Syvecs Limited

Syvecs S7D-4

Pinouts and Wiring Info

Support Team
05-01-2026

This document intended for use by a technical audience and describes a number of procedures that are potentially hazardous. Installations should be carried out by competent persons only.

Syvecs and the author accept no liability for any damage caused by the incorrect installation or configuration of the equipment.

Please Note that due to frequent firmware changes certain windows might not be the same as the manual illustrates. If so please contact the Syvecs Tech Team for Assistance.

Support@Syvecs.co.uk

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Overview

The S7D-4 ECU delivers an exceptionally high level of precise engine management control, designed specifically for modern Direct Injection (DI) engines used in high-performance road cars, motorsport, and advanced OEM-style applications where up to four direct injection channels are required.

The ECU features a triple-processor architecture, combining a high-speed RISC processor for core code execution with a large FPGA dedicated to ultra-high-speed engine position tracking. This allows code scheduling to operate independently of signal patterns, significantly improving accuracy, flexibility, and efficiency, particularly under transient conditions such as rapid load and RPM changes.

This powerful hardware platform enables highly advanced control strategies while remaining intuitive and easy to calibrate using SCal software and S7 firmware. The S7D-4 is also designed to support plug-and-play (PnP) kits, offering extensive programmable CAN Bus functionality, CAN FD support, and the flexibility to meet unique OEM and aftermarket hardware requirements.

Core ECU Features

Engine & Vehicle Control

- Full engine control with live tuning of fuel, ignition, VVT, DBW, torque, and more via SCal
- Direct injection and port injection strategies (DI + PI)
- Torque-based control architecture
- Advanced knock control
- Advanced traction control
- Multiple sensor decoding support including SENT, PWM, and unique signal patterns
- Plus much more

Launch, Boost & Power Management

- Advanced launch control including multi-stage launch, rolling launch, and GPS speed-based control loops
- Anti-lag strategies to suit all forms of motorsport including WRC, LMP, T1, and OEM-style applications
- Closed-loop boost control for solenoids, electronic wastegates, and CO_2 systems
- Per-gear, speed-based, and time-based boost targets with trims
- Nitrous control with wet and dry strategies, including pressure and heater management
- Water and methanol injection support

Safety & Protection

- Lean condition monitoring
- Knock-based safety strategies
- EGT monitoring with shutdown strategies
- Fully configurable safety trips and limp modes

Data Logging & Analysis

- 64 MB onboard high-speed logging memory as standard
- Optional upgrade to 128 MB
- Logging rates up to 1000 Hz
- Simultaneous laptop logging
- Full analysis using SView, including log overlays and comparison tools

Motorsport & Expansion Support

- Paddle-shift and sequential gearbox control
- OBD-II support for live data and fault clearing
- GPSBT module support for GPS and IMU telemetry, lap timing, and track mapping via Bluetooth
- Expandable I/O using Syvecs X10 or X20 expansion modules

S7D-4 Full Specification

Outputs

- 4 direct injection injector outputs
- 2 direct injection pump outputs
- 4 ignition outputs (TTL or IGBT, selectable at time of order)
- 12 low-side port injector / PWM outputs
- 6 low-side PWM outputs
- 1 main relay control with power hold

Inputs

- 14 frequency inputs
- 4 ADC voltage inputs
- 4 thermistor inputs
- 2 knock inputs
- 2 wideband lambda inputs (NTK, Bosch LSU, or Denso AF, optional at time of order)
- 2 EGT thermocouple inputs

Communications

- 3 CAN buses with CAN FD support (standard on all S7D models)
- 1 LIN
- 1 RS232
- 1 Ethernet for PC communications and data transfer
- 1 USB PC communication interface for direct injection adjustment and custom CAN messaging

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Hardware & Electrical

- Sealed aluminium billet enclosure
- 4 waterproof connectors
- 120-pin total I/O
- Input voltage range: 6–20 V with reverse-polarity protection
- Operating temperature range: −55 °C to +125 °C

A	DESCRIPTION	CONNECTOR A	
	PART NUMBER	4-1437290-0	
	NOTES:	34 Way - Key1	
Syvecs Description	***Pinout***	***Function***	***Notes***
PWR CTR OUT	A1	MAIN RELAY OUTPUT	Linked to Power Control IN on C28, Will pull to Ground when C28 is above 5v
H-Bridge1	A2	H-Bridge1	H-BRIDGE OUTPUTS, CAN BE DRIVEN HIGH OR LOW. USED GENERALLY FOR MOTOR CONTROL, PWM OUTPUT, VANOS ……
H-Bridge2	A3	H-Bridge2	
H-Bridge3	A4	H-Bridge3	
H-Bridge4	A5	H-Bridge4	
H-Bridge5	A6	H-Bridge5	
H-Bridge6	A7	H-Bridge6	
H-Bridge7	A8	H-Bridge7	
H-Bridge8	A9	H-Bridge8	
Fuel 1	A10	Fuel 1	Port Injector or PWM Output
GDI LS2	A11	Low Side GDI 2	Low Side Direct Injection Output 2
Fuel 3	A12	Fuel 3	Port Injector or PWM Output
GDI LS4	A13	Low Side GDI 4	Low Side Direct Injection Output 4
Fuel 5	A14	Fuel 5	Port Injector or PWM Output
GDI LS6	A15	Low Side GDI 6	Low Side Direct Injection Output 6
Fuel 7	A16	Fuel 7	Port Injector or PWM Output
GDI LS8	A17	Low Side GDI 8	Low Side Direct Injection Output 8
GDI HS2	A18	GDI Hi Side 2	High Side Direct Injection Output to be paired with Low Side 2 (A11)
GDI HS4	A19	GDI Hi Side 4	High Side Direct Injection Output to be paired with Low Side 4 (A13)
GDI Pump 1 HS	A20	GDI Pump 1 Hi Side	DI Pump 1 High Side
GDI HS6	A21	GDI Hi Side 6	High Side Direct Injection Output to be paired with Low Side 6 (A15)
GDI HS8	A22	GDI Hi Side 8	High Side Direct Injection Output to be paired with Low Side 8 (A17)
GDI Pump 2 HS	A23	GDI Pump 2 Hi Side	DI Pump 2 High Side
Fuel 15	A24	Fuel 15	Port Injector or PWM Output
Fuel 16	A25	Fuel 16	Port Injector or PWM Output
IGN1	A26	CYL 1 IGNITION OUTPUT	TTL or IGBT Available, Default TTL
IGN2	A27	CYL 2 IGNITION OUTPUT	TTL or IGBT Available, Default TTL
IGN3	A28	CYL 3 IGNITION OUTPUT	TTL or IGBT Available, Default TTL
IGN4	A29	CYL 4 IGNITION OUTPUT	TTL or IGBT Available, Default TTL
GDI Pump 1 LS	A30	GDI Pump 1 LS	GDI Pump 1 LS
GDI Pump 2 LS	A31	GDI Pump 2 LS	GDI Pump 2 LS
PWRGND	A32	POWER GROUND	**LINKED POWER GROUND**
PWRGND	A33	POWER GROUND	**LINKED POWER GROUND**
PWRGND	A34	POWER GROUND	**LINKED POWER GROUND**

