Protection and control device for MV substation – RGDM customer interoperability enhancement

This document standardizes the functional requirements of the protection and control device for MV substation – RGDM customer interoperability enhancement.

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00	26.03.2019	First draft
01	26.07.2019	First approved edition

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FIGURES

TABLES

1 ACRONYSM

a. **CID** Configured IED Description

b. **DG** distributed generation

c. **DLP** Local Production Disconnection

d. **FSL** Logic Selectivity Function

e. **GS** Enel Global Standard

f. **GOOSE** Generic Object Oriented Substation Events

g. **IDC** Interoperability Device with the Customer

h. **IDC_DER** IDC (functions) related to the DER resources

i. **IDC_Prot** IDC (functions) related to the DER plant Protections

j. **IED** Intelligent Electronic Device

k. **MMS** Manufacturing Message Specification

l. **MV** Medium Voltage

m. **PG** general protection

n. **PI** interface protection

o. **RGDM** Enel Standardized MV Advanced Fault Passage Indicator for protection, measurement, remote control and monitoring

p. **RVL** line voltage detection

q. **TDLP** Local Production Remote Disconnection

r. **VCS** central voltage regulating system

2 LIST OF COMPONENTS, PRODUCT FAMILY OR SOLUTIONS TO WHICH THE GS APPLIES

The RGDM customer interoperability enhancement described in this GS is a product of GSTP01X series, as shown in Table 1 in GSTP011.

3 NORMATIVE REFERENCES AND BIBLIOGRAPHY

All the references in this GS are intended in the last revision or amendment.

3.1 For all countries

IEC 61850 series	Communication protocols for IED at electrical substation
IEC 60375.	Electricity metering equipment - Particular requirements -Part 23: Static meters for reactive energy (classes 2 and 3)
GSTP013	Protection and control device for MV substation – RGDM communication profile according to IEC61850

3.2 For EU countries

EN 62053-23.	Electricity metering equipment - Particular requirements -Part 23: Static meters for reactive energy (classes 2 and 3)
CENELEC HD 186 S2	Marking by inscription for the identification of cores of electric cables having more than 5 cores
EN 50160	Voltage characteristics of electricity supplied by public distribution systems.
EN 14399	High Strength Structural Bolting assemblies for preloading.

3.3 For Colombia

NTC2050 + RETIE	Reglamento Técnico de Instalaciones Eléctricas – Colombiano.

4 REPLACED STANDARDS

Codification	Country	Title
DV7070	Italy	RGDM ST PRESCRIZIONI PER LA COSTRUZIONE E METODI DI PROVA

5 APPLICATION FIELDS

This document standardizes the functional requirements of the customer interoperability enhancement used by the RGDM in the ENEL’s MV distribution substation.

The RGDM is defined in GSTP011.

The DG management functions specified in this document are:

a. Regulation of the voltage profile along the line, by means of static converter control

b. PI (Interface Protection) control and remote disconnection of DG

c. Prevention of PG (General Protection)

The commands to the generator, to the Interface Protection (PI) and the General Protection (PG) will be sent, according to the IEC 61850 standard.

The communication profile is defined in GSTP013.

6 DG MANAGEMENT FUNCTIONS

The commands to the generator, to the Interface Protection (PI) and the General Protection (PG) will be sent, according to the IEC 61850 standard, on the optical fiber that will be provided to the producer (as shown in Figure 2). If these units are physically divided, two different optic ports must be used to connect to the two different IDC, each used to interface with the PI only and the PG only.

The space must also house the IDC_DER, the optic fiber will be connected to a switch (in the space available to the producer), from which two cables will branch out (in fiber or copper, depending on the producer's needs and choice); one of which will connect to the IDC_DER device, and the other to the IDC_PROT.

This panel will convert the IEC 61850 coded signals into digital electrical signals, used to command the PI and PG (or only one of them).

Figure 2 shows a connection diagram that identifies the various parts involved in order to implement the voltage regulation function.

IDC_DER informs the RGDM of the operating status of the DG (or group of DGs), using a P/A signal. This must be sent to the PRIMARY RTU without any processing.

6.1 UPG Function

The RGDM must implement a function to control and manage the generators connected to the MV network, in terms of regulating the power factor. Hereinafter, this function will be referred to as UPG.

The UPG function is activated in the RGDM installed in the delivery sub-station for the active users with an estimated generating power not less than 200 kVA.

The reference norms for the UPG function are EN 62053-23, which refers to IEC 60375.

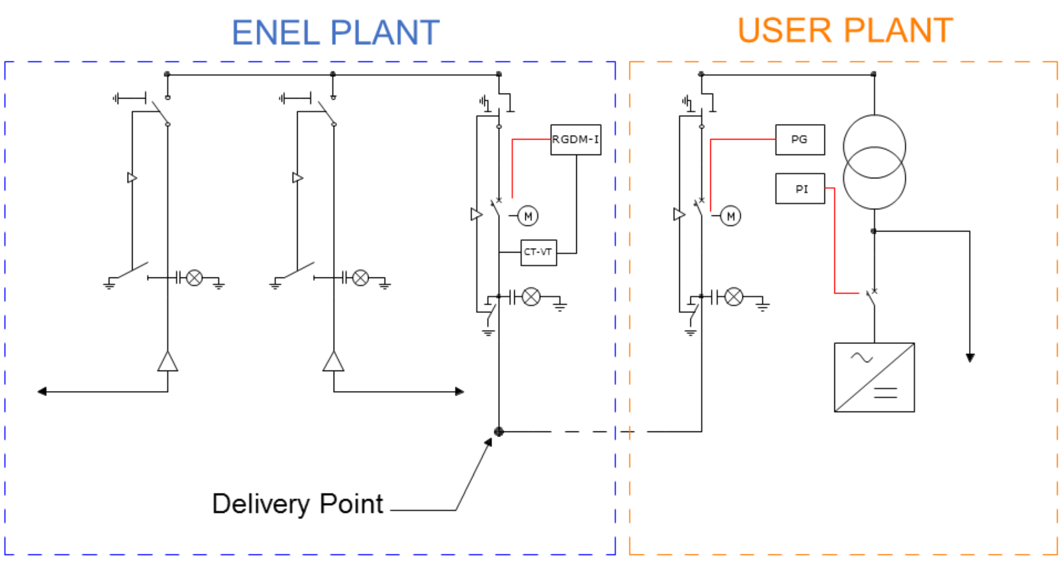

Figure 1 – DG Installation mode

It must be possible to deactivate this function.

The UPG (Generator Peripheral Unit) function, has two purposes:

a. To bring about voltage control locally, by sending a power factor set-point. The purpose is to induce a variation in the reactive power exchanged at the delivery point. This mode is activated when a certain voltage threshold is exceeded.

b. To call for assistance from the central system (VCS - Voltage Control System), if local voltage control proves ineffective.

Measuring of the voltage at the delivery point, which is necessary for processing the UPG's algorithms, must be evaluated directly, that is, without using any hysteresis.

