

## RcWare Vision

### Functions Overview



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# 1 What is RcWare Vision

## 1.1 Focus and basic settings

RcWare is a SCADA system with rich possibilities of integration. It was originally intended for creating monitor networks of various technologies through telemetric networks and different types of local communication. The system takes advantage of the most modern software tools and communication standards, but incorporates a great deal of verified “technically standard” solutions as well.

This provides both full compatibility with existing systems on the market and advantage of advanced networking of subsystems, data acquisition stations and SCADA management stations. The modularity of the system enables gradual construction of the dispatching sites from the simplest visualization of metering data to distributed integrated systems. Special focus is put on high reliability, fast application engineering and easy settings even for less experienced users. Licensing policy makes the system available even for the smallest sites while large datapoint number licenses possess a upper price limit.

After standard installation (less than 20 minutes) and primary settings the operation is simple and self-explaining. For basic modifications and design, elementary knowledge of computer operation is sufficient; it is not necessary to be a programmer or an IT-specialist. The RcWare package has been created very consistently in order to be intelligible and user friendly. Since there is a multitude of communication drivers for various types of PLCs and meters in the application, it is possible to monitor and navigate more diverse subsystems with one user interface. The application is directly designed for extensive dispatching systems and contains all the necessary steps for the processing of the acquired data.

RcWare Vision is designed to make use of all the features of the MS Windows 32-bit operating system, series NT/2000/XP/Vista. We recommend to use the Professional versions of the system (in particular MS Windows 2000/XP) for a continuous run of the application. As for backward compatibility, MS Windows 98 can be used for design and graphical evaluation etc., but it is not recommended to use it for a continuous run due to its stability issues. Client part for the communication stations, which are not demanding on HW resources, or just for real-time protocol integration can be set up even on a DOS version.

The application environment is easy to use and comprises all the tools and views for less experienced users. At the same time it contains all the tools for system administrators for application creation and maintenance.

## 2 Main program parts

### 2.1 Data editor

The data editor is the basic component for creating of the database which is used for communication.

The data editor window contains two main parts

- tree view
- datapoint table.

## Datapoint table

Actualization time	Exchange station	Value	Control Mode
Mo 12.01.2004 16:13:23	Mode of pump	AUT	AUT MAN
Mo 12.01.2004 16:13:23	Command for pump	ON	ON OFF
Mo 12.01.2004 16:13:42	State of heating pump	RUN	
Mo 12.01.2004 16:13:42	Operate hours heating	2222 hours	
Mo 12.01.2004 16:13:42	Error of heating pump	OK	
Mo 12.01.2004 16:13:23	Command for heating valve	CLOSED	OPEN CLOSE
Mo 12.01.2004 16:13:44	Position of heating valve	OPEN	
<b>Output for aircondition</b>			
Mo 12.01.2004 16:13:23	Mode of AC pump	AUT	AUT MAN
Mo 12.01.2004 16:13:23	Command for AC pump	ON	ON OFF
Mo 12.01.2004 16:13:44	AC pump	RUN	
Mo 12.01.2004 16:13:44	Error of AC pump	OK	
Mo 12.01.2004 16:13:42	Operating hours of AC pump	1714 hours	
Mo 12.01.2004 16:13:23	AC operating mode	AUT	AUT MAN
Mo 12.01.2004 16:13:23	Command for AC valve	CLOSED	OPEN CLOSE
Mo 12.01.2004 16:13:44	AC valve position	OPEN	
<b>Exchange station</b>			
<b>PLC time</b>			
Mo 12.01.2004 16:13:43	Date-time	12.01.2004 16:09:39	SET
<b>Venkovní teplota</b>			
Mo 12.01.2004 16:13:43	Outdoor temperature - WEST	3.0 °C	
Mo 12.01.2004 16:13:43	Outdoor temperature - EAST	2.7 °C	
Mo 12.01.2004 16:13:43	Outdoor temperature - NORTH	2.1 °C	
<b>CH1 Western part</b>			
Mo 12.01.2004 16:13:44	Time program	ON	SET
Mo 12.01.2004 16:13:43	Outdoor temperature - WEST	3.0 °C	
Mo 12.01.2004 16:13:43	CH1 Mode	DAY	
Mo 12.01.2004 16:13:43	CH1 temperature WEST	43.7 °C	
Mo 12.01.2004 16:13:26	CH1 return temperature	37.6 °C	
Mo 12.01.2004 16:13:43	CH1 required value	44.0 °C	
We 09.08.2006 15:58:52	Difference required - real	0.3 °C	
Mo 12.01.2004 16:13:43	CH1 valve position	22.7 %	
Mo 12.01.2004 16:13:43	CH1 pump	RUN	
Mo 12.01.2004 16:13:43	Error of CH1 pump	OK	
Mo 12.01.2004 16:13:44	CH1 pump mode	AUT	AUT MAN

In the right pane, there are data points properties (e.g. last update time, actual value, description, alarm and history settings, communication properties, etc.) The left pane contains tree structure which makes easy to sort datapoints and assign them to technological groups and locations.

