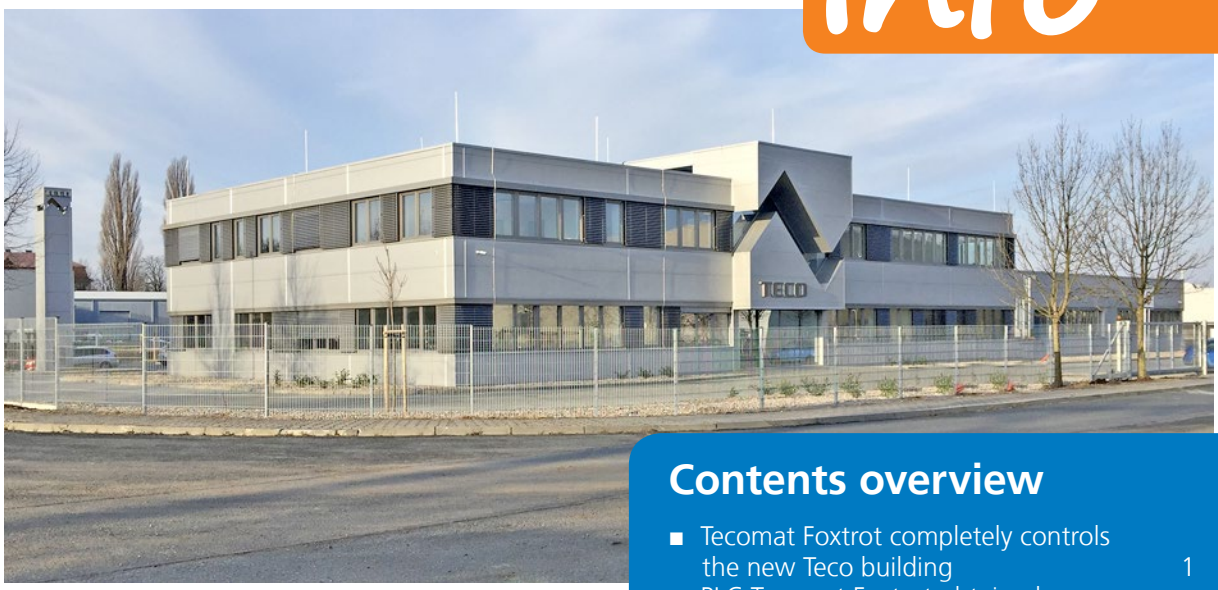
Newsletter for Teco system users

March 2018

39

TECO Info



The new Teco a. s. building is built in the industrial area on the eastern edge of the town of Kolin.

Contents overview

Tecomat Foxtrot completely controls the new Teco building

We have moved!

In 2017 we have built our new Teco building on a green field in the Staralka industrial zone, on our own land, for our money and without any subsidies. We managed to do that in total of eight months. After two years of designing, we have chosen a construction company Navlacil from Zlin. Excavators took their first dirt bites at the end of February. The final building permit inspection took place at the beginning of November and the relocation of the entire company took three weeks, plus one-week production interruption. That is all we have to say about the timeframe of the construction project and subsequent logistics opera-

tions which allowed us to start the next quarter of the existence of Teco a.s. in our new building fully equipped with new technologies.

Architecture and structural design

The pure purpose oriented two-storey building was divided by the architect Irena Schusterova into four parts – the manufacturing section and warehouses, all located at the ground floor towards the right side and the training centre, sales and purchasing departments and dining room with meal serving section on the left. The development and administrative sections are on the first floor.

These four operating sections, which may be separated and individually closed, are connected by a spacious communication centre whose façade is the visual dominant feature of the entire building. Inspired by the two-dimensional logo of the company using the typical motif of a periodic signal provided a third dimension which passes through the entire width of the building, from the north to the south façade.

The ground plan of the main building represents a rectangle 21 m wide and 60 m long, the longer side facing the east-west direction. The two uneven floors of the building are built above this rectangle. Flat roofs cover the entire building. The simple concept of the two-storey unit is disrupted at approximately one third of the building' length by the "indentation" representing the Teco, a.s. logo with a glass-fitted staircase, to which partially roofed terraces are connected. This highlights the main entrance to the building. The "indentation" in the mass of the building follows a line of striped windows equipped with outdoor blinds that run around the entire perimeter of the building and provide natural light and ventilation for all rooms in the building. The entire building is wheelchair-accessible. In addition to the staircase, the first and second floor may also be accessed by an electric lifting platform. The main entrance to the building leads to the access road which runs around the entire facility offering 50 parking spaces and all the way to the rear entrances which lead to the material receiving section, ‚goods shipping section and meal receiving area which are served in the dining room. The building rests on reinforced concrete structures

Fig. New Teco a.s. building in Kolin. View from the south; source: Teco, a. s.

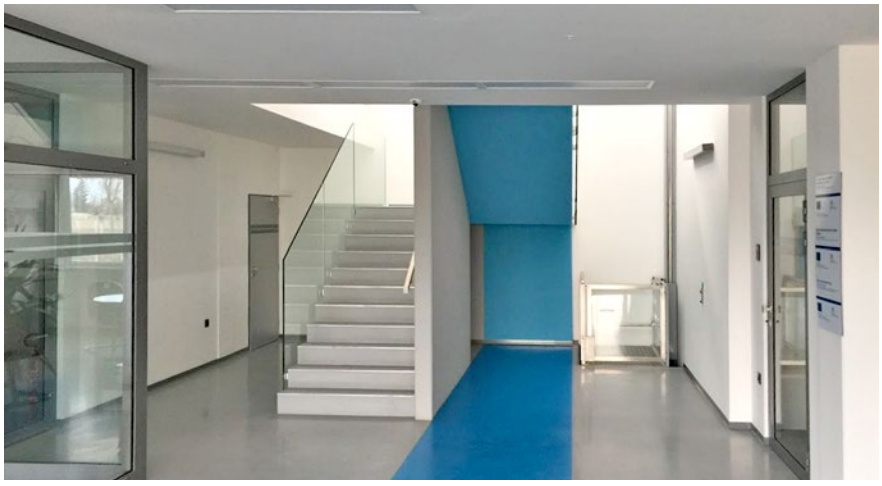


Fig. Entry hall connecting all four and wheel-chair accessible operation sections of the building;

filled with panel system made of light insulation materials. Sheathing around the building is made of PUR panels. The inner facings and partitions are made of plasterboards fitted with plastic windows equipped with triple glass panels. The inner and entrance doors are made of aluminum and are also fitted with glass panels. No bright colors have been used to draw unnecessary attention. The building color pattern has been designed using silver and grey shades and simple, sharp and clean lines which run around the entire building. These lines also penetrate the interior of the building where a colorful logo design is used. The logo is placed on a blue area on the floor in the entrance hall and on the under ceiling of the staircase. The interior radiates pleasant light thanks to multi-colored floor designs used in offices.

This has created a very compact, visually clean object, firmly and naturally anchored into the Polabi region. This is meant literary. The building is supported by 56 steel reinforced concrete columns and it is connected to twelve 125 m deep boreholes through which water circulates. Therefore, the building is connected to the ground not only statically but also through the so-called „energy concept".

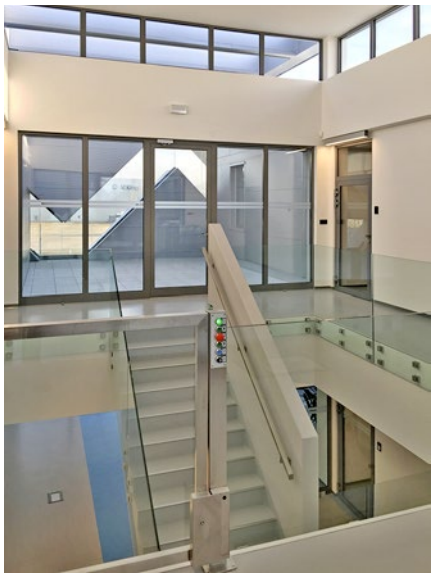


Fig. The staircase and the lift run through the communication centre of the building, which is fitted with glass panels and illuminated from all sides. Two outdoor terraces hidden behind the company logo on the façade are connected to the floor.

Energy concept

The energy concept is another unique specialty of the building. The project has maximized effective energy management. Teco is not only the investor but also the operator of the building, so naturally, there was a common interest to find an optimum solution between investment and operating costs. For example, the calculation for higher cost of ground drilling also included reduced cost for archaeological survey, which would have been higher if shallow earth collectors were used. In addition to the obvious need for thermal insulation of the building sheathing, low-temperature floor heating system and ceiling cooling systems were selected. Therefore, this concept allowed us to avoid using any air-conditioning units inside the building.

In winter, 10 °C warm water comes from the deep earth boreholes. A plate heat exchanger transmits the heat to the heating circuit, where two PZP heat pumps increase the temperature in the accumulation tank by approximately 13 °C reaching the final temperature of 23 °C. From here the heat energy is distributed via control valves to individual rooms and in line with the actual settings. Based on the actual needs the pumps switch to a higher temperature setting and heat up the service water storage tank to approximately 50 °C.

In the summer, the water also comes from the boreholes at 10 °C, but this time it is considered "cold". Through the control valve the water goes to the ceiling cooling system in individual rooms or to the fan-coil units, if no under ceiling are designed in the given room. The cold water cools the interior of the room and then goes back to the 125 m deep boreholes to cool down again. In doing so the water thermally "revives" the boreholes so that the basic heat may be used again during the upcoming winter. To achieve further energy savings, a ventilation system made by Atrea equipped with central recovery unit has been installed throughout the entire building. During winter this system returns the heat back to the ventilated area and vise versa – it returns the cold during the summer. Further in winter, the system also uses the heat generated by the servers and by the SMD component soldering technology. The actual measurement and control of this heating and cooling system is fully handled by Tecomat Foxtrot made by Teco a. s.

Fig. Heating and cooling circuits before insulations; two heat pumps, two large accumulation tanks, air compressor, central recuperation unit and two wide fields of the control system cabinets and high-voltage circuits were placed in the energy-centre (energocentre); source: Teco, a. s.

Rainwater management

Below the building there are six rainwater tanks with a total volume of 100 m³. The water from here is used throughout the entire year to flush toilets and in the summer, it goes to the irrigation system in the garden around the building. Only water supplied to regular faucets and showers comes from the public water distribution system.

Electric power and electric wiring

The new Teco building uses only electricity. No combustion process is used for heating or cooling! All electricity comes from a 150 kW transformer station. Electricity is mainly used for heating, cooling and ventilation and it also powers heat and circulation pumps and fans. It also powers the typical systems. Only LED lights are used for illumination. Even in the public lighting posts around the facility. Electricity also powers computer technology and the newly acquired production technologies used for electronic components soldering, mechanical machining and for laser inscriptions which are used to burn text on plastic parts. The installation of photovoltaic panels and battery storage was not done during the first

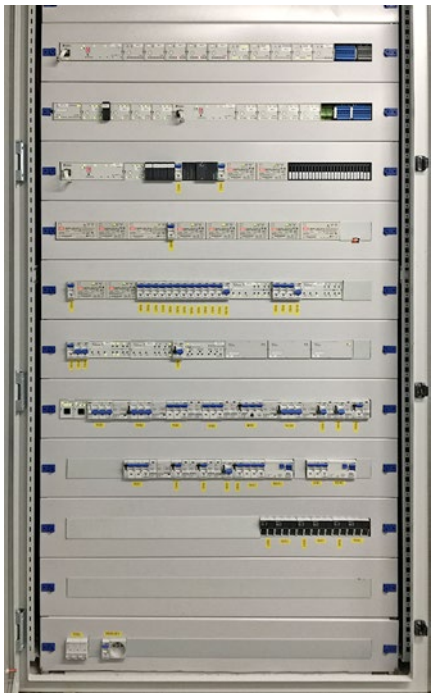


Fig. Complete Tecomat Foxtrot control system including power circuits and online power consumption measurement in the main cabinet in the energocentre; source: Teco, a. s.

implementation phase but it will be done in the next phase. Electrical wiring and installation is fully controlled by Tecomat Foxtrot. All high and low voltage systems share data connection. Sockets, switches, blinds and thermostats are connected to more than twenty branches on the CIB installation bus.

Control relay modules together with circuit breakers and protectors in secondary cabinets are located in each of the four sections of the building. Tecomat Foxtrot also offers a connection to the access system and a security switchboard in the building. The security switchboard is connected to the central securty desk. There is also a camera system monitoring the outdoor area. The building has been programmed according to the initial project requirements and ready for any future operational changes and according to various combinations including logical conditions and measured data, for example energy consumption.

Ing. architect Irena Schusterova, Ing. Jaromir Klaban, Teco, a. s.

And what the company that handled the electrical installation says about the project?

We have asked Radek Cerveny from ELEKTRIKABRNO s.r.o. which handled the electrical installation directly.

„At the beginning of the last year, I was offered a participation in a tender focusing on electrical installation including Foxtrot control system into a new manufacturing plant of Teco a.s. Because we are the integrator of the Foxtrot system, and we have built a great personal relationship with the manufacturer over the years, the offer for the installation pleased me a lot.

Finally, we were selected to supply a part of the control and MaR system.

The fact that the construction project was planned for eight months only, and of course there were various delays, was not a good thing because it created several complications during the implementation process, sometimes even very complex problems I must say, but thanks to our common interest and personal relationship we have managed to solve everything to the satisfaction of all involved parties.

The overall management of the project was prepared by Tecont and even though the project showed signs of a bit different approach than we are used to, I must say that I liked the overall design and the detailed implementation documentation. As expected, the designer included all the technologies in the building and entrusted their control to the superior Foxtrot system. I do not want to list what Foxtrot is controlling here, but I was also interested in one thing. A waste heat is produced during soldering applications, which would be wasted without any benefits. Here, even this detail was addressed and the waste heat is used to help the system to heat up the water in the energocentre. I would like to stop here for a minute and talk about the energocentre in the new Teca building. It is practically the only room dedicated to machine parts and technologies used in the entire building.

In the original project the energocentre was designed with smaller dimensions but they were increased during the construction to make sure that all the technologies actually fit in this room. It finally turned out that even the increased spaces are still rather tight for all the technology, but there was no additional space available and the location of each component in this room had to be carefully thought out and coordinated with all professions. Even so, it was not easy to go through all the piping, fittings and air-conditioning ducts with the cables of the connected technologies to make sure that the cables are installed within a reasonable distances and look presentable at the same time. The limited space of the energocentre also surprised us just before the final building permit inspection where many professions gathered in such a small space, each claiming completion of their job as the priority, which occasionally, created comic situations. Moreover, during the installation there was a need to manufacture distribution cabinets with control system combined with power components. The supplier of the wiring installation did not have that much experience with such cabinets so he needed to find a way how to solve it. We have offered a non-standard solution and installed the part with the control system. The power part was completed later by the power supplier. This was done successfully thanks to great coordination between all involved parties. Although it was difficult at first to explain why we want to bring the cabinets to the production plant in Brno and why we do not want to bring all the workshop equipment needed for the manufacture of these cabinets, including the equipment that performs the inscriptions on terminals and conductors to Kolin, but eventually everything went well. Finally, I have to evaluate the entire event from the perspective of ELEKTRIKABRNO s.r.o. as a very successful project and I appreciate the personal approach of all the people involved in this event where the coordination of the technological professions was overseen by the investor alone – Teco. The construction was very specific and many milestones which had to be addressed operatively during now the construction process but thanks to above-standard approach of all people and companies involved I must say that the entire construction project was a great success.

In conclusion I should point out that the new building of Teco, a.s. also serves as a reference project for the installation of Tecomat Foxtrot system where all interested investors, developers, architects, designers or representatives of universities or colleges are now invited to see on their own and to evaluate the actual functionalities offered by smart industrial buildings – all under full operation. ■

PLC Tecomat Foxtrot received UL certification

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Under the scope of our activities performed abroad and based on our entry to the North American market, the first part of Tecomat Foxtrot products have successfully passed the UL certification. Therefore, these products may be used in projects or machine/equipment produced by Czech and foreign companies for the given market. ■

The following products are certified under the following registration number E486762 :	The following products are certified under the following registration number E486191
CP-1000, CP-1003, IB-1301, OS-1401, IR-1501, IT-1602, IT-1604	CP-1970, C-OR-0011M-800, C-JC-0006M, C-IB-1800M, C-DM-0006M-ILED, C-DM-0402M-RLC, CF-1141, C-RC-0003R-Design, C-RQ-0600R-CHT. C-WS-0400R-Logus, C-RI-0401R-Logus, C-OR-0202B, C-LC-0202B, C-JC-0201B, C-DL-0064M, C-IR-0203S, C-WG-0503S, C-IT-0908S-PNP, C-WS-0200R-Logus

Tecomat systems expanded its portfolio of IP protocols with MQTT

MQTT is one of the abbreviations which is today used almost as a equal term to IoT – Internet of Things. It is not a new protocol because it appeared already in 1999 due to practical reasons relating to the need for practical solutions in terms of telemetric data transfers.

Today, this abbreviation or specification takes up half of the name. MQTT, formerly known as Message Queuing Telemetry Transport and today referred as MQ Telemetric Transport. It is a simple and easy to use protocol to share messages between clients – the Publisher (data sender) and the Subscriber (data recipient) through central point – Broker (handles data exchanges). It was designed by IBM and today it is backed by the Eclipse foundation and recently it was standardized under OASIS. Thanks to its simplicity and user-friendly approach it may be easily implemented into devices with „small" processors. ■

Fig. Graphic visualization of function blocs fbMQTT Subscriber and fbMQTTPublisher ready to use in CFC editor.

Why did we go for the MQTT protocol with Tecomat systems? For Tecomat systems which, for very practical reasons, are oriented towards the high performance central units intended for processing tens and hundreds of parallel real-time tasks in the order of tens or hundreds of milliseconds since the start of the initial measurement until the release of the control command or regulatory action? The answer is simple. Because the MQTT protocol exists.

This protocol is supported by many cloud services and the IT world requires data to be supplied through this channel. And the IT world wants Big data. It has prepared terabytes, petabytes, exabytes or more in the form of data repositories. The IT world is looking forward to these data and is ready to use technologies to browse through the data and mine the important data. In addition, Tecomat may be connected to hundreds or thousands sensors at the same time.

The time has come that the IT and IoT community can reach for Foxtrot and use it as multiple sensor able to supply and receive large amounts of data and respond clearly and in real time.

Starting with the Mosaic version v2018.1 also library MQTTLib is part of the installation. It contains functional blocks fbMQTT Subscriber and fbMQTT Publisher. ■

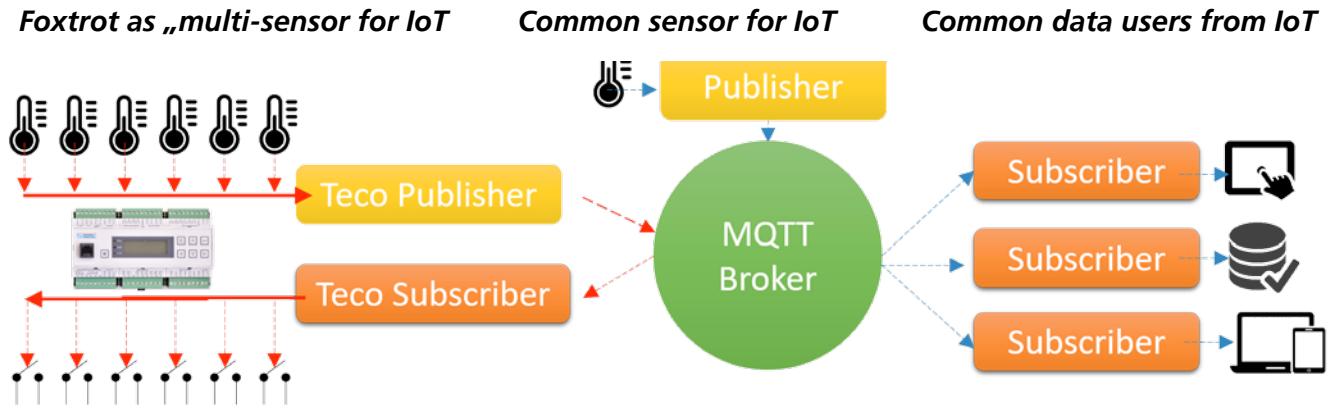


Fig. As for the Internet of things, Foxtrot can play the role of a freely programmable multi-sensor with a Publisher which sends data through a Broker to Subscribers, which however, can also be the subscriber of the data and based on the data content it may perform the appropriate control functions and actions.

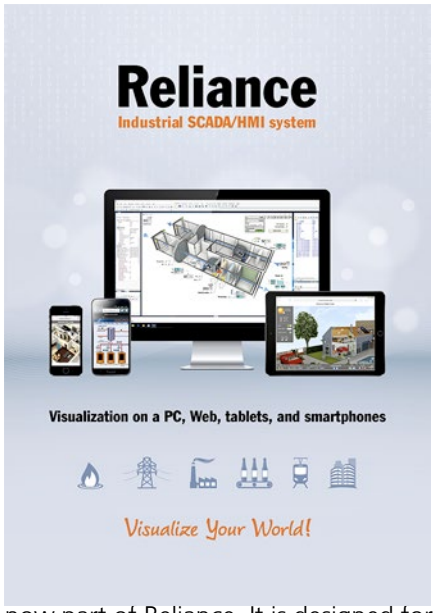
Reliance SCADA in 2017: Celebrating 20 years in business

Reliance is a SCADA system that has been developed by company GEOVAP – a member of Teco Group – since 1997. Over the past 20 years, we have managed to create a successful and reliable system that is used by systems integrators for their projects. The system has been installed in thousands of interesting locations all over the world. Many of these installations can be found on www.reliance-scada.com.

The Reliance SCADA system has a native communication driver for all types of Teco PLCs. This communication driver is free of charge and is part of every Reliance license. Thanks to this, it is very easy and fast to connect Reliance to any Tecomat PLC (Foxtrot, TC700, …).

2017 was the most successful year in the history of the Reliance SCADA system. Compared to 2015 – the previous record year –, our annual sales volume increased by 33 %. What is more, many new functions, technologies, and communication drivers were added to the system. The most important changes include the addition of OPC UA (both client and server), the implementation of new communication drivers (KNX, DNP3, Motorola, Mitsubishi, Sevbus, Omni), and many other enhancements. Last year, our systems integrators performed a lot of interesting installations of Reliance SCADA. Some of them are described in detail on the Reliance website – www.reliance-scada.com. The most interesting ones were awarded as the best installations of the Reliance Success Story Awards 2016 competition.

We are working on a new version of Reliance – 4.8.0. As security requirements for SCADA systems are increasing at a rapid pace, this version has a higher security and encryption level. In addition, IoT Communication Driver is



now part of Reliance. It is designed for communication with any IoT devices via the LoRa and Sigfox protocols. A driver for the MQTT protocol will also be available. Many other enhancements will be implemented in version 4.8.0. Once it is released, these changes will be described in a separate article.

This year, we are planning to implement other native drivers for frequently used types of PLCs.

The success we achieved in 2017 is largely due to the hard work of our distributors and all the companies that use Reliance to visualize industrial processes. Thank you. We are very happy with this result. It is our commitment to the future – we'll do our best to make the system even better.

We're looking forward to cooperate with you! ■

Internet of Things – Tecomat WEB server added with API

What is API? According to Wikipedia: „API – an acronym for Application Programming Interface, is used in informatics which indicates an interface used to program applications. This term is used in software engineering. It is a collection of procedures, functions, classes or protocols of a certain library (but also of another program or core of an operating system) that the programmer can use. Therefore, it is a concept and function that originated in the world of IT and solves or simplifies

data exchange between applications that may run on PC, on servers or on mobile devices. And because Tecomat systems, although they have originated in the industrial automation field and worship the IEC 61131 standards, are fully integrated into the Internet and follow IT industry compatibility, after the implementation of the MQTT protocol in 2017, Tecomats have made further progress and since the beginning of 2018 they came closer to supporting IoT. Starting with the firmware version v10.4 Tecomat Foxtrot and TC700 PLC server is equipped with API interface called TecoApi, which provides services allowing you to read

and write data from/to a PLC system using HTTP protocol. Data are provided in JSON –JavaScript Object Notation format. JSON is a text-based format, completely independent of language which is used for the data exchange. You can find more details about the JSON format at http://www.json.org/json-cz.html. To program Tecomat with this function, you need Mosaic environment v2018.1 or higher.

