CERTIFICATE

Certificate of NS protection		Nr.: 21-241-01
Manufacturer / Applicant	**ComAp a.s.** U Uranie 1612/14a; 170 00 Praque 7 Czech Republic	
Type of NS protection	InteliSys Gas, AIO-GAS, InteliSys GSC-C, InteliGen GSC-C, InteliGen GSC	
Central NS protection	☒	
Integrated NS protection	☐	
Network connection rule	**SOP-9-1_14 GCC Certification Program, 11/20** Based on: **VDE-AR-N 4105:2018-11 Generators connected to the low-voltage distribution network**– Technical minimum requirements for connection and parallel operation of power generation systems connected to the low-voltage network	
Test requirement	**DIN VDE V 0124-100 (VDE V 0124-100):(2020-06)** "Network integration of power generation systems – Low voltage" Test requirements for power generation units intended for connection to and parallel operation on the low-voltage network	
Test Report	**21PP125-01_0 dated 2021-07-28**	
The network and system protection designated above meets the requirements of VDE-AR-N 4105:2018-11.		

Kaufbeuren, 2021-09-08

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Raphael Rader

Certification Engineer

GRID CODE
COMPLIANCE
VDE-AR-N 4105:2018-11

DAkkS
Deutsche
Akkreditierungsstelle
D-ZE-12089-01-00

This NS protection certificate shall not be used in extracts

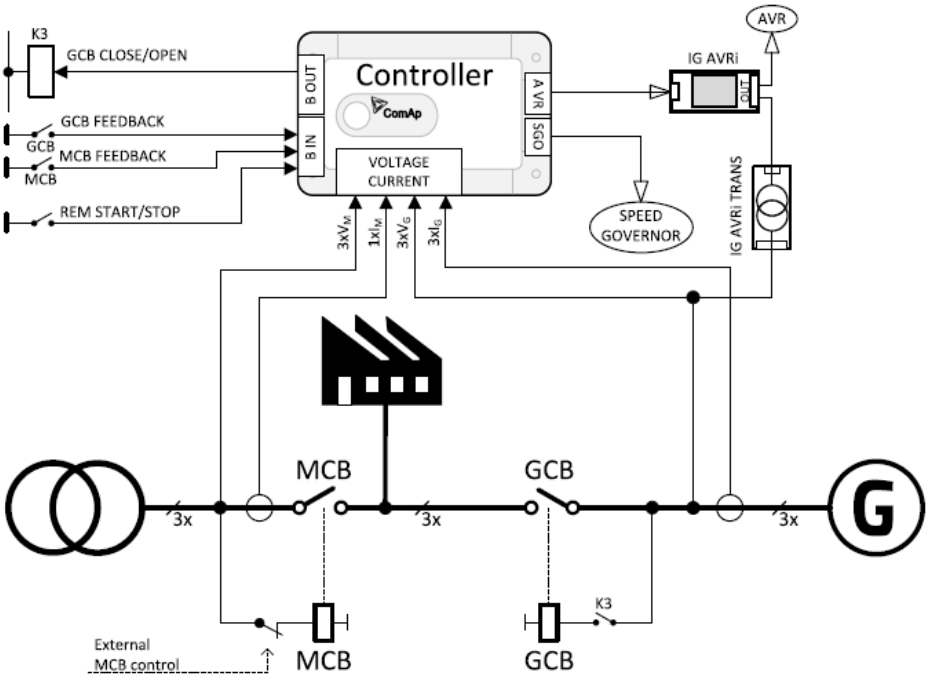
Annex 1
Description of the system

The EZE controllers InteliSys Gas, AIO-GAS, InteliSys GSC-C, InteliGen GSC-C, InteliGen GSC are controllers for genset applications manufactured by ComAp, a.s., which combine the following functions in one hardware:

- Engine operation/control (start, stop operation)
- Engine protection (oil pressure, water temperature, cylinder temperatures, etc.)
- Generator control (voltage control, active and reactive power control, cos ϕ control)
- Generator protection (overvoltage, undervoltage, overcurrent, short-circuit current, overload)
- Network voltage monitoring and generator shutdown if network values are outside adjusted limits (voltage and frequency monitoring)

Basically, the structure of the control systems can be divided into two levels. The upper level is responsible for active and reactive power management. Based on the selected mode, the required active and reactive power is made available for the lower level. At the lower level, the speed demand of the engine control unit (SRO) and the voltage demand (VRO) of the generator excitation unit are influenced.

A typical application of a control device is shown in the following figure.



For the certification, the NS protection and the PAV,E monitoring were considered.

The controller was tested with a "starter kit" simulation setup, in which the various feedback signals were implemented via switches and potentiometers in order to simulate realistic operation.

Annex 2	
E.7 Extract of the test report for NS protection „Determination of electrical properties“	**No.: 21PP125-01_0**

Test report NS protection

Type of NS protection	InteliSys Gas, AIO-GAS, InteliSys GSC-C, InteliGen GSC-C, InteliGen GSC	Further manufacturer information *Valid parameter set:* “SPtM under50kW.ant” or “SPtM over50kW.ant”

Software-Version:	Type	Software-Version	Version Grid-Code Module
	InteliSys Gas	IS2GASXX-1.9.0	V1.2
	AIO-GAS	AIO-GAS-1.7.0	
	InteliSys GSC-C	IS2GSC-1.3.0	
	InteliGen GSC-C	IG2GSC-1.3.0	
	InteliGen GSC	IG2GSC-1.3.0	

Manufacturer:	**ComAp a.s.** U Uranie 1612/14a; 170 00 Praque 7; Czech Republic	
Measurement period:	From 2021-04-22 to 2021-07-01	

	Sitrling generators, fuel cells			**Inverter(s)**		
	Synchronous and asynchronous generators with $P_n \leq 50kW$ coupled directly or via inverters			**Directly coupled synchronous and asynchronous generators with Pn >50kW**		
Protective function	Set Value	Tripping Value	Tripping time NS Protection*	Set Value	Tripping Value	Tripping time NS Protection*
Rise-in-voltage protection U>>	1,15 * U_n	1,15* U_n	38ms	1,25 * U_n	1,255* U_n	36ms
Rise-in-voltage protection U>	1,10 * U_n	1,10* U_n	10 min Mittelwert	1,10 * U_n	1,10* U_n	10 min mean value
Voltage drop protection U <	0,8 * U_n	0,793* U_n	59ms	0,8 * U_n	0,792* U_n	1,027s
Voltage drop protection U<<	Not applicable			0,45* U_n	0,444* U_n	321ms
Frequency decrease protection f<	47,5Hz	47,50Hz	77ms	47,5 Hz	47,50Hz	67ms
Frequency decrease protection f>	51,5Hz	51,51Hz	68ms	51,5 Hz	51,51Hz	76ms

* The tripping time includes the period from the limit value violation U|f until the triping signal to the interface switch.
When planning the power generation system, the response time of the interface switch shall be added to the maximum time value obtained as indicated above.

☐ **For integrated NS protection**

Assigned to power generation unit of type	
Type integrated interface switch	
Response time of interface switch for integrated NS protection	
Verification oft he entire functional chain “integrated NS protection – interface switch” has resulted in successful disconnection	☐