

Specification Sheet: Link G4+ Thunder

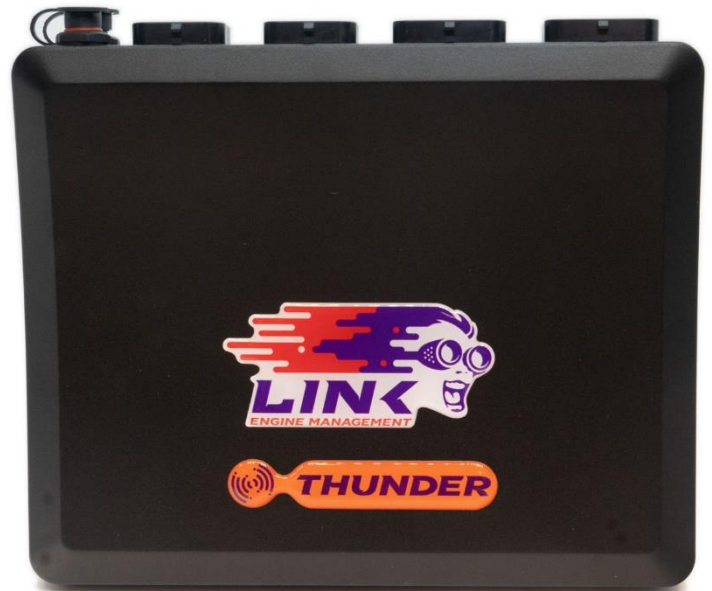
SKU 124-1000

Advanced fully configurable WireIn Engine Control Unit (ECU)

Most suitable for high end applications where multi electronic throttle bodies are used or where a large amount of IO is required.

Body

- Dimensions: 170 x 212 x 44 mm (6.7 x 8.3 x 1.7 in)
- Weight: 1.04 kg (2.29 lb)
- Material: Aluminium Die Cast, Black Powder Coated
- Mounting: Flush mount extruded mounting bracket
- Connectors:
 - 2 x 34 pin AMP Super Seal
 - 2 x 26 pin AMP Super Seal
 - 2 x Link 6 pin
- Indicators: Power / Fault code indicator LED
- IP Rating: 54



Platform

- Electronics: Link G4+ Engine Control Platform
- Processor:
 - 40 MHz dual processor
 - Engine control specific MCU and Digital Signal Processor
- Memory: 32 Mbit Data Logging Memory
- Communications
 - USB - PC Tuning
 - 2 x CAN 2.0B - User configurable
 - RS-232
- Firmware: Link G4+ Firmware V5.5.0 or later. In field firmware updatable
- Tuning Software: PCLink G4+

Security

- Password: Password protection can be applied to prevent unintended adjustment
- Lock: Shipped locked (engine control disabled). Must be unlocked by a Link distributor

Max. Ratings

- Power Supply: Reverse Polarity protected. Max Continuous operating voltage 24V. Over voltage protection at 27V. Minimum operating voltage 6.5V.
- Temperature: -40 to + 80 ° C (-40 to 185 °F)

Inputs

- Engine Position:
 - Up to 6 engine position sensor inputs (reluctor, hall or optical)
 - Engine position tracking to 0.1 degree accuracy
 - Digital Sampling Oscilloscope on Trigger 1 and 2 Inputs
- Analog:
 - 20 0-5V Analog Inputs
 - 2 have configurable pullup resistor
 - 2 have permanent pullup resistor
- Digital
 - 8 Frequency or switching inputs. All with switchable pullup resistor
 - 6 High frequency differential frequency or switching inputs
 - Suitable for ABS or turbo speed sensor
 - 2 Switching inputs
- Barometric Pressure: Internal factory calibrated barometric pressure sensor (or external sensor option)
- Knock: 2 Knock sensor inputs
- Lambda Sensor Control: 2 Internal wideband Lambda sensor controllers utilising latest Bosch OEM digital signal processing technology
- Thermocouple: 2 Thermocouple amplifiers suitable for K Type thermocouple sensors
- Accelerometer: 3 Axis accelerometer with orientation correction