6.1.1 Modality for interfacing with the producer

Interfacing with the producer will take place via the router/UP located in the secondary sub-station, according to the connection diagram below:

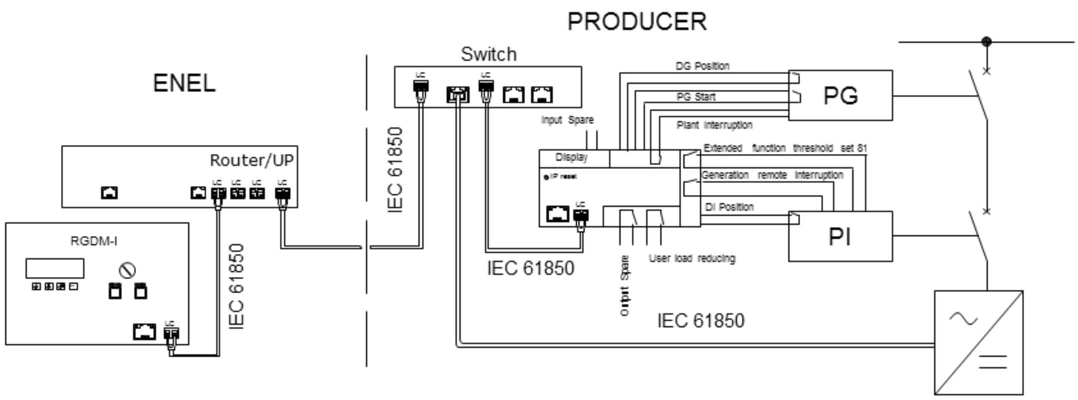

Figure 2 – DG Interfacing mode

The equipment available at the producer will be managed directly by the RGDM, which will send commands via the router / UP, and from there to fiber to the respective components (inverter, PI and PG).

6.2 Logic variables for the UPG function

Table 1 shows the variables that will be used to allow the UPG logics to function, as described below. The starting value must be applied when the equipment that contains the UPG function starts up.

Table 1 – Variables used for the UPG logic

Variable's name	Description	Starting value
logic12	Consensus for activation of logic2 given by logic1	0
logic34	Consensus for activation of logic4 given by logic3	0
logic56	Consensus for activation of logic6 given by logic5	0
logic78	Consensus for activation of logic8 given by logic7	0

It must be possible to calibrate fdp values on the RGDM and they are fixed values.

6.3 Voluntary activation and deactivation of UPG algorithms

The central system will be able to activate or deactivate the local algorithms. This must be done by using suitable MMS IEC 61850 messages that transmit the UPGon variable.

When UPGon = YES the algorithms are active, when UPGon = NO the algorithms are disabled.

6.4 Local action by the UPG function

Local action by the UPG involves the periodic sending (using IEC 61850 GOOSE) a multi-field power factor set-point, known as Rcosfi, to the IDC_DER interface on the plant to be controlled. The structure of the Rcosfi multi-field set-point is as shown in Table 2.

Table 2 – Structure of the Rcosfi multi-field set-point

Active input fdp value	Active absorption fdp value	Rcosfiact
float with sign (e.g. -0,9)	float with sign (e.g. -0,9)	boolean (YES/NO)

The “active input fdp value” has a float with a sign that conforms to the IEC convention for the power factor sign (ref. Figure 3).

The “active input fdp value” and “active absorption fdp value” fields contain a value (float with sign) for the power factor set-point required at the delivery point. The sign relates to the type of reactive behavior exchanged. Specifically:

a. negative value = the fdp must be of an inductive type

b. positive value = the fdp must be of a capacitive type

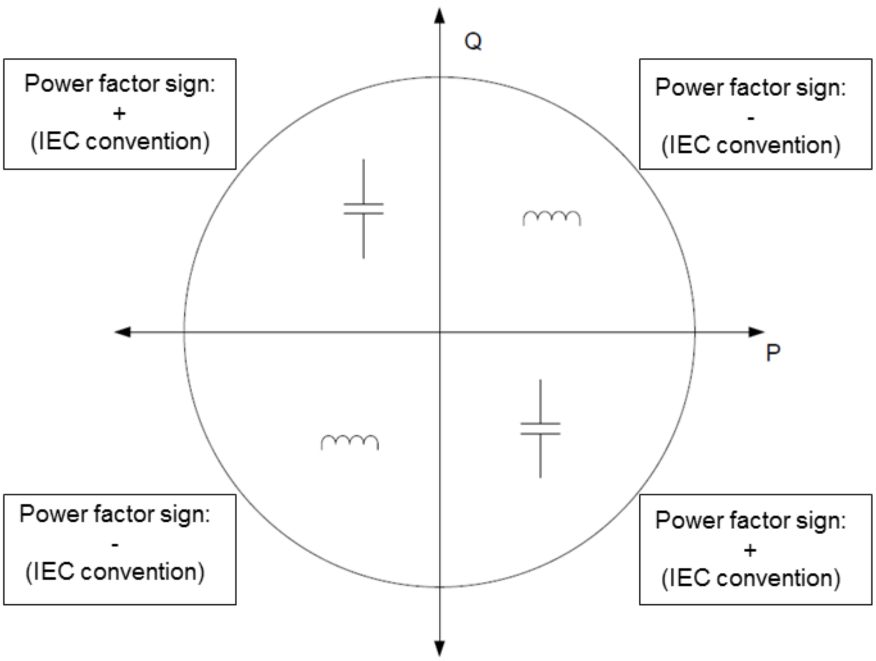

Figure 3 – IEC power factor sign convention

The IDC_DER chooses to implement one or other “input or absorption fdp value” based on the direction of the active power.

The “Rcosfiact” field indicated the effective local action of the UPG function. This is used to enable the fdp value, and, specifically:

c. If Rcosfiact = 1, the IDC_DER reads and implements the fdp value contained in Rcosfi

d. If Rcosfiact = 0, the IDC_DER discards the fdp value contained in Rcosfi and implements the “normal operation” power factor, which is calibrated in the IDC_DER itself.

In addition, the Rcosfiact is sent to the VCS to indicate the operating status of the plant controlled.

The local action of the UPG function is enabled only if the UPGon signal = YES, in which state the UPG is active (not voluntarily deactivated by the central unit).

If UPGon = NO, the Rcosfiact field must be set to NO, irrespective of the value of the other Rcosfi fields.

The local UPG functioning logics work as follows:

e. If the voltage exceeds the threshold $V_{2S\text{-}UPG}$ (“high” voltage) for a time $T_{2S\text{-}UPG}$, reactive power absorption is called for at the exchange point (inductive power factor), by sending a specific Rcosfi power factor set-point. At the same time, the return consensus variable (**Logic12**) must be set at 1. This behavior is described by logic1 indicated in Figure 4.

e.1 The return from the mode indicated in point e. occurs if the voltage measured is below the return threshold $V_{1S\text{-}UPG}$ for a time $T_{1S\text{-}UPG}$ and if the return consensus variable (**Logic12**) is equal to 1 (true condition if the request referred in point e. was made). At the same time, the return consensus variable (**Logic 12**) must be set at 0. This behavior is described by logic2 indicated in Figure 5.

f. If the voltage is below the threshold $V_{2I\text{-}UPG}$ (“low” voltage) for a time $T_{2I\text{-}UPG}$, reactive power supply is called for at the exchange point (capacitive power factor), by sending a specific Rcosfi power factor set-point. At the same time, the return consensus variable (**Logic34**) must be set at 1. This behavior is described by logic3 indicated in Figure 6.

f.1 The return from this operating mode occurs if the voltage measured exceeds the return threshold $V_{1I\text{-}UPG}$ for a time $T_{1I\text{-}UPG}$ and if the return consensus variable (**Logic34**) is equal to 1 (true condition if the request referred to in point f. was made). At the same time, the return consensus variable (**Logic34**) must be set at 0. This behavior is described by logic4 indicated in Figure 7.

