TecoRoute Service

TXV 003 38.02
2nd edition
November 2013
changes reserved

History of changes

Date	Edition	Description of the changes
October 2013	1	1st edition
November 2013	2	Editing of user interface for TecoRoute account management was reflected.

Content

1 INTRODUCTION

TecoRoute service is used for remote administration of Tecomat PLC via the internet. The service is provided by the company Teco for Tecomat Foxtrot and Tecomat TC700.

PLC system must be connected to the Internet, a public IP address or any additional hardware (except the router) are not needed. The PLC becomes easy accessible for both programmers and end users of the PLC by this way.

How does it works

PLC system is installed at a customer site and has to be connected to the local Ethernet network with access to the internet (as a any regular desktop computer). The PLC has to be set with the login information for the service TecoRoute. With these data, the PLC itself logs to the server with the service TecoRoute. So the PLC will become available for remote access from the Mosaic development environment or from a Web browser. The Mosaic also connects to a server running

TecoRoute at the beginning of communication and after verifying the login data on this server it will link with the PLC system.Similarly, the web browser first connects to a server running TecoRoute, which after verifying the login information and a selection of PLC links the selected PLC.

The benefits of using TecoRoute

For remote access to PLC system does not need any other technical means.You only need a normal Internet connection (such as a home router).A public IP address of the router is not needed, in the majority of cases the need to set up the router is eliminated. Remote access via TecoRoute stays the same even if you change your internet provider or if you replace the router for another one. In addition, the PLC system is involved in the local network, which is not available from the Internet, thus reducing the risk of hacker attack to the PLC.

The remote access via TecoRoute service can reduce significantly the travel costs of technicians of system integrators associated with the modification of user programs and configuring PLC systems in the field. It significantly saves the time usually spent by technicians on the road.

The end user gets the option of remote supervision of its controlled technology.

Account of the TecoRoute service

Any company (or single person) that wants to use the remote PLC management via TecoRoute, must have its own account on the server. It contains the following information:

• a list of users who are authorized to use TecoRoute service
• list of PLC systems, which are available via TecoRoute

Each user on the company account has allocated a specific PLC systems which can be accessed by him by specific applications (Mosaic, browser) authorized to use by him. Furthermore, each user has assigned one of the following roles:
• the company account administrator
• the group administrator
• the user

Role of the Company Account Administrator

At least one user with the role of company account administrator has to be registered on each company account. This is the user from the company staff, who is allowed to perform the following activities:
• add or take out other users on the account
• edit the data of individual users, including setting their roles
• assign the PLC to specific users
• grant applications, which specific users may use
• add or remove PLC systems on the account
• edit the data of each PLC
• create groups on the account
• allocate PLC and users to groups
• to use the service TecoRoute for remote access to PLC

Role of Group Administrator

The user with the group administrator role has slightly less rights than the company's administrator.This may include the following rights:
- to add new PLC systems to the PLC group
- to change the list of PLC in a given group
- to change the list of users in a given group
- to use the service TecoRoute for remote access to PLC

Role of User

A user with this role is authorized to use the TecoRoute service only for the remote access to PLC. He is authorised by the Company Account Administrator for applications which he can use for remote access as well as the specific PLC systems to which he has the access.He cannot perform any editing on the company account.

2   OPENING THE ACCOUNT FOR THE TECOROUTE SERVICE

The condition for the use of the TecoRoute service is the account opened through a portal http://tecoroute.geostore.cz/portal/ (non-secure connection) or https://tecoroute.geostore.cz/portal/ (secure connection). When the web page at that address ís displayed on your browser, the login dialogue box for the service will appear (see the following figure). On this web page there is also the link for newcomers, which enable to create new company account (marked in red).

For opening an account, you must provide the following information to the company Teco:

• information about the company
  ◦ the name of the company (including the ID and TAX ID)
  ◦ the address of the company
• information about the Company Account Administrator
  ◦ the name, surname, title of the Company Account Administrator
  ◦ email and telephone of account manager
• the estimated number of PLC, which will be remotely accessible through TecoRoute

All information provided will be used only for the needs of the portal.

TECORoute - Registrace

Společnost

Název	
IČ	DIČ

Stát	
Město	
Ulice	
Číslo	⦿ Popisné ◯ Evidenční
Psč	

Odpovědná osoba

Titul	▾
Jméno	Příjmení
Telefon	
E-mail	@

Přihlašovací údaje

Přihlášení	

Heslo	
Ověření	

Předpokládaný počet PLC

⦿ 1-2   ◯ 3-19   ◯ 20-59   ◯ 60-119   ◯ 120-499   ◯ 500

[Odeslat]

After the filling out and submitting the registration form a confirmation of receipt of the request to create an account is sent on the email of the person listed as the company's account administrator. This request must be approved by the TecoRoute administrator - staff of the company Teco

a.s. After they do so, the account is activated and you can begin using it.information about the account activation is sent again by email to the person who requested establishing the account.

The company's account administrator can then add to the account other persons of the company which will use the account and allocate them the login names and passwords for the account.At the same time he defines the names and passwords at the account logins and passwords of the PLC, which will be available through the TecoRoute service. Each authorized user of the account can grant access to selected PLC and also defines the services that the user can use. More specifically, see the following chapters.

3   ACTIVITIES CARRIED OUT BY THE COMPANY'S AC-COUNT ADMINISTRATOR

The activities described in this chapter can be carried out only by an account administrator after login to the account on the server https://tecoroute.geostore.cz/portal/. The following figure shows the first page that is displayed after an account administrator logs on.
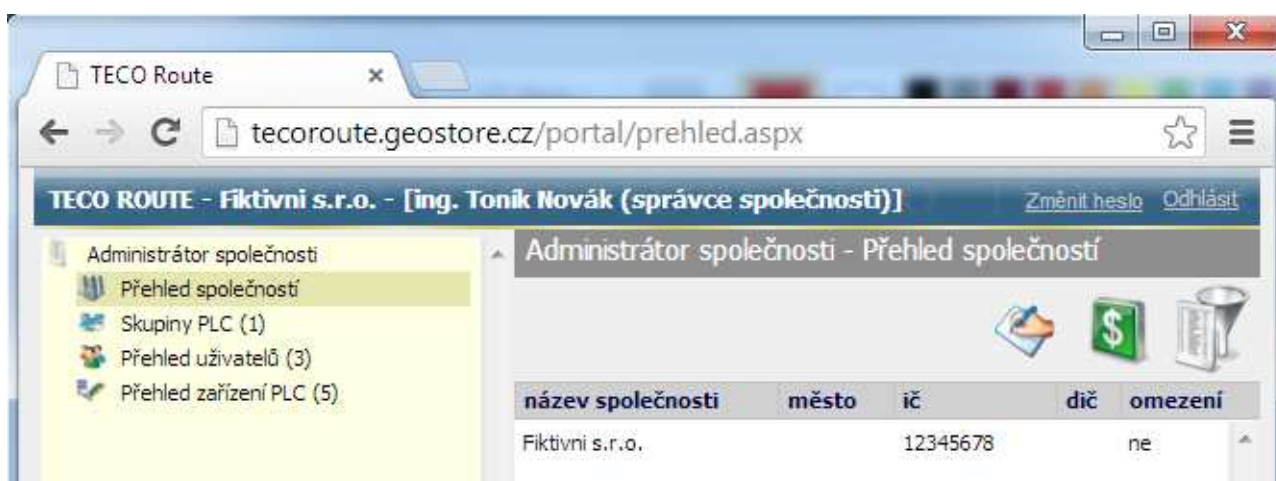

In the left part of the page you can choose to display the following information:
- list of companies (přehled společností)
- groups of PLC (skupiny PLC)
- list of users (přehled uživatelů)
- list of devices - PLC (přehled zařízení PLC)

The appropriate information is displayed in the right part of the page. By clicking on the line in the right part of the (company name), you can see additional details, as shown in the following figure.

