

ALP-UDR Universal Detection Relay

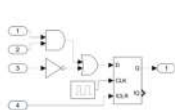
user-defined protection, automation, and monitoring



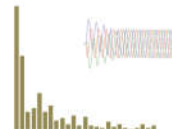
The first Real-Time Protection and Automation platform that can be adapted to a wide variety of applications. While retaining the expected standard functionalities of both protective relay and automation platform, the ALP-UDR unlock access to digital signal processing and integrate MATLAB algorithms inside the powerful and rugged ALP platform. Get the best of both worlds by merging flexibility and simplicity.



AUTOMATION



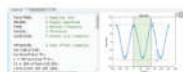
SIGNAL ANALYSIS



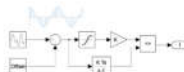
PROTECTION



MATLAB SCRIPT



SIGNAL PROCESSING



RECORD AND REPLAY



MAIN CHARACTERISTICS AND ADVANTAGES

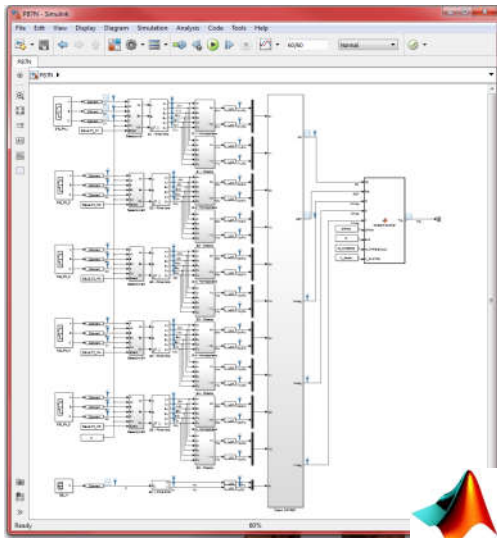
- Transfer user-defined MATLAB Simulink algorithms into the relay for protection, automation, and monitoring purposes
- Create and simulate algorithms using a single software (MATLAB), reducing implementation time
- Take control of the digital signal processing tasks
- Create or integrate digital filters and logics
- One of the highest sampling rate of the industry (7680Hz), enabling precise waveform reconstruction, recording, and fault analysis
- Cyber security features enabling easier compliance with the NERC CIP requirements
- Secure, rugged, and reliable protection relay in compliance with the latest utility standards
- User-friendly interfaces and software, making operation, configuration, start-up, and engineering easier
- Scalable solution for the detection of non-conventional electrical phenomena

APPLICATIONS OF THE ALP-UDR

- Customized protection development using a sampling rate of 128 samples / cycle
- Power system automation using complex logic, voltage, current, frequency functions, and quantities
- Design of System Integrity Protection Schemes (SIPS) and Remedial Action Schemes (RAS)
- Monitor operational data from distributed energy resources (DER) such as phase unbalance, harmonics, voltage flickers and dips, feeder load reporting, and load trending
- Complex anti-islanding protection
- Sandbox for various R&D developments in power systems (dynamic line rating, harmonic filters bank protection, etc...)



ALP-UDR OVERVIEW



ALP-2000 PLATFORM



ALP-4000 PLATFORM



MATLAB SIMULINK TRANSFER

Transfer Simulink algorithms into the relay's DSP and use the embedded WEB Server to monitor real-time DSP usage. Use ALP Config to activate and modify user defined variables from the Simulink model.

PROGRAMMABLE INPUTS/OUTPUTS

Outputs of the ALP can be configured individually to operate from the value of any of the relay's binary points (e.g. output of a function, timer, latch, logic equation etc.). Similarly, digital inputs of the relay can be used in any element using a binary point as an input (e.g. a logic equation).

HIGH-SPEED & HIGH POWER OUTPUTS

The ALP features high-speed and high power outputs based on a parallel combination of optocoupled transistors and mechanical relays.