B	DESCRIPTION	CONNECTOR B	
	PART NUMBER	3-1437290-7	
	NOTES:	26 Way - Key1	
PWRGND	B1	POWER GROUND	
CAN2 L	B2	Can 2	
CAN2 H	B3	Can 2	
KNOCK 1	B4	KNOCK 1	
KNOCK 2	B5	KNOCK 2	
PVBAT	B6	CONSTANT 12V	Battery Supply, used for holding Main Relay Control
IVBAT	B7	12v	12v
LAM1A	B8	Lamv / LamD1+/ LamLun1	Nernst Cell - Black
LAM1B	B9	Lami / LamD1- /LamIP1	Ion Pump - Red
LAM1C	B10	LamLIA1	Cal Trim Resistor - Extra Wire (pink)
LAM1D	B11	LamGND / LamLVM1	Virtual Ground - Yellow
LAM1HEATER	B12	LAMBDA HEATER	Lam Htr - White
IVBAT	B13	12V	12v
LAM2A	B14	Lamv / LamD1+/ LamLun1	Nernst Cell - Black
LAM2B	B15	Lami / LamD1- /LamIP1	Ion Pump - Red
LAM2C	B16	LamLIA1	Cal Trim Resistor - Extra Wire (pink)
LAM2D	B17	LamGND / LamLVM1	Virtual Ground - Yellow
LAM2HEATER	B18	LAMBDA HEATER	Lam Htr - White
IVBAT	B19	12V	12v
KLINE	B20	KLINE	K-Line or LIN Output
RS232RX	B21	RS232RX	
RS232TX	B22	RS232TX	
LANRX-	B23	Cat5 Pin2	Orange/White
LANRX+	B24	Cat5 Pin1	White/Orange
LANTX-	B25	Cat5 Pin6	Green/White
LANTX+	B26	Cat5 Pin3	White/Green

C	DESCRIPTION	CONNECTOR C	
	PART NUMBER	4-1437290-1	
	NOTES:	34 Way - Key2	
KNOCKGND	C1	KNOCKGND	KNOCK SENSOR GROUND
ANGND	C2	SENSOR GND	SENSOR GROUND CIRCUIT
ANGND	C3	SENSOR GND	SENSOR GROUND CIRCUIT
ANGND	C4	SENSOR GND	LINKED POWER GROUND
5V OUT	C5	5V OUT	5V OUT CIRCUIT
5V OUT	C6	5V OUT	5V OUT CIRCUIT
5V OUT	C7	5V OUT	5V OUT CIRCUIT
CAN1 L	C8	Can 1 Low	
CAN1 H	C9	Can 1 High	
AN01	C10	BI-POLAR INPUTS	0-5V or SPEED, FREQUENCY INPUT
AN02	C11	BI-POLAR INPUTS	0-5V or SPEED, FREQUENCY INPUT
AN03	C12	BI-POLAR INPUTS	0-5V or SPEED, FREQUENCY INPUT
AN04	C13	BI-POLAR INPUTS	0-5V or SPEED, FREQUENCY INPUT
AN05	C14	UNI-POLAR INPUTS	0-5V or FREQUENCY INPUT with Fixed Thresholds - Pull Up Available in Software
AN06	C15	UNI-POLAR INPUTS	0-5V or FREQUENCY INPUT with Fixed Thresholds - Pull Up Available in Software
AN07	C16	UNI-POLAR INPUTS	0-5V or FREQUENCY INPUT with Fixed Thresholds - Pull Up Available in Software
AN08	C17	UNI-POLAR INPUTS	0-5V or FREQUENCY INPUT with Fixed Thresholds - Pull Up Available in Software
AN09	C18	VOLT-INPUTS	0-5V INPUT
AN10	C19	VOLT-INPUTS	0-5V INPUT
AN11	C20	VOLT-INPUTS	0-5V INPUT
AN12	C21	VOLT-INPUTS	0-5V INPUT
AN13	C22	RESISTIVE INPUTS	RESISTIVE 0-5V INPUTS WITH 5V PULLUP BUILT IN
AN14	C23	RESISTIVE INPUTS	RESISTIVE 0-5V INPUTS WITH 5V PULLUP BUILT IN
AN15	C24	RESISTIVE INPUTS	RESISTIVE 0-5V INPUTS WITH 5V PULLUP BUILT IN
AN16	C25	RESISTIVE INPUTS	RESISTIVE 0-5V INPUTS WITH 5V PULLUP BUILT IN
EGT1-	C26	EGT1 -	K-Type ThermoCoupler Input
EGT1+	C27	EGT1 +	K-Type ThermoCoupler Input
PWR CTR IN	C28	MAIN RELAY INPUT SW	MAIN RELAY INPUT SWITCH SUPPLY
AN S1	C29	UNI-POLAR INPUTS	0-5V or FREQUENCY INPUT with Fixed Thresholds - Pull Up Available in Software
AN S2	C30	UNI-POLAR INPUTS	0-5V or FREQUENCY INPUT with Fixed Thresholds - Pull Up Available in Software
AN S3	C31	UNI-POLAR INPUTS	0-5V or FREQUENCY INPUT with Fixed Thresholds - Pull Up Available in Software
AN S4	C32	UNI-POLAR INPUTS	0-5V or FREQUENCY INPUT with Fixed Thresholds - Pull Up Available in Software
AN S5	C33	UNI-POLAR INPUTS	0-5V or FREQUENCY INPUT with Fixed Thresholds - Pull Up Available in Software
AN S6	C34	UNI-POLAR INPUTS	0-5V or FREQUENCY INPUT with Fixed Thresholds - Pull Up Available in Software

D	DESCRIPTION	CONNECTOR D	
	PART NUMBER	3-1437290-8	
	NOTES:	26 Way - Key2	
DVBAT1	D1	GDI Power Supply	Required
DVBAT2	D2	GDI Power Supply	Required
DVBAT3	D3	GDI Power Supply	Required
DVBAT4	D4	GDI Power Supply	Required
FUEL9	D5	PWM / FUEL OUTPUT	Optional 5v/12 Pull-Up Available via Solder Switch SB101
FUEL10	D6	PWM / FUEL OUTPUT	Optional 5v/12 Pull-Up Available via Solder Switch SB100
FUEL11	D7	PWM / FUEL OUTPUT	Optional 5v/12 Pull-Up Available via Solder Switch SB99
FUEL12	D8	PWM / FUEL OUTPUT	Optional 5v/12 Pull-Up Available via Solder Switch SB98
FUEL13	D9	PWM / FUEL OUTPUT	Optional Flyback Diode Available via Solder Switch SB142
FUEL14	D10	PWM / FUEL OUTPUT	Optional Flyback Diode Available via Solder Switch SB141
LSO1	D11	PWM OUTPUT	Optional Flyback Diode Available via Solder Switch SB80
LSO2	D12	PWM OUTPUT	Optional Flyback Diode Available via Solder Switch SB79
LSO3	D13	PWM OUTPUT	Optional Flyback Diode Available via Solder Switch SB78
LSO4	D14	PWM OUTPUT	Optional Flyback Diode Available via Solder Switch SB68
LSO5	D15	PWM OUTPUT	Optional Flyback Diode Available via Solder Switch SB82
LSO6	D16	PWM OUTPUT	Optional Flyback Diode Available via Solder Switch SB81
EGT2-	D17	EGT2 -	K-Type ThermoCoupler Input
EGT2+	D18	EGT2 +	K-Type ThermoCoupler Input
NC	D19	NC	NC
NC	D20	NC	NC
NC	D21	NC	NC
NC	D22	NC	NC
CAN3L	D23	CAN3L	CANFD
CAN3H	D24	CAN3H	CANFD
PWRGND	D25	POWER GROUND	POWER GROUND
PWRGND	D26	POWER GROUND	POWER GROUND

General Connections

Connecting Power

The ECU has three power blocks that power different sectors of the ECU and all blocks require a power source.

