# WiHartGateway & WiNSuite

# Installation Guide and Manual

E-Senza Technologies GmbH • Max Stromeyerstr 116 • 78467 Konstanz Tel: +49 (0) 7531 365 99 10 • Fax: +49 (0) 7531 365 99 29 • www.e-senza.de • info@e-senza.de

# Abstract

Doc. Title:	Installation Guide and Manual
Product:	WiNSuite
Version:	V2.7
Date:	2012-12-04
Document owner:	Mihaela Homana
Document approval by:	E-Senza Technologies

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#### V2.7



# 1. Installation

#### 1.1 Automatic Software Installation

The Setup will start automatically when the Installation CD is put into the CD drive. If the "autorun" function of your computer is turned off, you can start the Installation process by executing the WiNSuite\_VERSION.exe, located in the folder NSIS of the installation CD.



#### Figure 1: Installer - Welcome page

The installer will check your system for the required software and install the following components if there is no other version already installed.



Figure 2: Installer - Checklist

Java Runtime Environment 1.6 PostgreSQL 8.2 Apache Tomcat 6 Adobe Flash Browser Plug-in 10 Adobe Acrobat Reader 9.3 (optional)



	🕑 WiNSuite Setup	
Manual·WiHart·Gate•a	Installing Please wait while WINSuite is being installed.	E-Senza <sup>®</sup> Technologies
PostgreSQL 8.2	Instaling ProgreSQL 8.2	
1 <del>2</del>	Show glotals PostgreSQL 8.2	
	1 <del>1</del> 1 <del>1</del>	
	(******	
Notification¶	< Back Next >	Cancel
1		

Figure 3: Installer - User Account Notification

A system account is created to run PostgreSQL as a service. The account name will be "E-SENZA\_WiNSuite".

When the installation finishes, you can start the software on your preferred browser. The finish page of the installer will start the Internet Explorer by default.

#### 1.2 Manual Installation

If you have already installed Tomcat, PostgreSQL or Java on your machine and you do not wish to reinstall these applications, you still can use the Installer. It will automatically detect the installed components, if the version of the third party tools is same. If you want to use another version of Tomcat or PostgreSQL to work together with WiNSuite you have to follow up the next steps.

#### 1.2.1 Existing PostgreSQL

In case you already have installed PostgreSQL 8.2, enter a PostgreSQL user and password in the installer, assigning the corresponding rights to create DB, insert, select and update tables. If you want to use any other version of PostgreSQL you can import the file db\_dump.sql from following location on the CD:\Manual Installation\postgresql\ with user *db\_user* and password *db\_pass*. You also have to modify the login data in file WiNSuite.xml located on your hard disk at the following location (in case you already have installed the Tomcat & WiNSuite):

Program Files\Apache Software Foundation\Tomcat 6.0\conf\Catalina\localhost\ Enter your database user, password and database name. Save the file and restart Tomcat.



#### 1.2.2 Existing Apache Tomcat installation

In case you have already installed Tomcat 6.0, please import the WiNSuite.war file into Tomcat Manager from the CD location

Manual Installation\Tomcat

If the standard Tomcat service is running, you can achieve this by opening the browser at port 8080 using address http://localhost:8080. Go to Tomcat Manager and load the WiNSuite.war file from the CD location mentioned above.

If you have already installed Tomcat 6.0, the installer will find it, and deploy the corresponding files.

#### Note: Earlier Version

It is important that the version ID of your existing installations correspond to the one mentioned on the CD Installer. The Installer is installing Tomcat 6.0, but if you have Tomcat 5.0 on your PC, the installer will install the new version.

#### Note: Tomcat Port

It is very important that you keep Port 8080, as predefined. Later on you will access the WiNSuite Portal from your webbrowser using address http://localhost:8080/WiNSuite/. If you change the port address, then you will have to access WiNSuite through a modified address: http://localhost:YOURPORT/WiNSuite

#### Note: Tomcat as Windows Service

Please note down the user and password which you enter for the Tomcat Webserver, if you install it manually. You can select Install tomcat as service on the advanced installation menu. With this selection, Tomcat will be started automatically, with each restart of your PC.

## **1.3 Starting the WiNSuite**

The WiNSuite starts automatically after the installer has finished. You can also start it from the Windows Start menu. Or entering the URL: http://localhost:8080/WiNSuite/ in your web browser.



# 2. User Manual

## 2.1 Login

Senza WiNSu	ite	
	Wireless HART	
Usemanie	admin	
Password	+++++	]
	🔂 Lagin	
/2.7.18		

The default Login for the WiNSuite Username: **admin** Password: **admin** 

Figure 4: WiNSuite - Login Screen

# 2.2 Setting up Gateway and Network

After login you see the Network overview. First you have to setup the right EUI64 of the Gateway. Choose a description for your network.

At this time you can also specify the join- and network key and the desired RF Channels that should be used. The unique WiHart ID of the Gateway has to be entered here as well.

Network ID can be changed at startup, when there is no connection to the gateway.

The Ethernet settings can only be changed if the gateway is connected.

Gate	Eth	ernet	RF C	hannel	5		
Descript	ion	Test ne	twork				
Join	Key	000000	0000000	000000	000000	000000	)
Network	Key	000000	000000	000000	000000	000000	L
WIHART	ID	001B1E	EODBOOD	)20B			
etwork ID (	0×)	0013					

Figure 5: WiNSuite - Network configuration



The state of the Gateway in the WiNSuite is updated when you click the "Refresh" button in the upper right corner or by switching between different tabs inside the WiNSuite.

	Status	Description
8	Offline	No TCP connection
Ø	Online	TCP connection established

Tabelle 1: WiNSuite - Gateway status

Power on the Gateway, and observe the 'MGR' LED. 'MGR' will blink at 5Hz for 10 seconds. If, during this time the factory reset button is pressed, the settings will be reset to factory default values.