METERING AND MONITORING

Real-time measurements are taken from raw voltages and currents with a sampling rate of 7,680 Hz.

PROGRAMMABLE LOGIC CONTROLLER AND EQUATIONS

Logic equations can be configured. Latches, timers, and logic functions are available to build complex equations.

SELF-MONITORING

Self-monitoring continuously verifies system integrity in order to effectively detect any hardware malfunction in the device.

EXPANDABILITY

With its flexible and modular architecture, the ALP-UDR is the perfect solution for detection and processing of non-conventional electrical phenomena.

SEQUENCE OF EVENTS RECORDER

Up to 1,000 events of different kinds (Protection, Security, Configuration, and Maintenance) can be recorded in the ALP-UDR. Each entry of the recorder provides detailed system status when the event occurred.

OSCILLOGRAPHS

The ALP-UDR has 10 independently configurable oscillographs. Oscillographic files containing up to 5 seconds of data are stored in COMTRADE format (IEEE C37.111), either in version 1999 or 2013 according to the user's preferences. The increased storage of the ALP-UDR allows raw data capture at one of the highest sampling rates of the industry (128 samples/cycle), enabling better analysis of the faulted equipment.

SECURE ACCESS

Three user levels are available to secure access to the relay interfaces.

*DNP3 SECURE AUTHENTICATION

DNP3 protocol is now available with "DNP3 Secure Authentication" ensuring the relay communicates with an authenticated user before giving access to critical functions. This feature helps meet substation cybersecurity requirements.

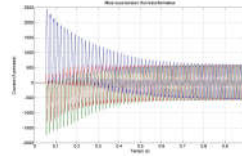
*61850 GOOSE MESSAGES

Transmit and receive GOOSE (Generic Object Oriented Substation Events) messages over the substation Ethernet LANs. GOOSE messaging reduces the amount of hard wiring between devices in the substation while allowing low-latency, real-time transmission of events.

*Soon available upon firmware update
DNP3 is available and DNP3 SAV5 will come with firmware upgrade

MATLAB SIMULINK

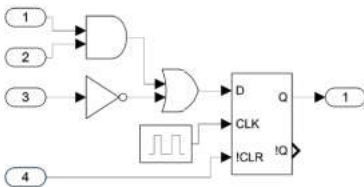
- Why Simulink?
 - Widely used for power system modeling and validation
 - Large capabilities for modeling power systems
 - Ideal tool for creating digital signal processing tasks
 - Enable both algorithm development and power system simulation in the same software.
- Why using Gentec ALP-UDR and Simulink?
 - Today's challenges in power systems sometimes require more control of the devices and custom signal processing tasks
 - Gentec ALP is widely used in power systems protection and control. Simulink is the modeling standard used in research and studies. Merging the two provides a powerful and rugged substation working environment.



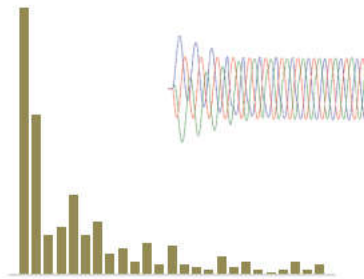
THE IDEAL SOLUTION

- Model simple or complex solutions using logic, user-defined digital filters, and built-in standard ANSI protections and more
- Monitor and record with a high resolution
- Web server for convenient and remote access to the relay

