Sauter novaNet Driver for Tridium Niagara

User Guide

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niagara4

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Contents

1 Introduction **2**

2 Requirements **2**

3 Quick Start **3**

4 Sauter EY3600 Specifics **3**

5 Network **4**
5.1 Setting Up Communication 5

6 Devices **8**

7 Points **9**
7.1 Point Discovery 10
7.2 Polling 12
7.3 Change-of-Value Subscription 12

8 Schedules **15**
8.1 Sauter Time Programs 15
8.2 Niagara Schedules 16
8.3 Niagara Calendars 19

9 Coexisting with Sauter SCADA **20**

10 Troubleshooting **21**
10.1 EYZ292 Router LED Diagnostic 21

1 Introduction

Sauter[1] EY3600 system – also known as Sauter EY-modulo 2 – includes a wide range of programmable controllers for HVAC control and building automation. The controllers communicate with a proprietary protocol called novaNet using two-wire twisted pair.

The novaNet driver for Tridium Niagara enables communication between Sauter controllers and Niagara powered devices. It provides an efficient solution for retrofit of building management systems, facilitates seamless integration of multiple protocols, and allows convenient makeover of front-end software.

A single Niagara powered device with the novaNet driver can serve as an integration platform for various Sauter controllers: EY-modulo 2 (novaNet), EY-modulo 4 (LON), EY-modulo 5 (BACnet), as well as 3rd party systems like Modbus, KNX, M-Bus, and SNMP.

2 Requirements

- Niagara-powered device with software v4.8 or later, such as JACE, Supervisor, or their OEM versions
- Communication options
  - JACE: serial RS-232 via EYZ291 or TCP/IP via EYZ292
  - Supervisor: TCP/IP via EYZ292
- Sauter driver module and license

To enable driver functionality, the Sauter EY3600 system must be connected to a Sauter novaNet router: serial EYZ291 or TCP/IP EYZ292 (same as EY-BU292).

[1] All trademarks or registered trademarks are the property of their respective owners

The Niagara host is connected to the novaNet network through the router as shown below.

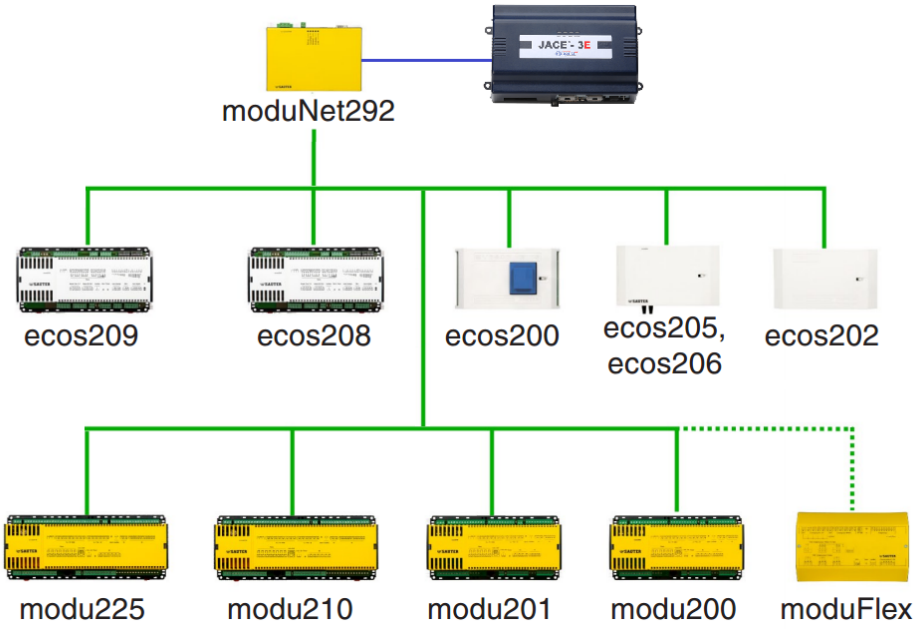

Figure 1: Network topology

3 Quick Start

1. Install **sauter.jar** and all dependent modules via Software Manager, restart the station.
2. Add **Sauter Network** (for EYZ292 TCP/IP router) or **Sauter Serial Network** (for EYZ291 serial router).
3. Enter the license code in **License** property under the network.
4. For EYZ292: enter router **IP Address** and **Port** in **Comm Config / Router Address**. For EYZ291: enter **Port Name** and **Baud Rate** in **Comm Config**.
5. Restart the station and verify **Router Status** is Running under **Comm**.
6. **Discover** devices in the **Device Manager**, add them to the station.
7. Open device **Points** extension, **Discover** points, and add them to the station.

4 Sauter EY3600 Specifics

Sauter controller memory is split into 256 or 128 MFA (Machine Fine Addresses) areas. Each MFA consists of 128 DW (datawords, 4 bytes each).

Each point variable (e.g., analog input, digital output, software analog point) is assigned to one MFA. This information is controller model specific and is available in Sauter datasheets. It can be particularly useful in order to find the specific hardware I/O in the controller. Each MFA contains a lot of information: current value, override flag, units, name, description, etc. Each of these values is stored in a DW.

The hardware address range with its text block area is located between MFA 00-59 and DW 00-63 in the RAM-Map. One of the DWs contains a Card Code, which identifies the type of point: hardware or software, analog or digital, input, or output. For each MFA (hardware and software address), the text block area can store point name and description; these areas are called House Address and Address Text.

5 Network

There are two types of Sauter networks, depending on the router model:

- **Sauter Network** – for TCP/IP communication via EYZ292 router.
- **Sauter Serial Network** – for serial RS-232 communication via EYZ291 router.

Both network types contain standard Niagara properties, as well as a few driver-specific ones:

- **License** – the code that allows the driver to run on your host.
- **Comm Config / Router Address** – IP address and port of the EYZ292 router (TCP network only). Standard port is 51807.
- **Comm Config / Port Name** – COM port name (serial network only).
- **Comm Config / Baud Rate** – serial baud rate, set with jumpers on EYZ291 (serial network only).
- **Comm / Router Status** – displays the current router connection status.
- **Comm / AS Counter Received** – counter of received messages from controller. A value of -1 indicates no communication.
- **Comm / PC Counter Received** – counter of received messages from router.
- **Poll Scheduler** – specifies polling rates for periodic data reading:
  - Fast Rate: 5 seconds
  - Normal Rate: 10 seconds
  - Slow Rate: 30 seconds

In most cases only **License** and **Comm Config** address properties need to be changed.

