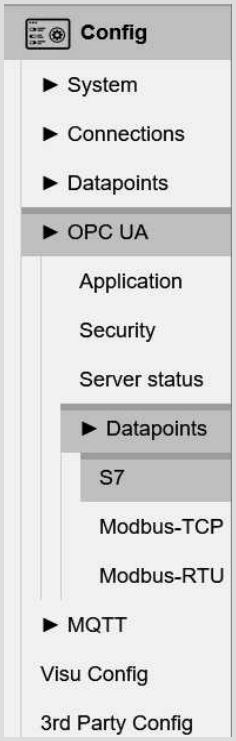
S7 data points in the OPC UA server

VIDEO-Tutorial avaibler

For this example, a link to a corresponding video on YouTube® is available on the INSEVIS download pages.

The previously released S7 data points of the OPC UA server can be managed in this menu item.





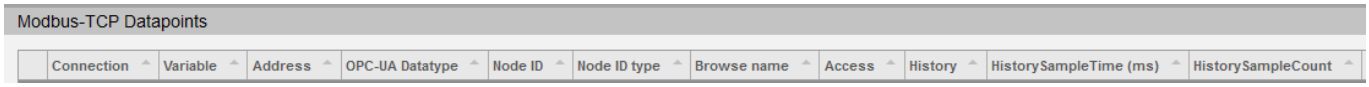
Handle to mark rows. Mark areas with Ctrl / Shift	
Name of the connection to which the variable belongs (is taken from data points)	Connection: PC430T
Name of the variable (is taken from data points)	Variable: Alarm 1
Address of the variables (is taken from data points)	Address: MW12
Data type in the OPC UA namespace A different data type can be defined here for OPC UA. (Length must correspond to the S7 data type)	OPC-UA Datatype: INT16
Node ID of the variable: In S71500 mode, the variable automatically appears under this name in the namespace - corresponding to the address under Inputs Outputs/Memory. In the user-defined name space, the node ID must be entered here to match the defined node in the namespace so that the user data can be assigned to the nodes in the namespace.	Node ID: Trend
Typ der Node ID (String or Numeric) Always string in S7 1500 mode.	Node ID type: string
Browse name (OPCUA browse name of the variables in the namespace)	Browse name: Trend
Checkbox to activate the history of the variables This starts the recording of the variable value with a time stamp in the time grid specified below in a ring buffer of the specified length.	History: ✓
Time between samples (The variables are updated every 100ms, i.e. only larger values make sense)	HistorySampleTime (ms): 500
Number of samples (The only limit is the storage space on the internal storage medium)	HistorySampleCount: 1000

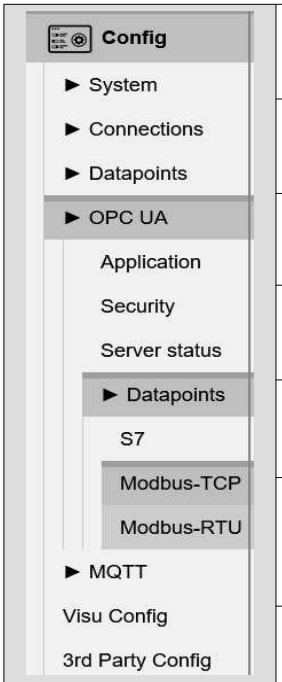
Note 1:
For variables in data blocks, it is essential that the S7 syntax "Block name.variable name" is used. The node ID is used to "sort" the variable into the tree, the browser name for display.

Modbus-RTU and -TCP in the OPC UA Server

VIDEO tutorial available
For this example, a link to a corresponding video on YouTube® is available on the INSEVIS download pages.

The previously released Modbus data points of the OPC UA server can be managed in this menu item.





Handle to mark rows. Mark areas with Ctrl / Shift	
Name of the connection to which the variable belongs (is taken from datapoints)	Connection: Connection_0
Name of the variable (is taken from datapoints)	Variable: Connection_00
Address of the variables (is taken from datapoints)	Address: DI0
Data type in the OPC UA namespace A different data type can be defined here for OPC UA (length must correspond to the data type of the Modbus variable)	OPC-UA Datatype: BOOLEAN
Node ID of the variable: In S71500 mode, the variable automatically appears under this name in the namespace - according to the address under Inputs or Outputs. (There is a separate documentation and demo for the user defined namespace, see download symbol below)	Node ID: Connection_00
Typ der Node ID (String or Numeric) Always string in S71500 mode.	Node ID type: string
Browse name (OPCUA browse name of the variables in the namespace)	Browse name: Connection_00
Checkbox to activate the history of the variables This starts the recording of the variable value with a time stamp in the time grid specified below in a ring buffer of the specified length.	History: ✕
Time between samples The variables are updated every 100ms only larger values make sense.	HistorySampleTime (ms): 0
Number of samples: The only limit is the storage space on the internal storage medium.	HistorySampleCount: 0

There is a documented demo on the subject of "User defined namespace" in the download area of the INSEVIS Website.

MQTT

MQTT (Message Queue Telemetry Transport) is now one of the standard protocols for IoT and M2M communication. The MQTT protocol works as publish-subscribe communication. There is a broker and several clients, which can publish messages as publishers and subscribe to messages as subscribers. The task of the broker is to manage and distribute the messages.

Broker settings

The IIoT Protocol Converter does not include an MQTT broker. Only general settings for connecting the IIoT Protocol Converter as a client with an external broker (in the local network or somewhere in the cloud) are made here. The IIoT Protocol Converter can communicate with several brokers, but only as one client at a time.

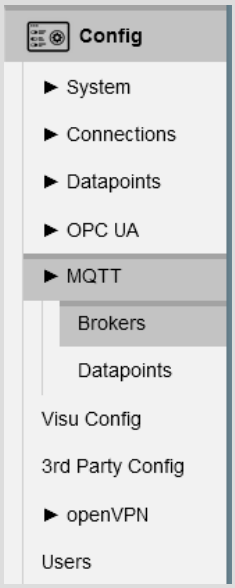
The MQTT broker is used to distribute messages. All communication is event-driven.

- If the "Retain" function is activated, the last message is saved by the broker and delivered immediately when a client reconnects. (Otherwise it would have to wait for the next change).

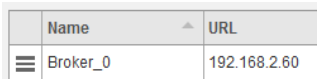
MQTT supports the optional "Birth" and "Last Will and Testament" (LWT) messages:

- The "Birth" message is sent when the client connects to the broker to notify other clients of a newly connected client.
- The Will ("Last Will and Testament" (LWT)) message is sent to notify other clients of a disconnected client.

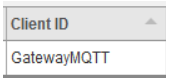




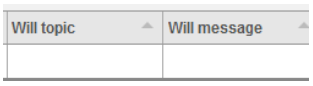
Internal **name** of the external MQTT broker (freely selectable) and **URL** of the broker in the local network or in the cloud (either static IP address or a URL e.g. mqtt.eclipse.org)



Client ID (freely selectable), must (absolutely!) be unique on the broker



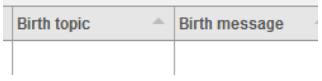
Will (last will) **-topic** and **-message** (optional) Sent when the connection is terminated by this client (default: unused)



Will-Quality of Service
0: at most1x
1: at least 1x
2: exact 1x
Will - retainflag:
If active, the Will message is delivered when a client reconnects and subscribes



Birth -Topic and **-message** (optional)
Sent when the connection is started by this client (default: unused)



Birth - Quality of Service
0: at most 1x
1: at least 1x
2: exact 1x
Birth - retainflag:
If active, the birth message is delivered when a client reconnects and subscribes



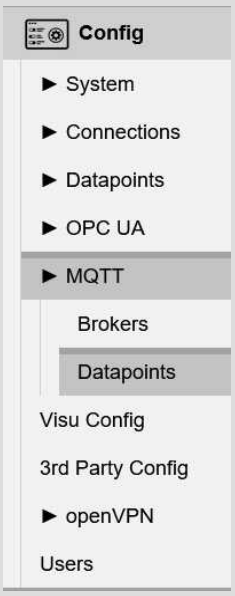
Connection status As long as no data points have been configured: **inactive**. Otherwise, if **running** does not stop, there is an error in the configuration Ping as a test function for accessibility of the entered URL, no statement as to whether the MQTT protocol is working

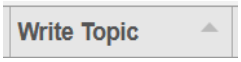
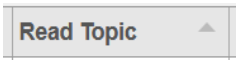
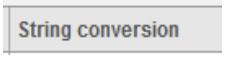
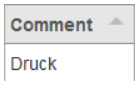


MQTT

Datapoints-Settings





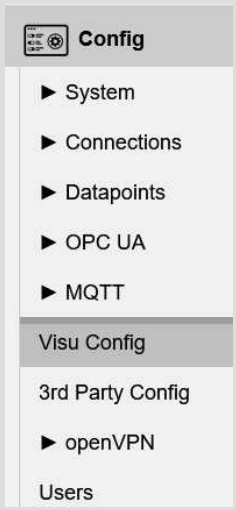
Handle to mark rows. Mark areas with Ctrl / Shift1	
Name of the local (S7 or Modbus) connection to which the variable belongs	
Name of the variables. Selection from the existing variables of existing connections via drop-down menu	
Assigning the variables to a configured broker	
Definition of a **topic for writing** the data to the PLC. A subscription is created at the broker for this purpose (i.e. the IIoT Protocol Converter works as a **subscriber**)	
Definition of a **topic for reading** the data from the PLC. When this data is changed, it is sent from the IIoT Protocol Converter to the broker via publish (i.e. the IIoT Protocol Converter works as a **publisher**).	
Read Topic - Quality of Service 0: at most 1x 1: at least 1x 2: exact 1x **Read Topic - retainflag**: If active, the message is delivered when a client reconnects and subscribes.	
The PLC data is normally sent in binary form. If this option is activated, the PLC data points are converted into a string according to the configured type information.	
Imported comment	



ATTENTION:
MQTT is currently only available unencrypted.
Data could theoretically be read or manipulated by third parties. Sensitive data should only be transmitted via trustworthy networks.

WebConfigurator

Visu Config



There are two menus under the Visu Config item

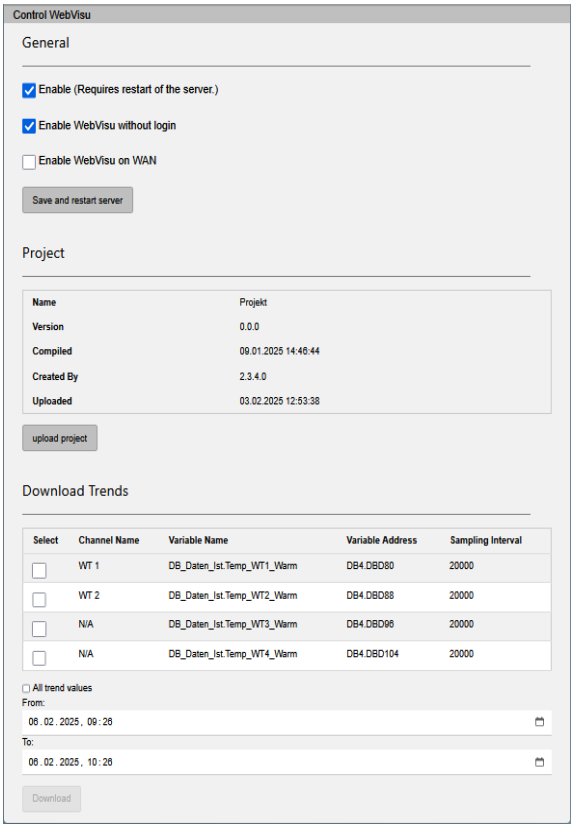
Enable activates the start of the WebVisu when the server starts up.

Enables access to the WebVisu without login. (A default user is automatically created for this).

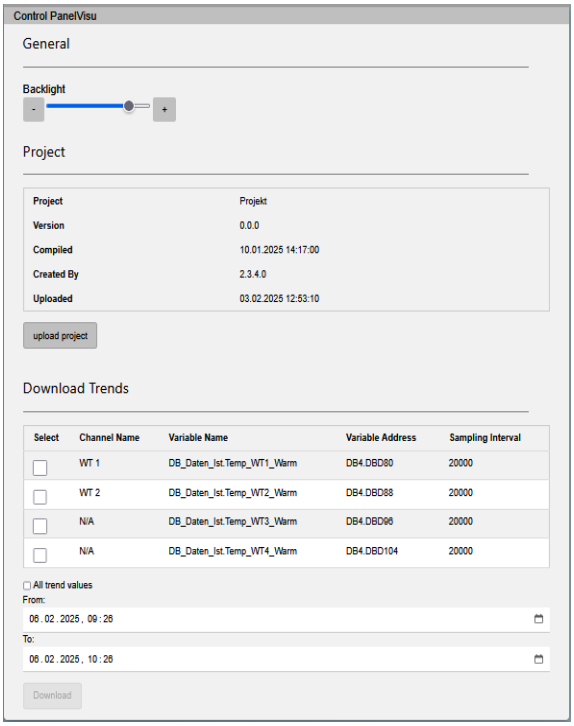
Enables access to the WebVisu via WAN port; no login is possible for security reasons. The contents of the WebVisu should therefore be safe in terms of data security.

Restart Server restarts the entire server

At the bottom of the window you will find information about the currently installed project and you can upload a project.



The data of the currently installed visualisation is also stored under the PanelVisu menu item. This menu is only available for EDGE HMIs, not for Protocol Converters
The displayed trends can be exported from here as a *.csv file, if no trends are available, the trends submenu is not displayed!
PICTURE NEW also install Webvisu with trends DEMO and make picture to show full extent!!!



3rd Party Config

Node-RED

Use external VIDEO tutorials
Various videos on working with Node-RED are available on YouTube®.

The behaviour of Node-RED is set in this menu item. The Node-RED server is an additional function for whose use in Node-RED projects no guarantee or service is provided by INSEVIS. Only use Node-RED nodes for your projects that you know and have tested extensively.



ATTENTION:
Do not activate Node-RED if you are not using it, as it consumes a lot of system resources

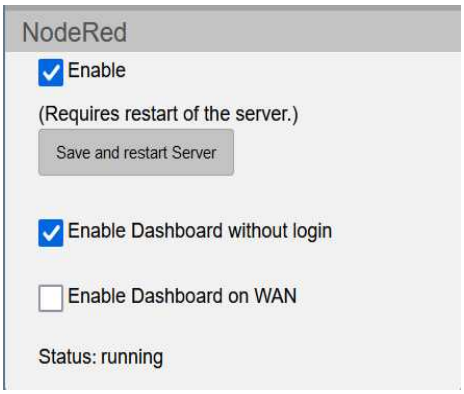
Due to the unknown origin of Node-RED nodes, INSEVIS does not guarantee their function and does not provide any service for Node-RED projects.



Enable activates the start of Node-RED when the server boots up.
Restart Server restarts the entire server.

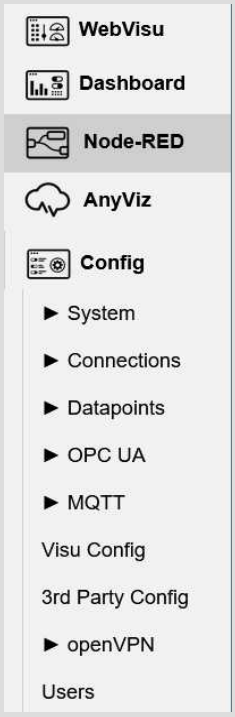
Enables access to the dashboard without login.

Enables access to the dashboard via WAN port.
For security reasons, no login is possible.
The contents of the dashboard should therefore be safe in terms of data security.



3rd Party Config

Routes



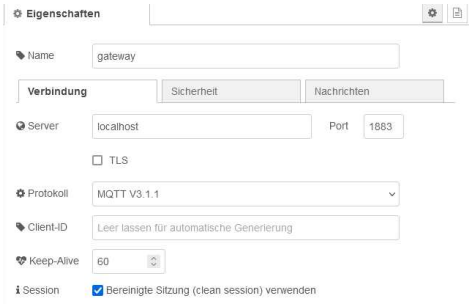
The menu item "Node-Red" opens a new window with the Node-Red "Routes-Editor".

Communication from NodeRed to the variables configured via the web interface takes place via an internal MQTT. connection. The MQTT IN/OUT nodes are used to read and write the variables





A local MQTT broker must be configured in these nodes (double-click) in NodeRed:



Server localhost, Port 1883, no SSL/TLS

An MQTT topic is used to read the variables according to the following scheme:
Protocol Converter_internal/<Connection-ID>/<Address>/R
To write to a variable, an MQTT topic is used according to the following scheme:
Protocol Converter_internal/<Connection-ID>/<Address>/W

e.g. Protocol Converter_internal/0/MD420/R
Protocol Converter_internal/0/MD420/W

Note: Mhen using the topic Protocol Converter_internal/#, all active topics are displayed via the debug node.

The user data is binary. Conversion can be carried out using a script: e.g.
Reading direction

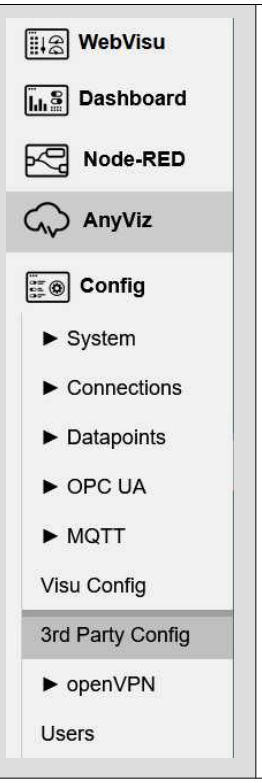
```
var buffer = Buffer.from(msg.payload);
msg.payload = buffer.readInt32LE(0);
return msg; var buffer = new Buffer(2);
```

Writing direction

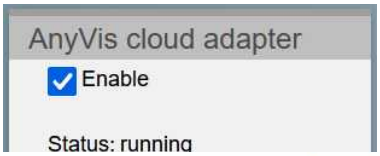
```
buffer.writeUInt16LE(msg.payload,0);
msg.payload = buffer;
return msg;
```

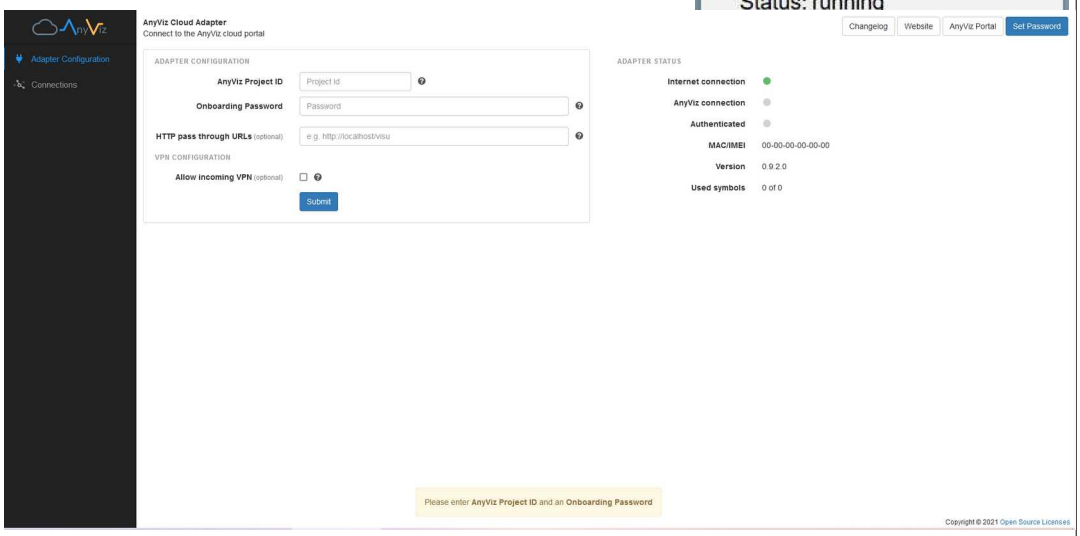
3rd Party Config

AnyViz Cloud Adapter



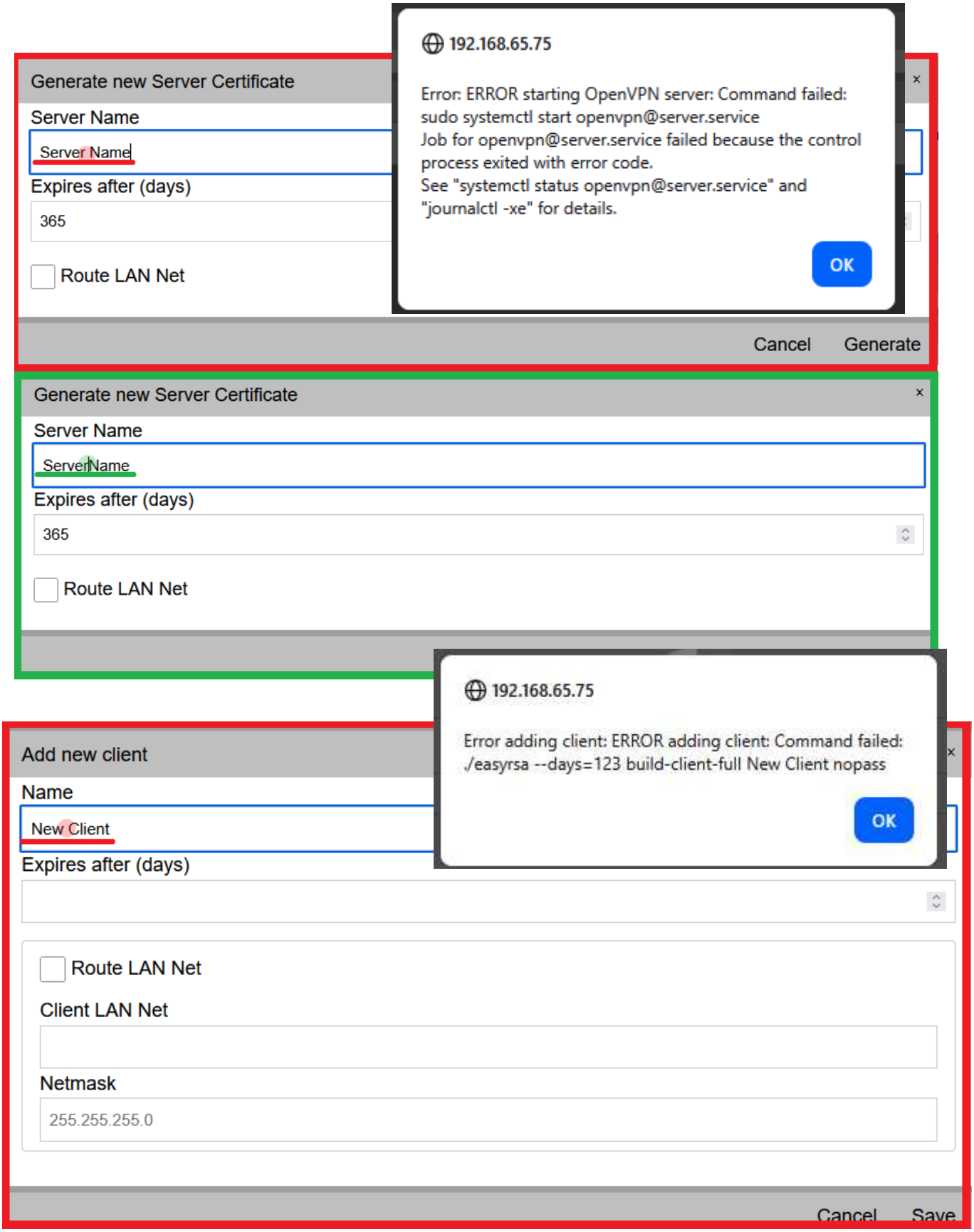
In addition to NodeRed, the AnyViz Cloud Adapter can also be switched on or off in the 3rd party menu.
IThe AnyViz Cloud Adapter configuration menu is then displayed at the top of the sidebar.





An AnyWiz account is required.

Another option is the connection to the Amazon AWS cloud. This would go beyond the scope of the manual at this point, but we have included the project as a manual in the download area of the INSEVIS website (simply click on the download symbol).

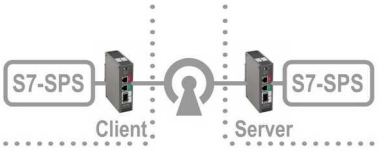

192.168.65.75
Error: ERROR starting OpenVPN server: Command failed:
sudo systemctl start openvpn@server.service
Job for openvpn@server.service failed because the control process exited with error code.
See "systemctl status openvpn@server.service" and "journalctl -xe" for details.
OK
Generate new Server Certificate
Server Name
Server Name
Expires after (days)
365
Route LAN Net
Cancel
Generate
Generate new Server Certificate
Server Name
ServerName
Expires after (days)
365
Route LAN Net
192.168.65.75
Error adding client: ERROR adding client: Command failed:
./easyrsa --days=123 build-client-full New Client nopass
OK
Add new client
Name
New Client
Expires after (days)
Route LAN Net
Client LAN Net
Netmask
255.255.255.0
Cancel
Save

openVPN

The IIoT Protocol Converter uses openVPN with openSSL to transfer machine data via an encrypted connection.

Site-To-Site-Topology

Secure client/server connection between two S7-“islands“



This topology is to realize a direct and secure client/server connection between 2 S7-“islands“ through a „insecure“ company net without using a cloud or portal.

Requirements:

- IP-address settings in the company net are static,
- address of the „unsecure“net (e.g. 192.168.2.0) is normally pre-defined
- a local net for the IIoT-Protocol Converter as openVPN-server (e.g. 192.168.80.0) and
- a local net for the IIoT-Protocol Converter as openVPN-client (e.g. 192.168.90.0) will be defined

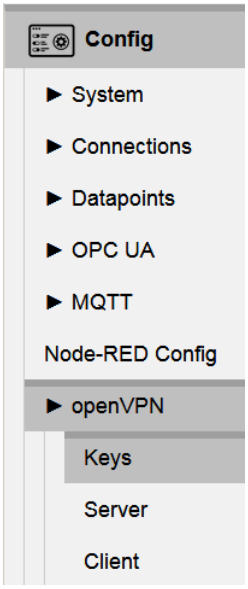
Hint:

- The local nets of both „islands“ must be different.

Procedure:
1: Configuration on the openVPN-**Server-IIoT-Protocol Converter**:

Step 1.0: Before generating of certificates the system time must be checked to be correctly so that valid expiry dates are generated. (If the IIoT-Protocol Converter was longer powered off, the low battery could cause a wrong system time.)

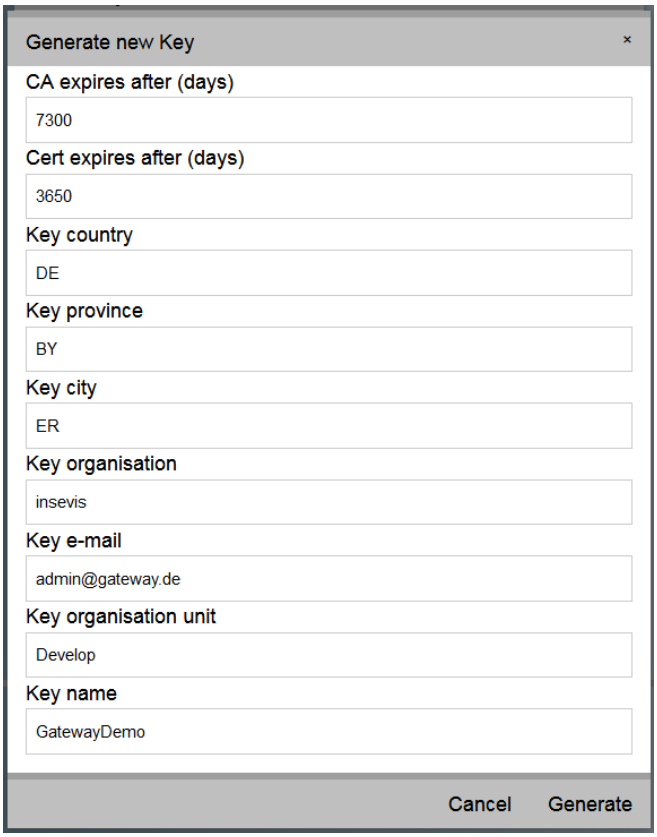
Step 1.1: Generate a local certificate authority = CA on the openVPN-**Server-IIoT-Protocol Converter**:



Fill the mask with usefull content

These data will be bounded to the certificates

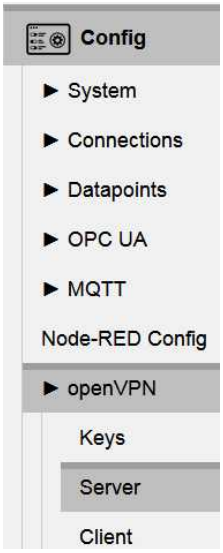
Caution:
The entries in „... expires after ...“ determines the period of validity of the certificates



openVPN

Site-To-Site-Topology

Step 1.2: Create a client on the openVPN-**Server-IIoT-Protocol Converter**

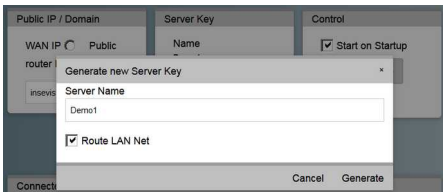


- Assign the static public IP-address of the server:
  Button „WAN-IP“ + WAN-adress
- activate „Start on Startup“
- „Save to device“
- Create server by button „Generate new“



Create a **Server name**, with which the "island" can be assigned

(Option „Route LAN Net“ means, that network addresses in the server-LAN (in sample 192.168.80.0) are accessible form the other “island”)



Create a **Client** in „Connected Clients“ by button „Add“

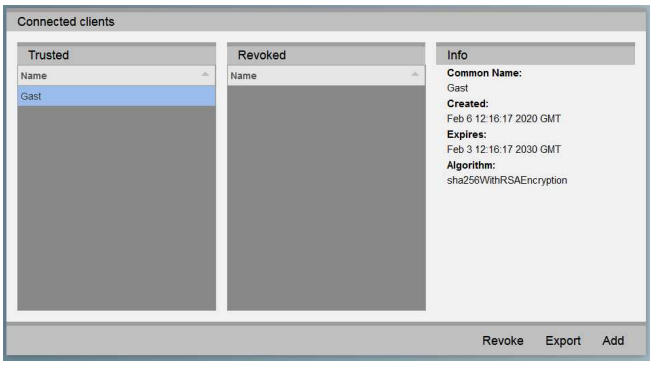
- Create a **Client name** with which the other "island" can be assigned

(Option „Route LAN Net“ means, that network addresses in the client-LAN (in sample 192.168.90.0) are accessible form the server-“island”)
Hint: Because this network is unknown until yet, this address needs to be typed in.



Mark the yet generated client and save it by the button „Export“.

(is exported at the PC normally to „Download“-directory to file „servername_clienname.tar.gz“)



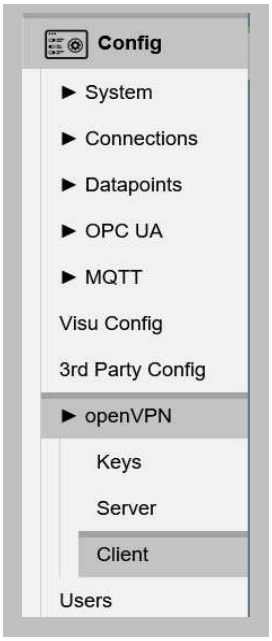
openVPN

Site-To-Site-Topology

2: Configurations on the openVPN-**Client-IIoT-Protocol Converter**:

Step 2.0: Before using of certificates the system time must be checked to be correctly.

Step 2.1: Import configuration on the openVPN-Client-IIoT-Protocol Converter

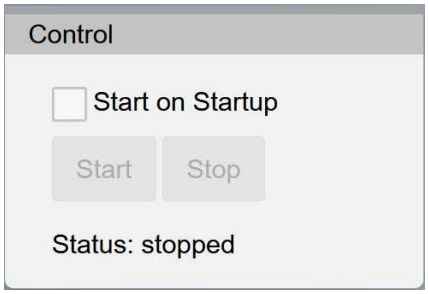


In the webconfig of the client IIoT Protocol Converter:

- Upload the configuration file "servername_clienname.tar.gz" exported from the server



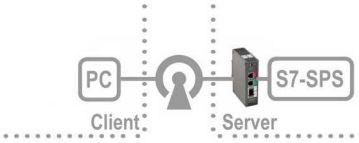
- Activate "Start on Startup
- „Save to device“



openVPN

Remote maintenance 1-Topology

Secure client/server connection betweenS7-“island“ and a PC



If a client „island“ in the Site-To-Site-open-VPN-Topology will be replaced by a PC, arises a remote access to the configuration shell of the IIoT-Protocol Converters (via WAN-port(!) as well to the PLC(s) behind (– with minor restrictions – you can not search in the remote network, you need to know it).

Requirements:

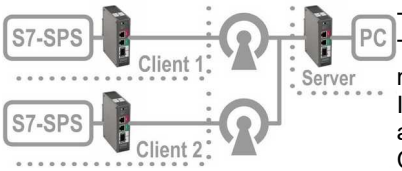
- openVPN must be installed on the PC
- decompress the exported file „servername_clienname.tar.gz“ (e.g. Win-7z).
- Rename the file "client.conf" into a meaningful client name with suffix „.ovpn“ (e.g. machine_xy.ovpn)
- move all 4 decompressed files to C:\Program Files (x86)\openVPN\config\clientname\...
  or use the gui's import function
- start a VPN-connection via openVPN-GUI („machine_xy – connect).

Hints:

- In practice, this is imaginable within a static configured company net.
  (Rare a IIoT-Protocol Converter will be accessible by a fixed IP-address via internet directly.)
- The option „Route LAN Net“ of the server configuration allows the PC-access to the PLC (and further components at the LAN-port of the IIoT-Protocol Converter). Without this option only the IIoT-Protocol Converter-shell is accessable.
- The option „Route LAN Net“ of the client configuration is not useful for that case.

Remote maintenance 2-Topology

Secure client/server connection of multiple two S7-“islands“ by openVPN through a switchboard



This scenario arises when a PC is inserted at the server side in the Site-To-Site-open-VPN-Topology.
Thereby this PC has a remote-access to the PLC(s) of the remote network (– with minor restrictions – you can not search in the remote network, you need to know it).
Is the server-side e.g. in a home-office, what does not belong to to a company-IT-administration, it is possible to “tunnel” vie internet as long the client-IIoT-Protocol Converters have a standard internet access.

Requirements:

- IP-address settings in the company net are static,
- a local network for the IIoT-Protocol Converter as openVPN-Server and
- each one local network for the IIoT-Protocol Converter as openVPN-Client will be assigned.

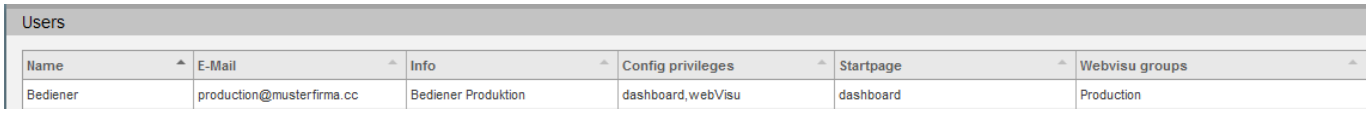
Hints

- If communication takes place via the "real" Internet, a global IP address is required for the server
  (e.g. by DynDNS) and this is to be assigned as „Public router IP“ and in the router is to configure a referring port-forwarding (see referring router-manuals).
  The external address of the server does not matter, but the WebConfigurator needs to insert it into the client-configuration.
- If the openVPN-server at the WAN-port will be configured by DHCP, a name server must exist.
  (perhaps the DHCP-Server takes over the device-FQN of the IIoT-Protocol Converter automatically.
  This must be assigned in the server als „Public router IP“ *.
- If IP-addresses changes, this configuration must be repeated.

Users

VIDEO tutorial available
For this example, a link to a corresponding video on YouTube® is available on the INSEVIS download pages.

In this menu item you will find the user administration. You can **edit** a user with a **double-click.**





Name of the user (freely selectable)	
E-mail address of the user (fselectable)	
About the user	
Rights of the user (The rights restrict access to the individual sections of the Config interface)	
Home page of the user (The page to which the user is redirected after login). **Make sure that the user has the necessary rights to access this page!**	
Webvisu groups for which the user has rights.	

The users created here must then also be created in the EDGE-HMI project in the Visu Stage and assigned to the corresponding groups there. (See Software/VisuStage manual)

Visualization with the software „VisuStage“

Differences between the EDGE HMIs and the previous S7 panel HMIs

With the release of the new generation of INSEVIS liot devices, the new VisuStage v3.x.x.x is also being released. With the new VisuStage it is possible to create WebVisualisations or, more importantly, to convert existing visualisations into WebVisualisations. Due to these innovations, there are also changes in VisuStage, at least when configuring a WebVisualisation. These are listed in the following table.

General information

Firmware	Specially customised and secure Linux, configuration and service via integrated web configurator.
Project planning tool	VisuStage v3.x.x.x, Existing visualisations can be converted Web visualisation can be generated automatically WebVisus cannot be converted to conventional Visus
Remote visualisations	Previously via additional programmes: RemoteStage und VNC-Client Now via browser: Web server with web visualisation, NodeRED with dashboard
Simulation and Download	The simulation of the created visualisation no longer takes place, instead the uploaded visualisation is tested in the web interface. The finished visualisation can be uploaded as before via VisuStage or from the web interface.
System functions (SFCs)	SFCs cannot be used for web visualisation. The data to be queried is configured via the web interface.

Ressources

Ressource Benutzerverwaltung / Access rights	- Access rights + rights groups are created in VisuStage. The desired access rights are assigned to the objects. Users are created via the EDGE device and assigned to the authorisation groups there.
Ressource Menues	Settings for backlighting, language and menu variables and watchdog are no longer required for EDGE devices
Resource Partner PLC	Several are possible and are set in the EDGE devices via the web configurator.
Ressource Recipes	Not yet implemented at the present time.