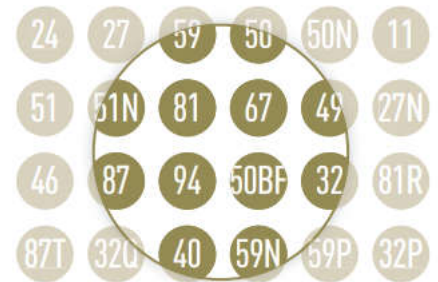
AUTOMATION



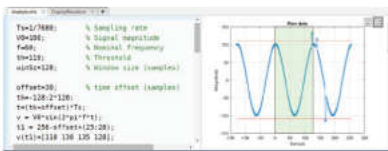
SIGNAL ANALYSIS



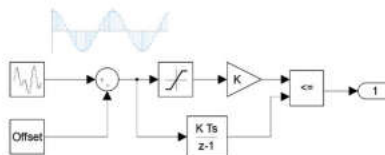
PROTECTION



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SIGNAL PROCESSING



RECORD AND REPLAY



SECURED WEB INTERFACE



SPECIFICATIONS

MAIN SPECIFICATIONS (ALP-4000 PLATFORM)	
AC current inputs	6 three-phase groups
AC voltage inputs	2 three-phase groups
Digital inputs	16
Digital outputs	16
High-speed, high-power digital outputs	8
Assignable buttons	8
Programmable LEDs	16
Synchronization	IRIG-B modulated / unmodulated
Interface	Secure web / Graphical LCD display
Communications	HTTPS, DNP3 (with Secure Authentication)
Power supply	105 Vdc – 140 Vdc 85 Vac – 265 Vac @ 50/60Hz
Typical power consumption	23 W (dc) / 38 W (ac)
Maximum power consumption	30 W (dc) / 50 W (ac)
Independent inputs/outputs	Dielectric strength between channels 2.8 kVdc (1 min)
Sampling	128 samples / cycle

MAIN SPECIFICATIONS (ALP-2000 PLATFORM)	
AC current inputs	1 three-phase and 1 single phase (neutral)
AC voltage inputs	1 three-phase and 1 single phase (synchronization voltage)
DC digital inputs	6
Digital outputs	4
High-speed, high-power digital outputs	2
Assignable buttons	4
Programmable LEDs	12
Synchronization	IRIG-B modulated / unmodulated
Interface	Secure web / Graphical LCD display
Communications	HTTPS, DNP3 (with Secure Authentication)
Power supply	105 Vdc – 140 Vdc 85 Vac – 265 Vac @ 50/60Hz
Typical power consumption	23 W (dc) / 38 W (ac)
Maximum power consumption	30 W (dc) / 50 W (ac)
Independent inputs/outputs	Dielectric strength between channels 2.8 kVdc (1 min)
Sampling	128 samples / cycle

METERING (specified at 25°C)			
Voltage RMS Value: Phasor magnitude: Phasor angle: Symmetrical comp. magnitude: Symmetrical comp. angle:	5-300V: 0.1%±12mV 5-300V: 0.1%±12mV 5-300V: ±1° 5-300V: 0.1%±12mV 0.5-100A: ±1°		
Frequency Accuracy : Measuring range :	*50Hz and 60 Hz nominal ±0.001 Hz (at 60 Hz) 30 to 90 Hz		
Nominal current	200mA	1A	5A
RMS Value : Phasor magnitude: Phasor angle: Symmetrical comp. magnitude: Symmetrical comp. angle:	0,005-8A: 0.1%±1.6mA 0.04-8A: 0.1%±1.6mA 0.04-8A : ±1° 0.04-8A:0.1%±1.6mA 0.04-8A : ±1°	0.2-20A:0.2%±1mA 0.2-20A:0.2%±1mA 0.05-20A : ±1° 0.2-20A:0.2%±1mA 0.05-20A : ±1°	0.5-100A:0.2%±10mA 0.5-100A:0.2%±10mA 0.5-100A: ±1° 0.5-100A:0.2%±10mA 0.5-100A: ±1°

*50Hz frequency soon supported upon firmware upgrade. Specification might differ.

