



Multi-functional EHV transmission line protection of series compensated lines for single or three-phase tripping.

Features and Benefits

- Operating times to one cycle
- Four zones of phase and ground mho distance functions
- User-selectable pilot schemes with step distance backup
- Phase and ground overcurrent instantaneous backup
- Ground TOC backup
- Optional four-shot recloser
- Horizontal and vertical models
- User-configurable I/Os
- Integrated metering functions
- Self-test diagnostics

Applications

- On or adjacent to series compensated lines for single or three-phase tripping applications
- enerVista.com compatible (see page 275)

Protection and Control

- Out-of-step blocking and tripping
- Over and undervoltage functions

Monitoring and Metering

- Fault location, event and fault recording
- High-resolution oscillography

User Interfaces

- LCD and keypad
- RS232 and RS485 serial ports



Protection and Control

The ALPS Advanced Line Protection System is a multi-function digital protective relay system designed for HV and EHV transmission lines. The ALPS provides advanced protection features including:

Distance

Four zones of phase and ground distance functions are provided. Functions may be set as adaptive reactance, blocking, phase and ground step protection. A quadrilateral ground characteristic is available in ALPS revision B.

Out-of-step blocking monitors swing condition and blocks either tripping or reclosing. Optional out-of-step tripping logic is available with a choice of two or three mho characteristics with adjustable shapes.

Directional Ground Overcurrent

These functions include forward and reverse negative sequence current and voltage operated with both IOC and TOC functions. An open pole period disables these functions.

Overcurrent Backup

The ALPS provides instantaneous phase and ground overcurrent functions. An instantaneous function provides phase overcurrent backup, controlled by the Zone 2 distance function. Ground overcurrent backup consists of IOC and TOC functions.

The ALPS also provides an adaptive sensitive current disturbance detector (fault detector). Supervision of distance function overcurrent is included. Both trip and block units are available for use in ground directional overcurrent pilot schemes.

An unbalanced current alarm is provided to detect open or shorted CT leads.

Voltage

Three single-phase over and under-voltage detectors, a positive sequence overvoltage detector and an optional compensated positive sequence overvoltage detector are available.

Fuse failure logic detects a full or partial loss of AC potential and blocks tripping of distance and directional functions. A line pickup function provides tripping if the breaker is closed. An optional synchronism check voltage can be used with the recloser.

Scheme Logics

Scheme logics provided include:

- Blocking
- Permissive Underreach Transfer Trip (PUTT)
- Permissive Overreach Transfer Trip (POTT1 and POTT2)
- Hybrid (POTT plus echo and weak in-feed tripping)
- Step distance backup (non-pilot)

User-programmable logic provides up to 40 gates and eight timers.

Pilot Channels

The relay is compatible with a wide variety of pilot channel equipment including AM and FSK via Power Line Carrier (PLC), FSK via microwave, and FSK via multiplexed fiber optic.

Four-Shot Recloser

Reclose programs for single and three-phase tripping applications may be initiated from the ALPS protection functions, or via external contact inputs. Inputs for recloser inhibit, cancel, and reset are included. Output contacts are provided for breaker close, reclose in progress, and reclose in lockout.

Manual Breaker Control

Manually trip or close a circuit breaker locally or remotely.

Multiple Settings Groups

Select from four active settings groups, stored in the non-volatile memory, both locally or remotely.

Configurable I/Os

All 12 contact converter inputs and all 24 contact outputs (except for alarms) in the ALPS are user-configurable. There are only 20 outputs for single-phase tripping.

Monitoring and Metering

Sophisticated monitoring and metering functions include:

Fault Location

Advanced algorithms display the fault location in miles, kilometers, or percent of line impedance. The fault location is displayed along with trip targeting, and is included in the fault reports and oscillography files.