Objects

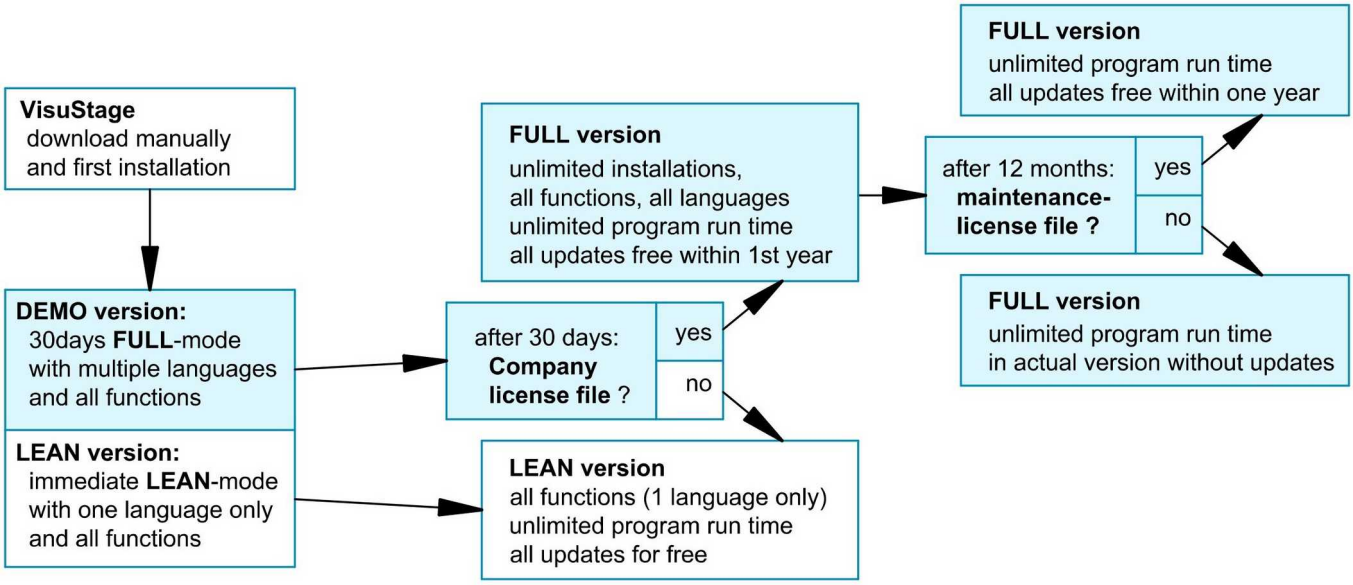
Objects Button, dynamic and text button, Touch surface	The different button types have been summarised for the WebVisu in the new "Button extended" object, which also includes a login button that replaces the pin input. This streamlines the object list and makes it easier to change the button at a later date.
Objects Trend display / trend archive	Have been merged into a trend display with included archiving, the current trend can be easily scrolled.
Object Function graph	Not yet implemented at the present time

Download and licensing

The actual version of VisuStage is free to download at INSEVIS websites in the download area. INSEVIS- programs do not check the internet for new versions, so pleas visit INSEVIS websites for new features by yourself. This software can be used with operating system Windows 10 only.

At the first installation VisuStage offers 3 modes: FULL-Mode with license, DEMO-mode with 30 days free FULL-mode without license and LEAN-mode without license. You can add a license later on at the folder “Help” → “Info” to upgrade a DEMO or LEAN version into a FULL version.

This company license can be multiple times used within one company for multiple installations. (Open visustage.exe once as administrator (by right mouse key) to not have to enter the license path every time).



System functions (not or WebVisu and EDGE HMIs)

The S7 Operating system provides the system functions (SFC) to control the visualization by your S7 program. These SFCs are described in the referring PLC-manual (Compact or Panel-PLC) at the chapter “System functions”. To use these SFCs you need the **S7-Library** from INSEVIS. It can be downloaded at download-area of INSEVIS websites for free.

Communication between PLC and external Panel-HMI

In a Panel-PLC these SFCs will be used from a common CPU for PLC- and HMI-functions as well. Only if you use PLCs with external HMI please note followig:



ATTENTION:
Only single SFC-jobs can be processed.
If the parameter "BUSY" of the corresponding SFC returns the value FALSE, the job is finished and a new SFC can be processed,
The configuration of connection parameters of INSEVIS-Panel to INSEVIS-PLC or external PLC is explained at the chapter “Resource Partner-PLC-device” in this manual

Use these data in the S7-program (e.g. LADDR := W#16#1 for the panel-connection with ID-No. 1)

Here the PLC can change the screens in an external panel (e.g. with the connection-ID-No. 1

```
CALL „SFC 201
LADDR    :=  W#16#1
SCREEN   :=  MW1006
RET VAL  :=  MW1008
BUSY     :=  #busy
```

More easy meanwhile: write/read your scree-ID into/from a variable (see more at the “Screen” resource)

General settings of the program shell

Top: **Standard functions bar** (self explaining or explained by tool-tips)

Alignment functions (2 and more objects)



FIRST mark the Master-element,
THAN mark the others, what shall be aligned to the master
than choose the alignment property you want (left, horizontal centered, right, top, bottom centered, bottom)

Size functions



FIRST mark the Master-element,
THAN mark the others, what shall be aligned to the master
than choose the size item (width, height)
or assign multiple dimension properties to different selected objects (right)
with key-combination of CTRL+arrow-keys size of marked objects can be changed pixelwise

Alignment functions (1 or 3 and more objects)



FIRST mark the Master-element,
THAN mark the others, what shall be aligned to the master
FINALLY the element, what should mark the outer border of the grid
than choose the alignment property you want (same horizontal distance, center a single object, same vertical distance)

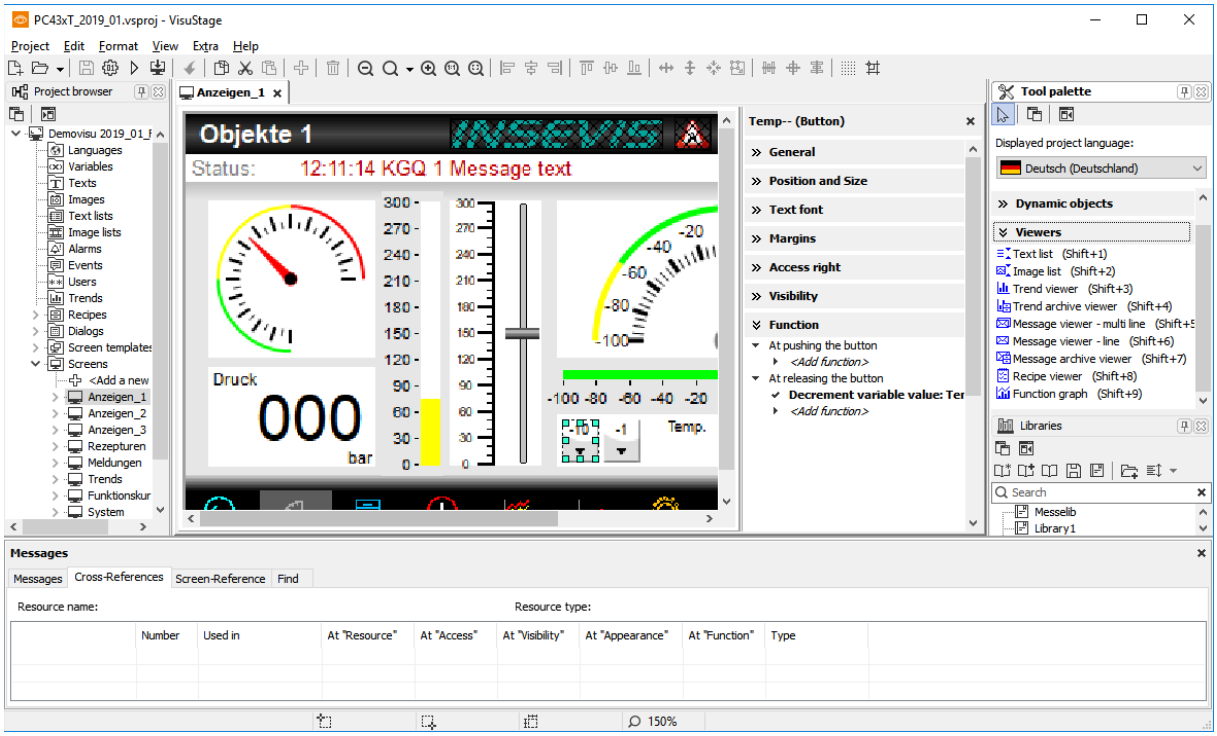
Grid-/ Snap functions (self explaining)



At Extra / Settings assign grid size
(de-) activate grid and snap by mouse click

General settings (without figure, self explaining)
It is recommended to hide the panels bezel to save window-space on your VisuStage-PC.
Grid and snap functions make it easier to design new screens

Top: General functions and drop down menus,
Left: Project browser with resource settings (here the resources will be set up and parametrized) and screens
Middle: Window of the projected screen, display of the objects parameters of the the selected object
Right: Tool bar with project language, function catalog with all objects what are available, Library catalog
Bottom: Message window (for messages, references, queries and filter results), to be switched on/off by F6-key



Visualization with the software „VisuStage“

General functionality

VisuStage imports S7-PLC-variables from Simatic®-Manager or TIA® Portal and uses it in different visualization objects in different screens. It can synchronize these S7-variables to the S7-project automatically.

The visualization source file will be compiled into a binary, what will be transferred to the Panel-HMI or Panel-PLC by Ethernet. The firmware in the Panel-HMI/-PLC creates the images and touch fields at the touch display there. No source date can be read back from the Panel-HMI/-PLC.

There is possible to get a free remote visualization of all S7-PLCs on a PC-screen by RemoteStage, what requires the visualization binary.

The following descriptions refer to the actual sample project what is available at the download area at INSEVIS websites. It requires the newest VisuStage-version and the newest operating systems at the devices. It is hardly recommended to use this project together with this documentation to understand it better.

Recommended procedures



A systematic working procedure reduces errors and decreases the programming efforts

- Import your S7-variables from the S7-symbol table or directly from your S7-DBs including symbols and synchronize it with your S7-project
- Assign objects for multiple screen use in different template screens, what you can use in every single screen.
- If you have finished entering all texts in your project language, you may export them into a *.csv-file and forward it to a translator into any other language you need. It is only necessary to keep the *.csv structure then you can re-import this file again - and you have your next language texts.
- Collect all special pictures for your visualization theme before you start. (We strongly recommend the file format "png", because it works with a good compression and it allows definition of transparency by an alpha-channel. This is very important, if you want to see your background color on rounded corners and not any image colors.)
- Use the grid- and snap-function.

Save your resources



It is very important to have an eye on the memory size, required by the visualization. In general it is better to tune your visualization with some easy hints, before you decrease the PLC performance with an unsuitable visualization.

- Multiple use of buttons
  (if you use exactly the same buttons (resolution, image) you save lots of memory size because they will stored only one time as 1 object. It dies not matter, if symbols or texts belonging to this items or not.)
- Do not overlap dynamic objects
  (This function is not allowed by program cycle. You better navigate your images by dialog boxes with coords.)
- Better to have less screens with more common objects than to have lots of nearly empty screens.
  (Every new screen is stored as image and requires memory space.

Keep the overview



You need to know, what resources are „active“ and what are „blind passengers“.

- Filters reduce the number of displayed resources to get a bettor overview.
- With „cross reference“-function (right mouse button in the resource-menu) the use of variables, texts, images, text lists, image lists and trends can be displayed. Delete resources you do not use.
- Delete unused resources with the „CleanUp“-function at the rider „Edit“

Transfer your work to other projects



When you invested much time to create a very special head- or bottom line or navigation:

- Use the library function to export often used groups to you PC for a further use in other projects.
- Use the screen template function for Headlines or footes, etc.



VIDEO-Tutorials available You find detailed explanations in the VisuStage-Playlist at the INSEVIS YouTube®-channel „INSEVIS EN“. This manual refers to e referencial visualization, what is available for free download at the download area at INSEVIS- web sites.

General project formats and settings

File formats

VisuStage creates 5 file formats:

- ***.vsproj** contains the source code of the visualization
- ***.res** contains the resources of the visualization
- ***.bin** contains the compiled binaries to be downloaded into the panel
- ***.webvisu** is created during compilation and contains the data to be transferred for the WebVisu
- ***.hmi** is created during compilation and contains the data to be transferred for the EDGE HMIs



Hint:
The vsproj and res-files must be in the same directory in order to open the project (vsproj)...
When passing on the source data, send the vsproj and res files!
If no source data is to be passed on, then pass on the vsbin/webvisu/hmi (sufficient for updating).

At the menu „Project“ basic settings will be made.

General data

- manual changeable

Version counter

- manual assignment of a 3 digits compile-no.
  or
- automatic counter (can be displayed by text field)

Screen rotations

- Only for CPU-P and -T versions

Data protection at upload

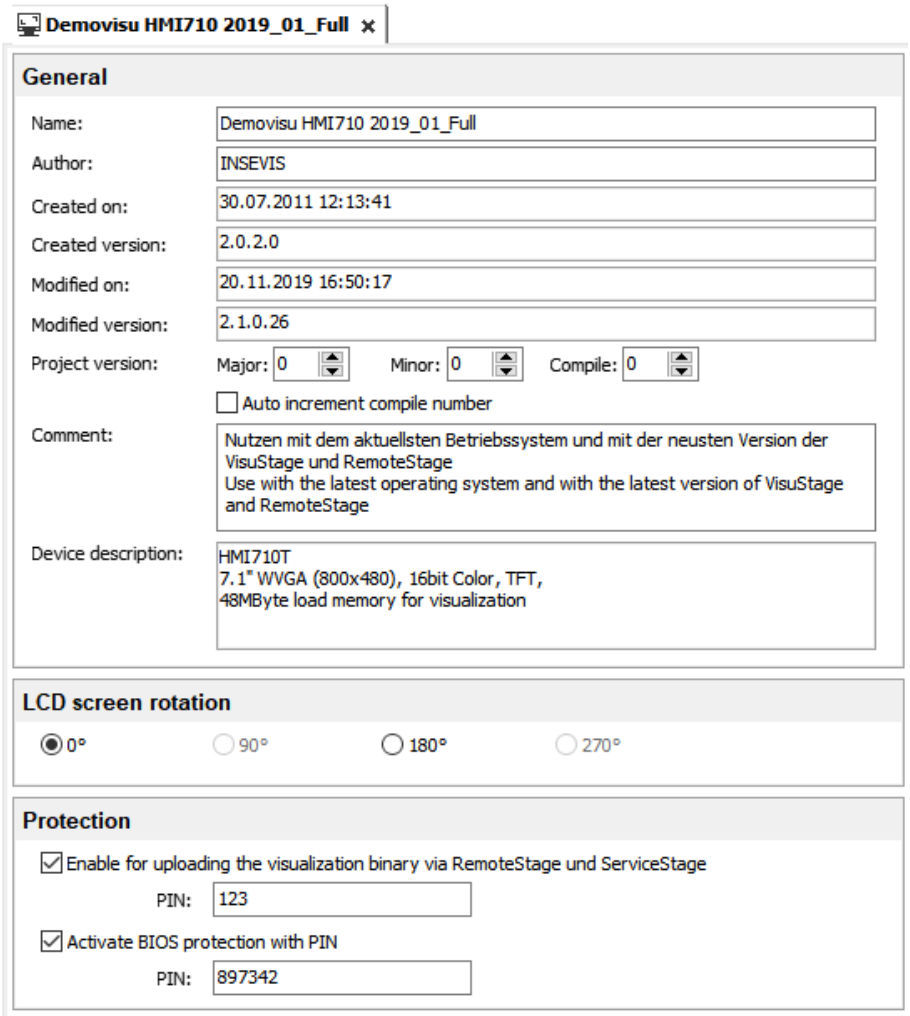
Secures the the vsbin file for upload (must be switched on, in each case with/without entering a PIN)

- into a remote PC (via RemoteStage)
- to a remote PC (via ServiceStage)
- to the micro SD card (for backup)

and (only for HMIs)

- Secures the the BIOS screen by entering a PIN (for access see chapter BIOS)

(upload not available for WebVisu and EDGE HMIs)

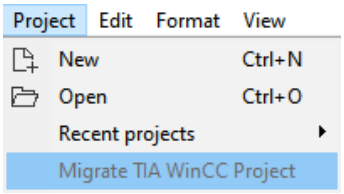


Conversion of third-party visualisations

TIA WinCC visualisations can to a large extent be automatically converted into VisuStage format. This saves the manual import of variables, the creation and linking of pages (menus) and the creation and linking of static and dynamic objects.

Only list objects such as recipe and trend management and the fault message system must then be added manually, as these cannot be converted.

Requirements



1) This function is integrated from VisuStage version 2.1.0.36.
2) However, on the same computer as the VisuStage, the Siemens software tools
   - TIA Portal 14-19.1 (from VisuStage version 2.2.3.0)
   - TIA Openness *

   must be installed on the same computer as VisuStage in order for the conversion function to be activated (not greyed out).
3) VisuStage and Openness (TIA-Portal) must be executed from the same user with the same rights.

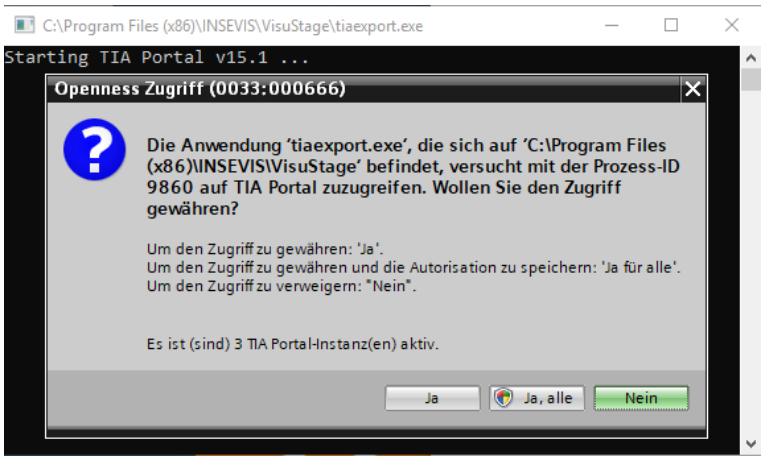


Hint for the correct settings when using the Openness software:
The Windows user must be a member of the "Siemens TIA Openness" group.
Depending on the Windows operating system, please set this assignment as administrator!

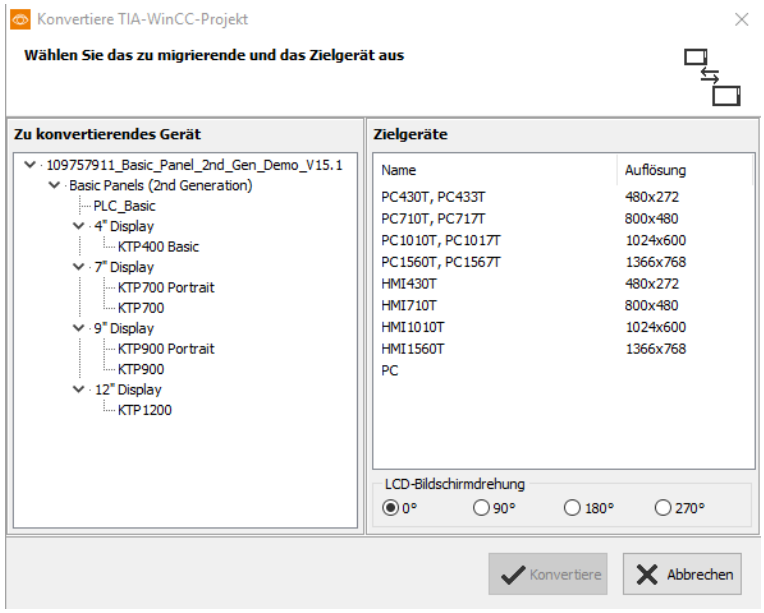
See here for more: https://support.industry.siemens.com/cs/mdm/109773802?c=101778035467&lc=en-DE

Procedure

- A project browser opens under Project → Convert TIA-WinCC Project.
- Open the TIA project with the visualisation to be converted.
- The file "tiaexport.exe" integrated in the VisuStage is opened and automatically started in a DOS window.
  (The DOS window may be hidden, but can be seen in the task bar).
- This program starts the TIA Portal.
- The Openness Firewall recognises the access, which must be granted with "Yes, all"



- A new screen opens for selecting the source and target devices.
- (Make sure that the resolutions of both devices are identical so that the entire visualisation is visible).
- Start the conversion by pressing "Convert".
- The progress of the conversion is displayed in the DOS window.
- (Depending on the size of the visualisation, the conversion may take some time).



Visualization with the software „VisuStage“

Cross reference list: The following TIA WinCC objects are converted into VisuStage screen objects

TIA WinCC „Basic objects“	VisuStage „Static objects“
Line	Line
Rectangle	Rectangle
Ellipse	Ellipse
Circle	Ellipse
Text field	Text
Graphic view	Image

TIA WinCC „Elements“	VisuStage „Dynamic objects“ /„Viewers“
I/O field	I/O field
Button (Mode=“Text“ and Label=“Text“)	Button
Button (Mode=“Text“ and Label=“Text list“)	Text button
Button (Mode=“Graphic“ and Graphic=“Graphic“)	Button
Button (Mode=“Graphic“ and Graphic=“Graphic list“)	Dynamic button
Button (Mode=“Graphics and text“)	Button
Button (Mode=“Invisible“)	Touch area
Symbolic I/O field	Text list
Graphic I/O field (Mode=“Two states“)	State area
Graphic I/O field (except „Two states“ Mode)	Image list
Date/time field	Time/Date field
Bar	Progress bar
Switch (Mode=“Switch“)	Text list
Switch (Mode=“Switch with text“)	Text list
Switch (Mode=“Switch with graphic“)	State area
Slider	Slider
Gauge	Gauge

The following TIA WinCC objects are not supported during conversion.
Either they must be created manually in the VisuStage project or they are not available due to the system.

- „Polyline“ ..... replace by multiple „Linies“
- „Polygon“ ..... replace by „Images“
- „Symbol library“ ..... replace by „Image list“ with single state images
- „Clock“ ..... replace by a digital display at „Date/Time field“
- „Alarm view“ ..... replace by „Message viewer“
- „Trend view“ ..... replace by „Trend viewer“
- „User view“ ..... replace by „Text list viewer“ with the user names
- „Watch table“ ..... this function is currently not available
- „SmartClient view“ ..... this function is currently not available
- „Recipe view“ ..... replace by „Recipe viewer“
- „f(x) trend view“ ..... replace by „Function graph“
- „System diagnostics view“ ..... this function is currently not available
- „Media player“ ..... this function is currently not available
- „GRAPH overview“ ..... this function is currently not available
- „ProDiag overview“ ..... this function is currently not available
- „Critera analysis view“ ..... this function is currently not available
- „Camera view“ ..... this function is currently not available
- „PDF view“ ..... this function is currently not available

Visualization with the software „VisuStage“

Following „Event-Press“ and „Event-Release“ functions are converted into VisuStage button functions:

TIA WinCC functions	VisuStage functions
ActivateScreen	Change screen
ActivatePreviousScreen	Change screen
SetLanguage	Select language
SetTag	Assign value to variable
IncreaseTag	Increment variable value
DecreaseTag	Decrement variable value
SetBrightness	Increment brightness
SetBit	Set a bit
SetBitInTag	Set a bit
SetBitWhileKeyPressed	Set a bit
ResetBit	Reset a bit
ResetBitInTag	Reset a bit
InvertBit	Invert a bit
InvertBitInTag	Invert a bit
ClearAlarmBuffer	Clear the alarm buffer
ClearAlarmBufferProTool (class number = 0)	Clear the alarm buffer
ClearAlarmBufferProTool (class number = 1)	Clear the event buffer
Logoff	Log-Out the user
ActivateCleanScreen	Activate Clean screen
ClearLog	Delete the alarm archive

Visualization with the software „VisuStage“

Creation and management of resources

Resource Device Settings

Assign the target IP-address

- The connection between the PLC and the PC with visualization software „VisuStage“is done by Ethernet S7-communication Put/Get. That´s why it is necessary to enter the IP-address of the target Panel-PLC/HMI to identify the device whereto the visualization should be send.
- **AT HMIs** the IP address of the connected PLC (partner PLC device) is entered, both must be in the same IP address range!

VNC-Server (CPU-T devices only)

- Select to start the VNC-Server always or controlled by variable
- Static / dynamic port number (default port 5900 recommended!)
- Password settings (Needed in VNC-Client/Viewer)
- Content in VNC-Client/Viewer
  - passive (1:1 display only)
  - active (controls the HMI)
  - changeable by variable (e.g. key switch)

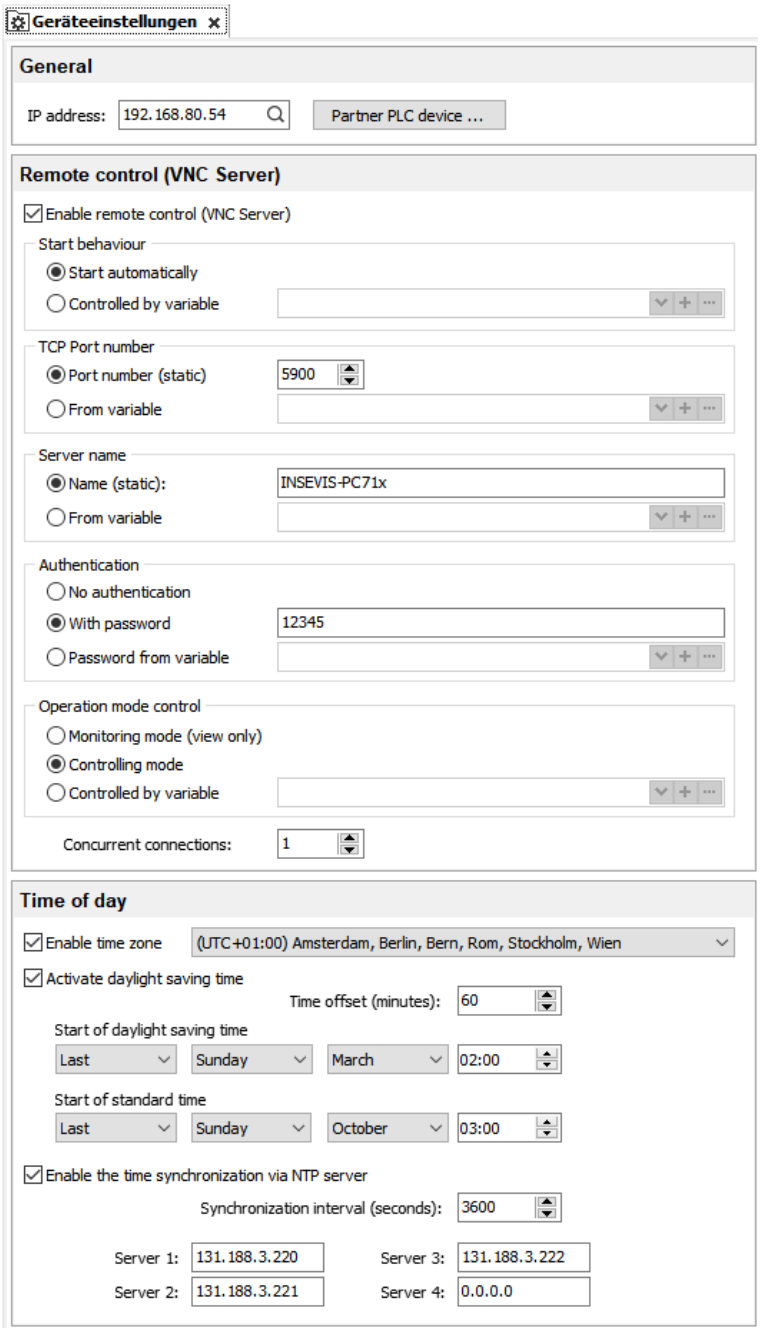
NTP-Server, time zones and daylight saving time (CPU-T devices only)

Activation of a time zone **(for HMIs only, for PLCs the configuration is done in the ConfigStage)**

- The respective changeover dates are entered here.
- The system then adjusts itself automatically. If the unit was switched off during the changeover and the battery had enough float voltage for the real-time clock, the unit adjusts the time itself to the current time during the boot process as of HMI firmware 1.6.3.
- If the unit was switched off for longer that the real-time clock became voltage-free, the time must be set manually.

Using NTP Servers

- NTP servers transmit the Coordinated Universal Time (UTC), which is the basis for calculating your own time.
  In the illustration, 3 TimeServers of the FAU University Erlangen-Nuremberg were addressed (131.188.3.220/1/ 2 correspond to the ntp0/1/2 of the fau.de). **Time settings for WebVisu and EDGE devices are made in Webconfig**



ATTENTION:
Using a VNC-Client/-Viewer as app makes possible a mobile application. The settings of operational and security functions depend on each app.
Every user is responsible for data security by itself! Do not use VNC-Server without authentification and care for access of identified and known devices by yourself
By connecting to the internet it is possible that unauthorized get access to the PLC and they could manipulate it and cause harms. The programmer and final user are responsible for installing and running suitable security actions to provide this unauthorized access.
INSEVIS is not responsible and does not take over responsibility for damages caused by unauthorized access.

Configure a VNC-Viewer/-Client

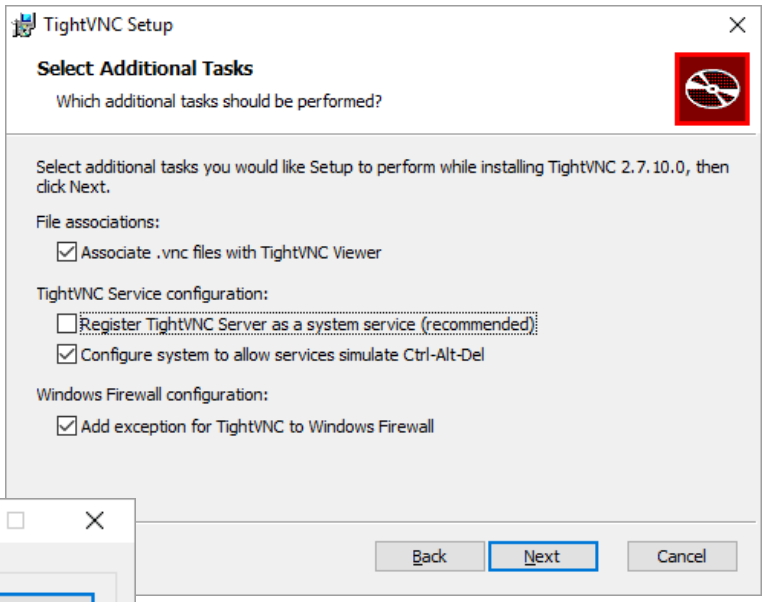
(not available for WebVisu and EDGE HMIs)

When select a VNC-Viewer/-Client care for following issues:

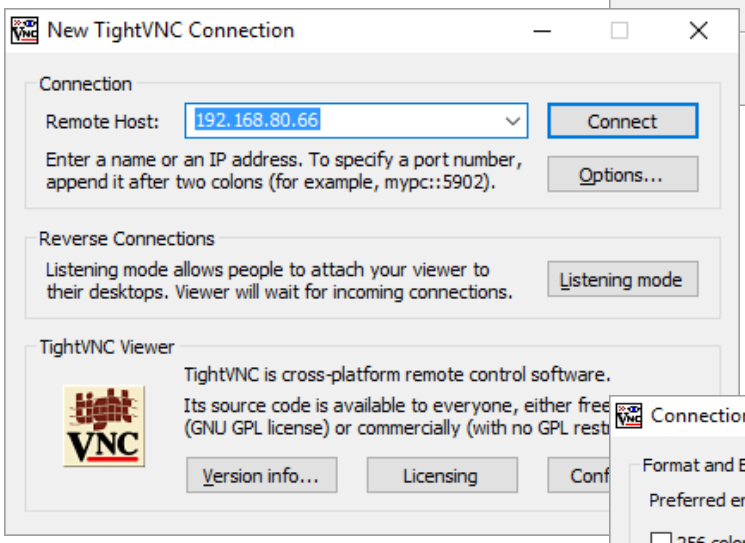
- Supporting RFB V 3.8 with encryption ZRLE, RAW-protocol
- Deselecting of „Clipboard transfer“ (copy & paste for texts)

See a setup and configuration sample for the free **Tight VNC-Viewer** to get the most important settings from installation to remote visualization

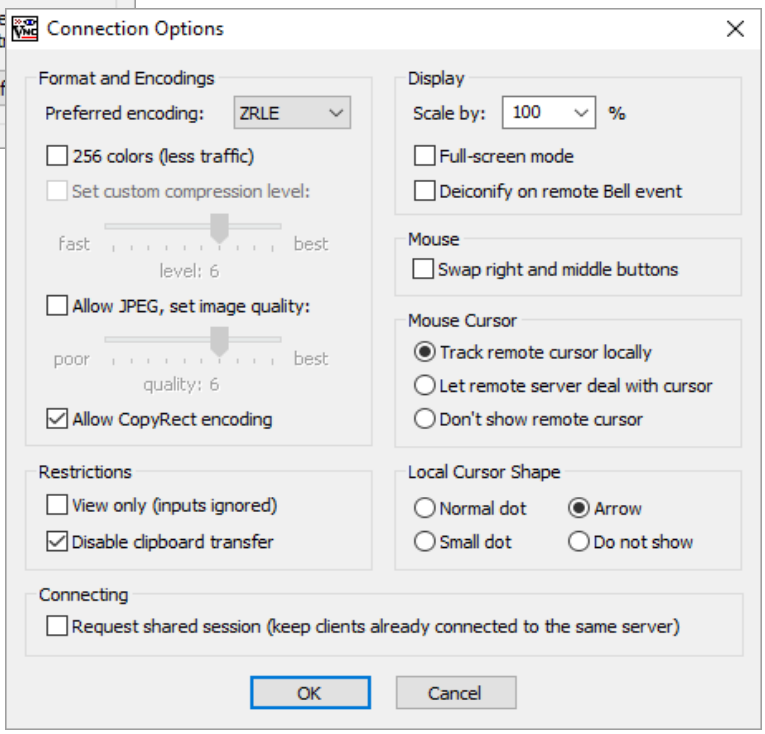
Deselect server function during program setup



Hint: Images are made at installation of Tight VNC-Viewer. This is a free software easy to install and configure, so that we can recommend it.

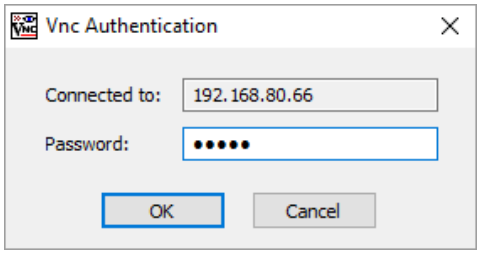


Assign IP-address of the remote devise and go to „Options“



assign “ZLRE-Encoding”
deselect „256 colors”
deselect „Clipboard Transfer“
deselect „Shared Session“

Insert password what was assigned in VisuStage



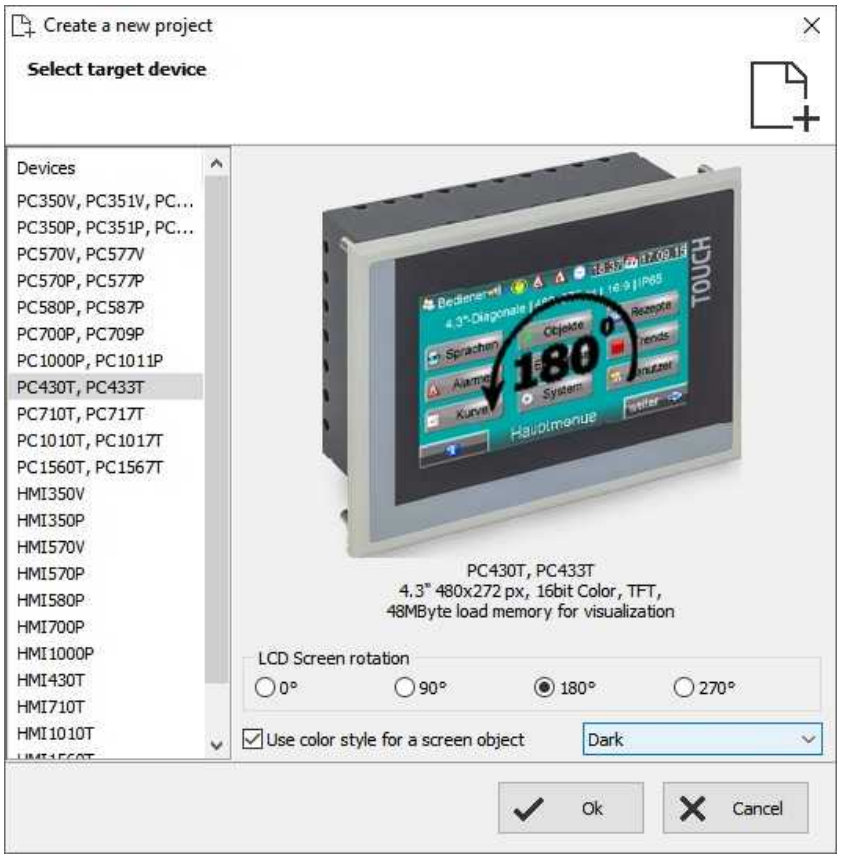
Change screen orientation or resolution

At the menu „Project/change target device“ it is possible to adapt the project to another target system.

This could be:

- other Panel-PLCs or Panel-HMIs from INSEVIS)
- a free resolution for using PC-monitors as remote panel
- other orientations of the same device (in 90-degree-steps for CPU-P-versions only)

This procedure is only made arithmetical and needs manual reconditioning to get an attractive visualization and to reduce the binaries memory size (e.g. font sizes, bottom sizes, etc.).

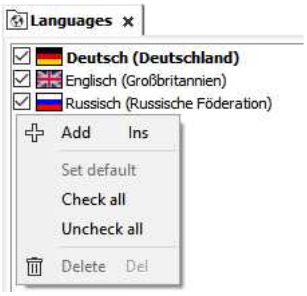


Create and administrate resources

Resource languages

All languages installed on your PC are available for VisuStage-projects. These will be stored as bmp. If an other PC without these installed languages will be used to compile and download to the Panel-PLC/HMI, the missing languages can not not be displayed correctly.

- Add / delete a language: → by right mouse key
- Select the project language: → by right mouse key opens up a pull down menu
- Select a reference: language (marked bright) → by right mouse key „Set default“





Hint:
Text- and image resources are connected to the language, where they were assigned/imported. If this language is deleted, all (text- and image) resources will be deleted after confirming it in a confirmation window.

