

FREJA and SMRT Digital Twin Virtual relay test system



- Enables virtual relay testing of Siemens SIPROTEC 5 devices
- Relay settings tested and approved prior to FAT or commissioning
- Reuse tests created for virtual relay testing for physical devices
- Saves money, time, and the environment
- Improves safety while working
- Perfect for applications such as training, FAT, remote support, complex tests, etc

DESCRIPTION

The FREJA and SMRT Digital Twin is a functional digital twin of the relay test systems FREJA and SMRT from Megger. This pioneering technology enables virtual testing of Siemens SIPROTEC 5 devices through Siemens' cloud-based SIPROTEC DigitalTwin. The relay tests are performed on-line prior to when the physical devices are accessible and, with tested and approved protection settings, only a subset of the test needs to be repeated on the physical devices to ensure the correct input and output of the hardware and connections.



The tests are performed through the Megger software RTMS in a similar way to how the physical test sets are used. However, instead of analogue signals, the signals are digital. As of March 2023, the digital twin test set conducts the test sequence without feedback from the digital twin relay, which is known as open loop testing. Enabled features and functions are used the same way in the digital twin as the equivalent physical model.

FEATURES

Digital twin of FREJA 546/549 and SMRT 1/46/410

The digital twin is a virtual replica of the preferred test system. It makes sense to use the same digital twin as the physical device that is available since the tests can be repeated without modification. RTMS connects to the digital twin as it connects to a physical test system and is controlled in the same way.

Super DT (Digital Twin) test set

The Super DT provides you with a virtual test set that offers 12 current-, 12 voltage generators, and 32 binary outputs. This allows for the creation of virtual tests that do not necessarily need to be performed physically. However, if required, a physical super test set can be created by connecting multiple SMRT or FREJA devices together.

Monthly or yearly subscription

The digital twin is accessed by registering a licence in RTMS from PowerDB version 11.2.10.130 released March 13, 2023, or later. A monthly or annual subscription is available, and it is issued by contacting Megger or a Megger representative. There is a free time-limited trial license available if the product should be evaluated prior to purchase.

Since both a digital twin of a relay tester and a relay are needed to gain the benefits, the Siemens SIPROTEC DigitalTwin needs to be acquired separately to the FREJA or SMRT Digital Twin, also through a subscription. SIPROTEC DigitalTwin is currently available in most of the countries. Please get in contact with your local Siemens sales for further details.

FREJA and SMRT Digital Twin

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APPLICATIONS

There are several applications for the use of digital twins. In all cases, it can save money, time, and the environment as well as increase your safety. Below lists the benefits for specific use cases:

Virtual factory acceptance testing (FAT)

When FAT is conducted virtually, case studies have shown it can save around 20 % off time and can reduce costs of around 30 %. A few examples are:

- Hardware availability constraints and logistics are eliminated - no need to send physical devices to one location to perform FAT.
- Connection time and material is saved - the temporary connections are made virtually.
- Travel costs, time, and CO₂ emissions are eliminated - FAT is performed at any location with internet access.
- Time saving when troubleshooting - experts are available to support from their location and work directly in the same environment.
- Time saving by parallel work - the devices and the system can be worked on simultaneously.
- Increased safety in FAT - there are no hazardous voltages present and possible wrong connections won't cause damage.

Protection relay training

In a high voltage environment, it is important to ensure that the workforce is qualified since mistakes are both costly and hazardous, the latter being potentially lethal. Digital twins have proven to be perfect tools to use in training situations and a few examples of the benefits are:

- Increased safety - there are no hazardous voltages present and possible wrong connections won't damage anything.
- Efficient training - each student can have their devices to build their environment and they can work in their own pace.

- Costs are eliminated - no need to have physical devices available.
- Potentially, travel costs, time, and CO₂ emissions are eliminated - distance training is possible since the digital twins are accessed from any location with internet access.
- Teamwork and group projects - the devices or the system can be worked on simultaneously from any location.

Remote support

When an engineer gets stuck with a problem during commissioning, support is urgently needed to not delay the project. With the FREJA and SMRT Digital Twin, the expert can efficiently support from distance as the device and settings can be replicated. The benefits of this include:

- Travel costs, time, and CO₂ emissions are eliminated - no need for the expert to travel to the site.
- Convenient work hours - the expert can solve the problem during work hours.
- Increased predictability of project time - delays due to external support are minimised.
- Time saving by parallel work - the devices or the system can be worked on simultaneously.

Above are just a few examples of use cases where benefits are proven. There are other applications as well, for example:

- Post-fault analysis
- Firmware upgrades
- Complex tests
 - Line differential - long distances
 - Busbar differential - large test systems
- Substation expansions
- Research and development

ORDERING INFORMATION

Description	Part number
Product	
DT Digital License 12 month – Digital Twin support with RTMS software	1015-221
DT Digital License 12 month Multicopy – Digital Twin support with RTMS software	1015-221MCS
DT Digital License 1 month – Digital Twin support with RTMS software	1015-221MON

Multicopy discount only with 12 month License

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