The factory default values are

Gateway IP : 192.168.0.126

Subnet Mask : 255.255.255.0

TCP Network Server IP: 192.168.0.0

The 'MGR' LED blinks at 2Hz with the Gateway is trying to locate a suitable Network Manager. Once a suitable Network Manager is located the 'MGR' LED remains 'ON'.

After about 40 seconds after the 'MGR' LED turns 'ON', the 'RF' LED turns 'ON'. This is indicative that the Network Access Point of the Gateway is now active. Once, this LED turns 'ON' the field devices may be powered 'ON'. If field devices are already powered on, and scanning the radio for a suitable Gateway, then they should also connect to this Gateway.

The Ethernet settings can be changed only if the Gateway is connected to the WiNSuite.

	- an Lander M	1.07	Galerray minimum a
000000000000000000000000000000000000000	0000000	000000000000000000000000000000000000000	00181EE0D8000208
Configuration			
Gateway Eth	ernet	RF Channels	
Current IP	192.1	68.0.31	
New IP	192.1	68.0.227	
Subnetmask.	255.2	55.255.0	
Ethernet Gateway	192.1	68.0.1	
		(0K) (5mm	
		UK Cance	

Figure 6: WiNSuite - Ethernet Settings



## 2.3 Setting Up Devices

At the 2<sup>nd</sup> tabulator you can see all devices from the current network. This includes all field devices and adapters.

To add a new device, press the "Add Device" button.

A popup window comes up and asks for EUI64, Nickname, Description and Update rate.

EUI64 - the HART ID of the device

Nickname - a number between 2 and 52 (0x0034) in hexadecimal format. The scheduling for the devices depends on the nick name.

Description - User specified description for easier identification

*Update rate* - time in seconds between each PV request. Only multiply of 10 are allowed, 0 disables the polling.

The description and update rate can be modified later by editing the device again, EUI64 and nickname are fixed.

E-Senza Technologies							Senza WiNSuite powered by E-Senza
👰 Netzwerke		👰 Netzwer	·ke 🛛 🚔 🕼	eräte 🛛 🏷 Werte 🛛 🏠 Graph	🚴 Admin 🛛 🚓 Modbus	Discover	Refresh 🔲 Deutsch 🔻 Logout
🚍 Geräte							
<sub> erät hinzufügen</sub>		🚗 Gerät hinz	zufügen 🛛 👼	🖁 Gerät bearbeiten 🗏 📻 Gerät entferne	en 🛛 🚞 Gerätedetails		
🥪 Gerät bearbeiten		Wählen Sie eir	n Netzwerk	Netzwerk ID			
🛋 Gerät entfernen		Nickname	Online	Long Tag	Beschreibung	WIHART ID	Letzte Nachricht
		<b>V 🗁</b> 000D	Output de la construcción de	RAD-WHA	AUTO ADDED device	001B1EB0111ABE14	Thu, May 3, 2012 at 13:58:17
Gerätedetails		0D01	0	B002	AUTO ADDED subdevice	001B1EB002640007	Thu, May 3, 2012 at 13:58:17
		v 🗁 0005	$\bigcirc$	RAD-WHA	AUTO ADDED device	001B1EB01118CAE4	Thu, May 3, 2012 at 13:57:48
		0501	0	WIKA 11C8	AUTO ADDED subdevice	001B1E11C82B8506	Thu, May 3, 2012 at 13:57:48
		V 🗁 000E	$\bigcirc$	wha4	AUTO ADDED device	001B1EB01118D8EA	Thu, May 3, 2012 at 13:58:21
		DE01	0	PX_TX1	AUTO ADDED subdevice	001B1EB002690007	Thu, May 3, 2012 at 13:58:21
		<b>v 🗁</b> 0006	$\bigcirc$	RAD-WHA	AUTO ADDED device	001B1EB01118BBCE	Thu, May 3, 2012 at 13:58:27
		0601	$\bigcirc$	POLLING ADDR 7	AUTO ADDED subdevice	001B1EB00265800E	Thu, May 3, 2012 at 13:58:27
		0003	$\bigcirc$	PT-155	AUTO ADDED device	001B1E26596AD36A	Thu, May 3, 2012 at 13:58:33
		000c	0	TT-155	AUTO ADDED device	001B1E26586AD738	Thu, May 3, 2012 at 13:58:35
		<b>V 🗁</b> 000A	0	RAD-WHA	AUTO ADDED device	001B1EB01118B681	Thu, May 3, 2012 at 13:58:38
		0A02	$\bigcirc$	WIRELESS ADAPTER3	AUTO ADDED subdevice	001B1EB00269000E	Thu, May 3, 2012 at 13:57:42
		🗋 0A01	$\bigcirc$	263B	AUTO ADDED subdevice	001B1E263B163A2C	Thu, May 3, 2012 at 13:57:40
		▼ 😂 000В	$\bigcirc$	RAD-WHA	AUTO ADDED device	001B1EB01118BC24	Thu, May 3, 2012 at 13:58:41
		DB01	0	WIRELESS ADAPTER3	AUTO ADDED subdevice	001B1EB002658003	Thu, May 3, 2012 at 13:58:41
		<b>v 🗁</b> 0004	$\bigcirc$	RAD-WHA	AUTO ADDED device	001B1EB01119567F	Thu, May 3, 2012 at 13:58:05
		0401	$\bigcirc$	POLL_ADDR6	AUTO ADDED subdevice	001B1EB002690013	Thu, May 3, 2012 at 13:57:06
		<b>v 🗁</b> 0008	$\bigcirc$	RAD-WHA	AUTO ADDED device	001B1EB011040D00	Thu, May 3, 2012 at 13:57:57
		0801	٢	TEMPERATURE TRANSMITTER ABB	AUTO ADDED subdevice	001B1E16080A7BBE	Thu, May 3, 2012 at 13:57:57
		<b>v 🗁</b> 0009	$\bigcirc$	RAD-WHA	AUTO ADDED device	001B1EB0111ABBC3	Thu, May 3, 2012 at 13:58:15
		0901	$\bigcirc$	PAULS_OCTOPUS	AUTO ADDED subdevice	001B1EB00269000F	Thu, May 3, 2012 at 13:58:16
	_	<b>v 🗁</b> 0007	$\bigcirc$	WiHart Adapter SB350	AUTO ADDED device	001B1EE19519324E	Thu, May 3, 2012 at 13:57:55
Verte		0701	٢	PAUL_THE_OCTOPUS14	AUTO ADDED subdevice	001B1EB002690006	Thu, May 3, 2012 at 13:57:55
Admin							
Aumm .							