Resource variables

Beside the manually input of variables there are 2 better opportunities to import S7-variables from the S7-program

1) Import the variables by the system data file (*.sdf) of Simatic®-Manager

(without symbols)

- Create a S7- symbol table by the Simatic®-Manager
- Import it as a variables list **(importable in sdf-file format)** by:

  → Extra

  → Import

  → Variables

2.) Import the variables directly from the DBs of the S7-project

(including symbols)

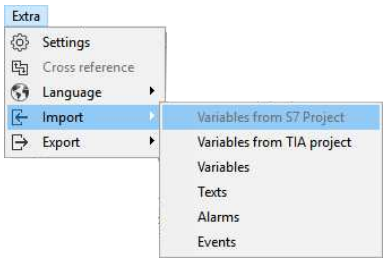
- Start it by

  → Extra

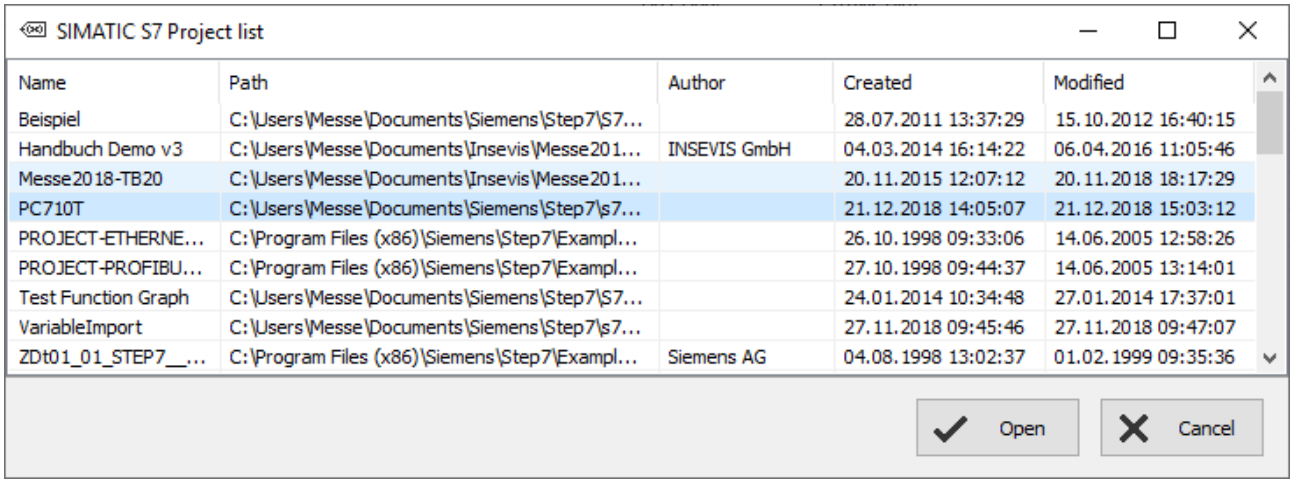
  → Import

  → Variables from S7-Project

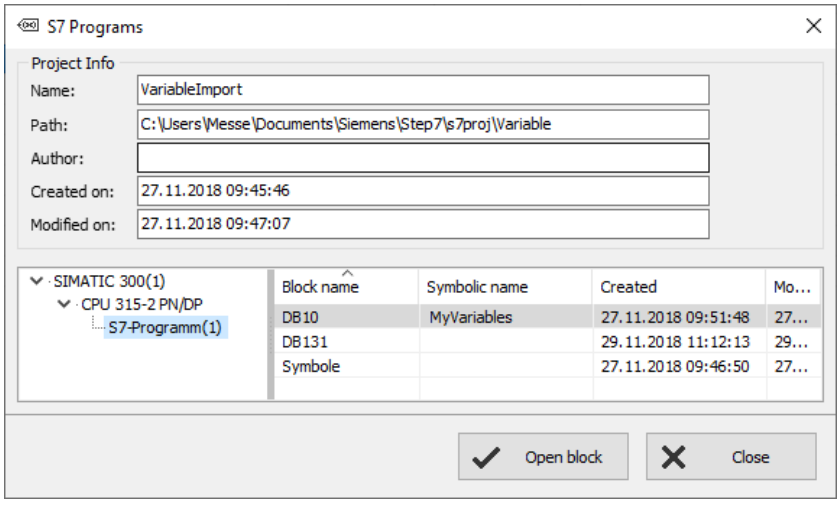
  (Simatic®-Manager must be installed on this PC)



- Mark and open the corresponding project



- Choose the required data blocks from the S7-program list **(no instance data blocks).**



- Mark the required variables (also multiple) and import it.

VIDEO-Tutorials available Therefore is a **VIDEO** available in the VisuStage-Playlist at the INSEVIS YouTube®-channel „INSEVIS EN“.

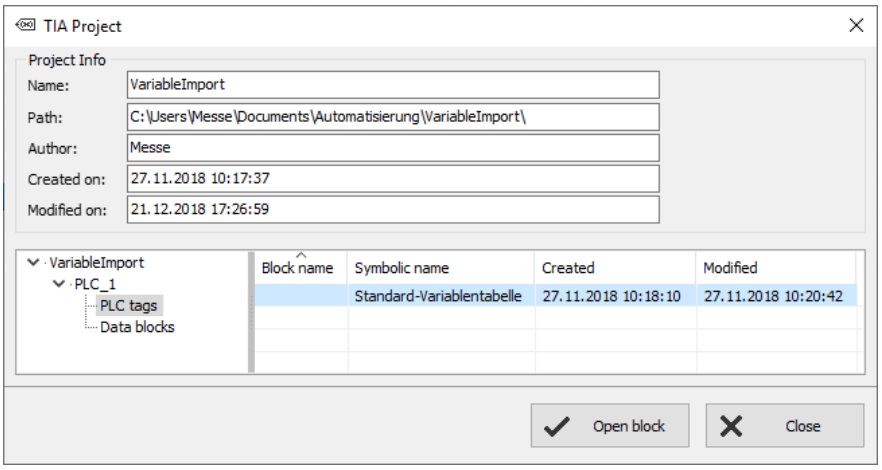
3.) Import the variables directly from the TIA®-project (including symbols)

3.1) Import the variables directly from S7-3xx-CPUs from TIA®-project

With VisuStage version 2.1.0.27 projects from TIA®-Portal versions 13...16 can be imported.
TIA®-Portal does not need to be installed on this PC, just only TIA®-project must be closed while importing.

- Start it by
  → Extra
  → Import from TIA®-project

Than a window opens to select the TIA®-project.

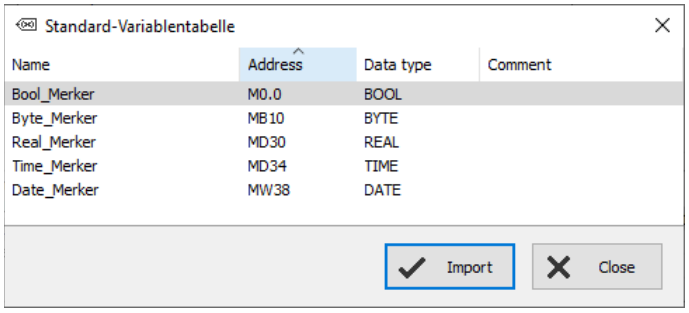


SELECTION

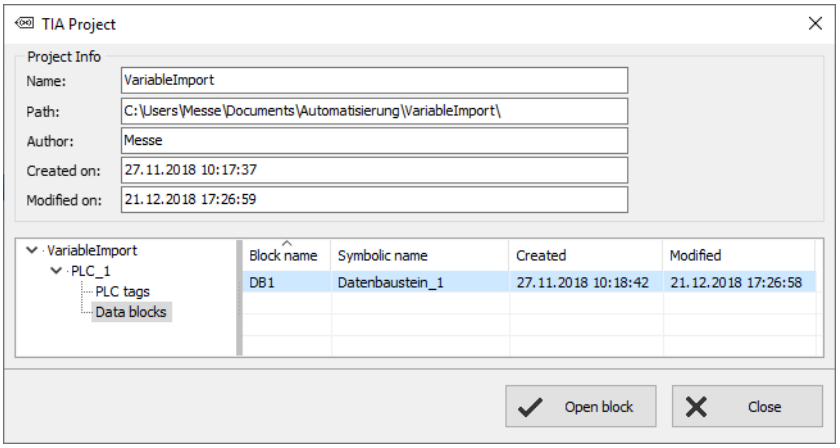
→ of the **Station** (here INSEVIS SPS)
→ and than of the **CPU** (here PLC_1)
and than

EITHER
of the **symbol table** (here SPS-Tags)

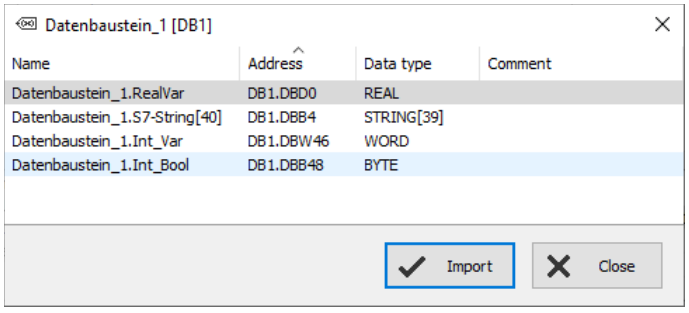
1. In the right window all variable tables will be displayed
2. Open up a variable table and see all existing variable lists.
3. Selection of the variable lists by marking (multiple marking by Shift or Ctrl)
4. Import the selected variable lists



OR
of the **data blocks** (here Data Blocks)



1. In the right window all data blocks will be displayed
2. Selection of the data block by marking (only single blocks)
3. Open a data block
4. Selection of variable from a data block by marking (multiple marking by Shift or Ctrl)
5. Import the selected variables from the data blocks

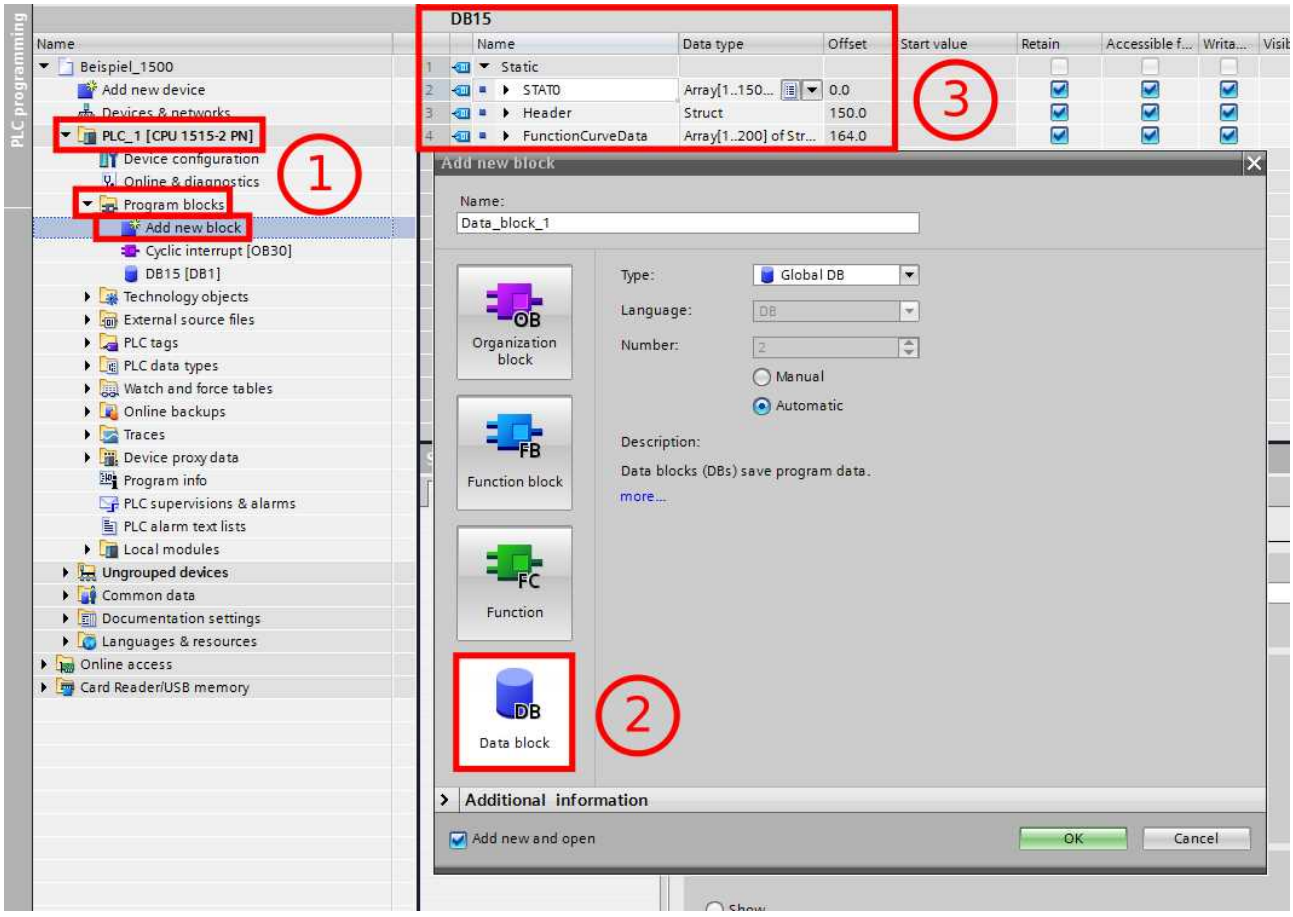


3.2) Import the variables directly from S7-12xx and 15xx CPUs from TIA®-project

To import variables from projects which are based on CPUs from the 1200 and 1500 series they have to be stored inside a data block.

To achive this execute the following steps in your TIA project:

1. Select your CPU -> Program blocks -> Add new block
2. Select in the opened menue the type "Data block" and enter a name.
   Press OK to create the data block
3. In this new data block you can now create variables with name, data type and offset which can later be imported into the VisuStage.

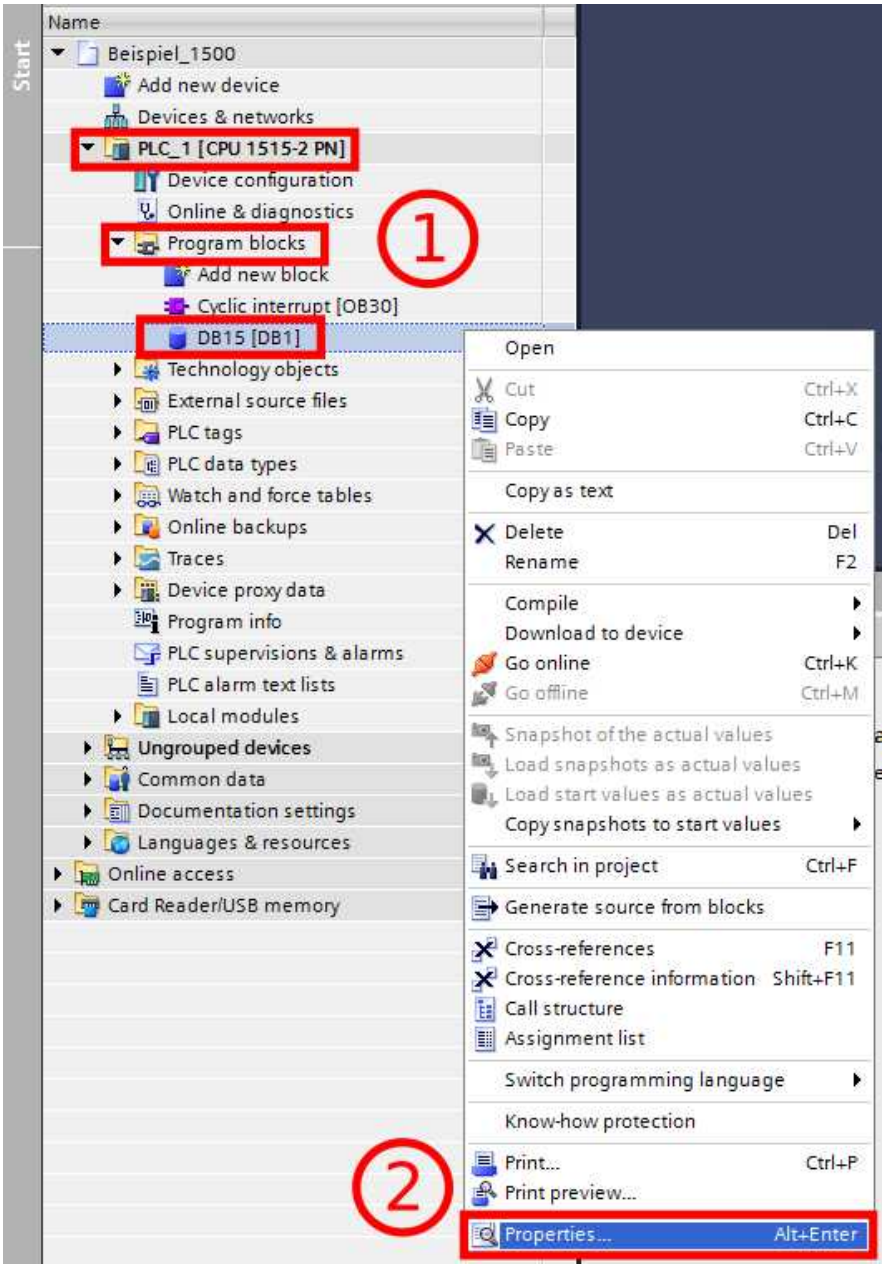


Visualization with the software „VisuStage“

To ensure a flawless communication between RemoteStage and S7-CPUs 12xx / 15xx, the block access must not be optimized. (only for S7-12xx and 15xx)

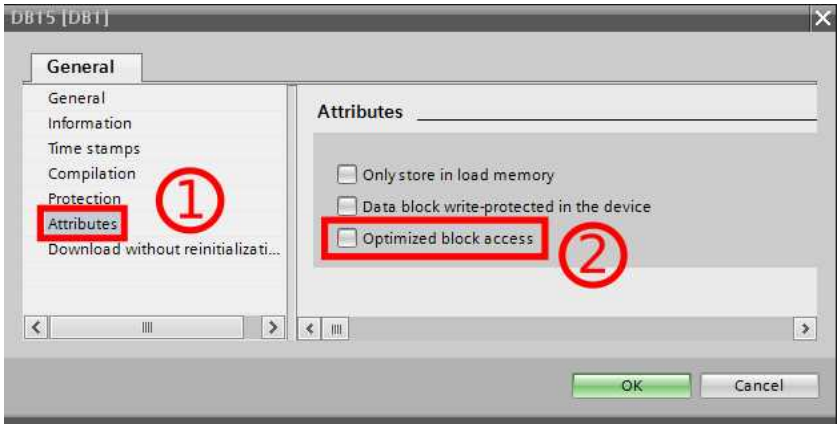
To achive this execute the following steps in your TIA project:

1. Select your CPU -> Program blocks
2. Do a right click on the concerning block and select "Properties..."



Execute the following steps in the opened window:

1. Select "Attributes"
2. Deactivate the option "Optimized block access"



In following cases VisuStage wants a confirmation before it starts a variable import:
- A variable with the same name exists already, but with another address or data type
- A variable with the same address exists already, but with another name or data type
- A variable with the same name and address exists already, but with another data type



ATTENTION:
When VisuStage overwrites the variables, the connections between variables and its objects will be kept.
When deleting the variables manually these connections will be deleted as well.

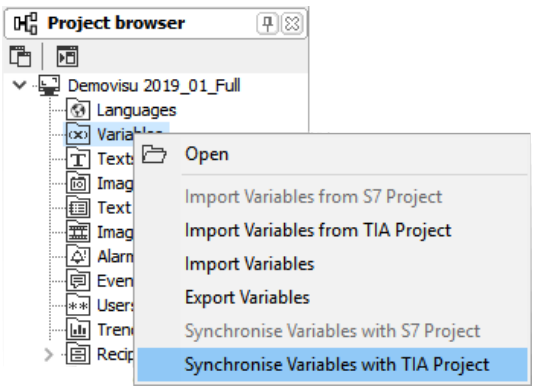
The **Export** of the variables is done in the same formats as well:
- sdf- file format (System data format, variables only), or in
- sym- file format (Symbol table format with variables and data blocks)

Synchronization of variables with TIA®-Portal/ Simatic®-Manager

By inserting, deleting and other manipulating of S7-variables in programming systems TIA®-Portal and SimaticManager the absolute addresses in referring S7-programs change. To synchronize these changes easily with the variables in the VisuStage-project as function „Synchronize with S7 /TIA® Project “ is available.

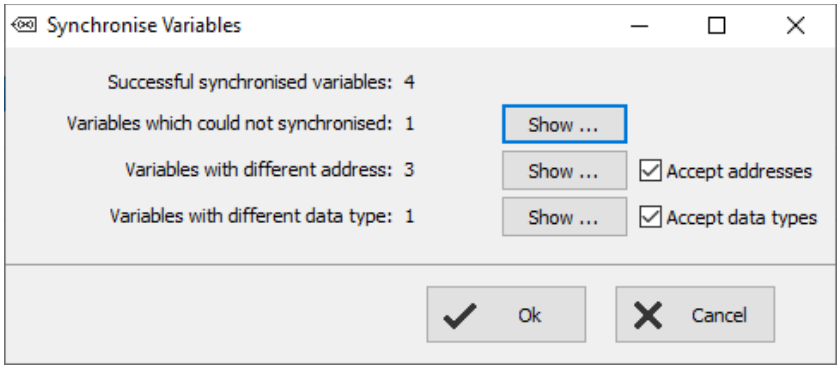
Go to resource „Variables“ or
directly into table of variables

- right mouse key opens Pull-Down menue
- if Simatic-®Manager is installed on this PC, synchronization with S7-Projects is possible
- to synchronize with TIA® projects insert the path to this project (It must be compiled and closed before)
- all variables of the VisuStage project will be detected and synchronized with S7/TIA now



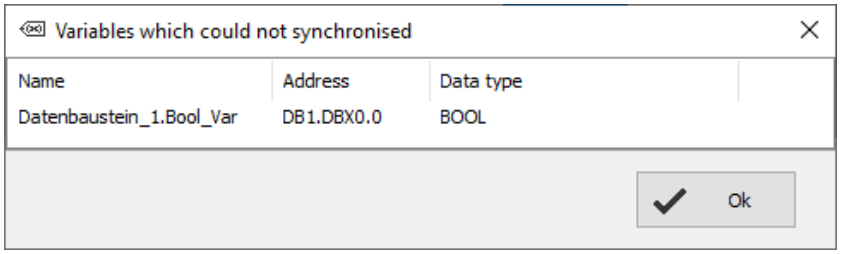
As result a synchronization table will be displayed, where

In the 1st line
- Successfully synchronized variables (without differences – where nothing was changed) are mentioned/displayed only.
- There is nothing to do for that variables, just for your information.



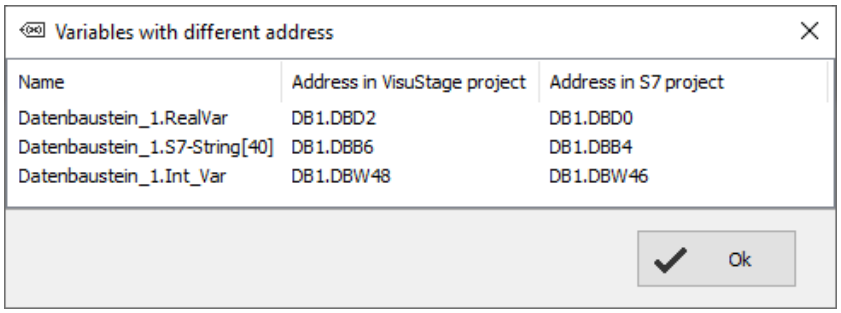
In the 2nd line:

- Not synchronized variables (where the symbolic variables name was not available in the S7-/TIA®-project) are mentioned/displayed only.
- These must be **deleted manually**, to keep the overview (First delete the connection in the visualization, otherwise you will earn compile errors)



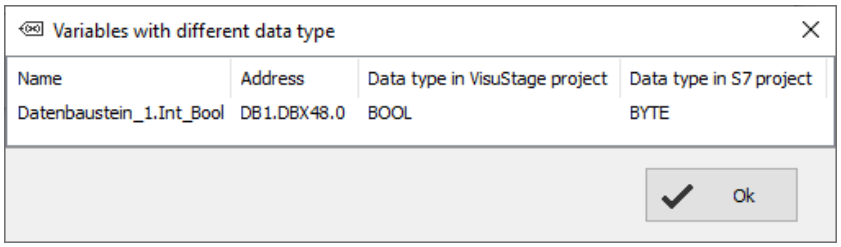
In the 3rd line:

- variables where at least the absolute address (or also the data type) was changed in the S7-/TIA®-project will be displayed.
- This is a proposal for modification only and **must be accepted** by checking a hook in the check box, than all these variables will be synchronized with referring variables in VisuStage-project automatically.



In the 4th line:

- variables where only the data type was changed in the S7-/TIA®-project will be displayed.
- This is a proposal for modification only and **must be accepted** by checking a hook in the check box, than all these variables will be synchronized with referring variables in VisuStage-project automatically.



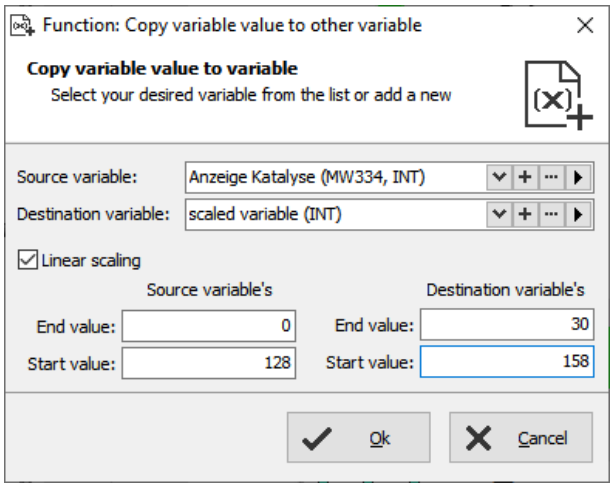
If there was created new variables in S7-/TIA®-project, import them or add it manually new.

Internal variables

These variables are available internally to the visualisation and are listed in a separate tab.

Using the key function "Copy variable value", the values of these variables can be transferred to PLC variables and vice versa.

With indirect variables, e.g. linear scaling is possible through this function (see picture on the right).



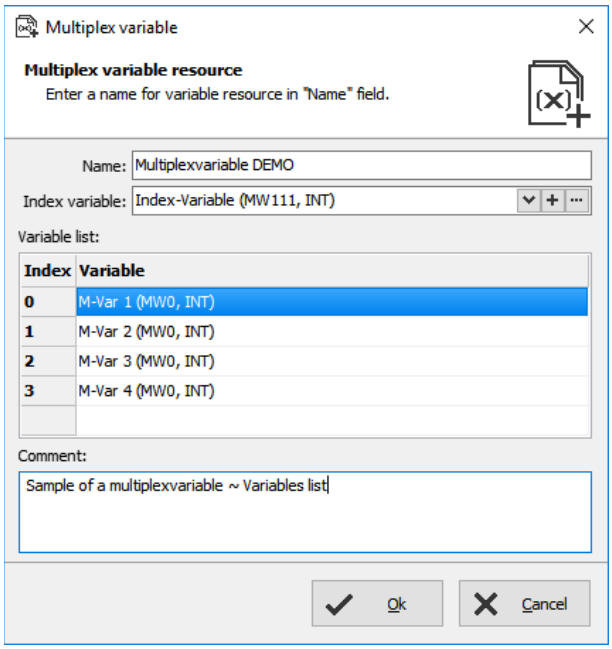
Multiplex variables (variables list)

With multiplex variables it is possible to use one I/O-field multiple times. Depending on the value of the index variable only the pre-assigned and referring the multiplex variables will be showed at run time.

At the resource “Variable”, at the rider “Multiplex variables” can be created (see sample right beside). It work similar to text- and image lists, but only with variables.

Only whole-number variables will be accepted as index variable, the variables in the variable list are free (STRNG-types are not to mix with other types). It also can be DBs, Merkers, inputs or outputs.

Index	Variable
0	Variable (DB1.DBW0, INT)
1	Variable1 (DB4.DBW10, INT)
2	Variable2 (DB10.DBW0, INT)



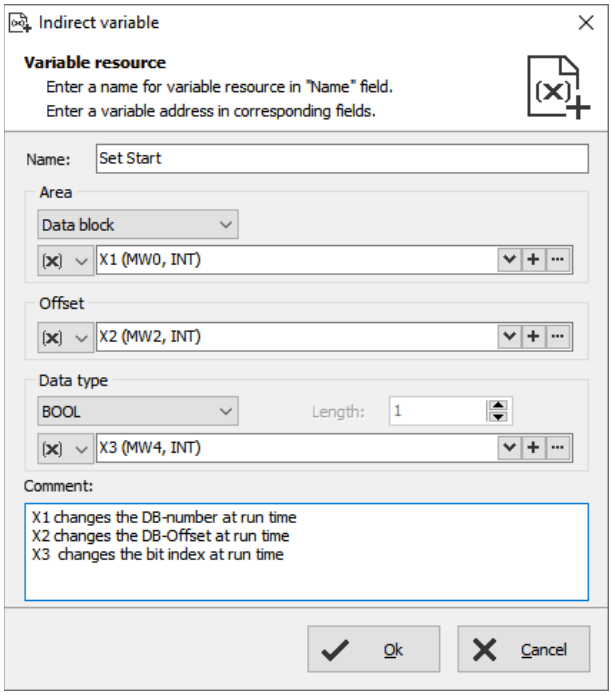
Indirect variables

(not available for WebVisu and EDGE HMIs)

Alternatively to the Multiplex variables (quasi the list of variables) the number of variables can be reduced by far, if the address range can be manipulated individually at run time by one or more variables.

The indirect variables allow by help of one or more variables a multitude of memory cells in the address range of the PLC. These variable memory areas can be written or read out, without defining a fixed variable for each before.

Sample with data type BOOL



Fix addressed
(512 variables)

DB 0 DBX 0.0
DB 0 DBX 0.1
…
DB 0 DBX 0.7

DB 0 DBX 1.0...7
DB 0 DBX 2.0...7
…
DB 0 DBX 6.0...7
DB 0 DBX 7.0...7

DB 0 DBX 0...7.0...7
DB 1 DBX 0...7.0...7
…
DB 6 DBX 0...7.0...7
DB 7 DBX 0...7.0...7

indirectly addressed
(4 variables)

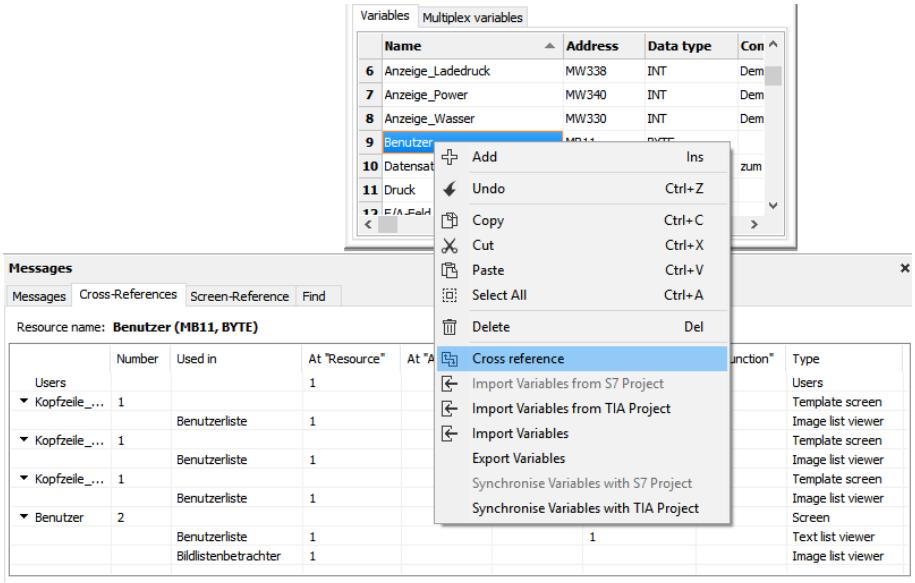
DB X1 DBX X2 . X3
X1 = 0...7
X2 = 0...7
X3 = 0...7

Visualization with the software „VisuStage“

Cross references for variables

To keep the overview about the variables used in the project, there is a function „Cross reference“ (mark a variable and use right mouse button). All variables will be displayed referring to their usage in resources or in menu objects.

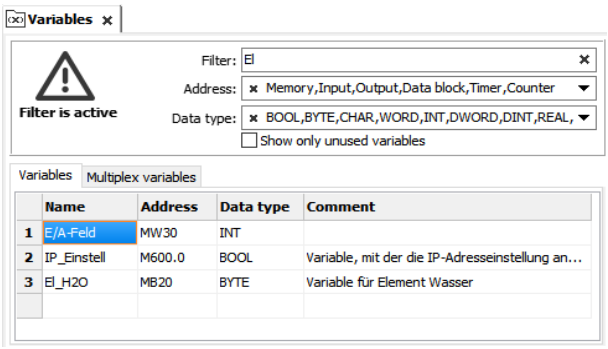
By a double click on an item you get automatically into the menu, where it is used. For sample the “Benutzer” variable was used. Close/open the message window by key „F6“.



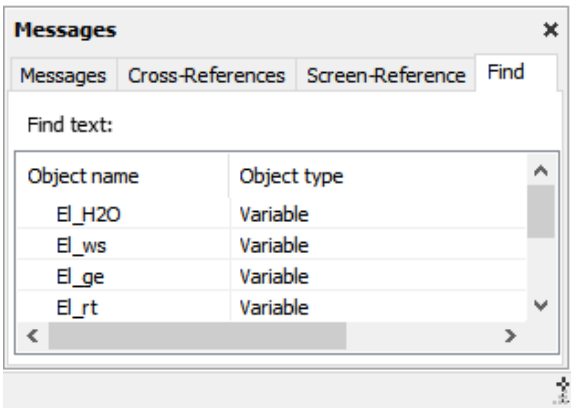
Set filter or find variables

Variables can be filtered for:

- Name
- Address- and
- Data type

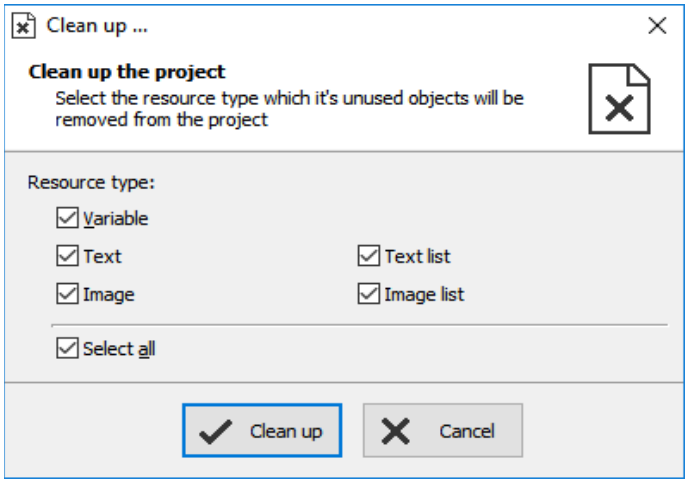


The result is shown in the message window (show/hide with key „F6“)



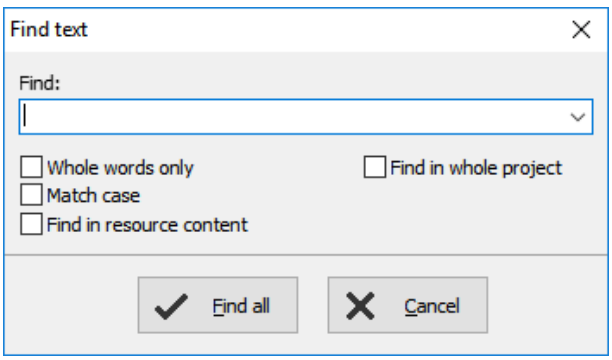
Clean up unused variables

Delete unused resources with the „CleanUp“-function at the rider „Edit“ and keep your project small and simple.



Find variables by text phrases

Find resources with the „Find“-function <CTRL+F> at the rider „Edit“ to keep an overview.

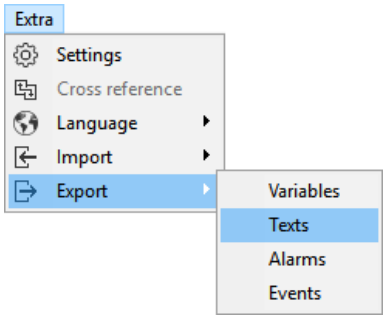


Resources Texts and Text lists

Texts

Will be created in the project language and can be imported or exported as a csv-file
(This helps for external translation.)

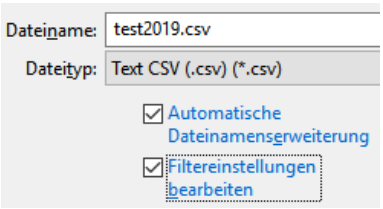
- Export by:→ Extra → Export → Texts
- Choose the languages to be exported
- select your csv-format and save the csv-file.
- Open/import it with a table calculation program (csv-settings must be the same!)
- Edit the text while keep the structure as it is (no cells may be removed or added!)
- Import by → Extra → Import → Texts



In the first lines there are system texts. Is a text created in the project language only and not in another language, it will be displayed in all other language as it was created in the project language (see line 5).

INFO

Hint:
If import is failed, your table calculating program removed the field delimiters or text separators. To prevent this, do „Save as“ and activate the „Assign filter settings“ function.



Hint: at some Windows7 installations it is necessary to check “Quote / Set All text cells”



Text lists

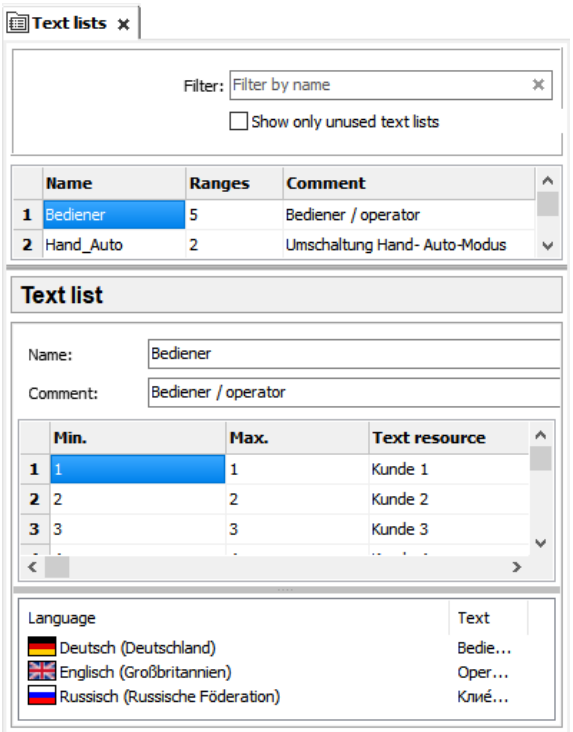
(when different texts should be displayed depending on a variable, e.g. in the user administration - operator, master etc.)

Will be created manually

- first define the list,
- than add existing text resources or create new ones
- than add limiting values **(Min/Max)** for each element of the text list

or

- mark multiple texts in resource “texts”
- press right mouse button and select “create text list”
- than add limiting values **(Min/Max)**
- and add a **name**



Caution

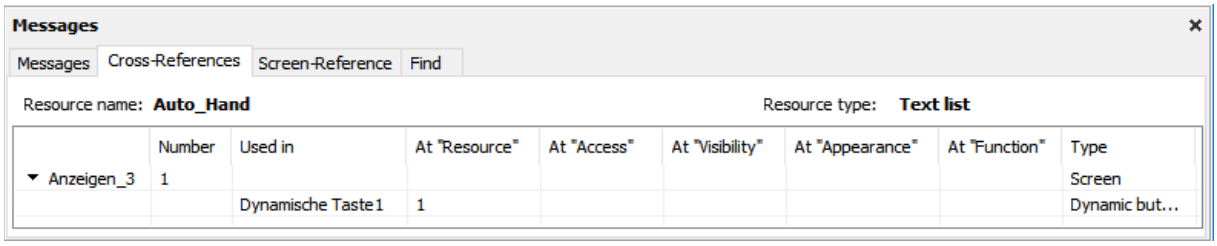
ATTENTION:
If there is active another value as these what are assigned in line 1...n, than ALWAYS this text resource will be displayed, what is assigned FIRST (in first line / line 1).