The system is configured by defining and editing communication channels (serial lines, remote RS232 over Ethernet ports, OPC, etc.) and data points. Various editing finctions are available for copying, moving, inserting and deleting of datapoints incl. group functions which allow to change a parameter of more datapoints at the same time (e.g. meter address of all the read data).

Within a datapoint, recalculation of measured to actual value can be made, as well as alarm limits and unit assignment. This is also where communication parameters are set. The communication parameters vary according to the driver used and contain e.g.

- station address
- datapoint type (analogue, digital, time...)
- register to read
- ...

The communication drivers are all available in one package and are included in the licence price. The range of drivers is updated continuously, new drivers are added on demand. Recent drivers and program improvements are contained in hotfixes which are freely downloadable from the RcWare web site.

## 2.2 List of currently available drivers

### Standard protocols

OPC, both client and server  
Modbus TCP  
Modbus, standard Modicon  
BACnet  
DDE Client

### PLC protocols

SAIA PCD – S-Bus  
SAIA PCD – (SCommXXX.dll)  
Simatic ASCII, 512RK, 3296RK, Siemens  
EH micro, Hitachi PLC  
ADAM4000, Advantech, Midam  
Sysmac, Omron  
A120, AEG  
I/O bus, Domat  
Landis & Gyr RWP80, PRU1, PRU2, PRU10  
Landis & Gyr RVD235, RWP97  
Sauter EYZ2400, RSZ, RSE, RSK, ECOS  
C-Bus, Honeywell  
N2 Bus (9100), Johnson Controls  
Staefa Control System – NICO Trunk Bus protocol  
B&R – PViComm.dll  
GFR – PCD/NT  
AMiT, DB-Net, Atouch32.dll  
Tecomat, Teco Kolín  
Buderus – Ecoport  
Dekamatic, Dekatel – Viessmann  
IWKA 921 series  
iRSM Martia (Sauter)  
Micropel – PES (DDE server)  
Term4, ZPA

### **Metering**

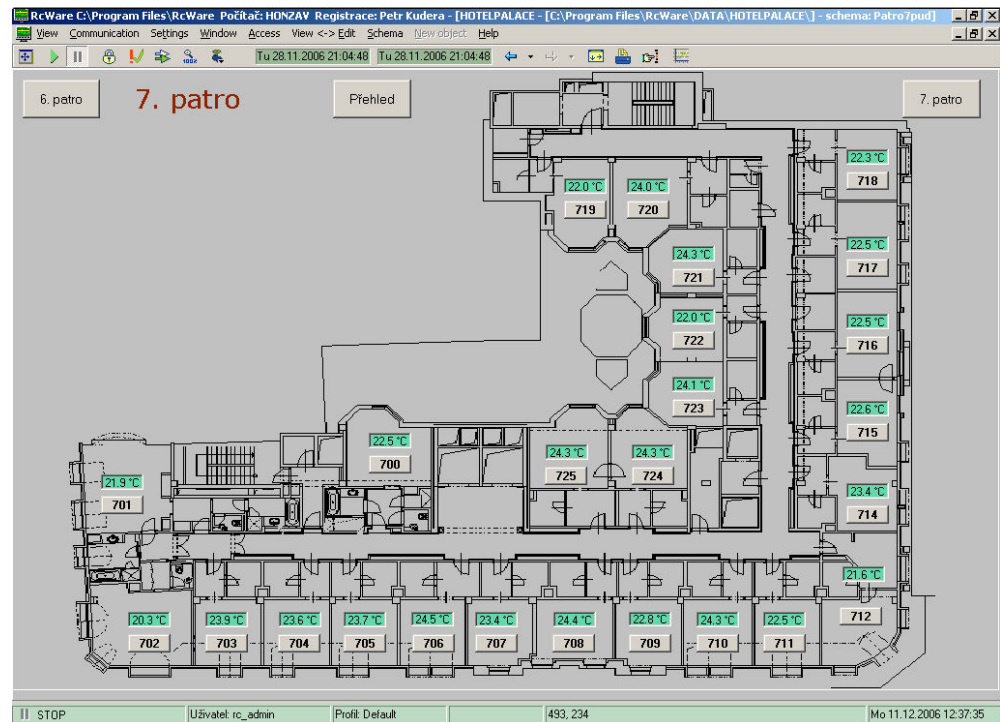
M-Bus: Pollustat  
EESA-485 (MT200, MT500, MP400)  
Multical  
Elster 88, 86  
Elcor  
Vittera  
CF50  
Flex  
EMU – ZPA (IEC 61107)  
Supercal  
PP02  
Sensus  
PadPuls  
Ultraheat, Siemens  
Megatron2, Siemens  
Sonogyr, Siemens  
AEW21 (2x impuls -> M-Bus, Siemens)  
Buderus  
free configurable generic driver for any M-Bus device with available protocol  
  
Lovato energy meters (Modbus)