Outputs

- Injector: 8 Peak and Hold or Saturated injector driver outputs. 10/3A max. Unused injector outputs can be used as general purpose outputs. 0.1 degree, 1.6 us precision
- Ignition: 8 Ignition pre-amplifier drivers (external igniter required). Unused ignition outputs can be used as general purpose outputs. 2.2A max. 0.1 degree precision.
- Auxiliary Outputs
 - 4 Low Side Drivers. 2.2A max
 - 4 Low/High Side Drivers. 2.2A max

- 6 Half Bridge Drivers 8 A max
- 6 Low Side Drivers with open circuit detection 1 A max
- Regulated Outputs
 - 8V sensor supply. 200mA max
 - 5V sensor supply. 200mA max

Accessories

- Included:
 - Flush fit clip in mounting bracket
 - USB tuning cable
 - Link stickers
- Optional
 - Wiring Loom (various length and pin kit options available)

The Thunder also has the Link G4+ platform features

- This list gives a basic overview of the Link G4+ ECU platform. For full details of the individual adjustments and settings it is recommended that PCLink G4+ is downloaded and installed.

Configuration

- Engine Types
 - 1 to 12 Cylinder (2 or 4 Stroke)
 - 1 to 4 Rotor
 - User configurable TDC points (for odd fire engines) and firing order
- Vehicle Details:
 - Tuner memo and VIN number stored in ECU

Fuel Control

- Types:
 - Single Point
 - Multi Point Group
 - Group Staged
 - Sequential
 - Sequential Staged

- Calculation: Full Modelled Fuel Equation, Modelled Multi Fuel (Flex Fuel) Equation or Basic Fuel Equation. Full modelled fuel equation considers:

- Volumetric Efficiency
- Load Type (MAP, TPS, MAP+TPS, none)
- Engine Capacity
- Lambda Target
- Fuel System Type and Pressure (Injector Flow Pressure Correction)
- Fuel Density
- Fuel Density Temp. Coefficient
- Stoichiometric Ratio
- Air Charge Temperature
- Fuel Charge Cooling
- Injector Size
- Injector Dead Time
- Injector Characteristic (GM Style)

- Multi Fuel:

- Full support for the use of multiple fuels with separate settings for each fuel type and configurable blending between fuels

- Cold Start:

- Configurable cold start/warmup. 2D/3D tables
- Pre Crank Prime - Key on or crank
- First Crank and Cranking Enrichment
- Post Start Enrichment, Hold and Decay
- Warm Up Enrichment
- Multi Fuel fuel blend dependent cold start supported

- VE Corrections:

- Dual Fuel Table (overlay, switched or blended)
- 3D Intake Air Temp
- 4D Fuel Tab
- 5D Fuel Table

- Other:

- Acceleration Enrichment
- Overrun Fuel Cut
- Closed Loop Lambda (Dual Bank)
- Individual Cylinder Fuel Trim
- 3D Injector Timing (Start, End or Center)
- Staged Injection Primary/Secondary Tuning

- Corrections by other control features (eg limits, motorsport features)

- Auxiliary Injection:

- Additional injector stage control using unused fuel outputs for additional fuel stages or water/alcohol

Ignition

- Types:

- Direct Spark
 - Distributor
 - Twin Distributor
 - Wasted Spark
 - Rotary Leading Wasted
 - Rotary Direct Spark

- Signals:

- Rising or Falling Spark Edge
 - ms or duty cycle dwell mode

- Ignition Control:

- Ignition Delay Correction
 - Minimum Spark Duration Control
 - Maximum Advance Limit

- Ignition Corrections:

- Ignition Timing Calculated using:

- Ignition Table
 - Dual Ignition Table (Overlay, switched or blended)
 - ECT Trim Table
 - IAT Trim Table
 - 4D Ignition Table
 - 5D Ignition Table
 - Other control features (eg limits, motorsport features)

- Multi Fuel:

- Blending of ignition timing between fuels supported

- Other:

- Transient Ignition Retard Control
- Idle Speed Ignition Control
- Individual Cylinder Ignition Correction

- Memory:

- 32 Mbit Data Logging Memory

Engine Protection

- Limiting System
 - Used for all limits and configurable for each limit type:
 - Fuel Cut
 - Ignition Cut
 - Rotary Specific
 - Closed loop RPM limiting based on configurable control range
 - 2D/3D Tables
 - Basic/Advanced modes
 - Throttle position dependent cut control
 - Adaptive or Constant cut effects
 - Hard Cut
 - Ignition / Fuel trim during limit
 - Limit exit decay
- Limit Types:
 - RPM, MAP, Vehicle Speed, System Voltage
 - Two General Purpose Limits with configurable tables (eg oil/fuel pressure or IAT/ECT)

Output Functions

- Types:
 - Variable Valve Timing Control for intake and exhaust cams up to 4 cams
 - Idle Speed Control for two/three wise ISC solenoids or four/six terminal stepper motors
 - Boost Control Solenoid
 - Test On/Off
 - General Purpose Output with up to three switching conditions and logic mode
 - General Purpose PWM with up to three switching conditions and logic mode
 - Fuel Pump Control
 - Fuel Pump Speed Control (switched or PWM)
 - Engine Fan Control
 - Air Conditioning Clutch
 - Intercooler Spray Pump
 - Tacho
 - Check Engine Light

- Purge Solenoid
- ECU Hold Power (Keep Alive)
- Speedo
- Electronic Throttle
- Electronic Throttle Safety Relay
- Oxygen Sensor Heater
- Cam (switched valve lift / VTEC)
- Anti-Lag ISC Lift Solenoid
- Exhaust Power Valve
- Starter Control Solenoid
- Shift Light
- Throttle Blip Solenoid
- Traction Light
- Rotary Oil Pump Position Control
- Closed Loop Stepper Position Control
- Tumbler Valve Control (Subaru)

- Virtual Auxiliary:
 - Configurable internal signals that can be used as switching conditions for other ECU functions or to extend output functions number of conditions

- Timers:
 - Triggerable/resettable timers to be used in sequencing output and internal functions

- Shift Light:
 - Shift Light control function
 - Per gear RPM and control range
 - Configurable light brightness depending on RPM to shift point

- CE Light:
 - Check Engine Lamp functionality to display ECU fault codes on the dash. Various modes for light operation

- Engine Fan:
 - Up to three independent engine fans with temperature, hysteresis and air conditioning options

- Tacho:
 - Correctable tacho output with key on tacho sweep option

- Speedo Out:
 - Correctable speedo output with key on speedo sweep option
- IC Spray:
 - Pulsed intercooler spray pump low frequency PWM with various switching conditions
- ECU Hold Power:
 - Keep Alive function for controlling EFI main relay to keep the ECU powered for a controlled time after key off
- Fuel Pump Control:
 - Prime time, RPM and fuel flow switched and PWM support
- Unused Fuel and Ignition Outputs:
 - Can be used for most outputs function types listed above

Input Functions

- Digital Types:
 - General Purpose Input
 - Frequency
 - Variable Valve Timing Cam Position
 - Wheel Speed
 - Air Conditioning Request
 - Intercooler Spray Request
 - Anti Theft Switch
 - Neutral/Park Switch
 - Power Steer Pressure Switch
 - Ignition Switch (Key on)
 - Speed Limit Request
 - Start Signal
 - Clutch Switch
 - Brake Switch
 - Cruise Control Switches
 - Turbo RPM
 - Ethanol Content Sensor
 - Dual ECU Mode Switch
 - Oil Level Switch
 - Stop (engine kill) Switch