Figure 7: WiNSuite - Device View



When a device is added to the WiNSuite, you can see the current state of the device.

	Status	Description
8	Offline or unknown	
R	Joining	join request received and setting the device
$\odot$	Online waiting for data	Join process successful, no data to be polled
$\bigcirc$	Online, data available	Join process successful and data available

Table 1: WiNSuite - Device Status

Status will only updated by pressing the refresh button at the upper right corner or if you switch between different tabs.

To avoid errors with typing of the WiHart ID of the device, wireless devices are added automatically to the network, and they appear as auto added devices. They can be edited exactly like the manually added devices.

Devices which are added with another device beneath are adapters with their subdevices.

<b>v 🗁</b> 0008	٢	RAD-WHA	AUTO ADDED device	001B1EB0111ABE72
0801	$\bigcirc$	POLL_ADDR8	AUTO ADDED subdevice	001B1EB002690010

In order to see the subdevices of adapters, this process has to be triggered manually by the "Discover" Button.

		Senz	a Wi ered by	NSuite E-Senza
Discover	Refresh	🚆 english	-	Logout

Do press this button whenever you feel that new subdevices have to be detected or rediscovered into the network. This process is not being started automatically.



#### 2.3.1 Polling vs. Bursting

Most of the Wireless Hart devices would be preconfigured in burst mode, which means that it automatically starts sending data at a predefined rate. Therefore it would be immediately possible to see data in the data tab. Same is the case for the subdevices of the adapter.

If devices are not in burst mode it is possible to request data via the user interface and through following update rate command. Default update rate is 0, but user can set it to any value in minutes to give PV in that particular rate.

Device Settings WHART ID 001B1EE19519324E Nickname 0009 Description AUTO ADDED device Update Rate 0  Minutes	/	NUTO ADDED device
WiHART ID 00181EE19519324E Nickname 0009 Description AUTO ADDED device Update Rate 0	Device Setting	5
Nickname 0009 Description AUTO ADDED device Update Rate 0 + Minutes	WiHART ID	001B1EE19519324E
Description AUTO ADDED device	Nickname	0009
Update Rate 0 Minutes	Description	AUTO ADDED device
	Update Rate	0 Minutes
Edit Cancel	Edit Ca	ncel

Figure 8: WiNSuite - Device Settings

It is not recommended for bursting devices to add any value in the update rate, as it would increase the traffic of the wireless network and data would come double.

## 2.3.2 Device Details

Based on the health report of each device, WiNSuite collects that data statistically and would show it in this view.

Statis Batte	ry History	Neighbors		
Packets generated:	58			
Packets terminated:	14			
DLL MIC failures:	0			
NWL MIC failures:	0			
Power Status:	Recharging	High		
CRC errors:	0			
Missing Packets:	4			

Figure 9: WiNSuite - Device Statistics



Battery history is only avilable for battery based devices. All other devices would not show any data.

Dev	ice Details	[AUTO ADDED device]			
s	tatistics	Battery History	Neighbors		
	100				
	80				
Da	60				
ş	40				
	20				
	0				
	1:00				
				ОК	Cancel

Figure 10: WiNSuite - Battery History

Through the neighbour health and the wireless discovery process, the selected device would show the neighbours it has detected.

Statistics Battery H	istory Neighbors		
HART ID	nick	Signal Strength	
001B1EB0111AD4C0	000F	-38	
Gateway (NAP)	0001	-49	
001B1EB0111ABD8C	0006	-34	
001B1EB0111AD56C	0011	-22	
001B1EE1951ABE2F	0010	-38	
-100			

Figure 11: WiNSuite - Neighbour List



#### 2.4 Data Values

The Values tabulator shows the list of all devices, and their last primary values, if they are available.

You can also switch to a single device to show their data history as a table or graph.

