



MEETUP ONLINE '21

МОНИТОРИНГ СОЛНЕЧНЫХ КОНТРОЛЛЕРОВ (MORNINGSTAR)

АНТОН ФАЯНЦЕВ
ИНЖЕНЕР ИНТЕГРАЦИИ

ZABBIX

СОВРЕМЕННЫЙ МИР



ПОЛУЧЕНИЕ ЭНЕРГИИ



ТРАДИЦИОННАЯ ЭНЕРГЕТИКА



ВЕТРОВАЯ И СОЛНЕЧНАЯ ЭНЕРГЕТИКА



ГЕОТЕРМАЛЬНАЯ ЭНЕРГЕТИКА



ЭКЗОТИЧЕСКАЯ ЭНЕРГЕТИКА



СТРАННАЯ ЭНЕРГЕТИКА



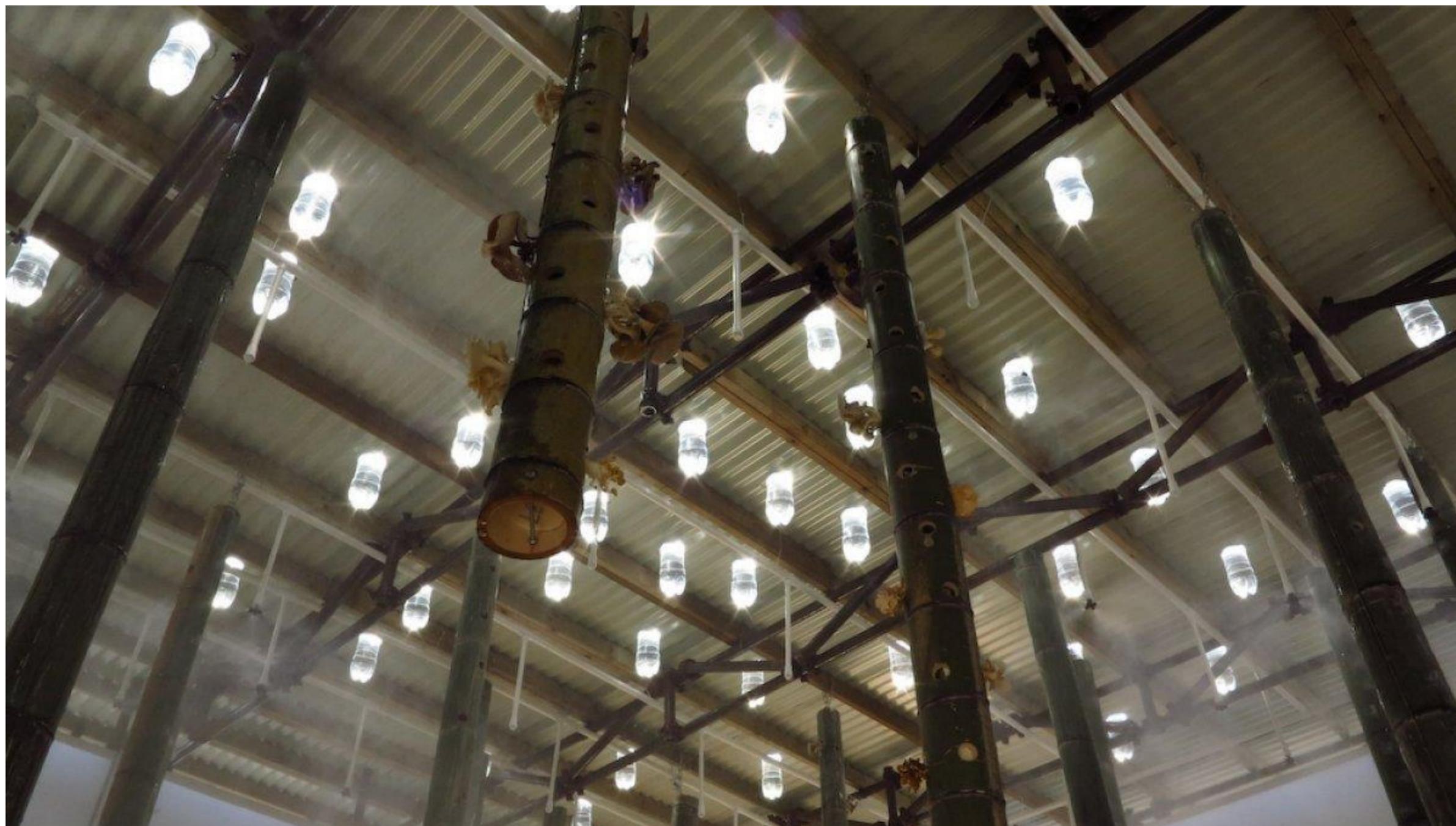
РАЗВИТИЕ



ТЕХНОЛОГИИ



ПРОМЫШЛЕННЫЙ ВАРИАНТ



ZABBIX



MORNINGSTAR
World's Leading **Solar Controllers & Inverters**



УСТРОЙСТВА MORNINGSTAR

TriStar MPPT

ProStar MPPT

SunSaver MPPT

TriStar PWM

ProStar PWM

SureSine



ЗАДАЧИ

Отслеживание показателей нагрузки

Определение первопричины перебоев

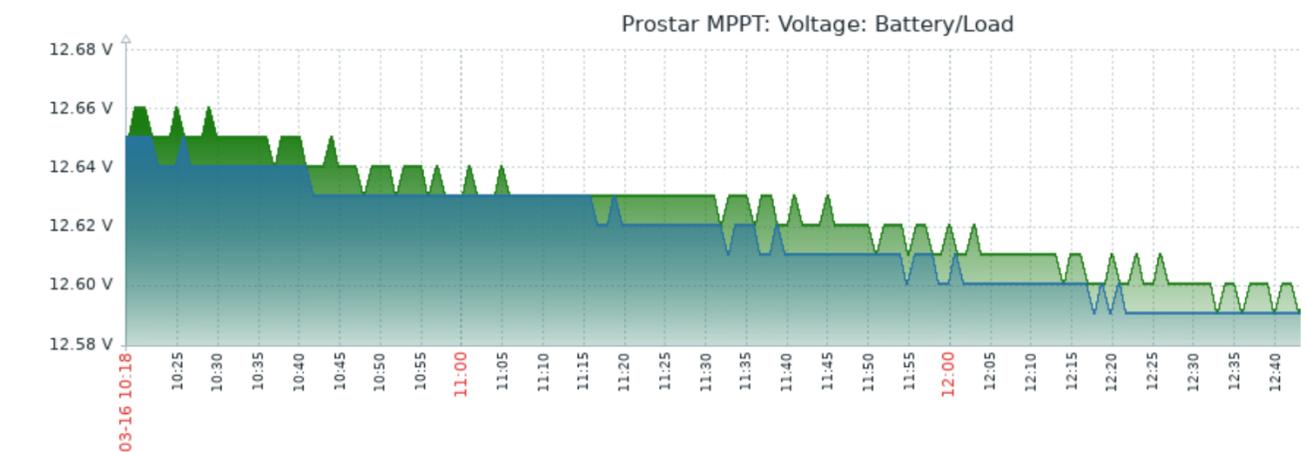
Предотвращение разряда батареи

Оповещение смены состояния устройства

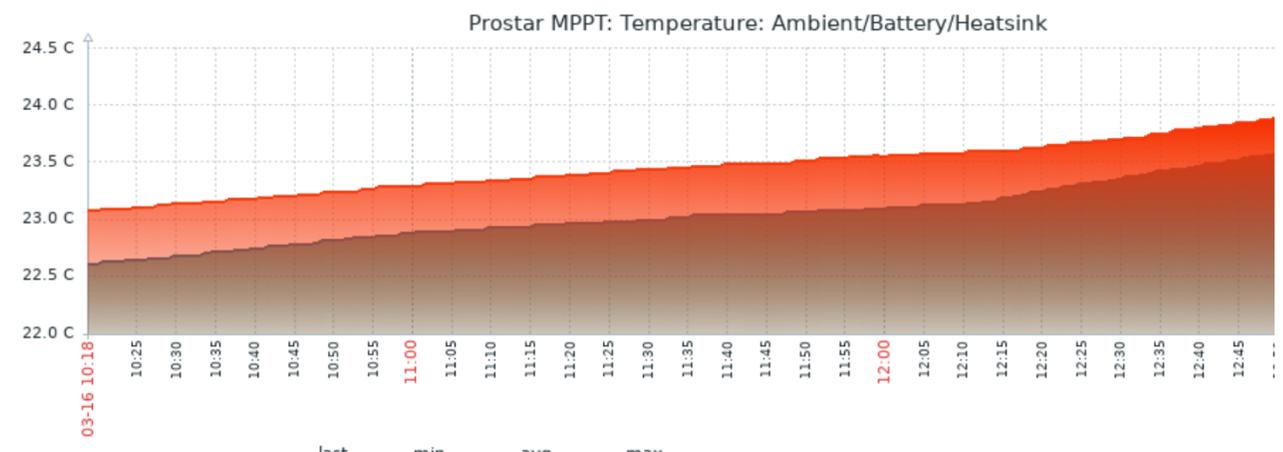


ШАБЛОНЫ

<input type="checkbox"/> Name ▲	Hosts	Applications	Items	Triggers	Graphs	Dashboards	Discovery
<input type="checkbox"/> Morningstar ProStar MPPT SNMP	Hosts 1	Applications 7	Items 21	Triggers 55	Graphs 3	Dashboards	Discovery 1
