



January 2025

## **Remote Monitoring and Remote Control for Network Production**

### **Stations Application of Articles 111 and 118 of Law 5106/2024 (GG**

### **63/A/01.05.2024}<sup>1</sup> Questions - Answers**

#### **1. What is remote monitoring and remote control?**

Remote monitoring refers to the real-time observation of key characteristics of a production station that are relevant to the Network Operator and other market participants, such as Aggregators Remote control involves intervening in the operation of a station to adjust its performance based on target commands. For RES stations, standard adjustments typically involve limiting the plant's maximum active power output to a specified value, known as the ('active power setpoint')."

#### **2. Who are the beneficiaries of remote monitoring and control?**

The obligation to install remote monitoring and remote control systems shall, in principle, apply to independent producers' plants with electricity compensation and an installed capacity exceeding 400 kW, connected to the interconnected grid, regardless of the generation technology or activation date For self-consumer stations, remote monitoring and control will be carried out at a later stage.

#### **3. Is the installation of the equipment mandatory?**

The installation of equipment for remote monitoring and remote control in power stations with an installed capacity exceeding 400 kW is mandatory by Law 5106/2024. Specifically, Articles 111 and 118 of the law outline the obligation, specify deadlines for equipment installation and make provision for penalties in case of non-compliance by the producer.

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<sup>1</sup> As amended by Article 86 of Law 5151/2024 (GG 173/A/04.11.2024)

#### **4. What are the deadlines for installing the equipment?**

Stations with an installed capacity exceeding 400 kW and up to 1000 kW are required to install the equipment within eight (8) months from the notification of the requirements of HEDNO, i.e. by 13/02/2025.

Power plants with an installed capacity exceeding 1000 kW are required to install the equipment within eight (8) months from the publication of Law 5106/2024, i.e. by 31/12/2024.

#### **5. What are the penalties for not installing the equipment?**

In the event of failure to install the equipment within the prescribed time limit, Article 111 provides for the deactivation of the connection of the station to the Network. In addition, for stations with a capacity exceeding 1 MW, Article 118 also provides for financial penalties.

After 31/12/2024 and after 13/02/2025, the Operator will decline connection to the grid of stations with capacity exceeding 1000 kW and stations in the 400-1000 kW power range respectively, in which the required equipment has not been installed.

#### **6. How is compliance with the obligation to install the equipment demonstrated?**

Within the time limit provided for in Law 5106/2024, the producer must submit to the RES/CHP platform a signed Declaration of Compliance stating that they comply with the requirements for remote monitoring and remote control as specified in the latest version of the text "Equipment used in the reception and execution of remote monitoring/control commands for RES & CHP Stations" of HEDNO as part of the application of articles 111 and 118 of Law 5106/2024. The Declaration of Compliance may also be submitted by the station's Technical Manager, as designated by the producer. To confirm it, the signed and fully completed 'Equipment–Station Control Protocol' and 'Equipment–SCADA/DMS Control Protocol' must be attached.

HEDNO will carry out the necessary tests and checks in order to verify compliance and in case of false or inaccurate Declaration, in addition to the deactivation of the connection of the station, the declarant will have the consequences stipulated by the Law.

**7. Who covers the cost of the equipment?**

The costs of installation, maintenance and operation of the equipment shall be borne by the producer.

The operation of the remote monitoring and remote control equipment requires the telecommunication connection with the command system of the Network Control Centers of HEDNO.

**8. Is there an indicative list of equipment or eligible devices that meet the requirements?**

HEDNO has published the equipment specifications and their intended purpose on its website. The equipment will be installed downstream of the HEDNO/producer ownership boundary, i.e., within the production station. The selection of the equipment type is the producer's responsibility. HEDNO does not intend to recommend or verify the suitability of equipment from any specific type or manufacturer. The only exception is the router, which is provided by the Operator.

**9. Why can't I install a router of my own choice?**

The equipment installed for remote monitoring and remote control is provided by the producer. Specifically, the router is supplied by HEDNO in order to meet the increased cyber-security requirements that have been specified.