Visualization with the software „VisuStage“

Cross references for texts / text lists

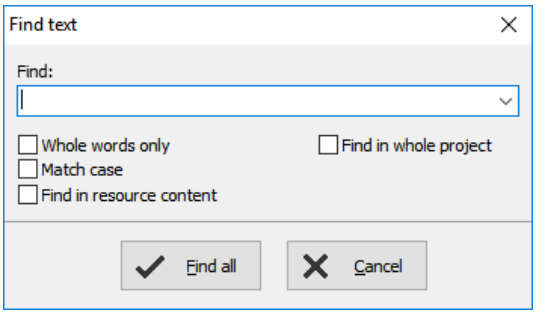
To keep the overview about the texts/ text lists used in the project, there is a function „Cross reference“ in the resource pool. (Go to resources Text/ text list, mark a text/ text list and use right mouse button). All texts / text lists will be displayed referring to their usage in resources or in menu objects.

By a double click on an item you get automatically into the menu, where it is used. Close/open the message window by „F6“.



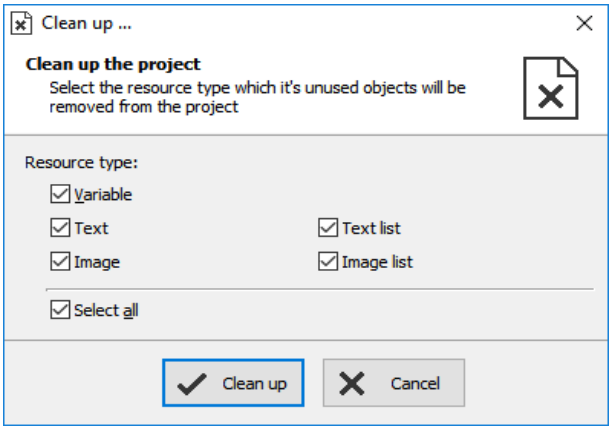
Find texts / text lists by text phrases

Find resources with the „Find“-function <CTRL+F> at the rider „Edit“ to keep an overview.



Clean up unused texts / text lists

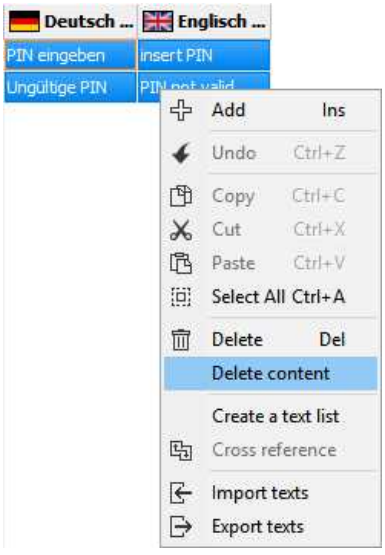
Delete unused resources with the „CleanUp“-function at the rider „Edit“ and keep your project small and simple.



Delete single text contents in text resource list

It is possible to delete single text contents in the text resource list.
Mark the desired cells by mouse and click right mouse key.
With “Delete content” the content of these cells will be deleted.

Alternatively:
If you press the “delete”-button of your keyboard the marked text resources will be deleted completely.



Resources Images and Image lists

Images

INSEVIS delivers some sample images with the VisuStage.
Creating own images is a child´s play by any free software.

- Recommended file format: PNG because of the transparent alpha-channel.
  Substitute a color by transparency and save the image as PNG (Interlaced / Automatic recommended).
- Images of the project-language will be used for all other languages as well
  → shown half transparency
- It is possible to use other images in other languages instead the image of the project language
  → by right mouse key assign a new one and it will be shown with full color

Image lists

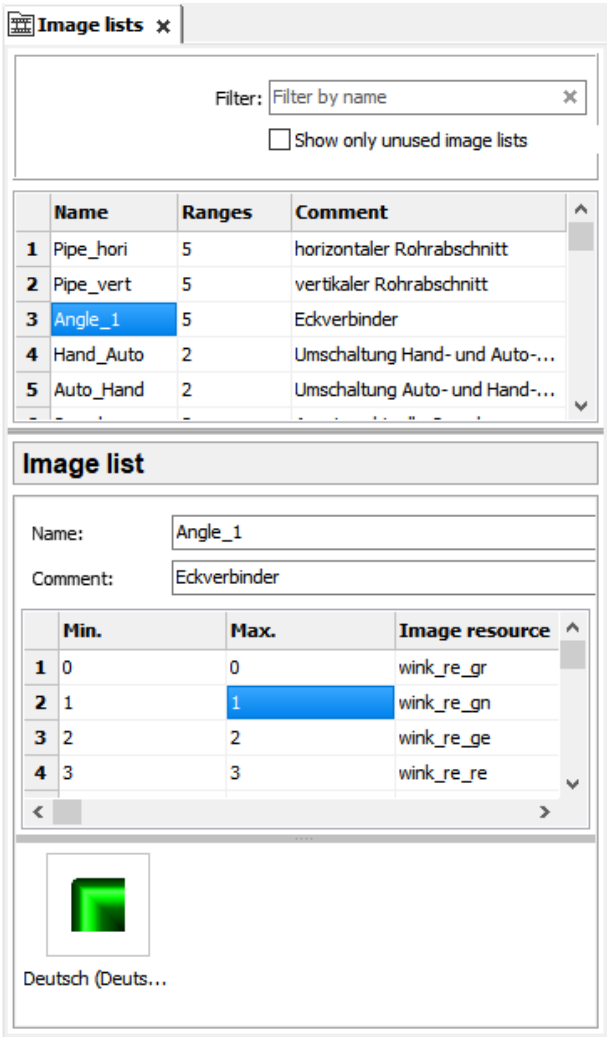
These lists are the best tool for color changes of an object or toggling images caused by changing variable values.

Will be created manually

- right mouse key in the field **Name**,
  (add the new name of the image list)
- Add limiting values for each element of the image list
- Assign an existing image resource,
  (or add a new one in this field directly)

or

- mark multiple images in resource “images”
- press right mouse button and select “create imagelist”
- than add limiting values **(Min/Max)**
- and add a **name**



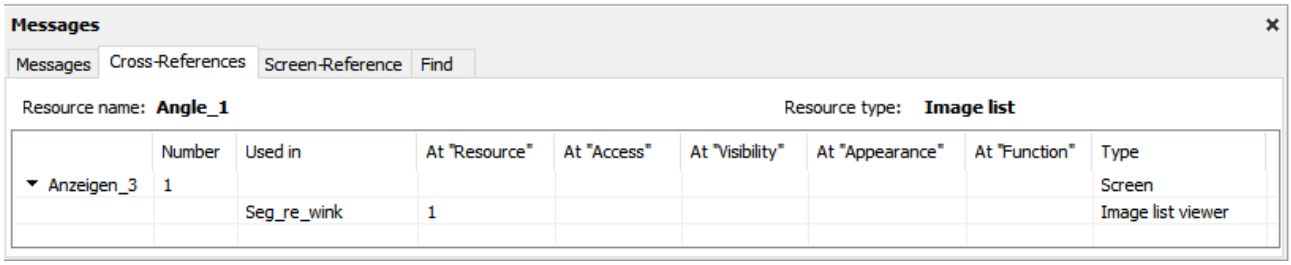


ATTENTION:
If there is active another value as these what are assigned in line 1...n, than ALWAYS this text resource will be displayed, what is assigned FIRST (in first line / line 1).

Cross references for images / image lists

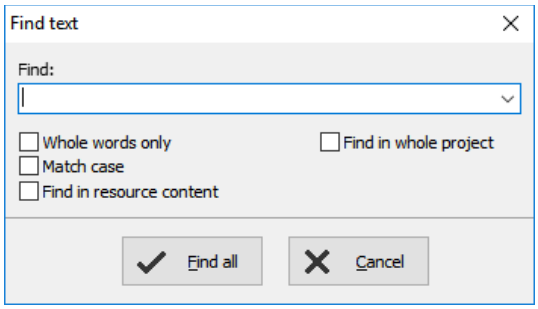
To keep the overview about the images / image lists used in the project, there is a function „Cross reference“ (mark a image / image list and use right mouse button). All images / image lists will be displayed referring to their usage in resources or in menu objects.

By a double click on an item you get automatically into the menu, where it is used.
Close/open the message window by key „F6“.



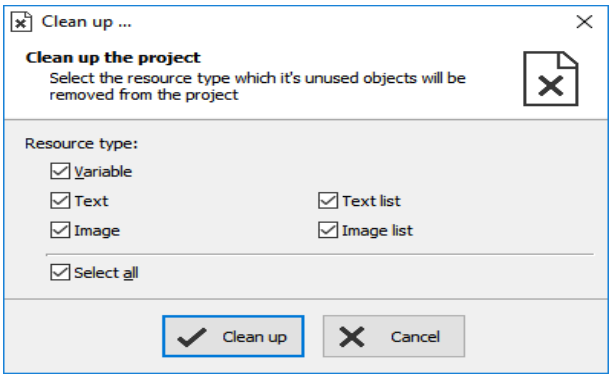
Find images/image lists by text phrases

Find resources with the „Find“-function <CTRL+F>
at the rider „Edit“ to keep an overview.



Clean up unused images/image lists

Delete unused resources with the „CleanUp“-function
at the rider „Edit“ and keep your project small and simple.



Multiple replacement of resources

If you organize your symbolic stringently you can swap multiple resources

- Variables,
- Texts,
- Text lists,
- Images,
- Image lists.

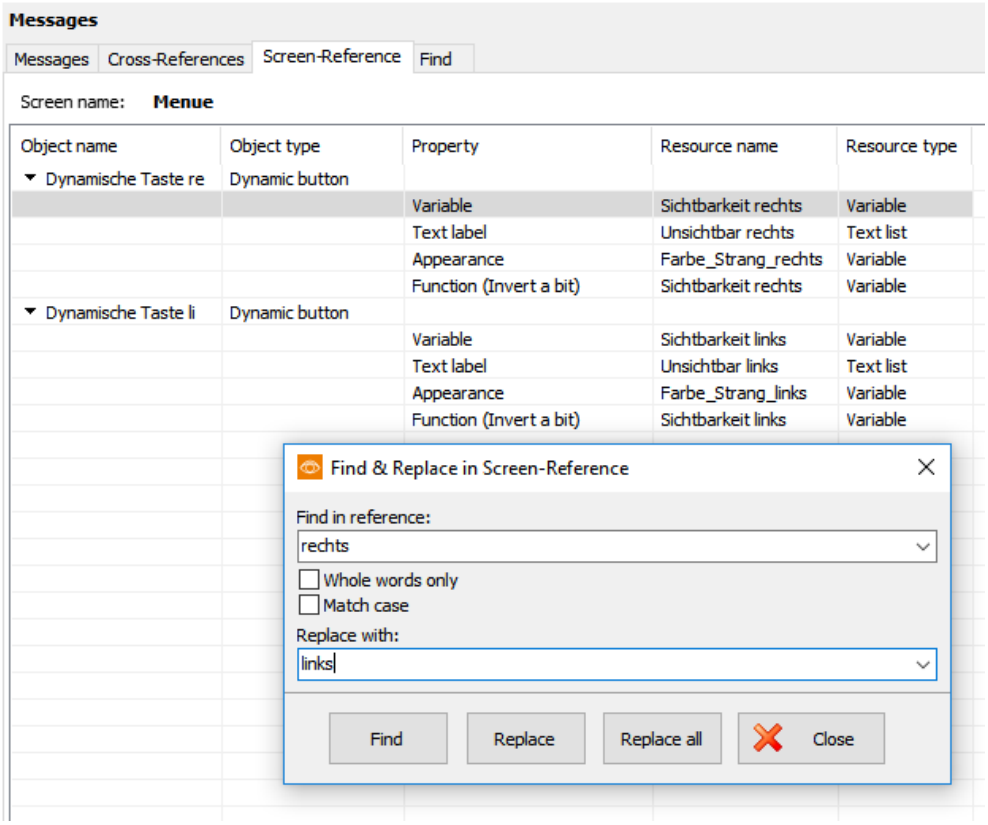
If they have similar symbolic phrases in their name.

In the sample on the right a „Dynamische Taste re“ is described with different properties by different resources „*** rechts“.

After copying an object like this it is necessary to swap all resources at the new copied object step by step. This needs time while multiple copying.

The function „Find & Replace“ allows a fast swapping.

Click with the right mouse key directly on the screen background (not on an object!), than select “Show references” and the message window opens up (close with F6, refresh by closing and re-opening)



There all resources such as with „rechts“ in their name will be replaced into others like such as with „links“ in their name.
(… but only, if you organized you symbolic stringently ...)

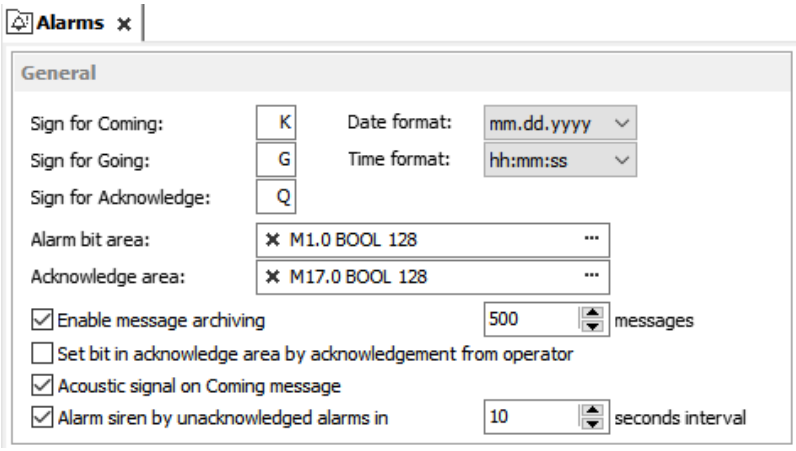
Resource Messages (Alarms and Events)

Alarms / Events

It can be processed
- with CPU-V 128 alarms and 128 events
- with CPU-P/T 1024 alarms and 1024 events

It can be archived messages
(each: alarms and events). in total:
500 for (CPU-V/-P-devices)
or 50.000 (for CPU-T, WebVisu and EDGE-HMI devices)

(These archives can be deleted from Micro-SD-card
by a VisuStage button function)



- Can be imported or exported as a csv-file (This helps for external translation)
- Import by → Extra → Import → Alarms / Events
- A new creation proceeds in project languages set default before.
- To archive it enable message archiving by a check mark and insert a micro-SD-card (Archiving is done in a binary fil format. RemoteStage converts this binaries into csv, alt automated in batch files) With WebVisu and EDGE-HMI, archiving takes place internally without an SD card
- Acoustic signal means a single sound by an internal buzzer. Not for WebVisu and EDGE HMIs.
- Alarm siren means an one-second-sound of the internal buzzer, what is played once between 10 and 600 seconds. Not for WebVisu and EDGE HMIs.

Alarm-(Event-) Bit area (Trigger bit address area)
is 128 bit at CPU-type V and 1024 bit at CPU-type P/T, WebVisu and EDGE-HMIs
and must be in a row without gaps!
Each bit belongs to a message (alarm/ event) (bit 0 to Alarm/Event 1, bit 1 to Alarm/ Event 2, etc...)

The message state can be controlled by the S7-Program by a bit from this area.
With bit=1 this message appears as „coming“.
With bit=0 this message will be interpreted as„going“.

Acknowledge bit area (only for alarms)
is 128 bit at CPU-type V and 1024 bit at CPU-type P/T, WebVisu and EDGE-HMIs too
and must be in a row without gaps!.

Each bit belongs to an alarm (bit 0 to alarm 1, bit 1 to alarm 2, etc...)

The alarm state can be controlled by the S7-Program by a bit from this area.
With bit=1 this alarm appears as „acknowledged“.
With bit=0 this message will be interpreted as „not acknowledged“.

Both areas may not overlap each other (error message appears at compiling)



ATTENTION:
The block for Trigger- and Acknowledge areas **MUST EXIST** in the PLC and must have at least that size 128/1024Bit, otherwise messages will not be displayed!
If the acknowledge bit is **activated**, it must be **reset** in the PLC after a while, otherwise the next of these alarms appears as „acknowledged“.
If it is **not activated** and you create and use a visualization with the RemoteStage there will be set no bit in the PLC when you acknowledge the alarm on the RemoteStage-visualization and on any other panels/HMI this alarm stays **not acknowledged** there.

Alarm/ Event-Message box

Alarm messages

	Deutsch...	Englisch...	Russisch ...	Group	Trigger bit address	Acknowledge bit address	Variable
1	Alarm 1 hat a...	Alarm 1 trigg...	тревога 1 нога...	1	M1.0	M17.0	
2	Alarm 2 hat a...	Alarm 2 trigg...	тревога 2 нога...	2	M1.1	M17.1	
3					M1.2	M17.2	

- Alarms of the same **Group** are acknowledged together
- Alarms of Group 0 are acknowledged **automatically**.
- **Trigger bit / Acknowledge bit areas** are displayed for better information only and are not changeable in this view!
- An additional **variable** *(only for Panel-PLCs not for Panel-HMIs,* WebVisu nnd EDGE-HMIs *)* offers to display a dynamic optional error code as decimal number.
  (e.g. an calculated value of an special factor for customers needs as decimal number)
  → This is not a trigger variable for the message!
- Events can be displayed ascending or descending in the archive viewer
- By “Variable” a variables value (INT or REAL with (fix) 2 decimal places) can be displayed at the end of the message line.
- Like at the text resources it is possible to delete single text contents in the alarm / event message box.
  → Mark the desired cells by mouse and click right mouse key.
  → With “Delete content” the content of these cells will be deleted.
  Alternatively:
  → If you press the “delete”-button of your keyboard
  → the marked text resources will be deleted completely.

Resource User administration

(not for WebVisu and EDGE-HMI)

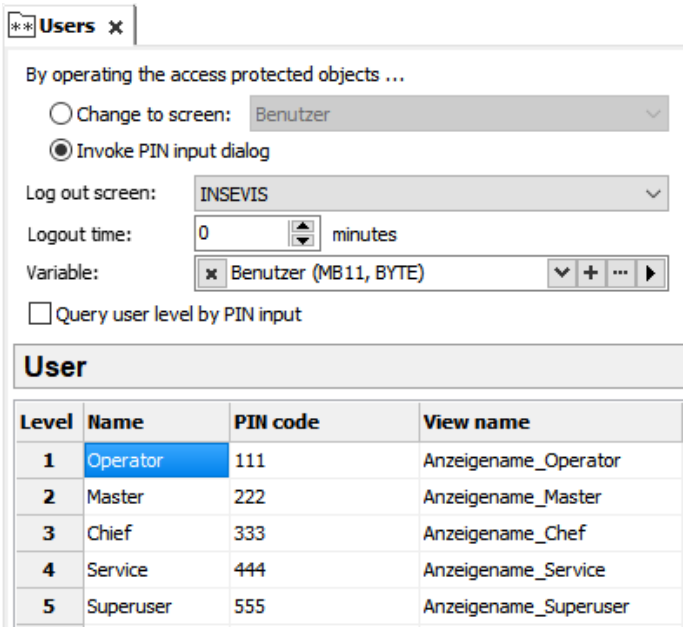
There can administrated be up to 9 users with passwords by 8 digit - PIN-codes. Users with level 9 have all access rights, those with level 1 have least access rights.

In the upper mask can be assigned

- the target screens, whereto the project should change after login/ logout or if there shall be called the PIN-input dialog directly after touching a button with access rights.and
- an automatic logout time (in minutes). (With logout time 0 is assigned no automatic logout.) and
- a variable, what informs the PLC, what user level is active yet and
- an additional query to identify the user level before PIN input

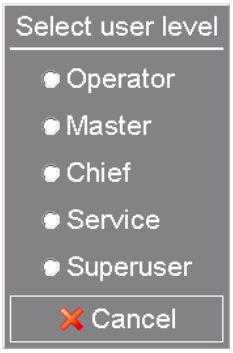
In the lower mask can be assigned

- the user names and PIN-codes of each levels (1...9).
- A new user will be added by entering its name and PIN-code
- The “view name” (multilingual resources, what displays the present user name by using system variable $(CurrentUserViewName) in text fields (only CPU-T-devices) see sample visualization



“Query user level by PIN input

Just before entering PIN code it is possible to activate a identification mask, where the user enters his level.



All lines can be displayed single-lingual or -by selecting different text resources- multi lingual in every project language. To be assigned at the resource “Dialogs / user level select”



Hint:

- The target menu screen after successfully log in will be assigned at the dynamic object „**PIN-input field**“
- With the **PIN-Change dialog- function** a PIN can be changed by the operator (his level stays the same). If this PIN is forgotten, a new upload of the visualization binary can set it back to delivery state.
- For a **user-level-referring screen** change use the function „Change screen with PIN input“ on a button.

Change user level by SFC215 "LOGIN"
(not for WebVisu and EDGE-HMI)

The SFC215 "LOGIN" enables the user level change by S7-User program at Runtime.

Parameter	Declaration	Data type	Description
LADDR	INPUT	WORD	Logical base address = 0 (for all Panel-PLC) Logical base address = 1..16 (Connection ID number to Panel-HMI)
LEVEL	INPUT	BYTE	User level (1..9) 0 = Logout current user level
RET_VAL	OUTPUT	WORD	Error code W#16#0000 – No error W#16#8002 – VisuStage is not running W#16#8005 – Level is invalid or not configured W#16#8xyy – General error codes (compatible to STEP 7) only for Panel-HMI: W#16#7000 – Job is in process W#16#7001 – Invalid connection state e.g not connected W#16#7002 – Job is not accepted, because another job is proceeded actually W#16#7003 – Connection resource occupied (temporarily locked) W#16#8001 – Invalid connection ID number or connection is not configured
BUSY	OUTPUT	BOOL	TRUE: Job is in processing

S7-User program example to change user level 7

Target: Change to user level 7

```
UN    M   1502.4                 // if change request is not set, then
BEB                               // end the function

CALL  SFC  215
 LADDR  :=MW2000                  // VisuStage connection ID number.
                                  // In Panel-PLC (e.g PC710T) must be W#16#0.
 LEVEL  :=B#16#7                  // User level, could be 0..9
                                  // 0= Logout current user level
 RET_VAL:=MW1000                  // Return / result code
 BUSY   :=M1702.3                 // TRUE = Reading is in process

U     M   1702.3                  // Job is in process
BEB
R     M   1502.4                  // reset request signal

L     MW  1000                    // return / result code
L     0                           // no error
==I                               // If no error, then
BEB                               // end the function

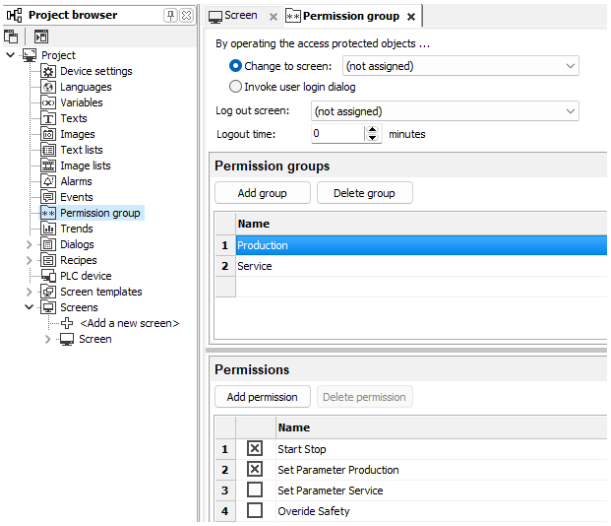
L     MW  1000                    // error occurred
                                  // error evaluation
                                  // ...

BEA                               // end of function
```

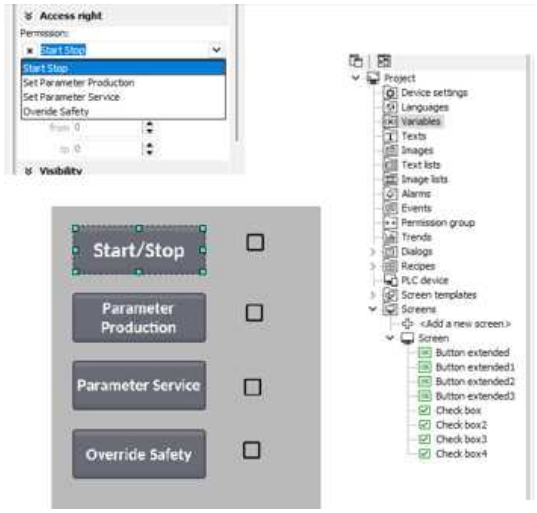
Resource access rights management

(only for WebVisu and EDGE-HMI)

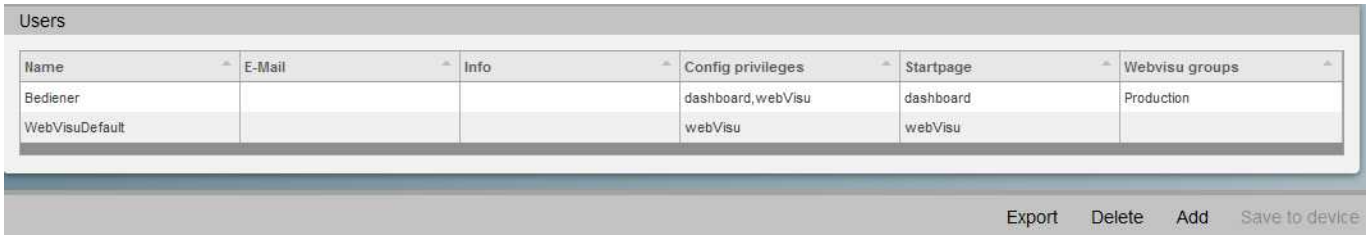
Unlike the previous user administration, there is an access rights administration for the WebVisu and EDGE HMIs. In this case, the Permission Group tab is located in the Project Browser Links. As can be seen in the screenshot, various groups can be created there and assigned different rights.

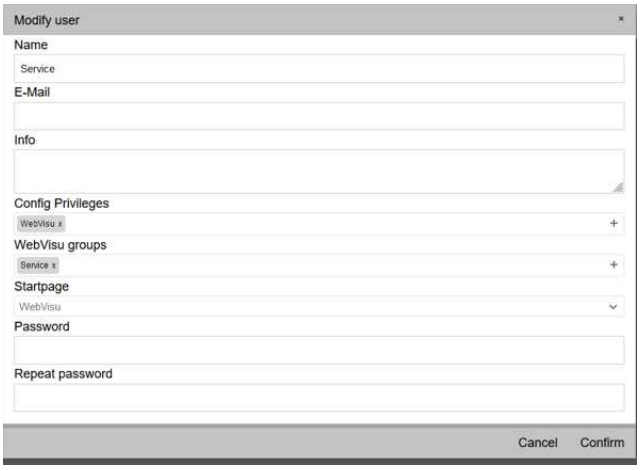


The created authorisations can now be linked, as shown in the example image below with buttons

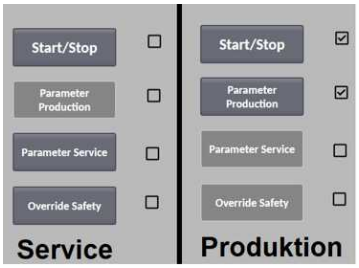


Once all the required rights and groups have been assigned in VisuStage, the corresponding groups must also be assigned to the users in the WebConfig interface of the EDGE devices. To do this, click on Users and the following menu will appear.





New users can be created using the Add button at the bottom of the screen. If you double-click this, the window with all the settings opens. If all rights have been assigned here too, the following screen appears in the WebVisu in our example. You can see that the operator can start the machine and change production parameters, but the rest is not available, whereas in our example the service can change everything except the production parameters. When the visualisation is started, a login is required. This consists of the user and password, after this entry preset rights are active.



Note:
If you transfer a previous visualisation with a conventional user administration to a visualisation for an EDGE device, this is not transferred and must be recreated as an access rights administration.

Resource Partner-PLC (for HMI only)

(not for WebVisu and EDGE-HMI)

INSEVIS HMIs run with data types of S7-300-family only. They use Ethernet S7-communication (Put/Get) to communicate. The HMI communicates with its partner device as active partner by via Ethernet S7-communication (put/get). In that communication INSEVIS-HMIs are the ACTIVE part. The referring partner-device will be identified by IP-address and TSAP (made of rack-no. / slot-no. of CPU / and hex no. of this connection resource). One HMI can only communicate with ONE partner-device (CPU).

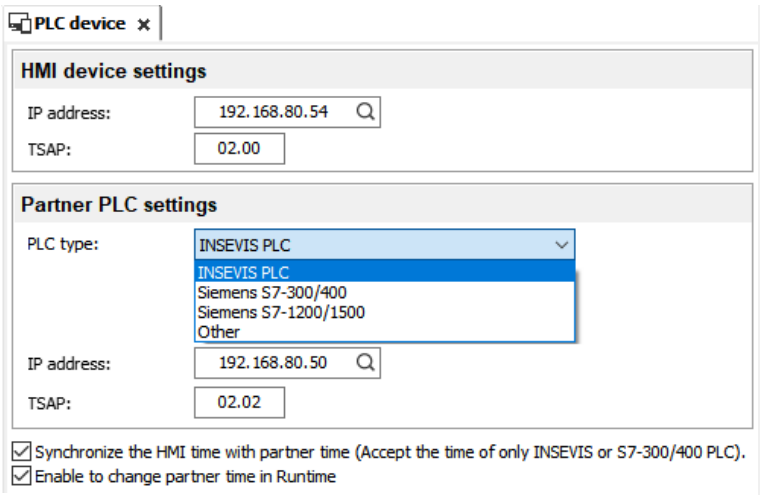
Connection setting in the HMI

- Either assign it in the BIOS of the Panel-HMIs (put out the Ethernet-cable, wait for the logo in the screen and than press left/right/left side of the screen) or
- in VisuStage-project at the resource partner device

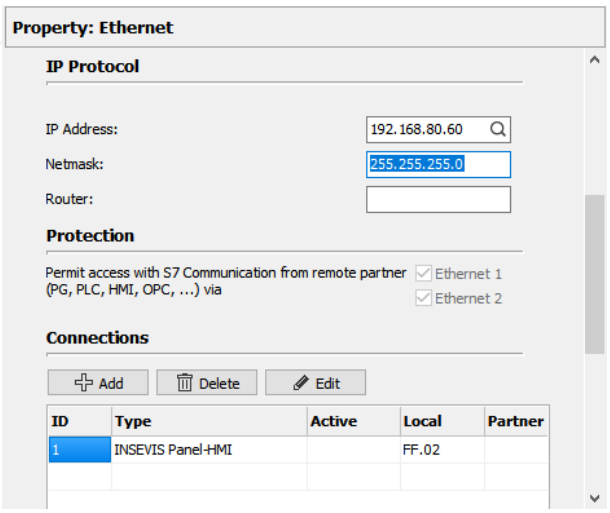
Connection settings in the Partner-device

- If general no connections must be configured in the partner device (PLC) for the HMI because the HMI is the actcive part of S7-communication (put/get) and uses the connection resource no.* 02 (reserved for OP-communication). (Screen- and language can be changed from PLC by using variables with screen- or language-ID-no.)
- If the **PLC uses SFCs for changing screens or handle trends** in the Panel-HMI shall change screens and languages at the INSEVIS-HMI, an Ethernet connection with connection resource no.* > 03 (hex), best FF must be assigned (e.g. in ConfigStage or in Siemens-programming tool)

below: assignment of connection parameter at HMI´s view in the VisuStage (TSAP can be entered by selecting a partner-PLC automatically by rules below)



below: assignment of connection parameter at PLC´s view in the ConfigStage



For INSEVIS-Panels and Siemens-CPUs

1. Assign the IP-address of the partner-PLC into the field „Partner-PLC“ in VisuStage-project or in HMI-BIOS
2. Configure the TSAP by assigning **CPU rack-no. and -slot-no. and connection resource no.* (hex)**
   for Siemens-CPUs 300/ 400 it is **0, 2, 02,**
   for Siemens-CPUs 1200/1500 it is **0, 1, 02** → allow “Put/Get” communication
   → do not use optimized DBs

*** Please do not confuse the connection resource no. 04...FF (hex) with the connection-ID-no. (01...16 (dec))!**

Partner-PLC Synchronization (for HMI only)

When assigning partner device a time synchronization between panel and PLC is highly recommended.

1st check box: The HMI will be synchronized to the PLC-time
2nd check box: The PLC-time can be changed by the panel at runtime



Attention:
If you do not synchronize panel and PLC the difference between both devices may lead to unexpected program behavior.

Resource Dialogs

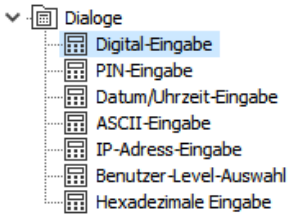
The dimension and the design of the virtual keyboards appearing at

- I/O-field,
- Login field,
- Date-/Time field
- Stringinput field
- IP-address field
- User level select

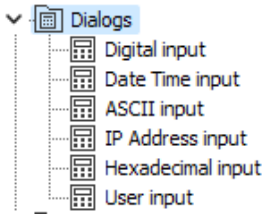
can be adapted to ones needs in the resource „Dialogs“.

The dialogues resource is slightly different in EDGE visualisations than in the previous visualisations.

Visu CPU-V/P/T



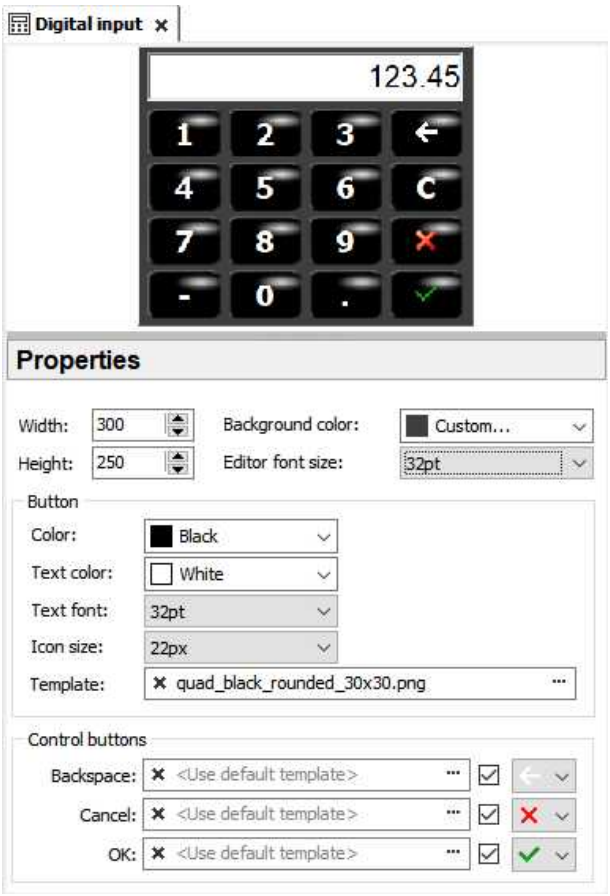
WebVisu/EDGE-HMI



The size of the entire object determines the automatically calculated button size at the end. (Do not exceed the LCD resolution!)

Without illustration: **Colour schemes** Various colour schemes are available for a uniform and modern design.

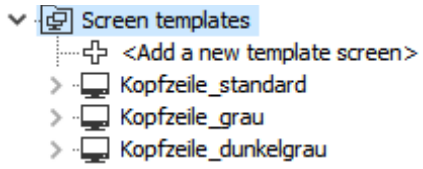
The remaining settings are self-explanatory.



Hints:
At small panel diagonals it is very important benefit for the operator to easy enter his values that there is available a fitting virtual keyboard. This is not available at most other HMIs and a strong benefit for your solution.

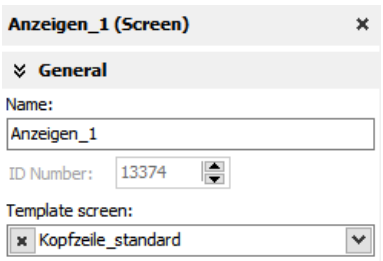
At the resource “user level select “ all lines (Header, single user levels and the cancel-button) can be displayed single-lingual or -by selecting different text resources- multi lingual in every project language.

Resource Screen templates



Screen templates (no image) can be created as a special resource and
can be uses once in every screen.

Therefore you activate this template screen in the settings of a screen you selected. Than choose one of the screen templates you made before.



Every modification in the screen templates will be taken over automatically into every screen this template will be used. Use this e.g. for top or bottom menus, headlines and so on.

Resources Trends

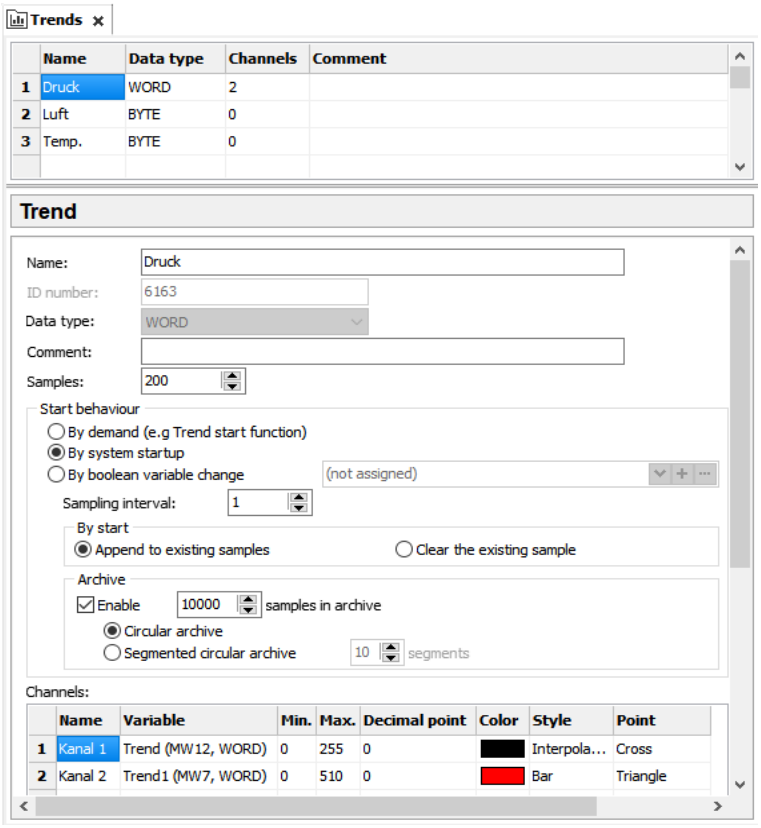
There can be processed 4 trends with 16 channels each. This represent values by time, smallest time base is 1 sec. All 16 channels of one trend need to have the same data format.