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👰 Netzwerke	🔊 Netz	werke	🚔 Geräte 🛛 🖄 Werte 🦙 🤆	Graph 🛛 🤱 Admin 🛛 📥 N	4odbus	Discover	Refresh 📕 Deutsch 🔻 Logout
🚔 Geräte	~	1					
\land Werte	💼 Dater	exportien	an				
🔓 Datenexport	Werteta	belle	Diagramm				
🔂 Diagramm anzeigen	Wählen Si	e ein Netzv	verk Netzwerk ID 🛛				
	Nickn	0n	Long Tag	Beschreibung	PV	PV-Einheit	PV-Zeitstempel
	v 🗁 0005	; 📀	RAD-WHA	AUTO ADDED device	3.9853	milliamperes	Thu, May 3, 2012 at 13:58:53
	0	5C 📀	WIKA 11C8	AUTO ADDED subdevice	24.3654	Degrees Celsius	Thu, May 3, 2012 at 14:00:02
	▼ 🗁 0004	0	RAD-WHA	AUTO ADDED device	38.2290	milliamperes	Thu, May 3, 2012 at 14:00:08
	0	4C 📀	POLL_ADDR6	AUTO ADDED subdevice	9999.9902	Degrees Celsius	Thu, May 3, 2012 at 13:59:11
	<b>v 🗁</b> 0008	: 📀	RAD-WHA	AUTO ADDED device	3.9867	milliamperes	Thu, May 3, 2012 at 13:59:58
	0	BC 📀	TEMPERATURE TRANSMITTER ABB	AUTO ADDED subdevice	NaN	Degrees Celsius	Thu, May 3, 2012 at 13:58:57
	▼ 🗁 0007	0	WiHart Adapter SB350	AUTO ADDED device	3.9795	milliamperes	Thu, May 3, 2012 at 14:00:08
	0	7C 📀	PAUL_THE_OCTOPUS14	AUTO ADDED subdevice	9999.9902	Degrees Celsius	Thu, May 3, 2012 at 13:59:03
	🛛 🗸 🔁 0004	0	RAD-WHA	AUTO ADDED device	7.9538	milliamperes	Thu, May 3, 2012 at 13:59:43
	<u> </u>	AC 📀	WIRELESS ADAPTER3	AUTO ADDED subdevice	9999.9902	Degrees Celsius	Thu, May 3, 2012 at 13:59:51
	0	AC 📀	263B	AUTO ADDED subdevice	393.5791	ohms	Thu, May 3, 2012 at 13:58:44
	0000	: 📀	TT-155	AUTO ADDED device	20.3479	Degrees Celsius	Thu, May 3, 2012 at 13:57:08
	🔻 🗁 0008	0	wha4	AUTO ADDED device	3.9827	milliamperes	Thu, May 3, 2012 at 13:59:22
	D.0	EO 📀	PX_TX1	AUTO ADDED subdevice	9999.9902	Degrees Celsius	Thu, May 3, 2012 at 13:59:25
	v 🗁 0000	) 📀	RAD-WHA	AUTO ADDED device	3.9820	milliamperes	Thu, May 3, 2012 at 13:59:15
	D •	DC 📀	8002	AUTO ADDED subdevice	9999.9902	Degrees Celsius	Thu, May 3, 2012 at 13:59:18
	🔻 🗁 000 s		RAD-WHA	AUTO ADDED device	3.9730	milliamperes	Thu, May 3, 2012 at 13:59:14
	0	9C 📀	PAULS_OCTOPUS	AUTO ADDED subdevice	9999.9902	Degrees Celsius	Thu, May 3, 2012 at 13:59:17
	<b>V 🗁</b> 0006		RAD-WHA	AUTO ADDED device	3.9821	milliamperes	Thu, May 3, 2012 at 13:59:32
	0	6C 📀	POLLING ADDR 7	AUTO ADDED subdevice	9999.9902	Degrees Celsius	Thu, May 3, 2012 at 13:59:34
	0003	. 0	PT-155	AUTO ADDED device	0.1797	pounds per square inch	Thu, May 3, 2012 at 13:58:54
r Graph	🔹 🔻 🗁 0008		RAD-WHA	AUTO ADDED device	21.5889	milliamperes	Thu, May 3, 2012 at 13:59:44
🕄 Admin	<u></u> 0	вс 📀	WIRELESS ADAPTER3	AUTO ADDED subdevice	9999.9902	Degrees Celsius	Thu, May 3, 2012 at 13:59:47
- Modbus	4						

Figure 12: WiNSuite - PV of Online Values

## 2.4.1 Data Graph

The chart view shows a graph and a data history of a specified device.



Figure 13: WiNSuite - Value Chart



Select a device and specify the dates from when to when you want to show the data, or check the live checkbox to show the last N minutes. Where N is between 1 and 1440 (1 day). When live the live mode is selected, the view is updated automatically every 10 seconds.

Note: If you press the refresh button while the live mode is on, the view may jump to the first device in list.

#### 2.4.2 Data export

You can also export the data of the whole network as a XML file. The XML format match the following DTD

```
<?xml version="1.0" encoding="UTF-8"?>
<!ELEMENT Dataexport ( Record+ ) >
<!ELEMENT Record ( MAC, Timestamp, UnitId, Value, UnitStr, FloatValue ) >
<!ATTLIST Record id NMTOKEN #REQUIRED >
<!ELEMENT MAC ( #PCDATA ) >
<!ELEMENT Timestamp ( #PCDATA ) >
<!ELEMENT Value ( #PCDATA ) >
<!ELEMENT Value ( #PCDATA ) >
<!ELEMENT UnitStr ( #PCDATA ) >
<!ELEMENT FloatValue ( #PCDATA ) >
```

## 2.5 Graph

This view would show the routing graph of the wireless network and the connections it created via other wireless nodes. Redundant paths would build up in time and they tend to change with the radio environment.



Figure 14: WiNSuite - Routing Graph



## 2.6 Login

Under the tab Admin there is a complete User Management Library where users can add users with respective roles as admin and user.

The user role has only reading options, while the admin rights can edit all the functions.

With the button Logout, the user can log out and a new user can get logged in.

E-Senza'											Senz	z Wik red by	ISuite E-Senza
👰 Networks	Networks	Devices	O Va	alues	e Graph	Admin	d. Modbus		Discover	Refresh	english	v	Logout
Devices     Values     Graph     Admin	<ul> <li>TCP Server</li> <li>UDP Server</li> <li>Add User   </li> </ul>	5002 5048 Edit User   2	Delete U	) ) Jser									
	lisemanne					Last Login			Admin				
	demo					Thu May 3 10:54	150 GMT+0200 201				0		
	admin					Thu May 3 10:54	150 GMT+0200 201				ă		
				EDIT US	ER								
				Usernar Passwor Confirm	me rd 1 Password	admin							
				Admin F	Rights	el							
an Modbus													

## 2.7 Changing language

The WiNSuite comes in two languages: English and German.