**10. What is included in the technical specifications published on HEDNO's website?**

The technical requirements published on HEDNO's website include:

- i) The commands to be received by the production station and the signals and measurements to be sent by the station to the SCADA/DMS of HEDNO
- ii) The communication protocol between the station and the SCADA/DMS of HEDNO
- iii) The equipment's programming requirements
- iv) The Specifications for Telecommunications equipment, excluding the router.

The requirements that have been published do not concern self-consumer stations and stations connected to Non-Interconnected Islands.

## 11. What commands will HEDNO provide?

The commands to be provided by HEDNO to the production station are as follows:

- i) command for the maximum permissible injection power ("active power setpoint") specified as either a fixed value or a %;
- ii) command for complete power shutdown;
- iii) command to open the Automatic Disconnect Switch (in emergency situations only).

In the future, there is a provision to send commands for the regulation of reactive power/power factor/voltage and frequency support for those Stations that have the capacity and/or the obligation under EU Regulation 2016/631 ("RfG").

It is clarified that the Equipment must comply with the current legislative framework for the operation of RES Stations as well as with the Final Connection Offer. These determine the maximum permissible injection power into the Network. If any active or reactive power setting commands (specified as either a fixed value or a percentage) are received from HEDNO's SCADA/DMS that result in non-compliance, the equipment must adjust accordingly to ensure compliance at all times.

For example, in stations with a permanent 27% power limitation (see question 24), the command to specify active power as a percentage refers to the maximum allowable injection power, which is already restricted by the 27% limit. Therefore, an active power setting command of 50% results in a limitation of  $(100 - 27) \times 50\% = 36.5\%$ .

## 12. What statuses are monitored by HEDNO?

With the installed equipment, the following statuses must be monitored:

- i) The status of the Automatic Disconnect Switch (closed or open) and its ability to be controlled remotely or locally (remote or local)
- ii) The status of the earthing (closed or open)
- iii) The control status of the equipment (remote or local), communication or loss of communication between the equipment and the production units and the health status of the relay and the equipment
- iv) Decoupling protection alarms
- n) Confirmation that the relevant command has been received from HEDNO or other operator.
- vi) Relevant signals relating to reactive power/power/voltage factor determination and frequency support modes.

## 13. What measurements will be sent to HEDNO?

The measurements sent to HEDNO relate to:

- i) The active and reactive output power of the whole station;
- ii) The current and the voltage per phase;
- iii) The frequency, and
- iv) The power factor.

**14. Does limiting active power entail loss of production and therefore loss of revenue?**

Limiting active power is generally required for allocation purposes, in which case generating stations or their Aggregators may need to reduce their production capacity during certain hours. This is necessary when the energy they are producing exceeds the demand of the Greek Interconnected System and the energy the country is permitted to export. However, an active capacity limitation may also be requested for reallocation purposes, such as when congestion in the System or the Network necessitates further reduction of capacity from RES stations.

Finally, power limitation may also be provided as a service to IPTO, which operates the balancing market, when stations are called upon to supply a 'downward frequency restoration reserve,' i.e., a real-time power reduction, to help regulate the System's frequency.

Depending on the purpose of the limitation, the production station may or may not be compensated for the lost output, or may even be compensated for providing downward frequency restoration redundancy.

**15. Why is remote monitoring and control necessary? Is it primarily about market participation, or are there other important factors to consider?**

HEDNO is focusing on modernizing its network through digitalization and active management.

Remote monitoring and control applies to all RES plants exceeding 400kW, irrespective of their participation in the market, and will cover the requirements for system stability and better management of the Network. With stations exceeding 400 kW expected to be integrated into HEDNO's control centers, the operator will be able to remotely manage over 70% of the RES capacity currently connected to the network (as of 2024). In addition to the Law, the option to install the equipment is outlined in the producer Connection Contracts and the HEDN Code (Article 75)

**16. My station is already being disconnected by opening a switch on the Network. Why should I install the remote monitoring and remote control system?**

The disconnection of a station from the Network by opening remotely operated or non-remotely operated Network switches is an emergency measure. In addition to the infrastructure for generating energy, the generating station features consumption infrastructure critical to its operation. Through the remote monitoring and control system, in addition to ensuring the continuity of critical loads at the station (e.g., alarms, telecommunications, and network monitoring for automatic restoration), the station can continue producing energy—albeit at a reduced level—rather than being fully disconnected as it has been in the past.

