

Leakage Detection with OSIsoft PI

René Kersten (Senior Functional Administrator PI)

Elco Verbrugge (Process Coordinator Extraction and Purification)

London, 28 May 2015

Agenda

René

- Introduction Vitens
- PI Infrastructure
- Challenge: Leakage Detection
- Principles
- Technical solution: PI Infrastructure add-on
- Functional solution: Configuration PI

Elco

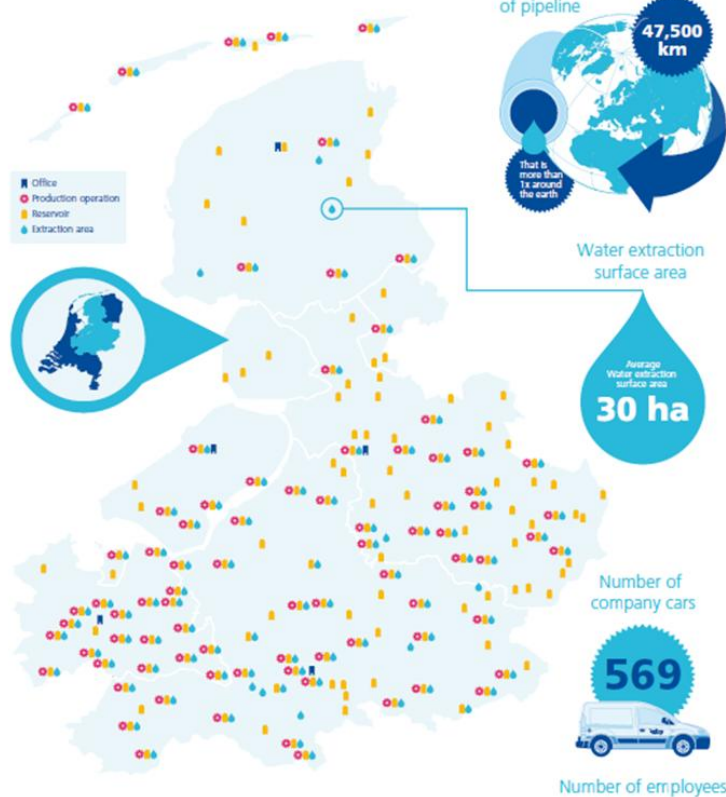
- PI Leakage Detection in practice
- Lessons learned
- Examples
- Next steps
- Positive impacts

René - Elco

- Questions

Introduction Vitens

Vitens' service area

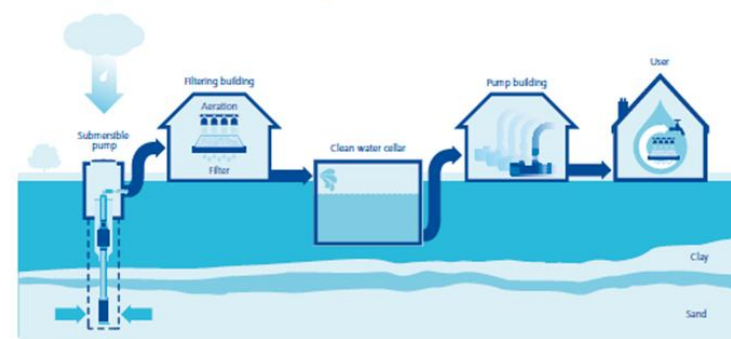


Company results (€ millions)

	2010	2009	2008
Total income	453.6	445.9	450.3
Result	416.8	408.0	414.8
Operating result before depreciation (EBITDA)	161.2	165.0	166.9
Operating result (S&P)	75.1	81.5	85.7

Spotlight on Vitens

Extraction, purification and distribution process



Total consumption 2010



Average cost of drinking water



Number of connections



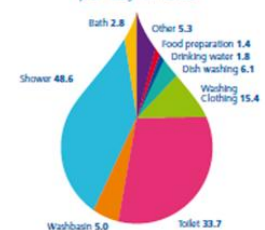
Costs per connection



Distribution of consumption in m³



Water consumption per household per day in litres



Vitens

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Challenge Leakage Detection

Presentation abstract:

As a supplier of drinking water, we unfortunately have to deal with leaks in our daily operations. In most cases, we are alerted by our customers. Usually because the pressure is too low, or they are not receiving any water at all. This means that we are always one step behind.

We wanted to be able to be **one step ahead** instead. Our challenge was to create business rules in OSIsoft PI that would alert us whenever an exception occurs in our distribution network. Our Central Water Distribution department can then **immediately take action**, even before we receive the first call from our customers. We have developed these business rules in a combined effort between business and IT. In our presentation, we will talk about how this functionality was developed, which parts of the PI system we use, the current operational results (hit rate) and lessons learned.