It is possible to see in details:
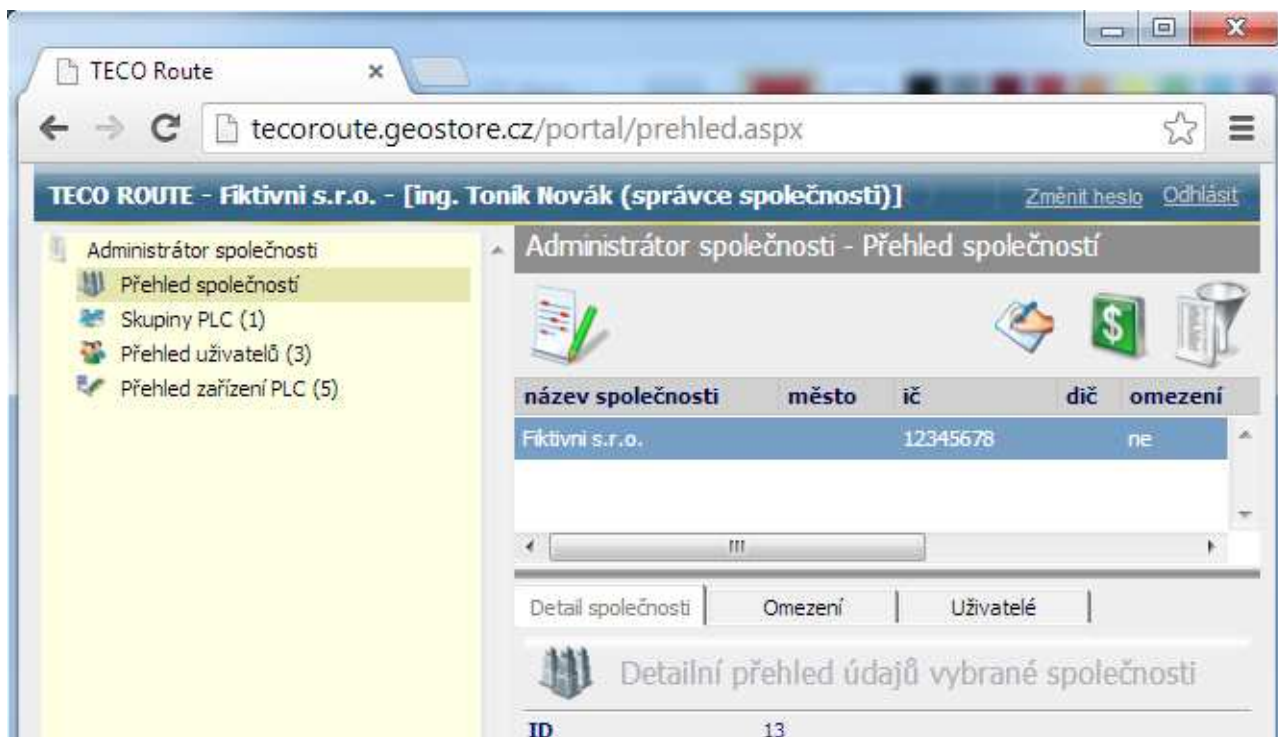
• details of companies (detail společnosti)
• restrictions on the company account (omezení účtu společnosti)
• user (uživatele)

3.1 Editing of data about the company

The account manager of the company can, if necessary, edit the information about the company.For this activity it must be selected "Company Overview" („Přehled společností") in the left column. Then click on the company name.
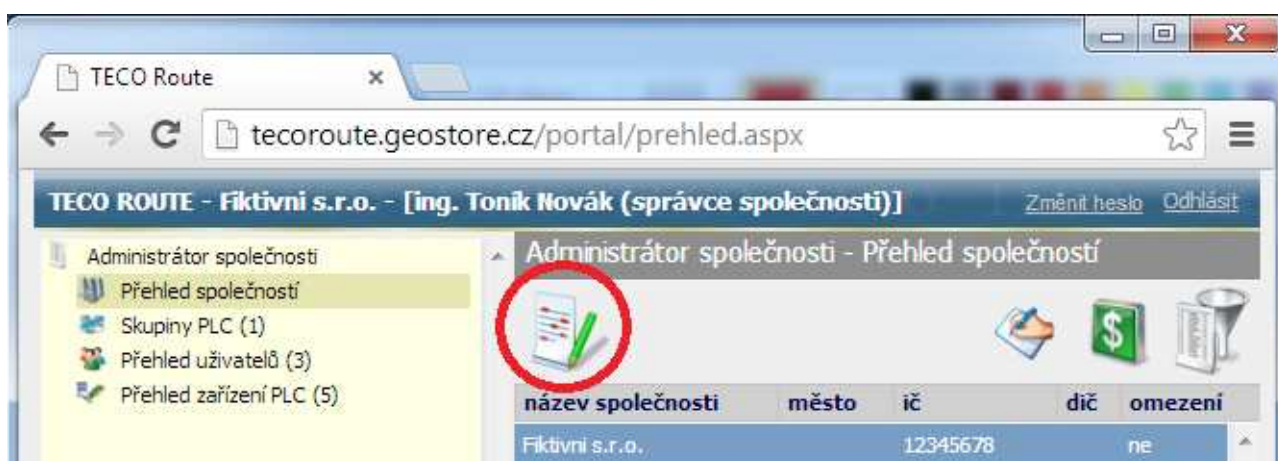
By clicking on the icon "Edit" (marked in red) the dialogue box is opened in which you can refresh the information about the company.
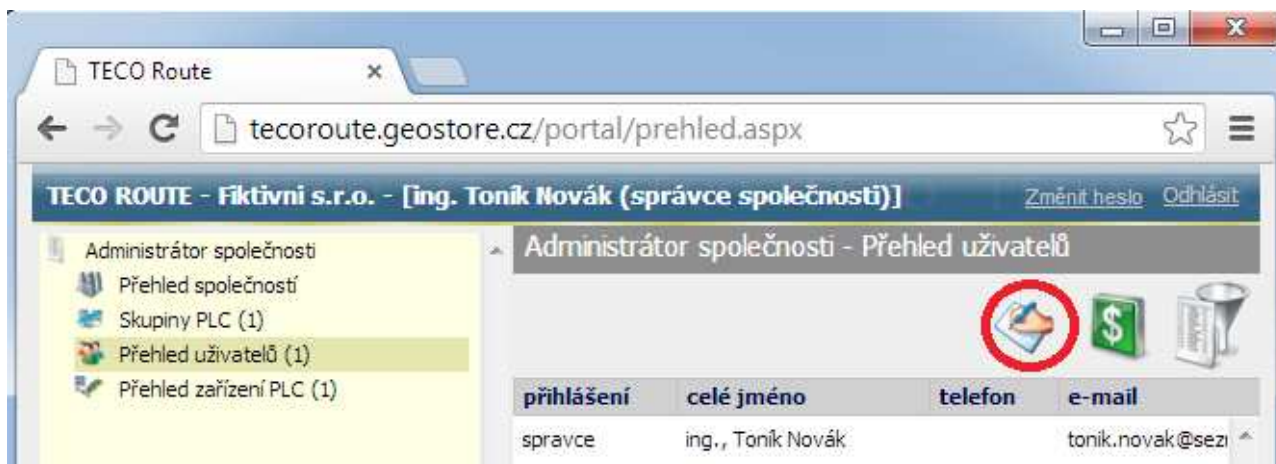
3.2 Entering of new user on the account of the company

Account manager can enter more users who will use the account. To view the users who are currently registered on the company's account select "list of users".ˇ(„Přehled uživatelů") in the left part of the page.

Next user can be added to the company's account by clicking on the icon "Create new entry" (marked in red in the previous figure). A window appears with the menu to add the new object, select the option "user" („Uživatel").
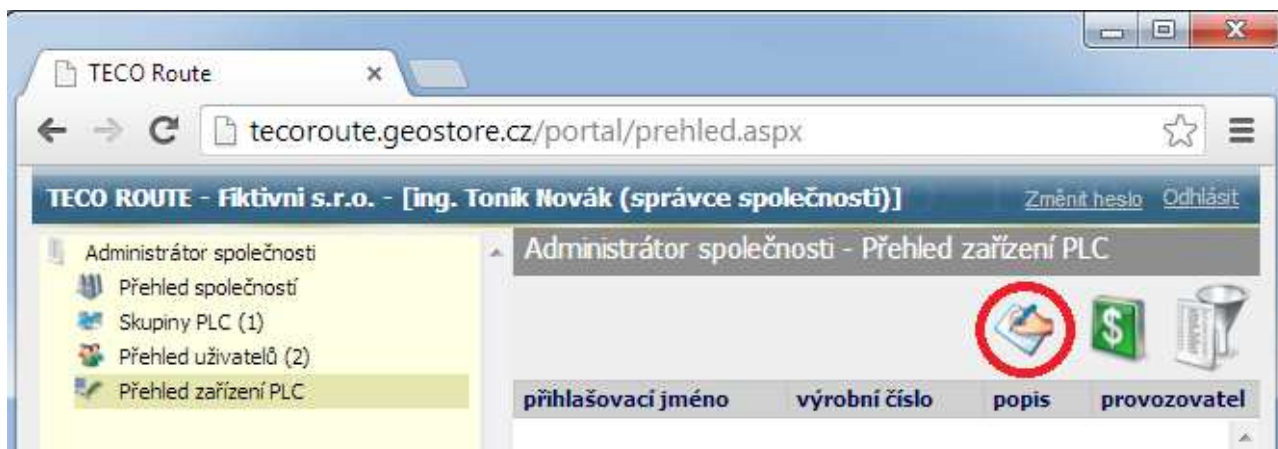
Then appears a dialogue "set up a new user" („Založit nového uživatele"). It is compulsory to fill in the following items:
- login (přihlášení (přihlašovací jméno)
- password (heslo)
- user role (uživatelská role)
  - company account administrator (správce společnosti)
  - group administrator (správce skupiny)
  - user (uživatel)
- e-mail of new user (e-mail nového uživatele)

Newly created user appears in the list of users.Now it is necessary to assign the PLC and the application to the user, that will be authorized to use.Select a user by clicking on the corresponding line in the list of users on the page "list of users" („Přehled uživatelů").