Trends will get a name - here “Druck” (pressure), what will be used for displaying and storing at RemoteStage as file name.

Samples: here you enter the number of samples in the circular buffer in runtime (100...200)

Start behavior: Beside S7-SFCs there are 3 additional ways to start a trending

- manually / by demand by assigning a function “Trend Start” to a button
  → Configuration at the function (limited archiving functionality to stay compatible to old versions)
- with each system start
  → Configuration at the trend resource settings
- depending on a variable
  → Configuration at the trend resource settings



If **Archive** was activated, you can

- enter the number of samples you want to archive in the **Circular archive** (max. 65635 samples per each trend channel) or
- combine up to 10 circular archives on the Micro-SD-card (integrated memory in the EDGE devices) to an **Segmented circular archive** to 656.350 samples per each trend channel to display it in the trend archive viewer.

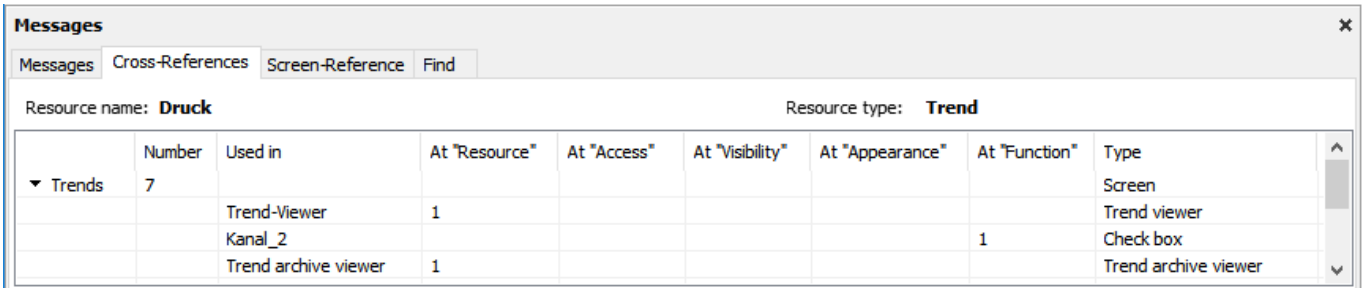
When number of samples exceed these limits, they will be overwritten in the FIFO system.

To configure the trend channel values, assign min/max values, decimal point, color, style (interpolated – shortest connection between 2 sample values, bars (vertically), stepped) and design of the sample point markers (diverse).

It is archived exclusively on the Micro-SD® card (integrated memory in the EDGE devices). Each trend is saved as ONE binary file with the ID number (cannot be changed). This file can be read into the PC with the RemoteStage, displayed and converted into csv format (manually or automatically via command line command in "scheduled tasks"). On standard HMIs, trend archives can be deleted from the Micro-SD® card using a button function; on EDGE devices, the data is managed via the configuration interface.

Cross references for trends

To keep the overview about the trends started, stopped, continued or displayed) in the project, there is a function „Cross reference“ (mark a trend and use right mouse button). All trend handling will be displayed referring to their usage in resources or in menu objects. By a double click on an item you get automatically into the menu, where it is used. Close/open the message window by key „F6“.



Starting the trend sampling with SFC 202 "TRENDSRT"

(not available for WebVisu and EDGE HMIs)

To start the configured Trend use SFC202 "TRENDSRT". The sampling interval and number of samples are assigned to the trend.
After starting, operating system samples the configured operand values in given interval and stores to Micro-SD card if „ARCHIVE“ parameter set to „TRUE“. If „CYCLIC“ parameter is „FALSE“, the „COUNT“ samples are one time sampled and trend automatically changes to „STOP“ state.

Trends are written to „**trend_xxx.bin**“ whereas xxx is Trend ID number. This archive file is based on „Ring-Buffer“ mechanism with „COUNT“ samples.

(Trend data can be get out of the PLC by SD-card only. In future versions a download by Ethernet will be possible.

Parameter	Declaration	Data type	Description
LADDR	INPUT	WORD	Logical base address = 0 (for all Panel-PLCs) Logical base address = 1...16 (connection-ID-No. to the Panel-HMI)
TREND	INPUT	INT	Trend ID number, (from VisuStage configured @ resources)
INTERVAL	INPUT	WORD	Sampling interval in seconds. 1..65535 second are allowed.
COUNT	INPUT	WORD	Number of samples to sample / to archive. 1..65535 are valid.
CYCLIC	INPUT	BOOL	TRUE: It cyclically samples the COUNT samples. FALSE: One time samples the COUNT samples, then stops the sampling
ARCHIVE	INPUT	BOOL	TRUE: Sampled values are stored in microSD card FALSE: No archive
RET_VAL	OUTPUT	WORD	Error code W#16#0000 – No error W#16#8002 – VisuStage is not running/configured W#16#8003 – Invalid „TREND“ ID number W#16#8004 – Invalid state / Already started. W#16#8005 – Invalid „INTERVAL“ value W#16#8006 – Invalid „COUNT“ value W#16#8xyy – General error codes (compatible to STEP®7) only for Panel-HMI: W#16#7000 – Job is in process W#16#7001 – Invalid connection state, e.g not connected W#16#7002 – Job not accepted, because another job is proceeded actually W#16#7003 – Connection resource occupied (temporarily locked) W#16#8001 – Invalid connection ID number or connection is not configured
BUSY	OUTPUT	BOOL	Busy flag, TRUE Job is in processing

If a trend is started once and the PLC has got a power OFF, the trend starts after power ON by itselfe automatically.

→ Here you will find more for parameterizing of the objects Trend viewer and trend archive viewer

S7-program sample for using the SFC202

(not available for WebVisu and EDGE HMIs)

Purpose: Start trend (ID number =6163) with configuration:

- 1s interval,
- cyclically,
- with archiving,
- ring buffer size 65535 samples (set of values)

```
      UN    M   1500.2       // if request is not set, then
      BEB                    // end the function

      CALL  SFC  202
       LADDR   :=W#16#0      // VisuStage connection ID number.
                             // In Panel-PLC (e.g PC700P) must be W#16#0.
       TREND   :=6163        // ID number of trend, which is configured in VisuStage
       INTERVAL:=W#16#1      // every 1s samples the values
       COUNT   :=W#16#FFFF   // max. no. of samples (set of values) 65535 (dez) => FFFF (hex)
       CYCLIC  :=TRUE        // cyclically samples as ring buffer.
                             // Buffer size is given in COUNT parameter
       ARCHIVE :=TRUE        // enables the archiving in micro SD card
       RET_VAL :=MW1000      // Result / return code
       BUSY    :=M1700.2     // TRUE = Request is in process

      U     M   1700.2       // If Start the trend is in process, then
      BEB                    // end this function
      R     M   1500.2       // reset request signal

      L     MW  1000         // return / result code
      L     0                // no error
      ==I                    // If no error, then
      BEB                    // end the function

      L     MW  1000         // error occurred
                             // error evaluation
                             // ...

      BEA                    // end of function
```

Stopping the trend sampling with SFC 203 "TRENDSTP"

(not available for WebVisu and EDGE HMIs)

The trend sampling can be stopped by SFC 204 “TRENDSTP“ function call.

Parameter	Declaration	Data type	Description
LADDR	INPUT	WORD	Logical base address = 0 (for all Panel-PLCs) Logical base address = 1...16 (connection-ID-No. to the Panel-HMI)
TREND	INPUT	INT	Trend ID number, (from VisuStage configured @ resources)
RET_VAL	OUTPUT	WORD	Error code W#16#0000 – No error W#16#8002 – VisuStage is not running/configured W#16#8003 – Invalid „TREND“ ID number W#16#8xyy – General error codes (compatible to STEP®7) only for Panel-HMI: W#16#7000 – Job is in process W#16#7001 – Invalid connection state, e.g not connected W#16#7002 – Job not accepted, because another job is proceeded actually W#16#7003 – Connection resource occupied (temporarily locked) W#16#8001 – Invalid connection ID number or connection is not configured
BUSY	OUTPUT	BOOL	Busy flag, TRUE Job is in processing

S7-program sample for using the SFC203

(not available for WebVisu and EDGE HMIs)

Purpose: Stop the trend with ID number 6163

```
      UN    M   1500.3          // if request is not set, then
      BEB                       // end the function

      CALL  SFC  203
       LADDR  :=W#16#0          // VisuStage connection ID number.
                                // In Panel-PLC (e.g PC700P) must be W#16#0.
       TREND  :=6163            // ID number of trend, which is configured in VisuStage
       RET_VAL:=MW1000          // Result / return code
       BUSY   :=M1700.3         // TRUE = Request is in process

      U     M   1700.3          // If top the trend is in process, then
      BEB                       // end this function
      R     M   1500.3          // reset request signal

      L     MW  1000            // return / result code
      L     0                   // no error
      ==I                       // If no error, then
      BEB                       // end the function

      L     MW  1000            // error occurred
                                // error evaluation
                                // ...

      BEA                       // end of function
```

Continue the trend sampling with SFC 204 "TRENDCNT"

(not available for WebVisu and EDGE HMIs)

The previously stopped trend sampling could be continued by calling SFC 204 “TRENDCNT“.

The sampling interval must be new assigned. The number of samples and sampling mode (cyclical overwriting, archiving) are kept as last assigned.

Parameter	Declaration	Data type	Description
LADDR	INPUT	WORD	Logical base address = 0 (for all Panel-PLCs) Logical base address = 1...16 (connection-ID-No. to the Panel-HMI)
TREND	INPUT	INT	Trend ID number, (from VisuStage configured @ resources)
INTERVAL	INPUT	WORD	Sampling interval in seconds. 1..65535 second are allowed.
RET_VAL	OUTPUT	WORD	Error code W#16#0000 – No error W#16#8002 – VisuStage is not running/configured W#16#8003 – Invalid „TREND“ ID number W#16#8004 – Trend was not started or Sampling count reached to zero. W#16#8xyy – General error codes (compatible to STEP®7) only for Panel-HMI: W#16#7000 – Job is in process W#16#7001 – Invalid connection state, e.g not connected W#16#7002 – Job not accepted, because another job is proceeded actually W#16#7003 – Connection resource occupied (temporarily locked) W#16#8001 – Invalid connection ID number or connection is not configured
BUSY	OUTPUT	BOOL	Busy flag, TRUE Job is in processing

→ Here you will find more for parameterizing of the objects Trend viewer and trend archive viewer

S7-program sample for using the SFC204

(not available for WebVisu and EDGE HMIs)

Purpose: Continue / resume the trend with ID number 6163

```
      UN    M   1500.4          // if request is not set, then
      BEB                       // end the function

      CALL  SFC  204
       LADDR   :=W#16#0         // VisuStage connection ID number.
                                // In Panel-PLC (e.g PC700P) must be W#16#0.
       TREND   :=6163           // ID number of trend, which is configured in VisuStage
       INTERVAL:=W#16#1         // every 1s samples the values
       RET_VAL :=MW1000         // Result / return code
       BUSY    :=M1700.4        // TRUE = Request is in process


      U     M   1700.4          // If Resume the trend is in process, then
      BEB                       // end this function
      R     M   1500.4          // reset request signal

      L     MW  1000            // return / result code
      L     0                   // no error
      ==I                       // If no error, then
      BEB                       // end the function

      L     MW  1000           // error occurred
                               // error evaluation
                               // ...

      BEA                       // end of function
```

Query the trend status with SFC 205 "TRENDSTA"

(not available for WebVisu and EDGE HMIs)

To query the trend status use SFC205 “TRENDSTA” function. It reports about trend sampling and/or trend archiving status.

Parameter	Declaration	Data type	Description
LADDR	INPUT	WORD	Logical base address = 0 (for all Panel-PLCs) Logical base address = 1...16 (connection-ID-No. to the Panel-HMI)
TREND	INPUT	INT	Trend ID number, (from VisuStage configured @ resources)
RET_VAL	OUTPUT	WORD	Error code W#16#0000 – No error W#16#8002 – VisuStage is not running/configured W#16#8003 – Invalid „TREND“ ID number W#16#8xyy – General error codes (compatible to STEP®7) only for Panel-HMI: W#16#7000 – Job is in process W#16#7001 – Invalid connection state, e.g not connected W#16#7002 – Job not accepted, because another job is proceeded actually W#16#7003 – Connection resource occupied (temporarily locked) W#16#8001 – Invalid connection ID number or connection is not configured
BUSY	OUTPUT	BOOL	Busy flag, TRUE Job is in processing
TREND_STATUS	OUTPUT	BYTE	Trend status code B#16#00 – Trend sampling is not initiated B#16#01 – Trend sampling is initiated and running B#16#02 – Trend sampling has finished/stopped
ARCHIVE_STATUS	OUTPUT	BYTE	Archiving status code B#16#00 – Trend archiving is not initiated B#16#01 – Trend archiving is initiated and running B#16#02 – Trend archiving has finished successfully B#16#03 – SD card is not inserted or not recognized B#16#04 – Trend archiving stopped: Could not create file B#16#05 – Trend archiving stopped: Could not read file B#16#06 – Trend archiving stopped: Could not set file size B#16#07 – Trend archiving stopped: Could not write header to file B#16#08 – Trend archiving stopped: Error on file seek B#16#09 – Trend archiving stopped: Could not write samples to file

→ Here you will find more for parameterizing of the objects Trend viewer and trend archive viewer

S7-program sample for using the SFC205

(not available for WebVisu and EDGE HMIs)

Purpose: Check the status of trend with ID number 6163

```
      UN    M   1500.5          // if request is not set, then
      BEB                       // end the function

      CALL  SFC  205
       LADDR          :=W#16#0  // VisuStage connection ID number.
                                // In Panel-PLC (e.g PC700P) must be W#16#0.
       TREND          :=6163    // ID number of DRUCK trend, which is configured in VisuStage
       RET_VAL        :=MW1000  // Result / return code
       BUSY           :=M1700.5 // TRUE = Request is in process
       TREND_STATUS   :=MB2008  // Trend status code
       ARCHIVE_STATUS:=MB2009   // Trend archiving status code

      U     M   1700.5          // If Start the trend is in process, then
      BEB                       // end this function
      R     M   1500.5          // reset request signal

      L     MW  1000            // return / result code
      L     0                   // no error
      ==I                       // If no error, then
      BEB                       // end the function


      L     MW  1000            // error occurred
                                // error evaluation
                                // ...

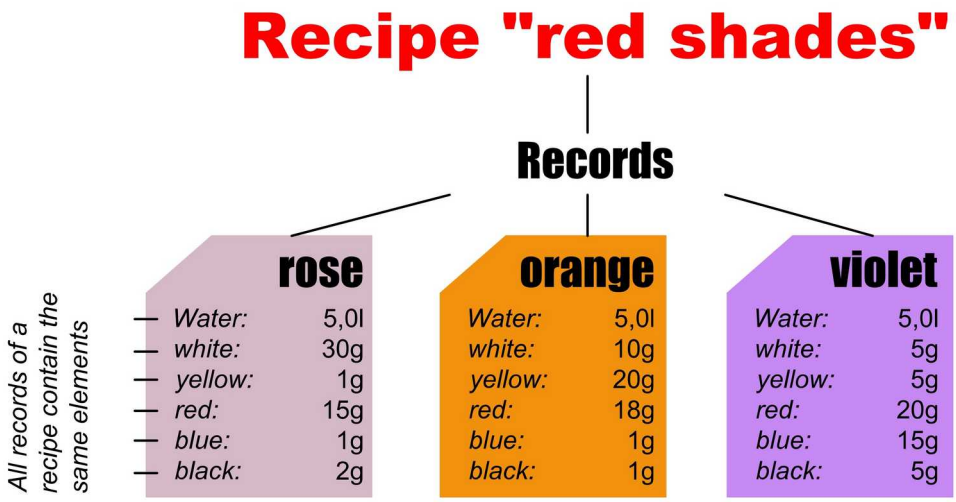
      BEA                       // end of function
```

Resource recipe administration and recipe viewer

(not available for WebVisu and EDGE HMIs)

INSEVIS-Panels/HMIs and Panel-PLCs may administrate
- with CPU type V up to 64 recipes with each up to 128 records with each up to 128 elements and
- with CPU type P up to 64 recipes with each up to 256 records with each up to 256 elements.

Structure of a randomized sample for color mixing

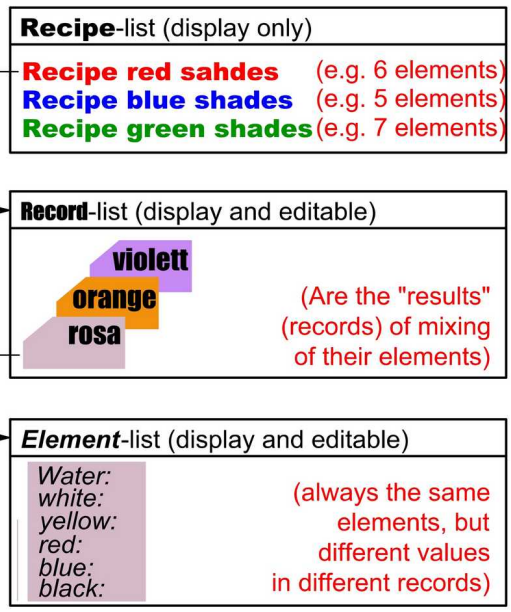


The different kinds of color shades (**red shade**, **blue shade**, **green shade**) are **recipes**.
Each recipe contains of always the same **elements** (e.g. **red shades** contains of *water, white, yellow, red, blue, black).*
Depending on the relation of the elements several **records** of the recipe **red shades** are generated (e.g. the colors **rose**, **orange**, **violet**).

The user selects a recipe from the **recipe list** first.
(in this sample the recipe **red shade**)
There can not be created new recipes at runtime, because new elements are needed for that. But for those elements some new machine parts must be integrated and wired (e.g. hatches, scales and so on...) first.

The record list shows existing records. A record can be added, selected for further operation, saved as or deleted here.
(in the sample te records (colors) **rose**, **orange**, **violet**)
If you create a recipe in the VisuStage, you assign a value for each element and so the first record is created automatically, buit not named and stored. Save it with a new name and so create your records.

Select a record to change its elements in the element list. The values of all elements (assigned to this recipe in the VisuStage) can be changed and stored here
(in the sample the elements *water, white, yellow, red, blue, black)*



INSEVIS-specific hints for recipe administration

1. INSEVIS- Panel-PLCs store the records in the Micro-SD-Card.
2. There is only one recipe viewer allowed and useful in a screen window.
3. If the visualization is changed and download again, the recipe structure wil overwritten by itself. But the record data on the Micro-SD-Card will be kept. So all stored records of the recipes can be kept while you update your visualization.
4. Because of the data storage on the Micro-SD-card (external memory) there no simulation of the recipe administration with SimuStage is possible.
5. The access administration is made by a button with own access rights, who changes the screen into the menu of the recipe viewer.
6. With SFC206 you can combine e.g. a bar code reader input with a special recipe record. The reference table (what bar code uses what recipe record) is to program in S7.
7. Export of recipe records is available with RemoteStage 1.0.3.7

Visualization with the software „VisuStage“

Development of recipes in a randomized sample for color mixing

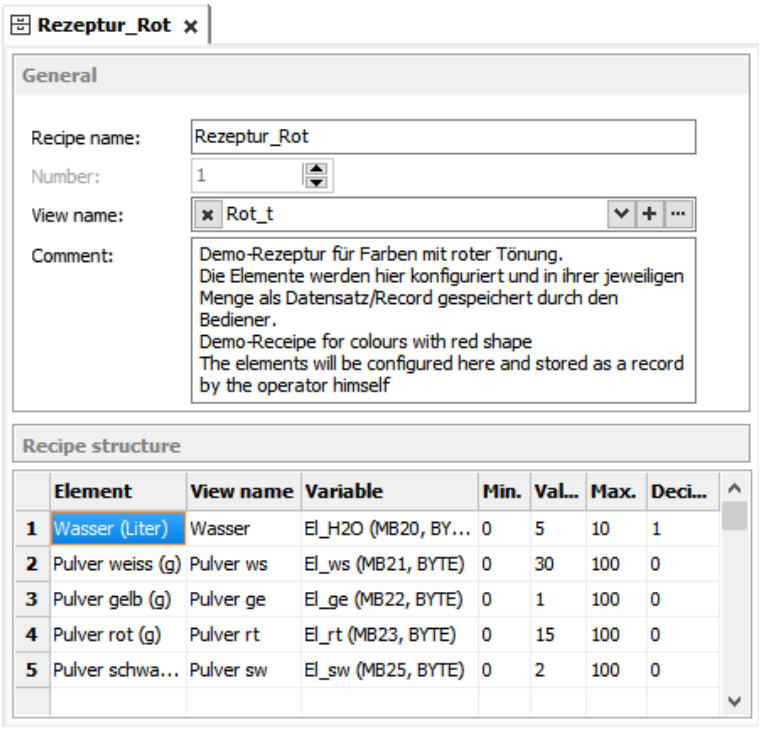
Choose „Add a new recipe“, parameterize it in a new window as written below:

General settings

Recipe name:	internal name of the recipe (independ of project language)
View name:	displayed name of the recipe (depends of project language)
Comment:	Insert your additional comments here
(Number)	automatic increased internal number of the recipe (not changeable)

Recipe structure

Element	internal name of the element (independ of project language)
View name:	displayed name of the element (depends of project language), Here the physical user unit can be displayed too (e.g. kg, sec., cm, etc.)
Variable	Assigning of a variable to this element (if you show user units, than scale this variable to fit with the displayed unit. So the operator can work very comfortable)
Min.	Input of the minimal value of the element (If the operator inserts a lower value, it will replaced by the the minimum value automatically)
Value	Input of the element value (thereby the elements of the first record will be pre-assigned and kept in the memory until the record is first time saved as...)
Max.	Input of the maximal value of the element (If the operator inserts a higher value, it will replaced by the the maximum value automatically)
Decimal point:	Insert the number of decimal places of the value



	Element	View name	Variable	Min.	Val...	Max.	Deci...
1	Wasser (Liter)	Wasser	El_H2O (MB20, BY...	0	5	10	1
2	Pulver weiss (g)	Pulver ws	El_ws (MB21, BYTE)	0	30	100	0
3	Pulver gelb (g)	Pulver ge	El_ge (MB22, BYTE)	0	1	100	0
4	Pulver rot (g)	Pulver rt	El_rt (MB23, BYTE)	0	15	100	0
5	Pulver schwa...	Pulver sw	El_sw (MB25, BYTE)	0	2	100	0



Hint:
The FAT16/32 file system of the Micro-SD-card does not accept some characters in the file- or folder names

These are: \ / : * ? " < > | This characters will be ignored.

Recipe handling with SFC 206 "RECIPE"

(not available for WebVisu and EDGE HMIs)

With the SFC206 “RECIPE” recipe records can be

- read in from Micro-SD-card and written to the PLC and
- written from the PLC to the Micro-SD-card.

It means, you can combine e.g. a bar code reader input with a special recipe record. The reference table (what bar code uses what recipe record) is to program in S7.

Parameter	Declaration	Data type	Description
REQ	INPUT	BOOL	TRUE assign and start job
LADDR	INPUT	WORD	Logical address 0 Panel-SPS (intern VisuStage RT) 1..16 HMI- Connection ID number
RECIPE	INPUT	INT	Recipe ID number (from VisuStage configured @ resources)
REC_NAME	INPUT	STRING	Recipe record name
FUNCTION	INPUT	BYTE	Function number 1 Read record from SD and write to PLC (SD → PLC) 2 Read record from PLC and write to SD (PLC → SD) 3 Read record from PLC and overwrite to SD (PLC → SD) 4 Delete record from SD 5 Check record existence in SD 6 Get number of records in SD (Output parameter „RETVAL“ returnes number of available records)
RETVAL	OUTPUT	WORD	Status code of job
BUSY	OUTPUT	BOOL	TRUE= Job is in process
DONE	OUTPUT	BOOL	TRUE= Job is done successful
ERROR	OUTPUT	BOOL	TRUE= Job is failed, error code in RETVAL

Status code meaning

RETVAL	BUSY	DONE	ERROR	Description
W#16#0000	0	1	0	Job is successfully done
W#16#7000	1	0	0	Job is process
W#16#7001	0	0	1	Connection is in invalid state (e.g. not connected)
W#16#7002	0	0	1	Job is not accepted, due to previous job is still in process
W#16#7003	0	0	1	Connection resource is temporary locked
W#16#7004	0	0	0	REQ Parameter is FALSE
W#16#8001	0	0	1	Invalid connection ID number
W#16#8002	0	0	1	Visualization is not running (on Panel-HMI) or recipe not configured
W#16#8003	0	0	1	Invalid RECIPE ID number
W#16#8004	0	0	1	File system is not ready (eg. SD card is not inserted)
W#16#8005	0	0	1	Could not access to record file in SD card
W#16#8006	0	0	1	Invalid file content
W#16#8007	0	0	1	Record file exists in SD card
W#16#8008	0	0	1	Recipe path not found in SD card
W#16#842A	0	0	1	Invalid format in REC_NAME parameter
W#16#852B	0	0	1	Invalid function ID number in FUNCTION parameter
W#16#8xyy	0	0	1	General error code (S7 compatible)

S7-program sample for using the SFC206

(not available for WebVisu and EDGE HMIs)

Purpose: Create (overwrite if record file exists) a new recipe record file in micro SD card.

```
      CALL  SFC  206
       REQ      :=M1500.6              // TRUE = Request to create a new recipe record
       LADDR    :=W#16#0               // VisuStage connection ID number.
                                       // In Panel-PLC (e.g PC700P) must be W#16#0.
       RECIPE   :=1                    // Recipe number, in VisuStage configured
       REC_NAME:=DB205.RECORD_NAME     // Recipe record name
       FUNCT    :=B#16#3               // Write Record to SD card,
                                       // if record exists, overwrite it
       RET_VAL  :=MW1000               // Result / return code
       BUSY     :=M1700.6              // TRUE = Request is in process
       DONE     :=M1002.0              // TRUE = Successful created
       ERROR    :=M1002.1              // TRUE = Error occurred

      U     M   1700.6                 // If Recipe record is in process, then
      BEB                              // end this function
      R     M   1500.6                 // reset request signal

      U     M   1002.0                 // If successful done, then
      BEB                              // end the function

      UN    M   1002.1                 // if no error occurred, then
      BEB                              // end the function

      L     MW  1000                   // error occurred
                                       // error evaluation
                                       // ...

       BEA                              // end of function
```



Hint:
The FAT16/32 file system of the Micro-SD-card does not accept some characters in the file- or folder names

These are: \ / : * ? " < > | This characters will be ignored.



Hint to function 6
The input parameter „REC_NAME“ can carry wildcards as:

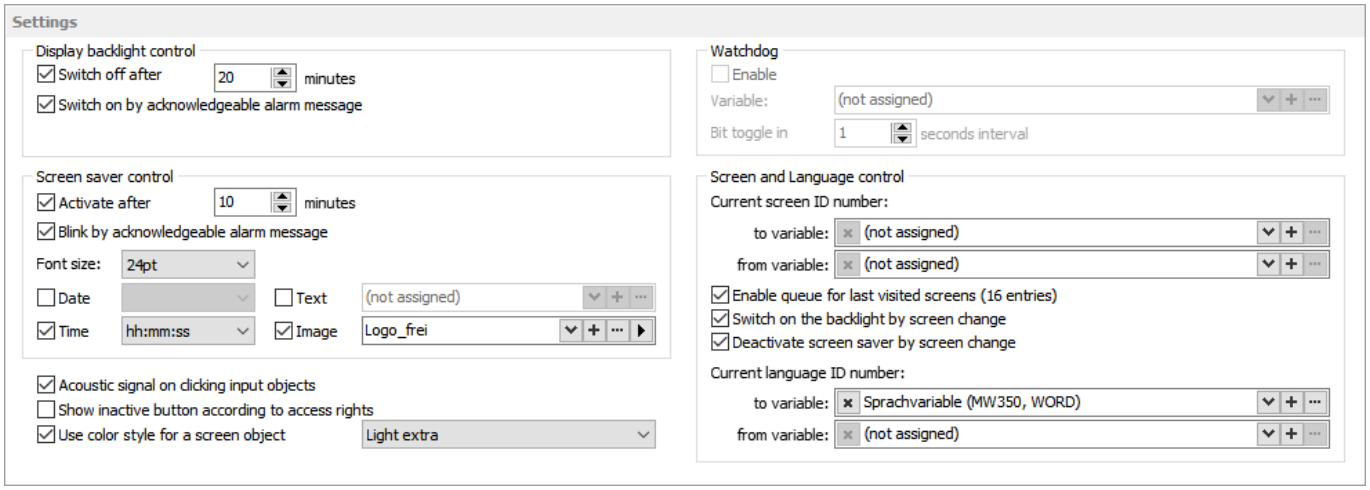
*	any ASCII character(s)
?	only one ASCII character
<ASCII character>	specific ASCII character

For sample:

- REC_NAME = “**ab***“ returns the number of all records, what start with **ab**
  (no matter what and how much character follow)
- REC_NAME = “**a?b**“ returns the number of all records with 3 characters
  (what start with **a** and end with **b** and contain on character in the middle (no matter what))
- **REC_NAME = “*“ or an empty S7-String return the number of all records**

Ressource Menues

The "Menus" resource shows general settings (not for WebVisu and EDGE HMIs) as follows:



- **Display backlight** - Autonomous switch off / - Alarm message after switch on
- **Screen saver**
  - Autonomous switch on
  - To be switched off by a programmed screen change by S7-program
  - Blinking, when alarm message is active
  - Design of a display of date/time, image or text, what should be displayed during the screen saver timer period
- **Acoustic signals** by an integrated buzzer
- **Displaying inactive buttons** when no access rights exist
- **Using of color schemes** to get a modern design (or to switch it off)
- **Watchdog**
  to control the connections to the PLC with a toggeling (live-) bit (for Panels-HMI only)
- **Control** of
  screens and languages by variables (writing actual screen/language ID to variable or change screen/language by its ID from variable)
- **Activation** of a log of the last 16 screens visited before (for button function “Change Screen” → <Previous screen>)

Below this is an overview of the created menus (screens). The menu screens can also be selected and opened by double-clicking on them.



INFO

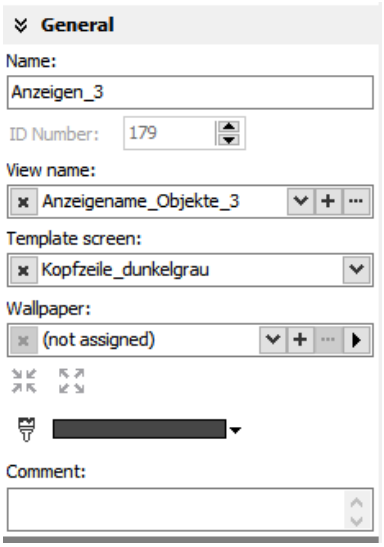
Hint:

Make the dimension of the screen saver ***much smaller*** that the whole resolution is to let the screen saver „walk“.

Visualization with the software „VisuStage“

Basic functions

There can be selected any objects by left mouse click and be copied/ cut out/ grouped/ ungrouped by right mouse key. Copied objects will be pasted in the same screen, they will get an X-Y-offset of 5 pixels to keep orientation. When haviing marked multiple different object, common properties can be edited at once.



Background image

Hit an empty space (with no objects) in your screen to get to the general settings.

The name is the name of the screen (to be seen in the screen-tree on the left side)
The ID-number of the screen will be used by the PLC, when a screen change is to be ordered by the PLC (of course not available in the HMIs). This ID is not to be changed manually.

By the view name a a multi-languaged text resource will be used from a text field from the screen template with the system variable $(CurrentScreenViewName) to display the present screen name in multiple languages .

A template screen can be selected and assigned.

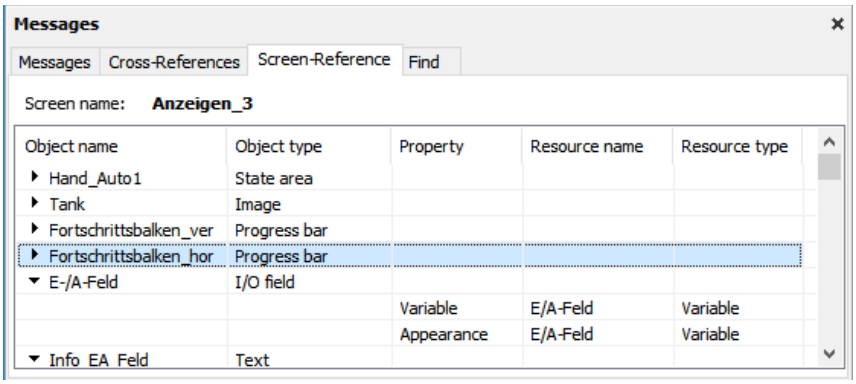
A background color or a background image can be selected. (Image needs more memory than a simple color.)

In this configuration no wallpaper but a gray background color is defined.

Display of used resources in a screen

The function „Screen-reference“ displays all resources used in the marked screen.

- Mark a screen in the left screen tree by left mouse key
- Right mouse key opens up a pull-down menu, select „Screen-reference“
- In the message window all resources of this screen will appear

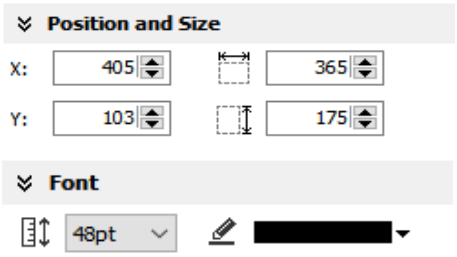


Clean Screen

(not for WebVisu & EDGE HMI)
The Clean screen will be started with a function (to be chosen by the rider „Function“) and there also the time period will be assigned.

Placing an object

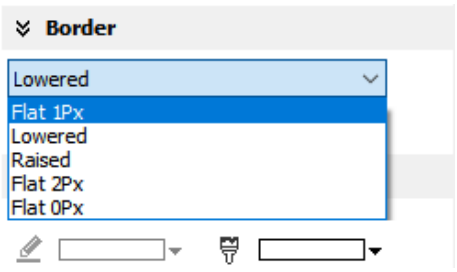
Select the required objects at the catalog tree (right) and add them to the screen in a window by left mouse key.
Make the fine placement by the box „Position and Size“ in pixels or by key-combination SHIFT+arrow-keys (8 pixels each click)
Note that the zero-point (X;Y = 0;0) is the **TOP LEFT CORNER**



Text font

Here you can assign the font and size as well as the color and the style (Italian, Bride) of text

Font handling is different for the WebVisu and EDGE HMIs; only free or appropriately licensed fonts can be used, as font fonts are delivered to the target system with the WebVisu. However, fonts can also be installed by the user at a later date; they simply need to be copied into the VisuStage installation directory,

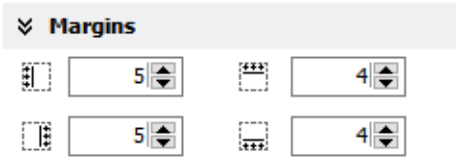


Border

Assign here the outline and mostly the rear color of your object
- flat = assign frame and background color without 3D-effect
- lowered = assign frame and background color with 3D-effect “low”
- raised = assign frame and background color with 3D-effect “high”
- none = transparent

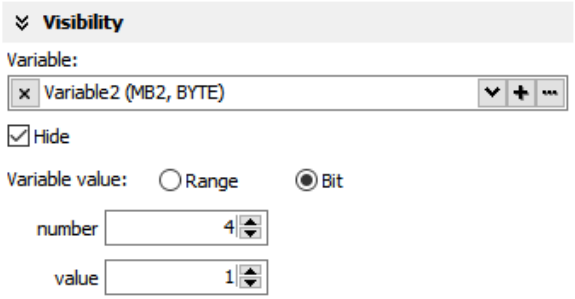
Margins

Assign the distance between texts/labels or symbols on a button to the frame of this object (in pixels).

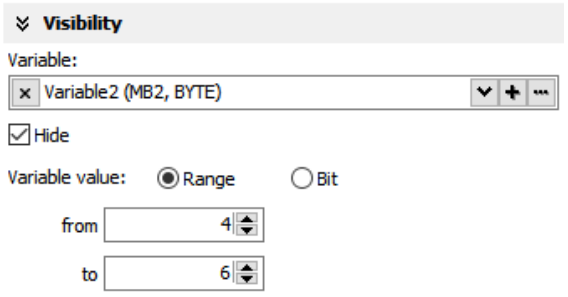


Visibility

The visibility of objects can be controlled by a variable and is to be assigned easily



In this sample an object is hidden,
when the 4th bit (counting from right)
will have the binary value 1,
in all other cases it is visible

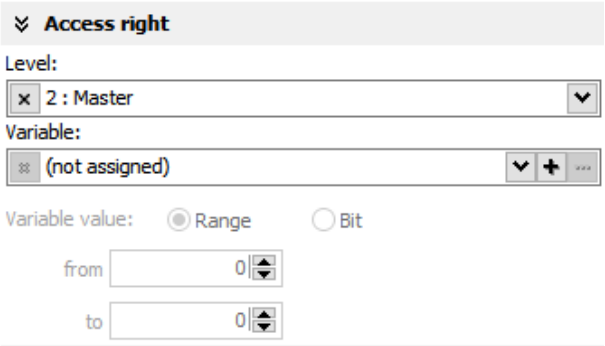


In this sample an object is hidden,
when the variables value is between 4 and 6,
in all other cases it is visible

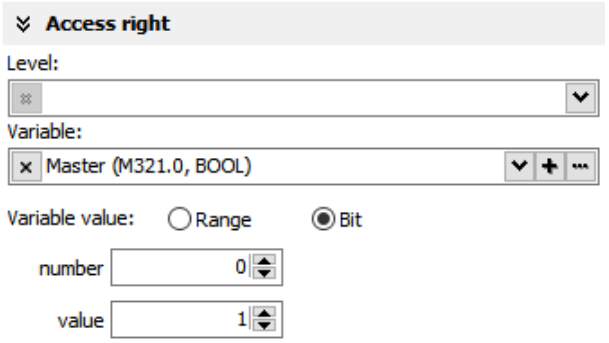
Hint: Depending on type of variables, some inputs can stay empty (e.g. the masking, if a boolean variable was selected).

Access rights (Not for WebVisu and EDGE-HMI)

These rights are to be assigned by user level and by a variable.