### **Others**

Esser, fire dampers signalling  
UPS, PowerValue 33  
Linde CAN/RS232, Z-modem  
Linde Marktrechner Modbus  
Hauser cooling furniture (Wurm C2C-EB-HRC-DOM)

## 2.3 Plant graphics

Floor plan example



For fast and clear overview of values and controls, dynamic pictures - technology schemas are the right means. The schemas are of free-definable size and may contain following elements:

**text** – free definable text with complete Windows font formatting properties

**bitmap** – fixed size or stretchable, also possible as background picture

**value indicator/control** – various shapes and sizes, free definable colours etc.

**button** – jumps to another schema

**shape** – basic geometric shapes

**line** – connecting lines with pipe functionality

**animation** – symbol changing bitmaps according to the state of one or more datapoints

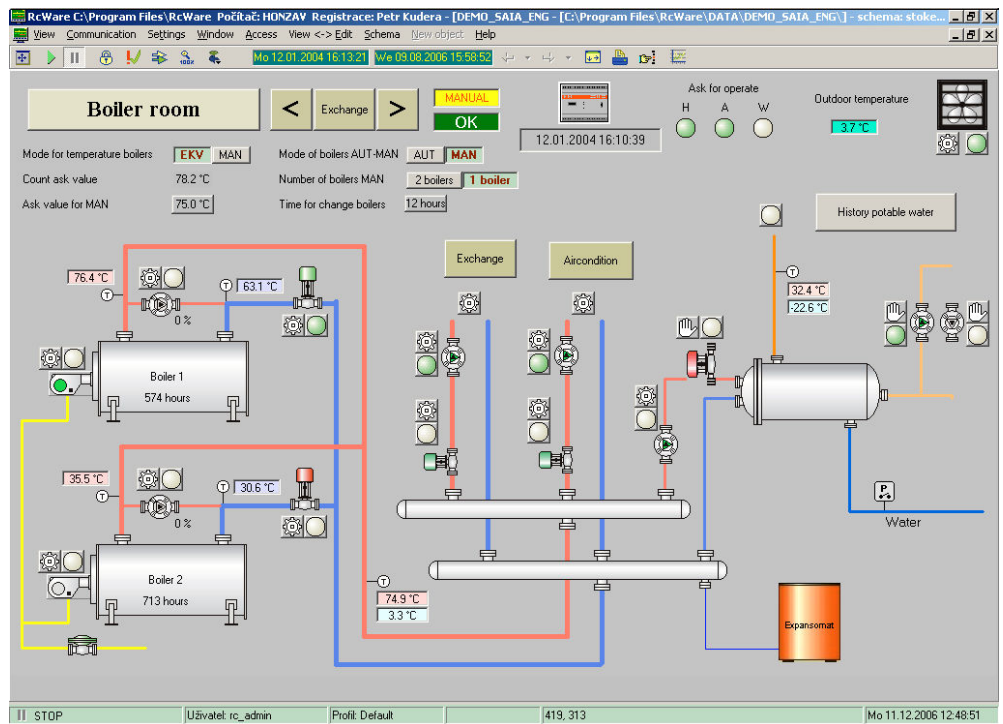
**time program** – weekly schedule

**heating curve** – graphic representation of a 4-point heating curve

**graph** – online trend with one or more values

As bitmaps, \*BMP, \*JPG, \*JPEG, \*ICO, \*GIF, \*EMF, and \*WMF files can be used.

Files with dynamic screen definition are saved to the files with a \*.SCH - extension and each screen is stored in a separate file which makes servicing and upgrade easy.



## 2.4 History data

Selected datapoints store their values periodically. There are two types of history data:

- **long term history:** saved permanently to text files or SQL database, for long-term analysis
- **short term history:** several days back, faster sampling, for trending, tuning loops, and problem analysis

### History sampling definition

For each datapoint, the sampling type and frequency can be defined. The sampled values can be displayed as a graph and exported to .CSV or .XLS files. The export may also follow on a periodical basis automatically.

The SQL database is open for 3<sup>rd</sup> party programs so that the RcWare Vision station can be used as a data integrator, providing actual values e.g. over an OPC server, and history readouts over a **SQL database** or/and **automatic export files**.