User can change between the two of them.

## 3. Modbus Interface

The WiHart Gate supports a Modbus communication channel. The WiNSuite has an UI interface where user can configure all required settings for connecting their Modbus client to the gateway.

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# 3.1 Info Panel

The Info Panel contains some information like:

- Vendor Name
- Product Code
- Vendor Url
- Product Name
- Model Name
- Status Register

E-Senza Technologies	a" s							Senz	a WiNSuite ared by E-Senza
Networks		Networks	🚍 Devices 🛛 🏷 Value:	s 🛛 🏫 Graph 🗍 🙇 Admin	📩 Modbus	Discover	Refresh	english	
🚍 Devices									
🔿 Values		🕕 Info 🎲 Co	nfig 🥢 Register Map	Register					
🎓 Graph		Man day Mana	D. Okohl Cabaltaneeska One	ku.					
admin 📃		Vendor Hame		D'A					
🐜 Modbus		Type	9715						
🕕 Info		Vendor UBL	www.stabl.de						
🎲 Config									
📝 Register Map		Product Name							
Register		Device	WirelessHart Gatevay						
		Status Register		over on.					
			Refresh						
				, 					
		L							
	1								

The Status register is the status register of the gateway and can be updated by pressing Refresh Button.



# 3.2 Config Panel

The Config Panel contains configuration parameters for the Modbus interface like:

E-Senza	a'										Senz	WiN	Suite Senza
🔊 Networks		👰 Netwo	orks 🛛 🚍 D	evices 📝	Values	🔶 Graph	🧟 Admin	🚠 Modbus	Discove	r Refresh	english	•	Logout
🚍 Devices							)						
🖉 Values		Info	🔅 Config	Regist	er Map	Register							
🎓 Graph	10			TOD Dot	F00								
🙇 Admin				TCP Port	502								
🚑 Modbus		Holding	register timeo	ut (n*100ms)	0								
🕕 Info													
🙈 Config			DCS Timeo	ut (n*100ms)	200								
				Error Value	FFFF	1							
Register Map						-							
Register			Err	or Value Float	7FA000	00							
				Error Value Bit	1								
			Co	onnection Lost	10								
						. )							
			Apply	<u> </u>	Lance	21							

- > TCP Port
  - $\circ~$  This is the TCP Port of the Modbus connection. It can be changed by the user to some other value
- Holding Timeout
  - This value is the Holding Register Timeout represented here in 100 ms. If user sets it to 0, the holding register would never timeout, otherwise they would time out after the elapsed time in this register and all affected holding registers would be set to Error Value
- DCS Timeout
  - This value is the DCS Timeout represented here in 100ms. If use sets it to some value, if no communication happens on the DCS side, then the DCS connection would be interrupted.
- > Error Value
  - This value is the error value of a holding data register so that user knows when the value in register is not correct. User can change it to desired value.



- Error Value Float
  - This value is the error value of a holding status register for analog devices so that user knows when the value in register is not correct. User can change it to desired value.
- > Error Value Bit
  - $\circ~$  This value is the error value of a holding status register for Digital devices so that user knows when the value in register is not correct. User can change it to desired value.
- Connection Lost
  - $\circ$   $\,$  This value is a counter after how many lost messages the Modbus should consider a device as not connected anymore

All changes become active and are communicated to the gateway only after pressing the Apply button.

## 3.3 Register Map Panel

The Register Map Panel contains the mapping configuration of devices for specific Modbus registers.

You can configure your registered devices in the mapping table as the user desires.

E-Senza Technologies											Senzo	a WiN	ISuite E-Senza
👰 Networks	6	Netwo	orks 🛛 🚍 Device	s 🏹	Values	🔶 Graph	🚨 Admin	🚠 Modbus	Discover	Refresh	📑 english	-	Logout
🚔 Devices			,,			_							
🖄 Values		🕕 Info	🌼 Config 📝	Registe	r Map	Register							
🔶 Graph		Applu	Euneut Ter	mont	Pecet	Defrech							
🚴 Admin		Abbiy	Export	ipore	Reset	Kerresit							
📩 Modbus		No	Hawt TD										
(1) Info		1	narcib										
- Canfin		-	0018158011148897										
age coming		2	00101000111400405	,	_								
🛃 Register Map		3 4	0010100011140444										
Register		4	OUTBIEBUIITAD4D	•									
		5											
		6	001B1EB011195684		- 11								
		7			- 11								
		8	001B1EB0111ABE72		- 11								
		9			- 11								
		10			- 11								
		11			- 11								
		12			- 11								
		13			- 11								
		14			- 11								
		15			- 11								
		16											
		17			- 11								
		18											
		19			- 11								
		20											
		21			- 11								
		22											
		23											
		24											
		25											
		26											
		27											
		28											
		29											
		30											
		31											



Following buttons are available:

- > Apply
  - $\circ$   $\,$  With this user changes are communicated to the gateway and the new mapping table becomes active
- > Export
  - $\circ$   $\;$  With this button you can export your configuration to a separate file
- > Import
  - $\circ$  With this button you can import your configuration from a separate file
- > Reset
  - Resets the configuration to all empty registers
- > Refresh
  - $\circ$   $\;$  Loads the mapping configuration from the Modbus gateway again

## 3.4 Register Panel

The register panel shows the last complete data in all the registers. By request dump you can request the latest register structure from the Modbus gateway.