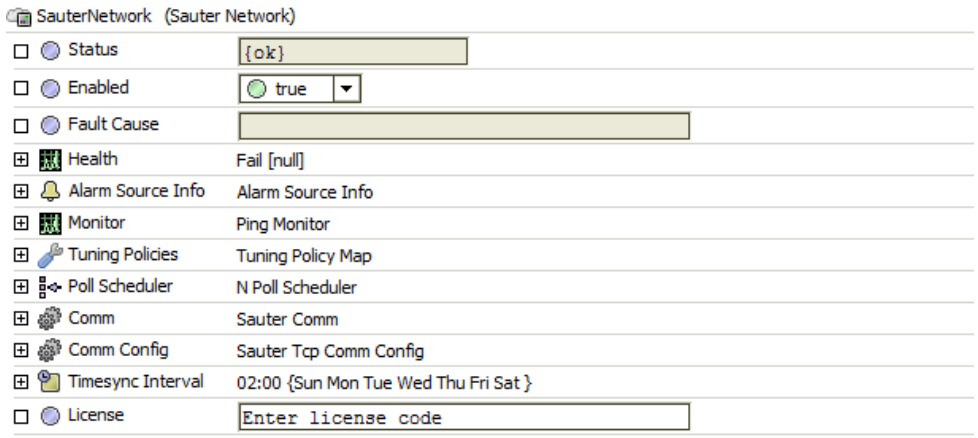

Figure 2: Network properties

5.1 Setting Up Communication

Make sure the host is connected to the router (directly to COM port for EYZ291 and through Ethernet for EYZ292), the router is connected to Sauter controllers, and everything is powered.

1. Install **sauter.jar** and all dependent modules via Software Manager.
2. Start the station and add a new **Sauter Network** or **Sauter Serial Network**, depending on the router model.
3. Enter the license code in the **License** property and restart the station.
4. For EYZ292 router, enter its **IP Address** and **Port** in **Router Address** (note, there are two fields for address: Address and Router Address, use the second one).

   It is recommended to check if the EYZ292 can be pinged from a PC first.

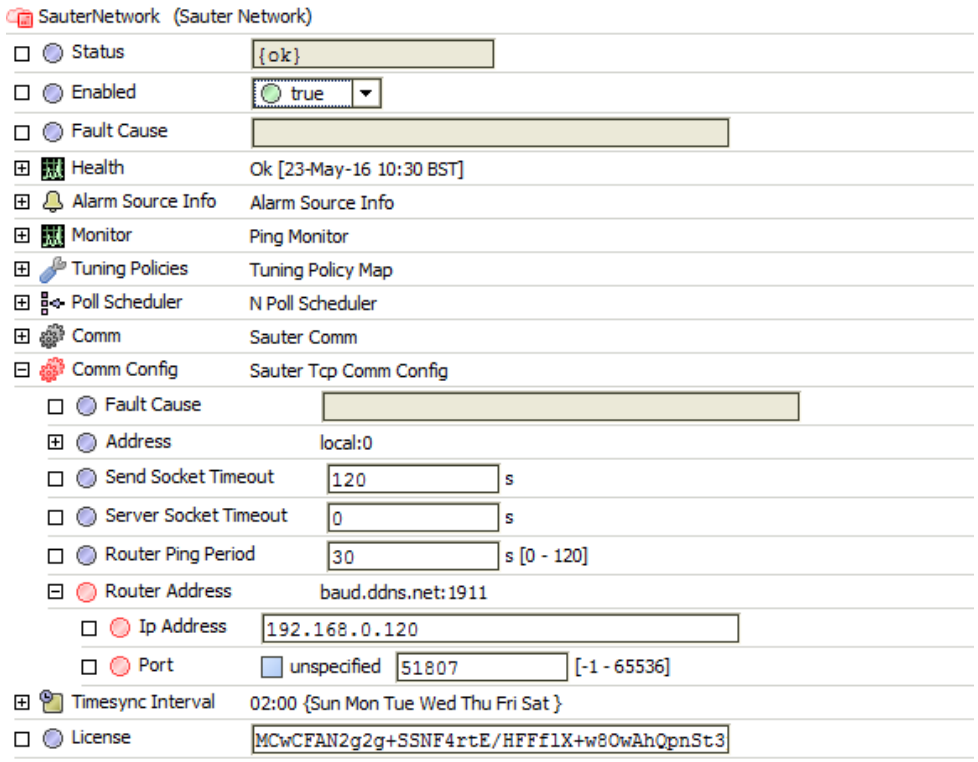

Figure 3: Router address

For EYZ291 router, enter the COM port name and its baud rate. Baud rate is set with jumpers on EYZ291.

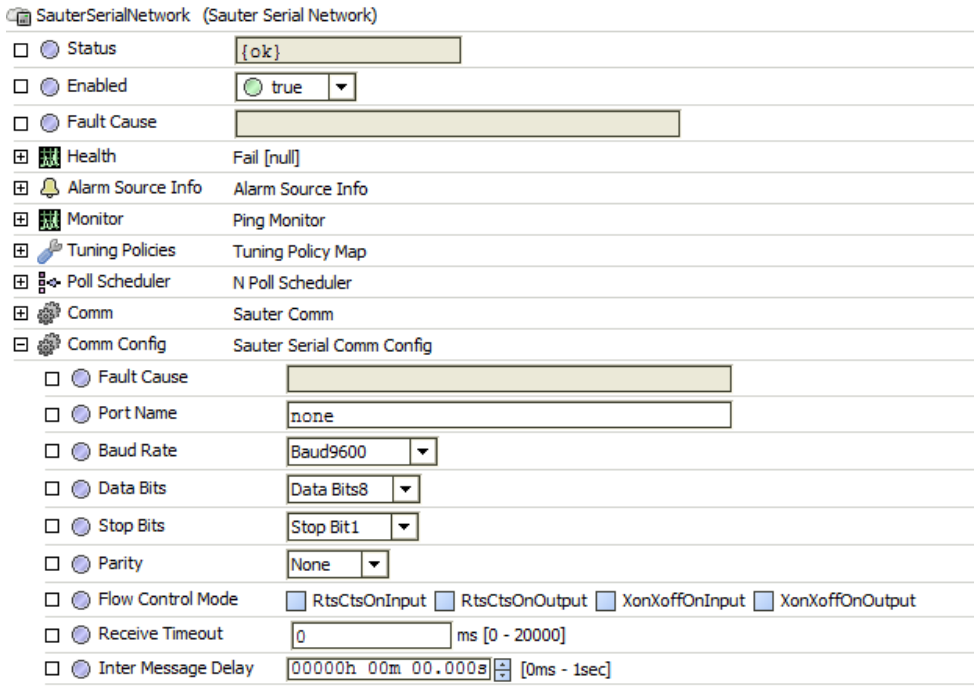

Figure 4: Serial port settings

5. To check if the host has established communication with the Sauter router, expand the **Comm** component and check if **AS Counter Received** and **PC Counter Received** fields have changed their values from -1 and **Router Status** is Running.

