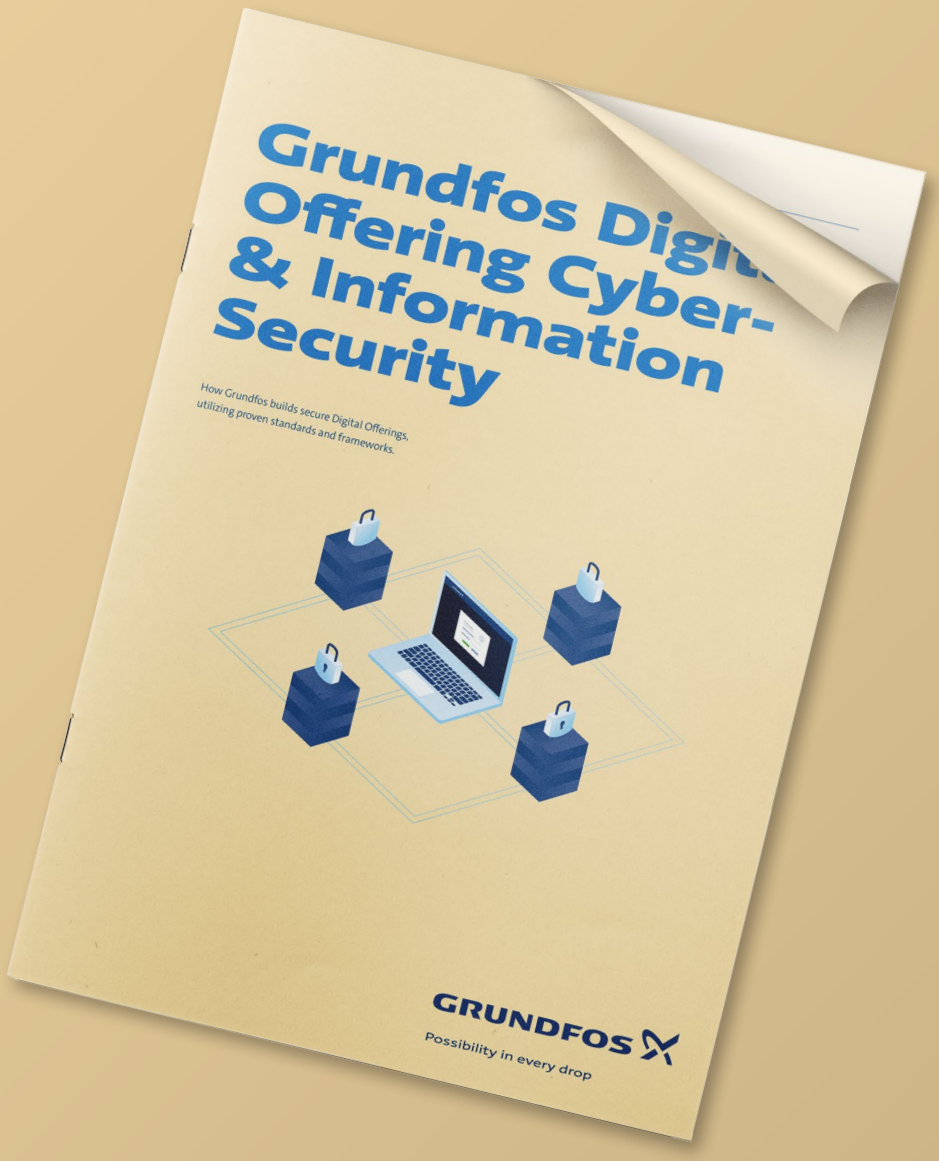
# Grundfos Connect

Security Application Note




GRUNDFOS

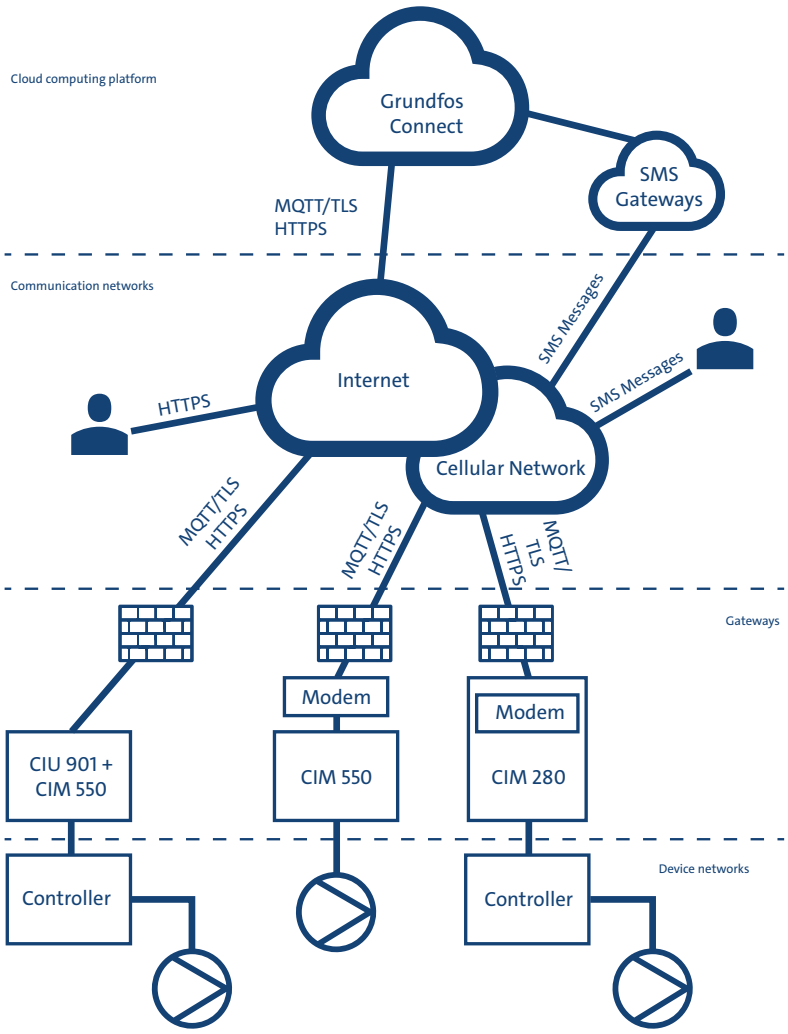
Possibility in every drop

## Introduction

Grundfos Connect is a plug & play internet-based system, that gives you an efficient and cost-effective alternative to more costly SCADA systems. It gives you complete control over your Grundfos devices, no matter where you are. It  has a number of security features that give you both protection and peace of mind.

This document details what they are.