<input type="checkbox"/> Morningstar ProStar PWM SNMP	Hosts 1	Applications 7	Items 18	Triggers 54	Graphs 3	Dashboards	Discovery 1
<input type="checkbox"/> Morningstar SunSaver MPPT SNMP	Hosts 1	Applications 7	Items 21	Triggers 40	Graphs 3	Dashboards	Discovery 1
<input type="checkbox"/> Morningstar SureSine SNMP	Hosts 1	Applications 5	Items 7	Triggers 16	Graphs 2	Dashboards	Discovery 1
<input type="checkbox"/> Morningstar TriStar MPPT 600V SNMP	Hosts 1	Applications 6	Items 17	Triggers 65	Graphs 4	Dashboards	Discovery 1
<input type="checkbox"/> Morningstar TriStar MPPT SNMP	Hosts 1	Applications 6	Items 17	Triggers 37	Graphs 4	Dashboards	Discovery 1
<input type="checkbox"/> Morningstar TriStar PWM SNMP	Hosts 1	Applications 7	Items 9	Triggers 35	Graphs 1	Dashboards	Discovery 6



	last	min	avg	max
Battery: Voltage [avg]	12.59 V	12.59 V	12.6182 V	12.66 V
Load: Voltage [avg]	12.59 V	12.59 V	12.6114 V	12.65 V
Trigger: Battery: Low battery voltage (below 12V for 5m)				[< 12]
Trigger: Battery: High battery voltage (over 15V for 5m)				[> 15]
Trigger: Battery: Critically low battery voltage (below 11.5V for 5m)				[< 11.5]



