Welcome!

CONTROL FREAK CERTIFIED

We would like to introduce you to KWE Technologies Group's newest personnel addition, the Control Freak. He has been a long-time fixture around KWE, although at his request, he has remained behind the scenes until now. Rumour has it that he actually snuck in Jeff's carry-on luggage when returning from a particularly odd start-up where everything was properly installed and ready to go upon his arrival.

At first, he wasn't noticed around the office, although signs of his presence were becoming more and more evident. Drawings and files went missing over weekends, electronic components and raw boards disappearing from inventory counts, and occasionally, the dishes in the sink Friday were clean and put away on Monday morning.

He officially made his introduction to the staff in the now infamous "red button" incident, when he just couldn't resist the urge to sprint from his hiding spot and push every button, turn every knob and flip every switch in sight. Needless to say, chaos ensued, controls went bonkers, panels spontaneously tripped their breakers and the poor employees who witnessed it refuse to speak of it in more than a whisper to this very day.

Gateway to Knowledge

As many of the worlds' gateways are well known for their visual appearance or history such as the St. Louis Gateway, the Brandenburg Gate in Germany or the Princes' Gate in Toronto, the Versatronik 505 gateway is lesser known for its striking appearance and more so for its functionality. Like the others mentioned here which allow passage from one side to the other, the 505 provides a different sort of passage. It is the passage of information which we are talking about here.

Before the days of the NR2 controls, the Dekamatik boiler control ruled the land. As part of the Dekamatik control communication package, we were able to adjust slope, shift, sun and moon settings as well as a few other basic functions. When the NR2 took over as mainstay of boiler controls, it was found that even though the NR2 were LON-based controls, there were some settings which were not available and this was the basis of the Versatronik 505 communication gateway.

The design intent of the Versatronik 505 NR2/LON, NR2/BACIP and NR2/ Modbus gateway were to address the field issues of integration and available information to integrate the Viessmann controls.

The previous issue of the newsletter discussed the Autobinding function of the Viessmann LON controls and how they seamlessly discovered each other to build a self-contained LON network. This was the first criteria of the Versatronik 505 NR2 gateway, to make it function like other Viessmann-based participants.

In order to continue to facilitate the ease of the NR2 control system, engineering a device to allow information from the boiler controls and the cascade control without disturbing the Autobinding function of the system was paramount.

The second function of the gateway was to be able to provide information that direct communication could not provide. This was the ability to adjust the operation of the slope, shift, sun and moon settings for the heating circuits. This would allow a more non-BMS related control function rather than just writing a common supply set point.

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Models

There are three primary communication protocols which KWE Technologies Group makes Versatronik 505 gateways for: LON, BACnet (IP) and Modbus (RS485).

The typical model is the 120VAC unit housed in a metal enclosure with a white powder-coated lid and galvanized base complete with knockouts for use with BX, conduit and soft cable.

There is also an alternate model which is a 24VAC DIN rail mount unit for installation in control panels. The DIN rail mount unit is also available with an optional DIN rail mount power supply.

Installation
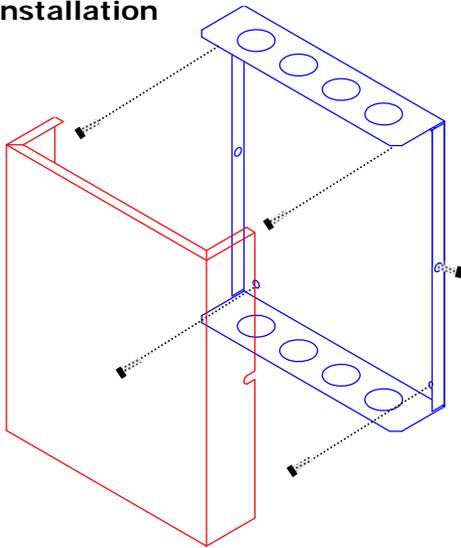
The installation of the 120VAC model of the 505 gateway is quite simple; the cover is removed by loosening the two screws on either side of the housing and remove the white cover. By using field-supplied hardware, depending on the mounting surface, locate a convenient location near the intended device being communicated with. A three-foot RJ45 network cable is supplied with the gateway, however if the gateway is mounted at a greater distance, a field-supplied cable will either need to be made or sourced.