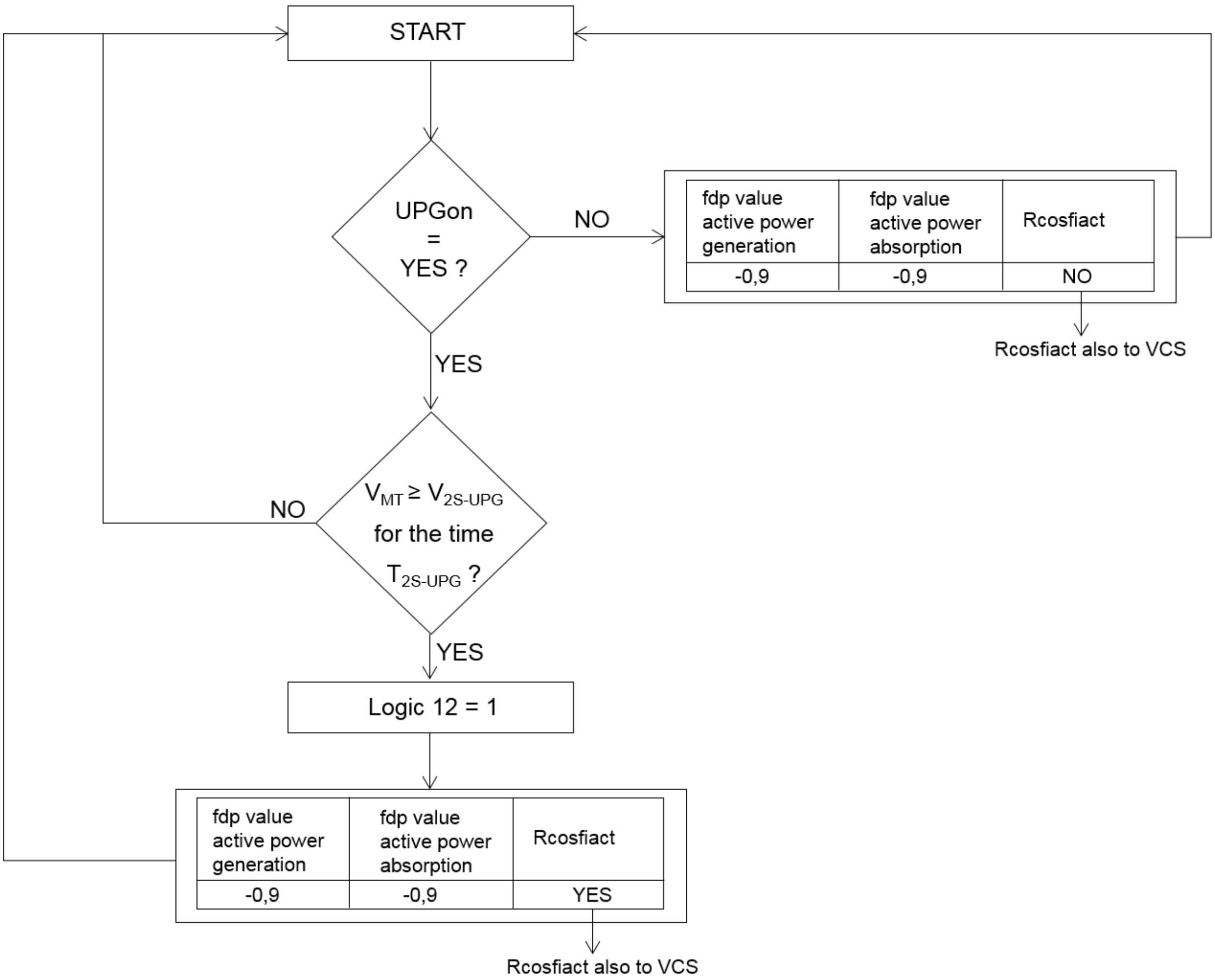

Figure 4 – Logic for local absorption of Q (logic 1)

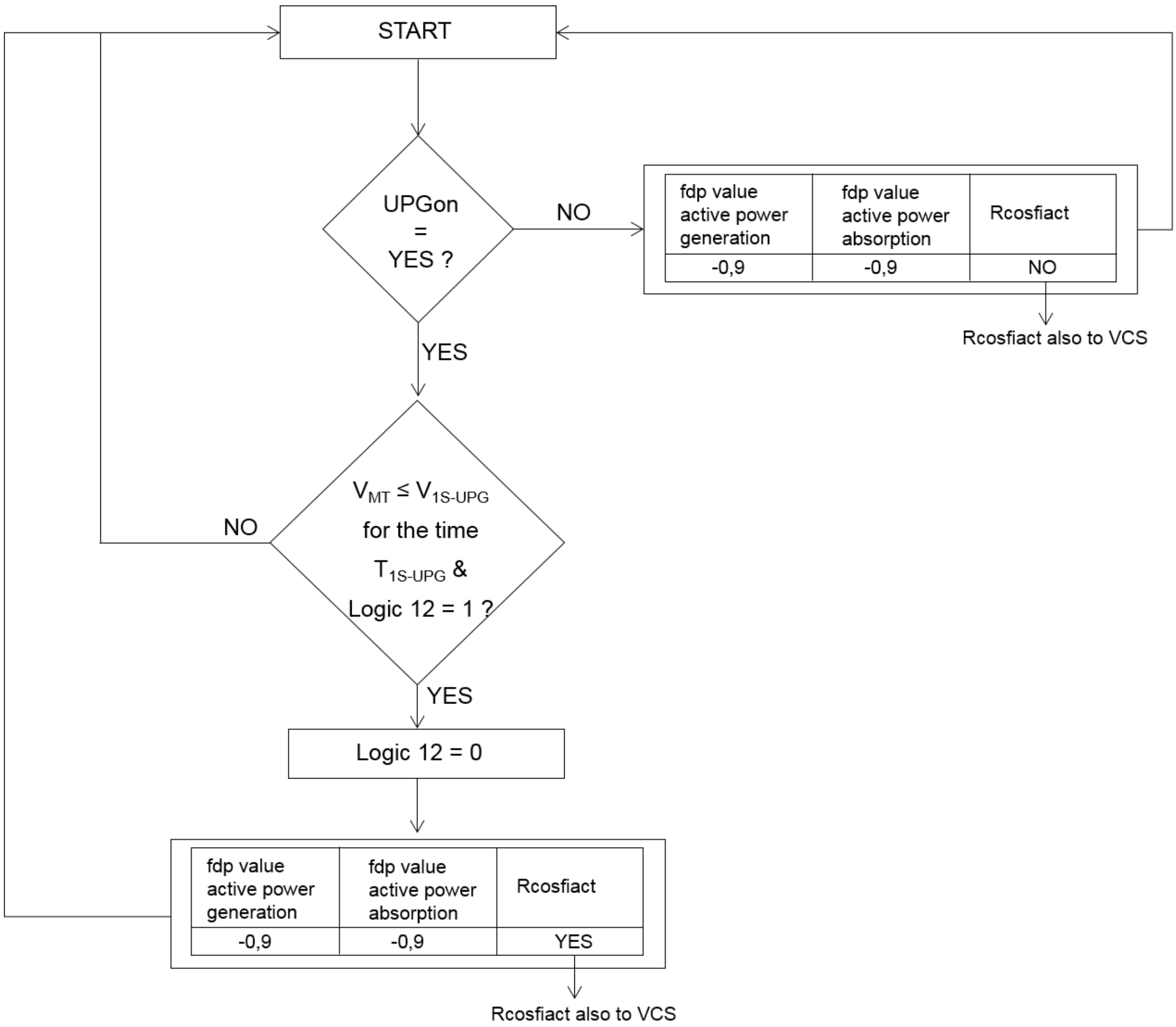

Figure 5 - Logic for the re-entry of the local absorption of Q (logic 2)