- Oil Pressure Switch
- Multi Fuel Select Switch
- Traction Disable Switch

- Analog Types:
 - General Purpose Input
 - Volt Input
 - MAP Sensor
 - Throttle Position Sensor
 - Accelerator Position Sensors
 - Oil Pressure
 - Fuel Pressure
 - EGT (0-5V)
 - Barometric Pressure Sensor
 - Engine Coolant Temperature
 - Intake Air Temperature
 - Narrow Band Oxygen Sensors
 - Rotary Oil Pump Position
 - Tumbler Valve Position
 - Closed Loop Stepper Position Feedback
 - Exhaust Back Pressure
 - Crankcase Pressure
 - Suspension Position
 - Air Conditioning Pressure
 - Lambda (Internal)
 - Gear Position
 - Fuel Temperature
 - Gear Lever Force
 - Fuel Rail Pressure
 - Reverse Lever Position

- Thermocouple:
 - Internal cold junction compensated thermocouple amplifiers

- Accelerometer:
 - 3 Axis G force sensor
 - Software corrected to allow install in any orientation

- Lambda Sensor Control:
 - Internal OEM level wideband Lambda sensor control using latest Bosch digital signal processing technology.

- Calibrations:
 - Built in calibrations for many industry standard and OEM sensors as well as custom 2 point and tabled calibrations.
- Fault Detection:
 - Configurable fault detection and fault value for all Analog Inputs with fault code generation

Engine Position

- Modes:
 - Over 80 built in trigger modes for OEM applications as well as user configurable modes for common configurations
- Sensors:
 - Supports all OEM Variable Reluctance (VR), Hall or Optical sensors. Aftermarket sensors supported
- Calibration:
 - Configurable filtering, pullup resistors and threshold voltages for VR sensors
 - Engine position correction (base timing adjustment) for all trigger modes
- VVT Cam Position:
 - Support for up to two engine position (Crank and Cam) and up to four cam position signals

Engine Control

- Idle Speed Control:
 - Support for most OEM and aftermarket idle control solenoids and stepper motors and electronic throttle
 - Basic open loop idle speed control and advanced closed loop control options
 - Configurable speed, RPM and throttle position lockouts
 - Engine Fan, Power Steer and Air Conditioning correction
- Electronic Throttle:

- Support for up to two electronic throttle bodies
- Independent or shared throttle target
- Full safety functionality for all sensors, drivers and other parts of the electronic throttle system including safety relay
- Up to three switchable throttle target tables
- Support for anti-lag idle up using electronic throttle

- Boost Control:
 - Basic open loop or advanced closed loop control options
 - Up to three boost target tables
 - Boost target table blending option for Multi Fuel or dash board adjustment
 - Staged boost control for fastest spool up and stable control
 - ECT, IAT and Gear boost corrections

- Knock Control:
 - Closed loop individual cylinder knock control
 - Uses digital signal processing (DSP) technology for accurate windowed knock level measurement
 - Configurable frequency and individual cylinder gain settings
 - Adjustable knock window
 - Fast timing removal (retard) and slow reintroduction (advance), all configurable
 - Permanent memory of timing removed or reset at key on
 - Per cylinder or grouped knock ignition correction tables

- Variable Valve Timing (VVT):
 - Over 40 built in OEM VVT signal patterns and user defined signal patterns
 - Up to four independently configurable (two inlet, two exhaust) cam control channels
 - Up to three switchable inlet and exhaust position target tables
 - Accurate, fast and stable position control
 - Supports common PWM and most BMW VANOS control types

- Cruise Control:
 - Cruise Control using electronic throttle
 - Allows digital and analog cruise switch input
 - Safety features to disengage cruise on brake and clutch
 - Adaptive driver behaviour recognition for a smooth transition between driver and cruise control
 - Adjustable speed operating range and maximum speed increase rate

- Air Conditioning (AC) Control:
 - Basic and advanced control modes
 - Digital or CAN control options
 - AC clutch control based on AC pressure, evaporator temperature and engine load
 - Engine fan control
- Starter Motor Control:
 - Crank with key, Start/Stop and Touch Start options
 - RPM, anti-theft and park/neutral lockout options
- Transmission:
 - Gear detection using RPM/wheel speed, CAN or gear position sensor
 - Auto calculated or user defined gear ratios
 - Driven and driving wheel selection
 - Slip % calculation
 - Input shaft RPM calculation