For the assigning of the PLC to the user the dialogue "Update device" („Aktualizovat za-řízení") should be used, in which you select the PLC, to which the user will be able to access it. This dialogue is called by click on the red highlighted icon in the previous figure. Blue highlighted icon then invokes the dialog "Update" („Aktualizovat aplikace").

For the assigning the applications to the user the dialog "Update" („Aktualizovat aplikace") has to be used. The application that the user will be authorized to use has to be checked.

Thus the entering the new user is completed.

3.3 Entering of next PLC on the company account

Account manager can enter more PLCs which will be accessible over the account. To view the PLCs which are currently registered on the company's account select "list of PLCs".(„Přehled zařízení PLC") in the left part of the page.

Next PLC can be added on the company´s account by clicking on the icon "Create new entry" („Vytvořit nový záznam") marked in red in the previous figure. A window appears with the menu to add the new object, where the option "PLC" („Zařízení PLC") has to be chosen.

Then the dialogue "register a new PLC" („Registrace nového PLC") appears. It is compulsory to fill in the following items:
- login (přihlášení (přihlašovací jméno))
- password (heslo)
- the type of PLC (typ PLC)

Text written in the box "device description" („Popis zařízení") will be displayed in login dialogue box for selecting PLC we want to communicate with in the Mosaic development environment or in Web browser. The new PLC is automatically assigned to the one who created this PLC. If somebody else will work with this PLC over TecoRoute account, you must select the corresponding user on the page "list of users" and assign him a PLC using the dialog "Update device" PLC. („Aktualizovat zařízení PLC").

3.4   Entering new PLC group on the account of the company

The company account administrator can establish a group of PLC. PLC group contains a list of the PLCs and the list of users who are authorized to work with that PLC. After you add the next PLC all users registered in the group are authorized to access this new PLC After you add a user to a group, that user is authorized to access to all PLC, which are defined in the group.

To view the PLCs which are currently registered on the company's account select "PLC groups".(„Skupiny PLC") in the left part of the page.
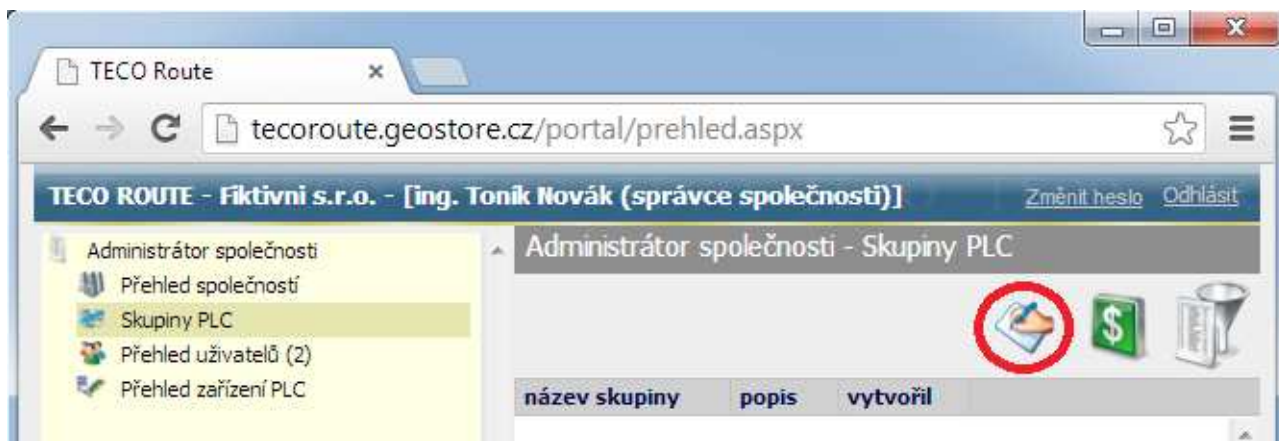
The next group can be added on the company´s account by clicking on the icon "Create new entry" („Vytvořit nový záznam") marked in red in the previous figure.A window appears with the menu to add the new object, where the option „PLC group" („Skupina PLC") has to be choosen.


Then appears a dialogue "establish a new group"(„Založit novou skupinu"). In it, just fill in the name of the group.
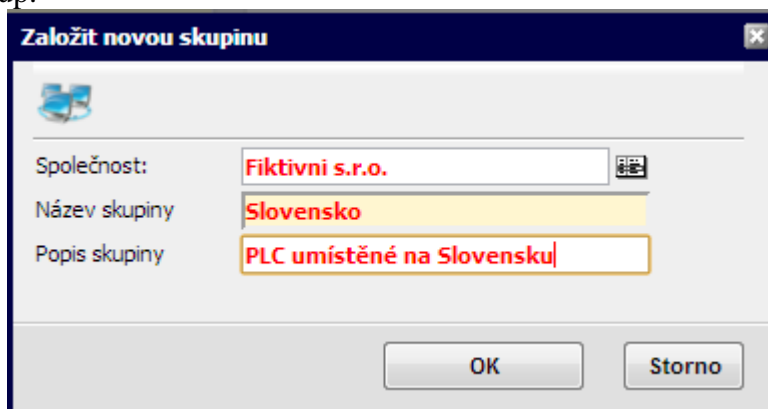