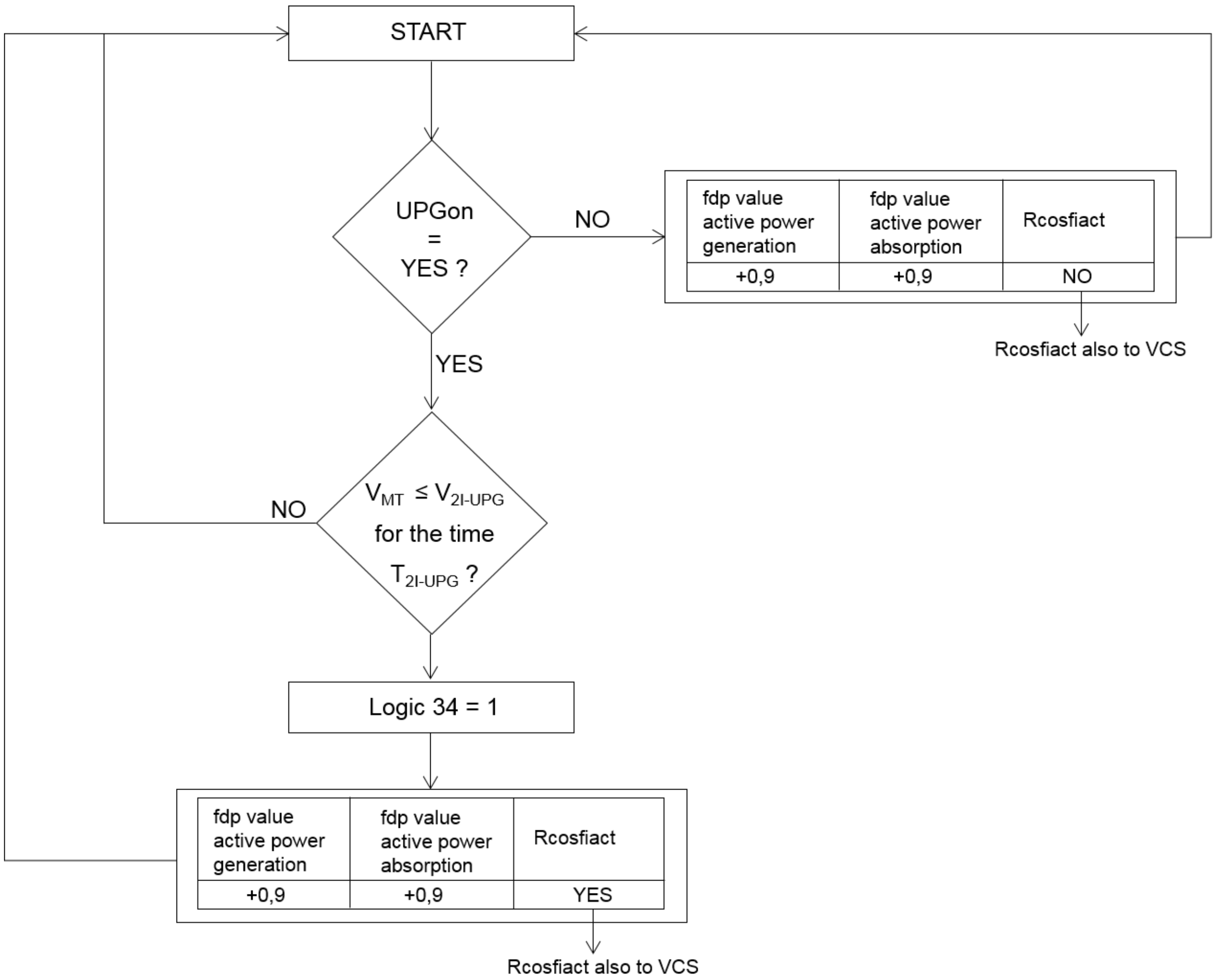

Figure 6 –Logic for local generation of Q (logic 3)

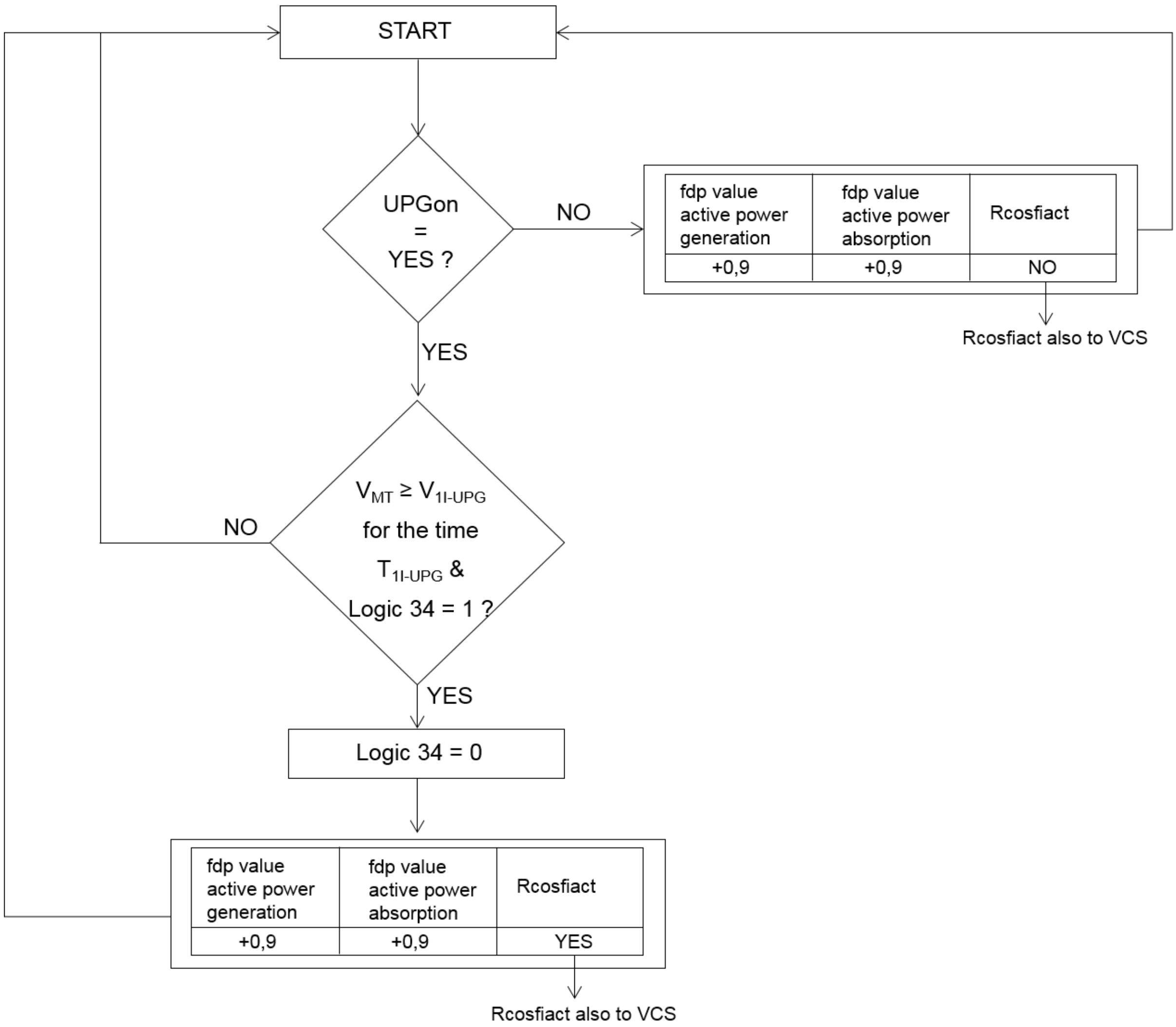

Figure 7 – Logic for the re-entry of the local generation of Q (logic 4)

