



AGL10x

Central-i Adapter

Product Manual



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Member of Akribis Systems group

Revision History

Version	Description	Date
2.2	Updated connector information for electrical interfaces. Various, minor text corrections.	18 September 2023
2.1	Minor correction in I/O Specifications table. Added hot plugging warnings. Corrected figure – AGL102 Interface X1	28 February 2023
2.0	New. One manual for both AGL101 and AGL102. Completely revised content.	8 June 2022

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Warranty

This product is warranted to be free of defects in material and workmanship and conforms to the specifications listed in this manual, for a period of 12 months from the shipment date from factory.

Contents

1	Product Description	4
1.1	General Description	4
1.2	Part Numbering	5
1.3	System Design	5
1.4	Technical Specifications	6
1.5	Environmental Specifications	9
2	Safety	10
2.1	Safety Symbols	10
2.2	Safety Guidelines	10
2.3	Compliance	11
3	Installation	12
3.1	Unpacking and Packing	12
3.2	Mounting	12
3.2.1	Mounting the AGL10x	12
3.2.2	Mounting Multiple Adapters	13
3.3	Electrical Installation	14
3.3.1	Power Supplies	14
3.3.2	Wire and Cable Guidelines	14
3.3.3	Grounding	14
3.4	Communication – Central-i	16
3.5	AGL101 – Electrical Interfaces	17
3.5.1	Interface X4: Power	17
3.5.2	Interface X5: I/O Power	18
3.5.3	Interface X2: Drive I/Os	19
3.5.4	Interface X3: System I/Os	21
3.5.5	Interface X1: Central-i	23
3.6	AGL102 – Electrical Interfaces	24
3.6.1	Interface X1: Power	24
3.6.2	Interface X3: Drive I/Os	25
3.6.3	Interface X4: I/O (Inputs for Limit Switches)	27
3.6.4	Interface X2: Central-i	28
3.7	Electrical Interfaces Circuitry	29
3.7.1	Isolated Digital Inputs – AGL101	29
3.7.2	Non-Isolated Digital Inputs	29
3.7.3	Isolated Digital Outputs – AGL101	30
3.7.4	Non-Isolated Digital Outputs	31
3.7.5	Analog Inputs	31
3.7.6	Analog Outputs	32
3.7.7	Differential Inputs	32
3.7.8	Differential Outputs	33
3.7.9	Bi-directional Differential I/Os	33

1 Product Description

1.1 General Description

The AGL10x is a series of Central-i remote adapters to interface the Central-i network with third-party external devices, such as servo and stepper drives. The adapters provide two operations modes:

- **Position closed loop:** AGL10x converts Central-i current or velocity commands to analog $\pm 10V$ output. The position feedback is connected to the AGL10x encoder input.
- **Pulse and direction:** AGL10x converts Central-i position commands into pulse and direction outputs.

These adapters enable the Central-i master to control any third-party drive in analog current mode or digital pulse and direction mode, thereby extending the Central-i network to work with any servo drive.

- AGL101-CI is a fully featured Central-i remote adapter with numerous I/O interfaces and incremental and absolute encoders support.
- AGL102-CI is a compact Central-i remote adapter with standard I/O interfaces and incremental encoder support.



Figure 1. AGL10x adapters

1.2 Part Numbering

AGL10x Product Variants

Product Description	Part Number Format
Central-i remote fully featured adapter	AGL101-CI-xx
Central-i remote compact adapter	AGL102-CI-xx