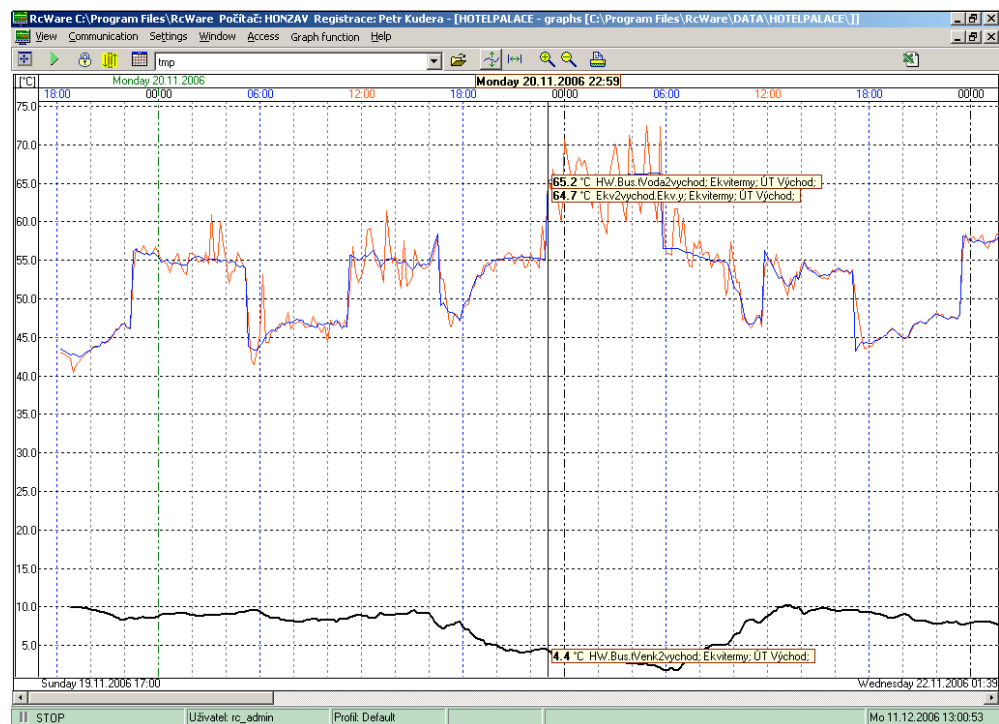
Graph configuration data can be defined and saved as a template accessible either from the Graph menu or directly from the plant graphics.

## 2.5 Alarming

Each datapoint can be defined as an alarm datapoint. For binary and discrete values, each possible value in the list can be defined as alarm value. For analogue values, upper and lower alarm limits may be defined.

### History graph





Each alarm point has an insensitivity time period (switch-on delay). After this time span an alarm message is initiated, which can be forwarded to:

- alarm phone call
- SMS message
- pop-up window
- voice message (to the management station sound card).

There is a log of all sent SMS with possible forwarding to another user.

*Alarm pop-up window*

All active alarms and alarm history are shown in the alarm table. The alarms can be filtered and sorted according various parameters, for easy localization of the alarm in the graphics there are "Find in text editor" and "Find in pictures" functions available. Those functions locate and focus the corresponding datapoint in the data table or in the plant graphics.

Alarms are event-driven and shared for all stations in the network, see System topologies.



Alarm overview table

Time of origin	Station	Data point name	Value	Technology group	Group	RC Address	Way of report
Fr 22.12 09:48	DEMO_SAJA_E...	Valve error	OK	Aircondition	Incoming	5.11.9	Local
Fr 22.12 09:48	DEMO_SAJA_E...	Newest DP	12.01...	Boiler room	System setting	1.1.58	Not known
Fr 22.12 09:49	DUNAPLAZA	H1_K2BH	ACK	Trunk 3	Alarms	4.0.2556	Not known
Fr 22.12 09:49	DUNAPLAZA	H1_K2AH	ACK	Trunk 3	Alarms	4.0.2555	Not known

Time of origin	Station	Data point name	Value	Technology group	Group	RC Address	Way of report
Th 21.12 16:31	DEMO_SAJA_E...	Valve error	OK	Aircondition	Incoming	5.11.9	Local

2.6 Event logging

User and system events are logged into a database. They can be retrieved as a table and as a bar chart which shows the frequency of occurrence of the event types.