6.5 Remote signaling by the UPG function (request for assistance from other controllable nodes – centralized voltage control)

Remote signaling by the UPG function occurs as follows:

a. If the voltage exceeds the threshold $V_{2S\text{-}VCS}$ ("very high" voltage) for a time $T_{2S\text{-}VCS}$, the VFLS signal must be sent to the VCS. This signal activates assistance action by the VCS, which decides which electrically close nodes it will ask to implement reactive absorption. At the same time, the return consensus variable (**Logic56**) must be set at 1. This behavior is described by logic5 indicated in Figure 8.

a.1 The return from this operating mode occurs if the voltage measured is below the return threshold $V_{1S\text{-}VCS}$ for a time $T_{1S\text{-}VCS}$ and if the return consensus variable (**Logic56**) is equal to 1 (true condition if the request referred to in point a. was made). At the same time, the return consensus variable (**Logic56**) must be set at 0. This behavior is described by logic6 indicated in Figure 9.

b. If the voltage is below the threshold $V_{2I\text{-}VCS}$ ("very low" voltage) for a time $T_{2I\text{-}VCS}$, the VFLS signal must be sent to the VCS. This signal activates assistance action by the VCS, which decides which electrically close nodes it will ask to implement reactive power supply. At the same time, the return consensus variable (**Logic78**) must be set at 1. This behavior is described by logic7 indicated in Figure 10.

b.1 The return from this operating mode occurs if the voltage measured exceeds the return threshold $V_{1I\text{-}VCS}$ for a time $T_{1I\text{-}VCS}$ and if the return consensus variable (**Logic78**) is equal to 1 (true condition if the request referred to in point b. was made). At the same time, the return consensus variable (**Logic78**) must be set at 0. This behavior is described by logic8 indicated in Figure 11.

The node that emits the VFLS and VFLI signals to the VCS is known as the "calling node" or "beyond limit node".

It is worth noting that all the functions described in flow diagrams from Figure 4 to Figure 11 must be executed in parallel. Also note that the algorithms for generating the VFLS and VFLI messages are always active. This means that they are not subject to UPGon.

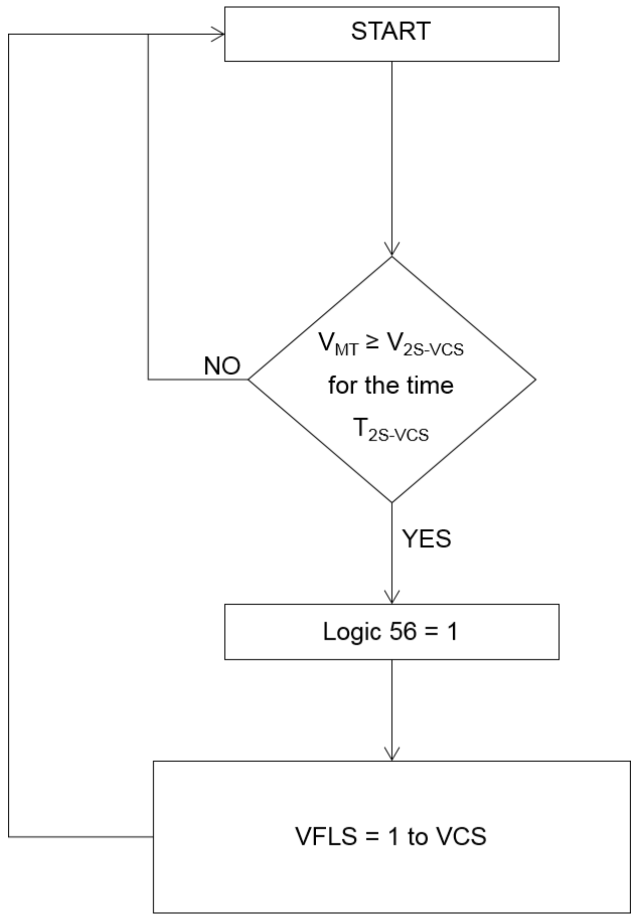

Figure 8 – Logic for sending VFLS to the VCS (logic 5)

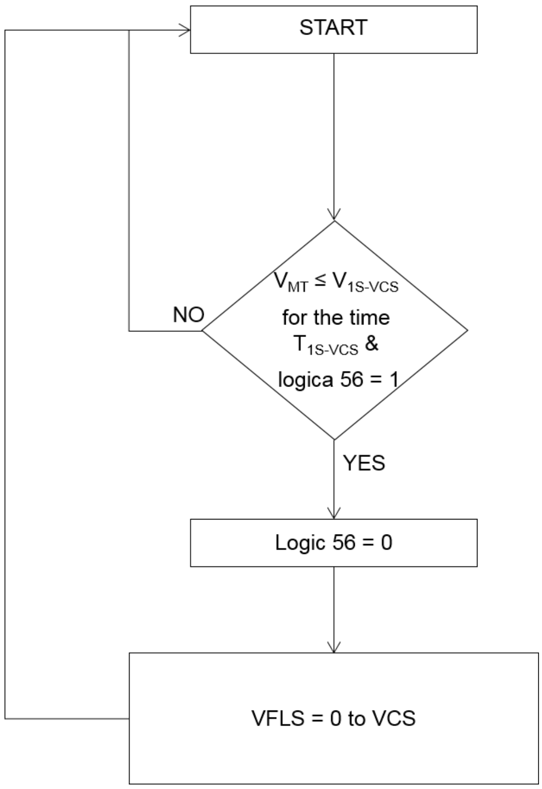

Figure 9 – Logic for the re-entry of the VFLS to the VCS (logic 6)

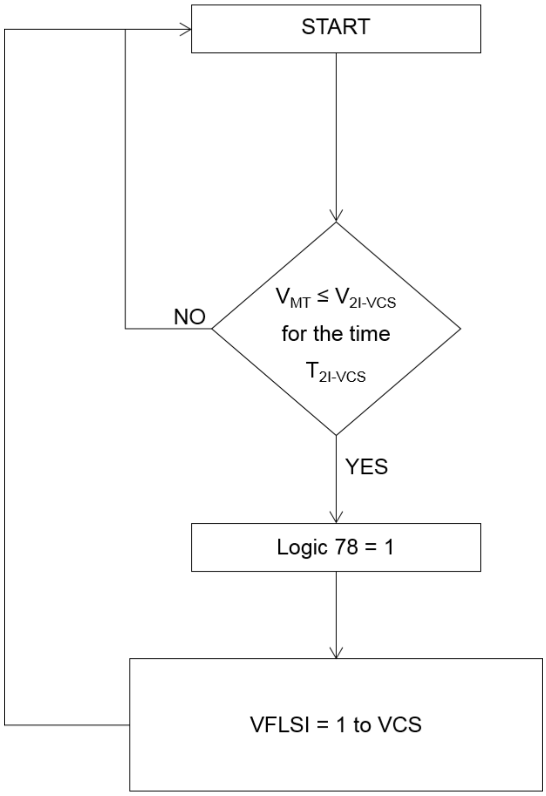

Figure 10 – logic for sending VFLI to the VCS (logic 7)