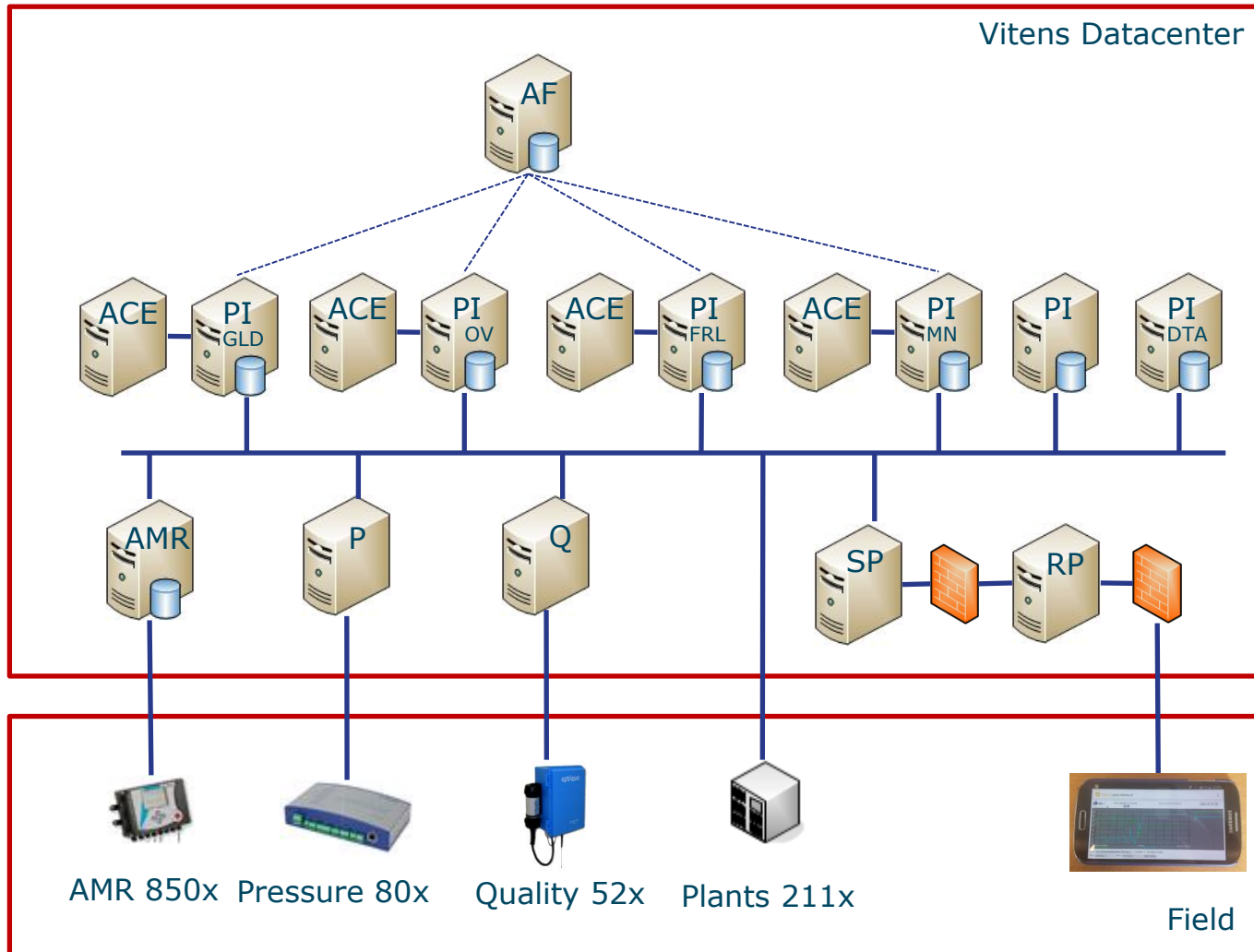


Principles:

- Just start 😊
- Using OSIsoft installed base (PI – AF – Webparts)
- Suggest a business rule based on existing measurements (flow and pressure) in the field
- There must be send and receive a notification => Anyplace, anytime, anywhere, with additional information
- Immediate analysis of information, use visualisation tools to trend data
- Secure
- Easy to maintain (template based)
- Scalable, easily expandable (template based)



Technical solution: PI Infrastructure add-on



Functional solution: Configuration PI

- Symptoms of a leak: flow increases, pressure decreases
- Business rule (*Elco*)
- AF, templates (element and notification)
- Notification
- PI instant Webpart (SharePoint), including customizing the Webpart (trigger time, -30min / +30min)
(using custom JavaScript in Ad-hoc trend)
- Receive notifications on smartphone. View ad-hoc trend directly from notification