IVBat – Has three power feeds for the Main ECU control and H Bridge Circuits.

PvBat – Used for Ecu power hold function, if power is not needed at the ecu after Ignition 12v is off then don't connect

DVBat – Has four power feeds to power the Direct Injection System

Internally all IVBats are Linked together, as are all the DVbat pins. It's important to ensure you connect enough power source pins to cater for your current consumption needs, Its good practice to try and power all the DVBat Pins.

Ground – Six power grounds are present and suggest to wire them all up on the S7D

Example Schematic

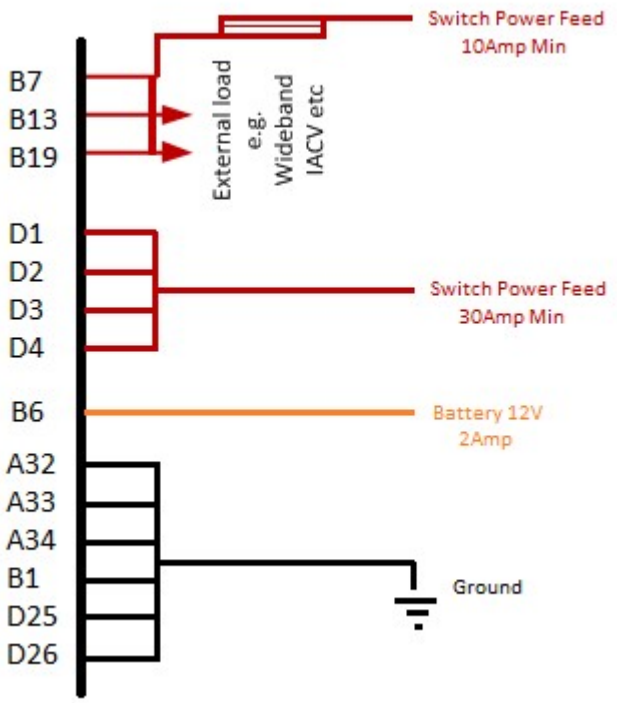


Figure 0-1 - Redundant Power Feeds and a Common grounding point.

Pin Schedule

Pin Number	Function	Notes
B7	IVBAT	Use a fused Switched feed.
B13	IVBAT	Use a fused Switched feed.
B19	IVBAT	Use a fused Switched feed.
B6	PVBAT	Constant Power - Used for Main Relay Control Only
D1	DVBAT	Use a High Current fused Switched feed.
D2	DVBAT	Use a High Current fused Switched feed.
D3	DVBAT	Use a High Current fused Switched feed.
D4	DVBAT	Use a High Current fused Switched feed.
A32	Power Ground	Power Ground – Internally Linked
A33	Power Ground	Power Ground – Internally Linked
A34	Power Ground	Power Ground – Internally Linked
B1	Power Ground	Power Ground – Internally Linked
D25	Power Ground	Power Ground – Internally Linked
D26	Power Ground	Power Ground – Internally Linked

NOTE! Power Grounds are designed to conduct High Current loads – Do not mix Power Grounds with Analogue (AN) Grounds.

Main Relay Control

The S7D has a Main Relay control circuit which takes a 12v ignition switched feed on Pin C28 and then turns on a Main relay output pin A1 (Pulls to Ground) to energies the OEM EFI Relays that power the electronics on some vehicles.

Main Relay hold is possible to keep ECU powered up after key off for programmable amount of time, this requires IVBat to be connected to constant 12V supply.

Pin Schedule

Pin Number	Function	Notes
A1	Main Relay Output	Pulls to Ground when Circuit active
B6	IVBAT	Constant 12v Supply pin
C28	Main Relay Input	Activates Main relay control when 12v is sent to this Pin

Communications

LAN Connection

Connection from the S7D to a Laptop/PC uses a Male RJ45 plug, wired in cross over configuration.

Example Schematic

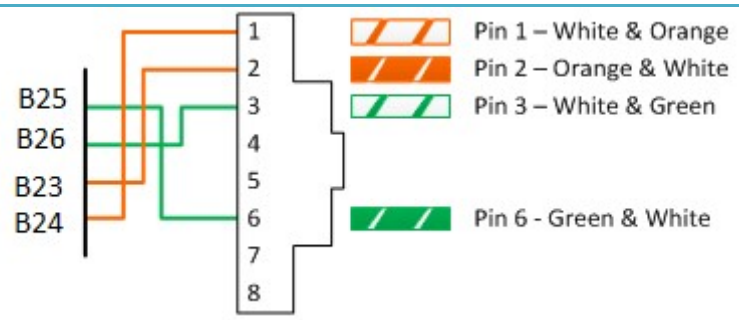


Figure 0-2 RJ45 Wiring

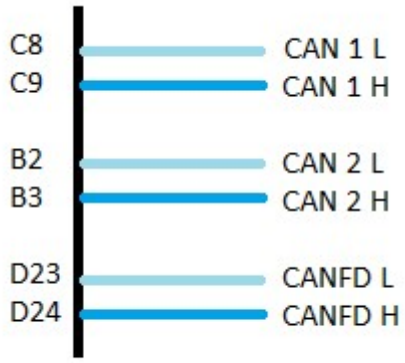
Pin Schedule

Pin Number	Function	Notes
B25	LAN Transmit -	RJ45 Pin 6 – Green & White wire
B26	LAN Transmit +	RJ45 Pin 3 – White & Green wire
B23	LAN Receive -	RJ45 Pin 2 – Orange & White wire
B24	LAN Receive +	RJ45 Pin 1 – White & Orange wire

CAN Bus

Common **A**rea **N**etwork Bus (CAN Bus) is a widely used data interface common used in many cars and aftermarket accessories (such as Stack Data loggers and Dashes). Data is sent using the High and Low wires, which are maintained as a twisted pair.

Example Schematic



Pin Number	Function	Notes
C8	CAN1 LOW	Ensure wires are twisted pair.
C9	CAN1 HIGH	Ensure wires are twisted pair.
B2	CAN2 LOW	Ensure wires are twisted pair.
B3	CAN2 HIGH	Ensure wires are twisted pair.
D23	CANFD LOW	Ensure wires are twisted pair.
D24	CANFD HIGH	Ensure wires are twisted pair.