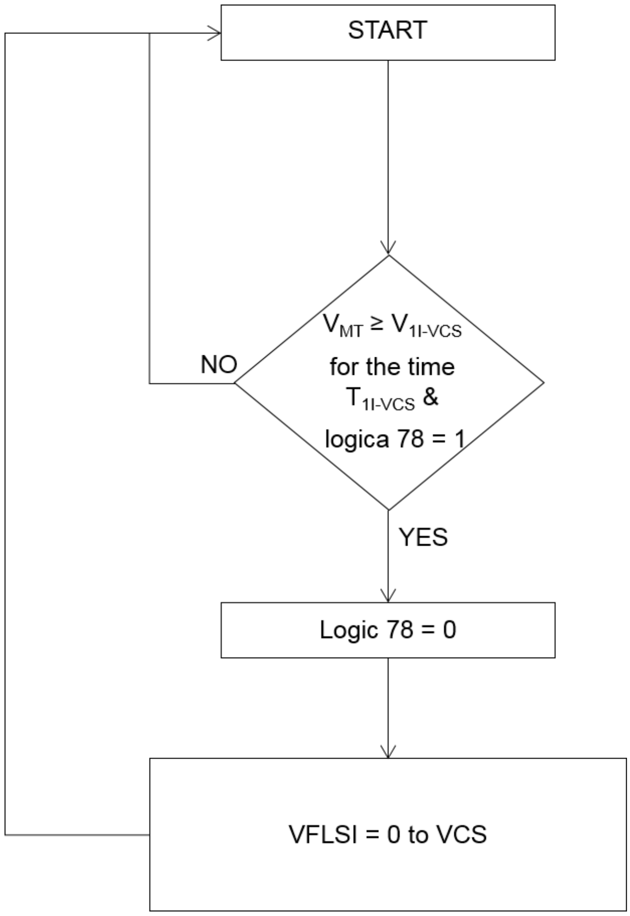

Figure 11 – logic for the re-entry of the VFLSI to the VCS (logic 8)

As an example of the logics described above, the temporal trends of the “high voltage” is shown in Figure 12. The same figure also shows the signals emitted when the thresholds set are exceeded.

As regards the “low voltage” on the other hand, the temporal profile is shown in Figure 13. The same figure also shows the signals emitted when the thresholds set are exceeded.

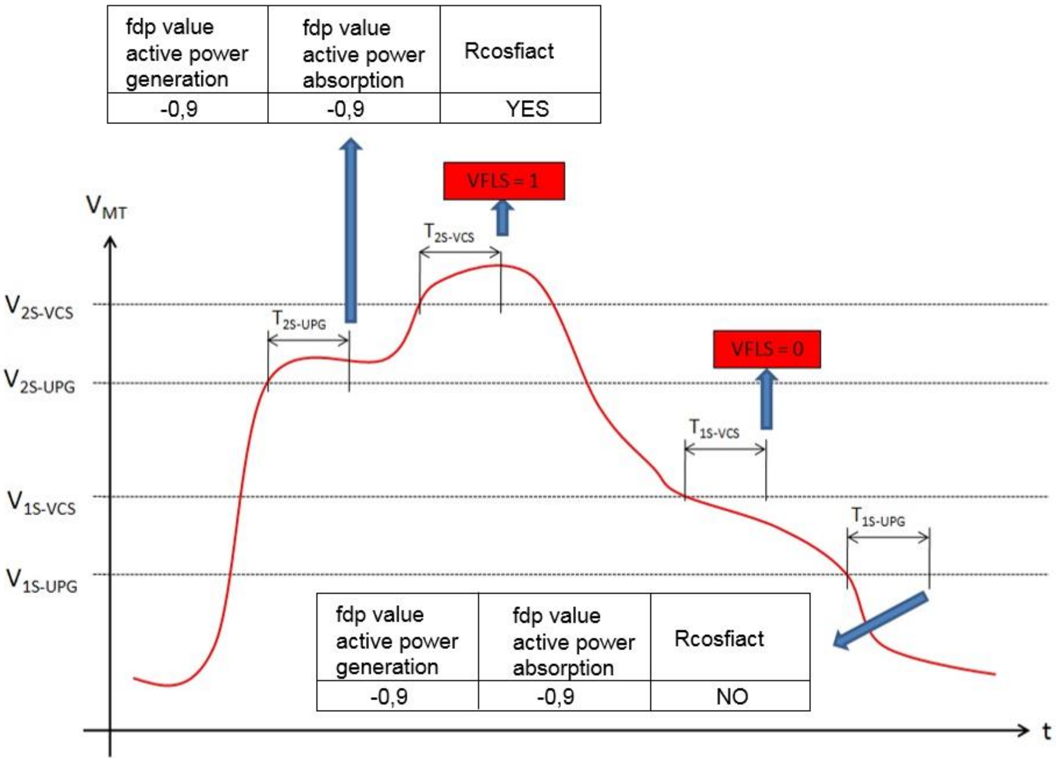

Figure 12 – Threshold for "High MV voltage"

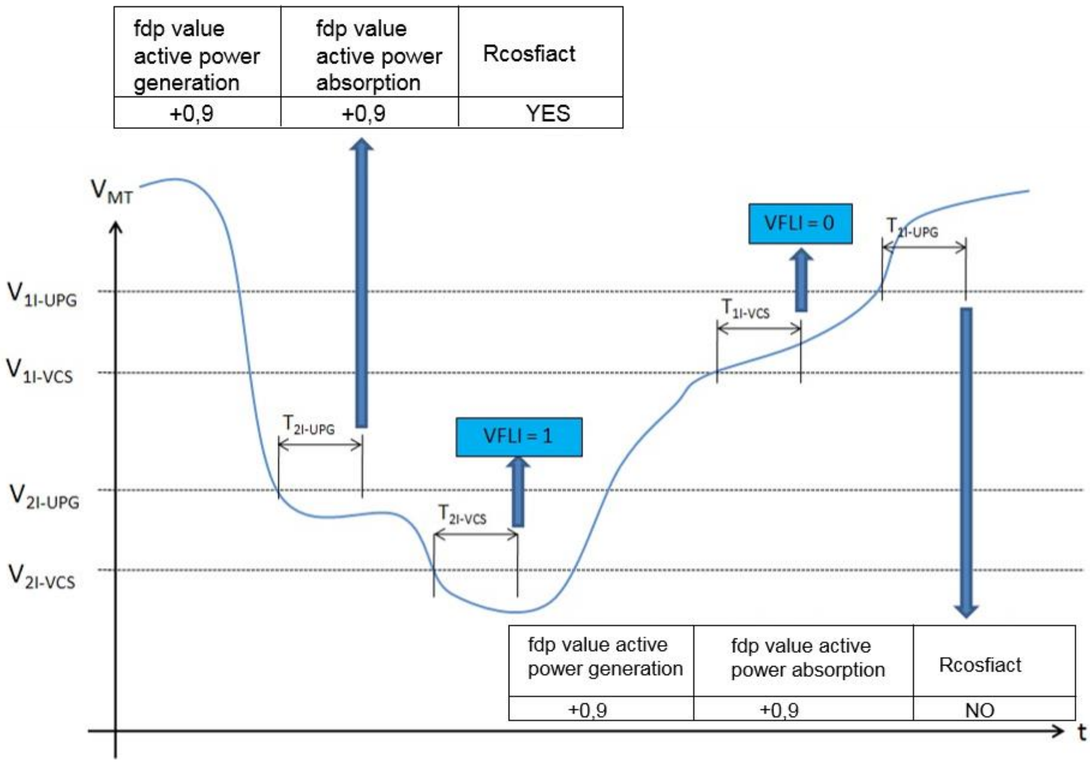

Figure 13 – Threshold for "Low MV Voltage"

6.6 Requests made by the VCS and structure of related set-points

The VCS can impose activation of regulation functions, on a specific controllable plant. The flow from UP / Primary RTU to the RGDM is made up of IEC 61850 MMS type messages. The RGDM must do a "mirroring" operation, converting these messages from IEC 61850 MMS to IEC 61850 GOOSE, and send them to the IDC_DER interface. The information content of the MMS messages coming from the UP / Primary RTU and the GOOSE messages to IDC_DER is identical.