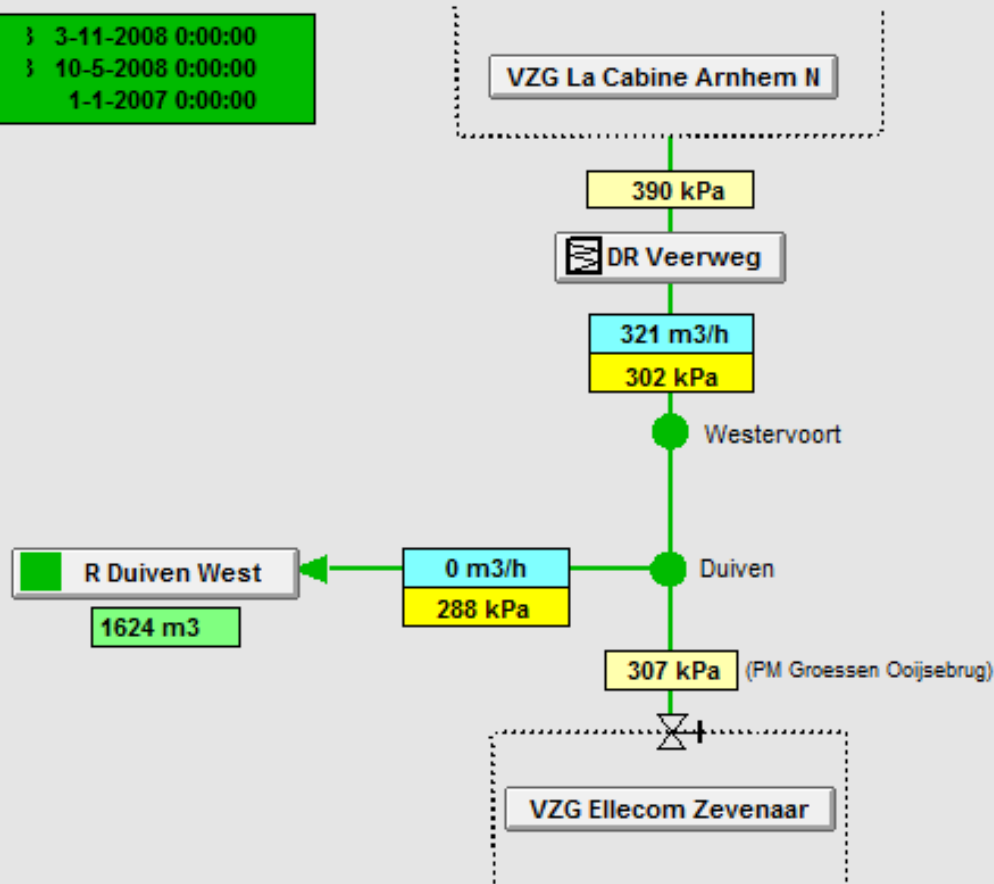
PI Leakage Detection in practice (Elco)

- Business rule
- Initial configuration of parameters based on best guess/knowledge by operator (configuration Maarn)
- Fine-tuning of parameters after real exceptions
- Hit rate => 95%

Lessons learned (Elco)