   If counter fields display -1, try to ping the router using the network ping action (**Sauter Network -> Actions -> Ping**), then check port, baud rate, or IP settings.

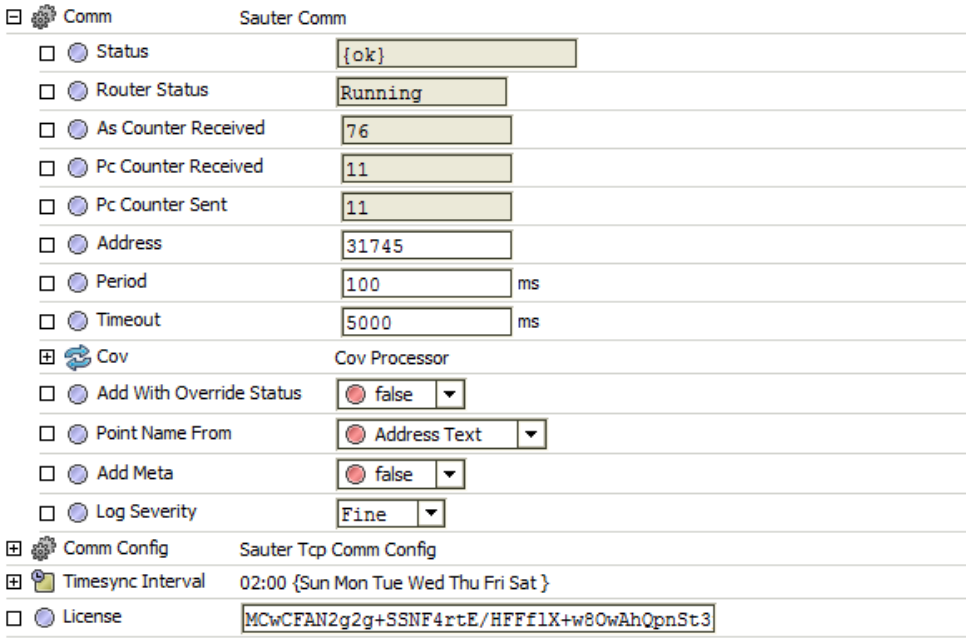

Figure 5: Comm status

6 Devices

After the connection with the router is established, open the **Device Manager** and press **Discover**.

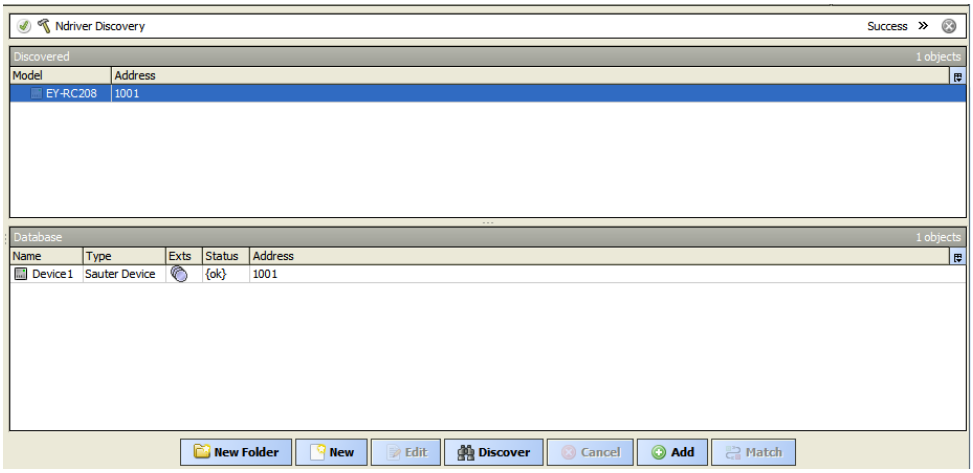

Figure 6: Device discovery

Niagara will find all connected devices and will display their models and novaNet addresses. Press **Add** to add them to the station.

Each **Sauter Device** has the following properties:

- **Address** – novaNet address of the controller.
- **Poll Frequency** – how often device points are polled. Only used if the COV method is not active.
- **Facets** – contains the controller model name.

Each **Sauter Device** has **Points** and **Schedules** extensions.

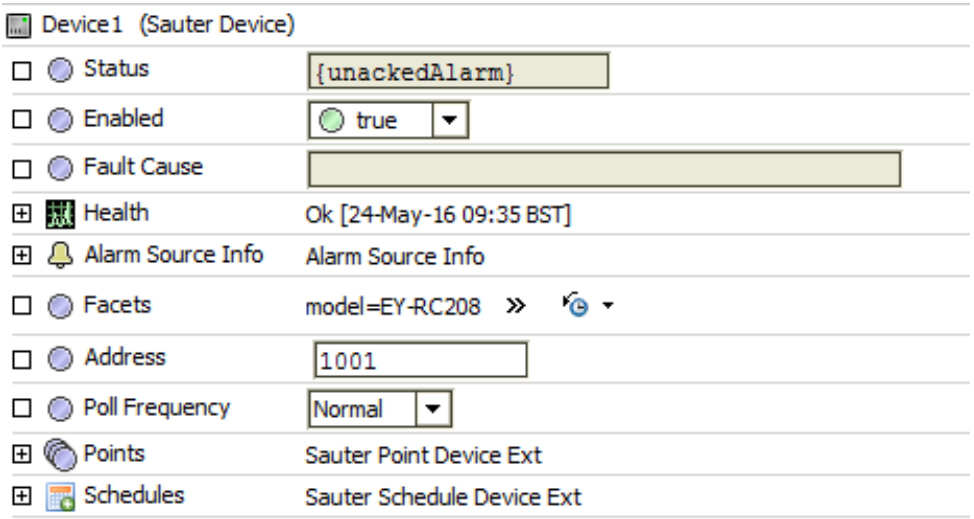

Figure 7: Device properties

7 Points

Every Sauter point extension contains the following properties:

- **MFA / DW** – specify the memory area and double word address in this area, which contains read-only data.
- **Format** – specifies how the raw value should be interpreted.