These regulation functions include:

a. Setting the active power limitation function

b. Setting the cosφ set-point function

c. Setting the Q set-point function

d. Setting the Q(V) function

e. Setting the PF(P) function

The related parameters are summarized from Table 3 to Table 7.

Table 3 – Active power limitation function parameters

Parameter	Unit of measure	Range	Reference	Default value
State	bit	ON/OFF	-	OFF
Active Power Limit	%	-100 ÷ 100	Apparent Power	-100

Table 4 – Cosφ set point function parameters

Parameter	Unit of measure	Range	Reference	Default value
State	bit	ON/OFF	-	OFF
Set point of the generation power factor	number	-1÷ 1	-	-0,95
Set point of the absorption power factor	number	-1÷ 1	-	+0,95

Table 5 – Q set point function parameters

Parameter	Unit of measure	Range	Reference	Default value
State	bit	ON/OFF	-	OFF
Set point Reactive Power	%	-100 ÷ 100	Apparent Power	0

Table 6 – Q (V) set point function parameters

Parameter	Unit of measure	Range	Reference	Default value
State	bit	ON/OFF	-	OFF

Table 7 – PF (P) set point function parameters

Parameter	Unit of measure	Range	Reference	Default value
State	bit	ON/OFF	-	OFF

6.7 UPG function management if zero power is detected

The UPG function changes how it behaves if a zero power condition is detected (no RVL) by the equipment that implements it. In particular, if there is no RVL, management of the UPG function must be according to the following algorithm:

a. UPG is normally working
b. RVL goes down
c. Algorithms from Figure 4 to Figure 11 are “frozen”, that is, while the others continue to be executed
d. When RVL is reinstated, the count begins by a timer T_{RVL}, on completion of which:
  d.1 If RVL is present, the UPG goes back to operating as indicated in point a.
  d.2 If within T_{RVL} it has fallen away again, go back to point d.

6.7.1 Configuration parameters

The UPG function requires configuration of the parameters indicated in Table 8.

Table 8 – UPG function parameters

Parameter name	Unit of measurement	Default value	Admissible range	Step
T_{RVL}	min	5	1 - 60	1
$V_{1S\text{-}UPG}$	p.u.	1,04	0,9 – 1,20	0,01
$T_{1S\text{-}UPG}$	s	30	0 - 1000	1
$V_{2S\text{-}UPG}$	p.u.	1,07	0,9 – 1,20	0,01
$T_{2S\text{-}UPG}$	s	30	0 - 1000	1
$V_{1S\text{-}VCS}$	p.u.	1,06	0,9 – 1,20	0,01
$T_{1S\text{-}VCS}$	s	30	0 - 1000	1
$V_{2S\text{-}VCS}$	p.u.	1,09	0,9 – 1,20	0,01
$T_{2S\text{-}VCS}$	s	30	0 - 1000	1
$V_{1I\text{-}UPG}$	p.u.	0,96	0,9 – 1,20	0,01
$T_{1I\text{-}UPG}$	s	30	0 - 1000	1
$V_{2I\text{-}UPG}$	p.u.	0,93	0,9 – 1,20	0,01
$T_{2I\text{-}UPG}$	s	30	0 - 1000	1
$V_{1I\text{-}VCS}$	p.u.	0,94	0,9 – 1,20	0,01
$T_{1I\text{-}VCS}$	s	30	0 – 1000	1
$V_{2I\text{-}VCS}$	p.u.	0,91	0,9 – 1,20	0,01
$T_{2I\text{-}VCS}$	s	30	0 - 1000	1
Active inductive case input fdp value (“high voltage” case)	-	-0,95	-1 - 0	0,01
Active inductive case absorption fdp value (“high voltage” case)	-	-0,95	-1 - 0	0,01
Active capacitive case input fdp value (“low voltage” case)	-	0,95	0 - 1	0,01
Active capacitive case absorption fdp value (“low voltage” case)	-	0,95	0 - 1	0,01

7 MANAGING THE DG AND CHANGING OF THE PROTECTION INTERFACE (PI) FREQUENCY BAND

The RGDM must send to the IDC_PROT suitable messages, coming from the central system, to disconnect a particular DG plant from the distribution network, in order to decrease / disconnect the producer client's load, and to change the PI frequency threshold.

The following messages must be provided for according to the MMS IEC 61850 protocol:

Table 9 – Signals received by the central system and to be sent to the IDC_PROT for the remote disconnection function, lightening/disconnecting loads and changing the f threshold for the PI's P81 threshold.

	Message name	Description	Source	Receiver	Final receiver
Remote disconnection Production	Production remote disconnection	Request for remote disconnection of a particular DG.	(UP / Primary RTU) --> RGDM (in MMS protocol) OR another IED in GOOSE protocol	RGDM --> IDC_PROT(in GOOSE protocol)	PI
	SO command	Spare Output command to IDC_PROT	RGDM itself OR (UP / Primary RTU) --> RGDM (in MMS protocol)	RGDM --> IDC_PROT(in GOOSE protocol)	SO contact on IDC_PROT
Load lightening	Reduction of User Load	Request for lightening of user load	(UP / Primary RTU) --> RGDM (in MMS protocol)	RGDM --> IDC_PROT(in GOOSE protocol)	Correspondin g contact on IDC_PROT
Load disconnection	Plant disconnection	Request for total disconnection of user load	(UP / Primary RTU) --> RGDM (in MMS protocol)	RGDM --> IDC_PROT(in GOOSE protocol)	PG
Frequency threshold	P81 Threshold Settings	Change f calibration band for PI	(UP / Primary RTU) --> RGDM (in MMS protocol)	RGDM --> IDC_PROT(in GOOSE protocol)	PI

Refer to the IEC 61850 protocol specifications for the RGDM (GSTP013), for the format and characteristics of the messages.

RGDM must send each messages indicated above, when requested by UP / Primary RTU to the relevant IDC_PROT (note that the remote disconnection message must be set up for transmission using the GOOSE protocol between RGDM and IDC_PROT).

7.1 Management of the P81 Threshold Setting command

When starting for the first time (in the absence of information from)

a. the command must have value

All the return messages covered by the ICD profile for the user interface device must be provided (ref. Par.8.1).

The remote disconnection message must also be set up for direct transmission in GOOSE protocol, between Primary RTU (or other IEDs) and the RGDM.

An IED publishers list must therefore be prepared, which identifies the IEDs (first of all the UP / Primary RTU), from which remote disconnection signals can be received. Management / updating of this list must be done in the way described, with greater detail, in GSTP011 par. 8.3.3 related to the automation function, with FSL logic selectivity.