Event log with histogram

Time	Event	Key	Word	Count
Su 03.12.2006 12:06:58	START_SYSTEM	Express.LOGIN_USER	ALARM_OFF	1
Su 03.12.2006 12:08:40	NET_SHARE_DIR	Sa 2.12	ALARM_ON	1
Su 03.12.2006 12:08:43	INIT_SYSTEM	Su 3.12	ALARM_QUIT	1
Su 03.12.2006 12:08:43	ROOT_DIR	Mo 4.12	BASE_DIR	34
Su 03.12.2006 12:08:43	BASE_DIR	Tu 5.12	CON_REPORT	129
Su 03.12.2006 12:08:43	DATA_DIR(1)	We 6.12	DATA_DIR(1)	34
Su 03.12.2006 12:08:43	NET_SHARE_DIR	Th 7.12	DTW_SAVED	16
Su 03.12.2006 12:08:43	HW_PROFILE	Fr 8.12	EXIT_RC	39
Su 03.12.2006 12:08:43	LOGIN_USER	Sa 9.12	HW_PROFILE	34
Su 03.12.2006 12:08:44	CON_REPORT	Su 10.12	INIT_SYSTEM	34
Su 03.12.2006 12:08:44	CON_REPORT	Mo 11.12	LOGIN_USER	34
Su 03.12.2006 12:08:44	CON_REPORT	Tu 12.12	NET_SHARE_DIR	68
Su 03.12.2006 12:10:06	SAVE_HWPROFILE	We 13.12	ROOT_DIR	34
Su 03.12.2006 12:10:09	SAVE_HWPROFILE	Th 14.12	RUN_STATION	15
Su 03.12.2006 12:10:34	STOP_STATION	Fr 15.12	SAVE_HWPROFIL	19
Su 03.12.2006 12:11:20	SAVE_HWPROFILE	Sa 16.12	START_SYSTEM	34
Su 03.12.2006 12:11:54	SAVE_HWPROFILE	Su 17.12	STOP_STATION	15
Su 03.12.2006 12:11:54	SAVE_HWPROFILE	Mo 18.12		
Su 03.12.2006 12:11:59	STOP_STATION	Tu 19.12		
Su 03.12.2006 12:12:36	SAVE_HWPROFILE	We 20.12		
Su 03.12.2006 12:12:37	SAVE_HWPROFILE	Th 21.12		
Su 03.12.2006 12:14:19	STOP_STATION	Fr 22.12		
Su 03.12.2006 12:14:22	EXIT_RC	Sa 23.12		
Su 03.12.2006 12:14:46	EXIT_RC	Su 24.12		
Su 03.12.2006 12:15:30	START_SYSTEM	Mo 25.12		
Su 03.12.2006 12:15:31	NET_SHARE_DIR	Tu 26.12		
Su 03.12.2006 12:15:37	INIT_SYSTEM	We 27.12		
Su 03.12.2006 12:15:37	ROOT_DIR	Th 28.12		
Su 03.12.2006 12:15:37	BASE_DIR	Fr 29.12		
Su 03.12.2006 12:15:37	BASE_DIR	Sa 30.12		
Su 03.12.2006 12:15:37	BASE_DIR	Su 31.12		

There are filtering options to focus the events of interest. Custom filters can be saved and retrieved. Event logs can be printed and exported as text files for processing in other systems.

The log databases are shared among the stations – it is possible to check the logs from slave stations at the master station.

2.7 Scripting

For complex data processing, computing and logic functions, script data points can be defined. The scripting language can be either classical RcWare (based on existing

systems) or JScript.NET. The scripting data point reads value of one or more other data points and provides the results at its interfaces.

### Script data point

Input, output and script edit: Difference requested - real

nr.	Description	I/O value type	Dir. type	Data source - driver	Data address	Value	Parameter 1	Parameter 2	Alarm
0.	A.	Analog input/output	reference		2.12.3[15]	44			0
1.	B	Analog input/output	reference		2.12.2[15]	44			0
2.									
3.									
4.									
5.	Dolní alarm limit	Analog input/output	const.		Const.	-5			0
6.	Horní alarm limit	Analog input/output	const.		Const.	5			0
7.									
8.									
9.									
10.									
11.									
12.									
13.									
14.									
15.	ANAC OUT	Analog input/output	const.		Const.	0.4 °C	°C		1

```

A = GetAnalog(0);
B = GetAnalog(1);
C = GetAnalog(2);
K = 0;
M = 1;

U = A-B;

SetAnalog(15, U);

if (AlarmEnabled() && (U < GetAnalog(5) || U > GetAnalog(6)))
    RaiseAlarm();
else
    CancelAlarm();

```

Current script row/column 1:1 Script check OK Cancel

The results of script data points are handled as any other data points: they can be displayed, trended, or communicated to the subsystems.

## 2.8 Web access

In a networked environment, it may be useful to offer access to the management station through a thin client – web browser. RcWare Vision uses MS IIS (Internet Information Server) and libraries for linking the process graphics and data to the web server.

The access rights for individual RcWare users are set up separately in the Data editor of each project. Each user can be granted access to a group of schemas only, optionally with write access (users can change values).

History trends are also available over the web access, with a comfortable menu where users choose from predefined templates and time spans to display.

The plant graphics looks exactly the same as in the SCADA, there is **no need for extra web-specific engineering**. The only thing which needs to be done is configuration of the web server.

## 2.9 Automatic functions

In order to simplify operation and make it more comfortable, RcWare Vision provides automatic functionality:

### Auto schema slide show

Selected schemas are automatically displayed on the screen in given intervals.

### Automatic log out

After predefined period of user inactivity, the current user is logged off.

### Auto dial down

Each station or PLC connected by a modem can be dialed down within preset intervals to get values and history data updates. Communication failures are reported as system alarms.

### 3 Communication, system topologies

RcWare Vision provides up to 24 **channels** – data connections for communication with subsystems and PLCs. The channels may be of following types:

- **serial**: RS232, RS485, M-Bus or another serial line at a COM port
- **modem**: dial-up telephone link for temporary remote connection with another RcWare Vision station and peer-to-peer communication with access to the complete data at the remote station
- **software driver**: communication such as BACnet, OPC, DDE, or another data exchange
- **network adapter**: TCP/IP connection to another RcWare Vision station and peer-to-peer communication with access to the complete data at the remote station.