There can be extra properties:

- **DW Write** – for writable points, the double word address where data will be written.
- **Bit** – in some controller models, Sauter boolean points (binary inputs or outputs) can be combined in a single MFA/DW as a single multi-bit point. There can be up to 6 binary points stored together. The point discovery manager will display them as a single point with a configurable **Bit** parameter. In order to map each binary point to a separate boolean point, duplicate the point and set the **Bit** parameter according to the controller datasheet. Such points can also be

mapped into enum points, which can be better suited for some points, like 3-speed switches. In this case **Bit** is not used, as all 6 bits will be mapped into an enum value.

If a boolean writable is used to write into a multi-bit point, only one of the bits can be overridden – other bits will be set to false. An enum writable can set any combination of bits, e.g., set enum to 7 to set bits 1, 2, and 3 to true and bits 4, 5, and 6 to false.

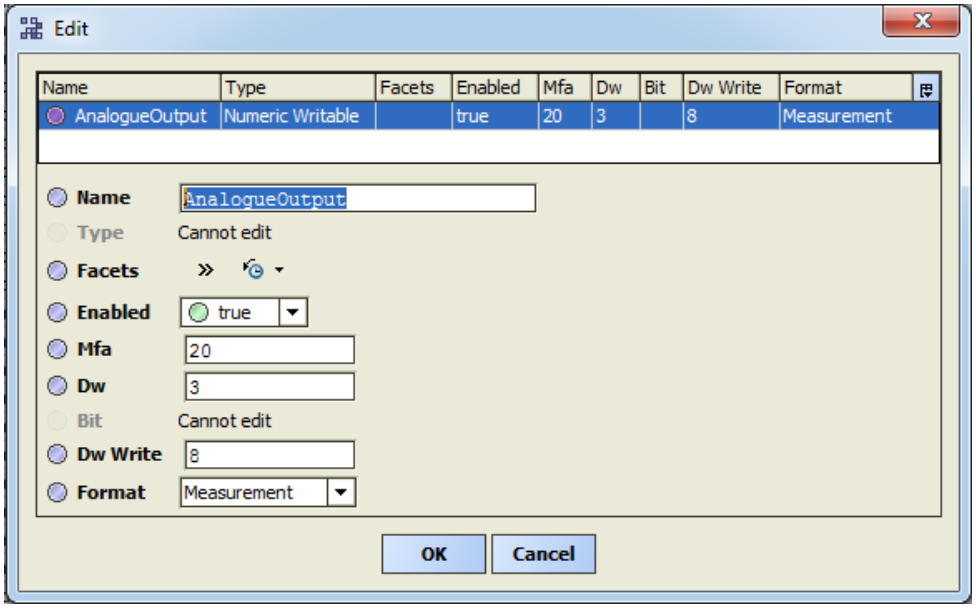

Figure 8: Point properties

There are two methods of reading point values: polling and change-of-value (COV) subscription.

Polling is a simple time-based method, where necessary points are requested periodically with an interval determined by the poll frequency. This is the default method and it allows reading any DW address.

COV method is when the driver asks the controller to send the point value when it changes. Using this method can be less traffic-intense and allows observing even fast-changing points. Not all DW addresses can be COV subscribed.

7.1 Point Discovery

Open the device **Sauter Point Manager** and click **Discover** to start point discovery. There are two discovery modes available:

- **Fast** – discovers point addresses (MFA/DW) and types (card codes).

- **Full** – also discovers point descriptors; takes longer to complete.

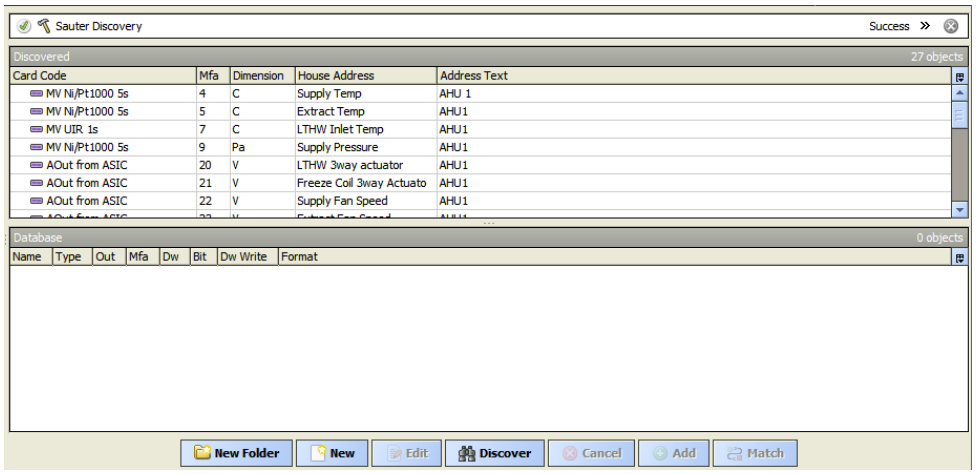

Figure 9: Point discovery

Niagara will find all available points, their types, units, and attributes. Text descriptions will be available if programmers have included them into the program.

There are a few settings under the **Comm** component that affect how discovered points are added to the station:

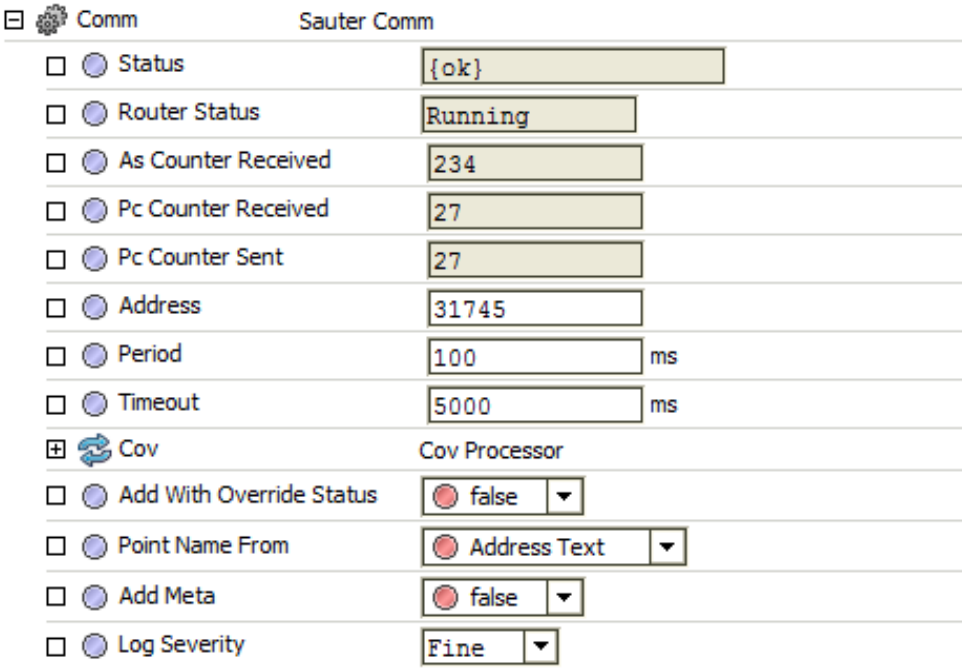

Figure 10: Discovery settings

- **Add with Override Status** – if set to true, then newly added points will be able to read override status from the device. The drawback is that this point will not be suitable for change-of-value subscription and can only be polled. If set to false, the point can be either subscribed or polled, but will not read the override flag from the device. The override flag can still be activated by Niagara itself if an override action is issued. However, if the point has been overridden before or from another software, that status will not be displayed.
- **Point Name From** – specifies how Niagara creates default point names, either from **Address Text** or from **House Address**.
- **Add Meta** – if true, then text fields and other meta-information will be saved in point facets. This can be useful to display points on graphical pages.

Add found points to the station to start reading them. Note that all points are added as read-only by default. Change point types to writable before adding them to the station if required.

If a discovered point has a dimension field, it will be automatically translated into Niagara units and assigned to the point.

Sauter points respond differently to writing commands, depending on their type and program configuration. Some points (hardware outputs, AIA_Soft, DIA_Soft) can be overridden: the point will display "overridden" status and the written value, but will return to the original value if set to AUTO. Other points (AI_Soft, BI_Soft) can only be written if the program does not write to them already. In this case they do not retain their original value and if the written value is null, the point value will become NaN (not a number).

7.2 Polling

Point polling method is used if:

- The point **Tuning Policy** property **Use Cov** is set to false, or
- The point DW property is not equal to 2 (binary value), 3 (measurement), or 6 (counter).

All polled points are grouped together and polled in groups to optimize network traffic. Group polling frequency can be set with **Device -> Poll Frequency** and **Network -> Poll Scheduler** settings.

Polled points can be read with deterministic frequency, but if the point value changes more often, some changes can be missed.

7.3 Change-of-Value Subscription

COV method is used if:

- The point **Tuning Policy** property **Use Cov** is set to true, and
- The point DW property is equal to 2 (binary value), 3 (measurement), or 6 (counter).

When a COV point value is requested for the first time, the driver subscribes this point, i.e., asks the controller to send the point value every time a substantial value change is detected. The controller instantly sends back the point value as the first update. Then it sends the value only after the point changes.

For binary points (DW=2) every change is substantial. For analog points (DW=3 or DW=6) a substantial change is when it exceeds the threshold value. Threshold values can be set individually for every point. If controllers are programmed, all points of interest should have thresholds set already and no further actions are required. This is done by the programmer by setting the TRW point parameter.

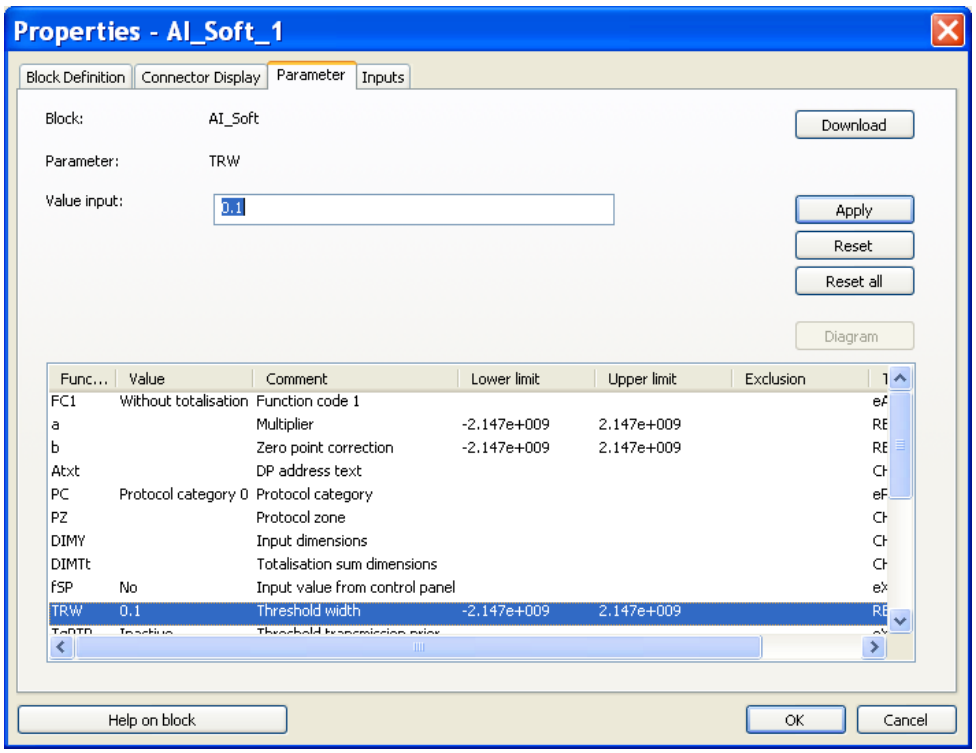

Figure 11: CASE Suite COV threshold

If a COV subscribed point does not update its value, then thresholds might not be set for some reason. There are two ways to set them.

The default way is to set properties in the **Comm -> Cov** component.

- **Measurement Threshold** – applies to measured values (DW=3).
- **Counter Threshold** – applies to counter values (DW=6).

If the value is set to *NaN* (not a number), then the threshold will not be set. For any other value, the threshold will be written into the point MFA during the first subscription.