Table 10 – Signals received by IDC_PROT and to be sent to the UP or Primary Substation RTU

	Message name	Description	Source	Recipient	Final recipient
Spare In & Out	SO status notification	Spare Output from IDC_PROT	IDC_PROT--> RGDM (in GOOSE protocol)	RGDM --> UP or Primary Substation RTU (in MMS protocol)	UP or Primary Substation RTU
	SI status notification	Spare Input from IDC_PROT	IDC_PROT--> RGDM (in GOOSE protocol)	RGDM --> UP or Primary Substation RTU (in MMS protocol)	UP or Primary Substation RTU
PI and PG positions	Switch 52 PI position	Switch PI position	IDC_PROT--> RGDM (in GOOSE protocol)	RGDM --> UP or Primary Substation RTU (in MMS protocol)	UP or Primary Substation RTU
	Switch 52 PG position	Switch PG position	IDC_PROT--> RGDM (in GOOSE protocol)	RGDM --> UP or Primary Substation RTU (in MMS protocol)	UP or Primary Substation RTU
PG	PG start-up	Used by RGDM as a BLIND signal for execution of the FSL automation	IDC_PROT--> RGDM (in GOOSE protocol)	RGDM --> UP or Primary Substation RTU (in MMS protocol)	UP or Primary Substation RTU

The PG start signal has the same function as a BLIND signal coming from the WAN. Therefore, it must be used when the FSL function is active, and in the same ways, as described in GSTP011 par. 8.3.3.

7.2 Management of local production remote disconnection commands

For managing this function, a list of publisher IEDs must be compiled in the RGDM, from which “local production remote disconnection” signals can be received and processed. The maximum depth of this list must be 100 elements (which are added to the list of 100 elements for the FSL function).

As for the list for the BLIND function, a further “PRED-OK” boolean field must be associated with each publisher in the list, which indicates whether that publisher is an electrical predecessor or successor. This is a configuration parameter, processed by the central system and set dynamically, by means of a write procedure, by UP or Primary Substation RTU (is not information conveyed by GOOSE).

7.2.1 Enabling of the Remote Disconnection function

The RGDM equipment provides the possibility of being enabled for the remote disconnection function, whether it is launched from outside, or determined by local causes.

It must be possible to configure that function in the equipment as ENABLED or DISABLED, with the default value being DISABLED.

This parameter can changed by means of the boolean MMS command called *Enable Remote Disconnection*, the meaning of which is as follows:

Enable Remote Disconnection = 0 remote disconnection function DISABLED

Enable Remote Disconnection = 1 remote disconnection function ENABLED

If the remote disconnection function is DISABLED, the IED must never emit any command (emit any message) that may cause a real remote disconnection of a DG, even if this is explicitly requested by means of an MMS from UP or Primary Substation RTU. However, behavior is allowed that may generate commands for test purposes, as described below.

7.2.2 Remote Disconnection TEST Commands

RGDM receives the *CMDTest* command as an MMS that comes from UP or Primary Substation RTU, to be handled as described in the paragraphs that follow. The meaning of *CMDTest* is:

CMDTest = 0 Test command in DEACTIVATED state

CMDTest = 1 Test command in ACTIVATED state

7.2.3 Format of the local production remote disconnection goose command to be conveyed on the WAN network

When a *CMDTest* = 1 message is received, a GOOSE message must be generated to be conveyed on the WAN, called local production remote disconnection (TDLP), made up of two boolean fields:

a. The activated (ON) or deactivated (OFF) remote disconnection value.

b. A flag that indicates whether this is a test signal (ON) or a real operating signal (OFF).

The only combinations admissible for TDLP signal payload, are described below:

Table 11 –GOOSE message for remote disconnection on stand-by	
Local production remote disconnection (TDLP)	TDLP test mode flag
OFF	OFF

Table 12 – GOOSE message for local production remote disconnection, to be used when remote disconnection of the DG is really required	
Local production remote disconnection (TDLP)	TDLP test mode flag
ON	OFF

Table 13 – GOOSE message for local production remote disconnection, to be used when the test mode is being used	
Local production remote disconnection (TDLP)	TDLP test mode flag
ON	ON

In stand-by conditions, the message is sent with both fields set to OFF – case shown in Table 11.

7.3 Mode for generating the “Local Production Remote Disconnection” message

The message must be in format shown in Table 12 (request for real remote disconnection), when all the following conditions arise:

a. The Remote Disconnection function must be configured as ENABLED.

b. The local remote disconnection logic (DLP function) takes on the value: TRUE.

The DLP logic is still being finalized, and will be implemented subsequently (ref. Par. 8.1).

When the DLP logics go back on stand-by, the message will once again take on format shown in Table 12.

The message must be in format shown in Table 13 (test message), when all the following conditions arise:

c. The Remote Disconnection function must be configured as DISABLED.

d. The MMS "CMDTest" command, coming from UP or Primary Substation RTU has a logic value of ON.

When the "CMDTest" command returns to a logic value of OFF, the message will once again take on format shown in Table 11.

7.4 IC activity on receipt of the "Local Production Remote Disconnection" message

The local production remote disconnection message, TDLP, is received by all the IEDs configured as subscribers for the message itself.

On receipt of the local production remote disconnection message in format shown in Table 12, coming from another IED:

a. If the ***Remote Disconnection function is ENABLED:***

- ➢ If the tag checking function is not enabled, go directly to point (*).
- ➢ If the tag checking function is enabled, the comparison algorithm described in the "Algorithms for assigning and comparing TAGs for FSL automation and remote disconnection.doc" must be executed. If the algorithm produces a negative outcome, the message must be discarded. If the algorithm produces a positive outcome:
- ➢ (*) RGDM will send a message to the IDC_PROT for the purpose of activating the "Production remote disconnection" output on that device.
- ➢ On receipt of the message in format shown in Table 11 (managed in the same way). RGDM will send a message to the relevant IDC_PROT in order to deactivate the "Production remote disconnection" output on that device.
- ➢ Note that the evidence of the change in the "Production remote disconnection" signal sent to the IDC_PROT involved, will, in any case, be sent to UP or Primary Substation RTU by means of the MMS protocol.

b. If the ***Remote Disconnection function is DISABLED***:

- ➢ RGDM will not send the local production remote disconnection messages on the WAN, nor any message to the IDC_PROT. However, management of the messages log must be provided.

On receipt of the "Local production remote disconnection" message in format shown in Table 13, coming from another IED:

c. If the ***Remote Disconnection function is ENABLED:***

- ➢ If the tag checking function is not enabled, go directly to point (§).
- ➢ If the tag checking function is enabled, the comparison algorithm described in the "Algorithms for assigning and comparing TAGs for FSL automation and remote disconnection.doc" must be executed. If the algorithm produces a negative outcome, the message must be discarded. If the algorithm produces a positive outcome:
- ➢ (§) RGDM will send a GOOSE message to its IDC_PROT for the purpose of activating the "Spare output" on that device.
- ➢ The return to stand-by (OFF) of the Spare Output command to be sent to IDC_PROT, will be done when the message is received in format shown in Table 11, (managed in the same way).

NOTE: The evidence of the change in the “Spare Output” signal sent to the IDC_PROT involved, will, in any case, also be managed according to the MMS protocol.

d. if the ***Remote Disconnection function is DISABLED***:

- RGDM will not send the local production remote disconnection messages on the WAN, nor any message to the IDC_PROT. However, management of the messages log must be provided.

8 MISCELLANEOUS

This chapter include further requirements, recommendations and additional information.

8.1 Clarification during procurement process

By summarizing, during the procurement process the following clarification will be provided to the supplier:

a. Information about ICD profile (par. 7.1)

b. Implementation of the DLP logic (par. 7.3)