E-Senza Technologies								Senza	WiN: red by E	Suite - Senza
👰 Networks	🔗 Network	s 🛛 🚍 Devices	🛛 🏠 Values 🛛 🏠 Gr	aph 🛛 🤱 Admin	🚠 Modbus	Discover	Refresh	📑 english	<b>•</b>	Logout
🚔 Devices										
🍋 Values	() Into	ुः Config 🛛 📝 R	egister Map Regist	er						
🏫 Graph	Request D	ump								
admin 急										
📩 Modbus	Register	Value	Value (Hex)	<u>.</u>						
🕕 Info	0	0	0000							
🎲 Config	1	0	0000							
Register Man	2	0	0000							
	3	0	0000							
Register	4	0	0000							
	5	0	0000							
	6	0	0000							
	7	0	0000							
	8	0	0000							
	9	5	0005							
	10	65535	ffff							
	11	65535	ffff							
	12	65535	ffff							
	13	65535	ffff							
	14	65535	ffff							
	15	65535	ffff							
	16	65535	ffff							
	17	65535	ffff							
	18	65535	ffff							
	19	65535	ffff							
	20	65535	ffff							
	21	65535	ffff							
	22	65535	ffff							
	23	65535	ffff							
	24	65535	ffff							
	25	65535	ffff							
	26	65535	ffff							
	27	65535	ffff							
	28	65535	ffff							
	29	65535	ffff							
	-20	25505		• •						



#### 3.4.1 Register Structure

The Register structure of the Modbus master is fixed, no optimization required. The registers are split into different segments. The segments are organized as followed:

Register	Content	Size (registers)	Comment
0	Reserved	9	
9	Status register	1	Gateway status
10	Status register	500	Signal status
510	Reserved	90	
600	Segment 1 - 250 x 1 Float	500	Mapping for 1. Variable
1100	Segment 2 - 250 x 4 Float	2000	Mapping for 4. Variables
3100	Segment 3 - 250 x 8 Float	4000	Mapping for 8. Variables
7100	Segment 4 - 250 x 1 Float	500	Mapping for Analog Output
7600	Segment 5 - 250 x 2 bytes	250	Mapping for Binary input
7850	Segment 6 - 250 x 2 bytes	250	Mapping for Binary ouput

This means that the Primary Variable is 3 times noted down in the registers for an Analog Input.

Segment 1	600+(i-1)*2
Segment 2	1100+(i-1)*8
Segment 3	3100+(i-1)*16
Segment 4	7100+(i-1)*2
Segment 5	7600+(i-1)
Segment 6	7850+(i-1)

i is the ID of the device (1 to 250)

Access to addresses below 9 or higher than 8099 are not allowed and are answered with error code 0x02 (Illegal Data Address)

All reserved bits are set to 0. Not to ErrorValue.

#### 3.4.1.1 Status Register Gateway

The Gateway status is specified in register 9.



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0 (000)	Reserved
1 (001)	Hardware error if NAP is not accessible
2 (010)	Data Exchange
3 (011)	No Data Exchange (after Power On without configuration)
4 (100)	configuration or parameter error
5 (101)	No Data Exchange (after power on)
6 (110)	Loss of connection between GW and NM

#### 3.4.1.2 Signal Status

Each wireless device, WiHART Field Device or WiHART Adapter, has two register for indicate the signal status for all variables. For each of the possible 8 values of a device are 4 bits specified. The 4 bits defines 5 states

Bit 3	Bit 2	Bit 1	Bit 0	Description
0	0	0	0	no Warning
1	0	0	0	Maintains required
0	1	0	0	Out of specification
1	1	0	0	Check function
1	1	1	1	Failure
Any other bit set				Not in use

The signal status of the first device is specified at register 10.

Status of any device(i) can be found at register 10+(i-1)\*2 and followed one.





Status changes are triggered by the following events and reflected in the specific status bit.

Event	Status bit	Limit
Battery status low	Maintenance required	< 30 days
Sign in failed	Failure	3 -retries on Application layer
Burst mode mismatch	Failure	
No Communication between end device and GW	Failure	n missing burst messages
Loss of connection between NM and GW	Maintenance required for all signal states	Tbd.
Loss of connection between GW and DCS	Failure (just for initialization)	
Device in Join process	out of specification	

## 3.4.1.3 Digital Input / Output

The Registers for Digital in- and outputs is split into status and signal byte. The low byte contains the signals of all 8 channels, and the high byte contains the associated stats.



Status Channel 8

Signal is the written or read value from the FieldDevice Status1 indicates no error

0 indicates a communication error, shorted or broken sensor The status bit is logical and for the Signal status register.



## 3.5 Modbus Functions

The Modbus functions which are supported are:

Modbus Fund	ction	Gateway functionality
03 (0x03)	Read Holding Registers	Output Register read 1register
06 (0x06)	Write Single Register	Write 1 register
08 (0x08)	Diagnostics	Connection test
	Subfunction 0x00	
	Return-Query Data	
16 (0x10)	Write Multiple Registers	Write Register
43 (0x2B)	Read Device Identification	Read device information
	Read Device ID code = 01 / 02 / 04	

# 4. HART Server

The Gateway is accessible over the HCF HART Server version 3.1.0 as a TCP client.

