

Certificate of NS protection		Nr.: 22-014-01
Manufacturer / Applicant	ComAp a.s. U Uranie 1612/14a 170 00 Prague 7 Czech Republic	
Type of NS protection	InteliGen 1000	
Central NS protection	<input checked="" type="checkbox"/>	
Integrated NS protection	<input type="checkbox"/>	
Network connection rule	SOP-9-1_15 GCC Certification Program, 09/21 <u>Based on:</u> 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	21PP213-01_2 dated 2022-02-17	
The network and system protection designated above meets the requirements of VDE-AR-N 4105:2018-11.		

Kaufbeuren, 2022-02-22

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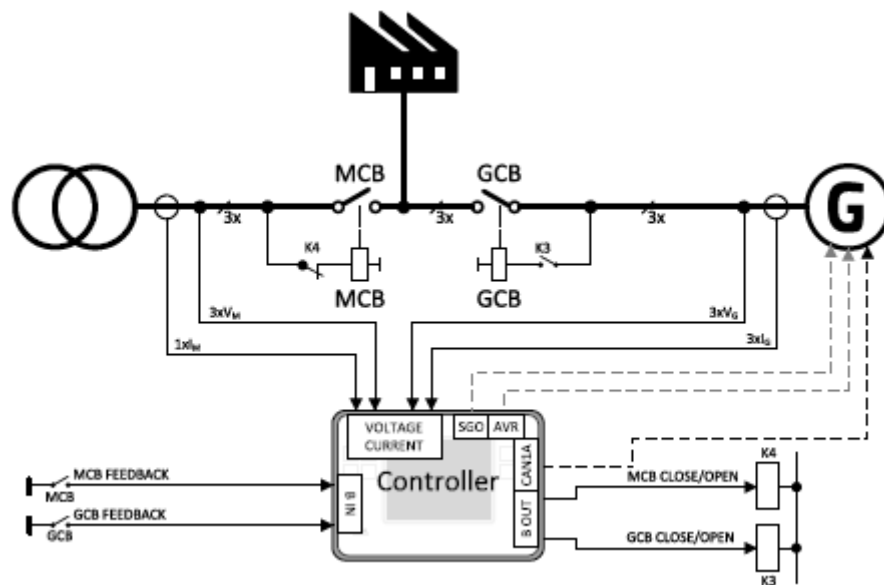
Annex 1 Description of the system

The EZE controller IntelliGen 1000 is a controller 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, $\cos \phi$ 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.



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

No.: 21PP213-01_2

„Determination of electrical properties“

Test report NS protection

Type of NS protection:	InteliGen1000	Further manufacturer information: <i>Valid parameter set:</i> "Initial archive_50-_20210728_01.aig3" or "Initial archive_50+_20210728_01.aig3"
Order Code:	IG31000XBBB IG31000YBBB	
Software-Version:	2.1.0 (Grid-Code Modul Version: V1.3)	
Manufacturer:	ComAp a.s. U Uranie 1612/14a 170 00 Prague 7 Czech Republic	
Measurement period:	from 2021-07-30 to 2021-12-09	

	Sitriling generators, fuel cells			Inverter(s)		
	Synchronous and asynchronous generators with $P_n \leq 50\text{kW}$ coupled directly or via inverters			Directly coupled synchronous and asynchronous generators with $P_n > 50\text{kW}$		
Protective function	Set Value	Tripping Value	Tripping time NS Protection*	Set Value	Tripping Value	Tripping time NS Protection*
Rise-in-voltage protection $U_{>>}$	$1,15 * U_n$	$1,154 * U_n$	32ms	$1,25 * U_n$	$1,254 * U_n$	41ms
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 Mittelwert
Voltage drop protection $U_{<}$	$0,8 * U_n$	$0,794 * U_n$	37ms	$0,8 * U_n$	$0,794 * U_n$	1,017ms
Voltage drop protection $U_{<<}$	Not applicable			$0,45 * U_n$	$0,45 * U_n$	315ms
Frequency decrease protection $f_{<}$	47,5Hz	47,50Hz	74ms	47,5 Hz	47,48Hz	78ms
Frequency decrease protection $f_{>}$	51,5Hz	51,50Hz	77ms	51,5 Hz	51,5Hz	81ms

* The tripping time includes the period from the limit value violation U/f until the tripping 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 of the entire functional chain "integrated NS protection – interface switch" has resulted in successful disconnection	<input type="checkbox"/>