CI: Central-i communication
 xx: CK: Connector Kit

1.3 System Design

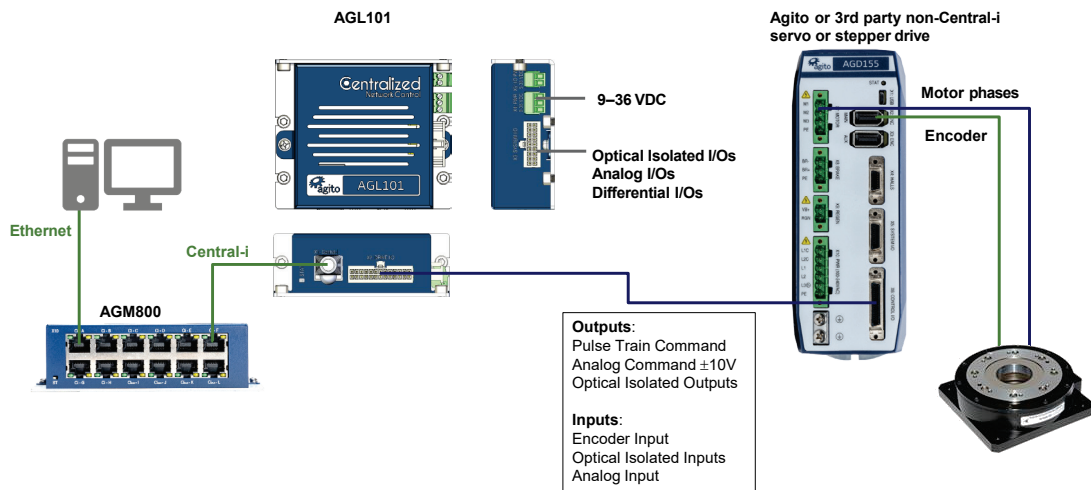


Figure 2. AGL101 System

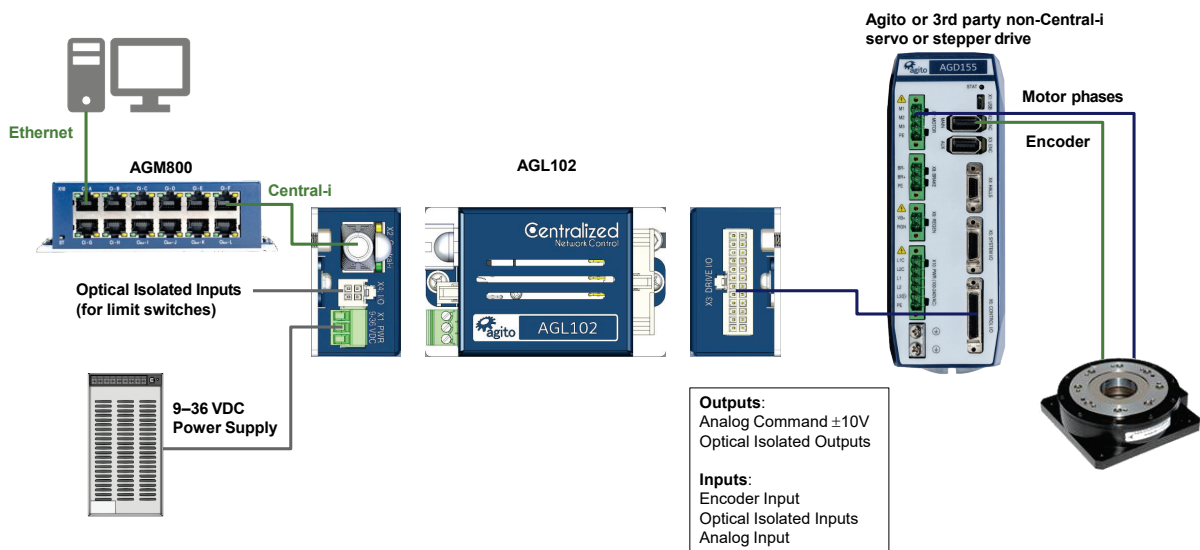


Figure 3. AGL102 System

1.4 Technical Specifications

Electrical/Mechanical Specifications

Feature	AGL101	AGL102
Number of axes	1	1
Nominal supply voltage	9–36 VDC	9–36 VDC
Isolated digital inputs	5	–
Non-isolated digital inputs	–	6
Isolated digital outputs	3	–
Non-isolated digital outputs (NPN up to 50 mA)	3	4
Analog inputs	2 (16-bit resolution)	1 (12-bit resolution)
Analog outputs	1 (16-bit resolution)	1 (16-bit resolution)
Differential outputs	2	0
Bi-directional differential I/Os	1	0
Supported encoders	1 port; AqB or absolute BiSS-C	1 port; AqB
Communication	Central-i	Central-i