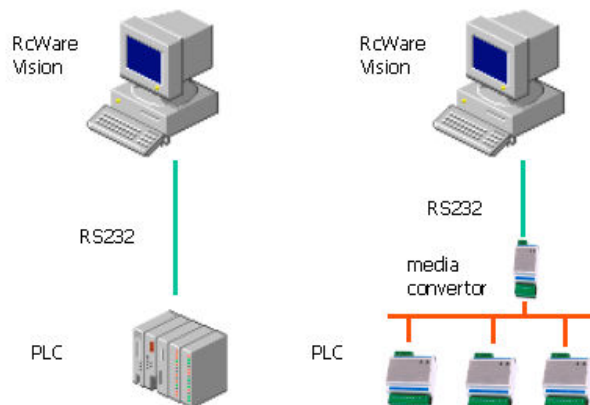
In the Computer resources settings dialogue the line parameters are defined, such as communication speed, parity etc.

There may be more profiles defined at the RcWare Vision management station. Each profile contains a particular channels definition so that it is possible to run the RcWare Vision environment on different machines with the same communication properties without need for redefining communication channels.

#### 3.1 Serial line

Link through a serial line is the most typical connection to a subsystem:

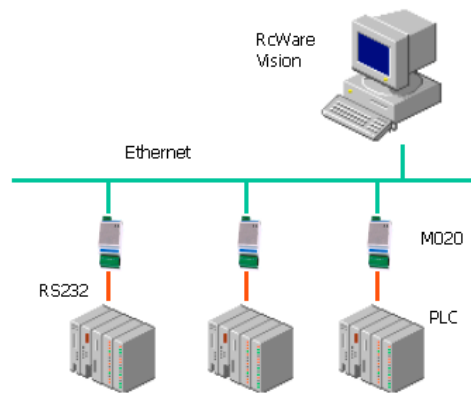
*Serial connection to a PLC*



The connection follows either via a RS232 interface or through an interface convertor to RS485, RS422, M-Bus or another bus. Typical drivers are Modbus, Advantech, Unigyr, and metering systems.

*Multiple serial connection with RS232 to Ethernet convertors*

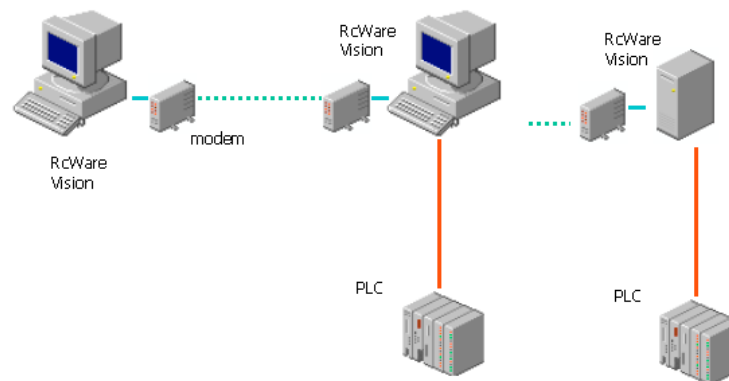
There may be more serial channels at one RcWare Vision station, either hardware COM ports (native or add-on cards), or virtual COM ports over Ethernet e.g. by the Domat M020 convertor.



## 3.2 Modem

Dial-up connection for remote plants. The RcWare Vision server installation may even be a „blind“ industrial PC which is particularly suitable for remote data acquisition and access, such as metering readouts and data trending and alarming.

*Topology with dial-up modems*

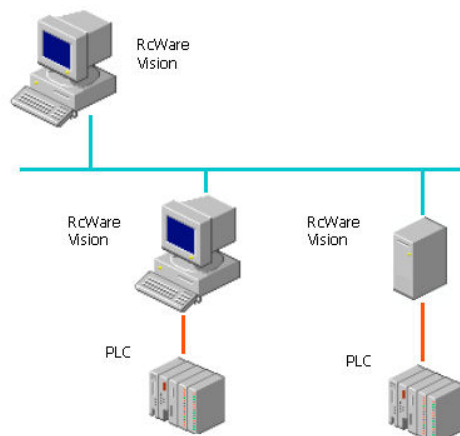


The server (slave) installations are able to dial-up alarms to the client (master) station. The master station can be configured so that it connects to the slaves in regular intervals, polls data and saves the sampled history files to the master database.

## 3.3 Network

Virtually the same as the Modem topology, but in a TCP/IP environment. The upper station is configured as Network station, accessing the other two stations.

*Topology with more stations in a network*



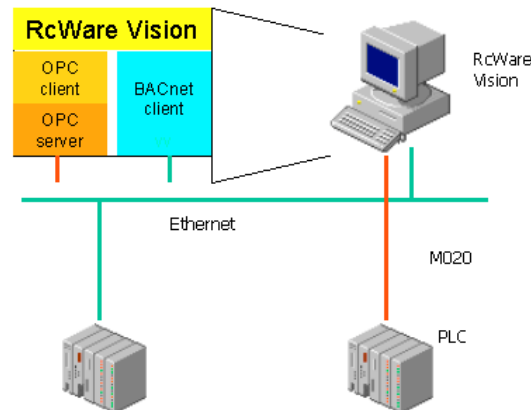
Of course there may be more master stations, each of them having complete access to the entire network.