Trip Circuit Monitor

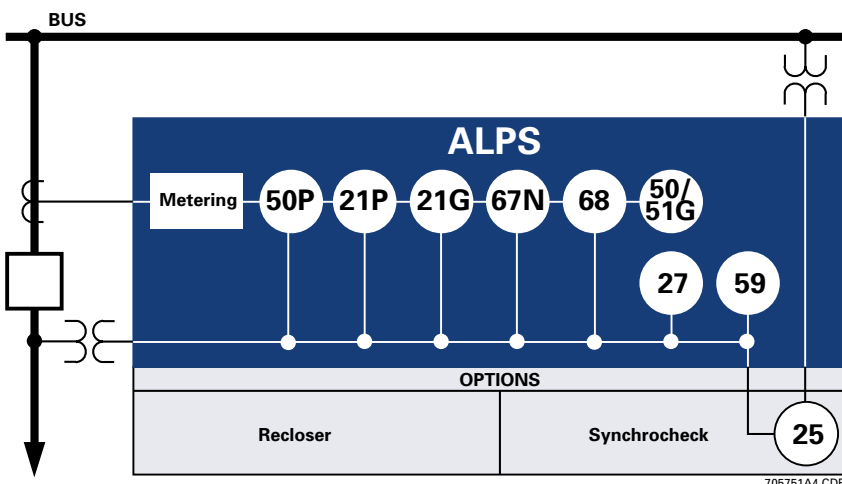
DC battery voltage is monitored across each open trip contact (or SCR) and triggers an alarm when the voltage becomes virtually zero. A current sensor logs an event message indicating if DC trip current was flowing following a relay trip.

Metering

RMS metering values include:

- Current (I_a , I_b , I_c , I_n)

Functional Block Diagram



- Voltage (V_a, V_b, V_c)
- Watts (three-phase)
- Vars (three-phase)
- Frequency

Phase current and voltage is calculated with a reading accuracy of 1%. Phasor value (magnitude and angle) of the phase currents and voltages is also displayed.

Event Recording

The ALPS stores up to 150 change-of-state events, with time and date stamp to the nearest millisecond, to help with fault analysis.

Oscillography

The ALPS captures current and voltage waveforms and selected internal logic signals at 64 samples per cycle. The unit can store from two events of 72 cycles each to 12 events of 12 cycles each. The time, date, active settings, and fault report are stored with the data capture. Prefault data can be set from one to eight cycles. Optional memory expansion allows the user to store from six events at 72 cycles each to 36 events at 12 cycles each.

Oscillography can be triggered by internal signals (trip outputs or programmable logic signals) or external signals.

Breaker Health

The breaker health threshold is set by the user to achieve “just in time” maintenance. When the cumulative value of the three-phase currents exceeds the threshold, an alarm occurs. The user can adjust the threshold value for breakers with previous duty.

Self-Test Diagnostics

Self-test routines are performed during power up and continue in the background during service. Failures are categorized as either a critical or non-critical alarm and recorded in the event log.

Time Synchronization

IRIG-B input is provided for time synchronization via satellite signal.

Security

Separate remote passwords permit view only, view and settings changes, or view, settings, and control capability.

Software

Four Windows®-based software packages are included in the ALPS instruction book.

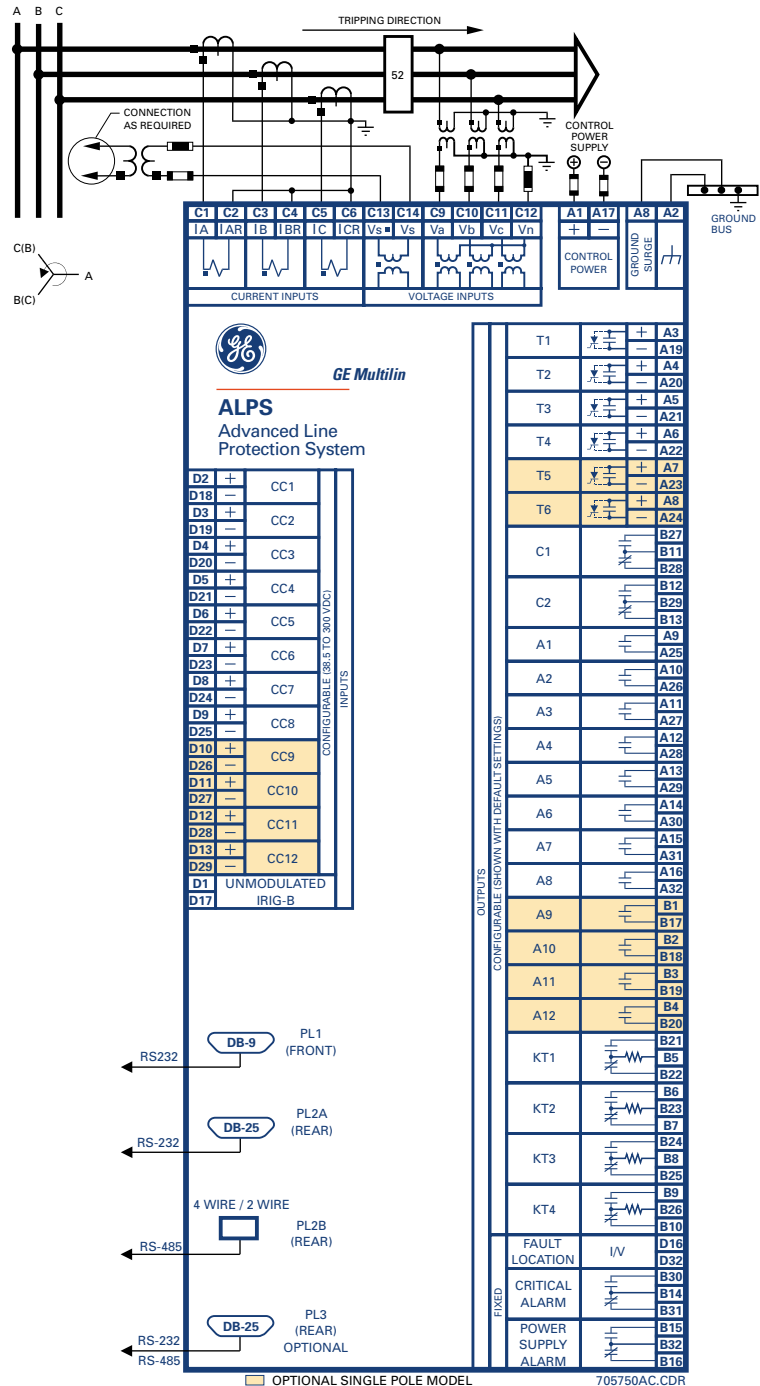
- ALPS-LINK – allows the user to communicate with the relay using GE protocol
- ALPS-SET – aids user in creating and downloading ALPS settings files