ENVIRONMENTAL CONDITIONS		
Dry heat – Functional and storage	CEI 60068-2-2 :2007 Bd and Rb	+85°C 16 hours
Cold – Functional and storage	CEI 60068-2-1 :1990 – Ab and Ab	-40°C 16 hours
Cyclic temperatures	CEI 60068-2-14 :2009 Nb	-40°C to 85°C 5 cycles
Damp heat, continuous	CEI 60068-2-78 :2012 Cab	+40°C, 240 hours 93% relative humidity
Damp heat, cyclic	CEI 60068-2-30 :2005 Dd	25°C to 55°C 8 cycles 95% relative humidity
Behavior under vibrations and endurance (sinusoidal)	60255-21-1 :1998	Class 1
Response to shocks, resistance to shocks and vibrations	60255-21-2 :1998	Class 1
Seismic tests	60255-21-3 :1993	Class 2
Enclosure protection	IP3X	
Surge category	II	
Pollution degree	2	
Equipment class	1	
Maximum elevation	< 2000 m	
Maximum relative humidity	95% non-condensing	
Operating temperature	-40°C to 70°C	

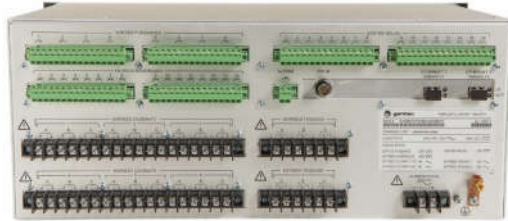
SECURITY		
Impulse voltage	60255-27 :2013	5 kV, 0.5J
Dielectric voltage	60255-27 :2013	2800 Vdc Copper Ethernet port 2250Vdc
Insulation resistance	60255-27 :2013	> 100 MΩ after damp heat test (CEI 60068-2-78)
Protective bonding resistance	60255-27 :2013	< 0,03 Ω
Thermal short time	60255-27 :2013	4*In (20 A) continuous 100*In (500A) for 1 s 1250Ac for 1 cycle

ELECTROMAGNETIC COMPATIBILITY		
Radiated emissions	CISPR 11/CISPR 22	A Class
Conducted emissions	CISPR 22: 2008	A Class
Electrostatic discharge immunity	CEI 6100-4-2:2008 Level 4	±15 kV air ±8 kV contact
Radiated electromagnetic field immunity	CEI 61000-4-3 :2006 A1 :2008 A2 :2010 IEEE C37.90.2 :2004 20 V/m	20V/m
Electrical fast transient/burst immunity	CEI 61000-4-4:2004 IEEE C37.90.1	±4kV
Surge immunity	CEI 61000-4-5 :2005 Levels 3 and 4	±4 kV L-PE ±2kV L-L POWER: ±2 kV L-PE ±1 kV L-L
Immunity to conducted disturbances	CEI 61000-4-6 :2008	20V
Power frequency magnetic field immunity	CEI 61000-4-8-2009	100 A/m for 60s 1000 A/m for 3s (50Hz and 60Hz)
Pulsed magnetic field immunity	CEI 61000-4-9:1993 A1:2000 Level 5	1000 A/m
Damped oscillatory magnetic field immunity	CEI 61000-4-10 :1993 A1: 2000 Level 5	100 A/m for 2s (0.1MHz and 1MHz)
Voltage dips immunity	CEI 61000-4-11:2004 CEI 61000-4-29:2000	DC Supply 40% for 200 ms 70% for 500 ms
Voltage interruptions on power supply voltage immunity	CEI 61000-4-11:2004 CEI 61000-4-29:2009	DC Supply 100% short-circuit for 5s 100% open-circuit for 5s
Gradual shut-down/start-ups	CEI 60255-26:2013	60s ramp
Immunity at the power frequency on the DC inputs	CEI 61000-4-16:2002	Digital input: 300 Vrms L-PE for 10s 60Hz 150 Vrms L-L for 10s 60Hz
DC Ripple immunity at power input	CEI 61000-4-17:2009	25%
Damped oscillatory wave immunity	CEI 61000-4-18:2006 A1:2011	2.5kV L-PE 1kV L-L IRIG-B : 1kV L-PE 0.5kV L-L 100kHz and 1MHz
Surge Withstand capability	IEEE C37.90.1:2002	2.5kV L-PE 2.5kV L-L