Balansgebied GA52 La Cabine Duiven

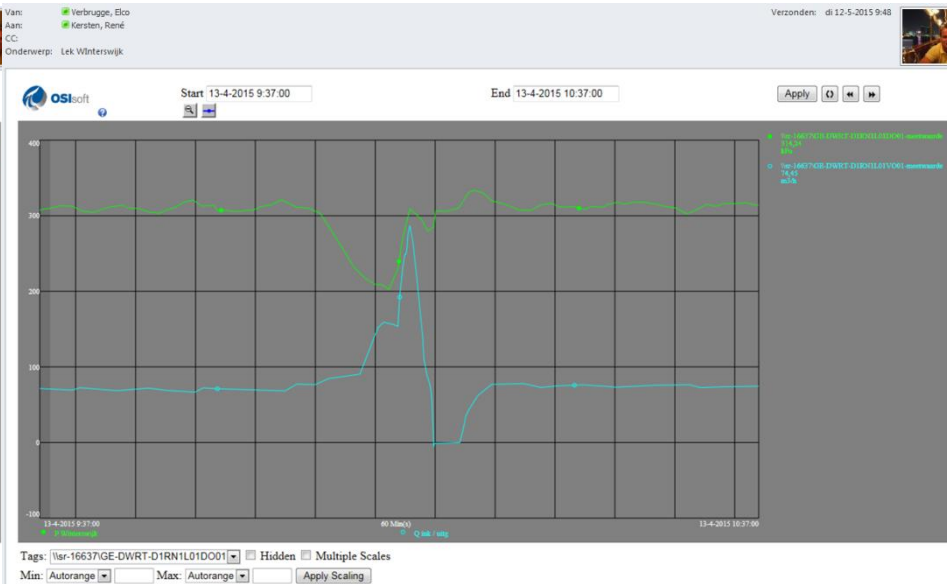
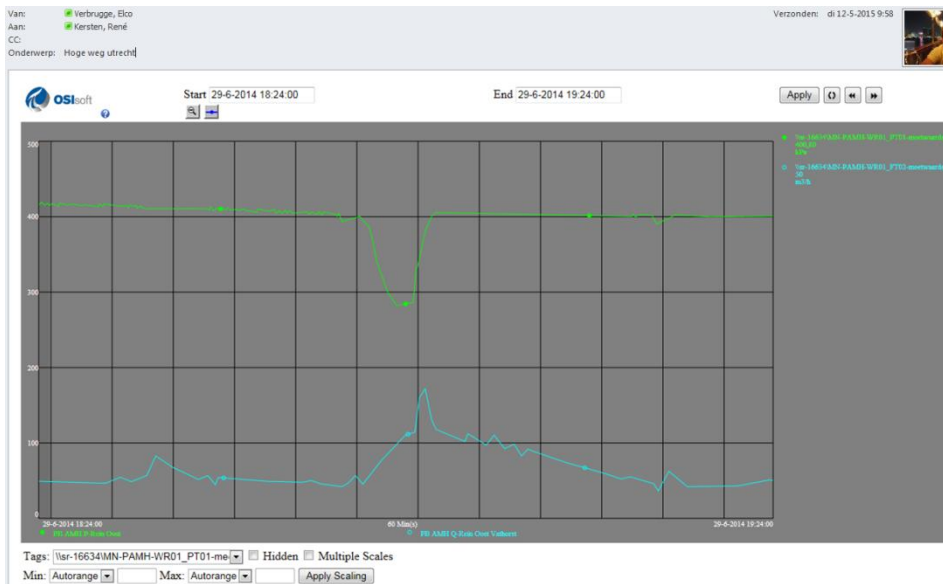
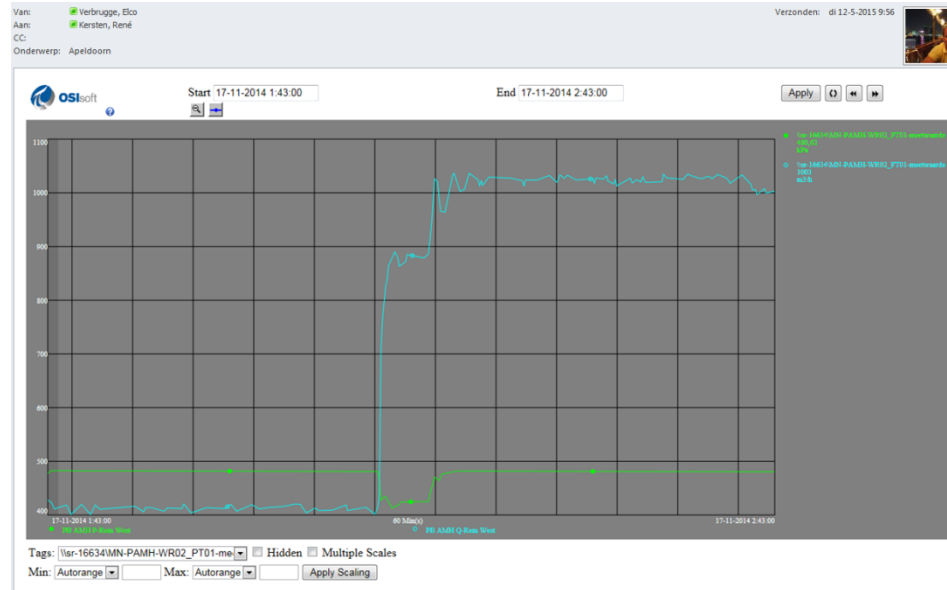
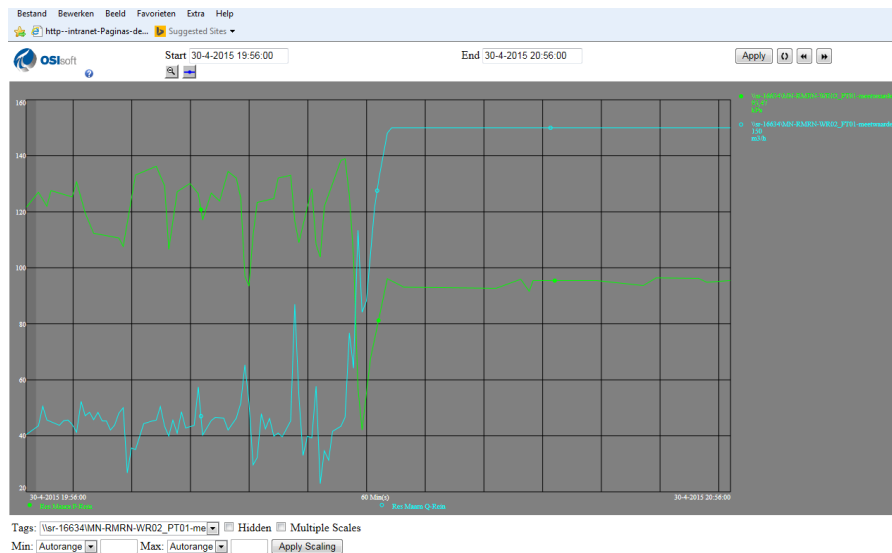
Min. dag	11011 m3	3-11-2008 0:00:00
Max. dag	27061 m3	10-5-2008 0:00:00
Gem. dag	-24 m3	1-1-2007 0:00:00



versie dd.1-6-2010 11:30:37

GA52 Achterhoek Overzicht

Examples (Elco)