## 3.4 Software drivers

RcWare Vision can integrate subsystems not only via serial interfaces, but also by means of software drivers for various communication standards, such as BACnet, OPC, and DDE.

The programs which link the subsystem with RcWare may be OPC servers, BACnet servers, DLL libraries delivered by PLC manufacturers, and the like. New RcWare Vision drivers are developed continuously according to the demands from the developed projects.

Communication with software drivers



## 4 International support and service

### 4.1 Localization

The RcWare software packages are distributed in several languages including English. System text translation into local language is easy and can be made and corrected online by the distributor. Adding another language just means to copy the language file and switch over in the system menu. No compilation is necessary.

Language translation table

RcWare C:\Program Files\RcWare Computer: HONZAY Registration: Petr Kudera - [Language edit]		
View Communication Settings Window Access Help		
Current lang: english Comparative lang: magyar		
Czech	Translation	Comparative(C:\Program Files\RcWare\magyar.lng)
Cas vzniku	Time of origin	Eredeti idő
Cas vzniku udalosti	Time of event origin	Eredeti esemény ideje
Cas zahajeni	Start time	Indulási idő
Cas zaniku	Termination time	Befejezési idő
Cas zobrazeni	View time	Képmegjelenítés ideje
Cas prog.	Time program	Időprogram
Casova f-ce tlačika	Button time function	IDŐ-rymógombok
Casove programy	Time programs	Időprogramok
Casove promenne ovivnujuci vykon pocitace	Time variables with influence on computer performance	Különböző idejű PC működetés
Casovy program	Timeprogram	Időprogram
Casovy program - editace	Timeprogram - edit	Időprogram szerkesztés
Casovy program - vlastnosti	Timeprogram - properties	Időprogram jellemzői
Casovy usek pro textove zobrazeni	Time period for textual view	Szöveges ábrák periódusa
Ceka na aktivaci	Waiting for activation	Várakozási idő (működésnél)
Cekani na pozadavek	Waiting for request	Várakozási idő (bejelentkezésnél)
Celkem	Total	Összes
Celkem RC pameti v byte	Total RC memory (bytes)	Össz. RC memória (byte)
Celkem fyzicke pameti k dispozici	Total physical memory	Össz. fizikai memória
Celkem prirazenych adres	Total assigned addresses	Össz. kiosztott cím
Celkem prohledanych adres	Total searched addresses	Össz. keresett cím
Celkova doba pro uchovavani (automaticke ruseni starsich zaznamu)	Total time-length of history (older items are autom. deleted)	Histori össz. időtartam
Celkova doba ulozeni	Total history time	Össz. histori idő
Celkova doba zaznamu, tj. doba vymazavani nejstarsich zaznamu	Whole history duration (oldest records are automatically deleted)	Teljes histori tartam
Celkova velkost vybranych souboru	Total size of selected files	Választott file teljes mérete

## 4.2 Remote service

Today, many installations have remote access enabled for comfortable and fast servicing which saves travel costs and makes the service more flexible.

In case of need of changes in the plant graphics or in the data file (adding new datapoints, setting constants, changing text or symbol in the schema, adding new values in the schema etc.), the procedure does not request compilations and restarts.

Just save your work and go.

Therefore, servicing over remote desktop is safe and fast.

## 4.3 Backups

Backup of the complete site including text history files means only zipping the project directory (no shutdown of the RcWare Vision nor stopping the project necessary). The zipped projects are sized mostly up to 8 – 10 MBytes which means that they can easily be sent by e-mails.