Just created group appears in the list of groups.By clicking on the line with the name of the group, the group is selected by the blue line.
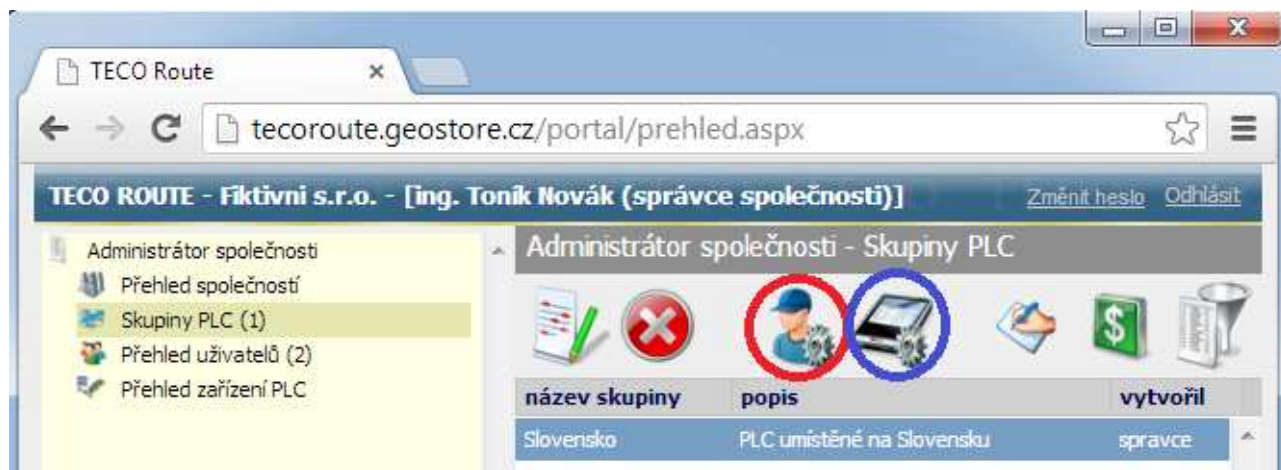
Furthermore, it is necessary to assign the user to thw group (red marked icon) and PLC equipment (blue marked icon).By clicking you can add users resp. PLC into the group.
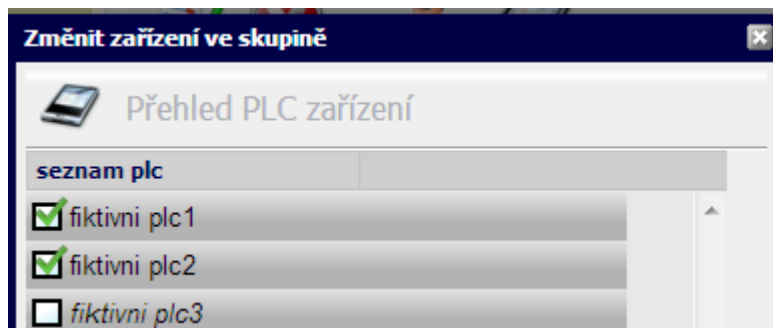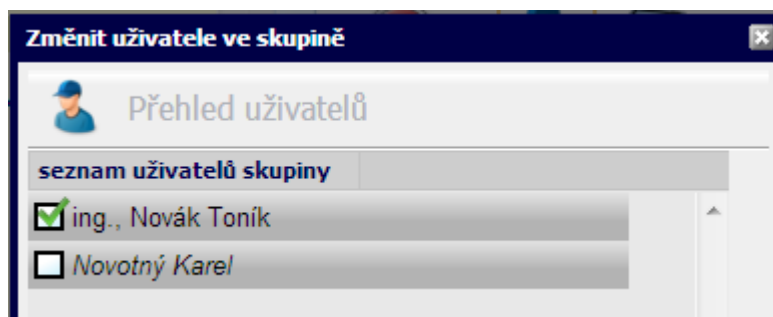
In this case the user,*,ing. Novák Toník*" will be authorised to access PLCs: "*fiktivni plc1*" a "*fiktivni plc2*" (because he is registered in group,*Slovensko*"). In addition, this user can be authorised for access to additional PLC that can be assigned him individually (see the procedure described in section 3.3). To view a list of all PLC, to which the user has access, select "list of users" in the left part of the page and select a specific user by clicking on the user in the list (the line with the selected user will turn blue). Overview of allocated PLC devices appears by clicking on the red highlighted icon in the list of users.
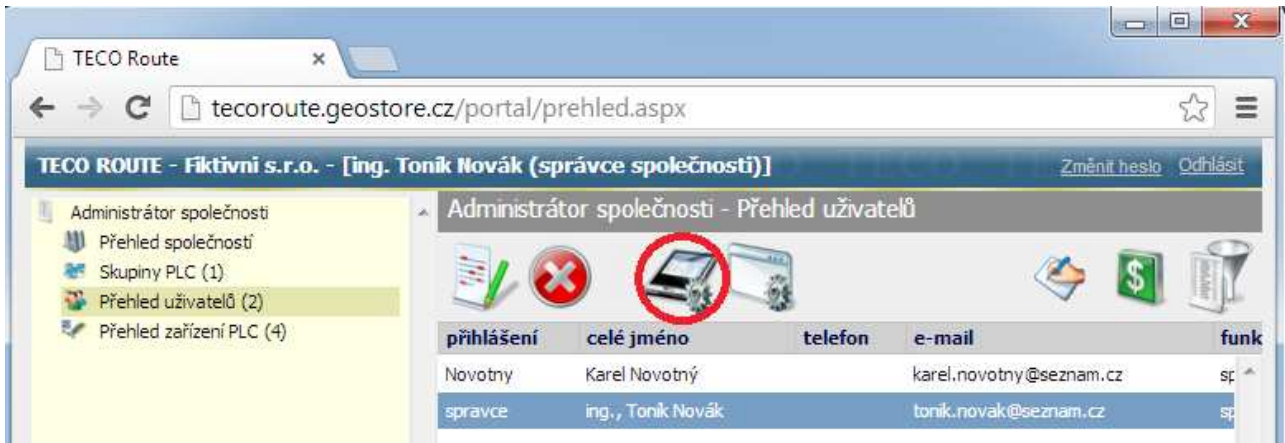
Individually assigned PLC are green highlighted in dialogue "Update of the PLC device" for user "("Aktualizovat PLC zařízení" pro uživatele),*ing. Novák Toník*", PLCs assigned via PLC group are grey highlighted as shown in the following figure.
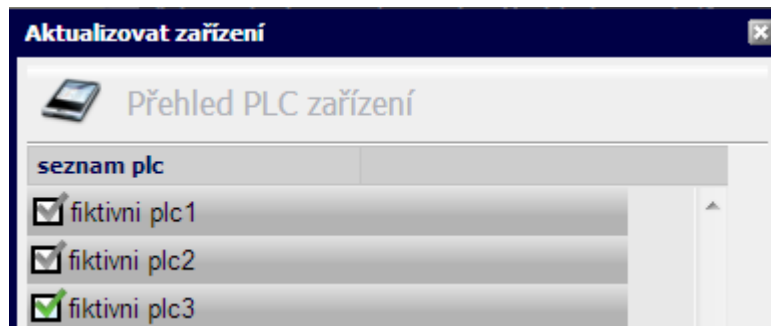
4 CONNECTION OF THE PLC TO THE TECOROUTE SERVICE

PLC system, which should be available through the TecoRoute service, must be connected to the Internet. The router through which the PLC is connected to the Internet must have the outbound TCP port 8080 enabled. PLC system must be registered on the account TecoRoute (see chap. 3.3 Entering of next PLC on the company account). In the PLC the login must be set which corresponds to the data on the account TecoRoute. Setting the login data in the PLC can be done either by SetPlcIP stand alone utility or from the user program of the PLC program using the TecoRouteLib library. See more detail in the following chapter.

Firmware of PLC central module
Central module of the PLC Foxtrot must have the firmware version 8.1 or higher. In system Tecomat TC700 central modules CP-7004 a CP-7007 with firmware version 8.1 or higher can be connected to th TecoRoute server. Connection via the communication unit SC-710x is not supporte-dUpgrade of the firmware of Foxtrot central module on the current version can be done by Firmware Updater utility. Upgrade of Tecomat TC700 can be done by FirmUp1C utilityBoth of these programs can be found on www.tecomat.com.

## 4.1 Settings data for the PLC logging by SetPlcIP utility

The Program SetPlcIP from version 1.2.0.28 allows you to set login information to TecoRoute. This program can run on a computer with OS Windows XP/2000/Vista/7/8, which is connected to the same LAN as the PLC system.

After starting the program, the following window appears:
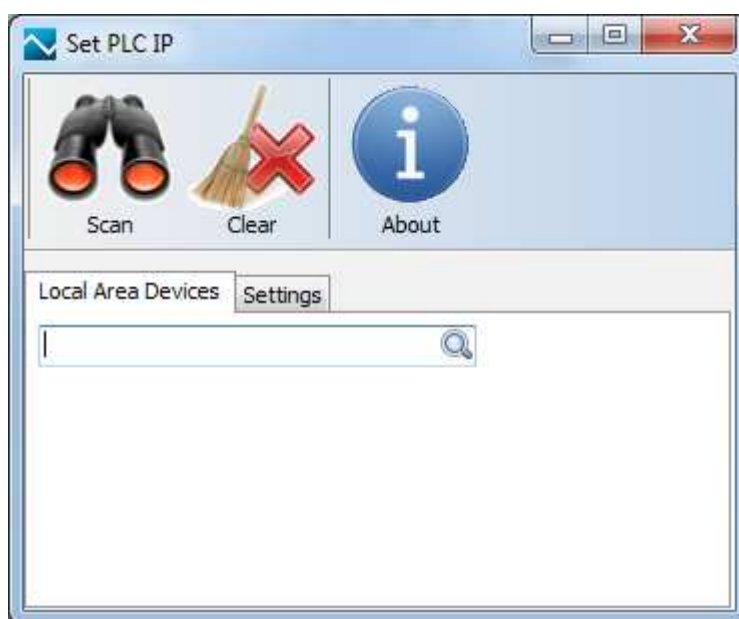
Pressing the "Scan" icon displays all PLC systems available in the same LAN network as the computer on which you are running the program SetPlcIP. Alternatively, you can specify the IP address of the PLC system (if known) in the input field "Local Area Devices". Then the information of the PLC system with the specified IP address is displayed, as shown in the following figure.
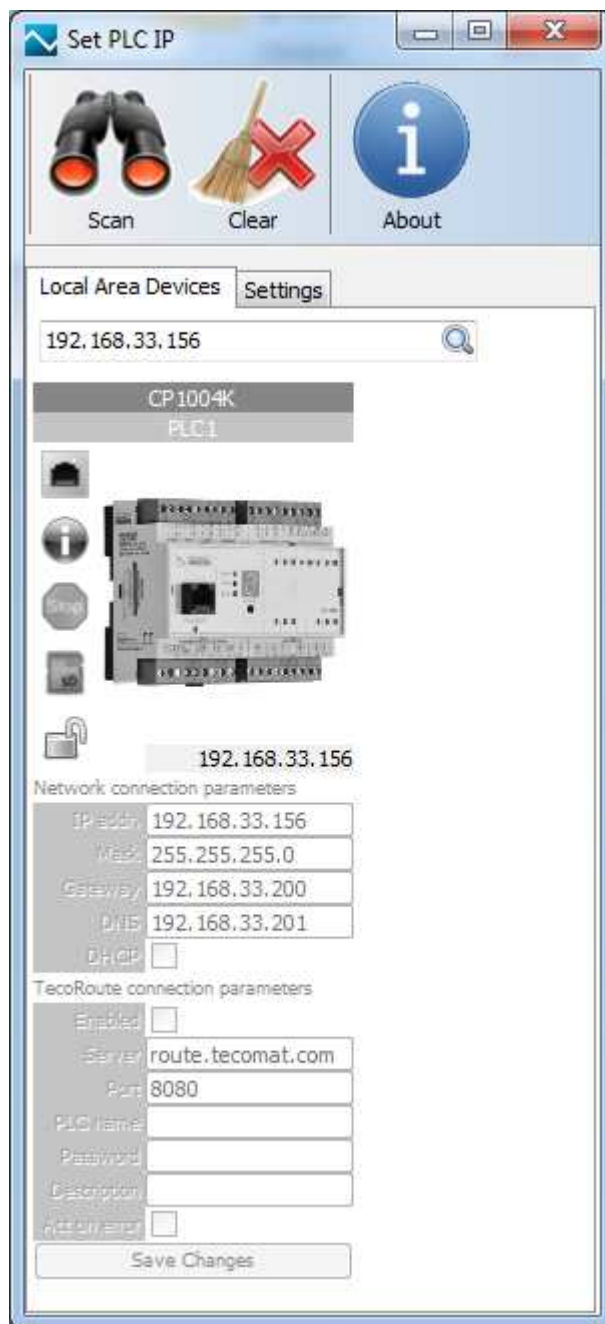
Click on the image to select PLC PLC system in which it is necessary to set the login information for the TecoRoute service. The selected system is highlighted and it is possible to set up the necessary information in the section "TecoRoute connection parameters". If this section is not displayed, the PLC system with an older version of the firmware is connected to. That version does not support connections to the TecoRoute service.