RS232

Telemetry data can be provided via RS232 communication options in the S7

Example Schematic

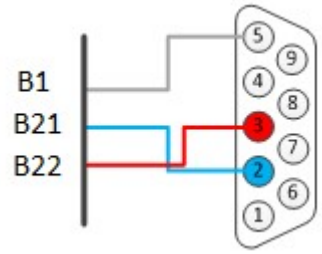


Figure 0-3 RS232 Connection

Pin Schedule

Pin Number	Function	Notes
B1	Pwr GND	DB-9 pin 5
B21	Rx	DB-9 pin 2
B22	Tx	DB-9 pin 3

LinBus

Local **I**nterconnect **N**etwork (LIN) is used in many automotive applications for functions like Alternator Control / Water Pump Speed etc. The S7D has a single LIN connection available and can be programmed by our support staff for custom tasks.

Note: No LIN calibration options are present in our calibration software.

Example Schematic

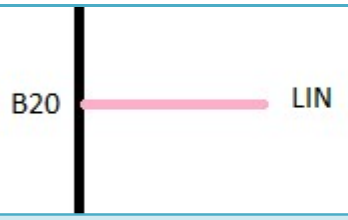


Figure 0-4

Pin Schedule

Pin Number	Function	Notes
B20	LIN Bus	

Input Connections

Sensor/ Analogue Grounds (AN Grounds)

Sensors and miscellaneous analogue inputs have their own Ground pins; these grounds must be kept separate from the Power grounds shown in the first section. As there are four ground pins you may have to connect multiple grounds to some of the pins if you have more than four sensors.

Pin Schedule

Pin Number	Function	Notes
C2	ANGND1	
C3	ANGND1	
C4	ANGND2	

Regulated Sensor Power (5V)

Sensors and miscellaneous analogue inputs have their own regulated power supply which is fixed at 5v. The 5V regulators are good for 500ma each and designed just for powering external sensors.

Pin Schedule

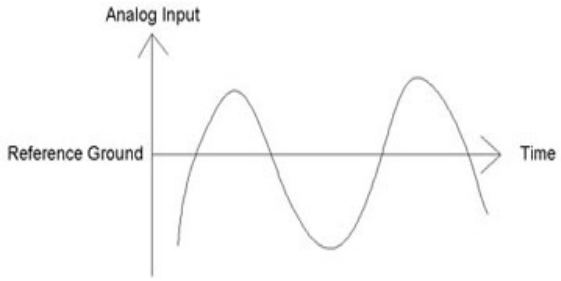
Pin Number	Function	Notes
C5	5VOUT1	
C6	5VOUT2	
C7	5VOUT3	

Assigning Inputs

The Syvecs S7D has 24 programmable inputs available and although they are fully configurable in Scal, they are not all the same type of input which means sensors that for example require a pull up, have to assigned to different types….. Listed below are the 4 types which are available.

Bipolar Inputs

These Inputs are able to swing above and below the reference ground meaning they can see Positive Voltage as well as Negative.



Bipolar Input

Example of sensors normally used on these Inputs are:

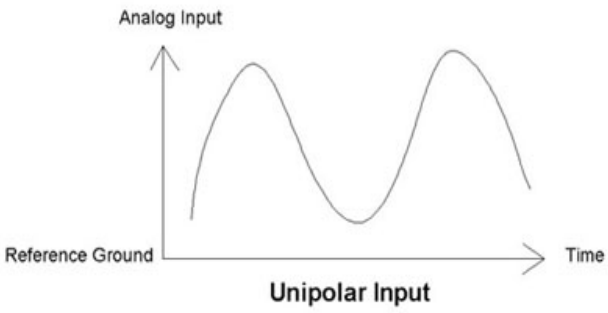
- Reluctor Crank and Cam Sensors
- ABS Sensors for wheel speed

Bipolar inputs are not just limited to the above they can also be used for any sensor that outputs 0-5volts. They are also able to provide a Pull-up through Scal

Pin Number	Scal Assignment	Notes
C10	An01	
C11	An02	
C12	An03	
C13	An04	

Unipolar Inputs -

These Inputs are only able to swing above the reference ground meaning they can only see Positive Voltage



Example of sensors normally used on these Inputs are:

- Hall Effect Crank and Cam Sensors
- Gearbox speed sensors

Unipolar inputs are not just limited to the above they can also be used for any sensors which outputs 0-5volts. They are also able to provide a Pull-up through Scal.

Pin Number	Scal Assignment	Notes
C14	An05	
C15	An06	
C16	An07	
C17	An08	
C29	Slave An01	
C30	Slave An02	
C31	Slave An03	
C32	Slave An04	
C33	Slave An05	
C34	Slave An06	

Voltage Inputs

These Inputs are able to sense a Voltage level which is linear and does not swing

Example of sensors normally used on these Inputs are:

- Manifold Pressure sensors
- Throttle Positions
- Oil Pressures

Voltage Inputs are not just limited to the above then can also be used for any sensor which outputs a 0-5volt signal but NOT able to provide a pull up.

Pin Number	Scal Assignment	Notes
C18	An09	
C19	An10	
C20	An11	
C21	An12	

Resistive Inputs

These Inputs are the same as voltage inputs in which they can accept a 0-5v but they have a fixed 3k 5v Pull up fitted

.Example of Sensors normally used on these Inputs are:

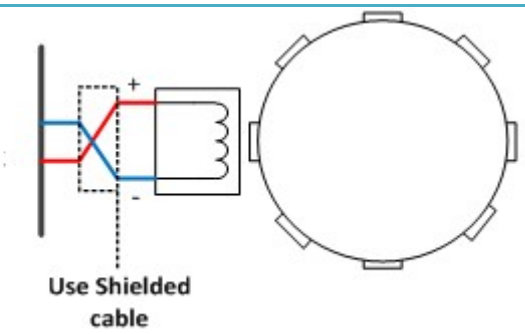
- Temperature sensors
- Calibration switches

Pin Number	Scal Assignment	Notes
C22	An13	
C23	An14	
C24	An15	
C25	An16	

Sensor Schematics - Examples

Crank Sensor – Magnetic Type

Example Schematic

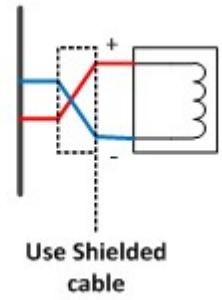


Pin Schedule

Pin Number	Function	Notes
C2	ANGND1	Crank Sensor – (Shared with Cam Sensor)
C10, C11, C12, C13	Bipolar Input	Crank Sensor+

Cam Sensors – Magnetic Type

Example Schematic

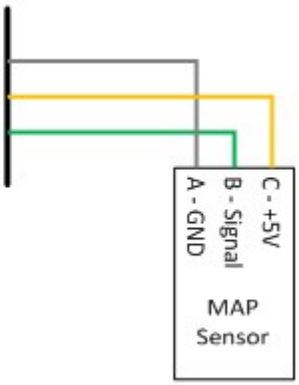


Pin Schedule

Pin Number	Function	Notes
C2	ANGND1	Cam Sensor – (Shared with Crank Sensor)
C10, C11, C12, C13	Bipolar input	Cam Sensor +