- ALPS-TEST – calculates expected operating voltages for mho distance functions for settings and test conditions

- XPRESSION BUILDER™ – allows the user to graphically design programmable logic settings and I/O assignments used by the relay

The user may also purchase GE-DATA to analyze oscillography data.

Typical Wiring



ALPS Technical Specifications

PROTECTION		
Positive sequence angle:	$I_n = 1$ 45 – 90°	$I_n = 5$ 45 – 90°
Zero sequence angle:	45 – 90°	45 – 90°
Zero sequence current compensation (K0):	1.00 – 7.00	1.00 – 7.00
Zone 1, 2, 3 and 4 reach:	0.05 – 250 Ω	0.01 – 50 Ω
Zone 4 offset reach:	0.00 – 0.40	0.00 – 0.40
Zone 2 timer:	0.10 – 3.00 sec	0.10 – 3.00 sec
Zone 3 and 4 timers:	0.10 – 10.0 sec	0.10 – 10.0 sec
Phase instantaneous OC:	0.4 – 32 A	2.0 – 160.0 A
Ground instantaneous OC:	0.1 – 16.0 A	0.5 – 80.0 A
Ground TOC:	0.04 – 3.00 A	0.20 – 15.00 A
TOC curves:	Inverse, very inverse, extremely inverse, definite and custom	
RECLOSER (OPTIONAL)		
Reclose attempts:	4	
Synchronism check:	Optional	

MONITORING	
OSCILLOGRAPHY	
Records:	2 – 12
Record length:	72 – 12 cycles
Pre-fault cycles:	1 – 8
Samples per cycle:	64
OSCILLOGRAPHY WITH EXTENDED MEMORY	
Records:	6 – 36
Record length:	72 – 12 cycles

COMMUNICATIONS	
Protocol:	ASCII, GE-MODEM, DNP 3.0 Modbus® (optional on revision A relays on Lg)
Ports:	Front: 1 DB9, RS232 Rear: 1 DB25, RS232 and 4 pin Phoenix, RS485 (standard); 1 DB25, RS232 or RS485 optional
Display:	4 line liquid crystal display standard
Keypad:	Full numeric keypad standard

*Specifications subject to change without notice.