Items in the „TecoRoute" connection parameters" have the following meanings:

- **Enabled**
  - checking enables PLC to log to TecoRoute service
  - not checked PLC will not connect the TecoRoute service
- **Server**
  - the name of server, with running TecoRoute service (route.tecomat.com)
- **Port**
  - the number of the TCP port on which the service is operated (8080)
- **PLC name**
  - the name of the PLC
   (must correspond with the data about the PLC on the TecoRoute account)
- **Password**
  - password of the PLC
   (must correspond with the data about the PLC on the TecoRoute account)
- **Description**
  - Additional description of the PLC
- **Act on error**
  - enable TecoRoute service in the case of critical error in PLC
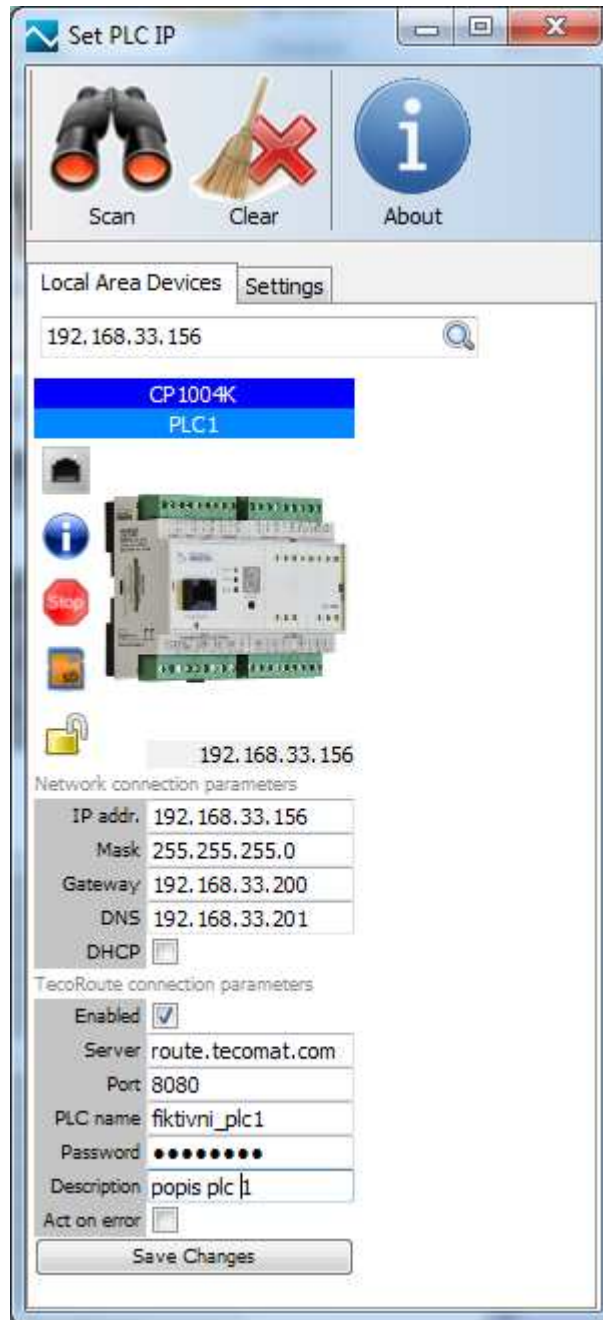
Data are loaded to the PLC by pressing the „Save Changes" button. After writing the login data, the PLC connects to the TecoRoute service during 1 minute.

4.2 Setting data for logging from the PLC user program

Parameters for logging of PLC to the TecoRoute service you can test and set from the PLC user program using the library functions from TecoRouteLib. This library is an inherent part of the installation of the programming package Mosaic from version 2013.2.

This option is ready for occasional settings of parameters e.g. from the operator panel, which is connected to a PLC. Another option is to control the connection and disconnection of the PLC to the TecoRoute service by the contact connected to input of the PLC or by sending SMS message. Thus the PLC is enabled to connect only for necessary period (it need not be attached permanently). The logic of connecting and disconnecting to the TecoRoute service must be programmed in the PLC user program. For detailed description see the TXV 003 83.01 Library TecoRouteLib or the help of programming environment Mosaic.

4.3 How to test the login status of the PLC to the TecoRoute service

After setting up your login data to the PLC the PLC will attempt to connect to the service TecoRoute. The current status of the connection to the PLC can be verified in several ways:
 • by web browser
 ◦ by access to the web interface of the PLC in the local network - connection state is shown in the system web page "Network"
 ◦ by connecting to the TecoRoute portal (http://tecoroute.geostore.cz/portal/) – in the list of devices the online / offline status of PLC is displayed.
 • from the PLC user program
 ◦ by calling the *fcGetTecoRouteStat( )* function from the TecoRouteLib library.

4.3.1 Information about connection of PLC to the TecoRoute service on the system web page

Each Foxtrot contains the system web page with basic information about PLC. These page can be accessed by the browser (Internet Explorer, FireFox, Chrome, Opera, Safari, …). Access to these pages is possible after entering your name and password, which is the same as the user name and password to the web pages created by WebMaker in Mosaic (the web application in PLC).
 PLC systems with firmware version 4.9 and higher contain the following system web pages:

 • **PLC info** (…/syswww/index.xml)
 ◦ basic information about PLC system
 ◦ information about the user/application program
 • **App profiles** (…/syswww/set_ap.xml)
 ◦ information about the type and serial number of the PLC
 ◦ information about the installed application profiles
 ◦ the ability to add new application profile

• **Network** (…/syswww/net_ifo.xml)
   ◦information about setting network interface PLC
   ◦information about TecoRoute services settings.
   ◦information about the status of connection to the TecoRoute service