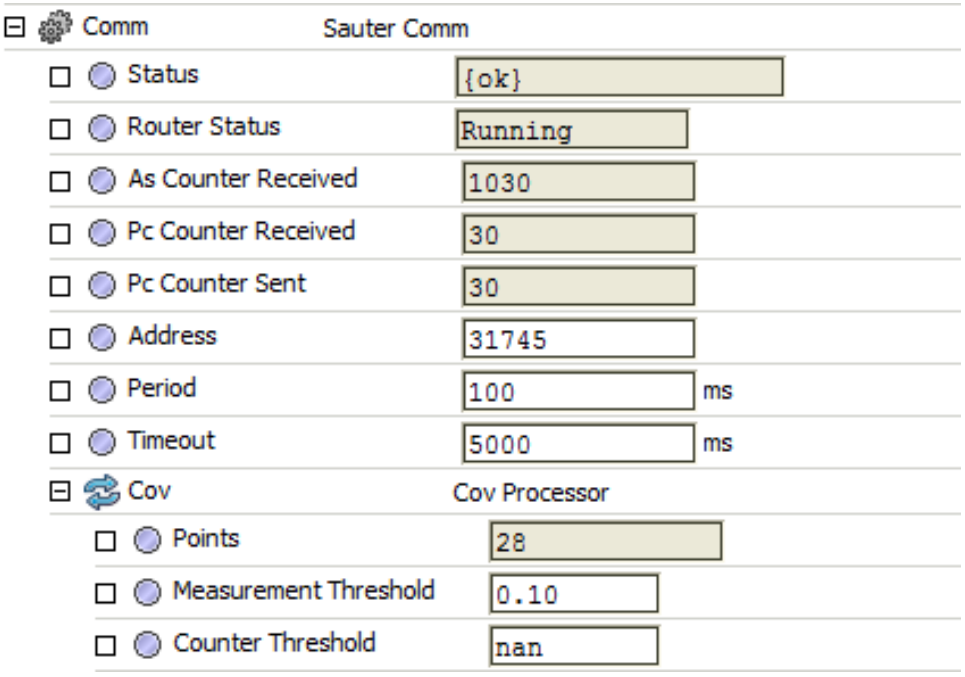

Figure 12: COV settings

As this method sets one value for all measured points, it can be necessary to set other thresholds for some specific points. This can be accomplished by creating a new facet *threshold* of type *double* under the **Device Facets** component. Then after the controller is restarted, this value will be written to the threshold during the first subscription.

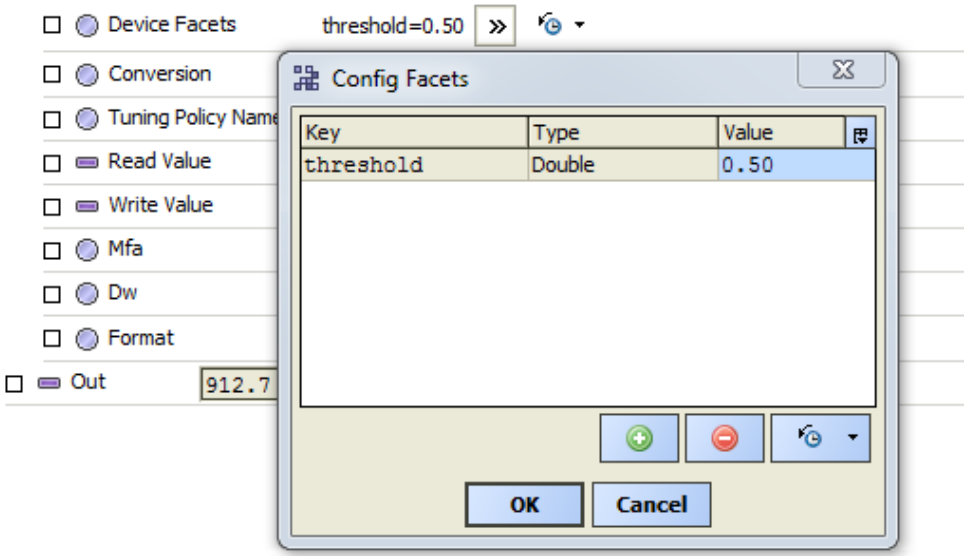

Figure 13: Facet threshold

Once a day every controller performs *garbage collection* – deletes all subscriptions from every MFA – and then reports it to subscribers. When Niagara receives such a message, it will re-subscribe all points that are currently subscribed.

8 Schedules

Sauter controllers can store and execute complex time programs to implement various control strategies.

The driver provides full control over Sauter time programs from Niagara schedules. Schedules can be imported, modified, and exported back into controllers. Schedules can be edited with standard Niagara graphical controls from Workbench, PX, or HTML graphics.

WARNING! It is highly recommended to fully read this chapter and try to read and write schedules with test bench equipment before moving to a working site.

8.1 Sauter Time Programs

The time programs issue automatic, time-dependent commands with which it is possible to implement digital values, setpoints, analog values (absolute or relative), and entries in the HDB on an autonomous basis in each AS. ECOS controllers can have up to 64 commands; other models can have up to 320 time commands.

The year, month, day, hour, minute, and MFA are linked to the time command; and month and day codes can also be linked to a weekly program. Each command issues a specific value at a specific time as demonstrated below with Sauter software.

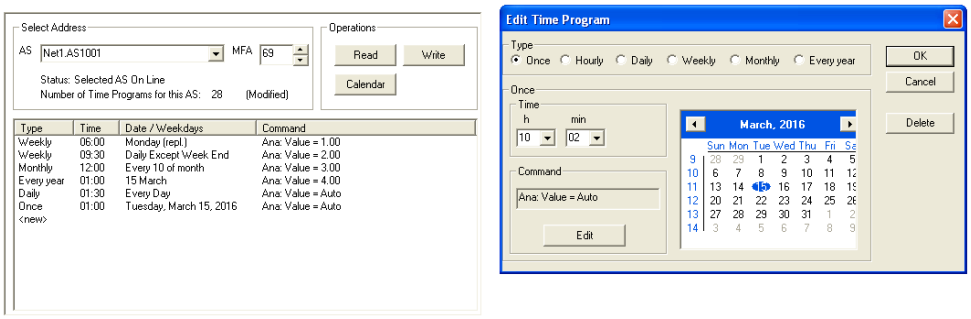

Figure 14: Time programs

In addition to individual time programs, there are two year calendars for exception dates: one for even and one for odd years. In them, each date can be overridden with a specified week day (Mon-Sun) or special day 1-8.

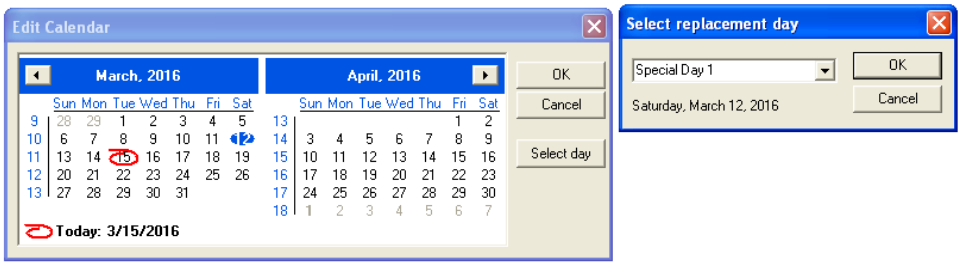

Figure 15: Year calendars

8.2 Niagara Schedules

Every Sauter device in Niagara has a Schedules extension, which contains Schedule Exports – components that connect generic Niagara schedules with Sauter time programs.