The operator reserves the right, in exceptional circumstances, to disconnect the station from the network using network means if the station fails to comply with the given order for any reason.

**17. My station is already monitored and receives orders from an Aggregator. Can I opt out of the obligation?**

The remote monitoring and control systems that a generating station may have, as required by an Aggregator for market participation, covers only some of the operational requirements set by HEDNO. HEDNO does not only specify requirements for monitoring the active power of a power station or only commands to reduce it, but also sets additional requirements related to the operation of the Network. Therefore, a producer must ensure that the equipment they install meets all the requirements outlined in HEDNO's specifications. While most of the requirements will be utilized immediately, others are expected to be implemented in the future. The Operator has specified equipment that will serve the current and future Network, and producers will be able to participate in the current and future energy market.

**18. My station is outdated and lacks active power. How will it be able to execute the given commands?**

The Operator, or any other entity, issues a command to a station to adjust the injection power to a maximum value (in percentage or absolute value). The station shall comply with the command and adjust its power to a value less than or equal to the command given. Stations without equipment for continuous regulation and with multiple generating units may disconnect some units to adjust their output to a level equal to or below the specified command. For the installation and operation of the remote monitoring and remote control system there is no requirement

for the replacement of the existing power generation equipment (power inverters or generators).

**19. CHP stations are primarily installed to meet thermal requirements. Are CHP producers obliged to install the equipment?**

Law 5106/2024 does not exempt CHP stations with an electrical capacity exceeding 400 kW from the obligation to install remote monitoring and control equipment. Similarly, EU Regulation 2019/943 as well as Article 9, par. 1B of Law 3468/2006, which identifies the stations that do not have priority allocation (i.e. the stations that may be required to disconnect), does not exclude CHP stations.

**20. If there is a telecommunication issue and the station is unsupervised and unable to receive commands, will sanctions be imposed?**

The producer must ensure that their telecommunications connection remains operational. After a command has been sent, the producer shall acknowledge receipt. Penalties for failing to execute a command, along with acceptable tolerance limits for magnitude and frequency deviations in network stations, will be defined and established in the next period.

**21. How often will a station be disconnected?**

Disconnections are currently imposed to meet primarily market requirements and system stability, and secondarily Network requirements. Market-related disconnections, concerning both supply (generation) and demand (load), are not within the responsibility or competence of the Operator. For Network needs, stations will be disconnected or limited due to maintenance or damage to Network elements, with the same frequency as currently, to ensure the proper functioning of the Network.

**22. When will the Interconnection Circuit Breaker (ICB) of the station be opened by the Operator?**

In general, the Operator shall open the Interconnection Circuit Breaker (ICB) of the Station in exceptional cases associated with avoiding the phenomenon of islanding in the Network, ensuring the safety of people, the environment and technical equipment, as well as in cases of non-compliance with the commands received by the Operator.

In cases where the Switch is opened by the Operator, it will be closed by the Producer or the Technical Manager of the station, after consultation with the Operator. It is recommended that the Producer or their Technical Manager continuously monitor

the status of the ICB to ensure they are promptly aware if it is opened at the Operator's request, however rare that may be.

The Operator shall not be obliged to compensate the Producer for any loss of revenue due to the opening of the ICB in the above exceptional cases.

**23. Law 3468/2006, as in force, gives priority to RES stations that were commissioned before 4.7.2019. I have an old station, why should I install the equipment?**

The limitation of the power of a RES station may be imposed not only for allocation but also for reallocation purposes due to congestion in the System or the Network, where no distinction is made between RES Stations with and without priority allocation. In addition, remote monitoring and remote control will enable the Operator to monitor power flows in real time, allowing better management of its Network, which will also allow for even greater penetration of RES. Law 5106/2024 outlines the obligation to install remote monitoring and control systems, not the purpose for which they will be installed.

Article 9, para. 1B of Law 3468/2006 refers to the priority of allocation only. It does not refer to the priority to be given for reallocation purposes or to necessary disconnections due to the management of the Network.