Manifold Pressure Sensor (MAP)

Example Schematic

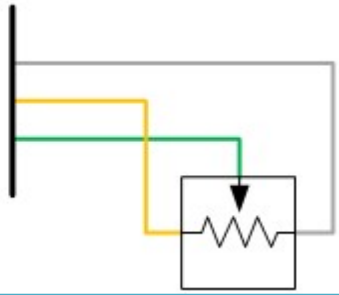


Pin Schedule

Pin Number	Function	Notes
C2	ANGND1	May be shared with multiple sensors
C5	5VOUT1	Regulated sensor power supply
C18	Voltage Input	Can use Bipolar, Unipolar or Voltage inputs

Throttle Position Sensor (TPS)

Example Schematic

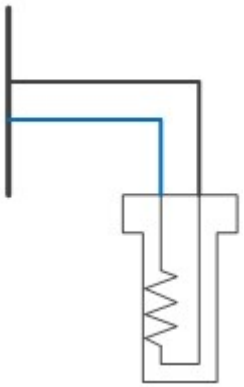


Pin Schedule

Pin Number	Function	Notes
C2	ANGND1	May be shared with multiple sensors
C5	5VOUT1	Regulated sensor power supply
C19	Voltage Input	Can use Bipolar, Unipolar or Voltage inputs

Coolant Temperature Sensor (CTS)

Example Schematic

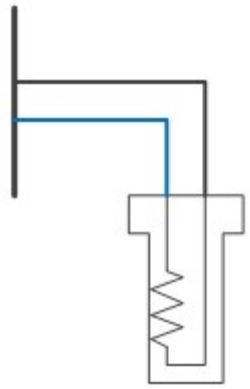


Pin Schedule

Pin Number	Function	Notes
C2	ANGND1	May be shared with multiple sensors
C22	Resistive Input	Can use Resistive inputs #1 to #4 (pins 63 to 66)

Inlet Air Temperature Sensor (IAT)

Example Schematic

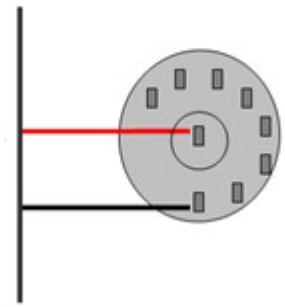


Pin Schedule

Pin Number	Function	Notes
C2	ANGND1	May be shared with multiple sensors
C23	Resistive Input	Can use Resistive inputs #1 to #4 (pins 63 to 66)

Calibration Switches

Example Schematic

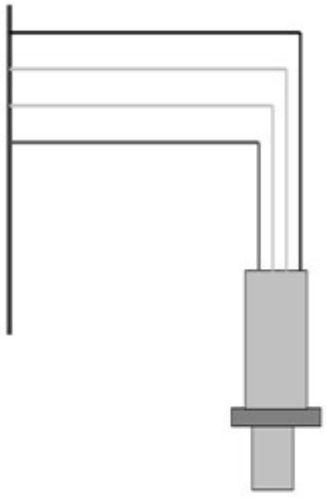


Pin Schedule

Pin Number	Function	Notes
C2	ANGND1	May be shared with multiple sensors
C24	AN15	Can use Resistive inputs #1 to #4 (pins 63 to 66) Cal Switches Require Pull Up to be On

Narrowband Lambda Sensor

Example Schematic



Pin Schedule

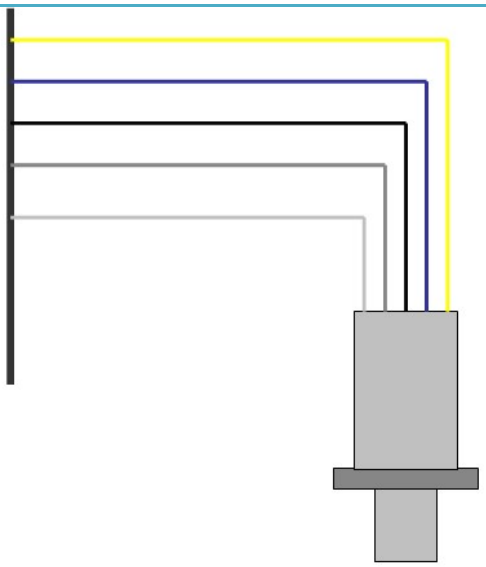
Wire Colour	Function	Pins Usable on S7D
White	Heater	B7, B13, B19
White	Heater Drive	Any FUEL Output – Needs to be assigned in Scal on I/O Configuration
Black	Signal Ground	A34
Grey	Lambda Signal	Can use Bipolar, Unipolar or Voltage inputs

Wideband Lambda Sensor

The Syvecs S7D has the ability to drive a NTK Wideband, Bosch LSU 4.2/4.9 and Denso AF Sensor directly without the use of external units.

On the S7D Ecu you can drive 2 x NTK, 2 x Bosch LSU 4.2/4.9 Sensors and 2 x Denso 4 wire A/F Sensors.

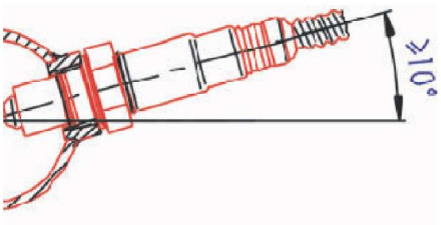
Example Schematic



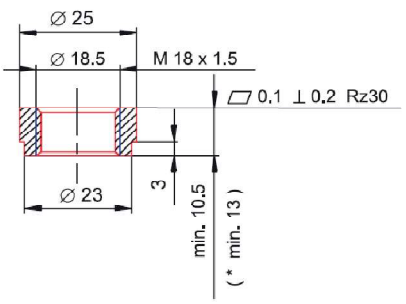
WARNING

Due to all the different Wideband Lambda sensors requiring different hardware to work, a few solder bridges need to be changed to suit the sensor type. These will be set by Syvecs on shipping to suit the kit ordered but can be changed in the field by a qualified electrical engineers. Email Support@Syvecs.com if you need to do this.