	last	min	avg	max
Temperature: Ambient [avg]	23.83 C	22.59 C	23.1204 C	23.83 C
Temperature: Battery [avg]	23.83 C	22.59 C	23.1206 C	23.83 C
Temperature: Heatsink [avg]	24.16 C	23.06 C	23.5237 C	24.16 C
Trigger: Temperature: Low battery temperature (below 0C for 5m)				[< 0]
Trigger: Temperature: High battery temperature (over 45C for 5m)				[> 45]
Trigger: Temperature: Critically low battery temperature (below 0C for 5m)				[< -20]

БАЗОВЫЕ МЕТРИКИ

Массив панелей

Батарея

Счётчики

Статус состояния

Температура

Counter: Load Amp-hours	
Load: Current	
Load: State	<u>Triggers</u> 2
Load: Voltage	
Status: Alarms	<u>Triggers</u> 25
Status: Array Faults	<u>Triggers</u> 12
Status: Load Faults	<u>Triggers</u> 8
Status: Uptime	<u>Triggers</u> 2
Temperature: Ambient	
Temperature: Battery	<u>Triggers</u> 4
Temperature: Heatsink	
Array: Sweep Pmax	
Array: Sweep Vmp	
Array: Sweep Voc	
Array: Voltage	
Battery: Battery Voltage discovery	
Battery: Charge Current	
Battery: Charge State	<u>Triggers</u> 2
Battery: Target Voltage	
Counter: Charge Amp-hours	
Counter: Charge KW-hours	