The TecoApi interface is also described in the TXV 005 37.01 documentation, from which we have briefly selected the principle of operation:

Communication via TecoApi is done via HTTP protocol and it is based on the query/response form. The TecoApi interface provides services allowing you to read and write objects from/to the PLC system. An object that is available through TecoApi, may be any variable in the PLC program. All variables which are to be visible as objects as well as object through TecoApi interface must be marked with a directive {PUBLIC_API}. The PLC project must contain at least one website created in WebMaker and WebMaker must be used to set at least one access name + password that will be used by TecoApi service.

Although there are faster transmission available in the PLC and industrial automation world, in the world of IT or rather in IoT the API interface is largely used expanded and standardized even for communication with single-purpose devices such as weather stations, smart thermostats, smart light bulbs, various alarms, door chimes, etc. where the volume of the transferred data is relatively small and transmission and processing delays are not critical. Today Tecomat plays similar role in the world of Internet of Thinks which uses API interface to mediate any input and output signals coming from the controlled object, or based on the received data, Tecomat may execute a control activity/action which may be programmed by the user.

By offering this feature Tecomats became one of the first programmable automatic devices in the world with natively built API interface and moved even further their traditional boundary in terms of communications universality. Tecomat has become a significant player – a node – in network solutions used in Smart City and Smart House solutions and, of course, in any application in the Internet of Things and industrial automation which follows the Industry 4.0 trends including any other field where several diverse devices and sensors must be interconnected and must communicate with cloud databases while ensuring functional independence and autonomy of these devices in the absence of Internet connection. ■

BOSE SoundTouch and KODI – another multimedia devices integrated into Tecomat Foxtrot system

In the previous TecoInfo 38 newsletter we have brought you information about the integration of audiomatrix DN-508MX made by DENON PROFESSIONAL. This system may by controlled by Foxtrot via LAN using IP protocol and allows you to select in each of the 8 output zones between 5 inputs signal sources and 6 microphones. This solution is especially useful for hotels, for audio technologies used in congress halls, but with respect to the cost that is today comparable with advanced smart phones, this solution has become interesting even for family houses.

Fig. The same wireless technology is used by other BOSE devices. For example it is used in the independent amplifier SA-5 which may be combined with any speakers or SoundTouch 300 soundbar and an elegant CD player

As far as multimedia system support is concerned we went even farther this year. We have prepared libraries compatible with Foxtrot and used by BOSE SoundTouch and by popular multimedia player called KODI. Foxtrot allows you to use the program to control the „volume“, mute, „play“, „pause“ or select the number of the played channel. Part of the intention of this selected approach was to retain controllability of the multimedia device using the original native application, or web interface where Foxtrot controls, in parallel only, the above mentioned basic functions.

Native applications evolve over time and new versions are created. Foxtrot does not want to deprive users from these new features so we leave the basic setting or resource allocation to individual channels as recommended by the manufacturer.

BOSE SoundTouch is currently the latest, but the market has already seen a multiroom audio wireless system meeting the highest quality requirements. BOSE's offer consists of several types of mutually compatible devices. It is mostly a „combo“ with a speaker, integrated amplifier and WiFi or LAN client. Therefore, each SoundTouch device uses a direct connection to all audio sources in the local network and to the Internet via open protocols. The device does not need any ntermediating unit, neither it needs any initial investment into a specific system – as other systems require so. Playing from Foxtrot may be achieved using only one SoundTouch device. Another advantage is that it is equipped with a Bluetooth interface and it is portable. Therefore, it may be used as a functional Bluetooth speaker when traveling for example, for your smart phone. Simply plug it directly into 230 V socket.

Another audio device supported by the new functional library block is the multi-platform KODI player. You may find this player virtually in all types of devices which use display and in

all operating systems. Earlier we have introduced XBMCLib library in Mosaic which is used to control this player – formerly known as XBMC player. We have extended the library with a functional block where you may enter playback command not only for one song or a video clip, but also a command to play the entire playlist. Now we are introducing KODIAudioLib library, which is a complementary addition to the BOSEAudioLib library. It supports implementation in iFoxtrot application and it is optimized to play audio sources, in particular, Internet radio sources. ■

Fig. Small players, nowadays already with multi-core processors and with implemented KODI player may be connected to both LAN network or through WiFi. You may used them to built an interesting multiroom assemblies controlled directly by Foxtrot.

New library blocks for DALI2 used for temperature chromaticity control

Recently the DALI – bus standard specializing in the control of addressable electronic ballasts has been updated and was given the name DALI2. In principle, it is a protocol innovation, all rather the protocol was supplemented with new commands. These commands take into account the needs not taken into account by the previous definition. Three channels are needed to control color (RGB), two channel to control chromaticity temperature two (cold/warm white), where originally each value required a separate address, which in turn reduced the number of required ballasts connected to one DALI line. That is why multichannel ballasts/converters with one DALI address appeared on the market . These are called Type 8. Specification of the physical layer of this bus remains the same so DALI2 works in Foxtrot with the existing CIB to DALI converters: C-DL-0064M and C-DL-0012S and the innovation takes place only at the SW level. The innovated library is called DALILibPlus, and contains some revised and two new blocks for multichannel converters with one DALI address type 8. These are called fb_DL_QueryColorTemperature – used to read the parameters from the converter and the fb_DL_SetColorTemperature where in addition to the light intensity you may now set temperature of chromaticity – Tc. Just to clarify we would like to point out that we have tested the function using converters made by Helvar. Other types of converters, for example RGB, will be added gradually. ■

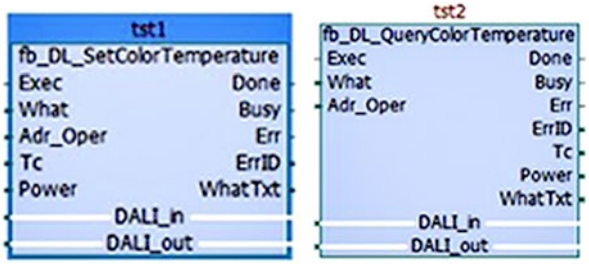
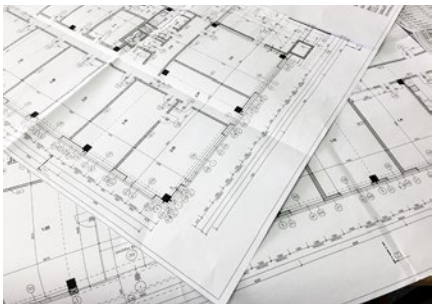


Fig. Picture for programmers – functional blocks from the DALILibPlus library used for light chromaticity temperature control.

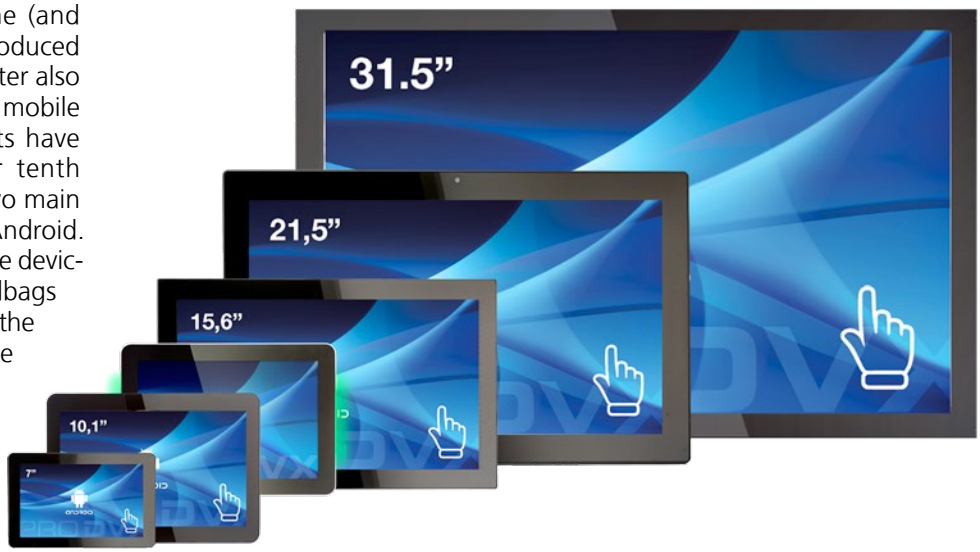
Fig. Temperature of light chromaticity is a debated topic today. Teco a.s. is a partner participating in pilot programs dealing with the control of public lighting systems including testing of light chromaticity temperature in open spaces. Teco provides own dimmers C-DM-0006M-ILED which control the current directly in power LED chips.

We increase our technical support

It is known fact that Teco a.s. provides a broad technical support including extensive documentation, email support, answers to various questions as well as over the phone support. In the last summer we have extended our team and since September 1 we have added two addresses support@tecomat.cz and support@tecomat.com to our mail support, to make sure that your questions reach the responsible party quickly and your problem is solved as soon as possible while taking into account the current work load. Therefore, we would like you, the users, to use this email address. ■



New line of wall-mounted graphic touchscreens 7“, 10”, 15 “, 22”, 32”



Ten years ago the first iPhone (and also Tecomat Foxtrot) was introduced to the market and a little bit later also the iPad tablets. Today, these mobile devices sold on these markets have reached approximately their tenth generations and settled for two main operating systems. iOS and Android. During this time these incredible devices took over our pockets, handbags and briefcases and almost over the entire world’s population. Huge increase in their functionality and performance made them an equivalent competitors to wall graphic panels that were considered privileged products made only by several brands and which entered the domestic automation market from the professional field of multimedia and home theaters. The market began to offer more or less functional wall holders which tried to combine mobility with a sturdy wall holders offering battery recharging functions.

However, experience of users who dedicated their lives to the control of their houses only from mobile devices demonstrated that it may be sometimes impractical, and therefore, certain users prefer touchscreens firmly fixed on a wall and equipped with permanent power supply connected to the household network. We have tried to accommodate these users and included in the assortment of our goods a comprehensive line of touchscreen panels of different sizes named APPC, which stands for Android Panel PC or rather Android Tablet PC. How these „de facto“ tablets differ otherwise than in their sizes? All use Android operating system which offers a browser (version 5) are able to correctly interpret Foxtrot websites with objects created in WEB maker using a technology called „canvas“. These panels offer resolution of at least 1024 × 600 pixels. Starting with the 15“ size they offer full HD resolution which enables them to display top graphics user interface. The main advantage which pre-determines these panels for the use with Foxtrot is the mode allowing the panel to enter a full-screen browser after the panel is turned on and without displaying any command line. That is without any additional text, graphics or frames. Anything created in WEB maker is also displayed on the screen. Configuration of the panel home page, which is linked with Foxtrot via LAN, is done in the service mode where a regular user has no access, so the user cannot exit an application – as it is possible with regular smart phone or tablet is. Panels are powered from 12 V power adapter or they may be powered via the Ethernet, that is based on PoE. Panels may be connected to LAN by a cable or through integrated Wi-Fi. ■

APPC-7DSQ	
Description	7“ Android Tablet PC
Diagonal; resolution	7“; 1024×600
Memory	2 GB RAM; 8 GB eMMC Flash
OS	Android 5
Network	RJ45 + WiFi
VESA 75 wall mount	
Design	Black plastic

APPC-10DSP Quad	
Description	10“ Android Tablet PC
Diagonal; resolution	10.1“; 1024×600
Memory	2 GB RAM; 8 GB eMMC Flash
OS	Android 5
Network	RJ45 (PoE) + WiFi
VESA 75 wall mount	
Design	Black plastic

APPC-10DSQPL	
Description	10“ Android Tablet PC
Diagonal; resolution	10.1“; 1280×800 IPS
Memory	2 GB RAM; 8 GB eMMC Flash
OS	Android 5
Network	RJ45 (PoE) + WiFi
VESA, 75 wall mount	
Design	Black plastic

APPC-15DSQP	
Description	15“ Android Tablet PC
Diagonal; resolution	15.6“; 1920×1080 IPS
Memory	2 GB RAM; 8 GB eMMC Flash
OS	Android 5
Network	RJ45 (PoE) + WiFi
VESA 100 wall mount	
Design	Black plastic

APPC-22	
Description	22“ Android Tablet PC
Diagonal; resolution	21.5“; 1920×1080
Memory	1 GB RAM; 8 GB NAND Flash
OS	Android 5
Network	RJ45 + WiFi
VESA 100 wall mount	
Design	Black plastic

APPC-32DSQ	
Description	32“ Android Tablet PC
Diagonal; resolution	31.5"; 1920×1080
Memory	2 GB RAM; 8 GB eMMC Flash
OS	Android 5
Network	RJ45 + WiFi
VESA 100/200 wall mount	
Design	Black plastic

New line of Touch@Glass panels – glass touch-sensitive wall-mounted controllers in original customizable design

Our new product marked as C-WS-0600R-TG is being introduced to the market as a new product that pushes the Foxtrot system even further towards the individual interior solutions utilizing system installation. After offering the Italian iGlass design in 80×80 and 80×120 mm sizes, we have introduced a new line called T@G – Touch@Glass, which in addition to standard designs also offers individual modifications and various color designs. In the first phase we have prepared for you square controllers with six buttons arranged into two rows each with 3 buttons. Each button is backlit with blue LED. Three two-color LEDs – red and green, are between both rows. Turning on/off and the dimming function is programmable from Mosaic and it may be done for all LEDs which allows the user to assign different importance to each button. The controllers come with integrated temperature and humidity sensor, which allows the user to integrate them it into the heat and cool controlling system overseeing the relevant room. To accommodate multi-control functions we also offer 12-button controllers.

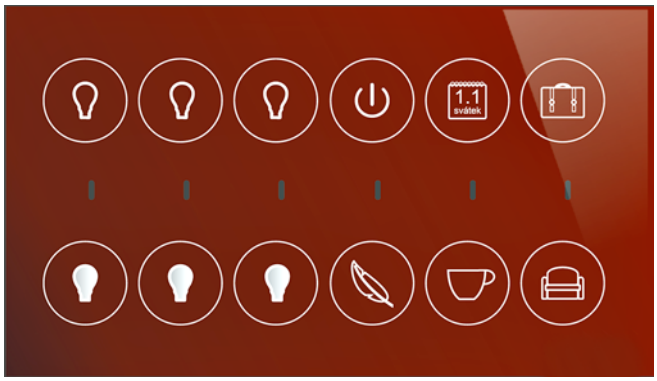


Fig. Glass touch wall switch on CIB bus with 6 buttons is available in 94×94 mm size, double size version is comming soon. Customizable design allows to add the logo of hotel, company or create any OEM version.

These glass touch panels are very suitable for installation into common areas and are usually seen in hotels, wellness or fitness centers, company headquarters or conference rooms. Each interior equipped with glass controller gives the room a very distinctive and unusual appearance. Here the user may select his own graphics. We are also able to manufacture glass touch panels according to your size specifications. For example, we can manufacture a rectangular 8-button or 12-button controller or just 2-button controller on a square glass. ■

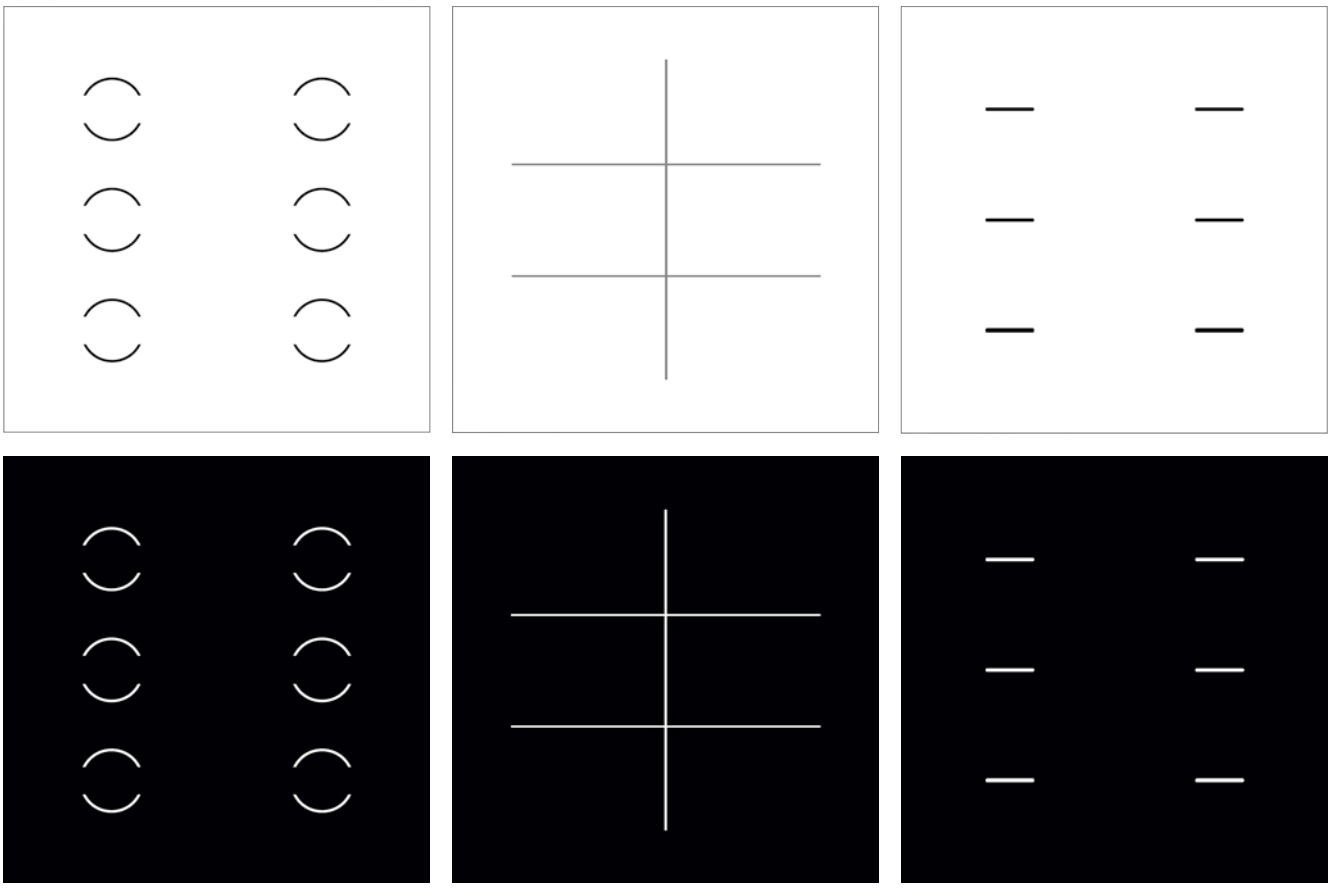


Fig. Picture showing some examples of standard and non-standard graphic designs and background textures that may be modified later. Glasses are exchangeable and may be supplied later.

New wall mounted controllers S-WS-0x00R-Logus

New wall-mounted push-button switches, 1-gang rocker S-WS-0200R-Logus and 2-gang rocker S-WS-0400R-Logus, represent another expansion of the Foxtrot platform in terms of flexibility required by individual investor or project designers. Unlike the established push-button switches the C-WS series, which may be connected directly to CIB®, these start with the letter S and are equipped with passive components with direct contacts from two or rather from four microswitches, one or rather two two-color LEDs and one joint temperature sensor.

These will be certainly appreciated by project designers who strictly prefer central installation into a star where all the switches are connected to the cabinet using multi-wire cables and to universal I/O modules as in systems which do not offer bus solution. Further, these will be also appreciated by investors who want to make sure that if the entire system is replaced, the bus switches on walls do not need to be replaced.

These may also be used as an extension of the C-WS-0x00R-Logus, which as you know, have two universal inputs for general use. So why not use these already installed, for example in one double-frame, side by side. Push-button switches are delivered in compact design with a rear cover and screwless terminal block. They may be used for the entire color and material range of covers or frames and for all LOGUS90 series. Similarly, passive push-button switches are available upon request from OBZOR designs. ■

New line of air quality sensors on CIB bus

The C-AQ-0006R modules are the new generation of air quality sensors designed for interior use. By introducing these new sensors Teco follows the development of sensors made by Protronix and integrates these sensors into the CIB installation bus. They are available in several basic variants and they can be used to measure concentration of carbon dioxide (CO_2) in the air, relative humidity (RH) of air, concentration of volatile organic compounds (iVOC) in the air and the air temperature (T). Built-in auto-calibration functions compensate for long-term aging of key components. If the module is continuously powered during its operation no further calibration is necessary. iVOC sensor is an advanced sensor able to detect volatile organic compounds typically found in the air exhausted by human lungs, gaseous metabolic products of human origin and other gaseous pollutants such as formaldehyde, cooking vapors, vapors from paints, varnishes, adhesives, cleaning agents etc. Therefore, the sensor detects pollutants we usually try to get rid of through ventilation. Basically, the functionality of the sensor is similar to the perception of air quality sensed by the human nose. The sensor output is calibrated as the equivalent of a CO_2 sensor using a range between 450 and 2000 ppm. The design of the module allows you to install it easily to a standard installation box (with mounting pitch 60 mm).

– To measure CO_2 the sensor uses infrared radiation (NDIR) and achieves accuracy ±35 ppm. The sensor is activated within 1 minute and responds to the incremental changes within 80 sec.
– To measure RH humidity the sensor uses capacitive polymer sensor and achieves accuracy ± 3.5%.

Fig. All modules belonging to the C-AQ-0006R series are directly powered from the CIB bus. The sensor dimensions are 90×80×31 mm and are designed to be mounted on the wall.

– To measure iVOC – volatile substances within the range 40 – 2000 ppm, the sensor is able to read with 1 ppm resolution.

Calibration of all sensors is done automatically. ■

1- Wire sensors may be connected to CIB

After we have mentioned in the previous TecoInfo that up to 40 single-wire sensors may be connected to two branches through the module made by Firvena using Modbus protocol, we have began cooperating with this company and find a new module, the C-1W-4000M, which connects directly to the system CIB bus. It has several advantages. One benefit is that the serial channel is not taken, the CIB can be branched out in the installation within the building anywhere which allows the user to place this module at the most convenient/suitable location from which separate cables dedicated only for 1-Wire sensors may be installed. Several of these modules may be placed to CIB bus and therefore the number of 1-Wire sensors may be increased. One C-1W-4000M module is equipped with 2 interfaces and each one allows to connect up to 20 sensors.

The module is suitable for use where the 1-Wire sensors have already been installed and where Foxtrot is needed to add some features to the given installation. The module may be separately configured from the front panel via USB connector using a separate programming utility. On the front panel there are indicators signaling the status of the CIB bus and the two 1-Wire bus branches. ■

Fig. C-1W-4000M module – allowing connection of up to forty 1-Wire sensors to Foxtrot using the CIB bus. You may connect even more and at any locations within the system wiring.