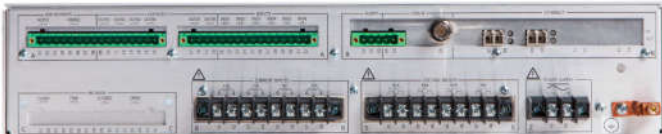
AC CURRENT INPUTS		
Nominal current	200mA	1 A or 5 A
Continuous maximum current	20 A	20 A
Measurable maximum current	8 A (200mA nominal)	40 A (1 A nominal) 200 A (5A nominal)
Maximum current (1 sec thermal)	100 A	500 A
Maximum current (1 cycle thermal)	1250 AC (peak)	1250 Ac (peak)
Frequency	40 – 75 Hz	40 – 75 Hz
Accuracy	0.005 to 8 A : 0.1% ± 1.6 mA	0.2 to 20 A : 0.1% ± 1 mA (1A nom) 0.05 to 100 A : 0.2% ± 10 mA (5A nom)
Frequency response (-3dB)	1500 Hz	
Burden	< 0.15 VA	
Individual inputs	Inter-circuit isolation of 2800Vdc for 1 min	

PHYSICAL LAYOUT AND DIMENSIONS

ALP-4000 PLATFORM



ALP-2000 PLATFORM



AC VOLTAGE INPUTS

Nominal voltage	70 V
Continuous maximum voltage	250 V
Measurable maximum voltage	300 V
Maximum voltage (10s thermal)	350 V
Frequency	40 – 75 Hz
Accuracy	5 – 300 V : 0,1% ± 10mV
Frequency response (-3dB)	1500 Hz
Burden	< 0,15 VA
Individual inputs	Inter-circuit isolation of 2.8kVdc for 1 min.

DIGITAL INPUTS

Operating nominal voltage	125 Vdc
Operation maximum voltage	145 Vdc
Minimum pickup voltage	102 Vdc
Nominal cutoff voltage	85 Vdc
Input impedance	30 kΩ
Input consumption	0,5 W
Individual inputs	Inter-circuit isolation of 2.8kVdc for 1 min.

DIGITAL OUTPUTS

Operating nominal voltage	125 Vdc
Operation maximum voltage	160 Vdc
Minimum pickup voltage	20 Vdc
Continuous maximum current	5 A
Nominal closure power	30 A @ 125 Vdc
Nominal resistive cutoff power	0,3 A @ 125 Vdc
Nominal cutoff power	0,3 A @ 125 Vdc (L/R = 40 ms)
Pickup time	< 9 ms
Cutoff time	< 25 ms
Electrical operations	>1E6 @125Vdc, I=0.3A, L/R=40ms
Individual outputs	Inter-circuit isolation of 2.8kVdc for 1 min.

HIGH-SPEED HIGH-POWER DIGITAL OUTPUTS

Operating nominal voltage	125 Vdc
Operation maximum voltage	160 Vdc
Minimum pickup voltage	20 Vdc
Continuous maximum current	10 A
Nominal closure power	30 A @ 125 Vdc
Nominal resistive cutoff power	10 A @ 125 Vdc
Nominal cutoff power	10 A @ 125 Vdc (L/R = 40 ms)
Pickup time	< 2 μs
Cutoff time	< 25 ms
Electrical operations	>50 000@125Vdc, I=10A, L/R=40ms
Individual outputs	Inter-circuit isolation of 2.8kVdc for 1 min.

CONTACT:

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Since 1959, Gentec is specialized in custom cutting edge technology electronic and electrical products development. Our sustained effort to exceed utility requirements is one of the reasons why our ingenious and robust solutions are renowned around the world. We are constantly looking for getting ahead in the electrical industry trend.

Gentec is the perfect partner for you!