Logging

- ECU Logging:
 - 32 Mbit internal flash
 - Log up to 100 ECU parameters. All ECU parameters can be logged
 - Selectable logging rates up to 100 Hz
 - Memory compacting algorithm to ensure maximum memory utilisation and wear leveling
 - Continuous (looping) data recording
 - Download all or any part of logging memory for instant display in PCLink
- PCLink Logging:
 - Log any or all parameters in the ECU while connected to PCLink in real time on the screen at rates in excess of 60Hz
 - Auto history recording to catch an event that happened in the past!
 - Advanced logging analysis and tuning functions
- Statistics:
 - Resettable statistics including Max RPM, Max ECT, Max MAP, Engine Starts, Engine Running Time and many more

Communication

- CAN:
 - Two CAN 2.0B channels available
 - OEM Modes and extremely customisable CAN templates for transmission and reception of ECU parameters
 - CAN bus status and error reporting
- OBD:
 - ISO 15765-4 (CAN) OBD communication to scan tools and displays
- RS-232:
 - RS232 connection
 - Multiple data stream options and baud rates supported

Motorsport

- Anti Lag:
 - Basic and Advanced modes
 - Full anti Lag integration with other ECU systems
 - Activation, ignition retard, fuel addition and ignition cut controls
 - Configurable smooth or "lumpy" cyclic idle control
 - Multiple switchable Anti Lag tables
 - Cool down mode
- Launch Control:
 - Single RPM mode for clutch switch or launch button
 - RPM vs Speed (2D or 3D) for controlled slip
 - Latched launch RPM for rolling start
 - Activation and clutch switch options
 - Ignition retard, fuel correction and cut effect options
- Gear Shift Control:
 - Extremely configurable closed loop gear shift control
 - Can be used from simple clutch switch through to full closed loop control with strain gauge lever and gear position sensor
 - Sequential and H pattern gear boxes supported
 - Per gear cut, ignition trim, fuel trim and torque reintroduction time settings
 - Downshift RPM lockout

- Downshift throttle blip control

- Traction Control:

- Closed loop wheel slip control
- Fuel or ignition control options
- Speed and throttle position lockouts
- Multiple per gear slip threshold tables

Tuning

- Real Time:

- All ECU Parameters available for real time display and logging during tuning
- Smoothest most configurable tuning and data display interface available (PCLink G4+)
- Quick view of all ECU runtime information for fast diagnostics

- ECU Controls:

- Upload, download and compare maps
- Easily upgrade firmware through PCLink
- Reset statistics
- Clear ECU fault codes
- Unlock (Enable) ECU
- Restore to factory settings
- Enable/disable password protection
- Temporarily disable password protection until next power cycle
- Auto throttle position sensor calibration
- MAP sensor calibration
- Trigger scope

- Tuning:

- Mixture MAP for fuel tuning correction from logged data
- QuickTrim for calculated VE table correction while tuning
- QuickTune for automated fuel tuning
- Knock audio graphical analysis for determining knock filtering frequencies

- Help:

- Over 800 pages of context sensitive documentation
- Help viewer embedded in PCLink for full documentation alongside settings

- Access to Link technical support and forums

Additional Accessories

(Purchased Separately)

- Looms
 - Terminal and plug kit - not recommended unless you have access to the correct AMP crimper
 - 400mm loom
 - 2.5m loom
 - 5m loom (ideal for boat installations)
- Intake Air Temperature Sensor
 - 3/8 NPT (Aluminium or Steel Mounting Bosses to suit)
 - Bosch push in (Aluminium or Steel Mounting Bosses to suit)
- Throttle Position Sensor
- 3 Channel Link Igniter
- Wideband O2 Controller & Sensor
- Injector Ballast Resistor Packs
 - 1 x 1R (6 x <6R injectors)
 - 2 x 1R (12 x <6R injectors)
 - 4 x 4R7 (4 x <6R injectors)
 - 6 x 4R7 (6 x <6R injectors)