**24. The PV station is already permanently restricted on a permanent basis, with a permanent 27% restriction applied. Will a new restriction apply?**

The restriction imposed by Article 10 of Law 4951/2022 and specified by relevant Ministerial Decision, is a limitation applied on a permanent basis in order to make better use of the existing RES margins in the Network. Any market limitations that may be imposed, which depend on the total production and load in the country at any hour of the day, are additional to the permanent limitations. Any exceptional limitations due to congestion on the System or the Network shall also be additional.

**25. Can the existing equipment installed on the MV side of the station be used to measure active and reactive power?**

The protection relay featured in each station, from which the required measurements could be taken, is powered by the protection windings of the voltage and voltage transformers, which usually have a maximum error of 1% and 0.5% respectively at nominal values, so taking into account the error of the relay itself (of the order of 0.5% at nominal values), it follows that the measurement accuracy requirement of the technical description (<1.5% at nominal values) is met.



Thus, based on the specifications set, the accuracy of measurement of active and reactive power for the purposes of remote monitoring can be achieved with the normal installed equipment in the MV.

However, for some older relay types, the error may be larger (around 2%). To achieve the required measurement accuracy of less than 1.5%, an independent meter with appropriate specifications should ideally be added, or the controller should be replaced with a more modern one. Nevertheless, it is recommended that measurements are taken from the existing protection relay in order to be able to verify the correct operation of the individual protections in future incidents. Therefore, and for the convenience of the producers, it is acceptable to take measurements from the existing relay, even if the required accuracy cannot be achieved with an old-type relay.

**26. The power station is part of the Crete network and is already remotely controlled by the Energy Control Centre of Crete. Am I required to install a remote monitoring and control system in accordance with Law 5106/2024?**

If the production station already has a system with which it is remotely monitored/controlled by the Energy Control Centre of Crete, there is currently no such requirement for the producer.

**27. Are Stations with net metering or virtual net metering also required to install systems for remote monitoring and remote control?**

The announcement of HEDNO and the publication of the technical specifications for the remote monitoring/control systems concerns the owners of RES and CHP Stations of the Interconnected Network with electricity compensation and an installed capacity exceeding 400 kW.

Stations with net metering or virtual net metering are not compensated, as the injected energy is offset against the absorbed energy. At present, these stations are not required to install remote monitoring and control systems. Article 111 of Law 5106/2024 makes provision for the Operator to issue specifications for remote monitoring/control systems for this category of stations as well. Therefore, the 8-month compliance period will apply to these stations when the relevant specifications are issued and published on the website of HEDNO.

**28. How can equipment testing be conducted, including communication with HEDNO's SCADA system, prior to the final connection stage?**

The control of the communication of the equipment with HEDNO's SCADA will be conducted at the final stage of the station's connection to SCADA. Tests for the exchange of signals and commands can be

executed using protocol Simulator IEC 60870-5-104.

**29. Is there a requirement for the equipment to include storage capacity for recording time-stamped events?**

According to the second edition of the technical requirements for equipment used to receive and execute monitoring/control commands, storage space for recording time-stamped events is not required.

**30. Is it possible to simultaneously transmit analog setpoint commands for both active power output and reactive power output?**

Simultaneous dispatch can be performed, as the values of active and reactive power, while related, can be determined independently.

**31. If two commands are issued—one for reactive power control and one for power factor control—which command will be executed?**

The command that will be executed will be the one that leads to the minimum absolute value of reactive power, in the case of reactive power control, or to the closest absolute value to one (1) for the power factor, in the case of power factor control.

**32. Is “O” the default value for the station’s mode setting command (command 60 of Table 4 in the Technical Specification "Equipment used in the reception and execution of remote monitoring/control commands for RES & CHP stations connected or to be connected to the HEDN with an installed capacity exceeding four hundred kilowatts")? Will “O” be used for active power control?**

The default value for the command with S/N: 60 of Table 4 in the Technical Specification is “O” (Status: Inactive). Active power control is independent of the value of the S/N 60 command.

**33. Can an existing internet connection be used for the telecommunication connection of the remote monitoring and control equipment with the command and control system of the Network Control Centers of HEDNO?**

The 4G/5G interconnection with a SIM card is provided by the HEDNO router. If the producer has an existing telecommunications medium for Internet connectivity, they have the option to interconnect the provided router with the existing Internet connection via Ethernet, instead of using a SIM card and external antennas.