ФЛАГИ СОСТОЯНИЙ

Faults/Alarms флаги устройства

Триггер на каждое «плохое»

Severity	Name
Warning	Morningstar ProStar MPPT SNMP: Status: Device has "arrayCurrentOffset" alarm flag
Warning	Morningstar ProStar MPPT SNMP: Status: Device has "batterySenseDisconnected" alarm flag
Warning	Morningstar ProStar MPPT SNMP: Status: Device has "batterySenseOutOfRange" alarm flag
Warning	Morningstar ProStar MPPT SNMP: Status: Device has "controllerReset" alarm flag
Warning	Morningstar ProStar MPPT SNMP: Status: Device has "currentLimit" alarm flag
Warning	Morningstar ProStar MPPT SNMP: Status: Device has "currentMeasurementError" alarm flag
Warning	Morningstar ProStar MPPT SNMP: Status: Device has "eepromAccessFailure" alarm flag
Warning	Morningstar ProStar MPPT SNMP: Status: Device has "fp10SupplyOutOfRange" alarm flag
Warning	Morningstar ProStar MPPT SNMP: Status: Device has "heatsinkTempLimit" alarm flag
Warning	Morningstar ProStar MPPT SNMP: Status: Device has "heatsinkTempSensorOpen" alarm flag

Severity	Name
High	Morningstar TriStar MPPT SNMP: Status: Device has "arrayHvd" faults flag
High	Morningstar TriStar MPPT SNMP: Status: Device has "batteryHvd" faults flag
High	Morningstar TriStar MPPT SNMP: Status: Device has "customSettingsEdit" faults flag
High	Morningstar TriStar MPPT SNMP: Status: Device has "dipSwitchChange" faults flag
High	Morningstar TriStar MPPT SNMP: Status: Device has "eepromRetryLimit" faults flag
High	Morningstar TriStar MPPT SNMP: Status: Device has "fetShort" faults flag
High	Morningstar TriStar MPPT SNMP: Status: Device has "overcurrent" faults flag
High	Morningstar TriStar MPPT SNMP: Status: Device has "rtsDisconnected" faults flag
High	Morningstar TriStar MPPT SNMP: Status: Device has "rtsShorted" faults flag
High	Morningstar TriStar MPPT SNMP: Status: Device has "slaveControlTimeout" faults flag
High	Morningstar TriStar MPPT SNMP: Status: Device has "softwareFault" faults flag

Device has "heatsinkTempSensorShorted" alarm flag
Device has "highInputVoltageLimit" alarm flag
Device has "inductorTempLimit" alarm flag
Device has "inductorTempSensorOpen" alarm flag
Device has "inductorTempSensorShorted" alarm flag
Device has "loadCurrentOffset" alarm flag
Device has "loadLvd" alarm flag
Device has "logTimeout" alarm flag
Device has "mosfetOpen" alarm flag
Device has "p12SupplyOutOfRange" alarm flag
Device has "p33SupplyOutOfRange" alarm flag

НАСТРОЙКА ТРИГГЕРОВ

Макросы

Значения от производителя

Гибкость настройки

Macro	Value	
{BATTERY.TEMP.MAX.CRIT}	60	T ▾
{BATTERY.TEMP.MAX.WARN}	45	T ▾
{BATTERY.TEMP.MIN.CRIT}	-20	T ▾
{BATTERY.TEMP.MIN.WARN}	0	T ▾
{CHARGE.STATE.CRIT}	4	T ▾
{CHARGE.STATE.WARN}	2	T ▾
{LOAD.STATE.CRIT:"fault"}	4	T ▾
{LOAD.STATE.CRIT:"lvd"}	3	T ▾
{LOAD.STATE.WARN:"disconnect"}	5	T ▾
{LOAD.STATE.WARN:"lvdWarning"}	2	T ▾
{LOAD.STATE.WARN:"override"}	7	T ▾
{VOLTAGE.MAX.CRIT}	value	T ▾
{VOLTAGE.MAX.WARN}	value	T ▾
{VOLTAGE.MIN.CRIT}	value	T ▾
{VOLTAGE.MIN.WARN}	value	T ▾