Next step(s) (Elco)

- Determine exact location using pressure sensors
-

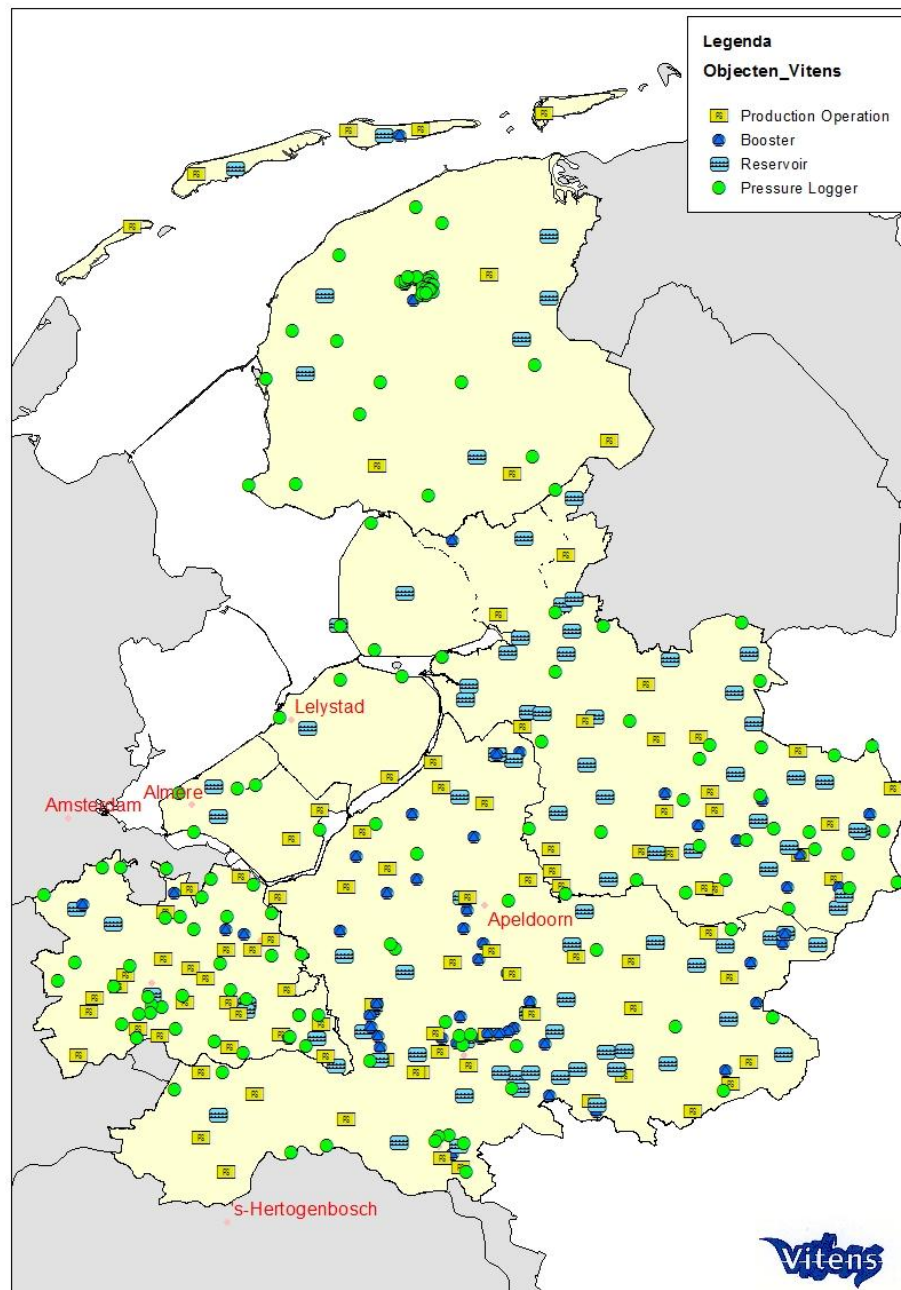
Positive impacts

- Less leakage water
- Less energy consumption
- Less damage
- Less dewatering
- Decreasing the Mean Time To Repair (MTTR)
- The customer has faster access to drinking water



Questions





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Library

- Lekmonitor Gelderland
 - Categories
 - Templates
 - Element Templates
 - LekMonitoring
 - Model Templates
 - Notification Template
 - Transfer Templates
 - Enumeration Sets
 - Reference Types
 - Tables

LekMonitoring

General Attribute Templates Ports

Filter

Name	Description	Default Value
Configuratie		
Factor P	Y	90 %
Factor Q	X	155 %
Minimum Q	Z	20 m3/h
Negeer ...	Geen notificatio...	0
Server	PI server	sr-16637
Tag P	PI tag P	
Tag Q	PI tag Q	
Verhogin...	W	20 m3/h
Grenswaarde		
P	F	0 kPa
P -2m	D	0 kPa
P avg -3m	B2	0 kPa
P avg -8m	B1	0 kPa
P avg -8...	B	0 kPa
Q	E	0 m3/h
Q -2m	C	0 m3/h
Q avg -3m	A2	0 m3/h
Q avg -8m	A1	0 m3/h
Q avg -8...	A	0 m3/h
Notification		
Notification		
Output		
Lek alarm		0