Wiring

The wiring of the communication gateway is an easy task as well. There are fundamentally two communication connections which are necessary and the supplied power cord.

The first connection is the one which connects the gateway to the boiler control/cascade control. Since all Viessmann cascade controls currently use the same communication LON board across its product line, there is fundamentally no difference in termination. As previously mentioned, it is a matter of plugging in the supplied RJ45 cable into the control and plugging the opposite end into COM 3 or 4 of the gateway.

The second connection is dependent on the model that is chosen: LON, BACnet IP or Modbus. The LON connection are terminals A and B within the gateway. The Modbus connections utilize the same termination for the Modbus communication. The BACnet gateway uses the RJ45 plug to connect to the network.

Once all of the communication connections are complete, the unit can be plugged in and communication with the boiler controls and BMS system verified.
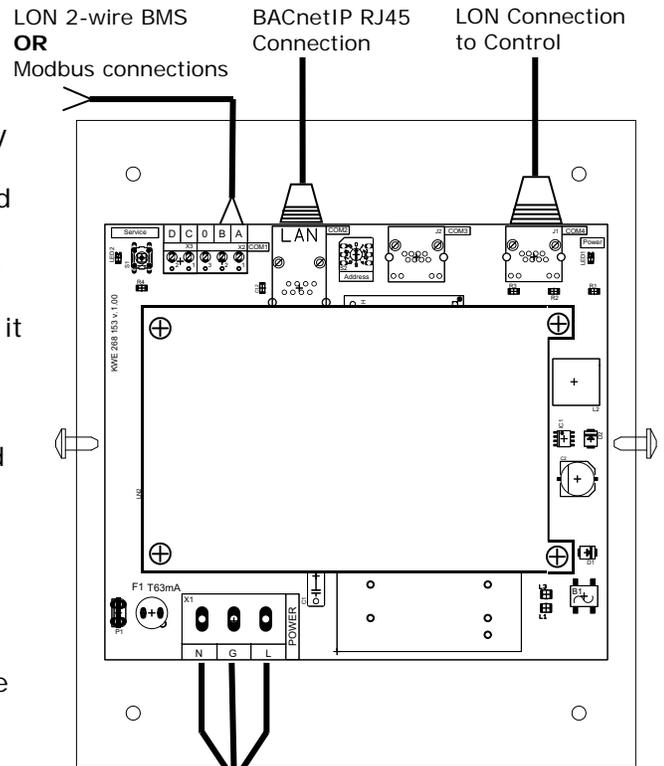
Configuration and Operation

The gateway is understood by any LON-based Viessmann control as a participant, so when you do a participant check, it will appear on the screen of the control as discovered participant.

In the previous issue of this newsletter, we discussed what a participant update and a participant check was, so for refreshments sake …

Participant Update

As a matter of process, when ensuring the LON communication is functioning correctly, a Participant Update is performed. This allows the internal control database to be updated and become aware of the controls connected to the Viessmann LON Bus.

LON 2-wire BMS **OR** Modbus connections   BACnetIP RJ45 Connection   LON Connection to Control

120VAC

Once the update is completed, then it is possible to continue with a Participant Check.

Like accessing coding level 2, there are specific button key combinations that are required for the Participant Update . Press the OK button and the ⬏ button simultaneously. You will see "Participant Check" appear on the screen of the boiler/cascade control. Once these words are visible, press the reset button under the OK button >I<. This will allow the control to perform the update function and read the LON device information from the various devices on the network. Once the control has finished the update, it will allow you to continue with the check.

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After cornering him under the stairs, and bribing him out of hiding with leftover donuts and coffee grounds mixed with glycol, he agreed to never do that again. He noted there is nothing more irresponsible than to push buttons, turn knobs and flip switches without reading the manuals first. The incident left him with the official KWE position of Chief K.T.I.

Since then, he has dedicated his entire life to mastering everything to do with KWE Technologies Group. He is the driving force behind our obligation to make controls more user-friendly, understandable, and accessible to everyone in the industry.