Mounting recommendation



Recommended materials for the mating thread in the exhaust pipe
*: THexagon > 600°C or
TGas > 930°C



23

NTK L1H1

Lambda Sensor Input in Scal - Pin assignments needs to be Set to Slave1 AN08 for Lambda 1 and Slave1 AN10 for Lambda 2, Lambda Heater needs to be assigned to Slave1 Out9 for Lam1 and Slave1 Out10 for Lam2

Lamda1

Lambda Pin Number	Colour	Name	S7D Pin
1	Yellow	Heater	B7 or B13 or B19
2	Orange	Heater Drive	B12
6	Red	Nernst Cell Voltage	B8
7	White	Ion Pump Current	B9
8	Black	Signal Ground	B11

Lambda2

Lambda Pin Number	Colour	Name	S7D Pin
1	Yellow	Heater	B7 or B13 or B19
2	Orange	Heater Drive	B18
6	Red	Nernst Cell Voltage	B14
7	White	Ion Pump Current	B15
8	Black	Signal Ground	B17

NTK L2H2

Lambda Sensor Input in Scal - Pin assignments needs to be Set to Slave1 AN08 for Lambda 1 and Slave1 AN10 for Lambda 2, Lambda Heater needs to be assigned to Slave1 Out9 for Lam1 and Slave1 Out10 for Lam2

Lamda1

Lambda Pin Number	Colour	Name	S7D Pin
1	Yellow	Heater	B7 or B13 or B19
2	Blue	Heater Drive	B12
6	Grey	Nernst Cell Voltage	B8
7	White	Ion Pump Current	B9
8	Black	Signal Ground	B11

Lambda2

Lambda Pin Number	Colour	Name	S7D Pin
1	Yellow	Heater	B7 or B13 or B19
2	Blue	Heater Drive	B18
6	Grey	Nernst Cell Voltage	B14
7	White	Ion Pump Current	B15
8	Black	Signal Ground	B17

BOSCH LSU4.2

Lambda Sensor Inputs in Scal - I/O Configuration - Pin assignments need to be set as Lambda1 - Slave1 AN08 and Lambda2 - Slave AN10.

The Lambda Heater is controlled automatically by the ECU's on Board Lambda controller which when it senses a sensor is connected will adjust the heater output to maintain the correct cell temperature.

The Sensor feeds back its cell temperature into the custom inputs LSUFeedback1 on Slave1 AN09 and LSUFeedback2 on Slave AN11 which can be monitored.

Lambda 1

Lambda 1 - Pin Numbers	Colour	Name	S7D Pin
1	Black	Nernst Cell Voltage	B8
2	Green	Cal Resistor	B10
3	Grey	Heater	B7 or B13 or B19
4	White	Heater Drive	B12
5	Yellow	Signal Ground	B11
6	Red	Ion Pump Current	B9

Lambda 2

Lambda 2 - Pin Numbers	Colour	Name	S7D Pin
1	Black	Nernst Cell Voltage	B14
2	Green	Cal Resistor	B16
3	Grey	Heater	B7 or B13 or B19
4	White	Heater Drive	B18
5	Yellow	Signal Ground	B17
6	Red	Ion Pump Current	B15

BOSCH LSU4.9

Lambda Sensor Inputs in Scal - I/O Configuration - Pin assignments need to be set as Lambda1 - Slave1 AN08 and Lambda2 - Slave AN10.

The Lambda Heater is controlled automatically by the ECU's on Board Lambda controller which when it senses a sensor is connected will adjust the heater output to maintain the correct cell temperature.

The Sensor feeds back its cell temperature into the custom inputs LSUFeedback1 on Slave1 AN09 and LSUFeedback2 on Slave AN11 which can be monitored.

Lambda 1

Lambda 1 - Pin Numbers	Colour	Name	S7D Pin
1	Red	Ion Pump Current	B9
2	Yellow	Signal Ground	B11
3	White	Heater Drive	B12
4	Grey	Heater	B7 or B13 or B19
5		Cal Resistor	B10
6	Black	Nernst Cell Voltage	B8

Lambda 2

Lambda 2 - Pin Numbers	Colour	Name	S7D Pin
1	Red	Ion Pump Current	B15
2	Yellow	Signal Ground	B17
3	White	Heater Drive	B18
4	Grey	Heater	B7 or B13 or B19
5		Cal Resistor	B16
6	Black	Nernst Cell Voltage	B14

DENSO A/F

Lambda Sensor Inputs in Scal - I/O Configuration - Pin assignments need to be Set to as Lambda1 - Slave1 AN08 and Lambda2 - Slave AN10.

The Lambda Heater control is done via Custom Outputs (Basic PWM 1 & 2) and needs to be assigned in the Pin Assignments as Lambda1 on Slave1 Out9 and Lambda 2 on Slave1 Out10.

Lambda 1

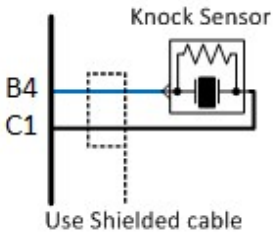
Lambda Pin Number	Colour	Name	S7D Pin
1	White	Ion Pump Current	B9
2	Blue	Nernst Cell Voltage	B8
3	Black	Heater Drive	B12
4	Black	Heater	B7 or B13 or B19

Lambda 2

Lambda Pin Number	Colour	Name	S7D Pin
1	White	Ion Pump Current	B15
2	Blue	Nernst Cell Voltage	B14
3	Black	Heater Drive	B18
4	Black	Heater	B7 or B13 or B19

Knock Sensor

Syvecs S7D has two Knock inputs for a piezoelectric Example Schematic



Pin Schedule

Pin Number	Function	Notes
B4	Knock 1 Signal	
B5	Knock 2 Signal	
C1	Knock Grounds	Shared Ground

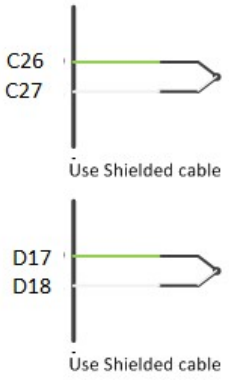
NOTE: Shield wires should be connected only at one end, common practice is to join shielding wires at the ECU end of the loom and connect them to a Power Ground wire.

EGT/Thermocouple

Syvecs S7D has 2 x K-type thermocouple inputs.

EGT1 is selected in Scal - Pin Assignments as Thermo1+
EGT2 is selected in Scal – Pin Assignments as Slave1 AN07

Example Schematic



Pin Schedule

Pin Number	Function	Notes
C27	THER1+	Green wire (K-type)
C26	THER1-	White wire (K-type)
D17	THER2+	Green wire (K-type)
D18	THER2-	White wire (K-type)

Driven/Output Connections

Ignition

The ignition channels are logic level outputs designed to control ignition coils via an additional igniter (Power transistor). These can be modified in hardware to drive coils direct in a IGBT manner but this is a build time option for plug in Kits or Customer Requests.

These as standard output a 5V Signal but can be raised to 12v with a Jumper change on board. Speak to Support@Syvecs.com more about this directly if required.

Pin Schedule

Pin Number	Function	Notes
A26	IGN1	Logic Level (5V) output / IGBT (BuildTime Option)
A27	IGN2	Logic Level (5V) output / IGBT (BuildTime Option)
A28	IGN3	Logic Level (5V) output / IGBT (BuildTime Option)
A29	IGN4	Logic Level (5V) output / IGBT (BuildTime Option)

NOTE: Do not connect IGN pins directly to a coil if hardware is not set for IGBT; the low coil resistance will draw a current that will damage the ECU.