LekNotificationTemplate

Overview Trigger Content Subscriptions

Add

Standard Content

- Name
- Description
- Target
- Start Time
- End Time
- Trigger Time
- State
- Escalation Level
- Priority

Trigger Input

- \\SR-16642\Lekmonitor Gelderland\Element Templates[LekMonitoring]Lek alarm
- \\SR-16642\Lekmonitor Gelderland\Element Templates[LekMonitoring]Negeer melding
- \\SR-16642\Lekmonitor Gelderland\Element Templates[LekMonitoring]P
- \\SR-16642\Lekmonitor Gelderland\Element Templates[LekMonitoring]Q
- \\SR-16642\Lekmonitor Gelderland\Element Templates[LekMonitoring]Notification[DrukIP voor
- \\SR-16642\Lekmonitor Gelderland\Element Templates[LekMonitoring]Notification[DrukIP trigger
- \\SR-16642\Lekmonitor Gelderland\Element Templates[LekMonitoring]Notification[DrukIP delta
- \\SR-16642\Lekmonitor Gelderland\Element Templates[LekMonitoring]Notification[VolumestroomIQ voor
- \\SR-16642\Lekmonitor Gelderland\Element Templates[LekMonitoring]Notification[VolumestroomIQ trigger
- \\SR-16642\Lekmonitor Gelderland\Element Templates[LekMonitoring]Notification[VolumestroomIQ delta

Link

- Instant PI WebParts Trend



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Van: ☐ PI_notifications@vitens.nl

Verzonden: do 30-4-2015 20:26

Aan: ☒ Kersten, René

CC:

Onderwerp: SR-16642\Lekmonitor Midden Nederland\Productiedijf Woudenberg\Reservoir Maarn richting Maarn\Notifications[LekNotification134] generated a new notification event.

Name: LekNotification134

Server: SR-16642

Database: Lekmonitor Midden Nederland

Start Time: 30-4-2015 20:26:00 W. Europe Daylight Time (GMT+02:00:00)

Trigger Time: 30-4-2015 20:26:00 W. Europe Daylight Time (GMT+02:00:00)

Target: SR-16642\Lekmonitor Midden Nederland\Productiedijf Woudenberg\Reservoir Maarn richting Maarn

State: OutsideControl

Priority: Normal

Trigger Input:

[\SR-16642\Lekmonitor](#) Midden Nederland\Productiedijf Woudenberg\Reservoir Maarn richting Maarn\Lek alarm: 1

[\SR-16642\Lekmonitor](#) Midden Nederland\Productiedijf Woudenberg\Reservoir Maarn richting Maarn\Negeer melding: 0

[\SR-16642\Lekmonitor](#) Midden Nederland\Productiedijf Woudenberg\Reservoir Maarn richting Maarn\P: 75,8974380493164

[\SR-16642\Lekmonitor](#) Midden Nederland\Productiedijf Woudenberg\Reservoir Maarn richting Maarn\Q: 121,575096130371

[\SR-16642\Lekmonitor](#) Midden Nederland\Productiedijf Woudenberg\Reservoir Maarn richting Maarn\Notification\Druk\P voor: 123

[\SR-16642\Lekmonitor](#) Midden Nederland\Productiedijf Woudenberg\Reservoir Maarn richting Maarn\Notification\Druk\P trigger: 90

[\SR-16642\Lekmonitor](#) Midden Nederland\Productiedijf Woudenberg\Reservoir Maarn richting Maarn\Notification\Druk\P delta: -33

[\SR-16642\Lekmonitor](#) Midden Nederland\Productiedijf Woudenberg\Reservoir Maarn richting Maarn\Notification\Volumestroom\Q voor: 44

[\SR-16642\Lekmonitor](#) Midden Nederland\Productiedijf Woudenberg\Reservoir Maarn richting Maarn\Notification\Volumestroom\Q trigger: 79

[\SR-16642\Lekmonitor](#) Midden Nederland\Productiedijf Woudenberg\Reservoir Maarn richting Maarn\Notification\Volumestroom\Q delta: 35

Link:

[Instant PI WebParts Trend](#)