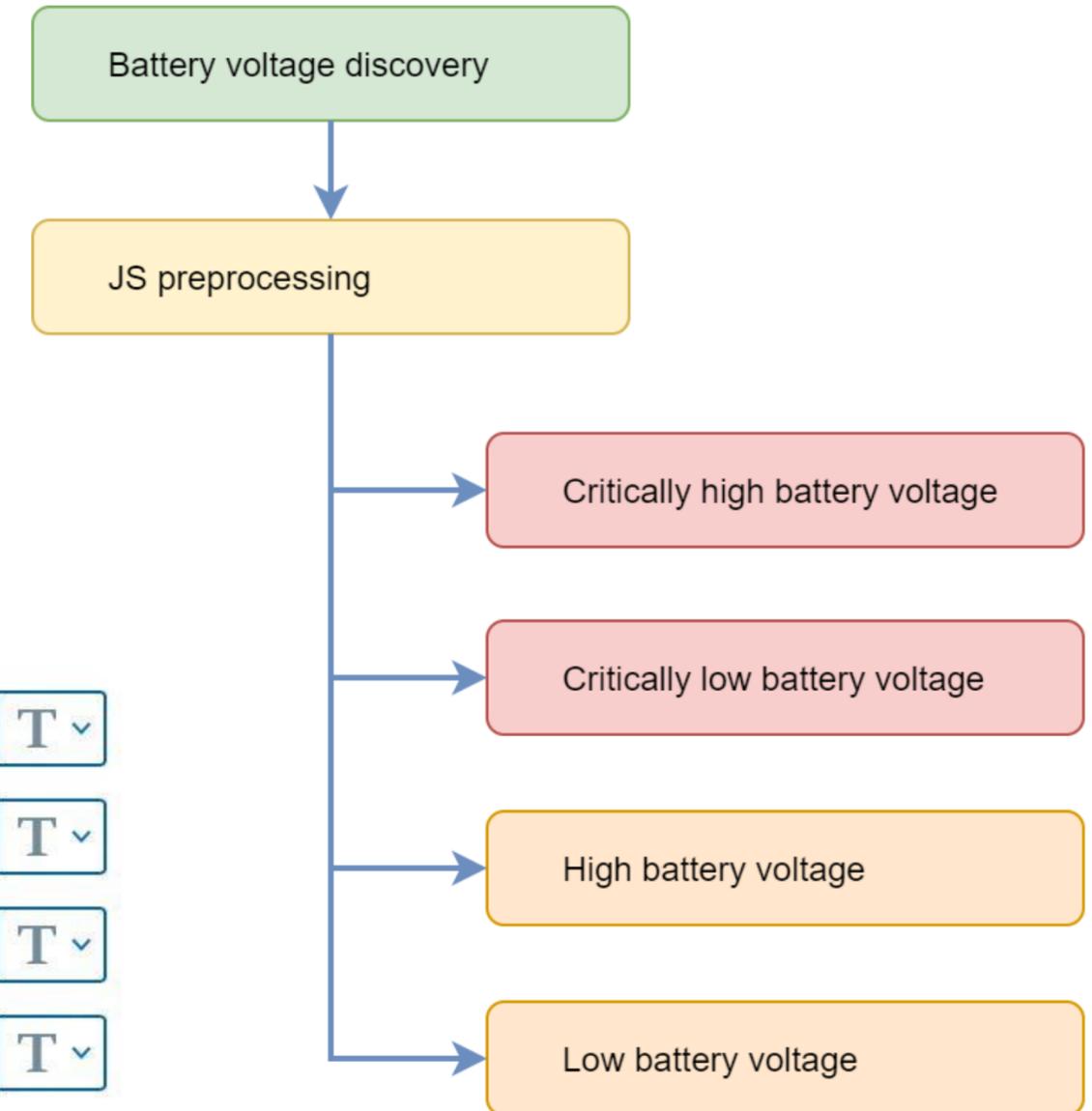
ОПРЕДЕЛЕНИЕ БАТАРЕИ

Автоматическое определение

Пороги для 12V, 24V, 48V

Возможность переопределения

<code>{ \$VOLTAGE.MAX.CRIT }</code>	value	T ▾
<code>{ \$VOLTAGE.MAX.WARN }</code>	value	T ▾
<code>{ \$VOLTAGE.MIN.CRIT }</code>	value	T ▾
<code>{ \$VOLTAGE.MIN.WARN }</code>	value	T ▾