C-RC-0005R and C-RC-0006R – a pair of glass touchscreen controllers with symbol display

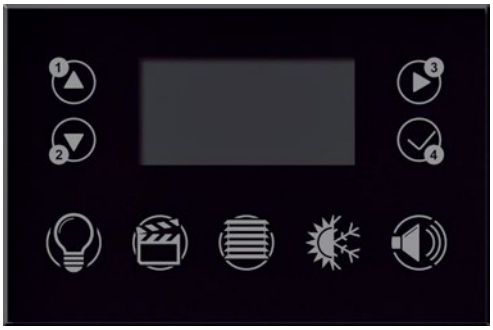


Fig. C-RC-0006R, a version of the controller for regular room

Fig. C-RC-0005R a version of the controller for hotel room

C-RC-0005R is a module on CIB bus used to control hotel rooms with text OLED display fitted in the middle and with nine capacitive buttons inscribed with icons. Five of them represent the usual features you would expect in a hotel room: temperature setting, ventilation/air conditioning control, bell, alarm control, do not disturb feature and calling for hotel services. After the buttons are pushed the system opens and dialogue through the display including four buttons on the sides which specify the request in detail. C-RC-0006R represents a variant of the same controller, but it shows icons which call the dialogues needed to control regular room functions: lighting, activation of previously defined shadow/illumination scenes, interior climate settings – heating/cooling and control of the local audio system. Both versions are fitted with a lighting, temperature and humidity sensor. Both are equipped with two other AI/DI inputs allowing connection of other temperature monitoring sensors or contacts if necessary. Both of these controllers are supplied in black color design and thanks to its size 120 × 80 mm they follow the dimensions of the iGlass touch controls. ■

Module C-OS-0808M – semiconductor outputs and control of two step motors (actuators) on CIB bus

Module C-OS-0808M contains 8 binary inputs and 8 transistor outputs for nominal voltage of 24 V DC. Outputs are especially designed for direct control of up to two step motors. Output functions may be customized and you can also use the transistor outputs even as common binary outputs. On two of the 8 outputs you can activate a signal with pulse width modulation (PWM). Input/output states are indicated by LEDs. Individual outputs allow local manual control using the buttons on the module. The module is fitted with removable screw-on connectors.

Module IC-1701 – control of two step motors on TCL2 bus

The expansion IC-1701 module is connected through the TCL2 bus and it is considered a standard speed PLC module powered by 24 V DC.
It contains 8 fast binary inputs in two groups of 4. They feature adjustable decision level. 4 fast transistor outputs, each connected as a half H bridge may be used as PWM outputs or as outputs controlling up to 2 step motors. Switched voltage may range from 10 V to 30 V DC. All inputs and outputs as well as individual groups are galvanic separated from the input voltage and from TCL2 communication. The status of each input and output is signaled on the front panel of the module. The module is fitted with removable screw-on connectors.

Overvoltage protectors and lightning arresters customized for the CIB bus

BDM-024-V/1

Lightning arrester designed to protect the CIB bus at the interface of LPZ 0-LPZ 1 zones and higher. It is installed right before the protected device. To protect the device against longitudinal overvoltage (CIB– ground protection) and transverse overvoltage (surge) (CIB + – CIB–) a combination of lightning arresters is used – coarse and fine overvoltage protections.

DM-024-V/1

Combined coarse and fine overvoltage protection intended for protection of the CIB bus against pulse overvoltage. To protect the device against longitudinal overvoltage (CIB – ground protection) and transverse overvoltage (surge) (CIB + – CIB–) a double combination of coarse and fine overvoltage protection is used. ■

BDM-024-V/1

DM-024-V/1

We have become members of the National KNX Group

New module and driver for the integration of Foxtrot-KNX, the new power supply for KNX bus.

At the beginning of 2018, Teco a.s. was accepted as the member of the Czech national group KNX as the integrator. In fact, Teco has already been fulfilling this role for several years by integrating its centralized PLC Tecomat Foxtrot with the world KNX distributed via the BAOS module made by Weinzierl. Together with this module a communication driver has to be initiated on Tecomat Foxtrot which automatically and bidirectionally transfers at the background states of all KNX sensors and actuators to or from Foxtrot variables. At the beginning of this year we have been innovating significantly and increased the driver itself which is a part of the Foxtrot application program – if needed or requried. The driver/ functional block is called KNXbin and transfers data in binary form. It may be replaced with the original functional block without any additional modifications to the application program.

The innovation of the connection with KNX is further enhanced by including a new module called BAOS 774 made by Weinzierl into our assortment of products. This module is half the size and currently occupies place as one standard module on the DIN rail. The Ethernet port is in the bottom facing the space where other cables are located, KNX bus remains on top. The third new addition to our assortment is a special /dedicated power supply for the KNX network made by Meanwell which takes the place of 3 modules on the DIN rail. At this size it feeds the KNX bus with up to to 640 mA.

It is now possible to create a very compact core around Foxtrot, which may provide the existing KNX installation with server services, full internet connectivity with freely programmable graphic web interface, logging services or it may add freely programmable features that are not available directly in KNX modules. On the other hand, it is a gateway for Foxtrot through which you can connect any element from the KNX world and which the end customer wants, for example interior design controllers which are only available in the KNX option. ■

Fig. The BAOS-774 has the same data transfer capacity as the previous model but in the cabinet it only takes place as one single module.

Fig. The KNX-20E-640 power supply module is able to supply the KNX network with up to 640mA. Therefore, a full-featured extension of the Foxtrot basic module with the KNX network will occupy a total width of 4 modules in the cabinet.

New power supply sources for DIN rail

We monitor the innovation process followed by our suppliers. We have included in the power source segment 2 new network power sources 24 V DC for DIN rail. Marked as HDR-60-24, it is the 60 W version offering maximum current of 2.5 A and it now occupies space equal to 3 modules. Model HDR-15-24 is the 15 W version offering maximum current of 0.63 A. Both sources are designed for primary voltage 100 – 240 V DC, 50/60 Hz. The stabilized output voltage may be set using the rotating element from 21.6 V to 29.0 V. In addition to smaller dimension and to the extra letter H that has been added to the model name you will notice the difference of the DR-60-24 at first sight thanks to its dark anthracite color. This design also offers other output voltages, for example power for 12 V LED stripes. ■

Smart City – modules for the control of public lighting system ballasts

Tecomat Foxtrot systems are being applied and used in the management and modernization of public lighting systems. It is always about complex solution and centralized management. To turn on and off or adjust the intensity of the light of a particular lamp is one thing but to minimize the consumption of ballasts/converters when you do not use the lightning system is another thing. That is why Teco a.s. included in its the portfolio of modules that may be connected to Foxtrot two new modules. Bus and wireless module, each equipped with a relay resistant to start up current of the ballast of up to 800 A and low-level output used to control dimming ballasts. The bus module is fitted with two such output channels and the wireless module has only one. And why is it a good idea to remove the ballasts at a time when the lightning system is off? A typical public lighting is not under voltage during the day. However, modern lamp posts and public pillars may potentially fulfill many other functions which must work even during the day. Q-EL PRO company develops such lamps and Teco a.s. has become the company's technological partner dealing with the required management. This company came with the idea to integrate cameras directly into the light post right next to the light source. At first sight the camera is hardly seen or almost invisible but it provides a 360 degree shot of the entire area. Another technology that may be integrated into the public lighting system lamp post is an AC electric car charger. In cooperation with another company called Kooperativa, which is the traditional steel column manufacturer, we have prepared a model lamp equipped with an intelligent charger and standard Type 2 socket (Mennekes). The intelligent ability of the charger controlled by Foxtrot is based on the need to control the charging current used by the electric car so the maximum total current assigned to the given branch in the public lighting system is not

Fig. Modules used for dimming one to two ballasts used in public lighting system. C-DM-0002L-10V is a two-channel unit on CIB bus (for 2 ballasts), and the R-SL-0201L-A is a single channel unit connected to the Foxtrot CPU wirelessly using frequency of 868 mHz. It has two inputs for external sensor and an internal detector which detects the primary current necessary for diagnosing the LED chip function on the secondary side.

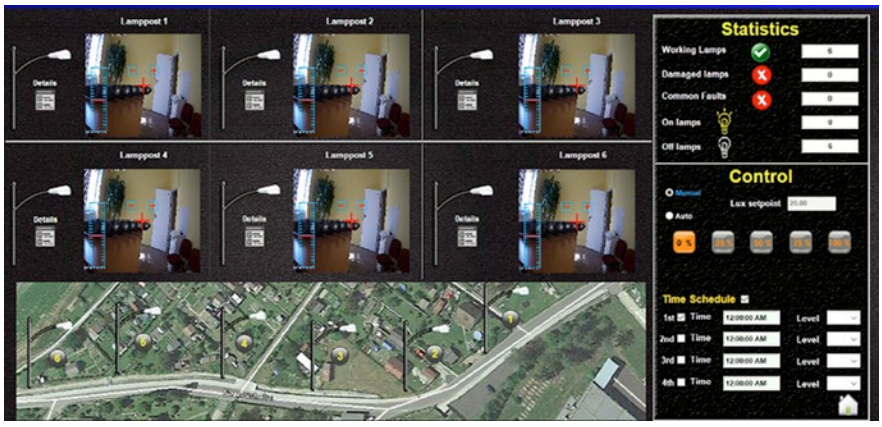


Fig. A part of the smart public lighting system lamp, which is being developed and supplied by Q-EL PRO, is also an IP camera. Therefore, the central dispatch of the public lighting system created in SCADA Reliance system may use these cameras to monitor and record all events.

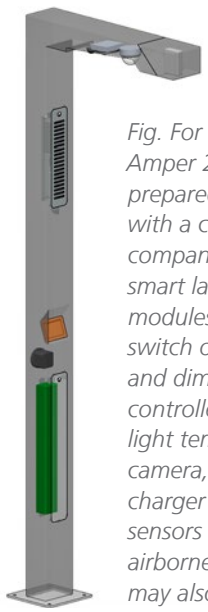


Fig. For the fair called Amper 2018 Teco has prepared, in cooperation with a consortium of other companies, a sample smart lamp fitted with modules controlling the switch on/off function and dimming feature, controlled chromaticity light temperature, 360° camera, electric vehicle charger and air quality sensors – particularly airborne dust sensors. It may also be equipped with communication touchscreen, panic button, RFID reader or Wi-Fi hotspot.

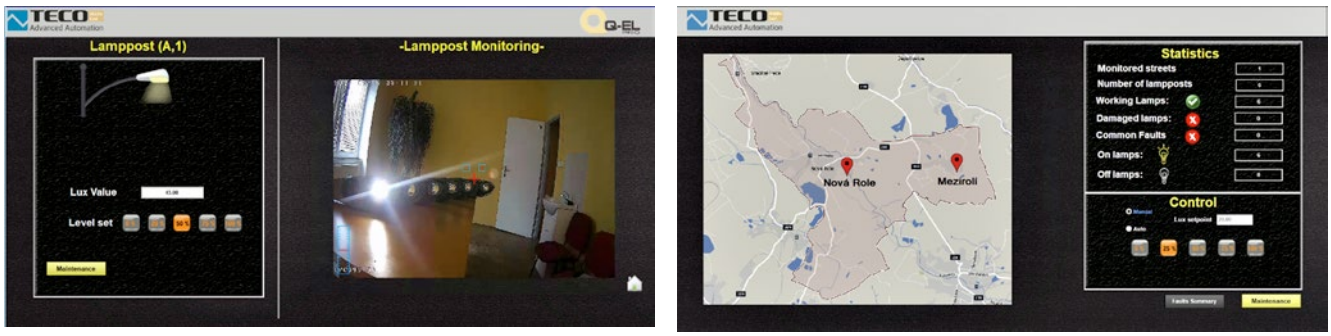


Fig. Overview screens used to control public lamp posts in the reference town of Nova Role. The last screen shows a detailed settings for a particular lamp. An online stream provided by the camera installed in the lamp post is also shown.

exceeded. Controlling charging currents, where the branch in addition to the electric vehicle charging system, is also used by other appliance, or if the source of the current is limited is one of the tasks where Foxtrot is seen as an expert. That is one of the main differences you will realize when you compare this system with a standalone charging station with guaranteed maximum charging current utilized and reserved only for electric vehicles.

However, a smart public lighting system does not include of the lamp posts only but also centralized management. TecoME company based in Dubai and its development team which has many experiences with the integration of camera systems, has developed a dispatch portal for municipal public lighting systems. Based on the SCADA Reliance system and together with Q-EL PRO company they put together a reference project in the town of Nova Role. You will learn more about the project from the attached pictures. I would like to point out that because a team from the Middle East was also involved in the development it is clear that Teco focuses again not only on the Czech Republic but on the global market as well. This fact is further supported by the fact that Q-EL PRO was displayed on the Teco stand at the international fair called 2018 Light & Building in Frankfurt am Main.. ■

Automer – Data from Foxtrot straight to the cloud

The auto-meter is a monitoring cloud used by technologies such as Tecomat and others. The basic feature builds on a non-invasive data collection process provided by controller units that is without requiring any interventions of the programmer.

The meter is used to monitor active control systems connected to the Internet or computer networks. Therefore, we may say that it allows us to track the status and collect different information on control systems and then evaluate the status of the given system.

The Automer is able to read data points from the control unit and the user can simply set how the data collection process will be carried out. This cloud will

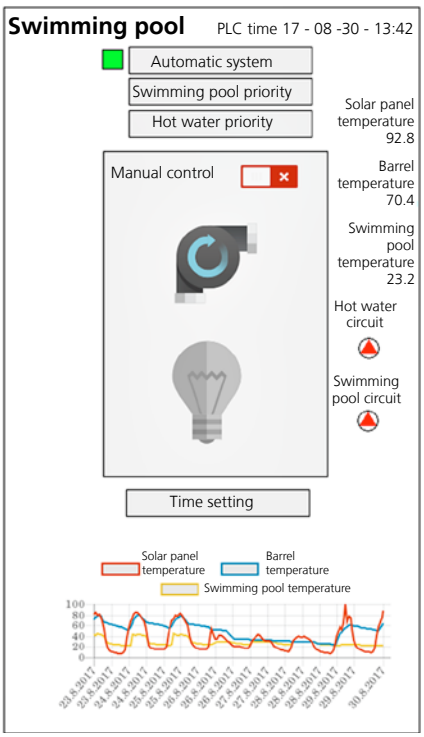


Fig.1 – Overview screen displaying swimming pool status

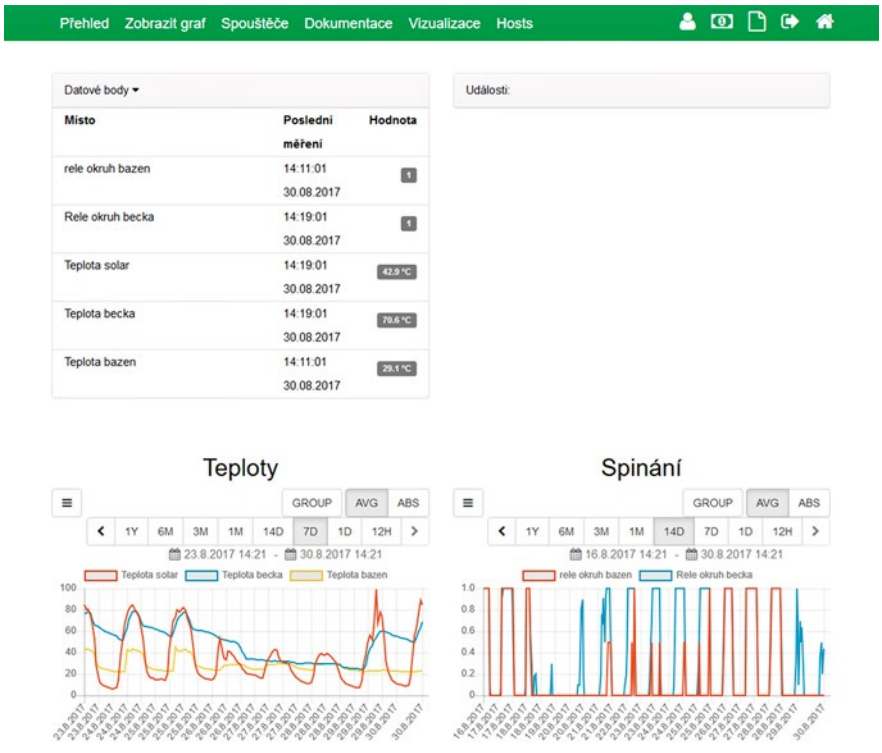


Fig. 2

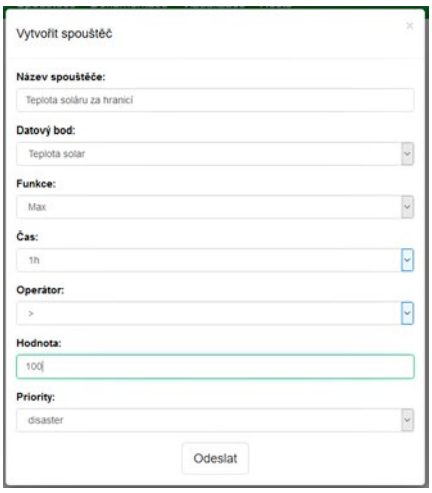


Fig. 3– A dialogue used to create an "event initiator"

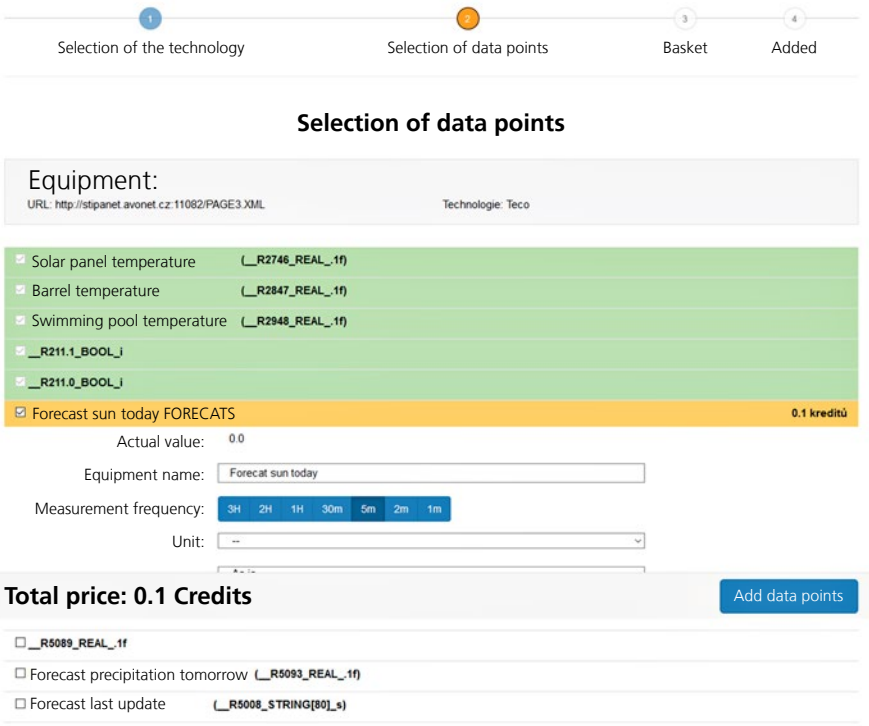


Fig. 4

show you how your technology works in time, therefore giving you a feedback or indication of incorrect status or function.

Example of Automer use

A family house using Foxtrot control system to heat a swimming pool and utility water (fig. 1). The user selects the required mode and the display of the control system, which is depicted on the diagram. The user sees how the technology works on the Automer display. On the overview Automer screen the user sees details of the technology process, how the swimming pool circuits are turned on or how the water heating process continues etc. The triggers are used to define the conditions for calling the function above the data point. If the temperature in the solar panel exceeds the defined limit for 1 hour (fig. 3) the user is notified about this condition (mail, SMS) and the status is visualized/displayed. This information may be used by a servicing company to take an action or to initiate repair of the given technology.

The Automer monitoring system is based on a system of credits, which means how intensively you measure the certain value that is how much you will pay.

Pricelist- 4 data items/day

Intervalprice per day in CZK

1 minute	0.18 CZK
2 minutes	0.15 CZK
5 minutes	0.10 CZK
30 minutes	0.08 CZK
1 hour	0.06 CZK
2 hours	0.05 CZK
3 hours	0.03 CZK

The process of adding data points is done as follows. The Automer cloud communicates and finds out what information is available from the control system and then the system will offer you the information so you may select the one you need (Fig. 5).

The Automer offers an option to integrate diagrams and overview pages directly into control systems.

Available components for integration:

- System Overview page
- Export into Excel
- URL of the diagram as a picture
- Reference to active diagram ■

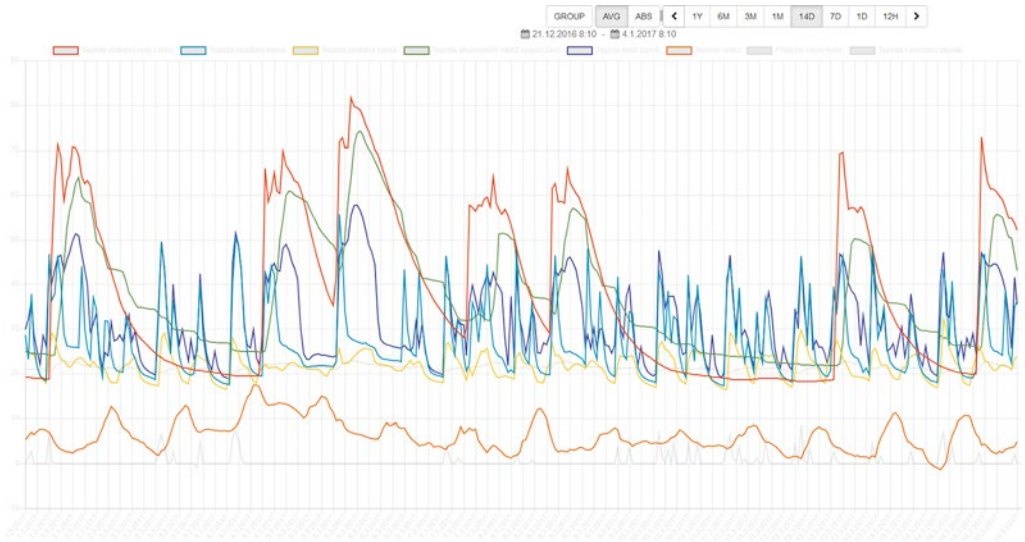


Fig. 5 shows the functionality of a heating system in a family house in the winter, where multiple heat sources are used together with the accumulation tank. The family house uses solid fuel (fireplace) and a gas boiler.

Tecomat programming

Why and how you may program Foxtrots and other Tecomats

So far the Mosaic development environment is the only development environment used to prepare and to debug PLC programs developed only in the Czech Republic. It is an environment designed to program Tecomats for the currently manufactured product series Foxtrot and TC700 made by the Czech manufacturer Teco a.s. Teco has been focusing for a long time on programming and communication compatibility of all its systems in order to enable Mosaic to manage installation and programs of all previous versions, typically the NS-950, TR050/200/300 and TC400/500/600/650. This makes us rather different from other PLC manufacturers who require customers to purchase license or to install new environments for some of their products.

Project and a group of project

The development environment of Mosaic works with individual projects which is a group of all files which relate to one PLC. Further, it also works with a group of projects which relate to mutually interconnected PLC Tecomat. These systems share between each network variables and therefore mutually coordinate their activities. This allows them to create large controlled units which are either territorially large, for example objects such as tunnels, large buildings and manufacturing plants with several interconnected machines and technologies, or it is used to manage long ongoing automation projects (tens of years) which use various generation of Tecomats to control certain sections, for example malt-houses.

Programming languages based on IEC EN 61131 – 3

This international standard in addition to regulations focusing on hardware compatibility, which includes mostly specifications of the behavior of inputs and outputs, also defines (in its third part) principles and compatibility of programming processes. This standard was created during the nineties as an extract of the best experience learned from the deployment of PLC since the fifties, and it also „tweaked" and joint several programming approaches into one unified concept. A programming language called Ladder Diagram (LD) has been established in the US and it is still very popular, whereas functional block diagram programming language (FBD) is more established in Europe, mostly in Germany. Both these programming languages are suitable to express logic tasks which is why PLC (Programmable Logic Controller) has been created. However, modern PLC are also able to handle any „analog" and regulatory tasks, or to work with data fields or to communicate with all sides by using all protocols but not all these more complex tasks may be clearly expressed and debugged using classic relay or functional blocks. That is why the ST – Structured Text language used for structured programming was introduced. Another text language IL-Instruction List is based on the similarity with processor machine code which was used for example in the first PLC series NS – 900 created in Tesla Kolin. Teco is the legal successor of the former Tesla Kolin.