Now that the technical department

has found a new home, he has decided to move with us. It was at his request that a shower was installed in the "executive washrooms" at the Tech Centre. Agreement was unanimous as his body odour tends to resemble the smell of burnt circuits and solder paste.

He is known to take vacations, or "sabbaticals" as he likes to call them, to places unknown several times a year. Whenever he returns, he seems to get a little more outgoing and likes to show off his newfound knowledge by performing an interpretive dance clad only in electrical tape. Most employees usually find somewhere else to be when this spectacle takes place.

The Control Freak still remains somewhat of a loner, relying mostly on speaking through the official KWE twitter feed, @505controlfreak, as well as occasionally trying to burn old controls to make smoke signals.

When approached for a photo, he refused politely and decided instead to only allow a portrait to be drawn. He did ask that he would be called KWERK from now on.


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If the update process has not been completed, the control will not allow you to proceed with the remainder of the check and will simply kick you out of the proper screen.

Participant Check
Accessing the Participant Check is just like that of the Update. Press the OK and the 🚰 button simultaneously. The words "Participant Check" should appear on the screen and you will be able to navigate the available participants with the + and — buttons.

The Participant Check allows a test sequence to be run ensuring that the controls are communicating correctly. The screen will show a number followed by the LON participant number. The controls may not appear sequentially as they only appear based on how they report back to the boiler/cascade control. Navigate with the + or — buttons to a

participant number in the user interface screen of the cascade control. Press the OK button and you should see that particular
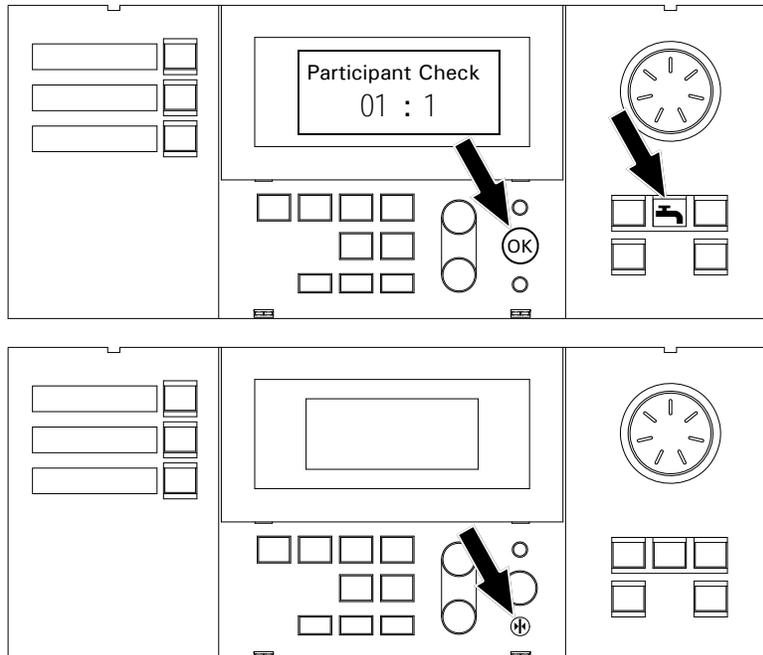
participant flash and the words "Check OK" should appear in the screen of the Cascade control. If the communication confirms to be OK, then the connection is correct. Devices such as the Output Module will have a green LED which will flash for confirmation of the check.

The most important aspect of this test is to ensure that all of the LON participants appear during the Participant Check. In a typical LON network with four boilers, you will only see four participants as the cascade control is not considered a participant. If a Versatronik 505 communication gateway is present, you usually will see a participant number of 55. This will depend on the rotary dial setting of the gateway. Refer to the installation manual of the Versatronik 505 device. Systems which use Output Modules on the individual boilers will show values from 51 to 54 based on the rotary dial settings in the Output Modules.

If the controls past a certain point are not responding during the Participant Check, verify the wiring up until that point.

As well, do not rush the Participant Check process as it may take some time for the controls to report to the Vitotronic 300-K. Be patient.