     To display information about the status of the PLC connection to the TecoRoute service, you must enter the IP address of the PLC system into the address bar of the browser, accompanied by the name of the system web page "syswww/net_info.xml". The following figure shows this page of PLC at 192.168.33.156 IP address
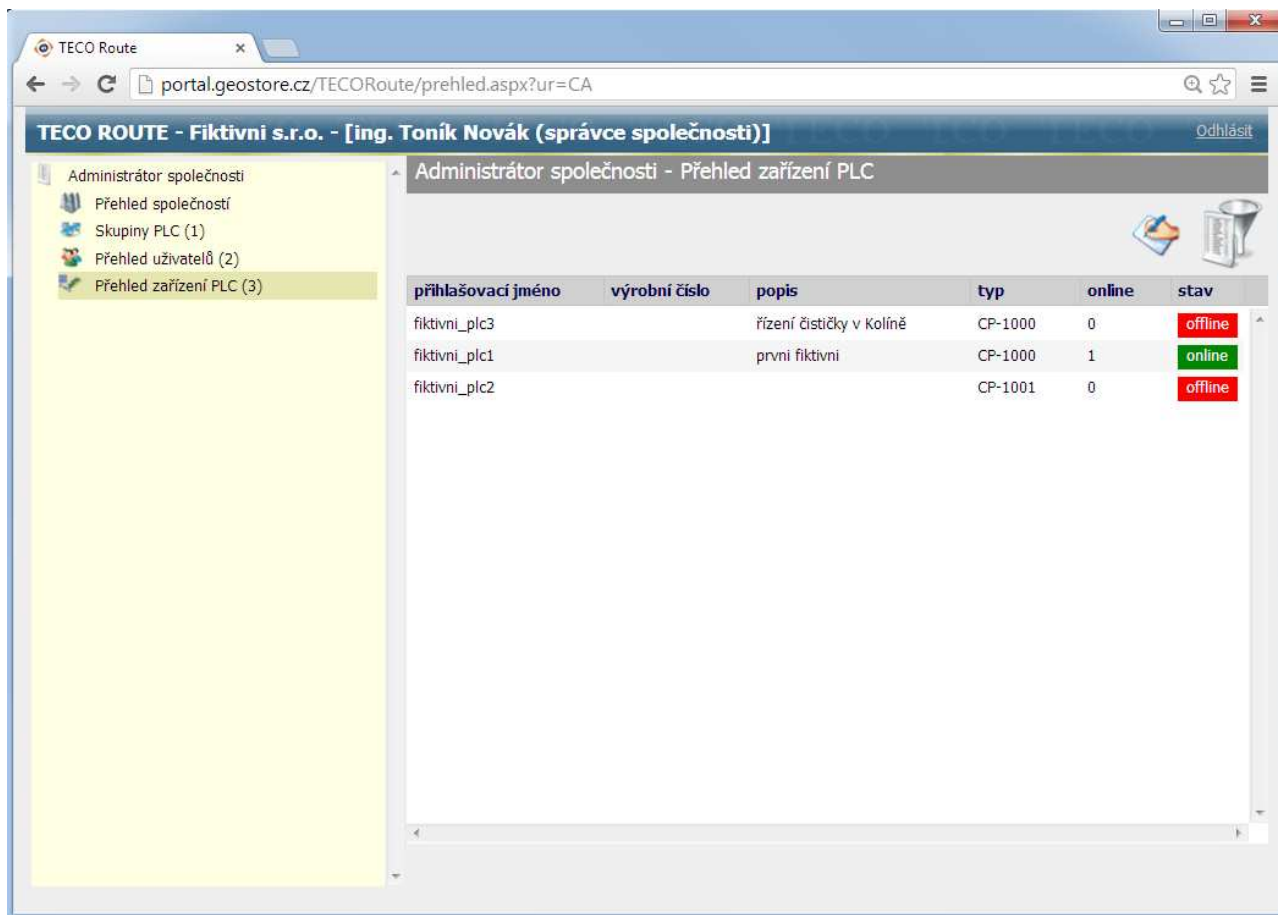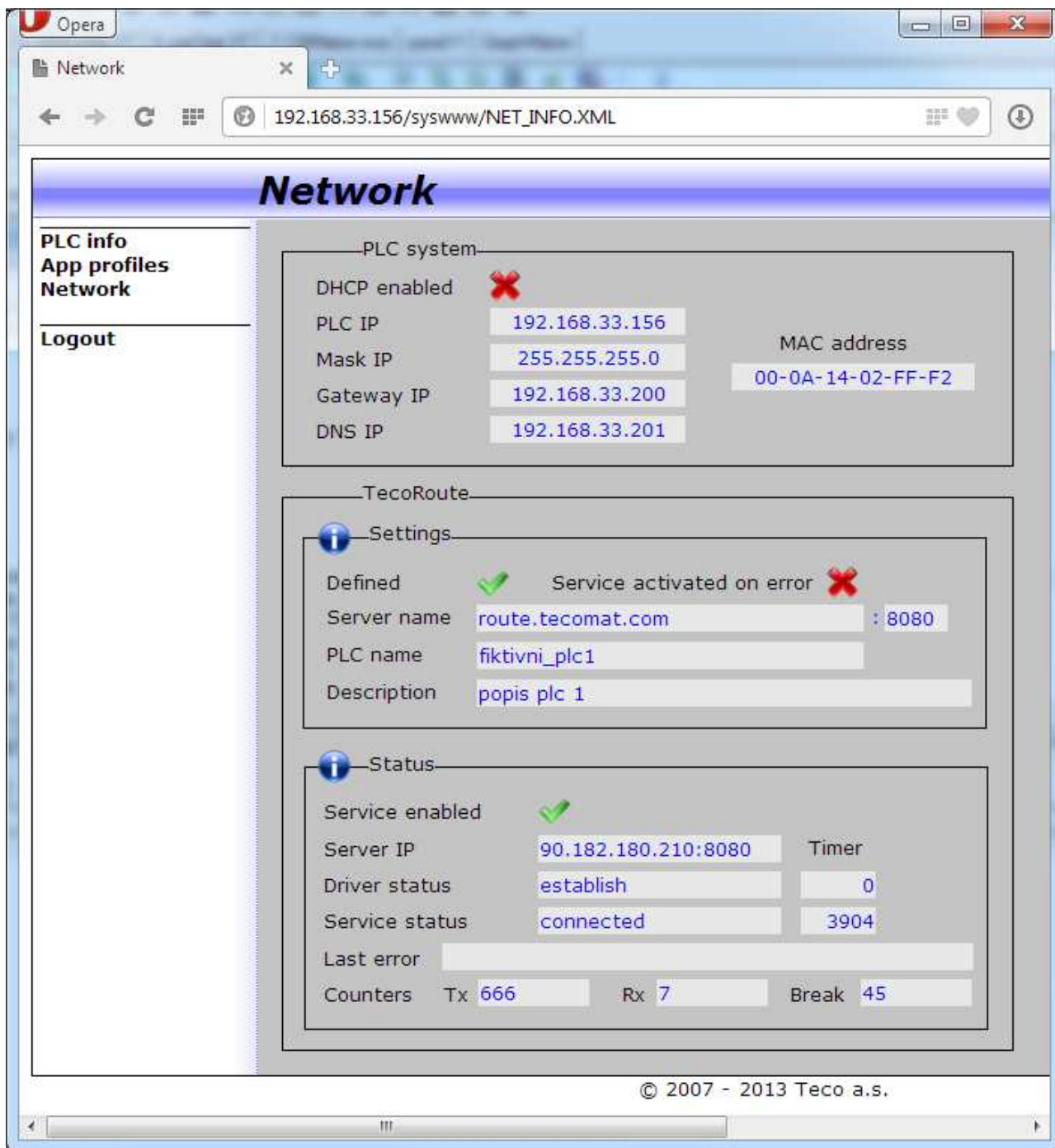
In the bottom of the page you can see the required information.In case the PLC is connected to the TecoRoute service, the "establish" is displayed in the "Driver status" field, "connected" is displayed in the "Service status" and the field "Last error" is empty (contains no error message).

4.3.2   Information about PLC connection to TecoRoute service on the service portal

Another option, how to check if the PLC is connected or not to TecoRoute service, is to log in from the browser to the portal „http://tecoroute.geostore.cz/portal/ " and show the page "Device list" („Přehled zařízení"). For each registered PLC there is posted, if the PLC is connected to the service (online) or if it is not available at the moment (not connected, offline).

An example of such a page is in the following figure.

Note that each user sees in the list only PLC authorised for him.

5 APPLICATIONS USING THE TECOROUTE SERVICE

The TecoRoute service can be used for the connection of the programming environment Mosaic to the PLC for remote administration of an application/user program in the PLC.Furthermore, it is possible to access the web server in the PLC from the browser through this service.

In order to use the service, the user and PLC must have a valid registration on the TecoRoute account .Furthermore, it must be connected to the service currently PLC (must be online).
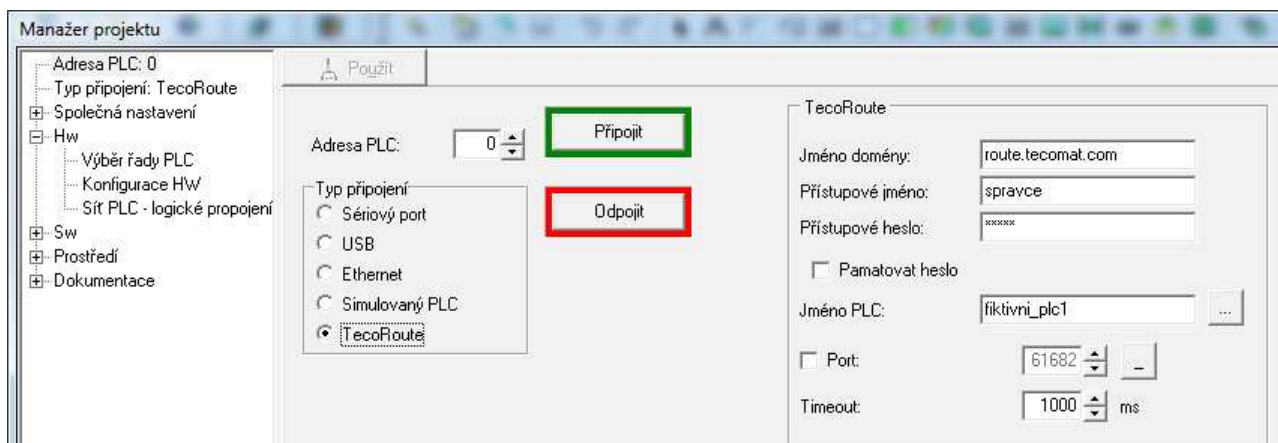
5.1 Mosaic

In a programming environment Mosaic the ability of access to the PLC via TecoRoute is enabled from from version 2013.2. For this case Mosaic uses TCP communication with the destination port 61682. Transmitted data are crypted (they are not transmitted in open form) and they only flow through the service. i.e. they are not saved on the server and there is not analysed there. Shortly said, the TecoRoute server "only" redirects data from Mosaic to the target PLC system.

In the project manager, you must set the "Connection type" to "TecoRoute". The other parameters have the following meaning:

- **The domain name**
  ◦ the name of server, with running TecoRoute service (route.tecomat.com)
- **Access name**
  ◦ the name of the user to sign in to TecoRoute
- **Access password**
  ◦ user password to sign in to TecoRoute
  (access name and password must be registered on the account TecoRoute)
- **PLC name**
  ◦ the name of the PLC registered in the account TecoRoute
- **Port**
  ◦ the outgoing port for communication (TCP port 61682)
- **Timeout**
  ◦ max. time to wait for a response

An example of the login dialogue is in the following figure.