CFC – Continuous Flow Chart

To achieve clear display and to demonstrate interconnection between functions and functional blocks and inputs/outputs Mosaic uses an advanced functional diagram the so-called Continuous Flow Chart (CFC). This type of program is not yet included in the standard but it is so intuitive and descriptive that it quickly became a popular tool among programmers and thanks to being so

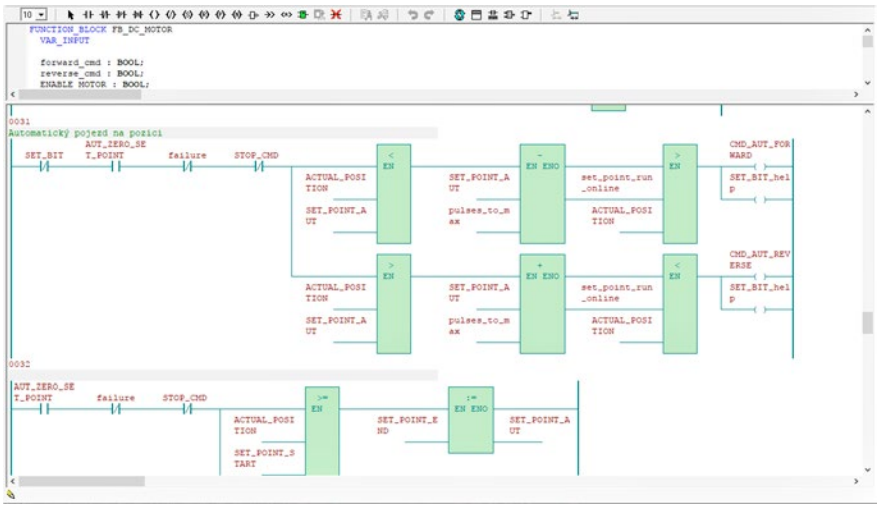
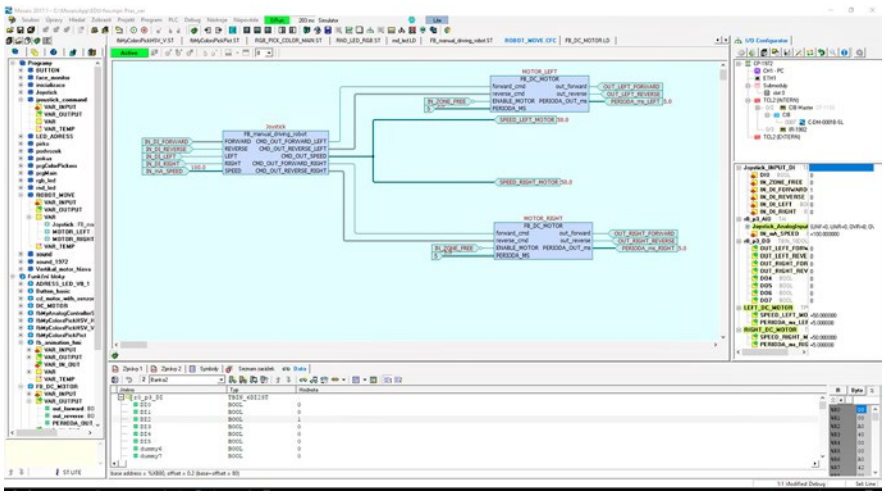


Fig. Mosaic – Ladder diagram programming (LD). On the left there are contact symbols representing the logic of the conditions that must be met so the correct values may appear on the outputs on the right side. On the top bar you see the contact icons, which are added to the program area using the Drag & Drop method. More complicated functions, which cannot be expressed by simple contacts, are expressed using functional blocks.



descriptive it is also a popular among teachers focusing on industrial automation systems. It is an editor where the programmer first places individual functional blocks on the screen and then links them together including links to particular inputs and outputs. This method also allows the programmer to draw a feedback which is, for example impossible in FBD. Using these editors the entire hierarchy of own functional blocks may be created in Mosaic and programmers can create their own libraries from them. In an extreme situation the entire program may be encapsulated into one single block and saved in the user library.

Program compatibility

Around the year 2000, Teco has accepted this standard together with the transfer of its new development environment under Windows and at the same time Teco has become the first Czech member of the PLC Open organization which brings together the largest world manufacturers of PLC and oversees the development and compatibility under this standard across all members and various technologies. Mosaic is continuously tested, particularly against „benchmarks" established by this organization. The implementation of OSCAT libraries into Mosaic with roughly 600 functions and function blocks is seen as a practical and independent confirmation of the compatibility of this standard. These libraries, which are available in source codes, were written by Open Source Community for Automation Technology (www.oscat.de) according to the standard and independently of development environments of any manufacturer. OSCAT libraries translated for Mosaic are available at www.tecomat.cz and programmers may fully use these libraries for Tecomat systems.

Data structures, program organizational units

The great benefit of this standard is the unification of database, data structures and division of each program into organizational units. This creates a structure which increases legibility and reusability of the written code. Therefore, in the Mosaic development environment the programmer may create above these data several functional blocks working above the same data structures but written according to the needs of different languages. Only the following types are used: bit, byte, integer, word, double word, real, but also with arrays and general structures. Thanks to this broad apparatus the user may program not only functions between inputs and outputs but also his own communication function blocks with any device on serial ports or on the Ethernet port, which is now included in each Tecomat. ■

New features in Mosaic – I/O configurator

Algoritmization and writing program in one of the standard languages is a portion of the task of the programmer. The added task is to link the program to particular inputs and outputs (I/O) of a PLC assembly. It is a well known fact that one of the basic characteristics and advantages of PLC is its modularity and adaptability to various types of input /output signals thanks to the ability to use applicable modules. Binary I/O are usually operated in 24 V DC or 230 V AC, analogue I/O are either current or voltage based etc. During this year the Mosaic development environment included an option to use new I/O configurator offering the following parameters:

The goal of the development of this tool was to simplify working with HW configurator of the target PLC as much as possible. The I/O window displayed in the configurator may be permanently attached to the right sidebar in Mosaic allowing the user to have it handy at all times. In addition to the clear and tree-like structure which displays the entire assembly, it also allows the user to quickly access individual statuses of inputs and outputs in individual modules. Configuration of parameters of each I/O module in the system is easily available and unified in the editing dialog window. Another advantage of the new I/O configurator is that it allows the manufac-

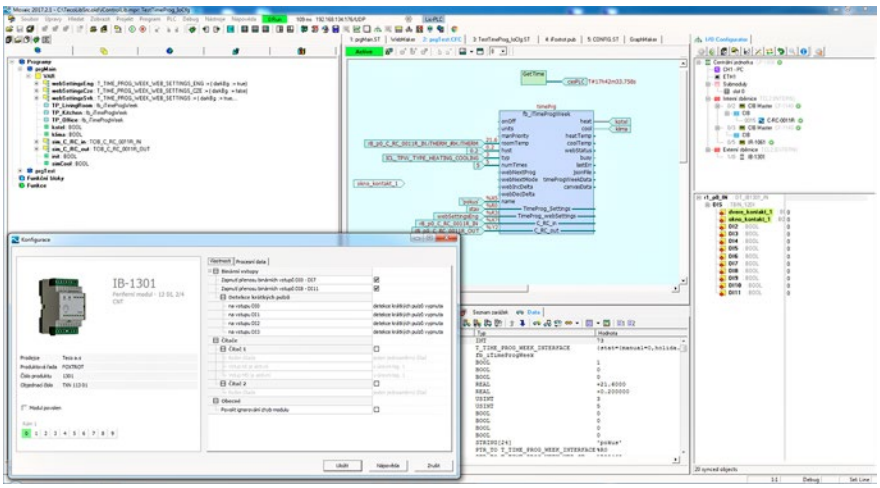


Fig. Sample of I/O configurator window in Foxtrot built into the Foxee robot. To achieve good legibility the window shows connectors and labels as they actually appear on the module.

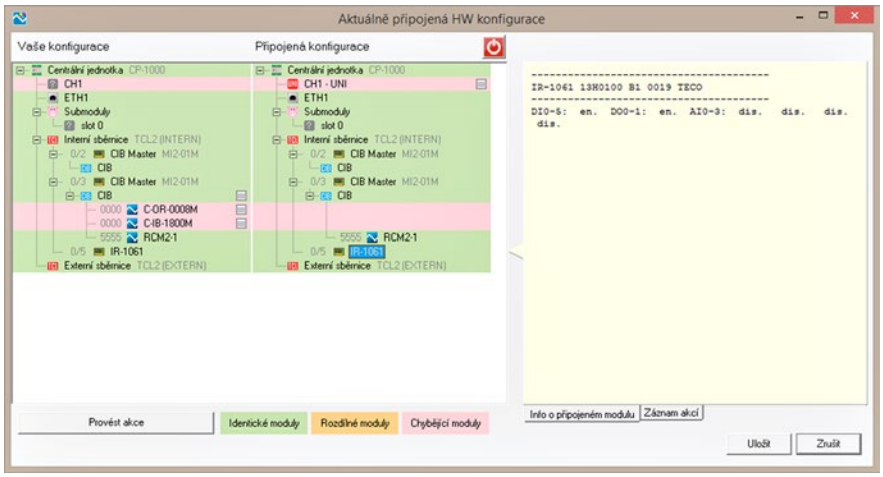


Fig. Configuration comparison sample

turer to add new modules into Mosaic without the need to issue a new version. This is thanks to the fact that the so-called device descriptors have been introduced. These are simple files describing the given module. The user simply downloads the given file and adds it to his/her actual installation and the I/O configurator immediately offers the new device for use.

To select individual components of the system, new dialog windows were designed which displays photographs of individual modules and therefore visually help users with the selection while increasing the comfort and accuracy of the search for the given module – as the assortment of modules keeps constantly increasing.

I/O configurator offers other interesting functions as well. In addition to being able to read the entire hardware configuration from a system connected on-line, the configurator is able to compare the connected configuration with the current configuration and allows the programmer to apply individual changes. The tool also offers a manual backup of the configuration, and during certain operation the system creates the backup by itself and allows the user to go back and reverse changes which were applied unintentionally.

The option to add the Mosaic installation descriptors of new devices also created a need to help users and to make working with updates easier. That is why a new Mosaic tool called Updater was created for the environment. These tool allows users to have control over the availability of new versions of descriptors applicable to new devices as well as other files designed for I/O configurator, including new library versions. The availability is checked through FTP server made by TECO and allows the user to download new files and integrate them automatically into their existing Mosaic installation.

Mosaic was further improved with additional functions which may seem unimportant at first glance, but which often make the work of the programmer easier. These include the option to run additional software (Firmware Updater, Project Loader, SetPlcIp) directly from Mosaic environment or the ability to run Internet browsers displaying the website of the currently connected Tecomat system. Therefore, the user no longer needs to search for individual programs in the computer but the user has them immediately available from the development environment.

Another properties and functions of Mosaic development environment

The usability and benefit of the Mosaic development environment is not only

Fig. Sample of the selection dialogue

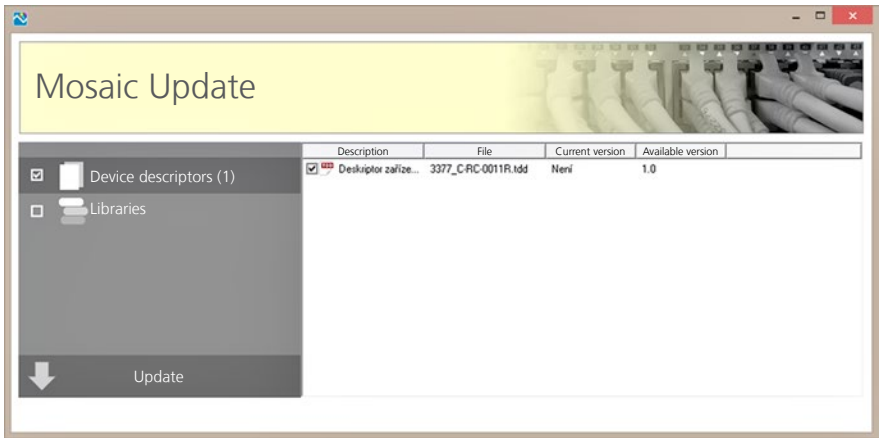


Fig. Sample of Mosaic Updater window

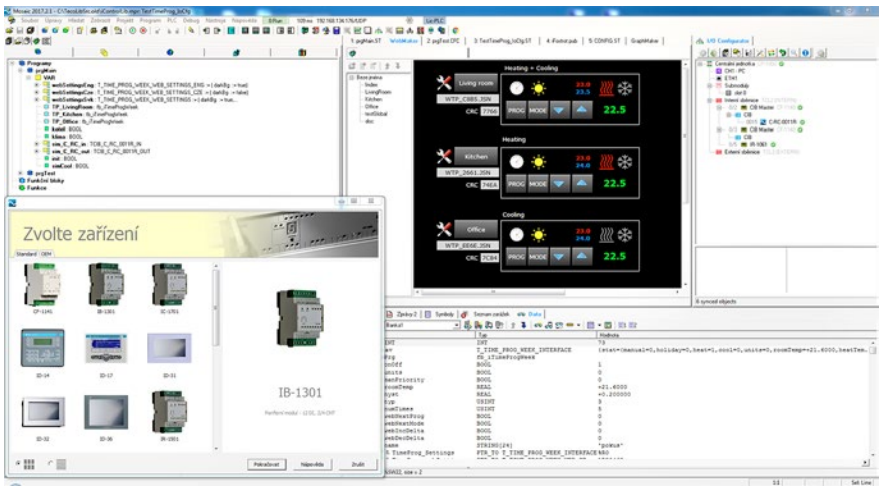


Fig. Selection of new I/O module from the offered list enhanced with the picture of the module. Windows displayed on Mosaic desktop may be arranged according to your current needs. Here, in the main window you see running WEB maker and the preparation of a graphic visualization for interactive control of the given task.

the fact that the algorithm may be written and edited using standardized languages, but also in the ability to use other tools which make the work of the programmer more effective and quicker. Mosaic has a built-in PLC simulator which allows the programmer to debug the program and run individual steps without the need to actually connect the programmable controller. While the program or simulation is running, all lines which meet the given conditions are visually highlighted in graphical languages and in the CFC editor. Mosaic allows you to put together graphic websites stored in each PLC and link them with the given variables in the program. This feature may be used both inside mosaic as quick and build-in visualization (SCADA), but mostly for remote management and monitoring of the programmable logic controller (PLC) through the Internet and through any web browser run on any device, therefore also on a mobile device. Programming may be done not only in simulation mode and with PLC on the table or in the distribution cabinet, but also remotely through the Internet and therefore anywhere in the world. This also applies to Tecomats which have not been assigned an IP address. Mosaic contains Firmware Updater which greatly simplifies firmware version management for particular PLC assemblies and it includes not only the central module but also all peripheral modules. All with public IP address, or without, and anywhere in the world. ■

Why objects with Foxtrot may always increase their self-sustainability and why they are Smart Grid ready"?

(from the info flyer prepared for „Smart Energy Forum 2017")

– Today, the subject connected behind the electric meter is not only an energy consuming entity – a „Consumer". A consumer of today may also produce electric power – a „Producer" and therefore, such entity is today considered a „Prosumer". A prosumer may also utilize accumulation capacities through a water heater but also through the use of batteries which store electric power. Or electric power may also be accumulated in an electric vehicle. Objects equipped with all these features will shortly become the basic elements of the so-called "Smart Grid". Objects involved in a smart grid are able to transfer relevant information in both ways and dynamically contribute to a well-balanced production of electric power, consumption and electricity accumulation at the given time and place, and partially also increase the stability outside of their own house/building.

– Be ready for this future even today and start using Tecomat Foxtrot control systems. Foxtrot is able to efficiently address personal priorities of the user related to Smart House technology. It is also able to optimize cost and control maximum self-sufficiency at the given location. Any additional or extra capacity in terms of production, consumption or storage of electricity may be offered to the local electric power distributor under conditions which benefit both sides.

– Control system Tecomat Foxtrot is a kit consisting of universal and special modules which may be used virtually for any automation projects. That includes industrial project, machines, transportation, office buildings or hotels and of course family houses. Our technology may be used in all

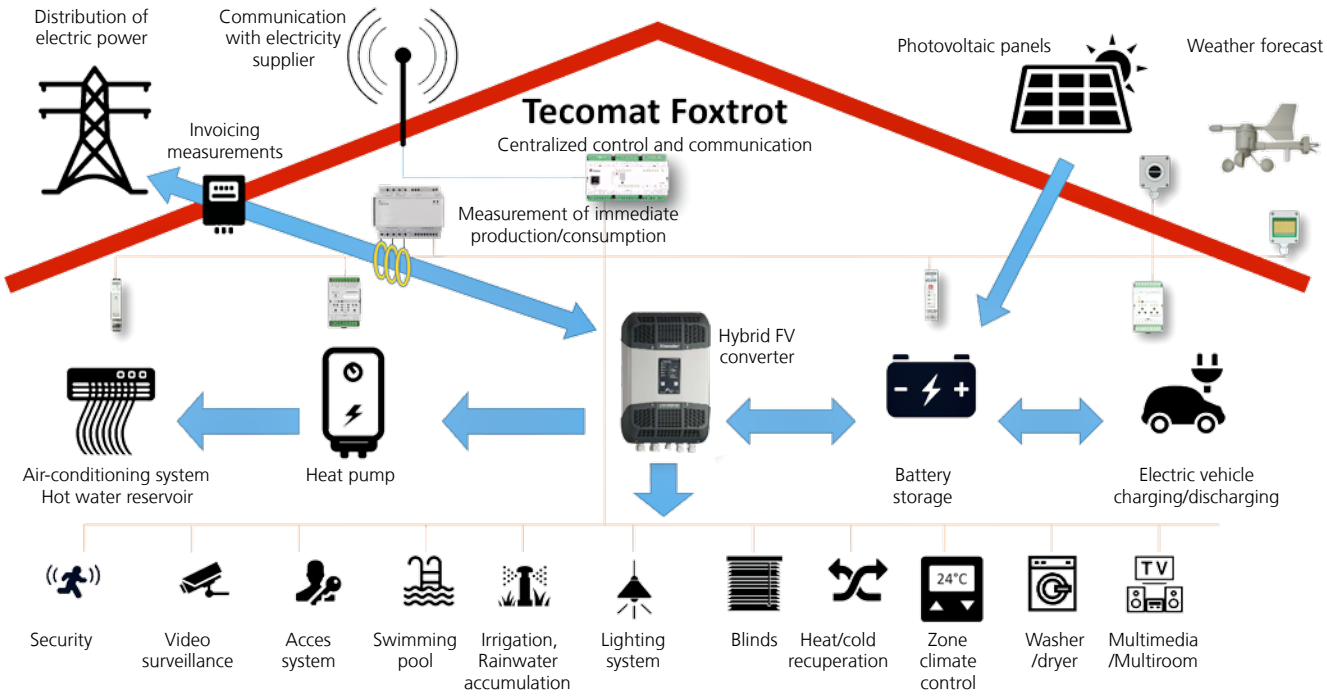


Fig. Diagram showing integration of common Smart house functions with a comprehensive energy management at the given draw location ready for Smart Grid.

the above object to control automation and local energy needs.
- In principle, Tecomat Foxtrot control system acts as a central brain overseeing the entire electric and data project including all technical devices installed in the house. At the same time it is a gateway to a secured and remote communication between the house and the owner, manager or selected servers and Internet cloud services, even with the fast coming Internet of things.
- Tecomat Foxtrot control system is also a Web server with own interactive websites which may be customized by the user to meet his or her needs and to monitor any device in the house through the use of mobile telephones, tablets, computers or Smart TV. The system may be accessed also through native applications installed in mobile phones.
- To manage energy needs of the house locally Tecomat Foxtrot is equipped with a quick electric meter module, module that handles communication with electric vehicles, battery management module used for LiFe-Po batteries, phase power output control module, modules used to control Solid State relay, power relay modules Further, integrated Ethernet port and up to 10 serial ports are used to communicate and control more complex systems including own communication and to control household appliances, heat pumps and air-conditioning systems, compiled battery storage, regular or hybrid solar converters, monitoring and security cameras, multimedia centers, or any other systems such as Solar Monitor or the entire installation projects based on KNX.
- During the 10 years after the first introduction of Tecomat Foxtrot to the domestic and foreign markets thousands of Foxtrot systems have been installed in smart houses, heat pump or recuperation systems. The system is also used in systems utilizing photovoltaic technologies combined with battery storage but also in other industries, such as machine and engineering industry etc. Recently, we see an increase in the number of houses equipped with systems used by electric vehicles. Several special systems such as IntelioBox, Haidy Home, Domotron, Topeni Chytre.cz, RITbox, Topeninadalku.cz, iCool, Smart Control or EcoOne, all use Tecomat Foxtrot systems. Hundreds of installation and engineering companies use Tecomat Foxtrot systems in their customized projects. ■

EcoOne Energy box

At the end of February and in the beginning of March 2018 a fair called Aquatherm 2018 took place in Prague. Teco a.s. invited and displayed in its stand, among other companies, also a company called Geosun offering two products from their EcoOne Home series. These products included the heat pump EcoOne DHW and battery storage EcoOne Energybox with connected solar panels. What these products have in common? Because both products were displayed under one roof which was dominated by the „Powered by Teco" logo it is obvious that this company uses Foxtrot system to control their autonomous functions. These systems complement each other not only structurally but also in terms of the used modules and functions. In order to maximize the use of electricity produced by solar panels a battery storage is necessary. A heat pump controlled in cooperation with battery storage further increases the efficiency of the use of own energy generated by a renewable source.

Let us now imagine a battery storage called EcoOne Energybox. At their website (www.ecoonehome.cz) we have learned the following:

Fig. At Aquatherm Prague fair we had a look under Energybox cover. Behind the dispay there is placed Foxtrot in OEM version CP-1970.

„The main challenge in the use of renewable resources is to find a way how to store the produced electricity. Solar/photovoltaic panels generate electricity during the day when we are at work. Once we come home the sunlight intensity is already at its minimum. Energy storage may however, eliminate this disadvantage completely. EcoOne Energybox not only stores electric power but also manages its consumption and use. Thanks to weather forecast the system knows whether to store energy or to use it efficiently and as soon as possible."

Elegantly designed EcoOne Energybox unit stores the energy produced by solar panels and it is delivered with batteries. It is completely regulated and connected to the Internet where it gets weather forecast information – the system needs this info to know how to use the stored energy. It is equipped with 7" color display controlled by the built-in Tecomat Foxtrot which is able to control the entire house. The system also offers measurement report from the power plant and household consumption measurement.

Energybox may be fitted with an inner unit that controls the heat pump – EcoOne DHW, which uses the quietest outdoor units available on the market called Mitsubishi Zubadan. Thanks

to its control system it also actively controls room temperature, lighting system, blinds, wall sockets, air-conditioning system, swimming pool, water heating, security and a large array of heat sources. Geosun increased the quality level thanks to the use of flexible battery storage integrated into a comprehensive energy management system utilized by the entire family house. Such house becomes more self-sufficient and at the same time it is ready to utilize all benefits which are currently being prepared for Smart Grids. ■

www.ecoonehome.cz

Fig. The EcoOne series devices for family houses are characterized by an elegant, modest design which may be installed in technical but also in non-commercial spaces.