In this sample an object is accessible,
for every user below the level 2 (Master)



In this sample an object is accessible,
when the variables value is 1

Access rights (for WebVisu,and EDGE-HMI)

Access restriction by permission or by variable (only for active objects)





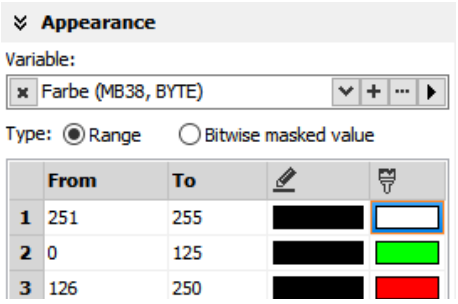
The previous variant (1) Level 1-5 according to registered persons is replaced by the selection of a permission defined in the resource permission groups This allows authorisations to be granulated even more finely. The access right via variables remains unchanged.

Group / Ungroup objects

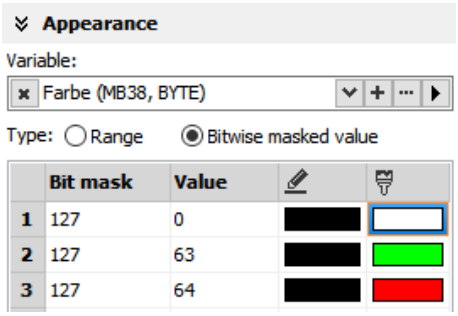
Group objects is necessary to fix multiple objects in an preassigned position by the right mouse key. It makes sense e.g. to create library elements. The group can be split by right mouse key again.

Appearance

The appearance of most of the objects can be controlled based by value of a variable.



In the area (0...125) the object will displayed in green and in the area (126...250) in red. The frame will be displayed in black.



Here the object becomes green only if in the lowest 7Bit (refers to bit mask 127) the value of 63 is reached and red If the value of 64 is reached. The frame is shown in black.

Out of the selected area or values the color of the first line is displayed always. In above samples it is withe with black frame. Here it is recommended to create an additional line for that purpose.

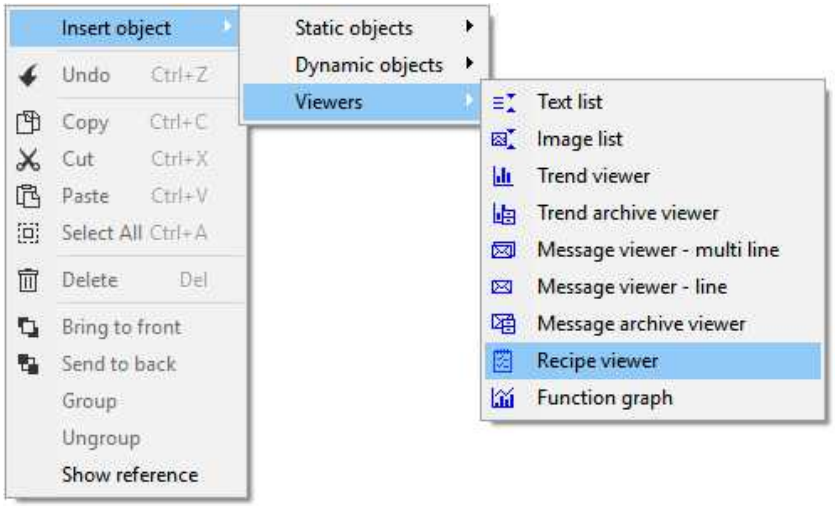


ATTENTION:
You need to define another color valid for values out of desired area or values in the 1st line.
If you do not add this line, the color of the first line will be displayed for values out of desired area or values.
This can cause wrong color information, what can cause an incorrect operation by operator!

Insert objects

Objects can be inserted by

- selecting in the right catalog window and clicking with left mouse key in the menue window
- a key combination without mouse in the menue window (to see right beside the object in the catalog-window)
- by right mouse key in the menue window by a popup window (see image right)



Copy objects

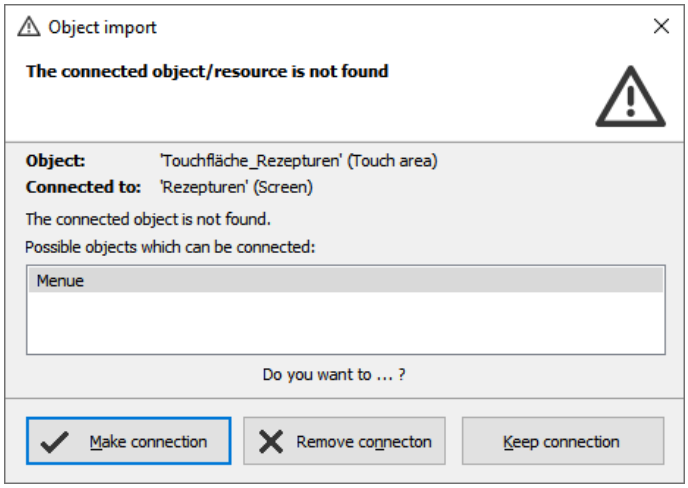
Instead of systematic saving groups of objects into libraries (recommended!) there is a “cheap´n dirty” version too by simple copying of selected object from one VisuStage into another open VisuStage.

- Mark the requested objects
- Move it by drag´n drop into the other VisuStage

Variables will be copied too and

- if identical to existing ones the original variables will be used
- if symbols (name) and or absolut address differ to original ones, a ne variable will be crated

If there are variables, what are linked to any objects (like screen changes) a message box appears and informs about every single variable and wants a decision how to act.



Visualization with the software „VisuStage“

The PLC can request what screen menu is active ad can force the VisuStage to change into another screen.

Query the current the screen ID number with SFC 200 "SCR_GET"
(not for WebVisu and EDGE-HMI)

The currently shown screen ID number can be retrieved by using SFC 200 “SCR_GET“

Parameter	Declaration	Data type	Description
LADDR	INPUT	WORD	Logical base address = 0 (for all Panel-PLCs) Logical base address = 1...16 (connection-ID-No. to the Panel-HMI)
RET_VAL	OUTPUT	WORD	Error code W#16#0000 – No error W#16#8002 – VisuStage is not running/configured W#16#8xyy – General error codes (compatible to STEP®7) only for Panel-HMI: W#16#7000 – Job is in process W#16#7001 – Invalid connection state, e.g not connected W#16#7002 – Job not accepted, because another job is proceeded actually W#16#7003 – Connection resource occupied (temporarily locked) W#16#8001 – Invalid connection ID number or connection is not configured
BUSY	OUTPUT	BOOL	Busy flag, TRUE Job is in processing
SCREEN	OUTPUT	INT	Currently shown screen ID number, (from VisuStage configured @ resources)
LANG	OUTPUT	INT	Currently selected language ID number (referring to int´l. codes - you can find it in the csv-file, when using the text export)

S7-program sample for using the SFC200

Purpose: Query the actual screen

```
UN    M   1500.0                // if read request is not set, then
BEB                             // end the function

CALL  SFC  200
 LADDR  :=W#16#0                // VisuStage connection ID number.
                                // In Panel-PLC (e.g PC700P) must be W#16#0.
 RET_VAL:=MW1000                // Result / return code
 BUSY   :=M1700.0               // TRUE = Reading is in process
 SCREEN :=MW2002                // Current screen ID number
 LANG   :=MW2004                // Current language ID number

U     M   1700.0                // Reading is in process
BEB
R     M   1500.0                // reset request signal

L     MW  1000                  // return / result code
L     0                         // no error
==I                             // If no error, then
BEB                             // end the function

L     MW  1000                  // error occurred
                                // error evaluation
                                // ...

BEA                             // end of function
```

Changing the screen with SFC 201 "SCR_SET"
(not for WebVisu and EDGE-HMI)

Screen can be changed by using SFC 201 “SCR_SET“.

Parameter	Declaration	Data type	Description
LADDR	INPUT	WORD	Logical base address = 0 (for all Panel-PLCs) Logical base address = 1...16 (connection-ID-No. to the Panel-HMI)
SCREEN	INPUT	INT	Screen ID number, (from VisuStage configured @ resources)
RET_VAL	OUTPUT	WORD	Error code W#16#0000 – No error W#16#8002 – VisuStage is not running/configured W#16#8003 – Invalid Screen ID number W#16#8xyy – General error codes (compatible to STEP®7) only for Panel-HMI: W#16#7000 – Job is in process W#16#7001 – Invalid connection state, e.g not connected W#16#7002 – Job not accepted, because another job is proceeded actually W#16#7003 – Connection resource occupied (temporarily locked) W#16#8001 – Invalid connection ID number or connection is not configured
BUSY	OUTPUT	BOOL	Busy flag, TRUE Job is in processing

S7-program sample for using the SFC201

Purpose: Change to screen with ID number 16917

```
      UN    M   1500.1                  // if request is not set, then
      BEB                               // end the function

      CALL  SFC  201
       LADDR  :=W#16#0                  // VisuStage connection ID number.
                                        // In Panel-PLC (e.g PC700P) must be W#16#0.
       SCREEN :=16917                   // Screen ID number to change
       RET_VAL:=MW1000                  // Return / result code
       BUSY   :=M1700.1                 // TRUE = Request is in process

      U     M   1700.1                  // request is in process
      BEB
      R     M   1500.1                  // reset request signal

      L     MW  1000                    // return / result code
      L     0                           // no error
      ==I                               // if no error, then
      BEB                               // end the function

      L     MW  1000                    // error occurred
                                        // error evaluation
                                        // ...

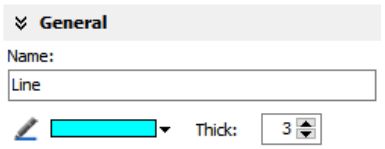
      BEA                               // end of function
```

Creating a visualization screen

Static objects

Lines, rectangles, texts, images

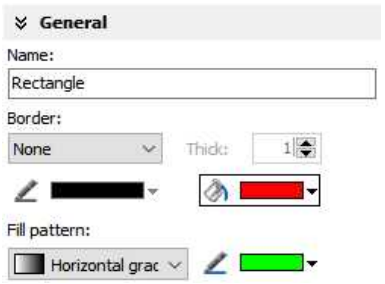
Lines



Place an object: (see basic funtions)
Assign visibility: (see basic funtions)
Assign appearance: (see basic funtions)
Parameterize the object: (register “General”)

- this sample shows a 3px wide line.
- When changing target screens a miss calculation of width can happen what causes overlapping failure (reported in message window)
- As of version 2.2.10, new line types and arrows can be used.

Rectangles



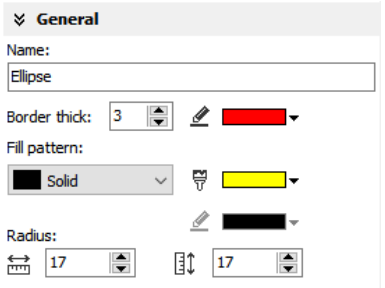
Place an object: (see basic funtions)
Assign visibility: (see basic funtions)
Assign appearance: (see basic funtions)
Parameterize the object: (register “General”)

- this sample shows a rectangle without border, with a horizontal color gradient from red to green, all other properties are self explaining



From VisuStage version 2.2.1.0 it is possible to round the corners with a radius.
In the settings, under the item Corners, a radius can be configured for all four corners.

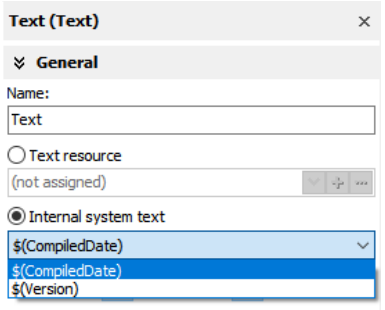
Ellipses



Place an object: (see basic funtions)
Assign visibility: (see basic funtions)
Assign appearance: (see basic funtions)
Parameterize the object: (register “General”)

- this sample shows 17px diameter yellow circle with a 3px red outline
- all other properties are self explaining

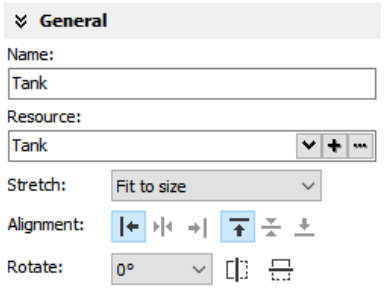
Texts



Place an object: (see basic funtions)
Assign visibility, fonts: (see basic funtions)
Assign appearance: **(see basic funtions)**
Parameterize the object: (register “General”)

- Use an existing **text resource** or create a new one directly here **OR** use the **Internal system text** to display compile-no and -date
- Assign font, bride and italic style
- Assign horizontal/vertical alignment
- Check “Wrap words” if this is a multiline text

Images



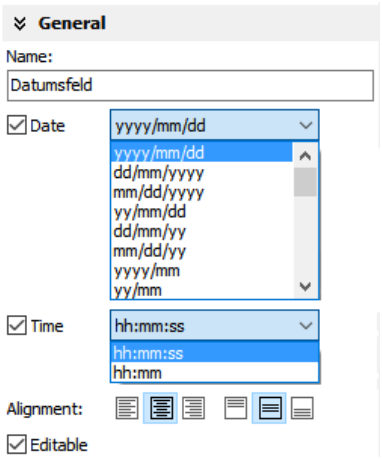
Place an object: (see basic funtions)
Assign visibility: (see basic funtions)
Assign appearance: (see basic funtions)
Parameterize the object: (register “General”)

- use an existing **resource** or create a new one directly here
- in the **„Stretch“**-box choose **„Fit to size“** to see your image in the objects rectangle you did draw
- assign horizontal/vertical **orientation** if object is not stretched
- **rotate** and **mirror** object as you want to

Dynamic objects

Date/Time fields

Date/Time fields are used to **display** (and, when „Editable“ is checked) to **edit** time and date by an automatic displayed virtual keyboard to type in the values.



Place an object: (see basic funtions)
Assign visibility: (see basic funtions)
Assign margins: (see basic funtions)
Assign border: (see basic funtions)
Assign font: (see basic funtions)
Assign access rights: (see basic funtions)

Parameterize the object: (register “General”)

- Assign the **format of Date/Time field:**
  - Time format
  - Date format
- Assign horizontal and vertical alignment
- By checking **„Editable“** the object´s value is changeable by the operator on the touch panel



Hint:

- If a DateTime field is to narrow, than characters, what can not be displayed completely will not displayed at all
- At **TOD** (TimeOfDay) the time will be displayed in hh:mm:ss format.
  Use TOD for longer times.
- At **TIME**, **S5TIME** and **TIMER** time is displayed in ms Milliseconds).
- At **DATE** the date will be displayed in days (since 01.01.1990).



Attention / objects in general: (not for WebVisu and EDGE-HMI)

- Dynamic objects shall **not overlap each other** (Exception: touch area may).
- Simulation with F9 or „ ► “ creates an error report, click on error and come directly to the failed object.

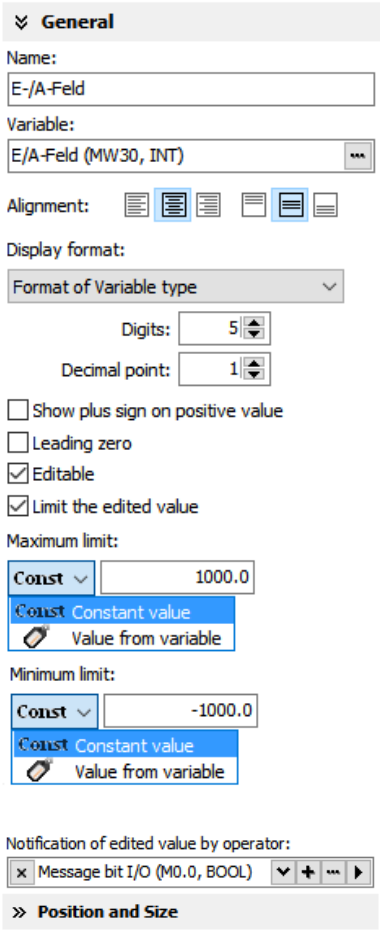
I/O fields

I/O fields are used to **display** (and, when „Editable“ is checked) to **edit** values with an automatic displayed virtual keyboard to type in the values.

Place an object: (see basic funtions)
Assign visibility: (see basic funtions)
Assign margins: (see basic funtions)
Assign border: (see basic funtions)
Assign font: (see basic funtions)
Assign access rights: (see basic funtions)
Assign appeareance: (see basic funtions)

Parameterize the object: (register “General”)

- Assign the vertical and horizontal **alignment**
- Assign a (or create a new one) **variable** to be displayed in this field
- Assign the **format of I/O-field**
  - leading zero, „+“-sign, digits, decimal point
  - display format (if comma-key shall be used in keyboard dialog)
  - or use the format of the assigned variable (shown here)
- By checking **„Editable“** the object´s value is changeable by the operator on the touch panel
- **Limit** the max/min values (always depending on the variables type)



Notification of modification
Assign a bit to get informed, when the operator changes the value of the I/O-field at runtime.

Hint:
- At **STRNG** notice the S7-definitions (length-values in the first 2 bytes)!
  At INSEVIS the maximal length of the STRNG is 60 bytes
  BUT the referring DB MUST BE at least 60+2 bytes large!
- **Scaling:** by S7-program with the Siemens-FC105 SCALE
  (Result: REAL-value, what is not allowed in VisuStage to color the appearance of this fields),
- If this coloring/ appearance is needed, than us S7-commands Rounding (RND) or Cutting (TRUNC) to reach a valid value for this function
- If a DateTime field is to narrow, than characters, what can not be displayed completely will not displayed at all

ACHTUNG:
- If an I/O field is too narrow, the characters that can no longer be displayed in full are no longer displayed at all!
- - Dynamic objects **should NOT overlap**. (Exception: touch surfaces), as a state-dependent
- state-dependent change of the background under transparent surfaces is ignored.
- An error message is issued for this during compilation.
- - The simulation generates an error report that leads directly to the faulty object.

PIN input fields

(not for WebVisu and EDGE-HMI)

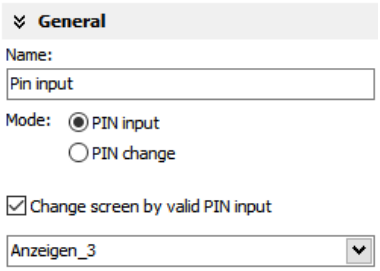
In the user administration can be assigned up to 9 levels with an up to 8-digit PIN- number to administrate the access rights.

A login-keyboard appears automatically after touching the PIN input field by the operator.
„INPUT“ is to enter your PIN to get into your access rights.
„CHANGE“ means, that PIN can be changed by authorized personally. After changing the new PIN is valid.

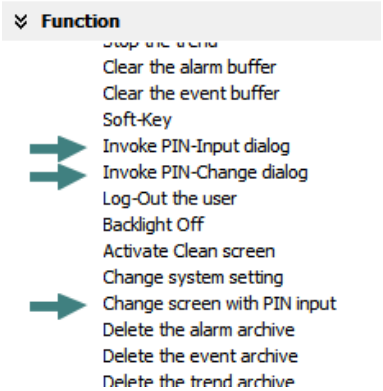
There are 3 ways to call this dialog:

1.) PIN-INPUT / CHANGE field (object)
The benefit of this way is, that the target screens, whereto it will be changed after successfully login/ logout are defined in the resource „User“

And here can be assigned a special screen change too.

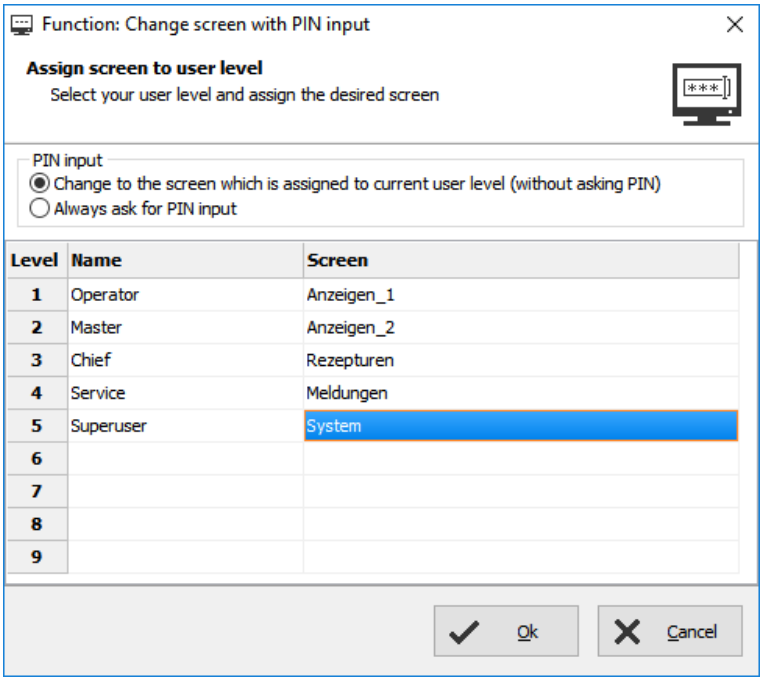


2) Invoke PIN-INPUT / CHANGE dialog (function)
The benefit of this way is, that the login dialog can be assigned to any button or touch field as well. (See first 2 functions right)
The disadvantage is, that the screen is not automatically changeable with this function.



2) Change screen with PIN-input (function)
This is the right way to assign a different screen to change for every single user level.
(See 3rd function right)

With assigning this function you need to design the target screens for every user level.



User/password input field

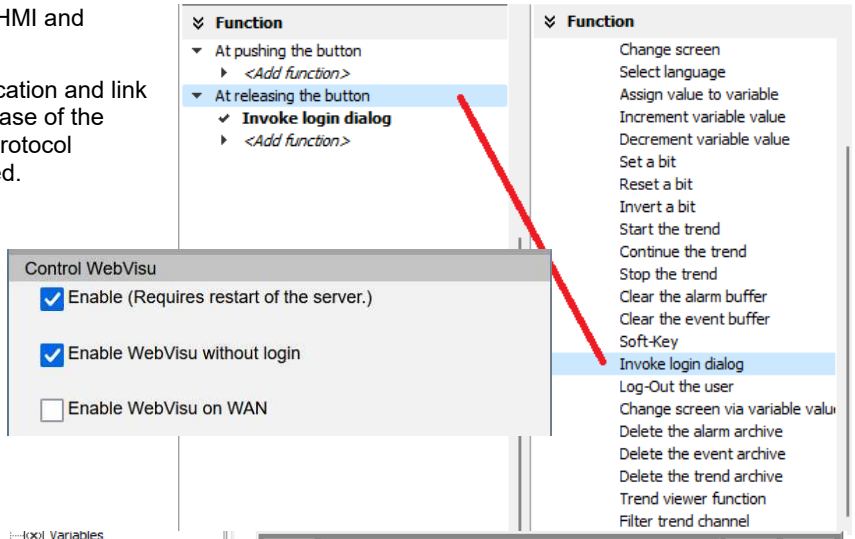
(only for WebVisu and EDGE-HMI)

A simple login button can be created for EDGE-HMI and WebVisu.

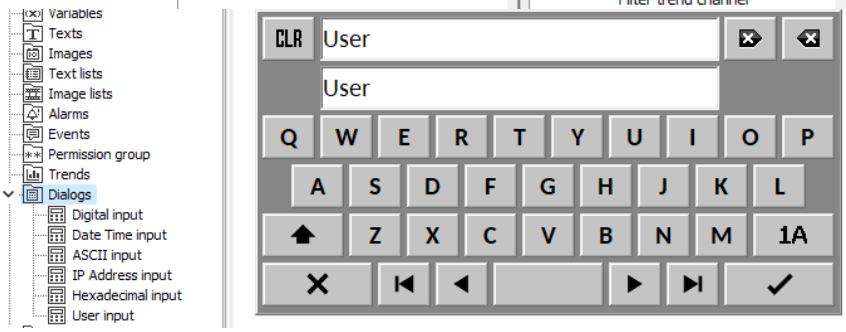
To do this, create a new button at the desired location and link the "Invoke login dialogue" function with the release of the button. This ensures that the login page of the Protocol Converter is called up when the button is pressed.

A log-out button can also be created in this way.

If the "Enable WebVisu without login" checkbox is activated, the default user created in the device is always logged in when logging out. This must be taken into account when assigning rights.



In the EDGE HMI, the "Invoke login dialog" opens the User input dialogue, which the operator can then use to log in. after logging out, the visualisation is always displayed without user rights.

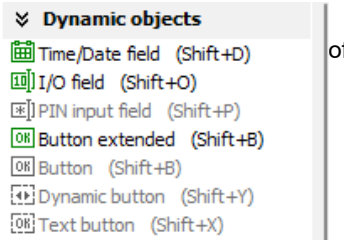


Various button types

The VisuStage offers standard, dynamic and text buttons. (not for EDGE-HMI and WebVisu)

- The **standard buttons** are available as templates and have 65,000 colours. They each have a permanently assigned design, a text and an icon.
- **Dynamic buttons** are defined in the VisuStage, have only 256 colours, but also offer a colour change, multilingual text wraps (text lists) and symbol wraps (image lists).
- **Text buutons** are required if you want to use text envelopes with very extensive text lists.

With EDGE-HMI and WebVisu, there is only the EXTENDED BUTTON, which contains all button functions including the touch surface in one. If an existing visualisation is ported to one the web visualisations, these buttons are automatically adapted. The extended button is parameterised in a similar way to the other buttons.



of

All button types have a so-called "dead man's function" (**execution of the function even if the button is left sideways)**, which can be selected.



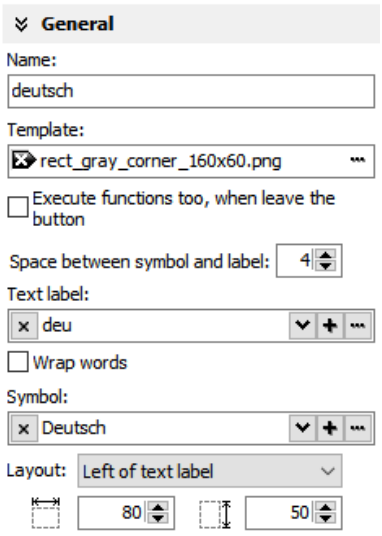
Note:
Due to the incompatibility of the buttons in WebVisu and EdgeHMI, they cannot be inserted from previous projects using drag and drop. It may therefore be worthwhile to temporarily port the existing visualisation to a WebVisu/EdgeHMI project. Buttons (and their links) can then also be inserted into the current WebVisu/EdgeHMI project using drag & drop.



ATTENTION:
- Normally, if a button is pressed incorrectly, you can prevent it from being executed by "sneaking out" to the side. This is preset, but sometimes dangerous, as the example of the "Invert bit" function shows:
- Bit = 1 → Switch on the motor by pressing the button, Bit = 0 → Switch off the motor when the button is released.
- IIf the hook is not activated, the user can accidentally slip out of the side of the button area and the motor will continue to run until the end contact is reached.

Standard buttons

Place an object: (see basic funtions)
Assign visibility: (see basic funtions)
Assign margins: (see basic funtions)
Assign font: (see basic funtions)
Assign access rights: (see basic funtions)



Parameterize the object: (register “General”)

- Check / uncheck the execution when leaving the button sideways
- Select a **Label (Text)** from your resources or import it directly here to place it on the button
- Select a **Symbol** from your resources or import it directly here to place it on the button
- Assign the place, where the image/symbol is displayed referring to the text
- Assign the size of the symbols image

Use of selfmade buttons

- Copy your 3 buttons (all with the same name) each in one of those 3 directories
  -\inactiv (displayed when no access is allowed),
  -\pressed (displayed wen pressed)
  -\unpressed (displayed when access is allowed, but unpressed),
  of the main directory C:\Programs (x86)\INSEVIS\ VisuStage\Buttons.
- Choose the same color for the are in the middle, where your text and/or symbol will appear.

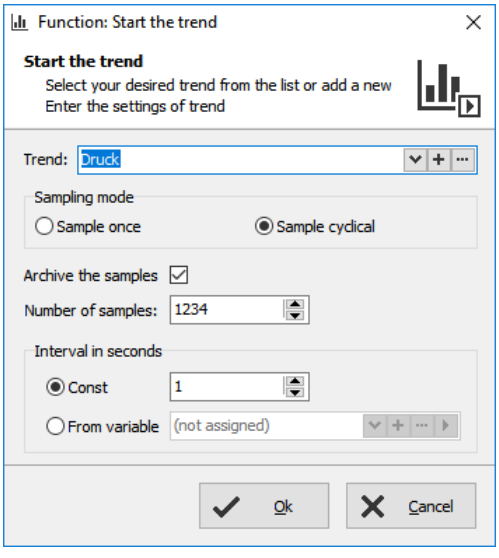


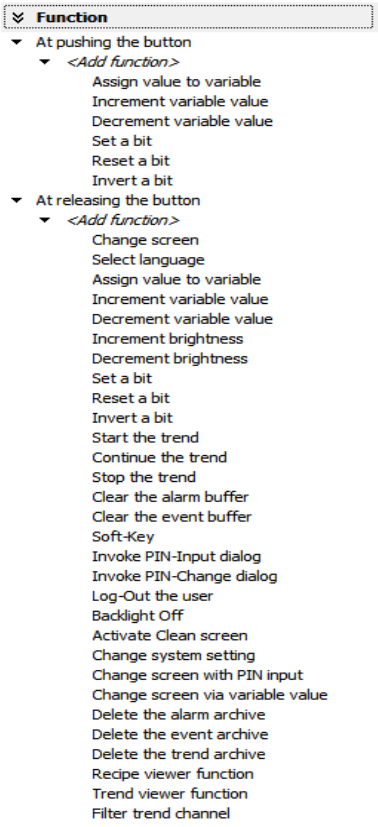
Attention
If you forward the source code of this VisuStage project (vsproj + vsbin) you need to add the 3 self made buttons and copy it in the same path like VisuStage Is installed there. Otherwise these buttons will not be displayed (and compiled to the binary).

Assign a function (register “Function”)

It is possible to assign multiple functions to one action (press or release).

- Decide, WHEN the function will be proceeded:
  - at PUSHING or
  - at RELEASING
  the button
- After choosing a function (by double click)
  opens up another window to enter the required data for the selected function (like shown in sample below at “start Trend” function:)
- There can be assigned multiple functions to one object as well
- There can be assigned functions for pushing and releasing the button as well

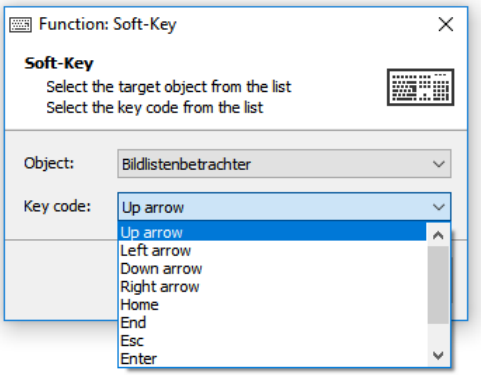




Standard buttons

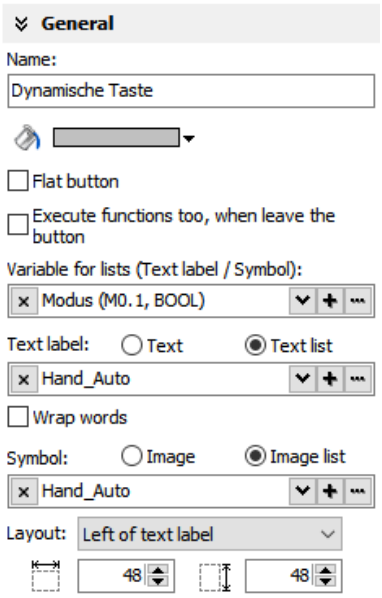
Use of Soft-Key function

- It is used to create own navigation buttons for viewer object and works in the same screen as the viewer object is.
- If there are more than one object with soft-key opportunities you have to select it first in the upper line.



Dynamic buttons

This buttons were used mostly for a mixture as state area, text- and image lists with a function to execute.)e.g. is in run / switch to stop, etc.). For this kind of button it is not possible to create own ones, because they were calculated at runtime.



Place an object: (see basic funtions)
Assign visibility: (see basic funtions)
Assign margins: (see basic funtions)
Assign font: (see basic funtions)
Assign access rights: (see basic funtions)
Assign appeareance: (see basic funtions)

Parameterize the object: (register “General”)

- **Assign a variable**, to control symbol- and text changes
- **Text changes:** (in the sample description / state of the buttons) choose (or create a new) a **text list**, what shell be shown on the dynamic button
- **Symbol changes:** (in the sample manually/automatic mode sign) choose (or create a new) an **image list**, what shell be shown on the dynamic button



Attention
If there is active another value as these what are assigned in line 1...n, than ALWAYS this appearance will be displayed, what is assigned FIRST (in first line / line 1).

Use of self-made buttons

- Dynamic buttons are to be created in the VisuStage software.
- There is not possible to add additional (own) button designs.

Text buttons

These objects are used like a dynamic button without symbol change, but can be used to proceed very large text lists. For this kind of button it is not possible to create own ones, because they were calculated at runtime.

Touch areas – invisible buttons

These objects will be placed above an other object (mostly an image) to add a special function by pressing it (like an invisible button over a special part of a machine).

Place an object: (see basic funtions)
Assign access right: (see basic funtions)
Assign appeareance: (see basic funtions)
Assign a function: (register “Function”)
like at the standard simple buttons.



Attention / objects in general:

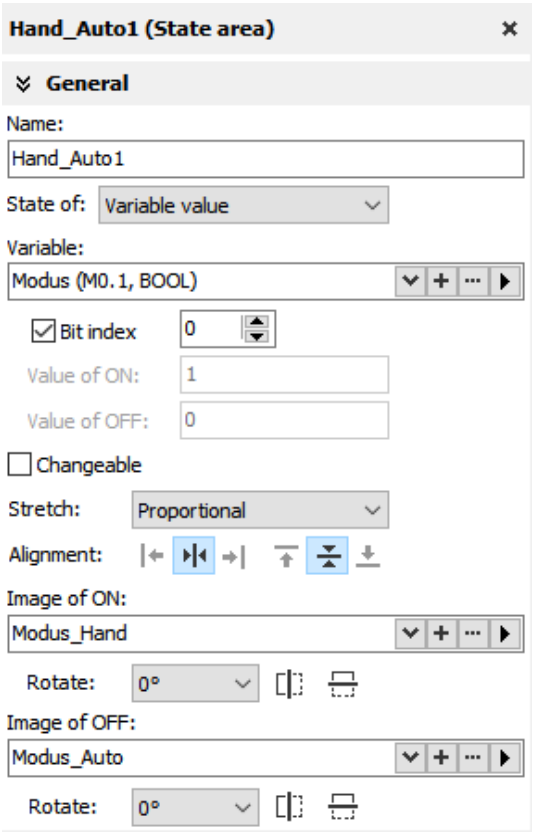
- Dynamic objects shall **not overlap each other** (Exception: touch area may).
- Simulation with F9 or „►“ creates an error report, click on error and come directly to the failed object.

State areas

Place an object: (see basic funtions)
Assign access rights: (see basic funtions)
Assign visibility: (see basic funtions)

Parameterize the object: (register “General”)

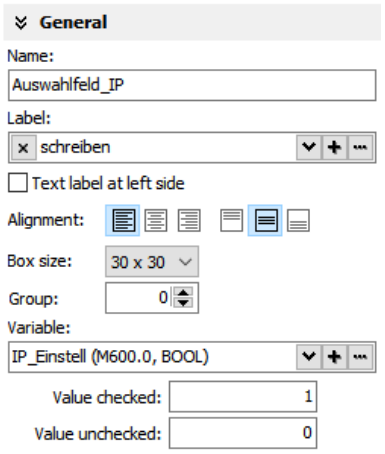
- If you depend the state area on variables
  → use an existing resource or create a new one directly here
- If you use a system setting
  → select one of the system settings of the drop down menue
- In the „Stretch“-box choose
  - „Fit to size“ to see your image in the objects rectangle you did draw
  - “Proportional” to keep the images proportion (rest of the object stays empty)
- Assign an image resource or create a new one to be shown in ON-state and in OFF-state





Attention / objects in general: (not for WebVisu and EDGE-HMI)
- Dynamic objects shall **not overlap each other** (Exception: touch area may).
- use PNG graphic format with a transparent Alpha-channel to let the background shine through the transparent areas of the image (e.g. on rounded corners).
- Simulation with F9 or „▶“ creates an error report, click on error and come directly to the failed object.

Radio boxes and Check boxes

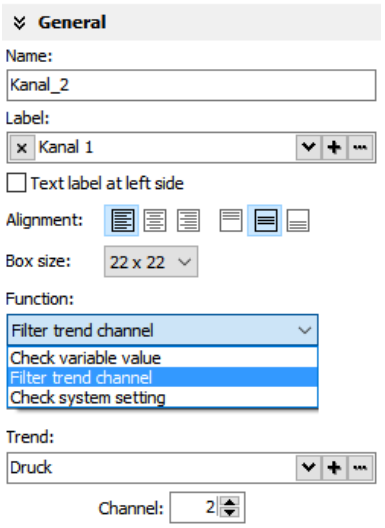


Radio boxes are used to visualize an **either-or-selection**
(e.g. at alarms coming and leaving)

Place an object: (see basic funtions)
Assign visibility: (see basic funtions)
Assign margins: (see basic funtions)
Assign font: (see basic funtions)
Assign access rights: (see basic funtions)

Parameterize the object: (register “General”)

- Assign (or create a new one) a text („Label“) to describe the check item in the box
- Assign the alignment of the text
- Assign the dimension of the box size to click into
- Assign the group information (to what other radio boxes it should belong)
- Assign a variable value for UNCHECKED and one for CHECKED state



Check boxes can be checked and unchecked individually and **multiple** of it
(e.g. to filter trend channel or to change a state area).
Also these boxes are used to assign buzzer system functions.

Place an object: (see basic funtions)
Assign visibility: (see basic funtions)
Assign margins: (see basic funtions)
Assign font: (see basic funtions)
Assign access rights: (see basic funtions)

Parameterize the object: (register “General”)

- Check,. If the text shall be left of the check box
- Assign (or create a new one) a text („Label“) to describe the check item in the box
- Assign the alignment of the text to the objects border
- Assign the dimension of the box size to click into
- Assign a variable, where the value is set by activating CHECKED / UNCHECKED (e.g. a bit with 0 / 1)
- Assign (or create a new one) a filter for a trend channel to show or
- Assign the state of a system property like e.g. the internal buzzer



Attention / objects in general: (not for WebVisu and EDGE-HMI)

- Dynamic objects shall **not overlap each other** (Exception: touch area may).
- transparent areas of the image (e.g. on rounded corners).
- Simulation with F9 or „▶“ creates an error report, click on error and come directly to the failed object.