## 5 References

**City Centrum Zagreb (HR)** – shopping and office center, HVAC

**Business Center Maribor (SLO)** – shopping and office center, HVAC

**Hospital Luanda (Angola)** – air condition control and supervising system

**MOL Százhalombatta (HU)** - oil refinery, building management system graphics

**Duna Plaza, Budapest (HU)** – shopping center, building management system graphics

**Skoda Auto Kvasiny (CZ)** – car production plant, HVAC and system integration

**Czech Technical University Prague (CZ)** – school campus, heating system

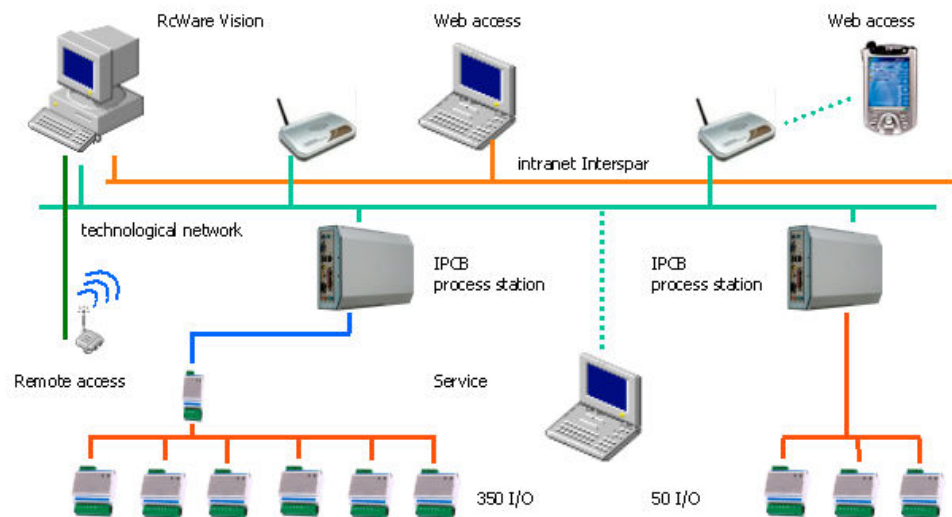
**Military Hospital Prague (CZ)** – technology monitoring system, HVAC

**Q-Byt Čelákovice (CZ)** – municipal district heating system

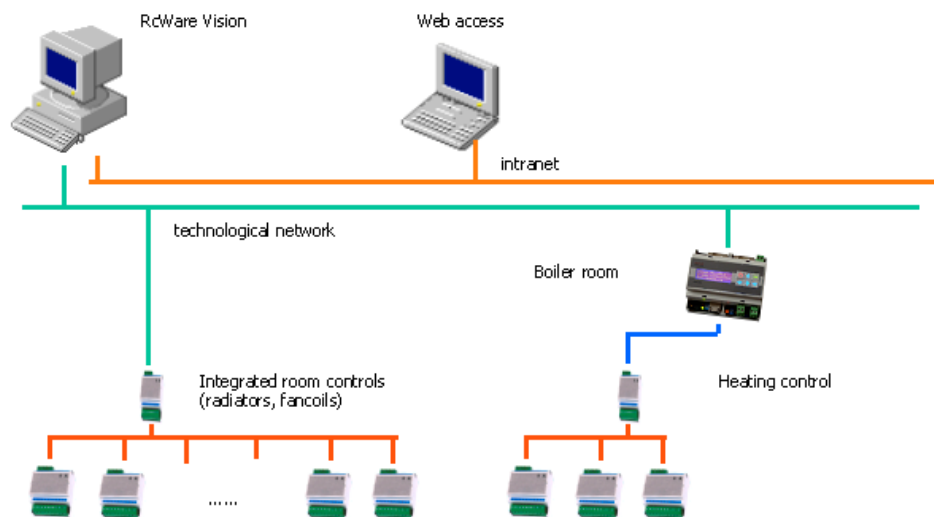
**Koito Czech (CZ)** – car parts production, energy meter readouts and graphics

**Interspar shopping malls (CZ)** - building management system, HVAC

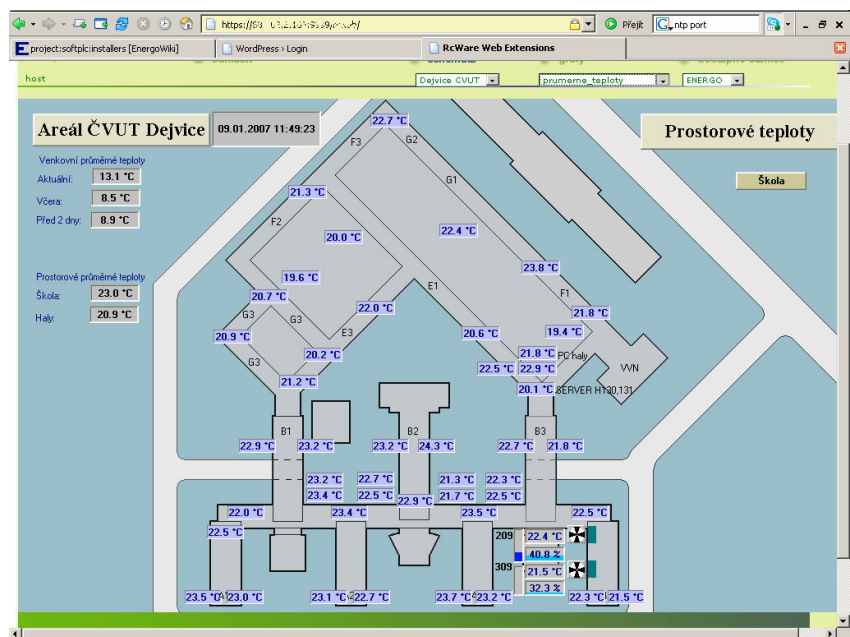
Interspar, system topology



Hotel Palace \*\*\*\*\* Praha, system topology



Czech Technical University, web access





**Czech Republic**

Domat Control System s.r.o.  
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