# The Security Architecture




### Security architecture

As shown above, the Grundfos Connect security architecture includes a computing platform on which Grundfos Connect runs, multiple communication networks, gateways that control the connection, and the physical infrastructure of the localised systems which control the pumps.
All TCP/IP data sent to and from devices connected to the network are encrypted at all times.

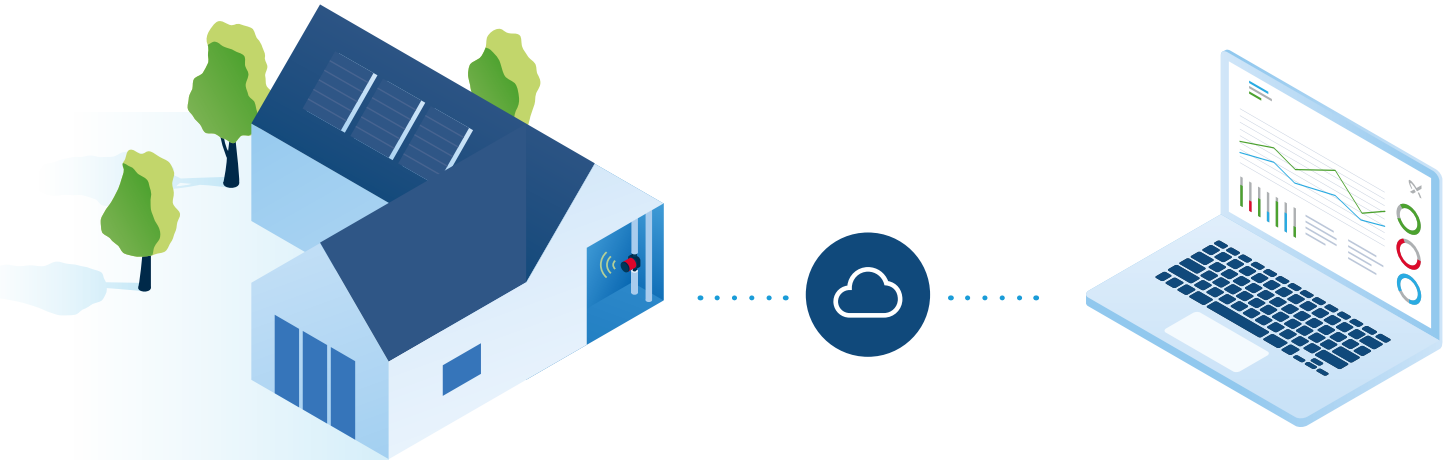
You can read more about the principles that Grundfos Connect abides by in the Grundfos cyber and information security whitepaper found at Grundfos.com.