To add a Gateway from the HART Server please follow these steps

Step 1: Right Click on the HARTServer and select 'Add Network'

👭 Unbenannt.hoc - HART Server					<u>_     ×</u>
File View Help					
D 🛎 🖬 🎒 💡					
Add Network Expand Collapse Lockdown Properties	Name				
🕐 Ready	Clients: 0	IO Systems: 0	Adapters: 0	Instruments: 0	04:39 PM



Step 2: In the Add Network pop-up menu select the Network type as TCP/UDP

Add Network			×
Connected	T o:		
Serve	r: HARTServer	ŧ.t	
Network—			
Type:	Serial Port RS-485	•	
he la	Serial Port RS-485 Single Serial Port		

Step 3: Give an appropriate name for the Network and maintain the default DR Retries values

Network Properties	X
Network Type: TCP/UDP Name: E-Senza GW	ŧł
DR Retries Number of Retries: 10 Retry Delay Base (ms): 1000	
OK Cancel H	lelp

Step 4: Right Click on the Network 'E-Senza GW 1' and select the option Add IO System





Step 5: Enter the IO System properties as shown in the next figure. The IP Address of the Gateway can be obtained from the WiNSuite User Interface (see Figure 6: WiNSuite - Ethernet Settings).

The Port should always be '4567' and the polling address is always '3'. The protocol should be 'TCP'. Now left click on 'Add'.

Add Device 🔀
Connected To: Network: E-Senza GW
Properties
IP Address: 192 . 168 . 0 . 24
Port: 4567
Poll Address: 3
Protocol C UDP © TCP
Add Close Help

Step 6: The following progress bar will briefly appear on the screen.

Processing HART Commands				
60%				
[Cancel]				

Once it is completed i.e. it reaches 100%, the following screen will appear. From this screen, you can verify the Tag name, descriptor and message settings of the Gateway. If you have no field devices connected to your network you will see that the number of instruments detected will appear as '0'. In this example there are '2' field devices detected. Left Click on 'OK' to continue.



IO System Prope	rties		×
– IO System Identi	fication		
Tag Name:	SGH350		
Descriptor:	SGH350	<b>•••</b>	
Message:	SGH350		
Manufacturer:	E Senza Technologies		
Model:	SGH350	<u>F</u> lush	
ID:	3		
Hevs:	7,1,4,0		
Operation			
Master Mode:	Secondary	7	
Retries:	3		
- Statistics			
	Maximum Number of IO Cards: 1		
Maximum N	umber of Channels per IO Card: 1		
Maximum Nun	nber of Instruments per Channel: 50		
N	lumber of Instruments Detected: 2		
	Unreachable Device: 0		
	OK Cancel <u>H</u> elp		

Step 7: At the main screen now right click on SGH350 and select the 'Learn' Option to add the detected instruments to the Network. This operation may take a few minutes to execute, so please be patient.

🗰 Unbenannt - HART Server					
File View Help					
🗅 🖻 🖬 🎒 🕯	8				
🖃 🔊 HARTServer			Name		
🚊 🖉 E-Senza GV	V				
SGH35	Add I/O Card				
	Learn				
	Data				
	Expand				
	Collapse				
	Lockdown				
	Delete				
	Properties				



After the 'Learn' is complete, the Network may look like this:

🕂 Unbenannt - HART Server							
=ile View Help							
- D HARTServer	Name	Address	Type	Status			
E-Senza GW	M RAD-WHA	B011195684	Unknown	Ok			
н. <b>—</b> SGH350	M RAD-WHA2	B0111ABD8C	Unknown	Ok			
IOCard 002	M RAD-WHA3	B0111ABE26	Unknown	Ok			
	M RAD-WHA4	B0111ABE72	Unknown	Ok			
C RAD-WHA	M RAD-WHAS	B0111AD183	Unknown	Ok			
d RAD-WHA2	M RAD-WHA6	B0111AD32C	Unknown	Ok			
d RAD-WHA3	M RAD-WHA7	B0111AD4A7	Unknown	Ok			
d RAD-WHA4	nad-whas	B0111AD4C0	Unknown	Ok			
d RAD-WHA5							
d RAD-WHA6							
d RAD-WHA7							
d RAD-WHA8							
Ready	1		Clients: 0	IO Systems: 1	Adapters: 8	Instruments: 0	11:36 AL
<b>•</b> ······,			20010310	111,110,101		1	

Field Devices will be available under the first IO Card/Channel under the Gateway as shown below:





<u>File E</u> dit <u>V</u> iew <u>H</u> elp				
8 🐱 🕹 🛍 🕷 💥				
Process / Output Device	HART Status Cor	mmand		
Process			1	Defeate 1
PV	23.1294	deg C		Send
Units Select	deg C	•		
Loop Current			1	
Analog Value	NaN	mA		
Percent Range	23.1349	%		
Upper Range Value	100.00	deg C		
Lower Range Value	0.00	deg C		
Damping	1.00	sec		
Transfer Function	Linear			
1				

Double clicking on a field device will show this window:

Such windows can also be opened for the HART Field devices connected to WirelessHART Adapters. Opening a window for a HART Field Device connected to a WirelessHART Adapter may take a few minutes, due to communication latencies and Delayed Responses from the legacy HART devices, so please be patient. You can observe multiple Field Devices from the HART Server at the same time as shown below.