Progress bars

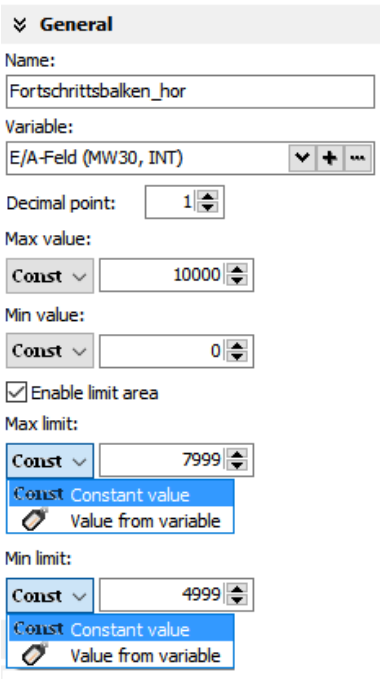
This item is uses to display analog values like dimensions, time, etc., where different colors depend on different limits assigned before.
The progress bar right was designed with these settings below:



Place an object: (see basic funtions)
Assign visibility: (see basic funtions)
Assign margins: (see basic funtions)
Assign font: (see basic funtions)
Assign access rights: (see basic funtions)

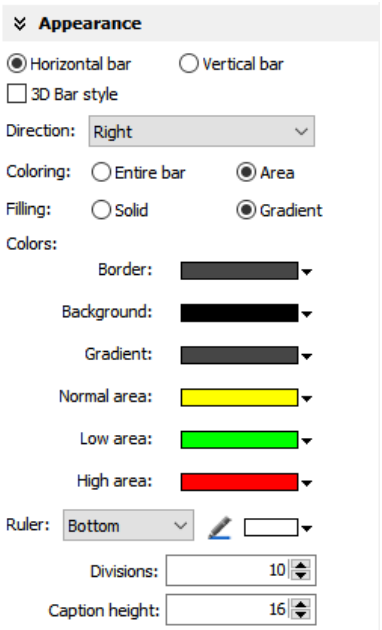
Parameterize the object: (register “General”)

- Assign a **variable** (or create a new one)
- Assign the **format** (minimal value, maximal value, decimal point)
  At INTEGER values type in the value w/o decimal point (here: 10000 = 1000.0)
- Assign a variable or a fixed value for Maxlimit and for Minlimit of the progress bar.
- If you want to color 3 parts of the progress bar, enable limit areas
  - by a fixed value or
  . By a variable



Color the object: (register „Appearance“)

- Choose a **bar style** (horizontal, vertical, 2D, 3D, color of background and fill color
- Decide, if the bar is always having ONE actual color (“Solid”)
  or 3 segments with a single color each (“Area”)
- If “Area” was selected: Assign direction of the colors in the bar
- Assign colors and of the 3 segments defined by the limits in “General”
- Design the **ruler** (position, color, divisions, capture height)
  → at unfavourable divisions rounding errors are possible!





Hint:
During first time dropping a progress bar into the screen the progress direction will be assigned referring to heigth / width as shown below:

- Is height > width = vertical direction
- Is height < width= horizontal direction



Attention / objects in general: (not for WebVisu and EDGE-HMI)

- Dynamic objects shall **not overlap each other** (Exception: touch area may).
- Simulation with F9 or „▶“ creates an error report, click on error and come directly to the failed object.

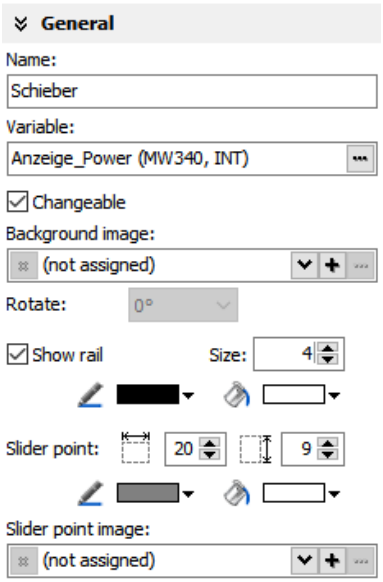
Sliders

This object is a good solution to display a variables value along a staight line or (if editable is activated) to set up a value roughly by hand.

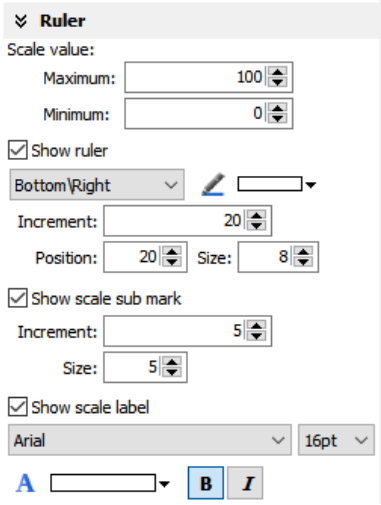
Place an object: (see basic funtions)
- Is height > width = vertical direction
- Is height < width= horizontal direction

Assign visibility: (see basic funtions)
Assign access rights: (see basic funtions)

Parameterize the object: (register “General”)
- Assign a **Variable** vor the value you want to display/edit
- If “**Changeable**” is activated the slider point is movable and changes the variables value
- It is possible to assign the sliding rail by VisuStage or to import an existing image as **Background image**
- It is possible to assign the sliding point by VisuStage or to import an existing image as **Slider point image**



Parameterize the scale: (register “Ruler”)
- Insert fixed values for the **Minimum / Maximum** of the rulers range
- Activate the display of the **Ruler**
- Select the rulers position referring the slider
- Assign the increments (values between the visible values on the ruler)
- **Position** = The rulers distance between the ruler and the sliding rail.
- **Size** = Width (at vertical) e.g. height (at horizontal) of the ruler
- Activate **Scale sub marks** (between the main marks = rulers increments)
  (it is better if these sub marks are a devisor of the main mark, e.g. 5 or 10, when the rulers increment is 20)
- Activate **Scale label** (self explaining)





Hint:
By the dimension of the objects when putting into the menue by mouse it will be set automatically, if it is a
- vertical (height > width) or an
- horizontal (height > width) slider.



Attention / objects in general: (not for WebVisu and EDGE-HMI)

- Dynamic objects shall **not overlap each other** (Exception: touch area may).
- Simulation with F9 or „►“ creates an error report, click on error and come directly to the failed object.

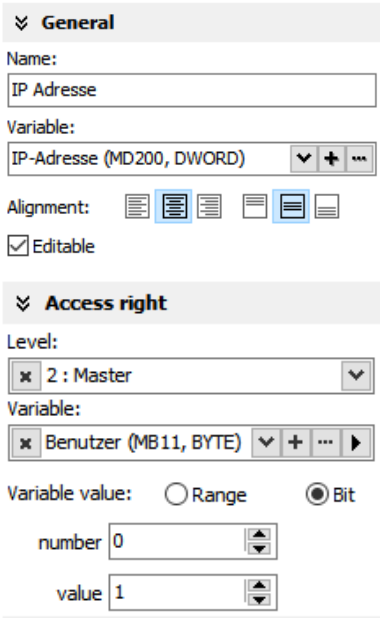
System data (IP-address field, languages, etc.)

While languages, brightness or screen savers are functions what can be assigned to buttons or touch areas, the IP-address-field is an own object.

Place an object: (see basic funtions)
Assign visibility: (see basic funtions)
Assign margins: (see basic funtions)
Assign font: (see basic funtions)
Assign access rights: (see basic funtions)

Parameterize the object: (register “General”)

- Assign a (or create a new one) **variable** to control the system property
- By checking **„Editable“** the object´s value is changeable by the operator on the touch panel
- Assign the alignment of the box
- Assign access rights





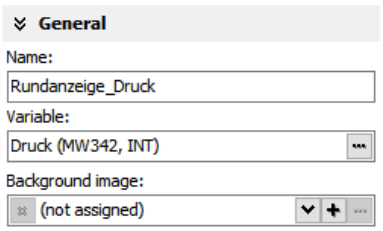
Attention / objects in general: (not for WebVisu and EDGE-HMI)
- Dynamic objects shall **not overlap each other** (Exception: touch area may).
- Simulation with F9 or „►“ creates an error report, click on error and come directly to the failed object.

Gauges

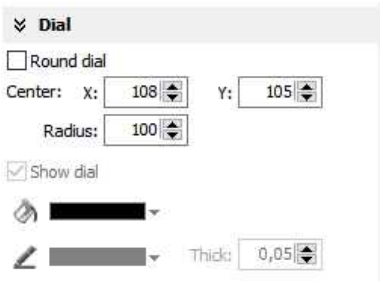
With this object a value can displayed in a gauge form with a pointer like in older meters.

Place an object: (see basic funtions)
Assign visibility: (see basic funtions)

Parameterize the object: (register “General”)
- Assign a variable to display their value
- Activate a background image
  (If you do not want do create your gauge by VisuStage)



Parameterize the dial: (register “Dial”)
When round dial is activated, a circle is created by the smaller value ox X and Y
- When “Show dial” is activated this can be colored
  - Assign the background color of the dial
  - Assign the border color and thickness of the dial
- When “Round dial” is dectivated, you can set:
  - **Radius** of the circle segment (angle below „Scale“)
  - **X-Position** of the pointer rotation points (from the left object border)
  - **Y-Position** of the pointer rotation points (from the upper object border)



Visualization with the software „VisuStage“

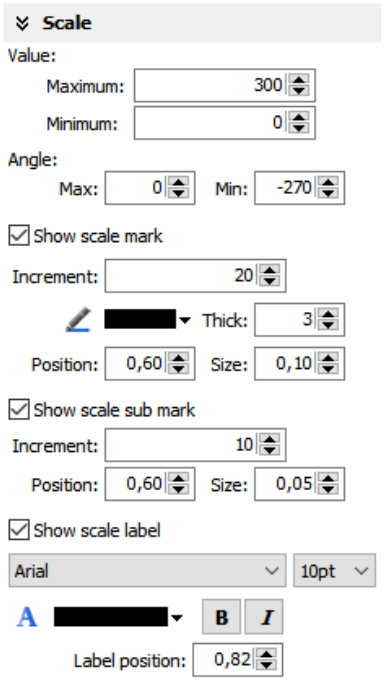
Scale configuration: (register “Scale”)

- Insert **Minimum / Maximum** of the scale value to be dislayed

- Insert the **Angle** of the circle segment for the scale area
  - Start at **Min**, end at **Max,**
  - **Pointer always runs clockwise**
  - Information angle position: -270° = „6 o´clock“ / -180° = „9 o´clock“ -90° = „12 o´clock“ / 0° = „3 o´clock“ / 90° = „6 o´clock“ 180° = „9 o´clock“ / 270° = „12 o´clock“

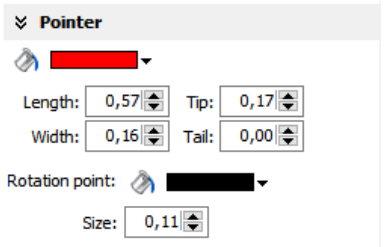
- Activate **Scale marks** (marks and sub marks)
  - Increments between main marks
  - Color, thickness, position (~Radius form pointer rotation point), size (~length)
- Activate **Scal sub marks**
  - Increments between sub marks
  - Color, thickness, position (~Radius of the pointer rotation point), size (~length)

- Activate **Scale label**
  - Font, size, color, style (bride/italian)
  - Position (~ assign radius of the pointer rotation point



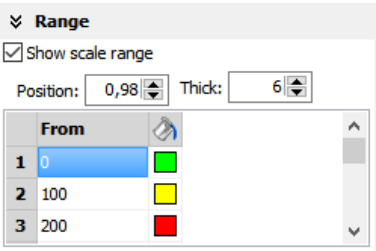
Pointer configuration: (register “Pointer”)

- Assign a **color** for the pointer
- Assign the **length** of the pointer (distance between pointer root to top))
- Assign the **width** of the pointer
- Design the shape of the **pointers tip** (0,01~ flat, >0,01 more and more narrow)
- Assign the distance between pointer root to the rotation point **(tail**)
- Color the **circle at the pointers rotation point** (The rotation circle always does have a 1 pixel-frame outside in the pointers color))
- Adjust the **size (diameter)** of the rotations points circle



Configure the color ring: (register „Range“)
Limits and areas can be colored by a ring inside/outside the scale.

- Activate **Scale range**
  - Assign the **position** (~ radius of this circle segment)
  - Assign the **thickness** of this ring
- **Coloring**
  - The color area do not have an upper limit.
  - The next color are starts at the lower limit of the next color.
  - the last color limit is the maximum limit of the scale





Attention / objects in general: (not for WebVisu and EDGE-HMI)

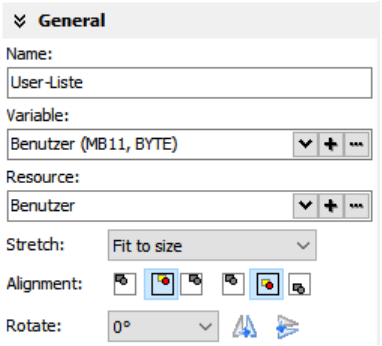
- Dynamic objects shall **not overlap each other** (Exception: touch area may).
- Simulation with F9 or „▶“ creates an error report, click on error and come directly to the failed object.

Viewers

Image and text lists

Image list

Look at the color change of the pipes in visualization sample, screen “objects” 3. The pipes will be separated into segments. For these segments all colors are available as single images with the requested colors. In the resource „image list“ values will be assigned to these single images. In the object image list these values will be controlled by a variable (what itself is controlled by arrow buttons, what increase/decrease its value by „1“. This value is also shown in a I/O-field).



Place an object: (see basic funtions)
Assign visibility: (see basic funtions)
Assign appeareance: (see basic funtions)

Parameterize the object: (register “General”)

- Ín the **„Stretch“**-box choose **„Fit to size“** to see your image in the objects rectangle you did draw
- Assign horizontal/vertical **orientation** if object is not stretched
- **Rotate** and **mirror** object as you want to assign an **image list** resource (must be existing - created at the image lists item)
- Assign a **variable**, what controls the image lists value

Text lists

Look at the text change of the users in visualization sample, screen “users”).with displaying the actual logged-in user. There were assigned 3 user (user 1, .._2, .._3).

Place an object: (see basic funtions)
Assign visibility: (see basic funtions)
Assign appeareance: (see basic funtions)

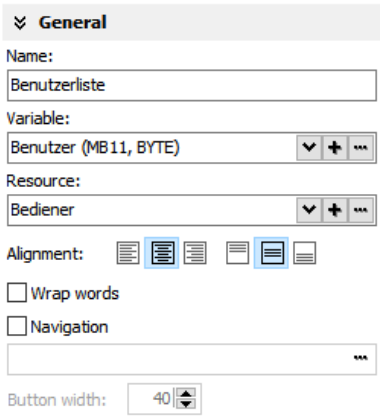
Parameterize the object: (register “General”)

- In the **„Stretch“**-box choose **„Fit to size“** to see your image in the objects rectangle you did draw
- Assign horizontal/vertical **orientation** if object is not stretched
- **Rotate** and **mirror** object as you want to assign an **image list** resource (must be existing - created at the image lists item)
- Assign a **variable**, what controls the image lists value

Color the object: (register „Appearance“):

Additional functions at text lists

- If there is a multiline text list, it is possible to assign **navigation buttons** for scrolling up-/down





Attention / objects in general: (not for WebVisu and EDGE-HMI)

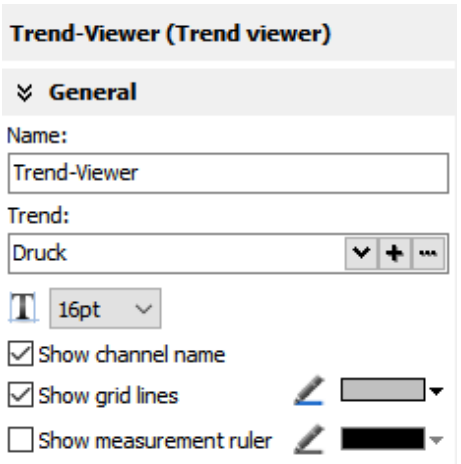
- Dynamic objects shall **not overlap each other** (Exception: touch area may).
- Simulation with F9 or „▶“ creates an error report, click on error and come directly to the failed object.

Trend viewer and trend archive viewer

This object shows the samples of up to 16 values (= 1 trend) by time in a graphic way.
At CPU-T-devices there are available grid lines for better orientation, a higher scaled X-axis (more time values) and a movable measurement ruler to show archived values at different times.

In WebVisu and EDGE-HMI, trend and trend archive are merged, the trend archive display as such is omitted.

Per trend there is shown only ONE vertical scale with the referring trend name above. To see the other scales click on the name and the scale and name of the next trend appears, and so on until the first trend comes again.



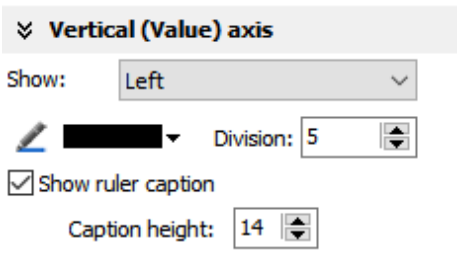
Place an object: (see basic funtions)
Assign border settings: (see basic funtions)

Parameterize the object: (register “General”)

- Assign a **trend resource**
  (use existing rersources)
- **Format the text** of the displayed channel name
- Check, if the **channel name** should be displayed
- Activate and color **grid lines**
- Activate and color the **measurement ruler**

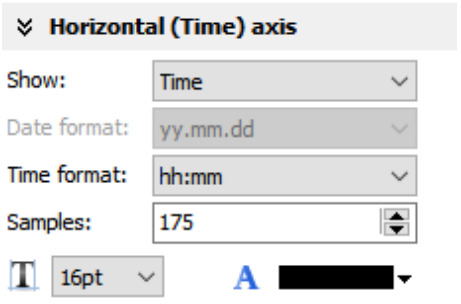
Parameterize the object: (register „X/Y-axis“)

- **Activate and color the Y-axis**
- Assign **scale divisions**
  (Rounding errors can appear!)
- Activate the rulers caption
- Assign caption height



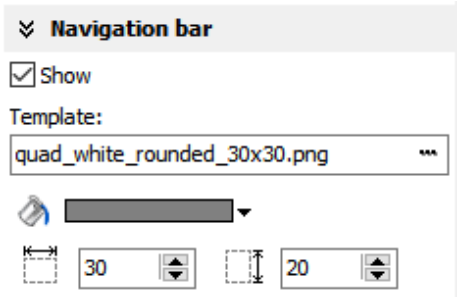
Activate and color the X(time)-axis

- **Assign time format**
  - Time + Date or
  - Time only or
  - Date only or
  - nothing
- Enter the **number of samples** to be displayed
  max. 200 in viewer, max. 65535 (expect longer displaying time)
  in archive viewer (values for CPU-T)
- Assign font, size and color of the X-axis



Navigation bar (for trend archive viewer only)
For CPU-V/-P-devices or for CPU-T-devices, when there shall not be an manual generated navigation, zoom bar

- Activate **navigation bar** for scrolling forward or backward
- Assign buttons and dimension it
- Assign background color for the bar
- 4 buttons with scroll functionality
  1st: back to first (oldest) sample
  2nd: one window back
  3rd: one window forward
  4th: forward to last (newest) sample



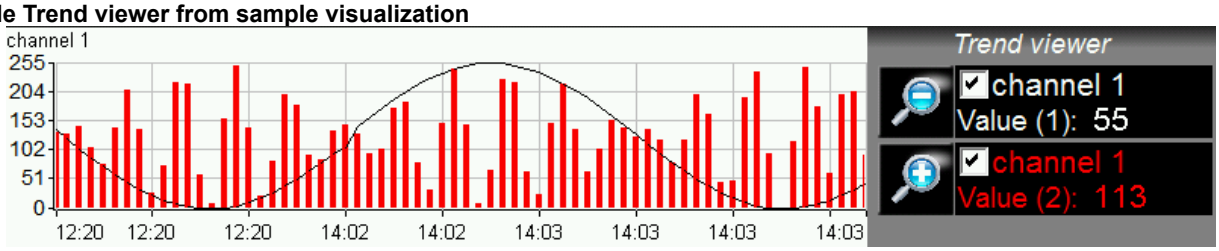
Information for time axis (X-axis) of CPU-V/-P-devices
Because the displayed time will be calculated in run-time, only 2 time stamps will be displayed:

- the time of the first shown sample (very left) and
- the time of the last shown sample (very right)

and nothing between it because it would overwrite each other.
100 samples will be displayed in the trend window. After the graph reaches the right border, the graph is moved 10 samples (10%) to the left (and the displayed times are changing).

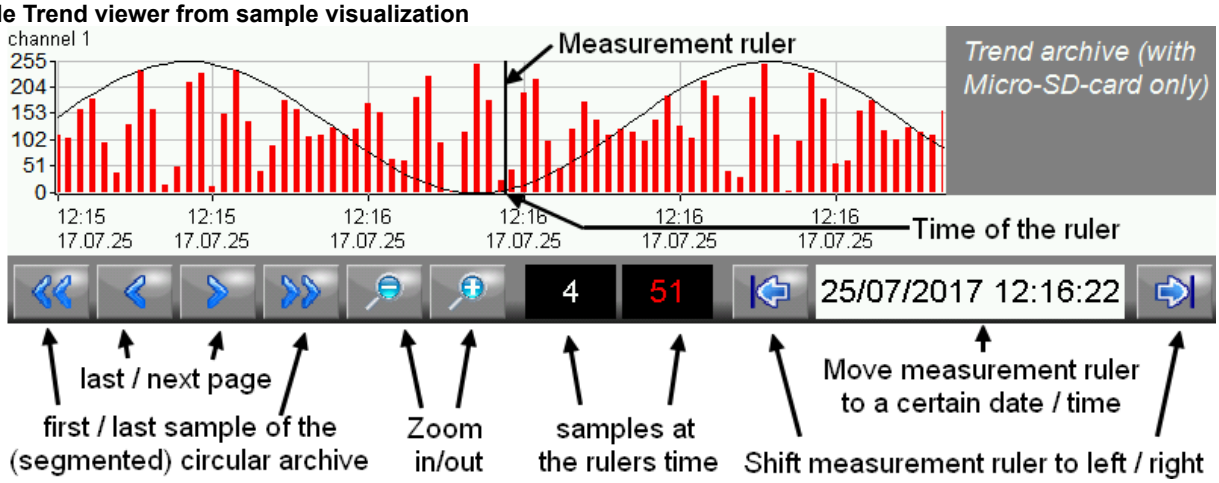
Visualization with the software „VisuStage“

Sample Trend viewer from sample visualization



Activating trend channel: by check box (function: Filter trend channel)
Display the actual sample value: by I/O-field (variables value)
Zoom in/out functions: as button function (Trend viewer function, zoom in/out)

Sample Trend viewer from sample visualization



Activating trend channel: by check box (function: filter trend channel)
Zoom in/out functions: as button function (trend archive viewer function, zoom in/out)

Manually designed navigation
First / last (actual) samples as button function (trend viewer function, zoom in/out)
Next sample page / sample page before as button function (trend viewer function, zoom in/out)
Values at the measurement ruler time as I/O-field (with values from trend archive viewer)
Move the m-ruler to a certain time as date/time-field (with source trend archive viewer)
(The measurement ruler can be moved by touching the touch display in the viewer)

Caution

Attention / objects in general:
- trends can be archived only, if there is a micro-SD-card inserted
- for CPU-V/-P-devices:
  trend viewer max. 100 samples will be displayed. When the samples reach the right border, they were shifted 10% to the left
  trend archive viewer: max. 800 samples can be displayed
- for the CPU-T-devices
- trend viewer: max 1000 samples can be displayed. When the last sample reaches the right border, the where shifted to left pixel by pixel.
- Trend archive viewer: max. 655.350 samples can be archived (=10 circular archives)
- For WebVisu and EDGE HMIs:
  If you scroll backwards in the trend, you can view the archived trend; if you scroll forwards, the current trend is displayed. The size of the archive is only limited by the available internal memory.
- Only ONE vertical trend scale is displayed at a time with the corresponding trend name above it. Tapping the name switches the scale and the name to the next trend until the first trend appears again, and so on.
- there is shown only ONE vertical scale with the referring trend name above. To see the other scales click on the name and the scale and name of the next trend appears... until the first trend comes again.
- Dynamic objects shall **not overlap each other** (Exception: touch area may).
- Simulation with F9 or „▶“ creates an error report, click on error and come directly to the failed object.

Message viewing and archiving

There are different objects to display messages:

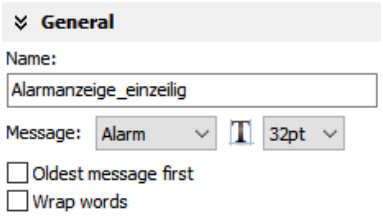
- blinking symbols (Message indicator)
- blinking text lines (Message indicator - text)
- oldest/youngest message only (Message viewer - line)
- viewer box for all actual messages (Message viewer - multi line)
- viewer for all archived messages (Message archive viewer)

For all standard parameters:

Place an object: (see basic funtions)
Assign frames: (see basic funtions)
Assign margins: (see basic funtions)
Assign visibility: (see basic funtions)

Message indicator symbol and text

This dynamic objects are used to inform the operator about an actual existing message (alarms/events) either with a blinking symbol or a blinking text line.



Indicator at alarms:

Blinking	if alarm has come and is not acknowledged
Display (without blinking)	if alarm is acknowledge but still there
Disappears	if alarm is acknowledged and no more there

Indicator at events:

Blinking	if event is there
Disappears	if event is no more there

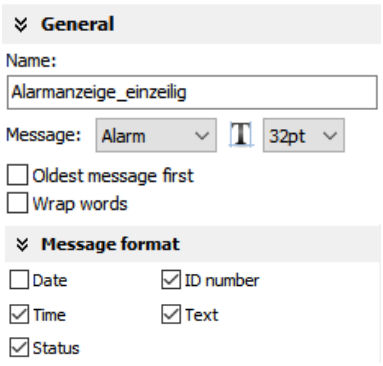
Placing as like at all other objects too, **Parameterization** is self explaining only **Assign** an event type - alarm or message.

Message viewer - line

This message line is made to **show only** the most actual message to be implemented as an information line only, with no opportunity to acknowledge or scroll.

Parameterize the object: (register “General”)

- Select “events” or ”alarms” to display
- Adjust, if oldest or newest message will be displayed
- Activate word wrapping

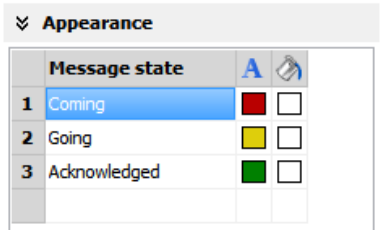


Formatting the object (register “Message format”)

- date
- time
- state
- ID-no. (Group)
- message text

Color the object (register „Appearance“)

All messages in the message viewers all single messages can be changed in color referring to their stat (Coming, Going, Acknowledged).



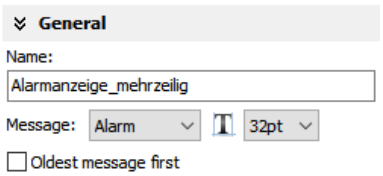
Message viewer multiline / Message archive viewer

This message viewer is made to show all **active messages**. It contains navigation functions (line **scroll**) and (for alarms) an **acknowledgment** function.
This message viewer is made to show all **archived messages** saved on the Micro-SD-card. It contains navigation functions (line and page scroll). To archive samples activate it by a hook as archivable.

Place an object: (see basic funtions)
Assign visibility: (see basic funtions)
Formatting the object: (register “Message format” at the single line message viewer)
Color the object: (register „Appearance“ at the single line message viewer)

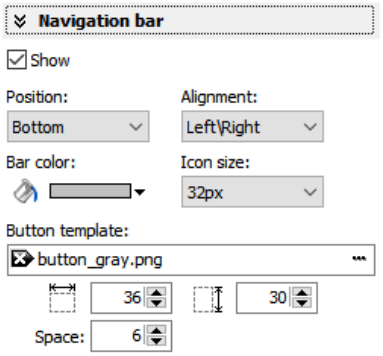
Parameterize the object: (register “General”)

- Select “events” or ”alarms” to display
- Adjust, if oldest or newest message will be displayed
- Activate word wrapping



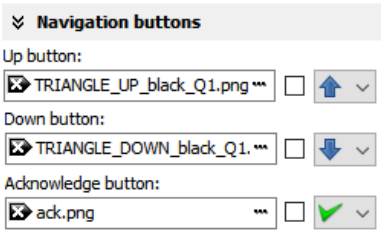
Formatting navigation bar: (register “Navigation bar”)

- **Activate** the bar
- **Color** the background
- Design the **placement** of the buttons
- Configure the **size of the icon**s in the buttons
- Select a **button template**
- Design the **button size** width by height
- Adjust the **distance** between the buttons



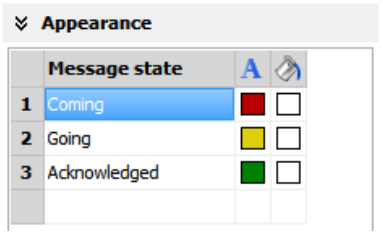
Designing navigation buttons: (register “Navigation buttons”)

- Select a **button template**
- Activate to insert a icon (Up/Down/Acknowledge)
- Select one of the icons from the list
- Scroll navigation (up & down):
  - Message viewer: line by line
  - Message archive viewer: line by line & page by page



Color lines and texts by status: (register “Appearance”)

- Depending on message status
  (such as Coming, Going, Acknowledged)
  different colors are possible for
  - Foreground (Text)
  - Background (field area)





Attention / objects in general: (not for WebVisu and EDGE-HMI)

- Dynamic objects shall **not overlap each other** (Exception: touch area may).
- Simulation with F9 or „▶“ creates an error report, click on error and come directly to the failed object.

Recipe viewer
(not for WebVisu and EDGE-HMI)

The resource “recipes” will displayed by this object in 3 different windows:
- Recipe viewer window
- Records viewer window (of each recipe)
- Element configuration window

Place an object: (see basic funtions)
Assign border settings: (see basic funtions)
Assign access right: (see basic funtions)

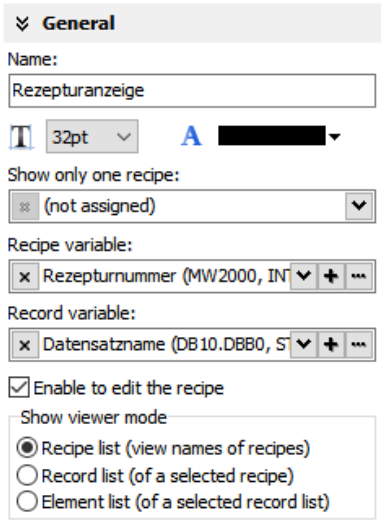
Parameterize the object: (register “General”)
Name:
- internal name of the recipe viewer (independent of project language)

Show only one recipe:
- reduces the list to only one (selected) recipe (e.g. if this machine is designed for only one recipe but the project contains more recipes for more machines)

Recipe variable: *(to display the actual used receipt name)*
- Assign it, if the internal number of the recipe shall be stored in a S7-variable, what will be linked with the receipt name
- (resource „View Name“ in a text list and can be displayed as active receipt name)

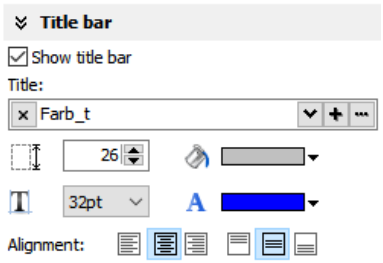
Record variable: *(to display the actual used receipt name)*
- Assign it, if the internal number of the record shall be stored in a S7-variable to be shown in a I/O-field to display the actual record name
- (At first simulation assign any value to this variable in the SimuStage, than you see the active record after press the button „Save to PLC“)

Enable to edit the recipe:
- Allows manipulation by the operator (changing the element values, storing as a new record, deleting records and so on)



Parameterizeing of the title bar
(general for recipe lists, record lists, element lists)

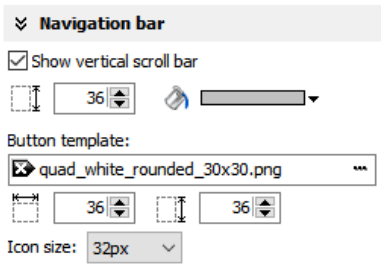
- It is recommended to use a title bar and to assign a title to the recipe list.
- The titles of the other lists bellow (record list and element list) will be assigned automatically by the inserted data.
- (Title of the record list in the sample „red shades“, element list in the sample Rose“)
- All other settings are self explaining settings to design the title bar

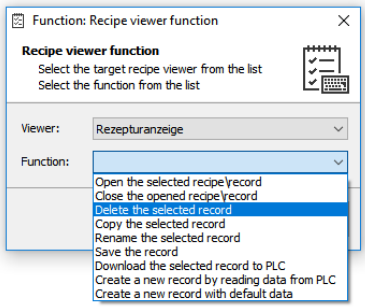


Parameterizeing of the navigation bar
(general for recipe lists, record lists, element lists)

- This activation is recommended, when more recipes, records or elements are used than fit into the screen window and scrolling is necessary.

- All settings are self explaining settings to design the scroll bar



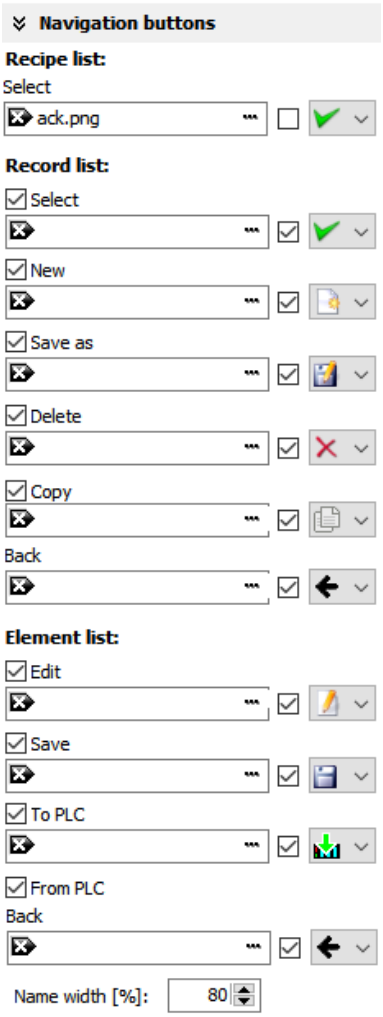




Hint:
Instead of a navigation bar you can assign own buttons by using “Receipe Viewer Function” at releasing the button.

Parameterizeing of the operators control elements
(general for recipe lists, record lists, element lists)

By the register „Navigation buttons“ can be selected all function keys you need.
Their button design can be substituted by a customized button.



Recipe list:

Select:	activates a recipe from the recipe list (will be highlighted), by touching directly too, this list can be hided, when you have 1 receipe only

Record list:

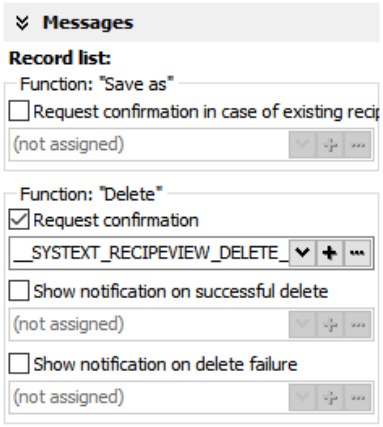
Select:	activates a record from the record list (will be highlighted), by touching directly too
New:	creates a new record with existing element structure
Save as:	saves the record with a new name in the Micro-SD-card (an string input field opens automatically)
Delete:	deletes an existing record
Copy:	copies an existing record
Back:	returns to recipe list

Element list:

Edit	opens up a virtual keyboard to edit the elements value
Save:	overwrites (in the Micro-SD-card) an existing value with actual element values
To PLC:	transfers the stored values and records into the PLC
From PLC:	reads variable for element values from the PLC
Back:	returns to record list

Assign a width of the recipe viewers window to the displayed elements name to have a efficient window design.

Different confirmation messages (register “Messages”)



In the 3 different viewing windows (recipe, record- and element-) it is useful to ask the usere “Do you really want to...?” BEFORE he is manipulating something wrong.
These message texts are system messages and can be activated here

At the text resources you will find these text phrases as system texts always on top of the texts and in the csv-file with the prefix „__SYSTEXT“.

These messages will be displayed BEFORE storing, deleting, data transfer to/from PLC

(These register is shown just for the record-list only, the others work similar to it.)

Views of recipe lists, record lists, element lists at runtime

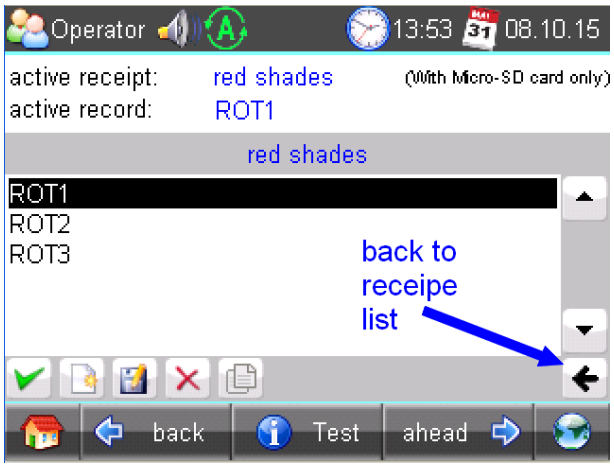
Recipe list

The recipe list contains all recipes, what are pre-assigned in the VisuStage before. It has an clear and an uniform element structure, what was pre-assigned in the software VisuStage before.

The assigned name for all recipes is displayed on the title list.

The choice of the a recipe is done by a touch on the name and a touch on the bottom left symbol to open it. Than the display changes into the next screen with the record list.

To exit the recipe administration, add a common button and assign the function „change screen“ whereto ever you want.



Record list

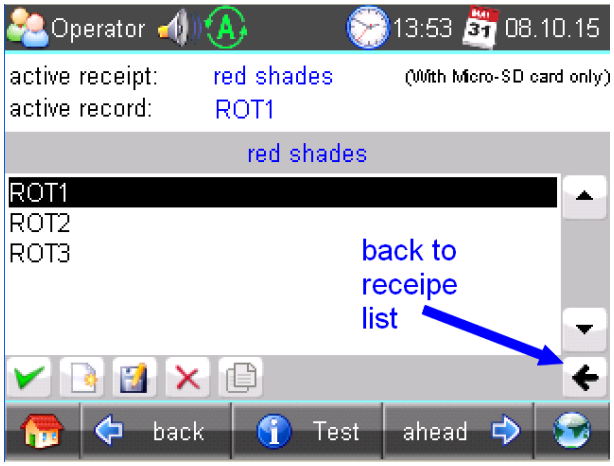
The record list contains all user-created records of a certain recipe (in this sample of the recipe „red colors“).

The regarding recipe name is displayed on the title list. Select it by touch on the name and press „Edit“ or create a new one. Than it switches directly into the element table to edit values and to store it in an automatically displayed string input field.