**34. Is a solution recommended regarding the required antennas of the telecommunication equipment and the SIM card?**

The provision of the required antennas is at the discretion of the producer, provided that the antenna's characteristics and its connection to the network equipment meet the requirements specified by HEDNO. As regards the SIM card, the choice of the telecommunications provider is at the discretion of the producer. It is recommended to select the appropriate telecommunication provider depending on signal strength and quality at the point of installation of the equipment and on the infrastructure of the RES producer.

The specific solution with the antennas will be used if the producer interconnects the network equipment via a SIM card. If the interconnection is made with another telecommunication medium (e.g. DSL) then the installation of antennas is not required.

**35. What are the characteristics of the router?**

- The router is powered via redundant dual input with 2 pins per terminal. It supports +12V to +125 V DC and -12 V to -125 V DC. DC power supply and cables are not included in the equipment package.
- The maximum power consumption of the router is 20 W and the average power consumption is 18.3 W.
- The maximum dimensions of the router are: Height: 15 cm, Width: 12 cm, Length: 13 cm.
- The router can be mounted on a DIN rail.

**36. What is the procedure for procuring the router?**

These are the step to be followed:

1. Please visit <https://ape.deddie.gr/apewebportal-ws/> and log in using your TaxisNet login credentials.
2. Select "Manage Connection Requests".
3. From the list of displayed applications, select any area in the row of each application, except for the application's S/N, to navigate to the section of the screen with the Producer/HEDNO Actions.
4. Select "Add Producer Energy" and from the list of available options choose "Supply Router for remote control" as the energy type.
5. After selecting the action, a screen will appear prompting you to fill in the router's shipping information and your phone number.

6. Then, select the RF generation button to generate the RF and type "Submit".

The cost for the acquisition of the router is €1736, including VAT. Please note that after submitting your router supply request, you will receive an email confirming the payment amount and the RF.

You are required to pay the router prior to the submission of the Responsible Declaration of Compliance and the accompanying protocols.

**37. What is the procedure for submitting the Declaration of Compliance and the accompanying protocols?**

The steps for submitting the Declaration of Compliance and the accompanying protocols are as follows:

1. Please visit <https://ape.deddie.gr/apewebportal-ws/>. and log in using your TaxisNet login credentials.
2. Select "Manage Connection Requests"
3. From the list of displayed applications, select any area in the row of each application, except for the application's S/N, to navigate to the section of the screen with the Producer/HEDNO Actions.
4. Select "Add Producer Energy" and from the list of available options choose "Supply Router for remote control" as the energy type.
5. On the next screen, you will be asked to submit the Declaration of Compliance, the Station Equipment Control Protocol and the SCADA Equipment Control Protocol separately.
6. If the Station is represented by an Aggregator, then from the list of Aggregator options, please select the Aggregator that represents you or if there is no Aggregator available in the options, enter the name of the Aggregator. If there is no Aggregator representations, please select "I am not represented by an Aggregator".
7. Finally, please select "Submit".

You are required to pay the router prior to the submission of the Responsible Declaration of Compliance and the accompanying protocols. Otherwise, it is not possible to complete the "Installation of Remote Monitoring/Control Equipment" procedure.

**38. What are the specifications of the SIM card that will be selected for the connection to HEDNO's Network Control Centre?**

According to the router manufacturer, a data service intended for network equipment (not a mobile phone) that supports the automatic configuration of internet settings (automatic APN) should be used, and it must be associated with a contract rather than a prepaid service.

More specifically, the SIM card should have the following features:

- *Voice and Data Contract* card that supports both voice and data services (rather than just data) with a contract rather than a prepaid card
- *Public IPv4 address (avoid CG-NAT): do not use the provider's CG-NAT. The SIM card should have its own public IPN4 address*
- *IPSEC VPN creation support:* the card should support the creation of IPSEC VPN tunnels without restrictions
- *Embedded APN:* the card shall have a pre-configured (embedded) APN for the data service.

These specifications ensure that the router will operate seamlessly, providing a secure connection and access to all necessary remote management functions.