An inspiring bachelor thesis

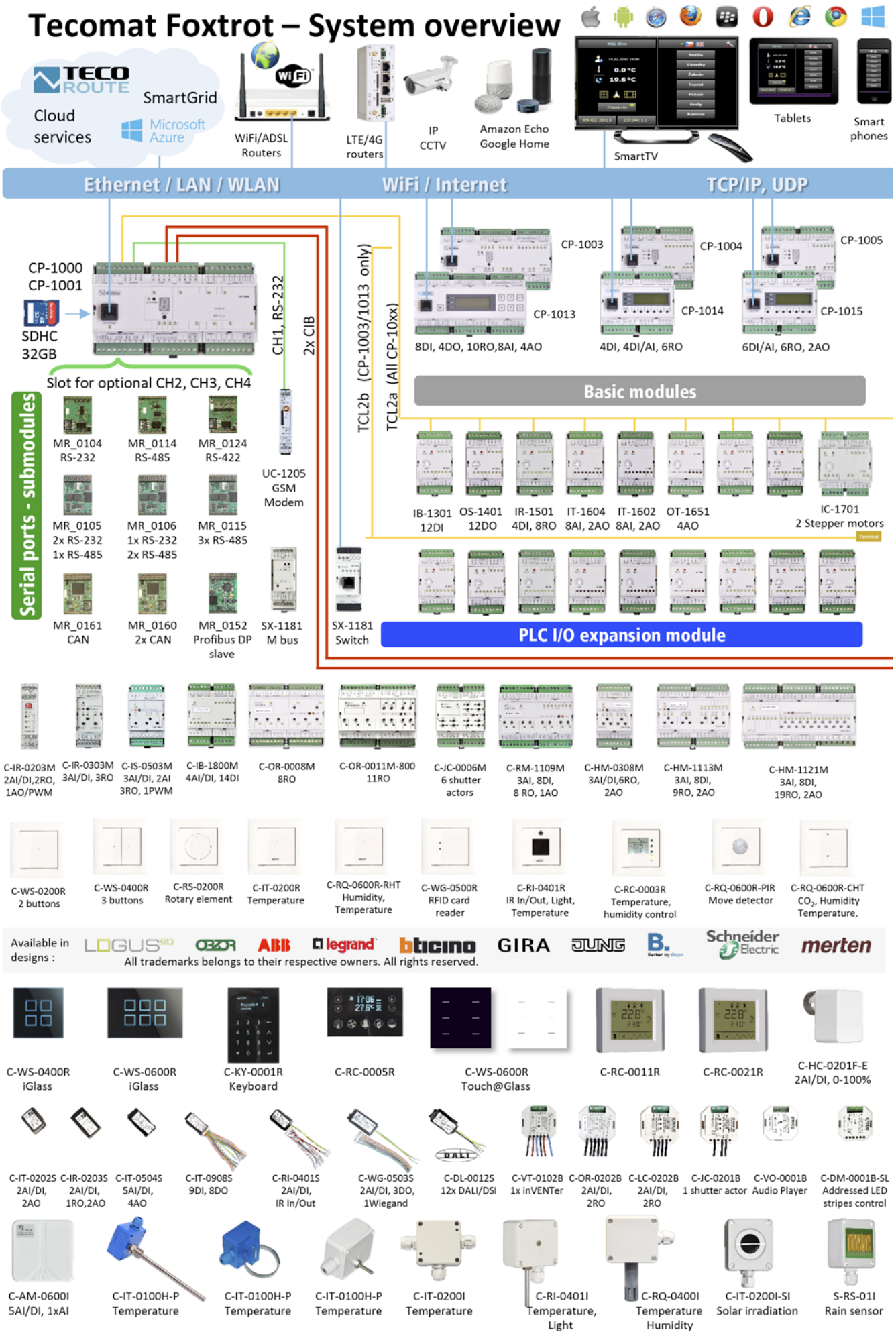
I had the opportunity to view an interesting bachelor thesis. Its author is Bc. Jiri Sizling who introduced his work at the Faculty of Mechanical Engineering in West Bohemia University of Plzen, at the Department of Industrial Engineering and management. The leader of the project was Ing. Petr Horejsi Ph.D. The work bears a humble name Industrial regulation options. After viewing the work I have realized that the author narrowed it down to building technologies and control. The work provides clear description of heating and cooling system regulation and control (based on indoor and outdoor temperature and combination thereof), air-conditioning and air quality systems, renewable resources and regulation measurements. At first sight the work looks like a regular research diving into the current status of the TZB field. Only careful reading reveals that the basis of the work is not its actual text but the project it has created – a complex program for Tecomat Foxtrot control system as a sample application for a smart house. The description is humbly hidden in a chapter called System Creation and Proposed Work Environment. It is an extensive program containing a total of almost 450 code pages.

The subject of the work is a test installation created for a showroom. The project uses Smart Control system which is manufactured and developed by a Czech company called TENAUR s.r.o. Its core is PLC Tecomat Foxtrot, built-in version (OEM version CP-1970) – see fig. 1. The development of the first Smart Control system has already began in 2009 and since then the system has expanded and improved significantly. Now there is a new third version which contains a comprehensive and large management system for technical devices used in buildings. It offers a gradual and continuous regulation of Mitsubishi heat pump with inner unit Eco-Watt connected to 8 heating zones offering cooling function and water heating. Recuperation system Stiebel Eltron controls the ventilation and may be set to three power levels. The system is newly connected to a solar power plant with 3.5 kW power output equipped with Fronius inverter which uses Modbus protocol to communicate with the system. In addition, the system also controls illumination of commercial banners, indoor lightning system and will control blinds in the future. The system is also able to control illumination systems, power sockets, blinds, security elements and other simpler components. This also includes user-programmable time scenes for all elements. The current version of the system offers continuous control of all devices based on functional relevance including the option to predict future states based on weather forecast. The configuration of a particular system is done through a service-programmable web mask without an intervention of the programmer. At present, there are hundreds systems of various scopes operating in private or commercial buildings. The majority is used as a control system for the manufacturer of indoor unit Eco-Watt. The system is being developed by 4-people team based on experience gained from former applications installed in technical buildings. The author's task was to create and test the program including proposal and creation of the web environment. The consultant is responsible for the development of the indoor unit, distribution cabinet design as well as for selecting suitable equipment for the given control. The functional control is prepared and designed by the entire team.

Fig. 1. View into the Smart Control system cabinet that is being developed and supplied by TENAUR s.r.o. On the right you see the OEM version of Foxtrot in "Open Frame" and a specially arranged input and output configuration that are used to control the heat pump. It is combined with standard expansion modules.

The work also presents quantification of energy and financial savings of the provided solution in comparison with a traditional approach. The scope and level of the programming work significantly exceeds the usual level of bachelor thesis and could have served as a high quality work presented for master's diploma thesis. Basically, this work represents a product of a highly experienced professional. It only demonstrates the fact that if a student has the opportunity to work creatively using real-life issues it will enable the student to gain the best experiences through the „school of life". ■

Ladislav Smejkal


Tecomat Foxtrot – System overview
TECO ROUTE
SmartGrid
Cloud services
Microsoft Azure
WiFi/ADSL Routers
LTE/4G routers
IP CCTV
Amazon Echo Google Home
SmartTV
Tablets
Smart phones
Ethernet / LAN / WLAN
WiFi / Internet
TCP/IP, UDP
CP-1000
CP-1001
SDHC 32GB
Slot for optional CH2, CH3, CH4
CH1, RS-232
2x CIB
TCL2b (CP-1003/1013 only)
TCL2a (All CP-10xx)
CP-1003
CP-1013
8DI, 4DO, 10RO,8AI, 4AO
CP-1004
CP-1014
4DI, 4DI/AI, 6RO
CP-1005
CP-1015
6DI/AI, 6RO, 2AO
Basic modules
Serial ports - submodules
MR_0104 RS-232
MR_0114 RS-485
MR_0124 RS-422
MR_0105 2x RS-232 1x RS-485
MR_0106 1x RS-232 2x RS-485
MR_0115 3x RS-485
MR_0161 CAN
MR_0160 2x CAN
MR_0152 Profibus DP slave
SX-1181 M bus
UC-1205 GSM Modem
SX-1181 Switch
IB-1301 12DI
OS-1401 12DO
IR-1501 4DI, 8RO
IT-1604 8AI, 2AO
IT-1602 8AI, 2AO
OT-1651 4AO
IC-1701 2 Stepper motors
PLC I/O expansion module
C-IR-0203M 2AI/DI,2RO, 1AO/PWM
C-IR-0303M 3AI/DI, 3RO
C-IS-0503M 3AI/DI, 2AI 3RO, 1PWM
C-IB-1800M 4AI/DI, 14DI
C-OR-0008M 8RO
C-OR-0011M-800 11RO
C-JC-0006M 6 shutter actors
C-RM-1109M 3AI, 8DI, 8 RO, 1AO
C-HM-0308M 3AI/DI,6RO, 2AO
C-HM-1113M 3AI, 8DI, 9RO, 2AO
C-HM-1121M 3AI, 8DI, 19RO, 2AO
C-WS-0200R 2 buttons
C-WS-0400R 3 buttons
C-RS-0200R Rotary element
C-IT-0200R Temperature
C-RQ-0600R-RHT Humidity, Temperature
C-WG-0500R RFID card reader
C-RI-0401R IR In/Out, Light, Temperature
C-RC-0003R Temperature, humidity control
C-RQ-0600R-PIR Move detector
C-RQ-0600R-CHT CO_2, Humidity Temperature,
Available in designs :
LOGUS90 OBZOR ABB legrand bticino GIRA JUNG B. Schneider Electric merten
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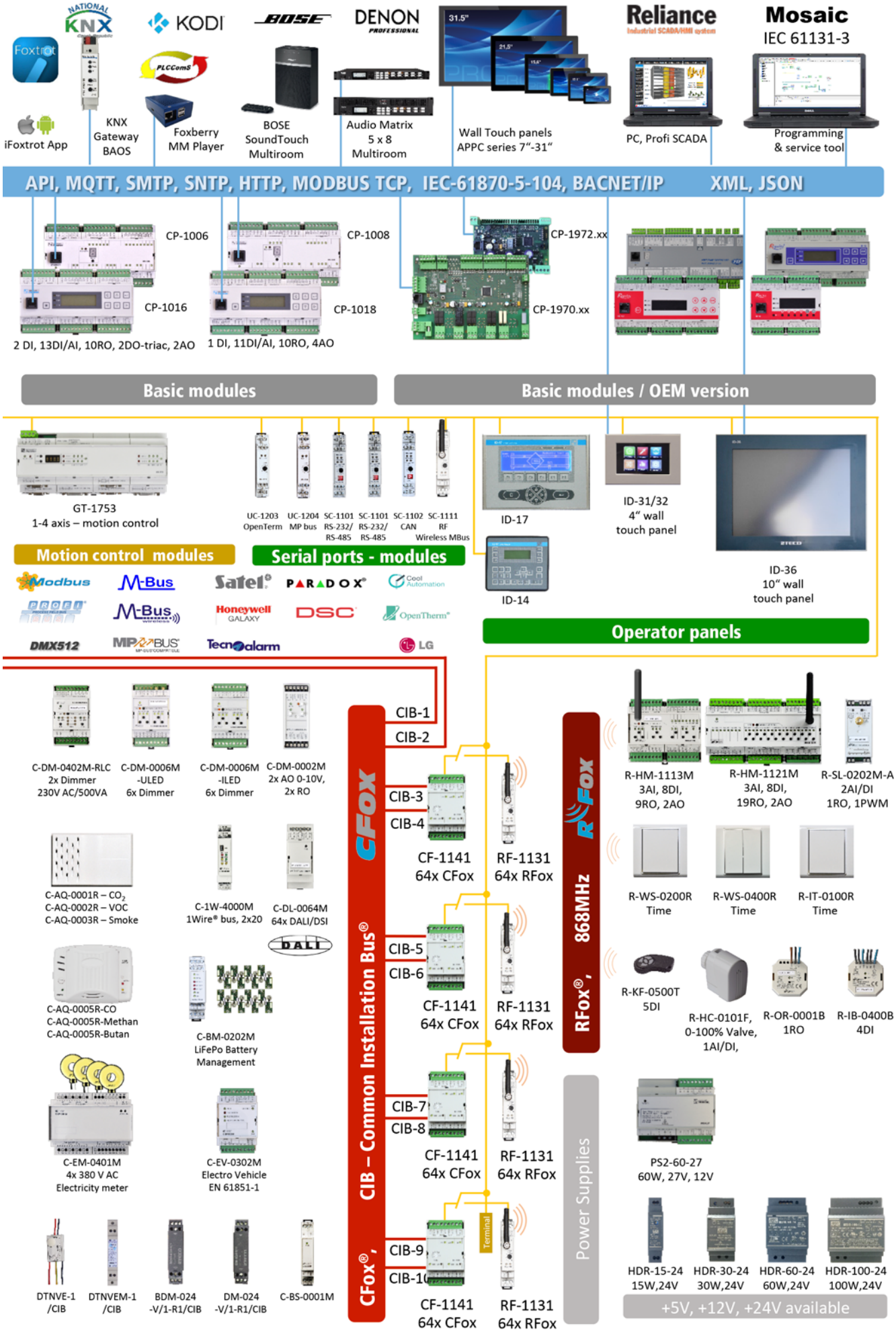
C-WS-0400R iGlass
C-WS-0600R iGlass
C-KY-0001R Keyboard
C-RC-0005R
C-WS-0600R Touch@Glass
C-RC-0011R
C-RC-0021R
C-HC-0201F-E 2AI/DI, 0-100%
C-IT-0202S 2AI/DI, 2AO
C-IR-0203S 2AI/DI, 1RO,2AO
C-IT-0504S 5AI/DI, 4AO
C-IT-0908S 9DI, 8DO
C-RI-0401S 2AI/DI, IR In/Out
C-WG-0503S 2AI/DI, 3DO, 1Wiegand
C-DL-0012S 12x DALI/DSI
C-VT-0102B 1x inVENTer
C-OR-0202B 2AI/DI, 2RO
C-LC-0202B 2AI/DI, 2RO
C-JC-0201B 1 shutter actor
C-VO-0001B Audio Player
C-DM-0001B-SL Addressed LED stripes control
C-AM-0600I 5AI/DI, 1xAI
C-IT-0100H-P Temperature
C-IT-0100H-P Temperature
C-IT-0100H-P Temperature
C-IT-0200I Temperature
C-RI-0401I Temperature, Light
C-RQ-0400I Temperature Humidity
C-IT-0200I-SI Solar irradiation
S-RS-01I Rain sensor


iFoxtrot App
KNX Gateway BAOS
Foxberry MM Player
BOSE SoundTouch Multiroom
Audio Matrix 5 x 8 Multiroom
Wall Touch panels APPC series 7"-31"
PC, Profi SCADA
Programming & service tool
API, MQTT, SMTP, SNTP, HTTP, MODBUS TCP, IEC-61870-5-104, BACNET/IP XML, JSON
CP-1006
CP-1016
2 DI, 13DI/AI, 10RO, 2DO-triac, 2AO
CP-1008
CP-1018
1 DI, 11DI/AI, 10RO, 4AO
CP-1972.xx
CP-1970.xx
Basic modules
Basic modules / OEM version
GT-1753
1-4 axis – motion control
UC-1203 OpenTerm
UC-1204 MP bus
SC-1101 RS-232/ RS-485
SC-1101 RS-232/ RS-485
SC-1102 CAN
SC-1111 RF Wireless MBus
ID-17
ID-31/32 4" wall touch panel
ID-36 10" wall touch panel
ID-14
Motion control modules
Serial ports - modules
Operator panels
C-DM-0402M-RLC 2x Dimmer 230V AC/500VA
C-DM-0006M -ULED 6x Dimmer
C-DM-0006M -ILED 6x Dimmer
C-DM-0002M 2x AO 0-10V, 2x RO
C-AQ-0001R – CO2
C-AQ-0002R – VOC
C-AQ-0003R – Smoke
C-1W-4000M 1Wire® bus, 2x20
C-DL-0064M 64x DALI/DSI
C-AQ-0005R-CO
C-AQ-0005R-Methan
C-AQ-0005R-Butan
C-BM-0202M LiFePo Battery Management
C-EM-0401M 4x 380 V AC Electricity meter
C-EV-0302M Electro Vehicle EN 61851-1
DTNVE-1 /CIB
DTNVEM-1 /CIB
BDM-024 -V/1-R1/CIB
DM-024 -V/1-R1/CIB
C-BS-0001M
CFox®, CIB – Common Installation Bus®
CIB-1
CIB-2
CIB-3
CIB-4
CIB-5
CIB-6
CIB-7
CIB-8
CIB-9
CIB-10
CF-1141 64x CFox
RF-1131 64x RFox
Terminal
RFox®, 868MHz
R-HM-1113M 3AI, 8DI, 9RO, 2AO
R-HM-1121M 3AI, 8DI, 19RO, 2AO
R-SL-0202M-A 2AI/DI 1RO, 1PWM
R-WS-0200R Time
R-WS-0400R Time
R-IT-0100R Time
R-KF-0500T 5DI
R-HC-0101F, 0-100% Valve, 1AI/DI,
R-OR-0001B 1RO
R-IB-0400B 4DI
Power Supplies
PS2-60-27 60W, 27V, 12V
HDR-15-24 15W,24V
HDR-30-24 30W,24V
HDR-60-24 60W,24V
HDR-100-24 100W,24V
+5V, +12V, +24V available

A smart boiler room RITbox – standardization of heat distribution in a house overseen by Foxtrot

At the 2018Aquatherm fair, which took place at the beginning of March in Prague, Teco a.s. has provided a presentation space at its display kiosk for a comprehensive solution called Smart boiler room named RITbox made by Ritop, Brandys nad Labem. It is yet another product where Foxtrot is the basic control, communication and visualization element of a standardized and scalable equipment used in house energy management projects. We have asked the inventor of the idea and the company owner Mr. Viktor Doldanov to explain the principle that lies behind the solution and what benefits this solution brings to companies which install this system and need to combine it with various heat sources and multiple distribution circuits around the house.

V. Doldanov: „The heart of a smart boiler room is an easy to install and intelligent heat distribution station RITbox. Controlled heat distributor represent an installation kit used for distribution of heat based on a particular heating system. The entire unit is already installed on a frame which may be mounted to a wall or on the floor.

Our solution does not require any additional accessories. One side of the RITbox only needs to be connected to the heat source and the other side to heating circuits in individual rooms. The number of heating circuits, their power output and control method may be fully customized. Tens of various control programs allow the user to create assemblies for various heating systems. The control system may utilize several heat sources and the temperature control and measurements in individual rooms may also be done locally or remotely through mobile phones or tablets.

In addition to installed pump units and control valves, the assembly also contains a built-in control system corresponding with the given assembly as well as the necessary cables and thermal sensors. This allows quick design assembly and connection. At the same time the installation company and the user are covered by a warranty policy provided by a single supplier. Any issues are handled by the company.“. ■

RITbox
Smart boiler room

Fig. Viktor Doldanov standing next to RITbox controlled by Tecomat Foxtrot at the Teco stand at the Aquatherm fair. Above the thermally insulated distribution unit you see cabinet with Foxtrot. The entire heating system in the house may be controlled by the user or by the servicing technician using an application in a tablet or in a mobile phone.

Fig. A typical heat distribution system – the installation of circulating pumps and control valves for multi-circuit heating system is reduced thanks to RITbox, which only requires the technician to connect pipes to a compact unit mounted on the wall.

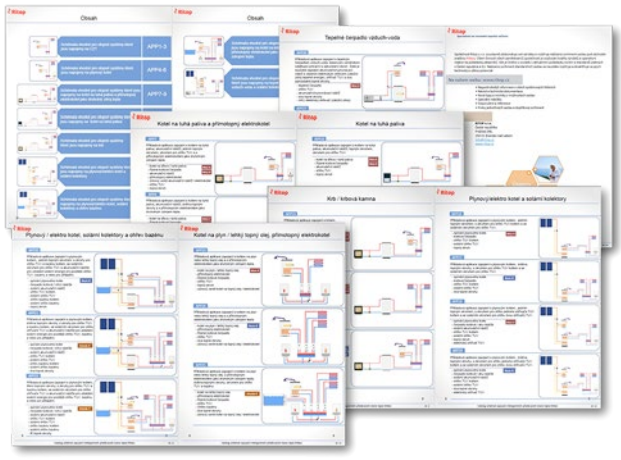


Fig. Project designers, heat system engineers and RITbox end users may select from a wide range of diagrams offering various connection to heat sources or heat exchangers in individual rooms. Each diagram has its own application which is already a part of Tecomat Foxtrot included in the connected distribution cabinet.

And what functions and comfort the pre-programmed control system running on the basis of Tecomat Foxtrot offers?

- Remote control capability.
- Electric boiler may be controlled by a mass remote control – external signal cable.
- Optimal organization and settings
- Heat source control
- Zone control
- Weather compensating regulation
- Weekly schedule of heating operation
- Automatic heat source selection
- Summer/winter operation (during summer only boiler heating)
- Attenuation function . ■

www.ritop.cz, www.topeninadalku.cz

Fig. An application in a mobile telephone allows clear and detailed display and control of each room. It may also be used to configure other service and user settings. It also works as a multi-WiFi thermostat accessible through the Internet.

We support the interest of students to study and focus on technical industries

The Foxee robot with Foxtrot in its soul

Real life experiences have shown us that Mosaic programming environment is also suitable for teaching PLC programming in line with the IEC standards even at universities, colleges or as well as for technically-oriented enthusiasts in elementary schools. It has showed us how important it is, after successfully completing the introductory steps and lessons offered by Lego, Arduin and by other teaching toys, to familiarize students with real-life programming practices. That includes both industrial programming as well as PLC programming for the so-called smart houses. In order to make this transition easier Teco a. s. has provided schools with its new and innovated long-term education program called EDUTEC. This innovation is represented by our Foxee robot powered by a battery and equipped with full version of Foxtrot including modified inputs and outputs. Our robot is ready to be deployed in schools before the end of this year.

Foxee does not act as a robot only. It has been designed to be used as the building block for any school projects focusing on robots and automation. It also supports creativity and fantasy in young adults while designing their own projects because it may be used together with renown kits such as Lego or Merkur and because it utilizes 3D printing.

Foxee will support:

- teachers, children and students in their application of theoretical knowledge of mathematics, physics, chemistry and other subjects related to natural sciences and technology and therefore it will allow students and teachers to get in touch with actual physical reality.
- the ability to create simple and complex applications that are able to simulate real situations using a model-scale project and will motivate pupils and students to get involved in this field and to improve their technical disciplines and creativity
- effective introduction to technology.. ■

Fig. Foxee robot kit with 3-D printed parts

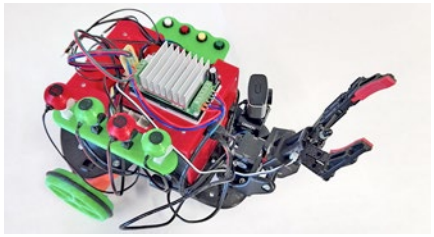


Fig. Wheeled Foxee robot. Inside the robot you will find OEM version of Foxtrot CP – 1972. It includes wireless Wi-Fi connection allowing the student to control the robot using smart phone. The voice module gives the robot an option to process sound effects or even talk.

And what teachers of professional subjects say about it?

We contacted Ing. Ludek Kohout at VOS in Kutna Hora, a teacher and methodologist who has been promoting and teaching industrial automation subjects based on PLC for more than 2 decades. Mr. Kohout also supplies many colleges or universities with the EDUtec system based on PLC Tecomat, where he also adds his own kit of electronically controlled models called EDU-mat. These includes a traffic junction, an automatic washing machine, a mixing unit, a beverage vending machine or a conveyor. Thanks to his long teaching experience and long use of Tecomat Foxtrot systems Ing. Kohout is able to build on

Fig. Assembled Foxee robot – assembly time approximately 15 minutes.

feedbacks from his students and his colleagues from other schools. Therefore, we were interested in his opinion on Foxtrot system „packed" into our Foxee robot.