In **Sauter Schedule Export Manager** press **Discover** to initiate time program discovery. The driver automatically groups found time programs in MFA groups. Each MFA group contains all time programs affecting it. Both exception year calendars are displayed as well.

If no time programs are discovered, then the controller might not use them and time control is done on the SCADA side by writing into some Sauter points.

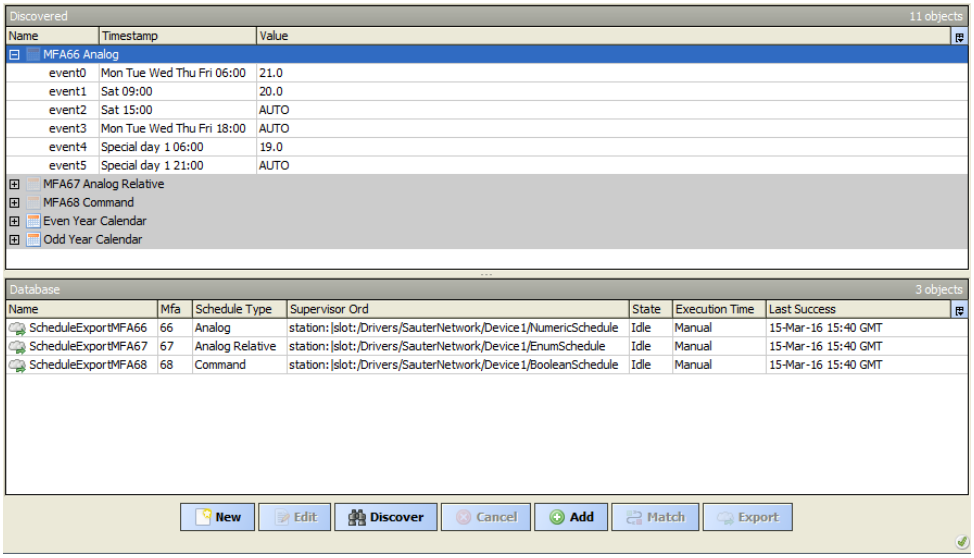

Figure 16: Schedule discovery

To configure schedule export, create a regular Niagara schedule: BooleanSchedule for Command type, Numeric or Enum for Analog type. Then select discovered MFA groups and **Add** them to the station. A Schedule Export component will be created for every MFA group.

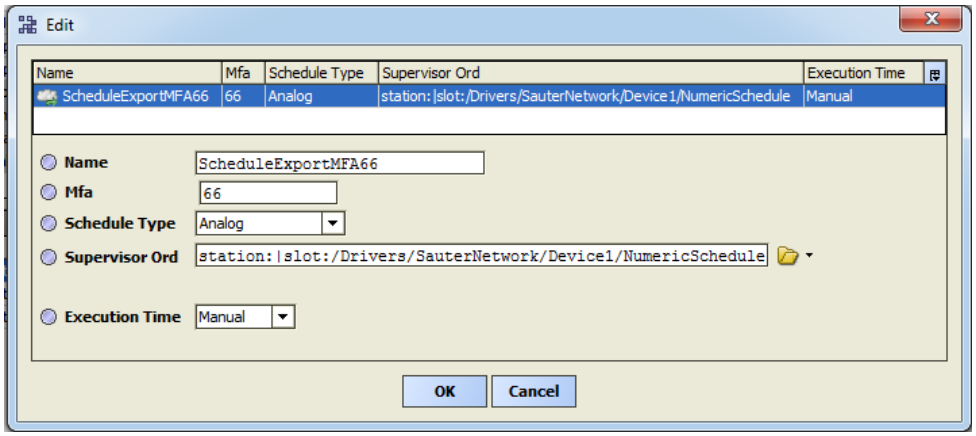

Figure 17: Schedule export

Select the exported schedule in **Supervisor Ord**. Do not set the execution time to periodical export yet to avoid writing an empty schedule.

After all schedule exports are set, it is possible to read existing time programs from the controller into schedules. Use **Read Schedule Exports** in **Schedule Device Ext**. The driver will once again read all time programs, parse them into Niagara format, and set the referenced schedule.

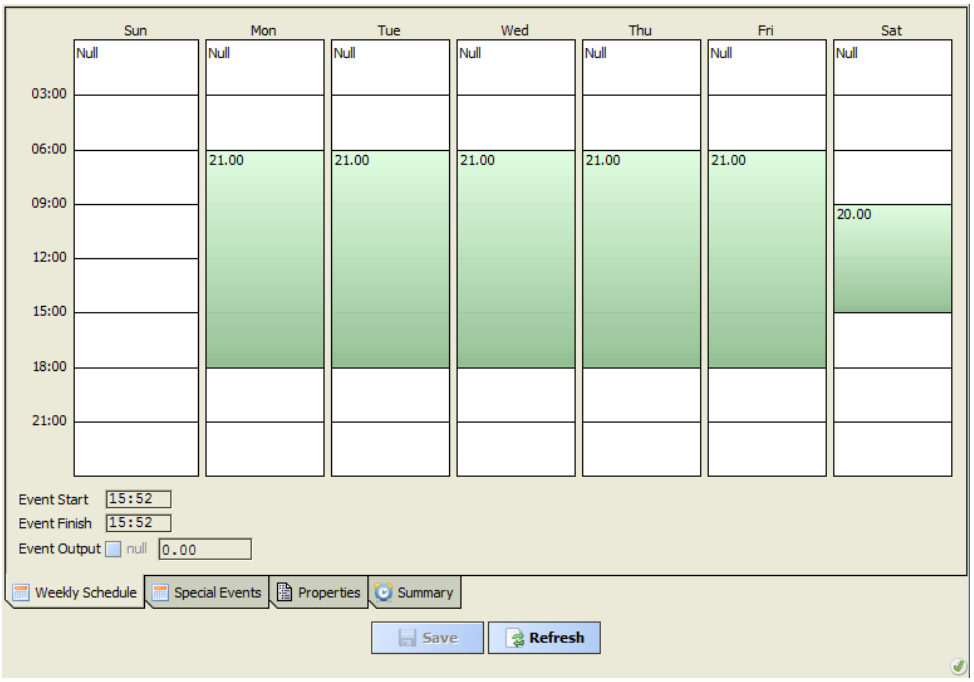

Figure 18: Read schedule exports

Because Sauter time program and Niagara schedule formats are not fully compatible, the driver ignores all non-weekly time programs, "every hour," and "every X minutes" time programs. Exception dates should be created in separate calendars, see below.