Fuel (Low Voltage) / PWM Outputs

The Injection channels are only able to drive high impendence injectors or actuators. The use of Low Impendence injectors with the S7D requires a Ballast pack/resistor pack.
Fuel Outputs also have full pulse width modulation available meaning they can be used for other strategies like wastegate control, idle solenoids etc. These outputs can be used to drive up to 10A Peak / 5A Continuous and can only pull to ground.

Pin Schedule

Pin Number	Function	Notes
A10	Fuel1	Injector Output or PWM
A12	Fuel3	Injector Output or PWM
A14	Fuel5	Injector Output or PWM
A16	Fuel7	Injector Output or PWM
D5	Fuel9	Injector Output or PWM
D6	Fuel10	Injector Output or PWM
D7	Fuel11	Injector Output or PWM
D8	Fuel12	Injector Output or PWM
D9	Fuel13	Injector Output or PWM
D10	Fuel14	Injector Output or PWM
A24	Fuel15	Injector Output or PWM
A25	Fuel16	Injector Output or PWM

Low Side Outputs / LSO

Low Side outputs are similar to Fuel outputs but cannot be used to drive injectors as the outputs are not linked to the internal FPGA for engine timing control. These outputs are useful for functions like wastegate control, VVT, Idle solenoids etc.

Low Side Outputs also have full pulse width modulation available and hardware options to enable flyback diodes. Speak with Support@syvecs.com at ordering if required.

These outputs can be used to drive up to 10A Peak / 5A Continuous.

Pin Schedule

Pin Number	Function	Notes
D11	LSO1	Assigned to Slave1 Out11
D12	LSO2	Assigned to Slave1 Out12
D13	LSO3	Assigned to Slave1 Out13
D14	LSO4	Assigned to Slave1 Out14
D15	LSO5	Assigned to Slave1 Out15
D16	LSO6	Assigned to Slave1 Out16

Half Bridge Outputs

H bridge is an electronic circuit that enables a voltage to be applied across a load in either direction. These circuits are often used to drive Electronic Throttle bodies applications to allow DC motors to run forwards and backwards.

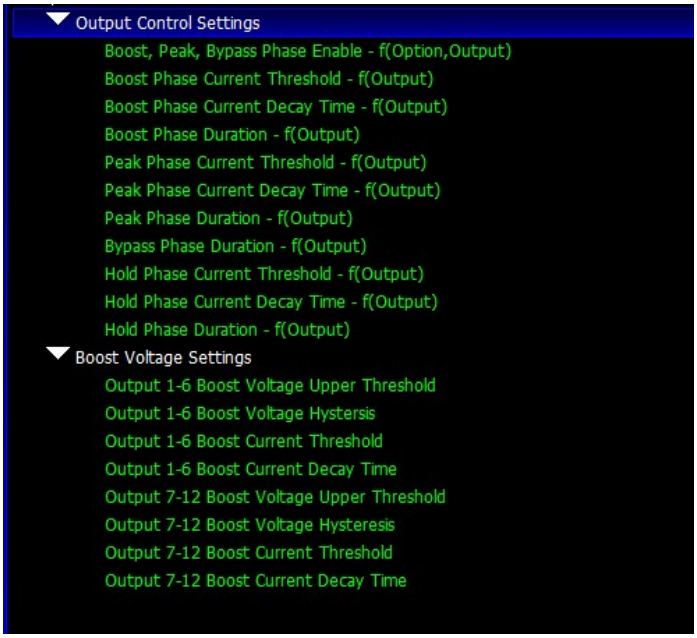
Half Bridge Outputs also have full pulse width modulation available and can be driven to 12v or Ground These outputs can be used to drive up to 10A Peak / 5A Continuous.

Pin Schedule

Pin Number	Function	Notes
A2	H-Bridge1	Assigned to Slave1 Out1
A3	H-Bridge2	Assigned to Slave1 Out2
A4	H-Bridge3	Assigned to Slave1 Out3
A5	H-Bridge4	Assigned to Slave1 Out4
A6	H-Bridge5	Assigned to Slave1 Out5
A7	H-Bridge6	Assigned to Slave1 Out6
A8	H-Bridge7	Assigned to Slave1 Out7
A9	H-Bridge8	Assigned to Slave1 Out8

GDI Outputs Logic

The following is fully adjustable via a USBC Connection to the S7D DI drive configuration area using our SCAL software to allow dealers to support any Direct Injection Injector and GDI High Pressure Pump.



The default S7D settings which work well for most GDI Injectors are set as:

Boost Phase is enabled on GDI 1-8 Outputs at a current threshold of **14amps**.

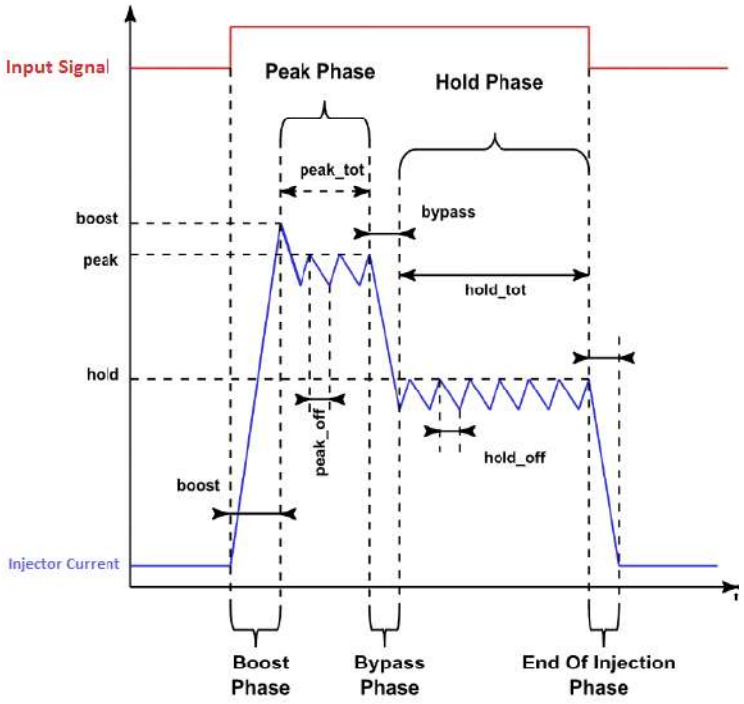
The Boost Phase duration of **400us**

The Peak phase current threshold is **10amps** for 200us

The Hold Phase current threshold is **4amps** for 10ms (If the Injection time is less than the hold phase will end)