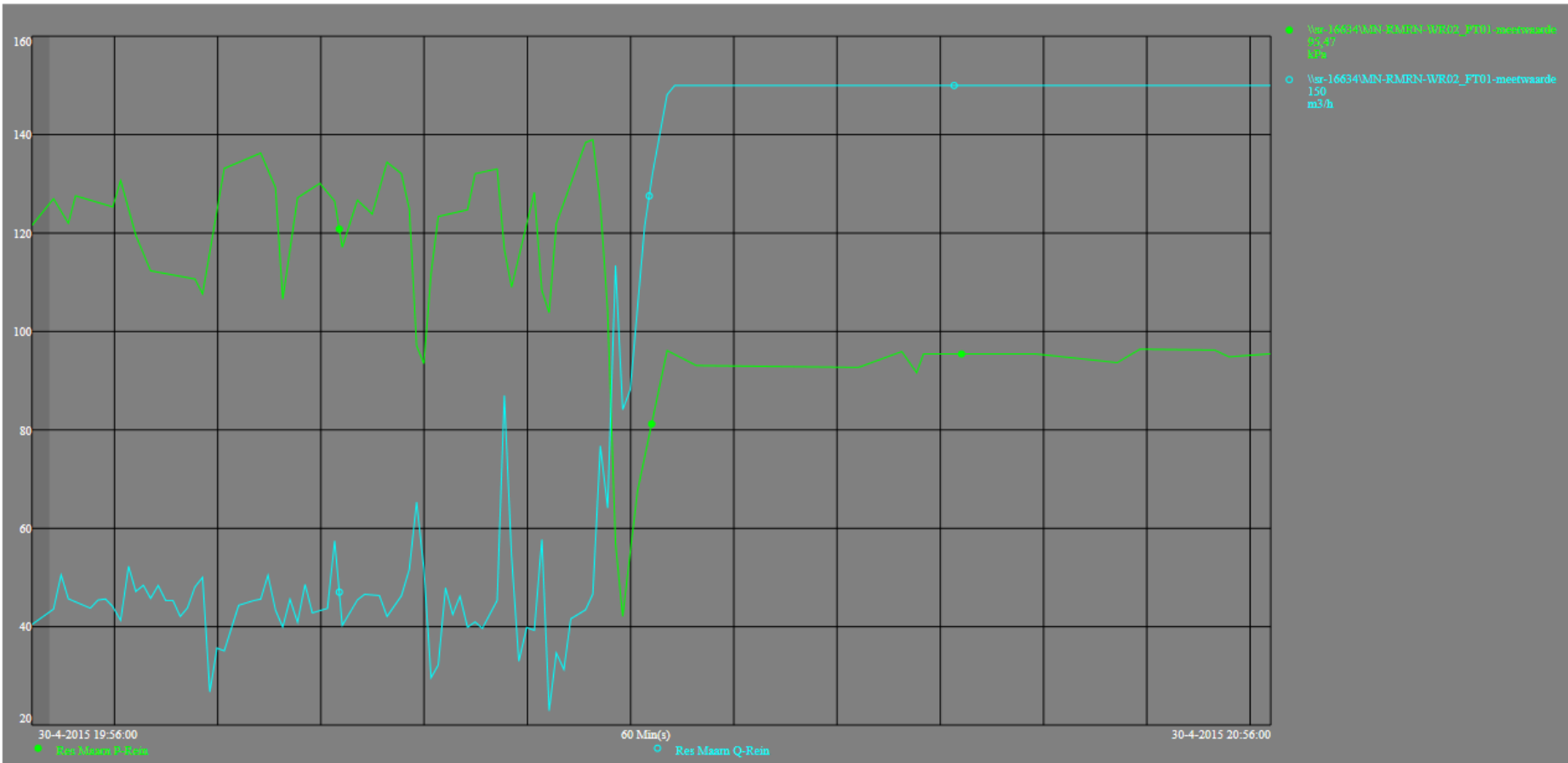
LAAT WATER VOOR JE WERKEN



Start 30-4-2015 19:56:00

End 30-4-2015 20:56:00

Apply

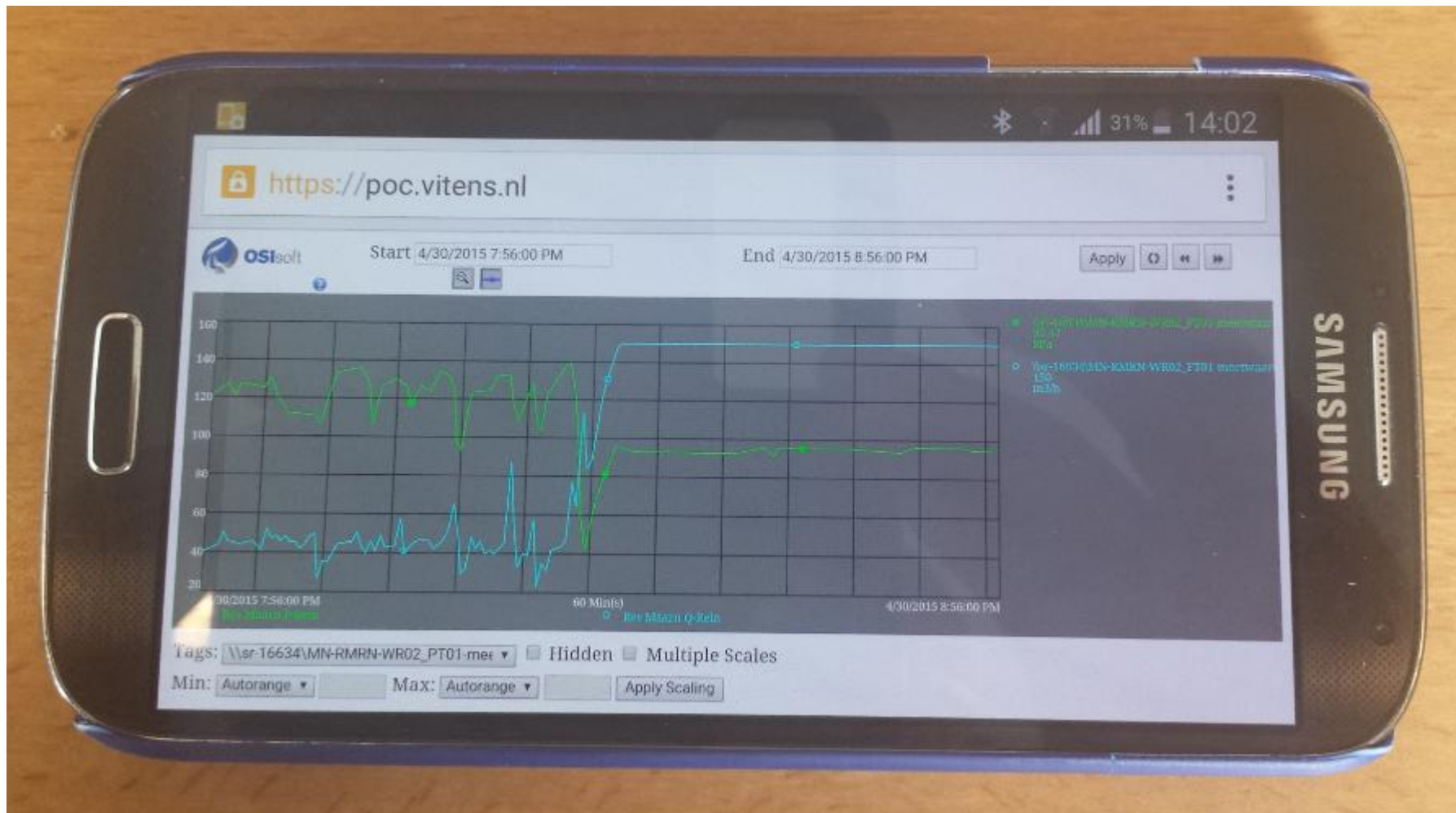


Tags: \sr-16634\MN-RMRN-WR02_PT01-me ☐ Hidden ☐ Multiple Scales

Min: Autorange Max: Autorange Apply Scaling



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\\SR-16642\Lekmonitor Midden Nederland - PI System Explorer

File Edit View Go Tools Help

Database Query Date Back Check In Refresh New Element New Attribute

Elements

- Elements
 - Productiebedrijf Woudenberg
 - PB Woudenberg richting Scherpenzeel / Woudenberg / Maarn
 - Reservoir Maarn richting Maarn**
 - Productiebedrijf Leidsche Rijn
 - Productiebedrijf Zeist
 - Productiebedrijf Amersfoort Berg
 - Productiebedrijf Amersfoort Hogeweg
 - Productiebedrijf Beerschoten
 - Productiebedrijf Bunnik
 - Productiebedrijf Cothen
 - Productiebedrijf De Meern
 - Productiebedrijf Doorn
 - Productiebedrijf Driebergen
 - Productiebedrijf Groenekan
 - Productiebedrijf Laren