<u>**New** from VS 2.0.1.5:</u> The actual record will be displayed in the color of the recipes name in the title bar

The function buttons are displayed in the lower left bar:
Edit | New | Save | Delete
With the lower right „←“ this screen changes back to the recipe list.

***Note:** Because recipe data are kept in the Micro-SD-card there is possible no simulation with these values (your PC has not such a memory extension).*



Element list

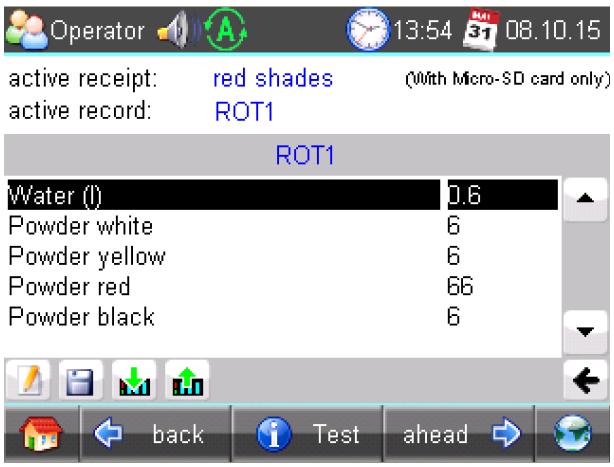
The element list contains all user-created values of a certain record (in this sample of the record „ROSE_1“)

The regarding record name is displayed on the title list.

By touching an elements value a numeric keyboard opens up automatically to type in the new value of the selected element.

The function buttons are displayed in the lower left bar:
Edit | Save | Read from PLC | Write to PLC
With the lower right „←“ this screen changes back to the record list.

***Note:** Because recipe data are kept in the Micro-SD-card there is possible no simulation with these values (your PC has not such a memory extension).*



Function graph

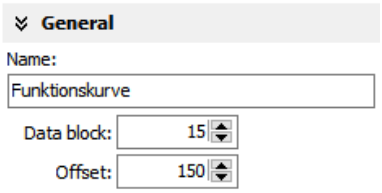
(not for WebVisu and EDGE-HMI)

This viewer is able to display a number of x;y-values from a data block. There could displayed up to 2000 couples of x;y-values each as one pixel.

Place an object: (see basic funtions)
Assign visibility: (see basic funtions)

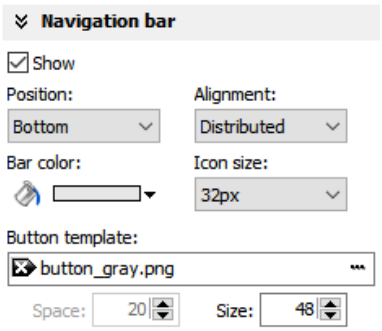
Parameterize the object: (register “General”)

- **Assign a data block and offset**
  This data block contains the values to be displayed



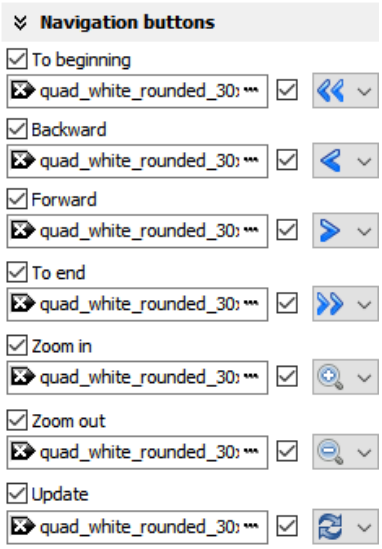
Adapt the navigation bar: (register “Navigation bar”)

- **Activate** the bar
- **Color** the background
- Design the **placement/alignment** of the buttons
- Configure the **size of the icon**s in the buttons
- Select a **button template**
- Design the **button size** width by height
- Adjust the **distance** between the buttons

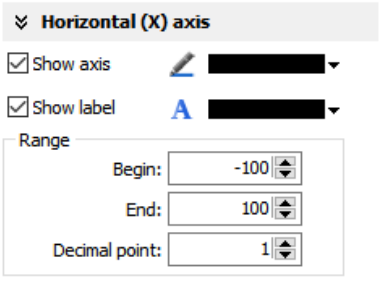


Designing navigation buttons: (register “Navigation buttons” / see right)

- Select a **button template**
- Activate to insert a icon into your buttom
- Select one of the icons from the list

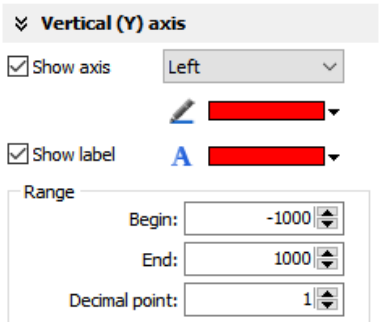


Parameterize the object: (register „X/Y-axis“ / see below)



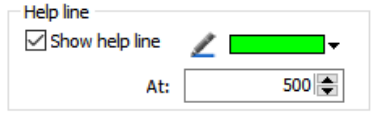
Activate and color X-axis
Activate and color the label of the X-axis
Assign scale values

- Start value
- End value
- Decimal point



Activate and color Y-axis
Activate and color the label of the Y-axis
Assign scale values

- Start value
- End value
- Decimal point



Activate and assign help line

- Y-Value
- Color (one help line possible for an Y-value)



ATTENTION: (not for WebVisu and EDGE-HMI)

- - Dynamic objects **should NOT overlap**. (Exception: touch surfaces), as a state-dependent
- state-dependent change of the background under transparent surfaces is ignored.
- An error message is issued for this during compilation.
- - The simulation generates an error report that leads directly to the faulty object.

Visualization with the software „VisuStage“

The data block with the x;y-values to display must be devided into two parts:

- Header — Information about trend coordinate structure.
- Data — Array of [X,Y] pairs. Data type must be defined in Header

Header structure

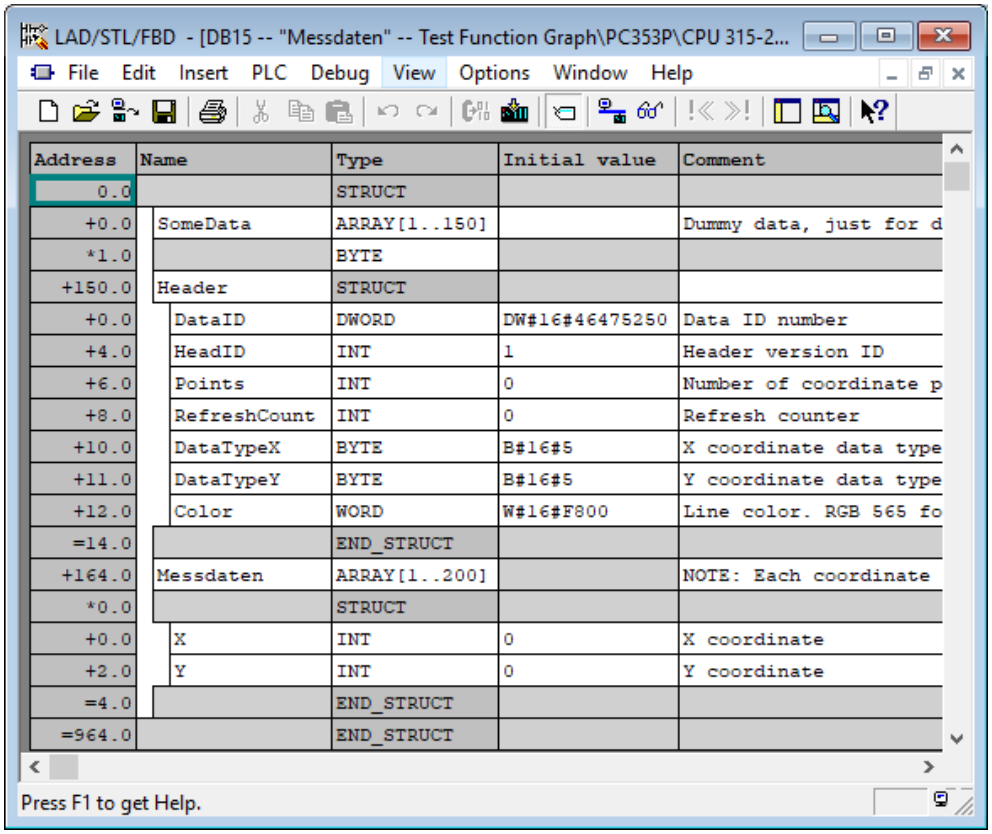
Offset	Name	Data type	Value	Notes
0	DataID	DWORD	DW#16#46475250	Constant value
4	HeadID	INT	1	Constant value
6	Points	INT		Number of [X,Y] pairs [0 .. 2000]
8	RefreshCount	INT		Refresh request counter. S7-User program should increment the value, in order to request refreshment in VisuStage.
10	DataTypeX	BYTE		Data type of X coordinate value 2 = BYTE 3 = CHAR 4 = WORD 5 = INT 6 = DWORD 7 = DINT 8 = REAL
11	DataTypeY	BYTE		Data type of Y coordinate value (see DataTypeX notes)
12	Color	WORD		RGB color value, format 565 Bit0..Bit4 Blue component Bit5..Bit10: Green component Bit11..Bit15: Read component

Data structure

Array of [X,Y] pairs (structure).
It's structure completely depending on user demands and must be correctly defined in Header structure.

For example:
The following data block contains trend coordinates with following property

- each coordinate value (16 bit integer, value range -32768 .. 32767)
- 200 coordinate pairs (sample, max. 2000)
- Line color is blue



Address	Name	Type	Initial value	Comment
0.0		STRUCT		
+0.0	SomeData	ARRAY[1..150]		Dummy data, just for d
*1.0		BYTE		
+150.0	Header	STRUCT		
+0.0	DataID	DWORD	DW#16#46475250	Data ID number
+4.0	HeadID	INT	1	Header version ID
+6.0	Points	INT	0	Number of coordinate p
+8.0	RefreshCount	INT	0	Refresh counter
+10.0	DataTypeX	BYTE	B#16#5	X coordinate data type
+11.0	DataTypeY	BYTE	B#16#5	Y coordinate data type
+12.0	Color	WORD	W#16#F800	Line color. RGB 565 fo
=14.0		END_STRUCT		
+164.0	Messdaten	ARRAY[1..200]		NOTE: Each coordinate
*0.0		STRUCT		
+0.0	X	INT	0	X coordinate
+2.0	Y	INT	0	Y coordinate
=4.0		END_STRUCT		
=964.0		END_STRUCT		

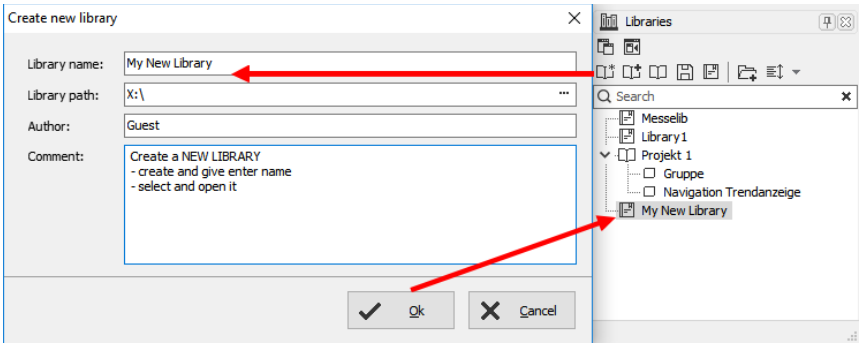
Working with library elements

Library elements were used to have available pre assigned elements for different projects. This is very useful as base for multiple visualizations and show a corporate design e.g. at navigation bars, state bars and login pages. For all, who want to copy (quick´n durty) only, find more about copying more in basic funtions.

Creating libraries and ~ elements

Single or multiple (grouped or ungrouped) objects can be added to a library, consisting of at least one element.

If a library element consists of multiple objects, it is better to group these objects before. So the positions between these objects are fixed.



To create a new library
- 1. select the "new library" button
- 2. assign name, path and comments
- 3. select the new created library and
- 4. open this new library

To add new library elements
- 1. open your library
- 2. move objects or groups directly on the library sign

Using library elements

The Library function is self explaining:
- either **CREATE** a new one,
- or **ADD** another library from any PC-directory (*.vsl) into this library list
- or **OPEN** a library from this list

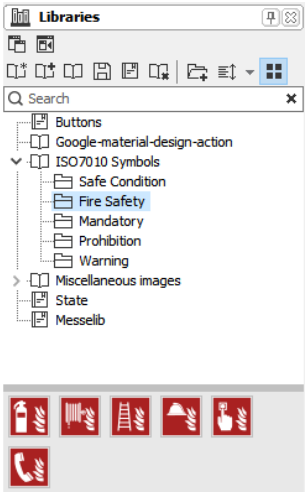
- Group some objects and name the group.
  Copy this group by drag´n drop into your open library
  or
- Click at a group in your open library and copy it by drag´n drop into your screen.

Variables, texts and images will be taken over 1:1 from the library element into the new screen/project. All other resources must be assigned new.

Library elements will be integrated in the visualization project (*.vsproj).

To send your libraries to others, always zip and send complete libraries (folders on the VisuStage-PC) including your library elements (*.vsl) .

The library offers images, button shapes and state areas in a SVG-format, who will be stored at the image-resorce of the project. To get a preview right in the library window, select the icon as shown in the figure to the right.



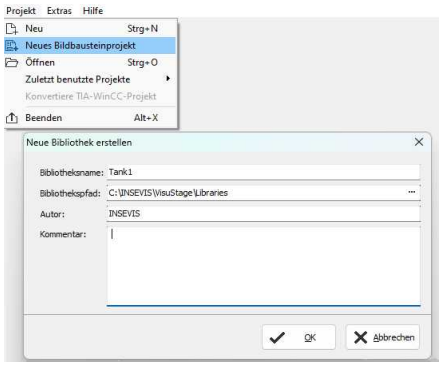


Hints:
The library objects in SVG-format allow a very simple color-change (at the rider „Appearance“), much easier then with image lists, what will simplify your visualization project by far.

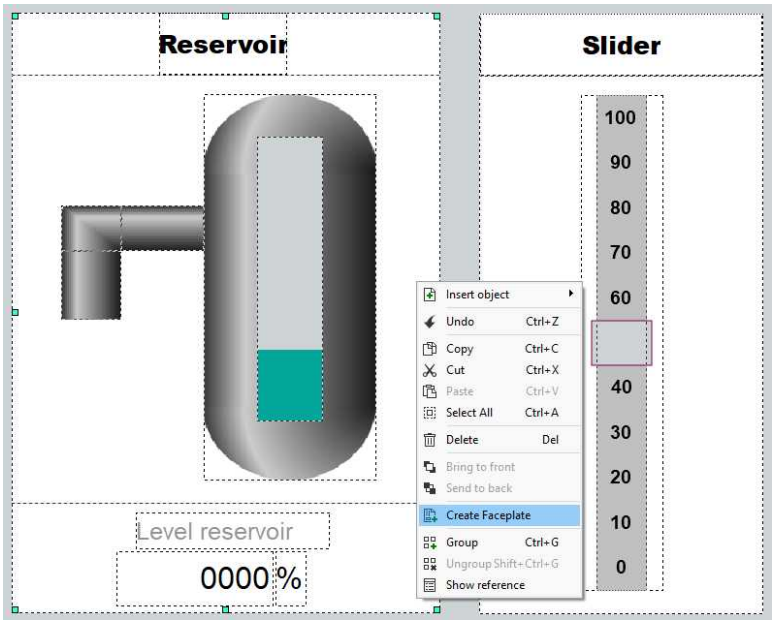
Also when scaling the size of the objects the quality loss is less than at bmp-, jpg- oder png-files.

Working with image blocks

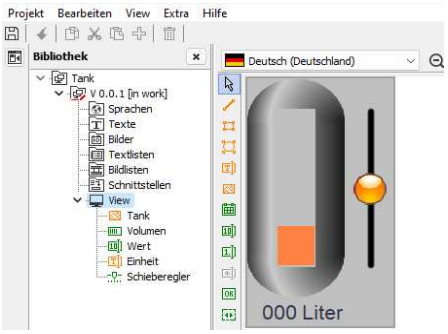
As of version 2.2.0.0, image blocks can be created.



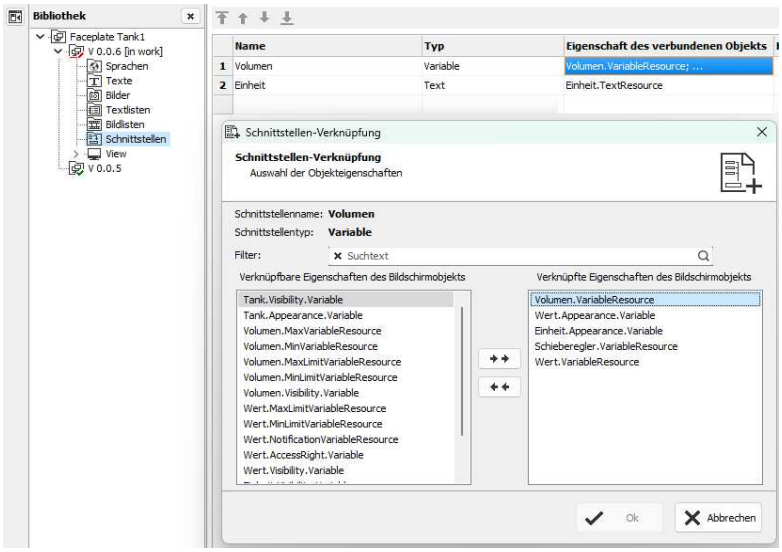
For this purpose, a new image block project is started in an empty VisuStage or an existing image block (attention: file format *.vsl) is opened in a library and a new release is created with the right mouse button (display as [in work]).



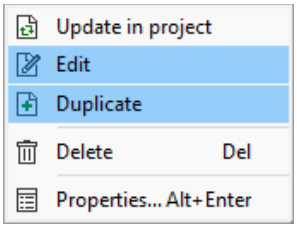
Another possibility to create image modules, which is especially useful for existing projects, is to select the desired objects in an existing view and then create an image module by right-clicking. This can then be stored under the desired name at the desired location. Afterwards, the image module that has just been created appears in the library.



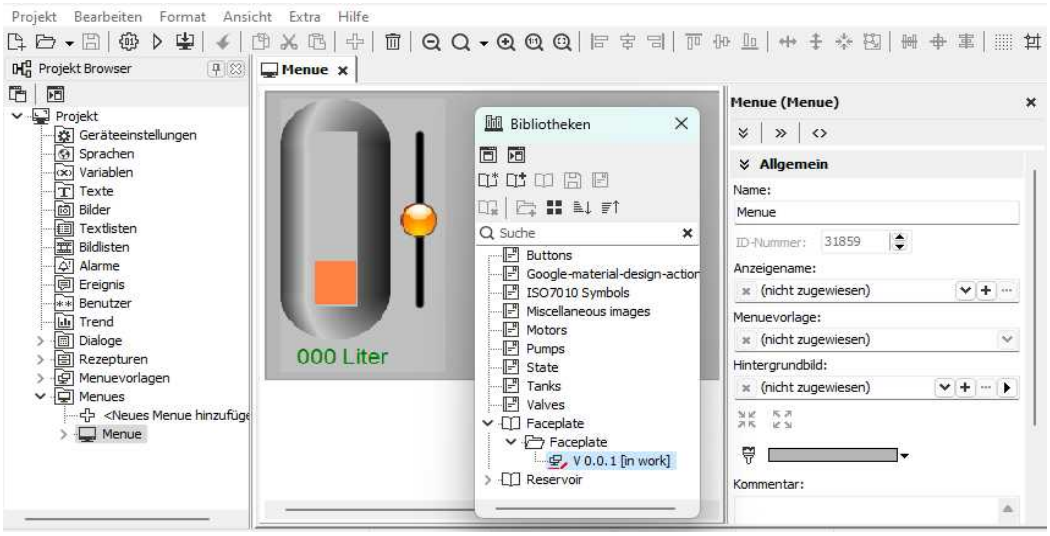
n the "View" resource, the image module is created with the familiar VisuStage objects (not all of them are useful for use in an image module and are therefore grayed out). The configuration takes place in the usual property windows as with the previous VisuStage also. However, no variables can be assigned (this is done in the resource Interfaces).



In the "Interfaces" resource, after adding an interface with the right mouse button, selected properties of the used individual image block objects are assigned as a property for the entire image block.
This is done in the "Property of connected object" column. These can be selected variables, texts or other properties. The image module is then integrated in the VisuStage project via these properties, which are now linked to the image module.



The image module can now also be opened, edited and duplicated directly from the library. This is done by right-clicking on the object, then selecting the desired option. (Changes made in one picture component affect all used picture components of this type. If picture components are to be excluded from this, a duplicate of the picture component must be created).

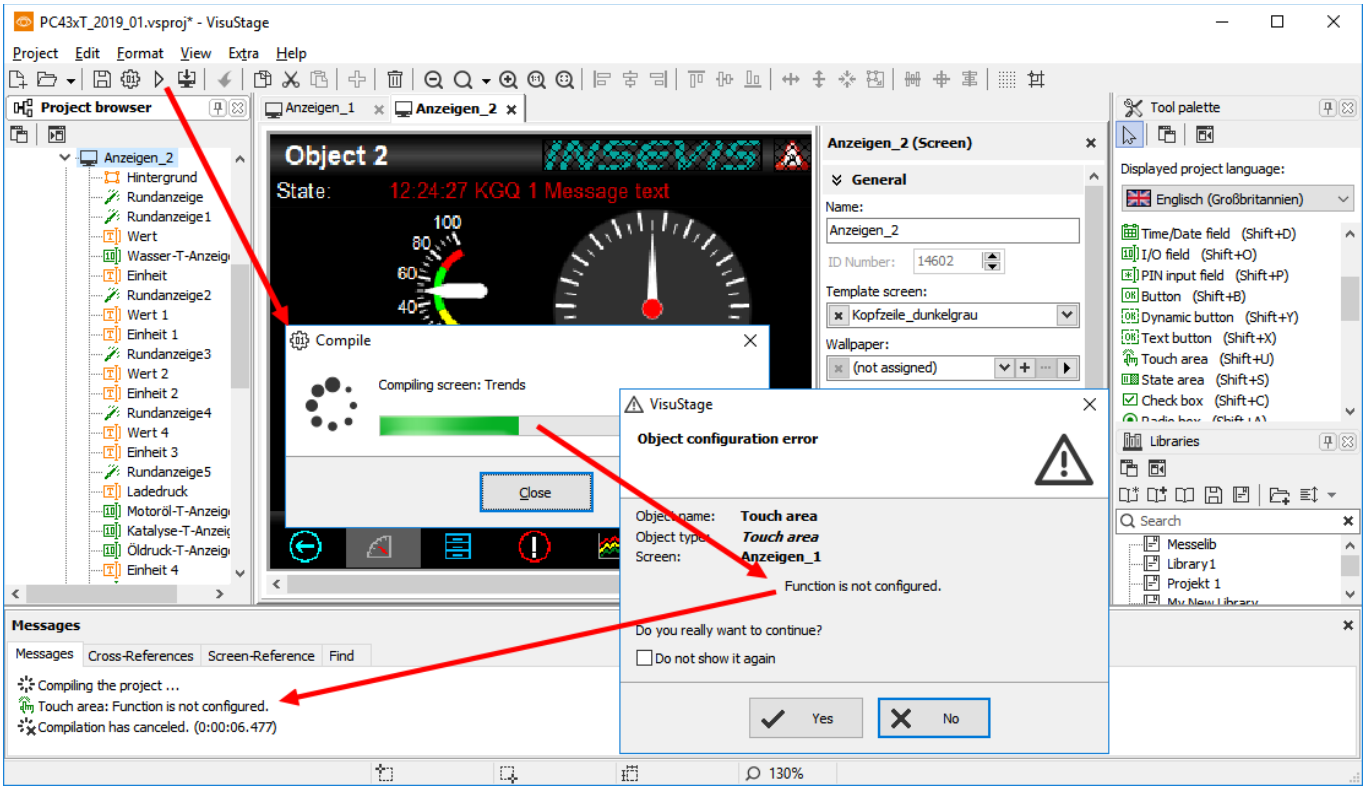


After creating the image module, this release is released (right mouse button) and the image module is saved (do not forget, otherwise the module remains locked in the [in work] state). Before release and saving, the function block is subjected to an automatic plausibility check. If errors occur, they are displayed and the module is not saved. Only after these errors have been corrected is the function module released and can be used. Now the project can be closed in VisuStage. The next time a VisuStage project is opened, the image module appears with its releases in the library at the bottom and the released versions can be dragged into a menu after opening the library. There, the linked properties of the image module must then be assigned to the resources of the visualisation project.

Simulation and download

Error treatment

(not for WebVisu and EDGE-HMI)



- After finishing the visualization start the simulation by F9 or „▶“
- If there are errors, the compiler stops and creates a error message (object and error type).
- Double click this message and you will see the failed object.
- Correct the error and restart the simulation by „F9“ or „▶“

If all errors are cleared, the compiler creates a *.bin-file and the simulation tool „SimuStage“ starts automatically.

Visualization with the software „VisuStage“

Simulation and download

(not for WebVisu and EDGE-HMI)

There are 2 ways to simulate your visualization:

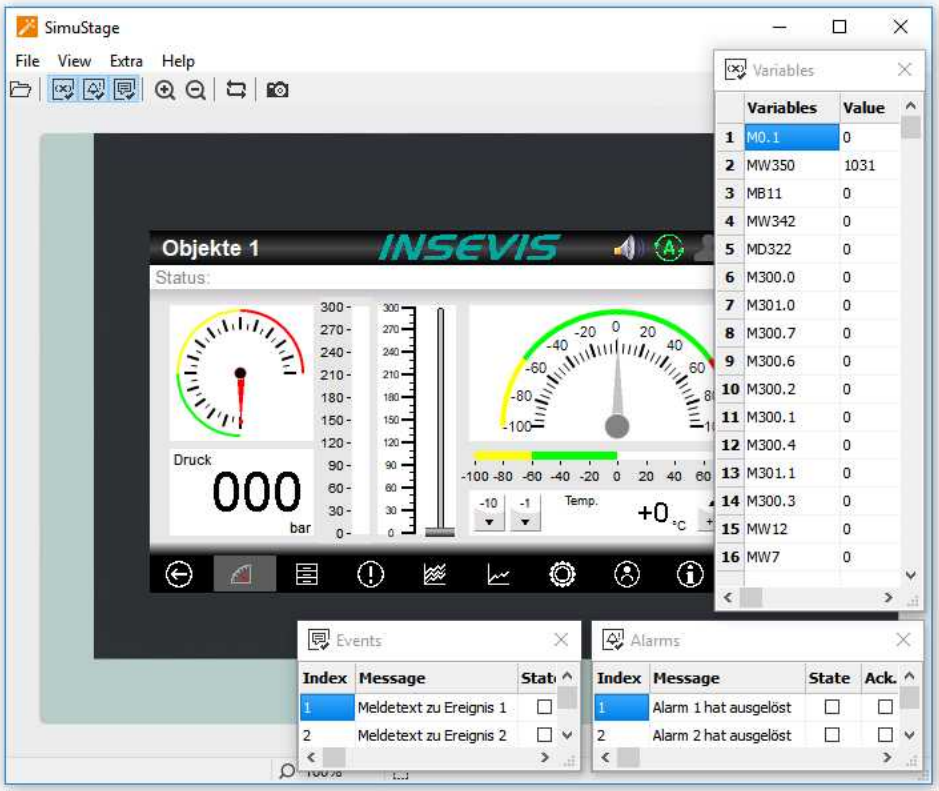
Manual simulation
Starts the integrated simulation tool SimuStage in a new window.
The operation by the user is by mouse pointer simulated like at the real touch panel.

Automatic simulation
Starts the SimuStage together with the Siemens-software S7-PLCSIM (what must be installed at the same PC).
The process data come from S7-PLCSIM (not from PLCSIM Advanced – this is for 1200/1500CPUs). Of course, S7-PLCSIM does not simulate INSEVIS-SFCs/SFBs.

Manual simulation
By manipulating variable values in the variable table you can cause changes manually.

Events can be simulated (Coming - Leaving - Acknowledge) by checking/unchecking boxes in the SimuStage.

It is also possible to generate screen shots of the simulated screen for creating any kind of documentation.

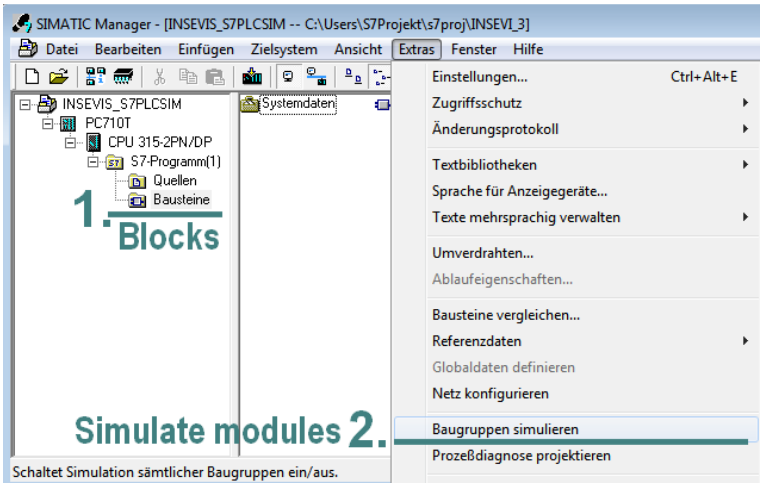


Automatic simulation
Start in the VisuStage by
“Project” → “Simulate with S7-PLCSIM”

The (already installed) S7-PLCSIM must be opened from the S7-programming tool.

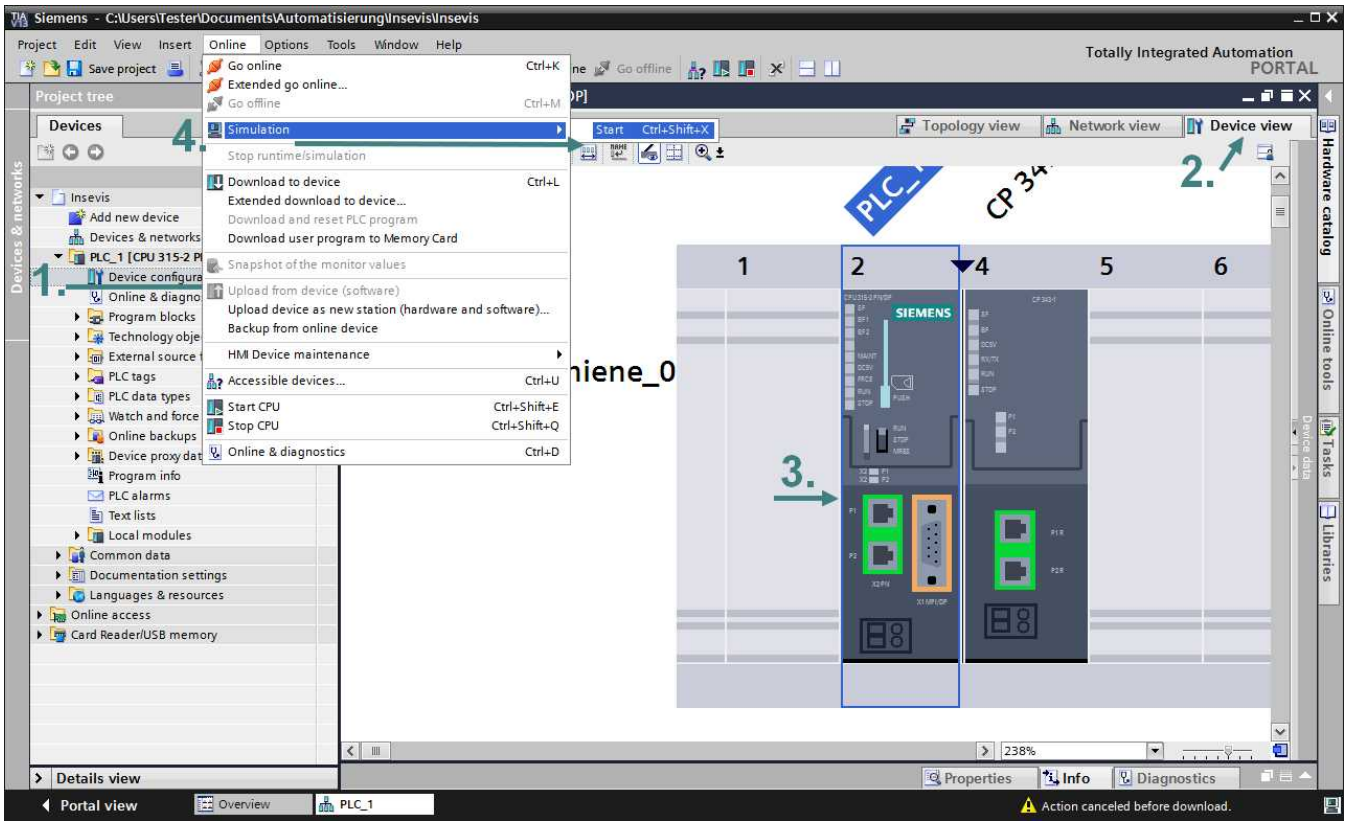
Here you find the call from Simatic®-Manager

1. select “Blocks”
2. click on “Simulate modules”



Visualization with the software „VisuStage“

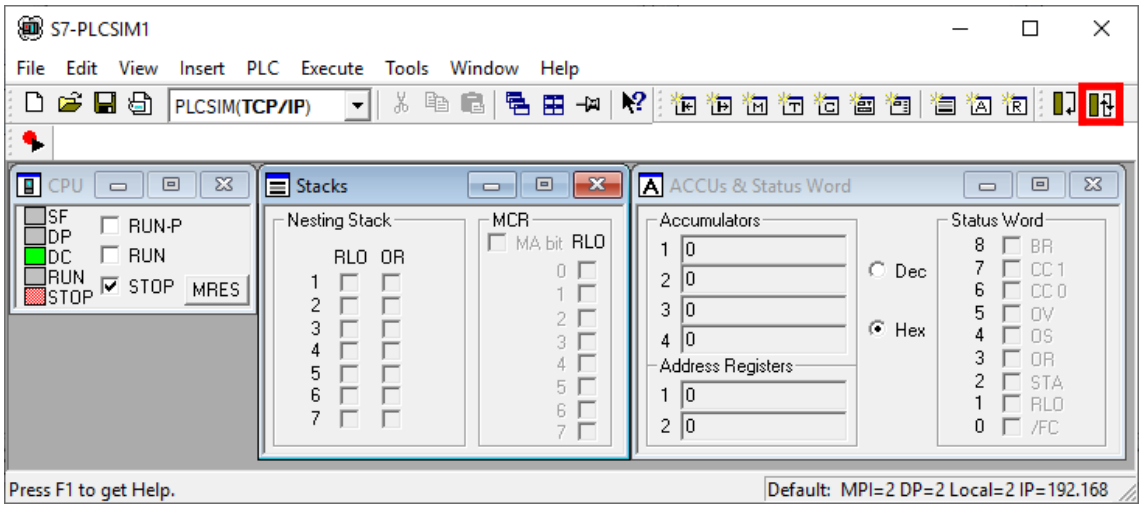
Here you find the call from Simatic®-Manager



1. Goto “Device configuration”
2. Select “Device view”
3. Select the CPU
4. select “Simulation” and “Start”

If the S7-PLCSIM was called, the S7 program is simulated **ONCE** only.

For a **CYCLIC** simulation use the right button (green frame)

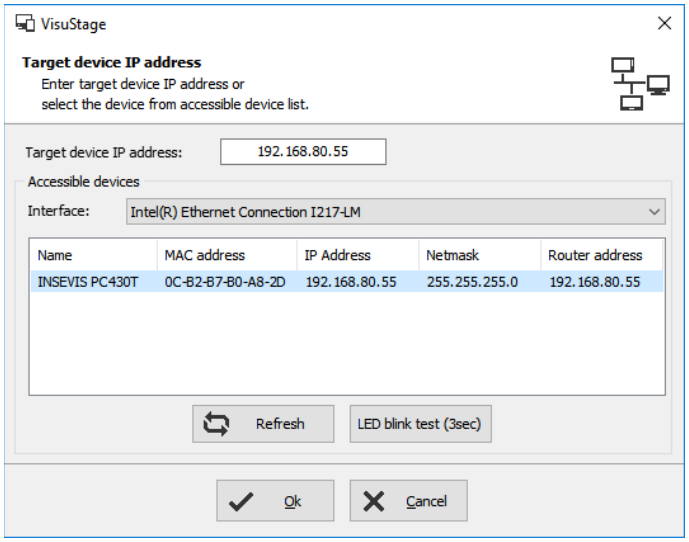


Download

Transfer the visualization binary file to the target device

To transfer the project (start by key F12 or icon) use

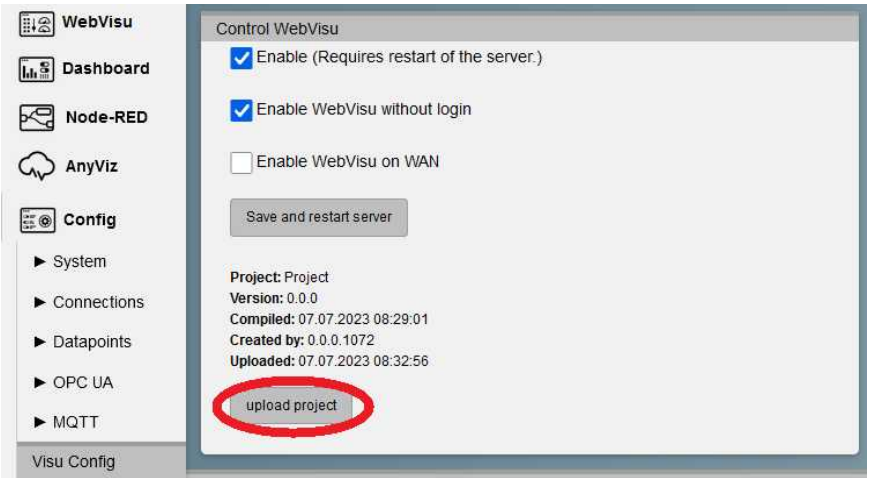
- the IP-target-address from the project data
  or
- the IP-addresses in the network area you are connected to by using the magnifier icon (identification in networks with switches only, not with routers, because they filter the Ethernet-Layer 2, what is necessary for identification)



Alternatively download the compiled project as vsbin-file

- via ServiceStage or
- by a Micro-SD-card
  (with hard reset and clear all)
  (not for WebVisu and EDGE-HMI)

For WebVisu and EDGE-HMI, the *.webvisu or *.hmi file can also be downloaded via Webconfig.





Attention
If some devices with **the same IP-address** should be connected, this will be stopped from Windows-OS. To switch off this function, please insert in the **cmd** this command: **arp -d** (this deletes in your PC the old MAC-address from the foregoing device, what was stored in your PC).

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