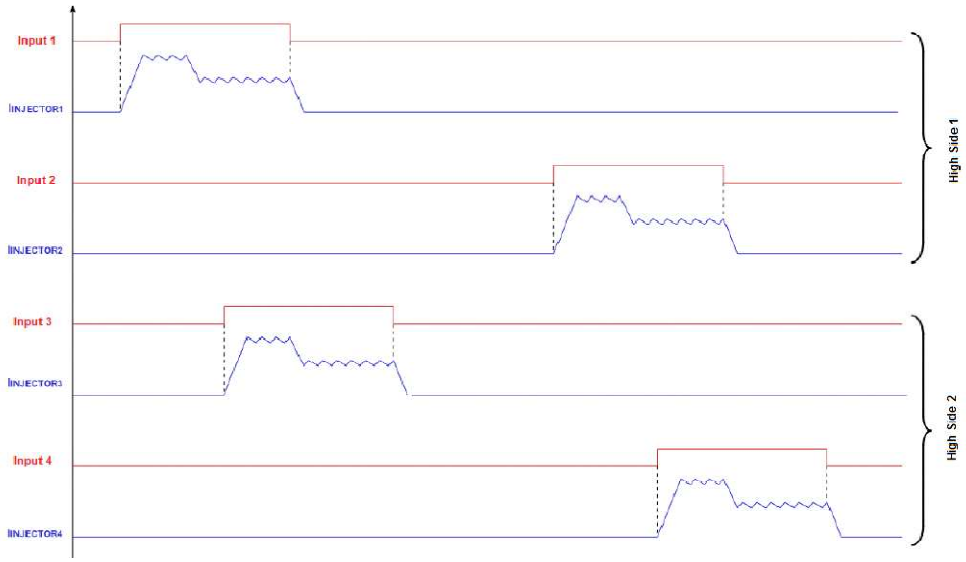
Maximum available current 20Amps

GDI Control phases



Each GDI high side driver output has a current sensor present in the circuit which means that 2 output can't be driven at the same time that are sharing a high side output. It's important to assign the outputs of the Injectors carefully to ensure that 2 injectors on the same high side output at not overlapping.

See example below where the spacing between each Injector on one GDI High side output is 360 degrees apart to ensure a high side output is not overlapping.

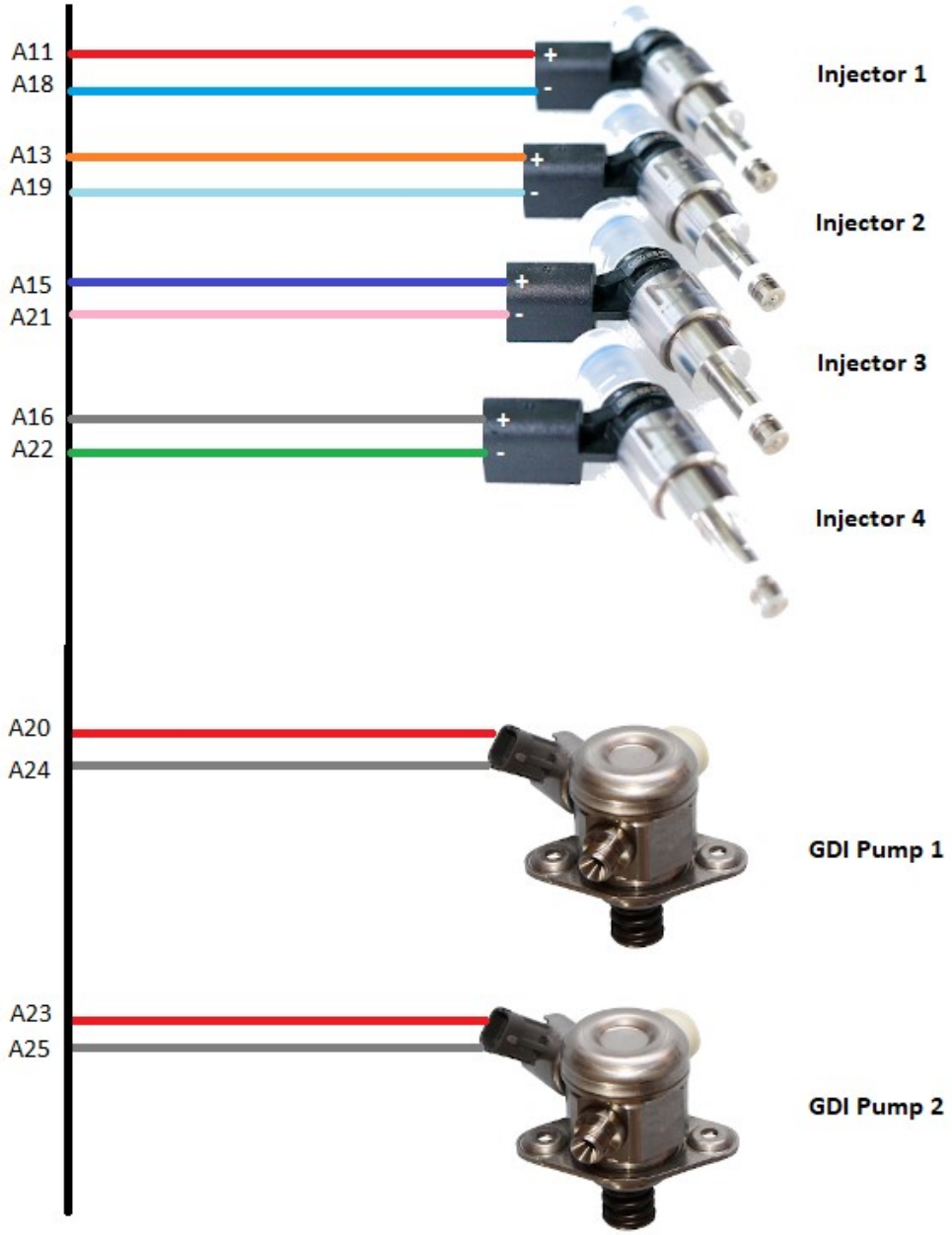


<u>Suggested wiring for I4 Engine</u>

S7D – PinA11 – LS2 – Injector 1 –
S7D – PinA13 – LS4 – Injector 2 –
S7D – PinA15 – LS6 – Injector 3 –
S7D – PinA17 – LS8 – Injector 4 –

S7D – PinA18 -HS2 - Injector 1 +
S7D – PinA19 -HS4 - Injector 2 +
S7D – PinA21 -HS6 - Injector 3 +
S7D – PinA22 -HS8 - Injector 4 +

Example Schematic - 4 Cylinder



GDI Outputs

The Syvecs S7D-4 allows 4 GDI Injectors to be controlled directly

Pin Schedule

Pin Number	Function	Notes
A11	GDI LS2	GDI2
A13	GDI LS4	GDI4
A15	GDI LS6	GDI6
A17	GDI LS8	GDI8
A18	GDI HS2	GDI2 High Side Connection
A19	GDI HS4	GDI4 High Side Connection
A21	GDI HS6	GDI6 High Side Connection
A22	GDI HS8	GDI8 High Side Connection

GDI Pump Outputs

The Syvecs S7D-4 can control 2 x GDI High pressure pumps directly depending on the build type specified at ordering. As default it will come setup to control 2 Di Pumps (A30) and (A31)

The Di Pump output current thresholds can all be adjusted like the injector outputs via a USBC Connection to the S7D DI drive configuration area using our SCAL software – See GDI Logic part of manual for more info

Pin Schedule

Pin Number	Function	Notes
A30	GDI Pump LS1	IGN5 Assignment
A31	GDI Pump LS2	IGN6 Assignment
A20	GDI Pump HS1	High Side GDI Pump1
A23	GDI Pump HS2	High Side GDI Pump2