If we press the button next to the field for "name of the PLC" („Jméno PLC") Mosaic offers a dialogue with the choice of the PLC. In the selection there are offered all the PLC, to which the user has authorized access. At the same time the dialogue contains information if the PLC is connected to the TecoRoute or not.
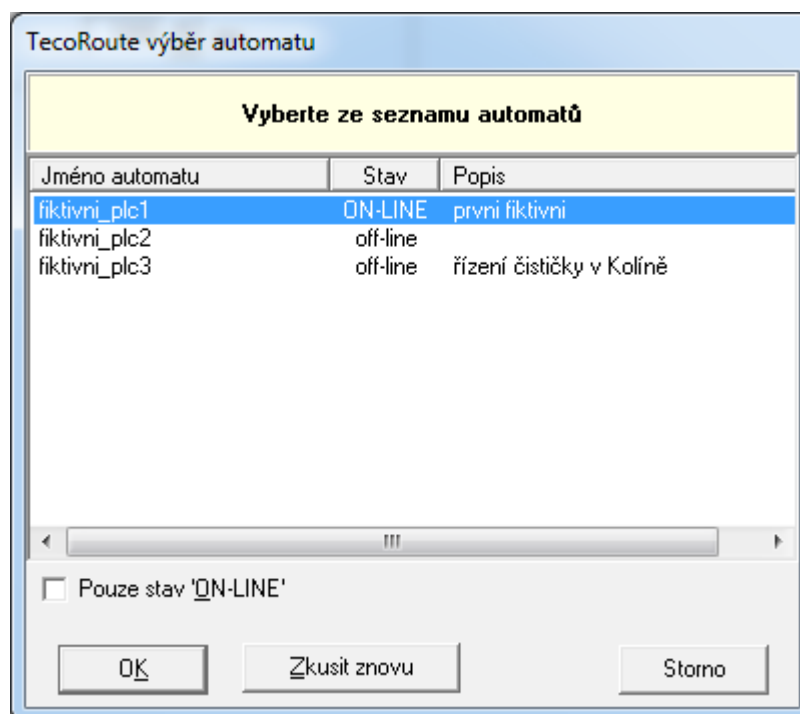
After selecting the PLC it is needed to press the button "connect" („Připojit") in the logon dialogue box. Further work with the Mosaic environment is the same as for all other connection methods (serial, USB, Ethernet).

Editing the user/application program in the PLC

When you edit the application program via TecoRoute it is necessary to bear in mind that this is a remote access, where the transmission route is little bit risky of failure of its technical nature.Each data packet sent from the Mosaic into the PLC system travels the Internet through several routers and also the stability provided by the Internet connection provider plays its specific role (both on the side of the Mosaic and on the side of the PLC). So the failure of a transmission route may occur even though the TecoRoute server is running continuously without any failure.

If the route failure occurs during the loading of a new program to the PLC and the online changes of the program are not turned on, it may happen that the PLC will remain in the HALT mode, and will not have the valid application program in the memory. In other words, the PLC will stop the control of the technology and will not be able to do it until the entire application program will be loaded into the PLC again. This may cause a serious problem especially in cases when the connection drops out for a longer period. For this reason, it is recommended to use the online changes of the PLC program.If the application program in the PLC is reloaded with the online-enabled changes, then the PLC control the connected technology during the recording of the new programme (in accordance with the original program). Only after a whole new program is loaded, the PLC switches from the old user program to the new one.Therefore, if the transmission route failure occurs during the load-

ing of the new user program the PLC proceedings is not stop and the PLC will continue to control the technology according to the original program.

5.2 Web page browsers

TecoRoute service can also be used in the case where it is necessary to browse the web pages stored in the PLC from the browser.

In order to use the service, the user and PLC must have a valid registration on the TecoRoute account .Furthermore, it must be connected to the service currently PLC (must be online).The user must be authorised on the account to access the PLC.And he must be allowed to use the service „browser“.

First it is necessary to subscribe the browser to the TecoRoute server. Enter http://route.tecomat.com:61682/ in the address bar of your browser. Then the logging dialogue to the service pops up in the browser.

The meaning of each field is as follows:

- **The user name**
  ◦ user name to sign in to TecoRoute
- **Access password**
  ◦ user password to sign in to TecoRoute
(access name and password must be registered on the account TecoRoute)
- **PLC name**
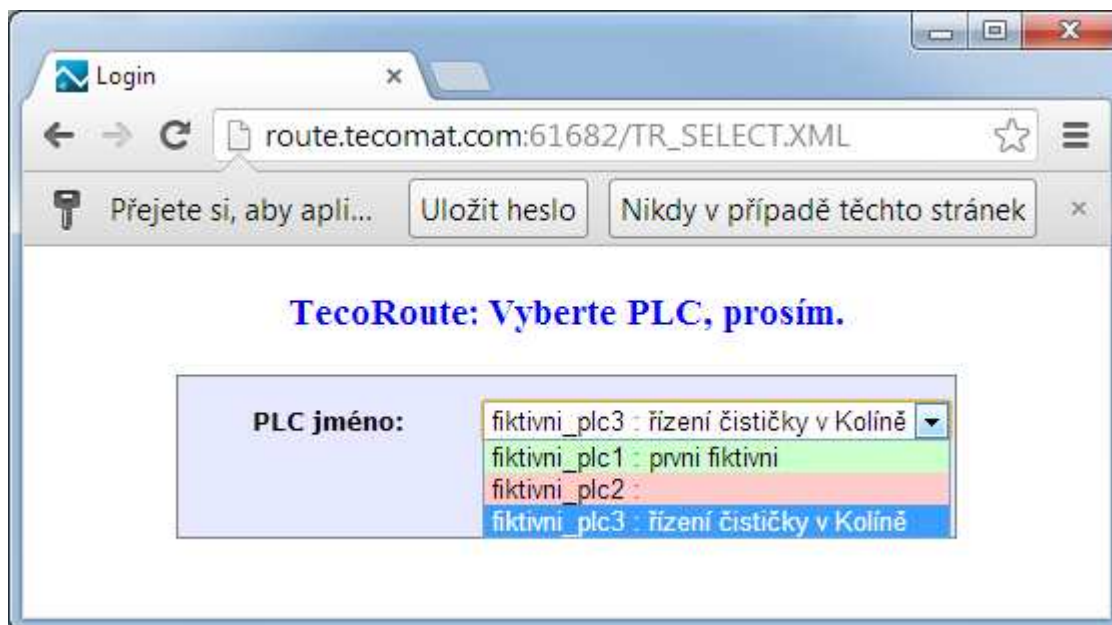 ◦ the name of the PLC registered in the account TecoRoute


If the PLC name is not entered ("PLC name" field is left empty) then the server services will offer the next page with a list of PLC systems, which are registered for the user to choose and log on. Dialogue with PLC looks as follows:

Green highlighted line means that PLC is currently connected to the service (online).Red highlighted line indicates that the PLC system is not currently available through TecoRoute (it is off-line, not connected).The currently selected PLC system is highlighted by blue.

Clicking on the name of the PLC the system you want to connect is selected.
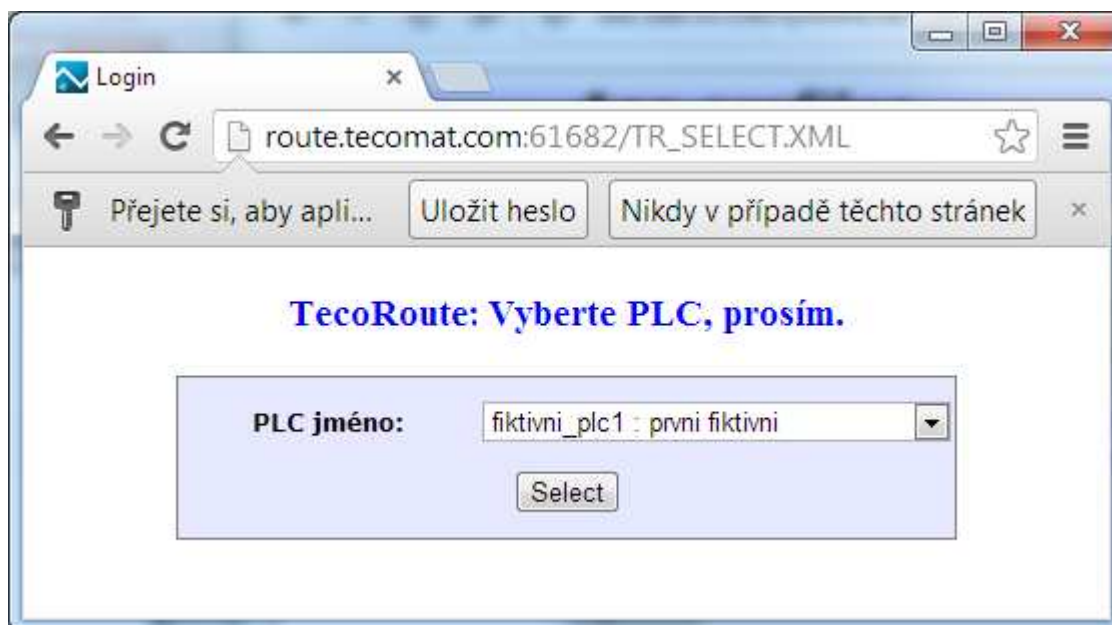
After pressing the button "Login" the connection to the selected PLC is proceeded and login dialog box of the internal web server of the target PLC appears (the same one as in the case of logging that PLC from its local network). From this point, the browser is redirected to the web server of the selected PLC.