Normally schedule reading is only required during initial setup. After that, schedules are modified in Niagara and exported (written) into Sauter controllers. As Sauter time programs are stored in one continuous list, Niagara schedules cannot be read or written individually, only all device schedules at once.

WARNING! When schedules are exported to a Sauter controller, all existing time programs and calendars for all MFA in Sauter RAM will be rewritten. Make sure schedule exports are configured for all MFA points before initiating writing, because unconfigured MFA schedules will be lost.

Schedules can be exported in multiple ways:

Type	Actions
Manually	Use **Export** in **Sauter Schedule Export Manager**.
	Or trigger **Write Schedule Exports** action in **Schedules** extension.
Periodically	Set **Execution Time** in **Schedule Export** for periodical export.

Type	Actions
By demand	Link master **Schedule** property **Last Modified** to **Schedule Export** object action **Execute**. This link initiates the exporting process as soon as the master schedule is modified and saved in **Scheduler**.

As all device schedules can only be written together, it is enough to export one of the schedules – the rest will be exported as well.

Writing schedules is a “heavy” task from a traffic perspective, so it is best not to do it excessively.

After the schedule is exported into the controller, time programs can be discovered again to check how the Niagara schedule is mapped into Sauter time programs.

8.3 Niagara Calendars

To set schedule exception dates (e.g., holidays) add a regular **Calendar Schedule** to the station from the **schedule** palette and then reference it from the schedule **Special Events** tab.

Set the daily time schedule for all special dates listed in the calendar.

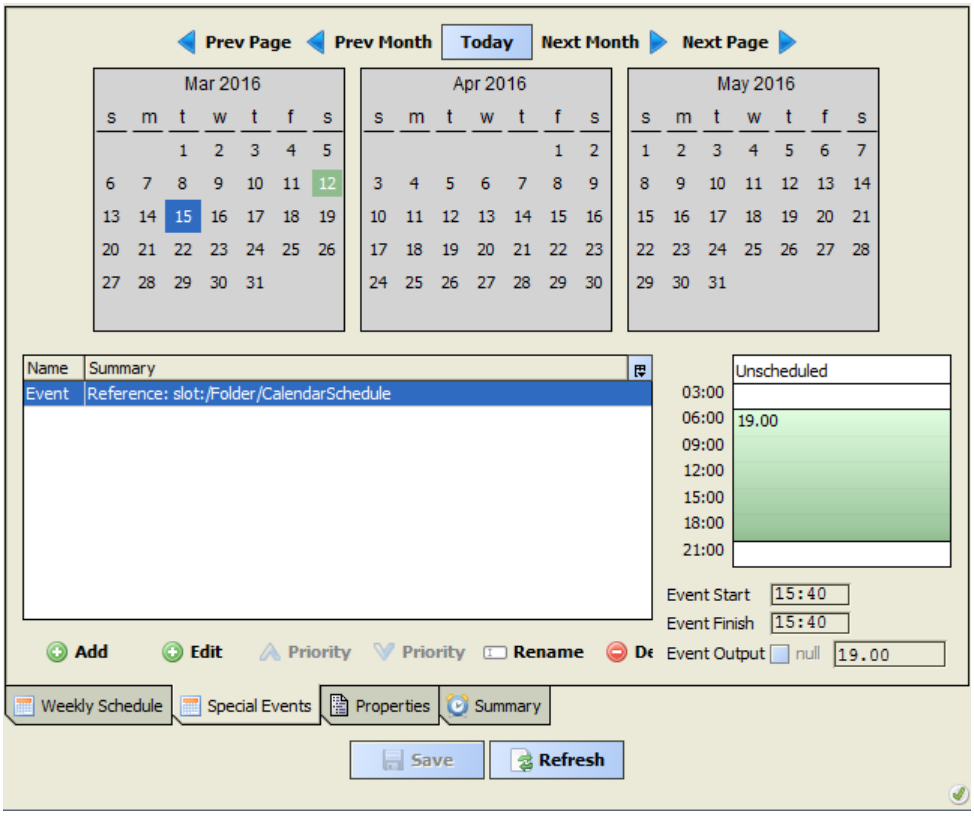

Figure 19: Calendar schedule

After the schedule is exported into the controller, special day time commands will be created in individual schedules and this special day will be referenced in both yearly calendars.

One calendar can be referenced from various schedules in one or multiple devices. This way it is easy to modify site-wide date exceptions and keep individual time programs for every point. Multiple calendars can be used for every point, but there can be up to 8 different calendars per device (limited by 8 special days in Sauter exception calendars).

Exception dates cannot be read from controllers into calendars, because normally one calendar will be shared with multiple points. The Sauter ability to override exception dates with a particular weekday is not implemented; special days are used instead. Niagara calendars should only contain Date type events. Schedule Special Events tab should only contain Calendar references.

9 Coexisting with Sauter SCADA

When refurbishing an existing BMS with Sauter SCADA (e.g., novaPro32), it is important to make the transition comfortable for users so they do not lose control over their system at any time. Niagara can

successfully coexist with other SCADA if a few configuration rules are applied properly.

Niagara must have a separate Sauter router: neither EYZ291 nor EYZ292 can accept two clients connected simultaneously.

Point polling interval should be selected considering the total traffic to avoid overloading the system.

10 Troubleshooting

Issue	To do
EYZ292 router is not answering to the ping message	Check if the Ethernet cable is connected and both PC and EYZ292 router have Ethernet connection LED active.
	Check if the PC is in the same IP range as the router.
	Check if only one Sauter client is connected to the router.
Device discovery does not find any devices	Check that the novaNet network is connected to the router and the novaNet LED is active.
EYZ292 router can be pinged from PC but not by the driver	Try to restart the router and the station.

10.1 EYZ292 Router LED Diagnostic

Name	Colour Status	Meaning
Power	Green on	Power supply present.
Activity	Green on	Receiving and sending Ethernet telegram.
Link	Yellow on	Ethernet connection established.
novaNet	Yellow on	novaNet telegram transmitted.
Error	Red off	Normal state.
	Red on	Startup 30 seconds.
	Red flash 1 sec	novaVPort communication missing.
	Red flash 1/4 sec	No novaNet telegrams received.