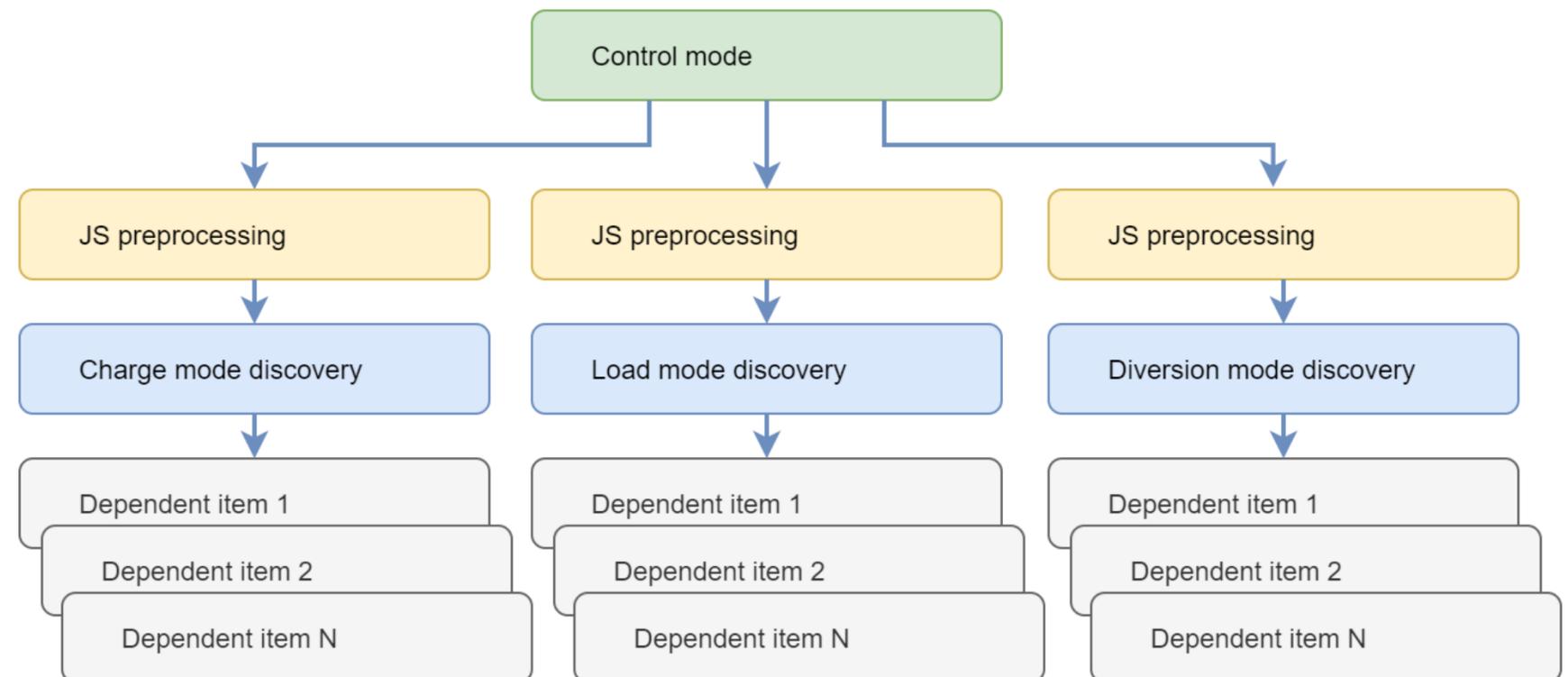


РЕЖИМЫ TRISTAR PWM

Поддерживает три режима работы

Один шаблон

Динамическое добавление/удаление метрик



СПАСИБО ДУКТАРЕ JAVASCRIPT



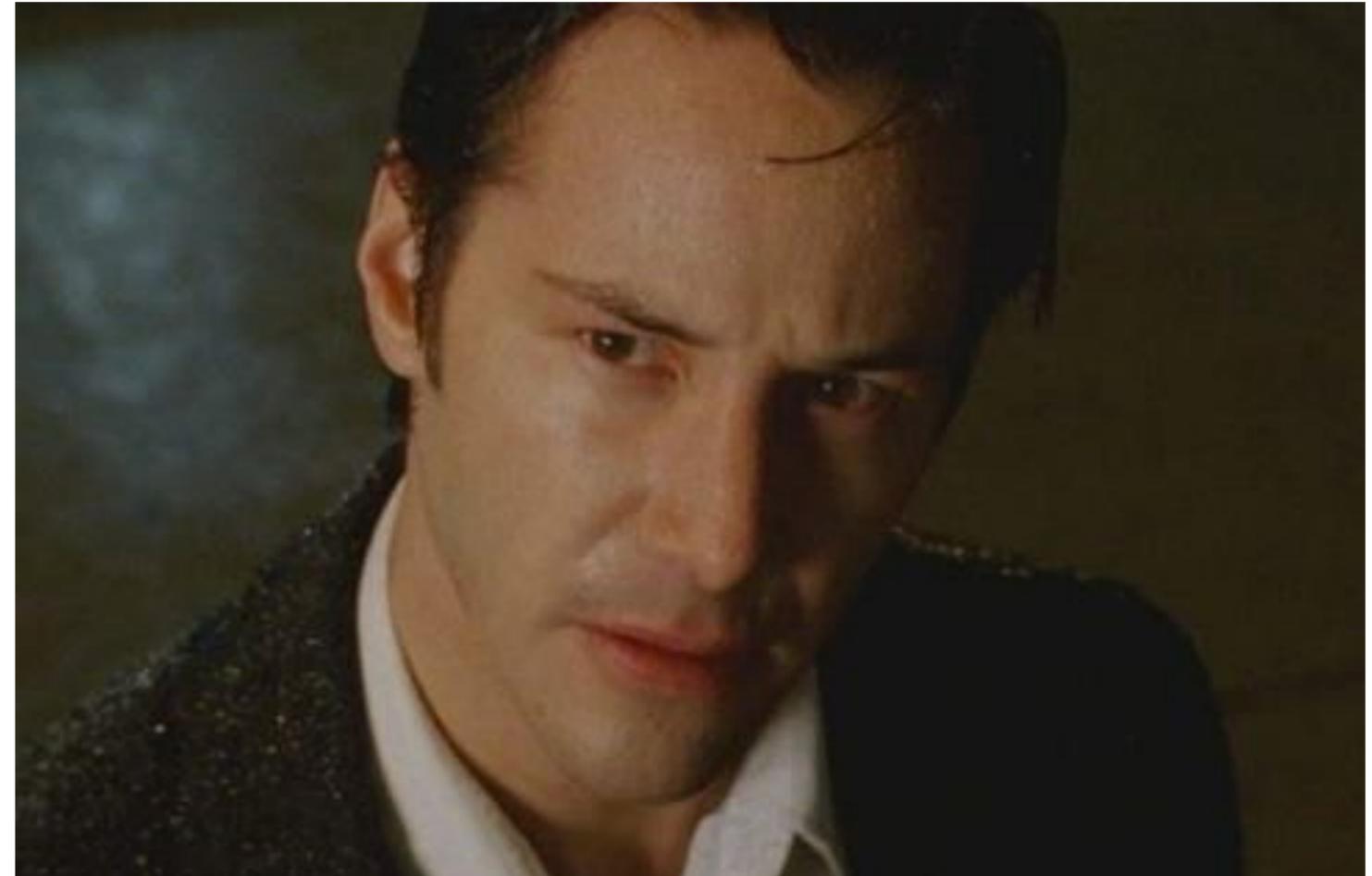
BULK REQUESTS

SNMP Get

STRING: "1"
Gauge32: 2
INTEGER: 1.61

SNMP Bulk Get

STRING: "1"
Gauge32: 2
INTEGER: 666



* SNMP version

SNMPv2



* SNMP community

public

Use bulk requests

ЗАКЛЮЧЕНИЕ



ПОЛЕЗНЫЕ ССЫЛКИ

<https://www.morningstarcorp.com/>

<https://www.youtube.com/watch?v=i5YQ4t5apPM>

<https://literoflight.org>



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ВОПРОСЫ?

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