Name and password in this dialogue box must match the setting done by WebMaker tool in Mosaic development environment.
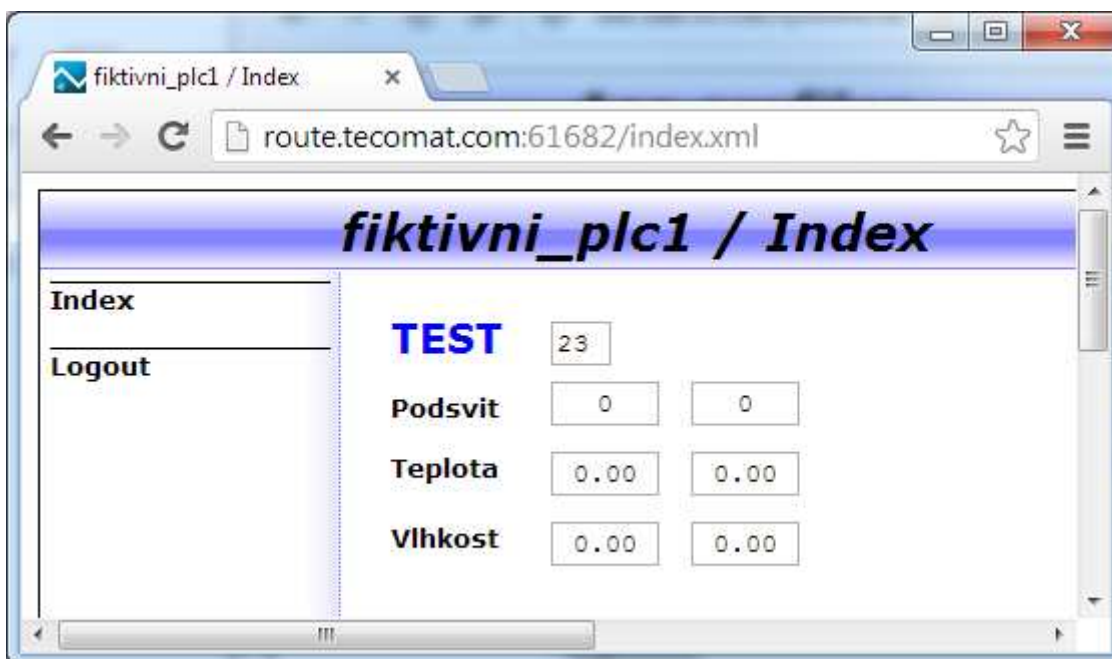
After logging on to the web server of PLC its home page appears. Now it is possible to work in the same way as in the case of a browser connected directly in a local network.

For comparison we show how the same web page looks when you access it by the browser from the local network PLC.
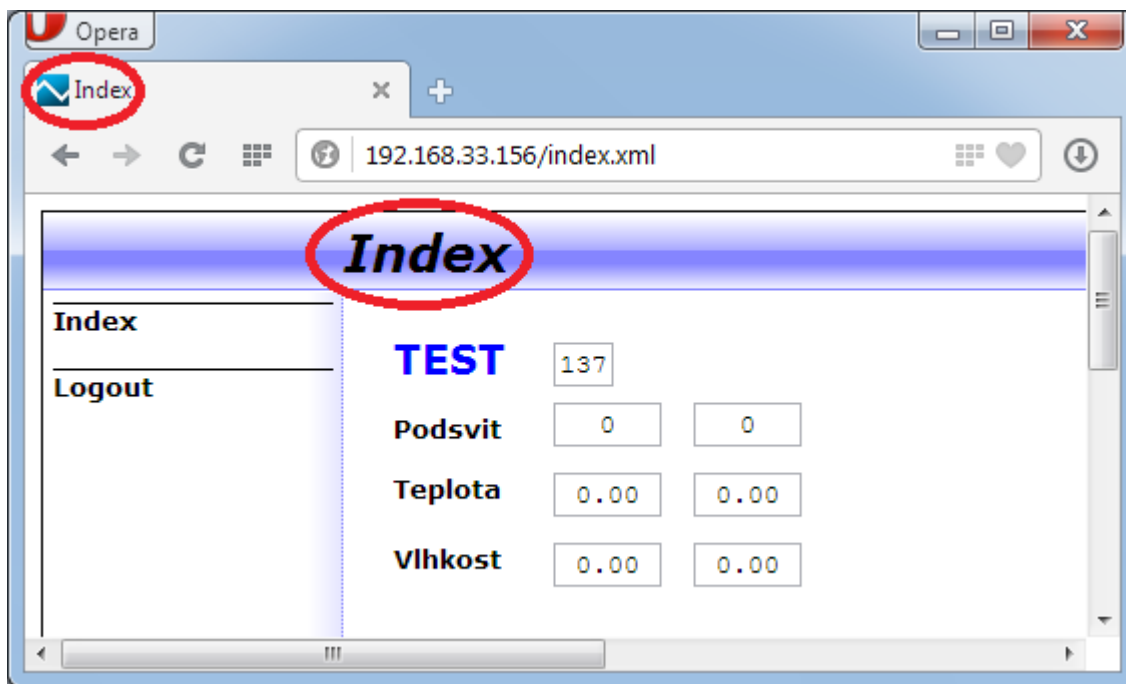
We see that the only difference between that two pages is in the name of the page that is listed in the browser and in the caption of the page (marked in red). In the case of access via the TecoRoute service the name of the PLC is automatically added in front of the name of the page. That is for unambiguous identification of the PLC system to which the browser is currently connected by the remote access.

Access restrictions of the browsing via TecoRoute

• Maximum 2 browsers can look into one PLC Foxtrot through TecoRoute service at the same time

• Images from web cameras (IP camera as the WebMaker object) are not available through the TecoRoute service.

The name and the password for the login from the browser

To sign in to TecoRoute each user has assigned unique user-name and password. If the same name and password is also entered as an access settings for the web pages in the PLC (in the WebMaker tool), then the user will be logged on at the same time both to the TecoRoute service as well as to the PLC internal web site. This eliminates completing the next logging dialogue on to the Web server in the PLC.In this case it is necessary for that user to have only one (or few) PLC set for access through TecoRoute, the application usage was restricted only to „*browser*" and his role was set to "user" („*uživatel*") (that is, someone who can make changes on the account TecoRoute).This option is primarily intended for connection of end users (operators of the equipment controlled by PLC system). In other words, if the company has established an account on the server TecoRoute services can offer access to the PLC via this account as well as for their end customers.

Name and password that should be used both for logging on to the TecoRoute service and for logging on to the PLC can have a maximum of 10 characters and may not contain the characters of

national alphabets (only ASCII characters)This restriction is due to the capabilities of the current Foxtrot types of central module.

The PLC control via the web interface

Setting the variables in the PLC using a web server/web browser, it is also necessary to remember that, for remote access through a TecoRoute service the failure of connection may occur. The user/application program of the PLC must be written so that any variable settings from the web interface will not damage the controlled when the connection failure appears.

For example, if you're going to turn off the light (which someone forgot to turn off) from the browser when you leave the house, the failure of the connection in the minute you turn off does not cause more serious problem. But if we control filling of the bathtub, the connection failure occurred after the opening of the valve and the user program of the PLC do not check the overflow of the tub, the connection failure can cause more serious damage.

6   THE TRIAL PERIOD OF TECOROUTE SERVICE

TecoRoute service is now running in test operation. . The aim is to test the stability of the service in real conditions and get a first feedback from users.Users of the Tecomat PLCs have the chance to try and decide whether it is convenient for them to use the service during the trial operation of the service. During the trial operation, the use of the service is free of charge. The end of the trial operation will be announced by e-mail to administrators of individual accounts at least one month prior to its termination. The end of trial period is expected at the end of the IQ/2014.All data entered on the TecoRoute server during the trial operation of the service (user name and password of the PLC, the names and passwords of users, ...) in the case of interest will be seamlessly transferred to the ordinary operation.

TecoRoute service is planned as a 24-hour/7 days service with reserved 4 intervals per year for maintenance services. Maintenance service plan will be published sufficiently in advance so as to shut down the service does not cause problems for users of the service. During the trial period, it is necessary to count with the possibility that it may occur rare unscheduled service outage.