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During the check, you should see all of the LON participants which are part of the Viessmann control LON bus. The numbers that appear are a function of the value programmed at address 77. The communication gateways use a rotary dial to program the LON address. The factory setting of 0 means that you should see a participant number of 55 in the screen of the control. Also during the check, the LEDs on the RJ45 plug will flash.

Participant Check
01 : 55
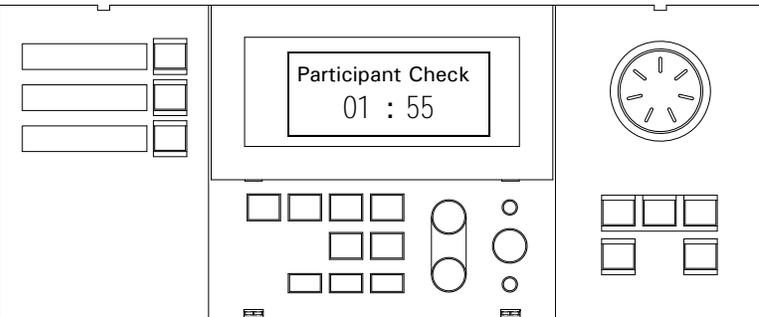
The Viessmann controls NEVER have to be put into tool binding mode to communicate with the Versatronik 505 device and this simple fact can justify the small expense of the 505 gateway. As commented previously, the Viessmann controls simply see this device as another LON participant.

The second advantage of the Versatronik 505 gateway is from the point of view of control. As we discussed earlier, it is not possible to adjust slope, shift, sun or moon values when communicating directly with the Vitocontrol-S, but with the gateway, these adjustments can be made. The same adjustments that you would make on the front of the control can be done through the gateway. If the customer wants to "write" a common supply setpoint directly to the control, this is also possible. This will be discussed more in detail.

Integration Requirements
Once the communication wiring is complete and the verification is made that the Vitocontrol-S can see the gateway, this is where the BMS can be set up. The gateway manual covers this in detail and should be referred to by the BMS Integrator

or whomever is doing this work. In most BMS systems, there is a process to discover new devices so as to "integrate" the points that are possible. This is a function of the specific software packages that may be utilized. The LON integration can be accomplished a couple of different ways, but often it is about discovering the LON ID and working with an XIF file. Again, this will depend on the integration software being used.

The integration of the BACnet IP gateway is a little different as there is a couple steps which need to be taken care of first. The configuration of the BACnet/IP settings are to allow the gateway to be part of the IP network. Following the integration settings, the integrator will then set the specific BACnet Device Settings. So to summarize, the first step is to be able to see the gateway and the second step is to be able to customize the BACnet settings of the gateway.

The 505 gateway needs to be set with the correct LON addresses with respect to the boilers and cascade control. Without this information being set, the gateway will not be able to forward the data to the BMS. It is important that the system integrator to be aware of the programmed LON addresses of the Viessmann controls. This is address 77 for each of the Viessmann controls installed. Typically, this is 1, 2, 3, and 4 for the GC1 boiler controls and 5 for the Vitocontrol-S. These values need to be set for the LON, BACnetIP and Modbus versions of the gateway. The last point of configuration is the number of zones, 1 for high temperature, 2, for high temp and mixing valve 1 and the last is a value of 3 for all three of the heating circuits.

The manual outlines these settings again specific to LON, BACnet and Modbus. Once all of the necessary settings are completed, the information will start being received by the BMS. Temperatures and status information can be viewed.

Point Information
As was commented in previous issues of our newsletter, it is very important to refer to the information supplied of any communication device. This document should outline all of the points/status info which can be provided to the BMS. This information can be effectively divided into a few categories: Temperatures, Setpoints, Status and Alarms.

Temperature Information
The temperature and set point information are often grouped together to be able to compare the actual current value and the setpoint. With these two values a number of conclusions can be made as to the operation of the boiler plant and zone control.

The gateway allows you to see boiler temperatures, supply temperatures and zone temperatures. Refer to the gateway manual for all temperature information.

Status Information
The relay state information for the boilers and the Vitocontrol-S are viewed in the appendix B of the manual. This is applicable for all three versions of the gateway.