Ing. L. Kohout:

„So far, I had the chance to use Foxee for a short while only. Students did not have the chance yet. I only played myself and did not let them to play with it (smile). Today, Foxtrots are widely used in schools either in the form of a workshop under EDUtec or, as skilled students in Zlin or Pisek for example, prepared the workshop by themselves. I can clearly see that Foxee robot will motivate students in colleges or universities. I can also imagine use of the system in graduation or bachelor thesis where students participate in the system improvement process or invent interesting new applications. I can even imagine that in certain cases they may even push forward their sometimes little cumbersome teachers (smile).

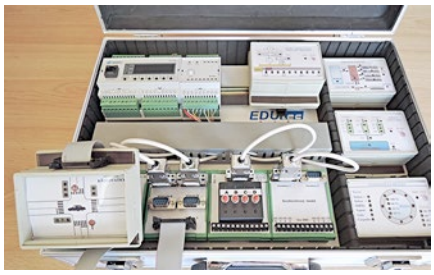


Fig. A briefcase with basic EDUtec system and Foxtrot with five model-controlled assemblies from EDU-mat series which may be ordered from Ing. Kohout.

I see the main benefit of Foxee in the fact that it actually works with mechanical models which are supplied and manufactured through 3D printing by Smart-Bit, or as metal structures by Hobbyrobot, or possibly also with models students build themselves using Lego or Merkur kits. Another pleasant advantage is the configuration of inputs for direct control of DC motors, pulses for step motors (actuators), PWM signals, LED control etc. There are also other improvements options. For example inputs should be addressed. Foxee does not have enough of them so you may prepare extension modules for Foxee connected via CIB bus.

The Foxee and EDUtec with electronic models may run in parallel because they focus in different class of applications. Based on my practical experience as a teacher a great advantage and contribution is the ability to control actual mechanical models. This moves the level up one notch in comparison with the use of PC simulations for example. Of course, these systems may also be used to handle basic tasks (turn the light on/off) but that is no task worth for Foxee. To sum it up, this approach is definitely a great contribution for schools focusing on professional and vocational skills. ■

Interesting success stories of SW and HW

GEOVAP and TECO companies have many interesting products and installations worldwide. In this article some of them are presented in order to demonstrate how big potential comes from the combination of the high quality SW and HW. When Tecomat PLCs are used with SW like Reliance SCADA, AVE Smart Metering, Marushka or SprintFlow it brings a great benefit to customers and end users.

WATER SMART METERING IN TURKEY

In the year 2016 the water smart metering project in Turkey started. It is a pilot project for automatic reading of water consumption. Water meters are equipped with Itron devices and are connected with the central system via MBus communication protocol. In this project there are 2 Tecomat Foxtrot devices with MBus communication used as data concentrators. Data from the water meters is refreshed automatically once per hour and stored on the SD card in the Foxtrot PLC for billing purposes.

Tecomat Foxtrot is connected to the TecoRoute service so it is possible to connect to the PLC remotely via web browser and monitor status of the system or change parameters of the reading period. It is also possible to read devices by request.

In the future it is planned to extend the project for reading of Power meters and Gas volume correctors. ■

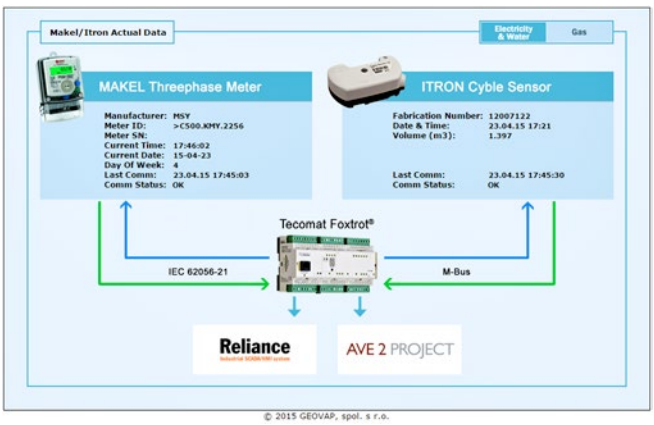


Fig. 1: Tecomat Foxtrot PLC is used as the main data concentrator for energy consumption reading.

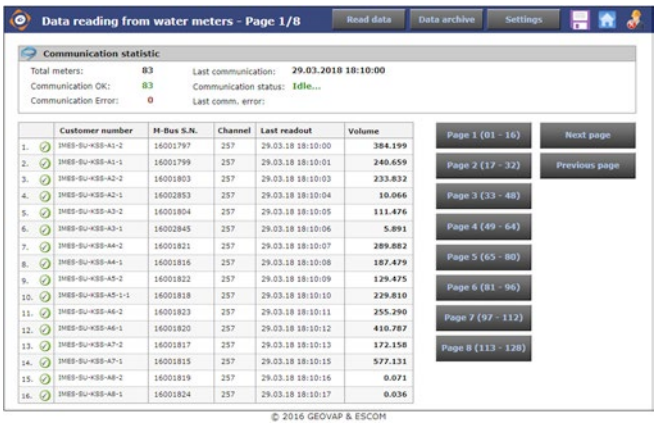
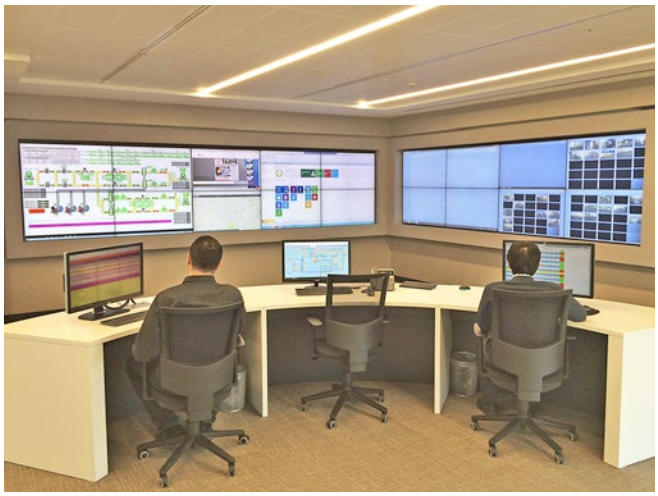


Fig. 2: Tecomat Foxtrot is available via Teco Route service and web browser.

BASKENTGAZ GAS COMPANY IN TURKEY

Baskentgaz is a Turkish gas company. In 2015 the Baskentgaz company decided to upgrade its SW systems for SCADA, GIS (geographical information system) and smart metering. For this purpose 3 systems from GEOVAP company were chosen – Reliance SCADA, AVE and MARUSHKA. These 3 systems cover all needs of Baskentgaz. The systems work together, acquire and exchange data. This success story is a perfect example how the world of SCADA and smart metering can be tightly connected with maps. The operators have not only the possibility to see the maps in SCADA but they can also see live data from the SCADA system in the dynamic map. The whole SCADA system runs as redundant which is very important for the customer from the security point of view.

In the year 2017 the whole system was replaced from the old building to the brand new control room. The pictures show how all 3 systems are placed on the big display wall in the main control room. ■



Pic 3: Baskentgaz company – the new control room

Pic 4: Reliance SCADA, AVE and MARUSHKA GIS are displayed on the big LED wall in Baskentgaz

SHOPPING MALLS CHODOV AND CERNY MOST IN PRAGUE – SMART METERING

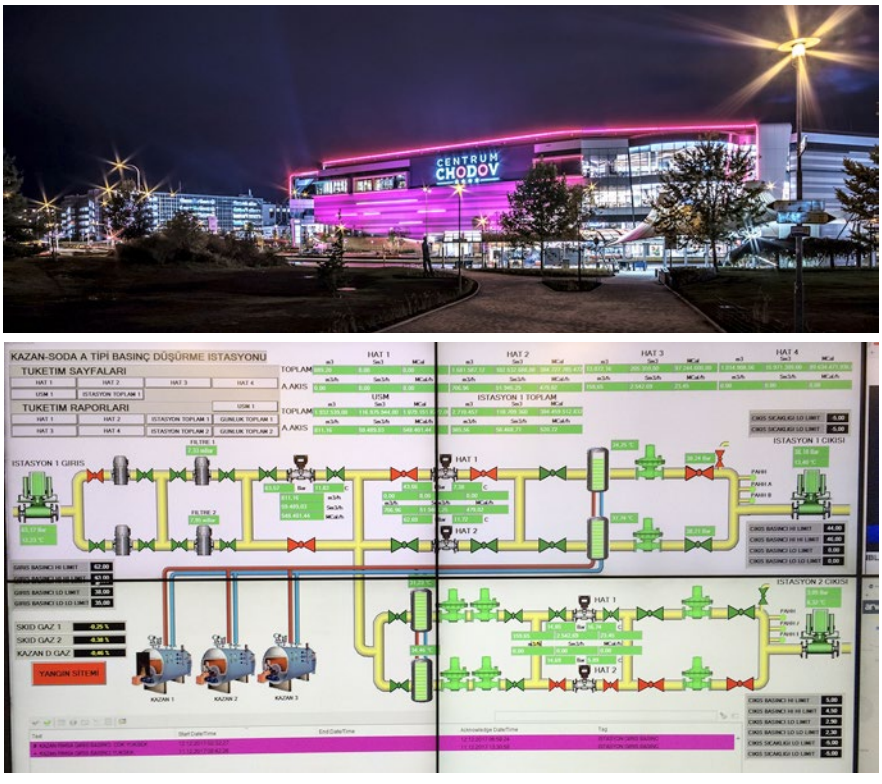
Shopping mall is like a small city full of small shops. Every shop has its own consumption of energy – electricity, water, gas, heating, cooling. The owner of the shopping mall needs to read out the consumption data, store it, validate and use for billing purposes.

In the year 2017 our SW system AVE was used to do this job in the biggest shopping mall in the Czech republic – Chodov in Prague. It is the same shopping center where Tecomat PLCs are used for LED lights control since 2012.

System AVE reads data from power meters once per hour. The rest of energy meters are read every 12 hours. There are 1458 meters in total. 95% of them are read via MBus protocol automatically with 99% success. 5% is read manually once per month.

Data read by system AVE is stored to the MS SQL database and validated. AVE check out zero values, % divergence from the measurement of previous month. After the validation the protocols are automatically generated and sent to the main energy manager. When the report is confirmed data is sent to SAP for billing.

The owner of the shopping mall is so satisfied with the result that he wants to use the AVE system for next 3 shopping malls in Prague. The second shopping mall Cerny Most is already connected and 2 shopping malls are planned for the year 2018. ■



Pic 6: Shopping mall Chodov in Prague. Control of the light and smart metering.

TECO HAS BECOME A TECHNOLOGICAL PARTNER OF A PROJECT CALLED THE CZECH ISLAND HOUSE – SELF-SUFFICIENT TECHNOLOGIES AND THE FUTURE

The project called the Czech island house, thanks to its large spectrum of activities, has drawn a huge attention from the public and experts alike. Starting with a large student competition and ending with public workshops and exhibitions, everything in this project focuses on the issue of building self-sufficiency and how to use resources more efficiently. In 2017 OSN (UN) even awarded this project with the Energy Globe prize for innovations in the energy field. The integral part of the entire story is the implementation of samples of two self-sufficient buildings which are currently in the preparation stage. Of course, an important role in this project is played by the Foxtrot system made by Teco a.s.

Fig. The Czech Island House Team /project was awarded the Energy Oscar – E.On Energy Globe 2017

In 2016 a student architectonic competition called the Czech island house was announced for the first time at the Faculty of (CVUT) Czech Technical University in Prague and the Institute of Technology and Business in in Ceske Budejovice. Their task described two small apartment buildings working independent of the utility networks while preserving the standard of living which we are accustomed to today. The first place was taken by the couple Vojtech Lichy (architecture) and Petr Pavek (TZB, technology). Their work was so exceptional that after the competition was over they got the call from the Czech Island House project team asking them for cooperation. Their task now was to design two prototype independent buildings for the Bohemian region, near Vyssi Brod. After more than a year of intensive work done by Vojta Lichy, Petr Pavek and their entire team we now have in our hands a completed project we can further develop and prepare for its actual implementation. Under the management of architect Jana Horicka from the Building Faculty at the CVUT (Czech Technical University) a complex design of two humble buildings independent of utility networks with rational technological structure have been presented," describes his feelings Pavel Podruh, the cofounder of the Czech Island House project. Now, approximately a year of additional preparations, calculations, programming and testing will follow. At the same time however, a test replica of the technical room that will be used in real constructions is already standing in the facility of ELPRAMO. The goal is to prepare and make everything as realistic as possible and completely debug the system before the actual construction.

Fig. Testing assembly in a warehouse hall. The inner garden house dimensions match exactly the size of the future engineering room. The equipment for the island house – refrigerator, water treatment, water heating, waste system including water filtering plant are located outside of the house.

Czech island house and used technologies

The selection of the technologies used in both houses was based mainly on the consumption of electricity, which is the key element for island systems.

Fig. The winning design of Vojtech Lichy and Petr Pavek after applying modifications accommodating the actual implementation in the Vyssi Brod location.

Fig. A distribution cabinet with Foxtrot located in the electrical room. On the wall you may see charging modules and inverters powered by batteries.

Fig. The project that took the second place in the competition was based on the mobility of the Island House. Before the actual implementation modifications were applied and the Czech Islands Hose was turned into the Czech Island Container.

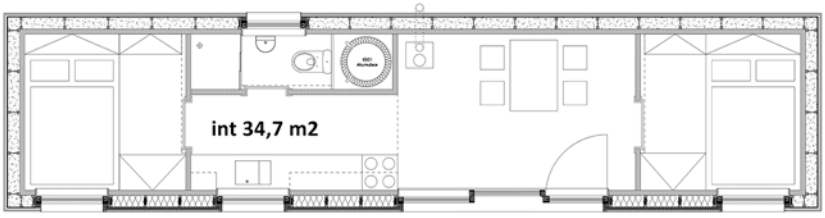
Fig. Its author Daniel Bryda finally realizes the project alone in South Moravia facing the famous Slavkov battlefield (project status in the middle of summer 2017). When finished and controlled by Foxtrot, Mr. Bryda will choose the land where to sit the house. He may literally load it on a truck and search for new sceneries.

The primary source of electric power will be the own photovoltaic power plant with installed power of 10 kWp equipped with battery storage LiFePo4 with capacity of 20 kWh.
The photovoltaic/solar panels are to be built-into the entire saddle roof area on the south following the common double-layer structure with a ventilated gap. These panels will also act as roof tiles. At present, the energy system is currently being optimized in cooperation with the main partner of the entire project, the GWL Power/i4wifi company, which prepares the solution so the backup source – gas electrical center is used only in emergency situations. The priority of the water distribution system was to minimize the consumption of drinking water down to a minimum. The source of drinking water is a drilled well. Rainwater from the roofs of both houses is collected in a common underground reservoir capable of storing 8 m^3 of water and will be able to supply almost half of the drinking water used during regular operation of the house. Waste water is to be cleaned using an aerobic bacterial technology supplied by Czech company Envi-pur. The water treatment process also involves a decorative pond where the water is collected before it is absorbed by the soil and which closes the water circulation process. Heating system and water heating process during winter months is powered by an 8 kW pellet burning boiler. During summer months (when there is sufficient sunlight), the water will be heated by electric power created by the sunlight. To ensure sufficient supply of fresh air and to maintain high quality inner environment a ventilation system with heat recuperation unit manufactured by a young Czech company called WAFE was installed.
To coordinate all these technologies and their consumptions is no easy task so the designers used an intelligent control system Tecomat Foxtrot made by Czech company Teco. The key task to prepare the software and install the electrical components was entrusted to a company called ELPRAMO – this company is currently preparing a highly sophisticated algorithm for this implementation which will be replicable in the future.

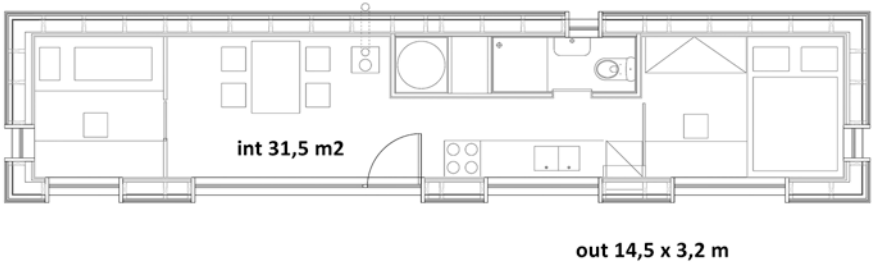
This is not ecology, it is just a common sense

The Czech Island House project focuses on promoting safer and more efficient utilization of resources and on research and development of further use of renewable sources while using our building systems. The project team has deliberately selected the most extreme case, that is a situation when the building is not connected to the city utility networks but is able to handle its needs alone and independently. These activities followed by real-life experiences helps the team to find solutions and methods useful in the future for regular construction projects which of course, has a positive outcome.
After a half year of testing of the completed house will open for the public, or rather you may reserve a stay here and check how the house works. „It would be very beneficial if a lot of people test the house and increase their awareness about renewable resources. Also construction companies should be able to see the potential of this project," adds Pavel Podruh. ■
www.ceskyostrovnidum.cz

Czech Island House



Czech Island Container



MONITORING CENTER FOR PHOTOVOLTAIC (SOLAR) POWER PLANT BUILT ON FOXTROT SYSTEMS

After the solar boom and crazy over-construction of photovoltaic power plants, the interest has shifted to the actual increase in yields or to a new owner replacement often accompanied with increased technical care for the installed equipment. One of such representatives of this trend is a company called General Energy, which gradually consolidates all its power plants (fig. 1) into one unified system. The central headquarters of the company is located in the Gity facility in Brno. There is also the monitoring center which is dominated by a wall made up of eight large screens. Several Foxtrots manufactured by Teco a.s. are continuously working behind the large screen.

We have asked the author of the implementation Ing. Pavel Smilek from Rameco what concept he has selected for this dispatch station and why, and what benefits this solution brings.

The solution is based on a concept which has proven to be the right choice for another project dealing with monitoring systems for backup generators, where hundreds of devices from different manufacturers and of different age, design and data outputs had to be connected into one unified monitoring interface. Foxtrot, which offers great connectivity, scalability, and reliability was a great choice at that time and it was not the same here. Foxtrots installed in individual photovoltaic power plants handle both data communication with the inverters, as well as the collection of other variables from the surrounding environment: fire and security alarms and logs, illumination sensors, temperature and wind sensors. They transform data based on specific user requirements such as unification periodicity of measurements, purification and unification of database of all technologies and send them to the monitoring centre. Here, other Foxtrots are used to display information on monitoring screens and also handle the local (or remote) administration of IT environment and company management. In addition, Foxtrots also archive data, send reports and alarms, or they are used as output interface for further processing of data which describe the power output or production capacity of individual small hydroelectric power plants and photovoltaic power plants.

What is the installed power output and how many power plants are seen on these screens, or how many plants are monitored here. Do you consider further expansions?

At present, 10 power plants (some FVE are further divided into logical sections based on the used technology or connection to topology) are monitored, and also two small water power plant (MVE) where each one is again a pair of independent MVE. The total installed power output is somewhere above 10 mW. The investor required a solution whose scalability will ensure that significantly larger number of locations will be available in the future and therefore in terms of the intended technology we shall look forward to the actual implementation. We count on the extension of the system with SCADA /HMI Reliance.

What is considered standard on this implementation of Foxtrot and vice versa. What is new or considered above-standard?

The use of Foxtrot systems for monitoring and control of industrial technology is considered standard. As you may know, Teco has been producing these systems for this purpose for decades. The interesting aspect of this implementation may be the necessity to deal with a large spectrum of used technologies. Whether this regards inverters and trackers in individual power plants supplied by many different manufacturers – each manufacturer offering a large range of types including the latest and old models which require development of special monitoring protocols and

Fig. 2 The large video screen of the monitoring center consists of 8 large screens

Fig. 1. General Energy gradually consolidates photovoltaic power plants with different establishment dates and with different technical equipment under one monitoring center

procedures. Also calibration and unification of variables had to be ensured. Here for example, I got help thanks to the use of calibrated solar radiation Sensors which Teco offers as a standard feature in its Foxtrot kits. Further, also the interface for various and deployed security systems had to be created and fluctuating connection quality between certain locations etc. had to be addressed as well.

Foxtrot is PLC. It has been designed for on-line control of connected inputs and outputs. Here you are mostly using its graphic, visualization and communication functions which are extra features and are therefore limited. Is there any automatic control function at the dispatch level? What limits did you encounter and how did you address it?

Foxtrot is equipped with high quality integrated visualization interface. This allows Foxtrots to be deployed even in this monitoring center (fig. 2). Certain limitations from the past, for example the number of variables on one screen, may be solved by using new graphic libraries using the so-called Canvas technology (Fig. 3). This allowed me, in addition to other things, to combine the power output diagrams of several power plants and display the statuses of the 400 inverters as well as other information on one screen. By clicking on any inverter, whose status or power may be compared graphically with any other device, the information may be transferred into a chart where the given parameters are displayed in the same way as we are used to seeing in regular server applications. Automatic control functions through PLC are implemented more commonly at the FVE level: tracker control, protections and watchdogs for various technologies. As far as the dispatch level is concerned, it allows intervention into the control through switching between the manual and auto functions as well as other smaller or extra features.

Here you are also using a connection to Solar Monitor modules. Can you comment on this part of the solution? How many types of different inverters are you communicating with?

Here Solar Monitors are used to transform protocols used by inverters from different manufacturers into one data tree based on XML, which is further processed by Foxtrot systems. At present we use three
Solar Monitor series at our locations with capacity six, thirty, or hundred inverters per unit and the communication is done with 5 different types of inverters made by ABB, Delta, Kaco, SMA and Solutronic. In certain FVE we also use SM2 – PC units for dispatch power management. Our experience with all 3 units mentioned above have been very good so far.

You also install Foxtrot for your customers for the so-called smart installations. What do these installations have in common, and how they fundamentally differ from the implementation of this dispatch center? Could some functions utilized by this large dispatch center be also used in "small" scale management, for example, in a family house?

A common feature of both types of implementations is the fact that they monitor the activity of FVE. That means they monitor the amount of the produced energy, states of inverters, faults and communication with the user. The main difference is the amount of installed power and also in the used control and regulatory functions. In case of a home FVE where Foxtrot is the superior system overseeing all home technologies, it also performs and optimizes water heating, air conditioning and controls appliances whose performance may be spread over certain time, controls the storage of energy in batteries etc. In terms of dispatch, the use of Foxtrot in household applications differs significantly from the use in large power plants where only the production capacity is monitored, whereas in the household the user has a complete overview including the return on his investment made into FVE as well as how the produced energy is used. ■

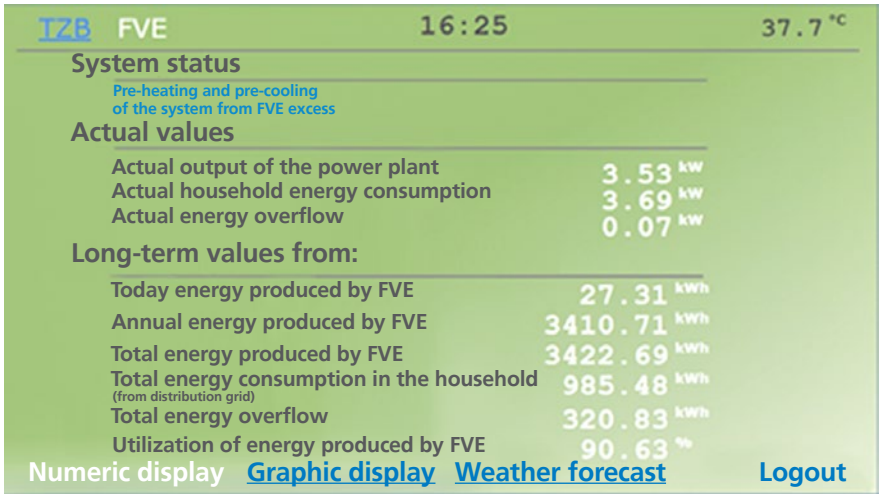
Fig. 3 Each screen focuses on Foxtrot. Canvas technology used by advanced graphic and interactive functions on the Foxtrot internal website allowed the monitoring center to place the actual number of basic details and information on each desktop.