GW 1.5GH350.IOCard 0	D2.CH002.5	iemens Temperature FD - Generio	: HART H 💶 🗖 🗙	Name
File Edit View Help				M TEMPERATURE TRANSMITTER ABB
Process / Output Device HART Status Co	mmand 🛛 🚺	HARTServer. GW 1.5GH350	IOCard 002.CH002.LWA2	01.IOCard 001.CH001.TEMPERATURE 🗖 🗖 🗙
Process	E	<u>File E</u> dit <u>V</u> iew <u>H</u> elp		
	, T	🔂   🔏 🛍 🛍 💥 🤶		
PV  23.0791	deg C		- 1	
	- II	Process / Uutput   Device   HART	Status   Command	
Units Select deg C	<u>-</u>	Process-		
Larg Count		PV 22155	8 dea C	Herresh
		14 jaa	o dogo	Send
Analog Value NaN	mA	Units Select deg C	<b>T</b>	
	1	10.30		
Percent Hange  23.0726	%	- Loop Current		-
100.00	1	Analas Valus 7.5449	má	
Upper Hange Value 100.00	degi	Analog Value 11.0440		
Lower Bange Value 0.00	dea C	Percent Bange 22.155	8 %	
		r orderik Haligo		
Damping 1.00	sec	Upper Range Value 100.00	deg C	
	_			
Transfer Function Linear		Lower Range Value 0.00	deg C	
		Damping 0.00	sec	
,				
		Transfer Function		
	I			
	ŀ			
				NU



## 4.1 Backup & Restore Gateway Configuration

The Modbus register map, the Modbus configuration as well as the general Configuration of the gateway with its unique GatewayID can be stored locally and restored back. The file can be stored locally on the PC and comes in format of an XML.

🙊 Backup Gateway	ng Restore Gateway
------------------	--------------------

## 4.2 Diagnostics

#### 4.2.1 Version number

The Gateway version number can be observed either on the HART Server or on the network tab:

E-Senza Technologies						Senza WiNSuite powered by E-Senza
殉 Networks	👰 Net	works 🛛 📾 De	evices 🛛 🍖 Values 🗍 🌴 Graph 🗍 🤱	Admin 🛛 🚓 Modbus	Discover Refrest	n 📑 english 🛛 🔻 Logout
👰 Edit Network	👰 Edit	Network   👰 Ba	ckup Gateway   🧖 Restore Gateway			
	Online	Description	Join Key	Network Key	Gateway WiHART ID	Gateway Manufacturer ID
	۲	Test network	000000000000000000000000000000000000000	000000000000000000000000000000000000000	001B1EE0DB000208	6030

System Proper	ties	
-10 System Identif	ication	
Tag Name:	SGH350	
Descriptor:	SGH350	<b>H</b> 11
Message:	SGH350	
Manufacturer:	E Senza Technologies	
Model:	SGH350	<u>F</u> lush
ID:	Software Version Number	
Revs:		
Operation		
Master Mode:	Secondary	~
Retries:	3	
Statistics		
	Maximum Number of IO Cards: 1	
Maximum N	umber of Channels per IO Card: 1	
Maximum Num	ber of Instruments per Channel: 50	
N	umber of Instruments Detected: 2	
	Linreachable Device: 0	

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## 4.3 Firmware Updates

The Gateway firmware can be updated by uploading the new tar file via the webserver of the gateway and the power cycling the Gateway.

http://IPaddressOfGateway and then go to the Menu Firmware Upgrade

DE-Senza Technologies - WiHART Gateway - 5G350 - Mozilla Firefox						
Datel Bearbeiten Ansicht Ghronik Lessezeichen Extras Hilfe						
C X 🔬 http://192.168.0.60/index.php?p=up	pdate	🔂 📲 Google	0			
[ 💆 dict.leo.org - Ergebniss 🗵 📔 🏥 teltarif - Call-by-Call-Re 🗵 📄 [Wir	relessHART] Index 🗵 📔 Veranstaltungen und T 🗵 📔 📈 WiNetMaster v2.6.39 –	📧 🚺 E-Senza Technologies 🛛 🚺 E-Senza Technologi 🔀 🔅	-			
Wireless HART	SG 350		^			
Info Configuration Firmware upgrade Logfile	<pre>File uploaded installer.tar Extracting to :/flash uww/yuestbook/del.gif uww/yuestbook/adguest.php uww/yuestbook/adguest.php uww/yuestbook/adguest.php uww/yuestbook/adguest.pif uww/yuestbook/ph dat uww/yuestbook/ph dat uww/udatues.php uww/hatt.css uww/adtues.php uww/hatt.css uww/adbus_identification.cfg uww/log.php uww/linages/favion.ico uww/linages/favion.ico uww/linages/favion.ico uww/linages/favion.ico uww/linages/favion.ico uww/linages/shadow.jpg uww/linages/shadow.jpg uww/linages.php uww/nofile uww/nofile uww/nofile uww/nofile.php uww/cookie.php uww/coste.php uww/coste.php uww/cajscl.php uww/cajscl.php uww/cajscl.php uww/cajscl.php</pre>					
	www/cgi-bin		•			

## 4.3.1 Logs

The Gateway logs is located and visible also on the web server of the gateway.

Wireless HART	SG 350		
Info			
Configuration	Logfile		
Firmware upgr	rade Loglevel is set to DEBUG		
Logfile	<pre>(2382) - 2011.12.21 15:12:16 - [DEBUG]-Int msg ids 233 213 (18) [2054] - 2011.12.21 15:12:16 - [DEBUG]-Int msg ids 234 205 (16) [1661] - 2011.12.21 15:12:16 - [DEBUG]-Int msg ids 234 195 (18) [911] - 2011.12.21 15:12:16 - [DEBUG]-Int msg ids 234 195 (0) [911] - 2011.12.21 15:12:16 - [DEBUG]-Int msg ids 218 196 (0) [911] - 2011.12.21 15:12:16 - [DEBUG]-Transport Layer timeout: Transport Layer Failure [911] - 2011.12.21 15:12:16 - [DEBUG]-Weiler (18) [911] - 2011.12.21 15:12:16 - [DEBUG]-Weiler (18) [911] - 2011.12.21 15:12:16 - [ERROR]-Hart Address:0xa0 0xdb 0x00 0x01 0x23 [911] - 2011.12.21 15:12:16 - [ERROR]-Hart Packet0x86 0xa0 0xdb 0x00 0x01 0x00 0x00 0x00 0x00 0x01 0x01</pre>		

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