### How it works

There are four components to Grundfos Connect which help it to connect quickly and securely to your systems.

- **Cloud computing platform**
- **Communication networks**
- **Gateways**
- **Device networks**

# Grundfos Connect



### Cloud computing platform

Grundfos Connect is made up of a number of backend services: An IoT endpoint service and an authentication service. The IoT endpoint service handles the general communication with devices while the authentication service handles authentication of devices and selects which IoT endpoint the devices should use for communication. Grundfos Connect uses a mutual authentication scheme based on X.509 certificates.

The backend services also include storage, authorisation and notification services, and specialist SMS gateways can send text messages to system users.

The backend services are hosted in a highly scalable cloud infrastructure, protected by modern and next-gen security technologies, such as reverse proxies with Layer7 filtering and traffic analysis, Web Application Firewalls (WAF) and Distributed Denial of Service (DDoS) protection mechanisms.

### Communication networks

Grundfos Connect uses the internet or the cellular network, depending on the customer's requirements and the available physical infrastructure.

Gateways initiate HTTPS connections through the network to connect with the authentication service. HTTPS is the secure version of HTTP that uses Transport Level Security (TLS).
When assigned an IoT endpoint, the gateway will connect to the IoT endpoint using MQTT/TLS to continue the communication with Grundfos Connect.
Gateways use a mutual authentication scheme based on X.509 certificates where both server and client are authenticated.

Users access Grundfos Connect with a web client. The web client uses HTTPS and can be used anywhere with internet access. User Authentication is ensured via the Grundfos identity provider (Global Login). You can invite additional users belonging to your organisation and they will have to go through the creation process in Global Login.

Grundfos Connect will send emails or texts to users who has subscribed to alerts.

### Gateways

Grundfos guidelines for dealing with connected products are available at grundfos.com and should always be followed for your security.

The CIM 280 is an interface used for data transmission via a 3G or 4G network, while the CIM 550 is used on ethernet-based networks.
Both the CIM 280 and the CIM 550 transfer data between the network the device is on and Grundfos Connect through secure TLS connections. They can be installed in different physical configurations, such as in a Grundfos product with a CIM slot or in a CIU 900/901 interface unit.

Gateways are assigned to users in a process that requires physical access to the equipment.

### Using firewalls

As the gateways always initiate the connection to Grundfos Connect, no inbound connections should be allowed through the firewall.
When using a an external firewall, be sure that it allows outgoing connections through HTTPS and MQTT/TLS.

### Device networks

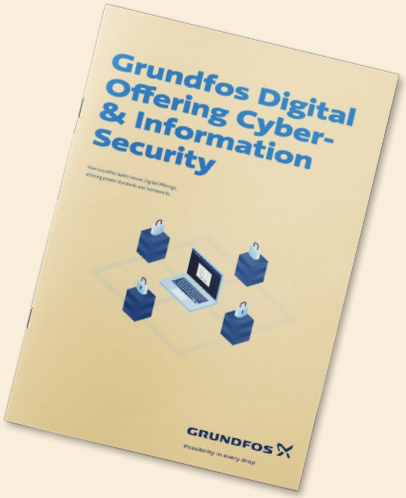
The device network section is where all working hardware, such as controllers, pumps and other devices are placed onto the system architecture. They can communicate with each other, as well as the system gateways, through serial fieldbuses. No communication in this section is TCP/IP based.

### Summary

**Device communication:** Serial fieldbus communication (not TCP/IP)
**WAN communication:** HTTPS and MQTT/TLS (using TLS 1.2) over ethernet or cellular (3G/4G)
**User communication:** HTTPS (using TLS 1.2) and email/SMS for notifications

**Grundfos Connect authentication:** X.509 certificates
**User authentication:** Username / password
**Gateway authentication:** X. 509 certificates

**Software update:** Over-the-air protected by TLS
**Availability:** Redundant virtualised application services setup
**Operations:** Penetration test, threat model and continuous logging and monitoring



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**Any questions?**
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