FVE CONTROL AND MANAGEMENT REFERENCES

Smart Control

The article describes installation done in Tenaur building

– A power plant with 3.5 kW power output is monitored and controlled by Smart Control system. The goal is to utilize as much energy as possible but without overflows – if achievable. A merger between two standard products Smart Control – Eco-Watt and Sun Control. Quick electro meter E- EM - 0401 M was used.
– Single phase 3.5 kW inverter Fronius Primo (ModBus control and reading)
– Single phase heat pump Mitsubishi controlled by inner unit Eco-Watt. The heat pump provides heat or cools down the floor heating system without utilizing any accumulation tank. It heats up the tank for hot utility water.
– Single phase 2 kW electric boiler in the tank for hot utility water.
– Accumulation of heating/cooling for 7 heat circles in floor heating system, tank for hot utility water
– At times when there is a shortage of energy the regular control mode applies. The heat pump heats the building according to the preset temperatures based on the time of the day and on the efficiency of the operation. Should there be small or unstable excess of energy the electro boiler in the tank is activated and controlled regularly within the range 0–2 kW and with accuracy of 5 W. The response time is 500 ms which means, if there is a place where the energy may be accumulated there is no overflow nor there is any power draw from the grid. During a stable supply of energy the heat pump is activated and the compressor frequency is controlled. Peaks excesses are still handled by the electro boiler. Weather forecasts lets the house cool down by the pre-set value, providing that an excess of energy from the power plant is forecasted for the next following day. During transition periods the heat pump is not switched on during the night, but only when there is an excess of energy/ electricity from the grid. A combination between all variables ensures maximum utilization of own energy and covers the vast majority of energy needed for heating/ cooling and or heat up utility water. ■



MANAGEMENT AND CONTROL OF TECHNOLOGIES INSTALLED IN THE ADMINISTRATIVE-PRODUCTION HALL OF VIPAX – LUKOV, CZECH REPUBLIC

Fig. New administrative-production hall of VIPAX in Lukov, Zlin region.

In 2017 a new administrative-production hall belonging to VIPAX, a.s. was built in the town of Lukov near Zlin. VIPAX manufactures fire resistant steel doors. Tecomat Foxtrot control system was implemented here by Vit Jadrnicek.
– www.jadrnicek.cz

In this building Foxtrot system controls the following systems:

- Heating system – two Viesmann gas boilers in cascade control, 4 independently controlled heating circuits – utility water, first floor – heating units (radiators), second floor – heating units, second floor – floor heating system
- Air-conditioning system CIC Jan Hrebec controlled according to CO_2 sensors on CIB bus
- Sinclair air-conditioning unit
- Argus Vsion Winter Warm heaters
- Motorized skylight window in the production hall
- Climax outdoor blinds
- Garage doors

Fig. Argus heaters and air-conditioning system from CIC Hrebec controlled by Foxtrot are other technologies which affect the inner climate of the building.

Fig. Foxtrot system controls blinds and skylight windows in the hall as these are involved in the complex indoor temperature and climate monitoring and controlling process.

- Paint spraying box monitoring

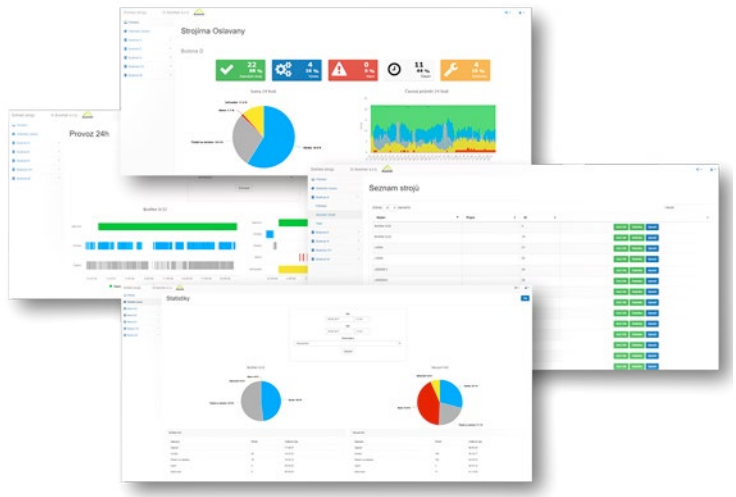
The entire control process is visualized in **Automer**, an application which replaces the classic SCADA system which is described in a special article in this issue. The investor and building manager therefore have a tool for easy and comprehensive control of the building allowing them to configure various parameters and scenarios. Further, the manager may also use consumption diagrams allowing the manager may optimize the climate inside the building based on known operational cost spent on energies. ■
www.jadrnicek.cz

Fig. Cabinet with Foxtrot installed in VIPAX.

MACHINE MONITORING IN OSLAVANY ENGINEERING PLANT – IMPLEMENTATION OF INDUSTRY 4.0 CONCEPT USING FOXTROT CONTROL SYSTEM

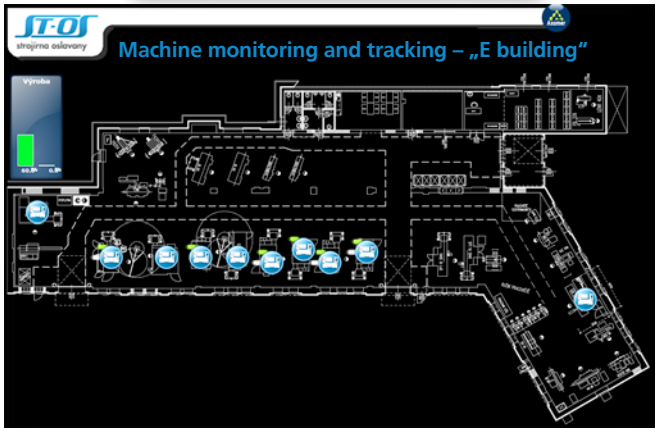
Between 2016 and 2017, Axomer s.r.o., Brno has implemented on behalf of Strojirny Oslavany Spol. s r.o. (hereinafter referred to as ST-OS, http: // www.st-os.cz) a monitoring system overseeing production machines under a project called „New Generation of ST-OS Production". This project builds on practical experiences and needs of the company that has been realized through a natural development and based on the need for complex monitoring of all its machines. The aim of the monitoring is to maximize the utilization of technological and production machines, signalization of machine operational statuses, outages and failures in connection with the installed ERP system called Helios Orange. The fact that such on-line machine tracking or monitoring system is seen as one of the pillars of a future marketing process known as the Industry 4.0 is a clear demonstration of the immediate and practical readiness of the Foxtrot system to address even these new challenges.

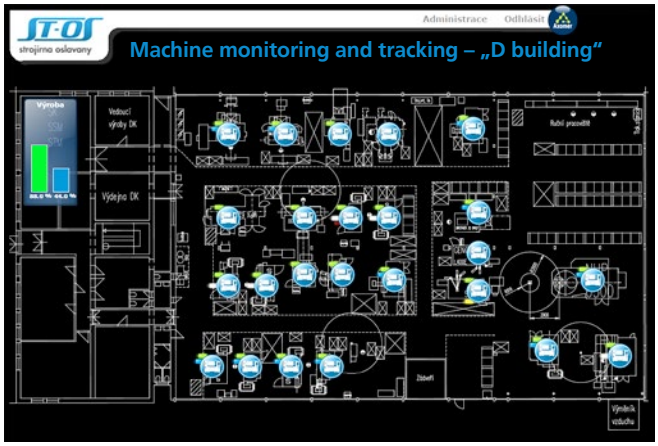
Because many different machines supplied by various manufacturers and with various technical connections to industrial bus systems and standards are installed in ST-OS, our Tecomat Foxtrot was chosen as the universal and variable „status collector system". A collector of the statuses of individual production equipment – binary equipment or network protocols – for example Modbus TCP. Machine or equipment information is displayed online at the PLC website, and the data are also sent and stored in the server database where it is evaluated and displayed in the form of graphs and the user can filter it out according to his or her own needs.



At present, over 43 machines in 5 production halls around the entire ST-OS facility are connected through 4 PLC units Tecomat Foxtrot. The information provided by the system may be accessed by managers and shift masters in the halls, and everyone may use and modify the information according to his own needs. The system is connected to ERP system Helios Orange, where the work hours of each machine are registered and where eventual maintenance is planned. In the event of a fault or breakdown, the service sheet is automatically introduced. ■

www.axomer.cz





LOW ENERGY HOUSES „NA AMERICE“

Right on the border of the protected landscape area of the Jizera Mountains, in the village of Mnisek near Liberec, a unique project consisting of 25 low-energy family houses embedded in the ground was implemented by a company called KONHEFR. The architect who designed these houses is Michal Hlavacek, a multiple winner of the „Building of the Year“ award. In the area called „Na Americe“ you will find 5 underground-type houses (houses with one floor embedded in the ground) and 20 half-embedded houses (one floor at ground level, one above the ground). Each house is built on a land area of 2 000 m„ the windows are facing southward giving the residents a beautiful view of the Jizera Mountains.

These houses are unique not only thanks to being embedded in the ground, but also thanks to the use of state-of-the-art technologies, making them very low-cost buildings. All 25 houses are equipped with intelligent control system HAIDY. State-of-the-art recuperation units made by PAUL also significantly contribute to pleasant climate and environment. Thanks to a well-optimized combination between the used technology and the house structure, residents living in these houses are able to turn on their heaters during the winter much later, and during the summer, are able to keep pleasant climate inside the houses for a long time. The monthly cost for the operation of the house ranges between only 600 to 800 CZK.

The entire project is divided into two stages. The first stage includes 11 homes which were completed and handed over to clients a year ago. The second stage, consisting of 14 houses, is currently undergoing the last modifications stage but half of these houses are already inhabited. „So far, we have a very positive response from our clients who have been living here for a year now,“ says Filip Rezek, the Business Director of HAIDY, which delivers intelligent control and recuperation systems for these homes. „Our control system has been received with a great satisfaction and most people are already expanding the system with other elements and control modules. This is not a problem because when we install HAIDY we always expect that the client may want to expand his smart home functions in the future. The cables are ready for such expansions“.

Fig. House rendering – underground house by Konhefr designed by architect Michal Hlavacek

A part of the equipment of each house is a package which contains modules for heating and cooling control, PAUL recuperation system and the leave button which puts the entire house into a standby mode. The possible system expansion is discussed by HAIDY representatives with each client individually. According to the director Mr. Rezek, the most frequent requests are aimed at the house security including camera monitoring systems, blind or irrigation system control as well as weather forecast functions which are linked to these systems. Some customers also enjoy the comfortable control of their lightning systems.

Houses half embedded in the ground are still new and unique in the Liberec region. Authors of the project kept in mind that the beautiful nature cannot be disrupted by these houses and they succeeded. They managed to build a facility which is not a typical satellite-like facility but offers its residents all the benefits and comfort of satellite-style living. ■

www.haidy.cz

Fig. View of the house interior – bedroom

Fig. Houses built by KONHEFR use Tecomat Foxtrot to automatically control their infrastructure

TENAUR DEPLOYED SMART CONTROL/FOXTROT SYSTEM IN A FAMILY HOUSE IN PRAGUE

The investor had two requests and they were rather clear: to be able to control the house as one unit and to be able to do it remotely. At first, this may look like simple, straightforward and rather humble request until you learn that this unit consists of 83 lamps, 70 blinds, 23 individually heated zones, 3 air-conditioning systems, 2 heat pumps – each supplied by different manufacturer, thermal solar panels, accumulation tank for hot water, heated swimming pool with filtration system, safety alarm, gate control, weather station, and monitoring of the main consumption – heat pumps. The installation company Tenaur from Plzen, which completed this project is certainly no novice in this field and Tenaur was perfectly prepared and ready.

Yes. In time when e-shops and commercials are trying to sell you the term smart house, smart household or wirelessly controlled light bulbs and thermostats, units or wall plug adapters which anyone can install, there are also houses which are built as real automated and sophisticated entities. These projects offer real energy savings and logic connections between all in-house technologies installed by companies that cover their work with long-term warranties. Tenaur enjoys a strong technological background and extensive experience with thermal and technical devices. This mainly includes knowledge dealing with various combinations of different technologies including efficient coordination of their operation. This has become today one of the key competencies because houses are equipped with ever-increasing number of state-of-the-art technologies usually supplied by different manufacturers and with different parameters even though, based on their characteristics these technologies have the same purpose or are considered the same type. In other words: not every heat pump is the same and not every air-condition or solar panel are the same, well we could go on and on ...

Fig. The roof of the house is an inseparable part of the building control technologies. It actually represents a engineering "room or space" which carries the installed thermal solar panels including weather station and communication antennae which talk with the world.

Tenaur follows this know how with its own control system. Simply put, Tenaur deployed Smart Control system which Tenaur has developed from the beginning together with eximen s.r.o. It is a service-programmable system or more precisely, it is customizable via tablet or PC and in order to perform configuration at the user facility it is not necessary to interfere with the basic SW core of the system. Smart Control is built on user (OEM) version of freely programmable Tecomat Foxtrot. In particular, on Foxtrot CP-1970 with individually preset combination of inputs and outputs on the basic module. This centre and therefore the entire Smart Control system is fully compatible with all expansion modules which belong to the CFox module series installed on the double-wire CIB bus and it may be programmed in the same way as the supplied Foxtrot system. Thanks to this fact Smart Control system has solved the scalability in an elegant way using the large spectrum of peripheral modules and any sensor or actor in the house and it may rely on remote management – the user control process done from the house or from anywhere is identical as well as the servicing interface for any on-line update. Due to the division of the system into logical units a pair of logic and mutually communicating modules was installed in this house with a unified control system and therefore are controlled as one unit. Both modules are backed up by own batteries which also power the entire peripheral system in case of emergency. This allows the house to be completely monitored even if the main power grid fails. The entire peripheral system is placed in a centralized distribution cabinet. See the picture.

The system allows the user to control 83 lamps and then approximately 70 blinds according to the user configurable scenes and customizable assignment of functions. „The user may select and customize any button and use it to control any desired function". Further, preconfigured scenes may be initiated based on weather forecast or synchronized based on the sundown or sunrise, or according to information received from the security center/switchboard. Of course, the user may also control the system manually using the graphic interface on any display mounted on the wall, or by simply using his smart phone. There are 3 air-conditioning units in total. One is assigned to the house and handles the ventilation based on preset time modes but also when needed

Fig. The outdoor unit of the heat pump is located in front of the house on the south. Chimney units on the façade are led from the bivalent source which is switched on when the surrounding temperature falls down to a minimum.

(VOD – Ventilation On Demand). That is when the air quality goes down (air breathability) and the CO_2 concentration increases. Another air-conditioning unit is linked to the cooling system and switches on based on the current temperature or rather based on the needs to cool the given room down. The third unit is used to ventilate the swimming pool area according to the pre-set time schedule and it also works as dehumidification unit.

This family house uses the energy of the incident light available around the house. To do so, the house is equipped with heat pumps and thermal solar panels. There are 2 heat pumps in the house. The one supplied by Nibe is used to heat and prepare hot service water and communicates with the Smart Control system via Modbus protocol. The Smart Control system coordinates the preparation of hot water in the accumulation tank using the heat pump and solar panels. It will not turn on the regular „paid" heating if the water is sufficiently heated by the sun. The other pump is made by Mitsubishi and handles the cooling using the already mentioned air-conditioning unit. The heat management process is one thing but it also involves a controlled heat distribution to zones throughout the entire house. This house is using floor heating system. Smart Control system handles valves in the hot water distribution cabinets which supply water to 23 zones. This control process is time-based and works with two temperature settings – comfort and economical. Distribution of cooling air in individual zones is achieved thanks to the use of continuously controlled flaps.

One of the controlled zone is considered the swimming pool area because

Fig. Electrical cabinet with peripherals is connected to the center with double-wire CIB ® bus. High capacity modules offering 6 to 32 inputs/outputs are used here. The modules are placed elegantly and covered in regular power cabinets on the DIN rail, in a similar way as circuit breakers for example. When in manual mode, each circuit may be controlled from the front panels independently. This is a handy feature used when the system is being put into operation, during service checks or in an emergency situation. There are also two displays fixed on the wall offering comfortable control features and which are also displayed on a remote tablet, smartphone or PC.

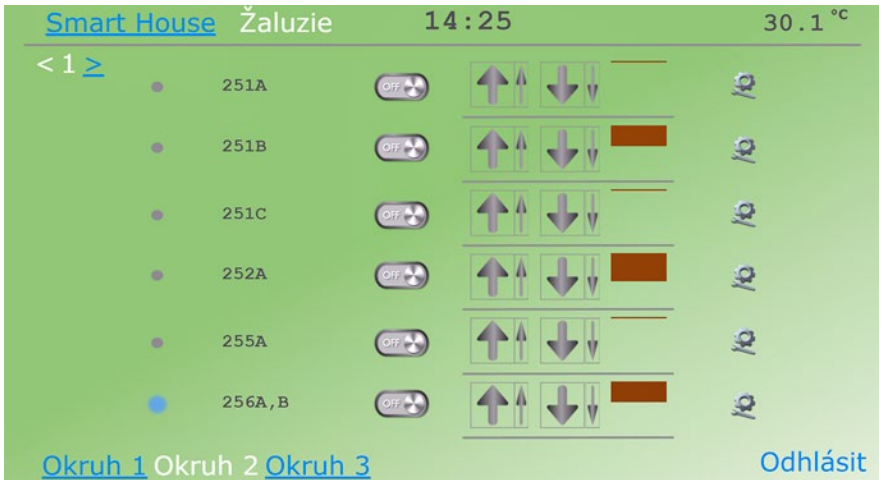


Fig. The picture shows the position of each blinds in relation to the window. Functional conditions for each blind may be set individually.

Smart Control

Fig. The actual Smart Control central unit is placed in the electrical room together with the recuperation and ventilation unit.

the air temperature, water filtering and temperature of the air are controlled. The control system continuously communicates with the security center, even when the security mode is off, that is when the house is under full operation. The system communicates with the weather station and all energy meters. This provides the system with immediate information and statuses in the house as well as outside of the house and allows the system to optimize the operation of the entire house based on the number of people inside the house, the current use of the house and based on ever-changing weather conditions. Everything is intertwined and integrated through the Smart Control system which builds on Tecomat Foxtrot and to make sure that the house is controllable as a single unit and not as a bunch of technologies which are not aware of the existence of the other technologies and therefore cannot be optimized together. This is a great example demonstrating how the ever increasing amount of different technologies installed in houses, which are fully understood only by tech enthusiasts, can be managed using simple and understandable commands or instructions. ■

Prepared by: Jaromir Klaban, Teco; Jiri Sizling, Tenaur, photo by Tenaur

Fig. Home screen of the Smart Control system allows you to control all technologies installed in the house, monitor their status and take manual actions based on your own decision but also to configure logic, quantitative and time requirements for fully automated behavior of the entire house.

Fig. Similarly as the blinds, you may also monitor the lighting system and control the system from a screen. You may also go to the settings screen where you can adjust individual conditions for each lamp.

Foxtrot communication – NIBE

Under the development framework of the Smart Control platform, eximen has managed to transfer data between Foxtrot and heat pump supplied by NIBE. Thanks to this transfer, eximen has extended the ever-increasing portfolio of tested communications applicable to devices and products supplied by third parties.

Detailed description of the achieved communication:

Modbus communication for the control of ground and air heat pumps made by NIBE with internal unit SMO-40 or with system units VVM310, VVM320, VVM500.

The communication process was developed in cooperation with NIBE representatives in the Czech Republic.

The communication process reads information about the actual values on all important sensors or information about faults. This information may be used either for servicing or for monitoring the given device.

The control process of the heat pump is based on the service life and reliability requirements. All safety elements are monitored through NIBE control which prevents the device from damage.

The control process is divided into:

- Utility water heating. The required water temperature may be set. The heating process will start only when the communication allows it.
- Heating – the communication allows the heating process and sets the required output temperature. The superior system alone will figure out the proper heat distribution using three-way valves.
- Cooling – the Communication uses passive cooling for underground pumps.
- Electro boiler – it is usually blocked and activated through the communication.

Therefore, the system is active only when the superior system allows it and when it is possible to specify the basic parameters necessary for the operation of the heat pump. ■

TEFORA S.R.O. HAS IMPLEMENTED A „VIRTUAL „ SMART HOUSE

In 2018, Tefora has completed an installation of a control system in one very common but at the same time a bit of an unusual smart house near the town of Rakovnik.

Tecomat Foxtrot automation system was first designed for zone control including heating system and electric blinds. Later, when it was established that 11 light circuits „fit“ exactly the C-OR-0011M device, the client also decided to have control over the lighting system.

Implementation documentation of the control system was processed on a shared Internet storage called Google Suite, allowing the client to perform modification through the Internet (layouts, types and functions of switches, etc.).

Using this documentation, the client's electrician has prepared the correct

Fig. To correctly configure multiple weekly schedules for several rooms including different temperature requirements you need to use more complex multi-table input screens.

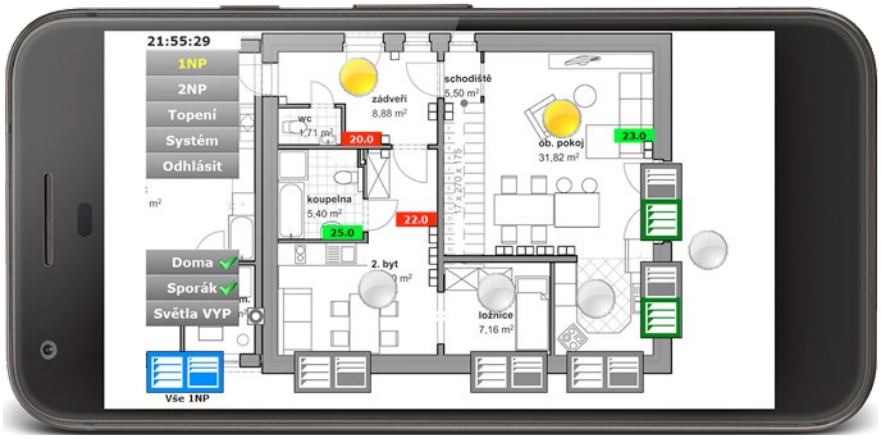


Fig. Basic screen with controls and indicators above the ground plan – floor plan is one of the popular ways how to clearly display all connections between several technologies at multiple locations.

connection cables for switches, lights, blinds and heat distributors. In parallel with the designing process, Tefora has prepared the program for the central unit and pre-connected components on the auxiliary DIN rail in the cabinet. Then, there was only one personal meeting with the client, not at his place, but at Tefora. At that meeting the client was presented and handed over the complete, fully functional Foxtrot system „in a box", including the control application in mobile phone. The only difference was that instead of shutters and lamps LED lights on the devices lit up.

Then the customer's electrician then connected the Foxtrot system to the cabinet according to the documentation using the prepared and ready cables, phoned in with two questions and the installation was completed. After Internet connection was established Tefora programmer remotely connected to the running Tecomat Foxtrot system through TecoRoute and made minor adjustments.

The entire project was implemented without a single trip to the house and based only on one personal meeting with the client. This could be achieved thanks to the client's technical knowledge and thanks to sharing the documentation over the Internet, but also thanks to the Foxtrot system features. In particular, the Teco-Route service was used two times:

- First, the client connected remotely and reviewed the Foxtrot control pages at the time when the system was being put into operation at Tefora.
- Later, the Tefora programmer made final adjustment to the system remotely when it was installed at the client's facility.Pouzite pristroje Foxtrot:

Used devices:

- central unit CP – 1006
- Relay module C-OR-0011M-800
- Blinds C-JC-0006M
- Button binary inputs IB-1301
- Indoor temperature sensors Pt1000

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AUTOMATIC FISH FEEDING – CARPFEED SYSTEM

ELPRAMO s.r.o. which has been active on the market for 10 years have implemented control system used by the so-called CarpFeed project. It is a unique modern technology used for automatic fish feeding which is manufactured and supplied as one unit by AGRICO s.r.o. CarpFeed ensures precise dispensing of feeding mixture into artificial pond covering several tens of square meters. This system is commonly installed in reservoirs or ponds where feeding mixture needs to be distributed.