 - Productiebedrijf Leersum
 - Productiebedrijf Linschoten
 - Productiebedrijf Loosdrecht
 - Productiebedrijf Lopik
 - Productiebedrijf Nieuwegein
 - Productiebedrijf Rhenen
 - Productiebedrijf Soestduinen
 - Productiebedrijf Tull
 - Productiebedrijf Veenendaal
 - Productiebedrijf Eemdijk
 - Reservoir Kanaleneiland
 - Rol Flevoland
 - Element Searches

Reservoir Maarn richting Maarn

General Child Elements Attributes Ports Analyses Version

Filter

	Name	Value
Category: Configuratie		
	Factor P	90 %
	Factor Q	155 %
	Minimum Q	20 m3/h
	Negeer melding	0
	Server	sr-16634
	Tag P	MN-RMRN-WR02_PT01-meetwaarde
	Tag Q	MN-RMRN-WR02_FT01-meetwaarde
	Verhoging Q abs.	20 m3/h
Category: Grenswaarde		
	P	102,759468078613 kPa
	P -2m	104,96558380127 kPa
	P avg -3m	100,525103838034 kPa
	P avg -8m	102,588823702341 kPa
	P avg -8m,-3m	103,827055620925 kPa
	Q	0 m3/h
	Q -2m	0 m3/h
	Q avg -3m	0 m3/h
	Q avg -8m	0 m3/h
	Q avg -8m,-3m	0 m3/h
Category: Notification		
	Notification	
Category: Output		
	Lek alarm	0