Alarm Information
The information that is provided by the alarm output when communicating directly to the Viessmann controls is heavily leaden with extraneous information which needs to be filtered. This filtering process will then allow discovery of the true fault information. This again is another advantage of using the 505 gateway, no excessive filtering of alarm data.

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The control alarm information is filtered to only show the specific code. Here is a note from the 505 manual: "*Viessmann controls show fault codes in hexadecimal format to conserve screen space on the user interface of the boiler and system controls. The Versatronik 505 gateway uses a SNVT_count variable which is usually displayed in decimal format*".

In which base-format this fault information can be displayed depends on your BMS software. This example shows how to display this fault code in hexadecimal, and *Text* format in Niagara AX. To display in hex, you can use the KitControl—> Util "Numeric Bit And" object's mask input. To display the equivalent fault text value, you can use the KitControl -> Conversion "Numeric To Enum" object and type out the enum range for all Viessmann error codes.

Time Necessary—Integration

The question inevitably is asked, "How long will this take?" Well, the answer is, "it depends." The integration of the gateways and programming the necessary information which the manual outlines is typically all of 15 minutes. The time necessary really starts to accumulate when it needs to be determined what information that is going to read from the gateway and then used on the BMS front end. Quite often, this a function of the building specification to know what temperatures are required as well as the statuses. Often, it is not clear what needs to be present as well as where to find it.

The information that is possible to be pulled through the gateway is a function of the model of the control (Vitotronic 300, GW2 vs. Vitotronic 300-K and boilers). The gateway manual outlines the information that can be displayed by the BMS.

If a Vitotronic 300-K Cascade Control with LON communication to four boilers and a system with two mixing valves and DHW production is considered, there are up to 22 actual temperatures which can be read. There are up to 16 adjustable settings and lastly upwards of 10 status points as well as all of the faults which can be communicated.

The point information for a multi-boiler system which is usually read by the BMS system through the gateway is the following:

Temperatures
        Common Supply
        Outdoor
        DHW
        Boilers 1-4
        Mixing valve zone
Setpoints
        Common supply
        Heating curve settings
        DHW
Status Points
        Burner ON signal
        Burner fault
        Boiler pump ON signal
        Zone pump ON signal

In some applications, it may be necessary to view burner modulation. While the BACnet gateway can pick up this information through the gateway, this is only the boiler control's understanding of the current burner modulation. It is always best to get this info directly from the burner as it is the true positioning of the burner.

The newer linkageless burners may provide a 0-10VDC or 4-20mA output signal directly proportional to modulation. Another communication method may be Modbus from the burner. It is best to ALWAYS review the burner manual for this information.

Termination Resistors

You may have heard of these little things in the past, but have been unaware of their use. The design and operational intent of the termination resistor is to suppress any reflected noise on the communication bus. The reflected noise my result in communication errors between devices.

An example of this noise that you may be familiar with is when talking on your cell phone and you can hear your echo. The background echo may be enough to make it difficult to isolate what you said from the person that you were talking to. This device suppresses any repeated messages within the LON communication bus so as not to cause errors between the communication devices. Noise can be an issue from longer communication runs or impressed noise by other devices adjacent to the interconnection cabling.

Depending on the configuration of the communications bus, STAR or BUS set up may dictate on where the resistor is placed.

Summary
—With the Versatronik 505 NR2 gateways, you are able to provide an easier integration of the Viessmann boiler controls.

—Some points of information are only available with the use of the gateway.

—Point data and alarm information does not need extra data filtering to be able to be picked up by BMS systems allowing for simplified integration.

—The Versatronik 505 gateways are seen as LON bus participants when performing a participant check from the Vitocontrol-S.

—The Versatronik 505 comes in 120VAC and 24VAC units allowing flexible installation and integration for wall-mount and panel-mount applications.

Control Panel Roadshow

Thank You!

Paul Ross Associates
(Springfield, Massachusetts)
Spring Session

&

Shamrock Sales
(Denver, Colorado)
Fall Session

For hosting and arranging
all of the participants
at our meetings
discussing control panel
sales, applications and
solutions

A Winter Session in the works!

What can a control panel solution
do for your customer?
Let's find out!

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