The delivered control system Tecomat Foxtrot oversees filling of the temporary reservoir, feed dispensing, controls the blower that transports the feeding mixture and up to 9 turns for individual feed routes/branches. CarpFeed technology works automatically based on preconfigured daily dosages or feeding times. For example, feeding may be done based on the water temperature. The clear and simple control environment allows you to set feeding times, dosage intervals for each branch and other system parameters. Feeding may also be turn on manually – outside of the preset times. The control environment is available in several languages. The system visualization is displayed on the ID-36 operator panel directly in the distribution cabinet. You may also connect to the visualization screen through a web interface, or remotely thanks to TecoRoute. In case of a failure or clogged piping, Foxtrot automatically sends an error message. ■

www.elpramo.cz

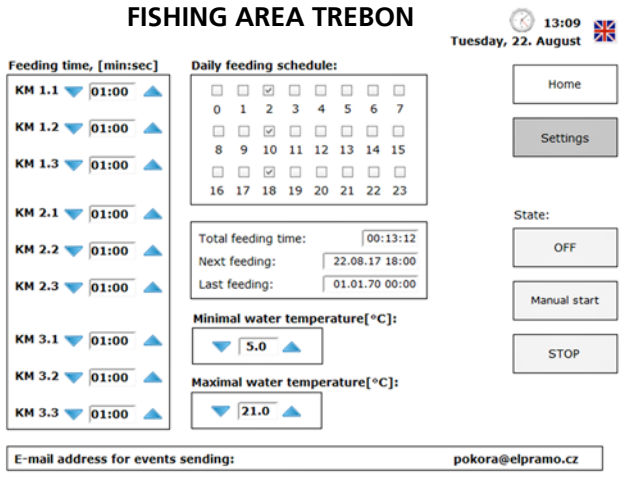


Fig. You may use the screen to select the language you wish to use to communicate with the operator

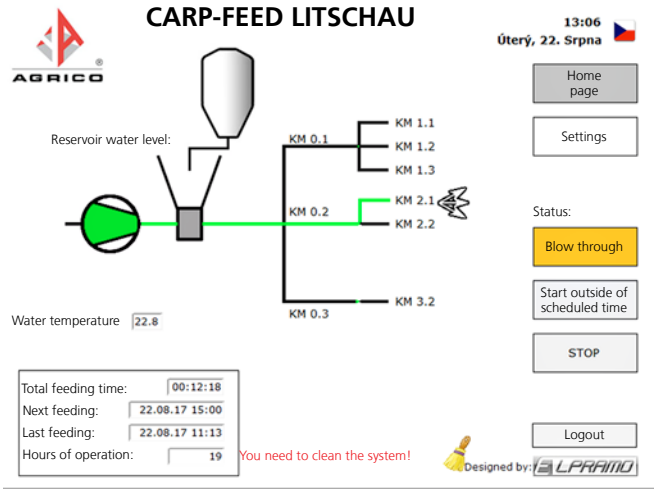


Fig. Visualization of the reservoir and traffic routes used to distribute fish feed.

TECOMAT SYSTEMS HAVE BEGAN SERVICING THE D1 HIGHWAY

Tecomats were installed in Prague in 2013 with the intention to control the vast majority of new traffic information display boards on major Prague's roads. Since 2017 Foxtrots have been increasingly used to control new traffic signs along the reconstructed sections of the D1 Highway. The actual traffic information display board is made by SWARCO. Tecomat foxtrot systems are used here to connect them to the National Information Center (NDIC) which is headquartered in the town of Ostrava. The supplier of this connection and solution is seen in one of the pictures attached to this article. The picture was shot by using multiple exposition settings during a test day of one of the three terminals which have been put into operation so far. Mr. Jadrnicek is not only experienced and universal programmer of Tecomat Foxtrot systems but also an ambitious photographer looking for new ways to take and process digital photographs. ■

www.jadrnicek.cz
www.rebut.cz

Fig. Foxtrot systems also work continuously and control information boards displaying the air temperature 1 and the road surface temperature along the sixth section of the highway and also on two warning traffic signs (PDZ) which display weather information. Photo by: Vit Jadrnicek

Fig. On three portals/boards namely at the 33.6 km, 54.4 km and 55.2 km of the D1 highway you can see Tecomat Foxtrot systems working above the heads of passing drivers. These are used as communication units processing commands from the National Information Center. Photo by: Vit Jadrnicek

LIGHTING SYSTEM IN TULI® CINEMA IN SAMORIN OVERSEEN BY FOXTROT

Recently, a new unique x-bionic® sphere complex has been opened in Samorin near Bratislava. It offers ideal background for professional sportsmen and teams, for sports enthusiasts, families and for lovers of healthy lifestyle and well-being. In the vast complex you will find three large facility where the control of the illumination system has completely been entrusted to Tecomat Foxtrot system. These include the cinema, hotel foyer and congress center. The system was deployed by a Slovak company called CableCom s.r.o. Let us take a look at this project from the viewpoint of the implementation of the control system and the from visitor point of view.

Tuli Cinema

Visually most exciting is definitely the unique and colorful Tuli® Cinema interior. It is the first of its kind in Slovakia. Its color and exceptional architecture will immediately get the visitors into the right mood. The non-traditional seating for 112 people is equipped with Tuli® seats that dynamically adapts to the instant position and the mood of the viewer. Exceptional cinema experience is further enhanced by both the cutting-edge projection technology, high-quality sound, but also by fully-controlled automatic lighting system installed in the hall. Yes, even in the cinema where darkness is one of the main functions, light, and above all, properly controlled light plays an important and obvious role. A total of 128 lamps in the hall ceiling, on the walls and on the staircase are equipped with standard DALI ballasts/inverters. All are coordinated by one central Foxtrot CP-1004, to which all lamps are connected via a pair of master modules DALI C-DL-0064M. Each of them controls full DALI bus space which consist of 64 light units. The principle used to control all lights is based on Foxtrot's Ethernet communication with the main IP projector. Foxtrot oversees user-adjustable light scenes: „OFF", „Trailer", „Projection" and „Full – 100%" for all 128 lamps. The scenes are arranged by Foxtrot along a time axis and the main projector automatically calls them.

Fig. Original interior in Tuli® Cinema hall. The hall comes to life when the first visitor enters.

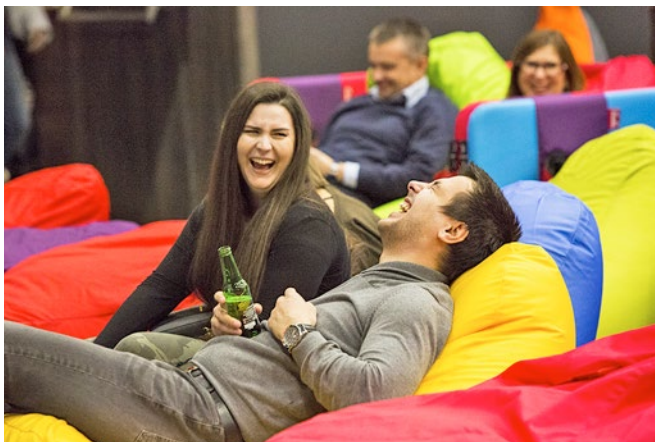


Fig. Light and dark, colors of comfort, fun and emotions. That is Tuli® Cinema.

Fig. Illumination of walls and the staircase during pre-set "Trailer" scene.

Hotel Foyer

Another area in the x-bionic® sphere where Foxtrot's scenic function is used is in the hotel's foyer. Even though you would not expect it, there is almost double the amount of controllable lights when compared with the cinema hall.

Fig. Hotel foyer is illuminated by approximately 200 individually controlled lamps.

There is again one central Foxtrot CP-1004 unit this time with four DALI master modules C-DL-0064M connected between via CIB bus. On the ceilings and on the walls there are roughly 200 lamps with DALI ballasts, divided into groups and controlled by one of the several preset scenes. The scenes are selected from the reception desk using the receptionist's PC screen with a web browser connected by default to Foxtrot through its user-programmable website with full graphics.

Congress centre

The third, and the largest project in terms of the size of the illuminated space is the congress center. It consists of 12 different congress rooms and halls able to accommodate a total of 1,850 people. There are 2 large congress halls, 3 congress rooms and 7 smaller meeting rooms. Capacity of the largest congress hall is 600 people. Top technical equipment, above-standard background support and qualified staff is ready to meet requirements of the most demanding customers.

The lighting control system is divided between 5 central modules Foxtrot CP-1004. The commanding and control of each from the hundreds of DALI ballasts is done by a total of 8 DALI master modules C-DL-0064M on CIB buses. In total, 512 controlled lamps may be addressed and handled by the system. Just in the largest congress hall alone there is approximately 120 lights. The superior system that uses Foxtrot systems to select from predefined scenes utilizes audio-video systems installed in individual halls. The superior system communicates with Foxtrot via RS-232 and Ethernet. There are also the following predefined light scenes: 0%, 20%, 40%, 60%, „Projection", „Projection & Speaker" and „Full – 100%."

Apart from the Dutch Van Der Valk Hotel in Veneendalen the x-bionic® sphere in the Samorin Center is another state-of-the-art hotel complex where the Foxtrot system was selected for the management and coordination of all technical facilities in the congress center, as in the Netherlands or as here in Samorin, in order to manage its specialized sections such as the lighting system. Here too Foxtrot has proven its flexibility especially when communicating with other operating sets or systems which are today necessary and which cooperate in the automatic control of lighting systems. Thanks from Teco a.s., the manufacturer of the Tecomat Foxtrot system, for completing this unique project in the x-bionic® sphere, especially to the developer the Slovak company CableCom s.r.o., as well as to IQ House s.r.o., the distributor of Tecomat Foxtrot systems in Slovakia. ■

Prepared by: Ing. Jaromir Klaban, Teco a.s.,
Ing. Michal Repka, IQ House s.r.o.,
Photo by: CableCom, x-bionic® Sphere

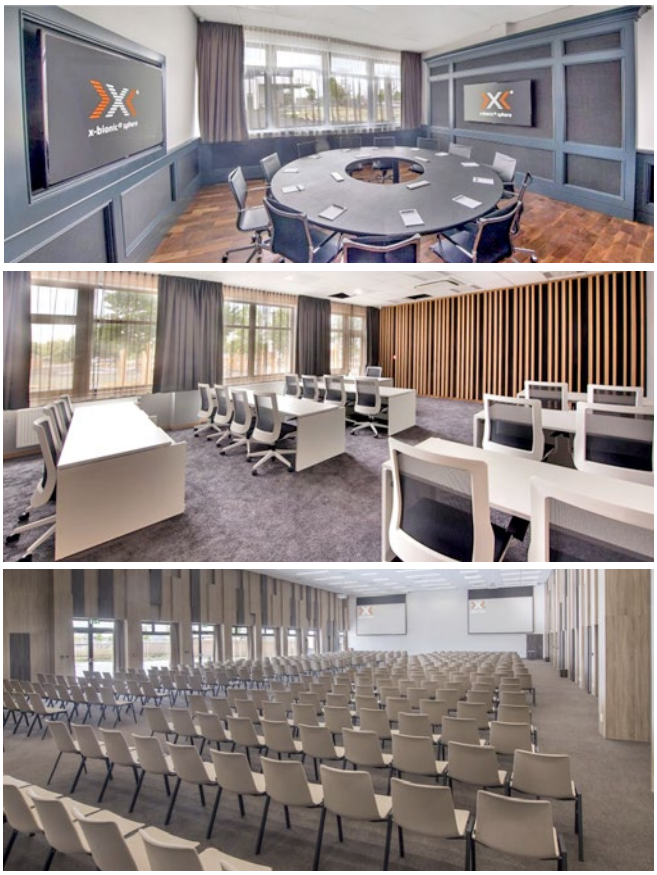


Fig. Illumination of small, medium and large congresses halls is controlled by Foxtrot. The preset scenes are automatically initiated by the audio-video system installed in the respective hall.

SMART CITY: A COLORFUL ILLUMINATION SYSTEM FOR A RECONSTRUCTED BRIDGE IN ZUTPHEN, THE NETHERLANDS, CONTROLLED BY TECOMAT FOXTROT

The original bridge over the IJssel River has become part of a broad redevelopment of the embankment in the town of Zutphen in the Netherlands which is built as a park with a number of new seating areas overlooking the water and historic Hanseatic towers in the south of Zutphen. The city has entrusted the project to Moederscheim Moonen Architects from Rotterdam. The company gave us the permission to publish pictures of the completed project in our TecoInfo newsletter. The completed project was handed over to the city at the end of 2017. The vaulted bridge is equipped with a basic lighting system consisting of 24 LED projectors 49M type made by SILL. The bridge is reserved for pedestrians and cyclists and it is equipped with 131 LUMENPULSE LED RGB-W lamps. RGB-W diodes, which are controlled by ballasts over DMX and DALI protocol, are the basic light source and may be programmed to create any color and dynamic scene. The intention of the architects was to control the entire lightning system interactively. For example, they used colors to signal the outdoor temperature. There was also a requirement for manual ad hoc control so the desired scene for special days or celebrations may be created.

It was a real challenge for the supplier – Spie company, to find the right partner who would provide the required control system capable of handling the illumination and interactive functions. During the tender which was thorough and very detail oriented the company has selected the solution offered by B & R design BV while using Tecomat Foxtrot CP-1015. This PLC is equipped with the MR-0105 sub-module, and offers even in the basic configuration two DMX lines. Two modules C-DL-0064M connected to CIB bus provide the needed 128 Dali bus channels. The basic user interface consists of ID-36 touch screen which is used to configure all local settings – controlled from the „Command Bridge". To control the color of the light scene based on the outdoor temperatures two PT1000 temperature sensors were installed under the bridge. The color range starts with the blue shade (–5° C) during the winter, and goes all the way to red (+25 °C), during the summer. The Tecomat Foxtrot PLC also turns on the bridge lights after the sun goes down and turns them off after sunrise while following the built-in astronomical clock. During late-night hours the illumination is dimmed down to 60 percent. Both for service purposes and for regular operation Tecomat Foxtrot is connected to the Internet through 4G/LTE router. Access through the inner Foxtrot web application allows Zutphen technical service department and the servicing technician to connect remotely to the system and program the color scene or to get information about the current system status. To accommodate this function better B & R Design has installed an IP camera on the bridge which is used to monitor the bridge and allows the operator to see the actual status in real time. The technical design and delivery of the systems were provided by Damsteegt/De Boer in cooperation with Spie and B&R design. ■

Arjan Van Der Vinne

Fig. The bridge in Zutphen blends in with the lights of the River embankment in the historical part of the city. Photo by Hettema

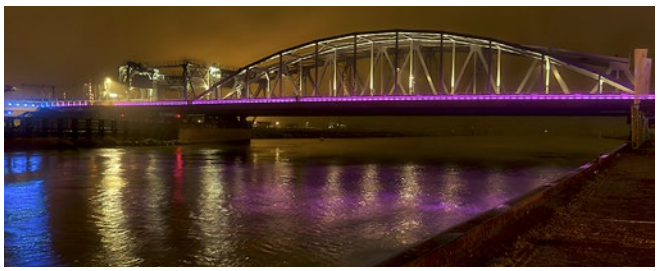


Fig. Bridge over the Ijssel River in Zutphen, the Netherlands equipped with controlled illumination effect system.

Fig. The control system also controls illumination of the staircase which goes down to the river embankment.

Fig. The color of the bridge over the IJssel River helps passersby to tell the outside temperature. Photo by: Hettema

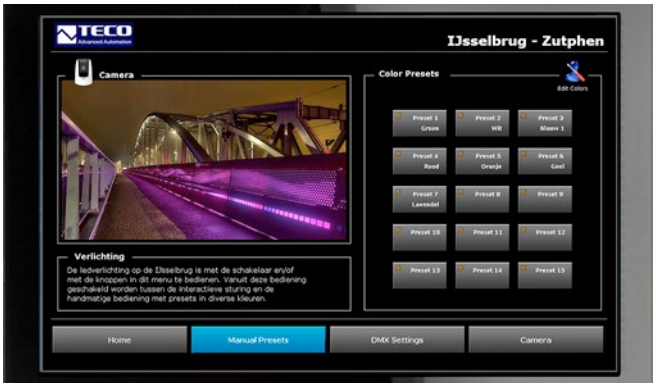


Fig. Bridge illumination system control panel. The current temperature is displayed and corresponds with the color between blue and red shade. The screen also shows the actual picture of the bridge in real time provided by the installed IP camera. The following page shows the preset colors used for manual configuration.

CONTROLLING ELEVATOR ACCESS IN 5-STAR DIVAN HOTEL, IRAQ

At the beginning of 2017 our control system Tecomat Foxtrot was installed to control the access to lifts in the 5-star Divan Hotel in Erbil, Iraq, which is 24 storey building with 4 elevators. The objectives was to set up access rights for ordinary guests, employees and VIP guests staying at the Divan Hotel. The actual implementation of the control system was done by our local partner in Iraq – a company called Securityco.

The integration in this project included interconnection of RFID card readers, supplied by Satin, with Foxtrot system. For this purpose modules C-WG-0503S with Wiegand interface were used. RFID readers are connected to the central module via universal CIB bus. Two central modules CP-1000 and expanding modules module CF-1141 are used in this hotel. Mosaic was used to design the control screens for the operator according to customer requirements, which are used by the control program itself. Foxtrot system forms here a responsive access control:

Fig. Thanks to its height the 5-star Divan hotel is one of the dominating features of the town of Erbil in Iraq.

Fig. Control windows/pages of the elevator access system in Divan hotel. These were created in Mosaic environment and run directly on the Foxtrot hardware.

Fig. The lobby of the Divan hotel where the elevators start and where the guest selects the floor and confirms his or her identity by inserting a valid RFID card.

- Registration of new card for specific floor
- Access acceptance/denial to the given floor after RFID card is inserted into the reader unit in the elevator
- Allows configuration of access rights (blocking, free access etc.) for system administrators (reception clerks, management ...)
- Registered card data logging ■

FOXTROT MANAGES THE ACCESS SYSTEM INSTALLED IN MAPUTO, MOZAMBIQUE

In the first half of 2017, Tecomat Foxtrot was installed in the African continent at the newly built high-rise building of the State Bank of Mozambique (Sede do Banco de Moçambique) in the capital of Mozambique, the city of Maputo. This bank is not a common commercial bank, as it fulfills similar responsibilities as our Czech National Bank.

Foxtrot system was installed here by our Portuguese partner, a company called InfraSecur. This 31-storey building contains 150 central units Tecomat Foxtrot CP-1006, which handle automatic doors, turnstiles and the access system. In total, there are 2,500 data points visualized in Reliance 4 SCADA software. ■

Fig. Entry turnstiles are the base of the bank access system.

Fig. The new building of the State bank in Maputo, Mozambique

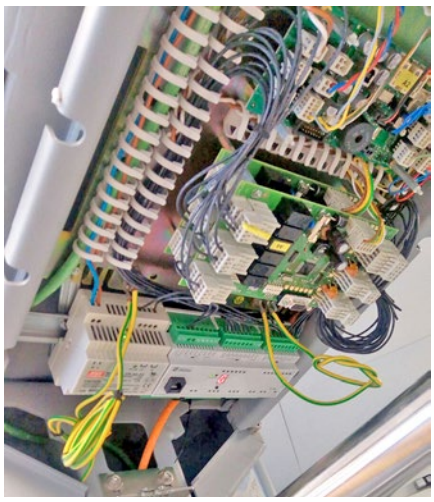


Fig. Central module Foxtrot built-into the turnstile

Fig. The control and overview diagram of the bank access system was created by InfraSecur in SCADA Reliance.

CONTROLLING THE LIGHTNING SYSTEM IN A RESTAURANT IN THE FIVE-STAR HOTEL JW MARRIOTT IN KUWAIT CITY

During 2016, the Foxtrot system was implemented with the intention to control lighting system in a 5-star restaurant in JW Marriot Hotel in Kuwait. The implementation was completed by our local partner and distributor – Gulf Automation Systems Company W.L.L.

Now the assigned staff may easily control the lighting and scenes in the restaurant via touchscreen panel on the wall. The staff may also use smartphones, tablets, or a computer. A combination of two converters from CIB to DALI bus was used here in total number of 128 controllable lamps and four phase dimmers, also installed on the CIB bus. ■

Fig. Illuminated interior in the hotel restaurant.

Fig. Built-in design of the ID-32 panel which is the central location used to control the lighting system and to configure the desired scenes.

Fig. JW Marriot Hotel in Kuwait City

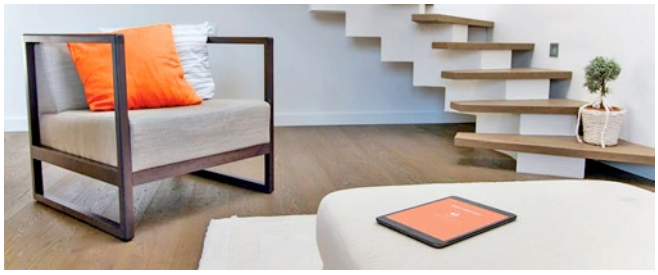
IN 2017 DOMOTRON HAS ENTERED THE GERMAN AND AUSTRIAN MARKET

Domotron is a modern and complex home automation system. Domotron system consists of hardware supplied by Teco and pre-programmed software that has been developed for more than 5 years exceeding a total of 12,000 programming hours. Domotron also offers a unique cloud service where all data and settings are backed up, or the cloud may be used to control Domotron system remotely. It also handles communication with third party cloud services. Domotron differs from its competitors because it offers very simple and user-friendly software which gives full control over the system (including advance functions and settings) to the end users. After more than 5 years of experience and after successful installation of more than 150 projects in Czech Republic and Slovakia Domotron has decided to expand to German-speaking countries.

The developer project in the German spa town of Bad Griesbach was completed in the spring of 2017. This project included reconstruction of an old hotel into an apartment building where the apartments are completely controlled by Domotron. Thanks to the system even the elderly and small families are now able to configure their own households without any hiccups. Heaters (radiators) are the heat sources used in the apartments. The intensity of the heating process is based on the occupancy level in the apartment which ensures the most efficient heating process possible.

Domotron enables easy technologies control in pension in Pruggern, Austria.

Domotron connects two approaches to home automation – a quality offline solution with a modern cloud service.



In a truly smart home most actions should be performed autonomously. That's why Domotron comes with a plenty of preprogrammed automations that take action based on various inputs without the need for any manual control.

Using Domotron App, every household member can customize the functions of the smart home and create smart actions according to its specific needs. With Domotron the user gains incredibly complex yet flexible smart home system that leaves all of the settings and adjustments in his hands.

Households or the actual apartments may be controlled through the installed application, web or through the programmable switch whose functions may be changed or configured at any time. Of course adjustable and controllable wall plugs are standard.

During 2017 in the Austrian village of Pruggern another very interesting project referring to Domotron has been completed. The Alpenhau pension/hotel. The architect designed the intelligent system controlling the entire hotel with attention to every little detail. Domotron controls the lightning system, blinds, heating, air-conditioning, recuperation system, and security system. Cameras and motion sensors provide flawless security coverage of the building. To further increase the security of the building also smoke, flood and wind sensors have been integrated into the building. Wall-mounted switches, Domotron Tuner configuration interface and the Domotron application are used as the control elements. This allows the owner of the hotel to control and configure all technologies entrusted to the Domotron system. ■

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