METERING	
Frequency:	50 or 60 Hz
Voltage (ph-ph):	100 – 120 VAC
Current (I_n):	1 or 5 A
Maximum permissible current:	
Continuous:	3 A for $I_n = 1$ A 15 A for $I_n = 5$ A
Three sec:	50 x I_n
One sec:	100 x I_n
Maximum permissible AC voltage:	
Continuous:	138 VAC (ph-n)
One min:	3.5 x rated
RMS values:	±1% of reading

OUTPUTS	
CONTACT RATINGS	
Trip contact (T1 – T6):	Continuous = 5 A Make and carry = 30 A per ANSI C37.90 Interrupting: 25 VA Pickup < 4 ms
Trip SCR (T1 – T6):	Continuous = 5 A Make and carry = 30 A per ANSI C37.90
Auxiliary (A1 – A12) (C1, C2)	Continuous = 5 A Make and carry = 30 A Interrupting: 25 VA Pickup < 8 ms
High speed (KT1 – KT4)	Continuous = 0.5 A Max voltage = 280 VDC = pickup < 0.5 ms

INPUTS	
Contact converter inputs:	38.5 – 300 VDC
BURDENS	
Current circuits:	
$I_n = 1$:	0.02 Ω at 5°
$I_n = 5$:	0.12 Ω at 30°
Voltage circuits:	
50 Hz:	0.20 VA
60 Hz:	0.15 VA
DC battery:	
Power supply:	< 20 W
Contact converters:	2.5 mA each

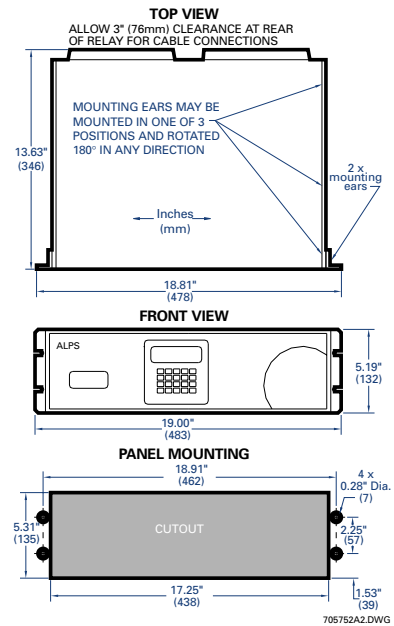
POWER SUPPLY	
Control voltage:	Range:
48 VDC	38.5 – 60.0 VDC
110/125 VDC	88 – 150 VDC
220/250 VDC	176 – 300 VDC

INSTRUCTION BOOK	
GEK 105555	

ENVIRONMENTAL	
Ambient temperature range:	
Storage:	-30° C to +75° C
Operation:	-20° C to +60° C
Humidity:	95% without condensation

TYPE TESTS	
Insulation test voltage: (high-pot)	2 kV, 50/60 Hz, 1 min ANSI C37.90 IEC 255-5
Impulse voltage withstand fast transient:	5 kV peak, 1.2/50 μs, 0.5 joules IEC 255-4 ANSI C37.90.1
Surge withstand capability (SWC):	ANSI C37.90.1 IEC 255-22-1
Radio frequency interference withstand (RFI):	ANSI C37.90.2 IEC 255-22-3
Electrostatic discharge (ESD):	IEC 255-22-2

Dimensions



Ordering

ALPS	* * * * *	
ALPS		Basic unit advanced line protection system
D		Distance relay
A		Revision Level A
B		Revision Level B
1		Single-phase tripping logic
3		Three-phase tripping logic
1		1 A rated current
5		5 A rated current
U		For applications without series capacitors
C		For applications with series capacitors
0		48 VDC battery voltage
1		110/125 VDC battery voltage
2		220/250 VDC battery voltage
1		SCR trip outputs and contact channel interface
2		Contact trip outputs and contact channel interface
3		SCR trip outputs and 5V/20mA channel interface
4		Contact trip outputs and 5V/20mA channel interface
2		Front RS232 port and 1 setable RS232/RS485 rear port (GE-MODEM/ASCII/DNP 3.0)¹
3		Front RS232 port and 2 setable RS232/RS485 rear ports (GE-MODEM/ASCII/DNP 3.0)
H		Horizontal mounting
V		Vertical mounting
S		Standard oscillography memory¹
E		Extended oscillography memory
0		No out-of-step tripping or positive sequence overvoltage¹
1		With out-of-step tripping¹
2		With positive sequence overvoltage units¹
3		With positive sequence overvoltage units and out-of-step tripping
N		No reclosure
R		Reclosure without synchronism check option
S		Reclosure with synchronism check option

¹These options are applicable to Revision A models only.

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www.enerVista.com

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ALPS Guideform Specifications

For an electronic version of the ALPS guideform specifications, please visit: www.GEindustrial.com/Multilin/specs, fax your request to 905-201-2098 or email to literature.multilin@indsys.ge.com.