Encoder Ports Specifications

Feature	Specification
Encoder types	AGL101: Incremental AqB Absolute: EnDat 2.2 (dedicated FPGA version), BiSS-C AGL102: Incremental AqB
Power supply to encoder	AGL101 only: 0.5A per encoder port
Max. cable length	20 m
Incremental encoder (AqB)	Hardware: Differential RS422/RS485 Max. input frequency: 6.25 MHz Termination: 120 Ω Commutation: Auto-phasing, Hall sensors
Absolute BiSS-C	Hardware: Differential RS422/RS485, clock (MA), data (SLO) Clock frequency: 1 MHz Max. position bits: 32 bit Commutation: Auto-phasing, by absolute offset
Absolute EnDat 2.2	Hardware: Differential RS422/RS485, clock, data Clock frequency: 1 MHz Max. position bits: 32 bit Commutation: Auto-phasing, by absolute offset

I/O Specifications

Feature	Specification
Power supply for optically isolated I/Os	Voltage: 5–28 VDC
Optically isolated digital inputs	Type: PNP/NPN Propagation delay: 10 μ s Max. frequency: 100 kHz
Optically isolated digital outputs	Type: PNP/NPN Max current: 0.5A (for NPN type), 0.3A (for PNP type) Propagation delay: 10 μ s Max. frequency: 100 kHz
Non-isolated digital inputs	Type: NPN Propagation delay: 10 μ s Max. frequency: 100 kHz
Non-isolated digital outputs	Note: Requires external pull up resistor, 1 k Ω recommended Type: NPN Voltage: 5–28V (AGL101), 9V–28V (AGL102) Max. current: 40 mA
Differential digital inputs	Hardware: Differential RS422 Propagation delay: 100 ns Max. frequency: 2 MHz
Analog inputs	Operational voltage: \pm 10V Resolution: 16 bit
Analog outputs	Operational voltage: \pm 10V Resolution: 16 bit

Central-i Specifications

Feature	Specification
Topology	Star (peer to peer)
Cycle time	61 μ s
Connector type	RJ-45 (Cat5e cable)
Cable length	Up to 20 m Longer cables, up to 100 m, are possible with special hardware
Physical layer	Dual channel RS485 full duplex
Baud rate	20 Mbps (per channel)
Synchronization between nodes	8 nanosecond

Dimensions and Weight

Feature	AGL101	AGL102
Unit dimensions (max)	H=89.5 mm, W=79.5 mm, D=18 mm	H=45mm, W=73 mm, D=27 mm
Package dimensions	H= 96 mm x W=85 mm x D=23 mm	H= 51 x W=69 x D=33
Unit weight	250 g	150 g
Shipping weight	350 g	250 g

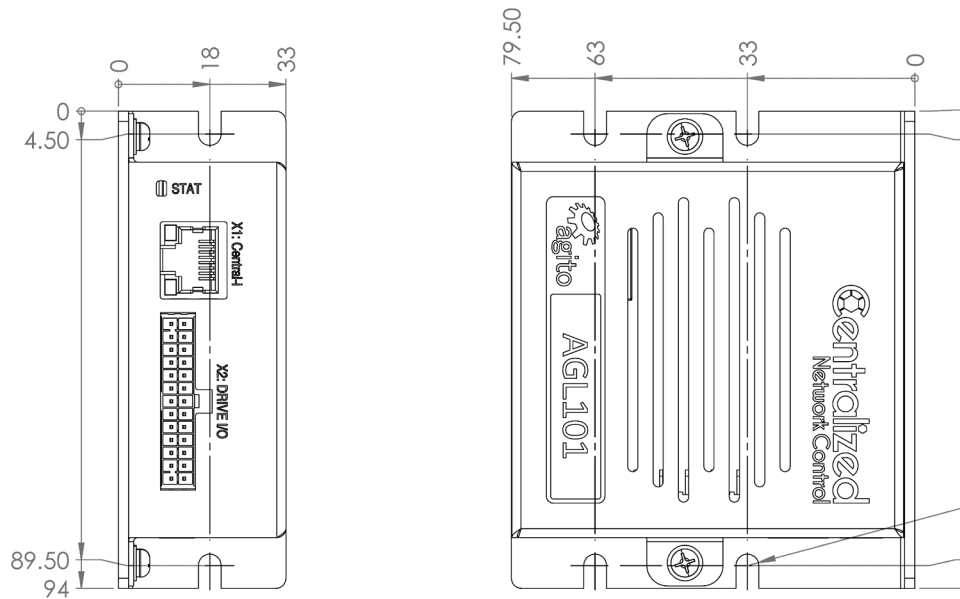


Figure 4. AGL101 dimensions (mm)

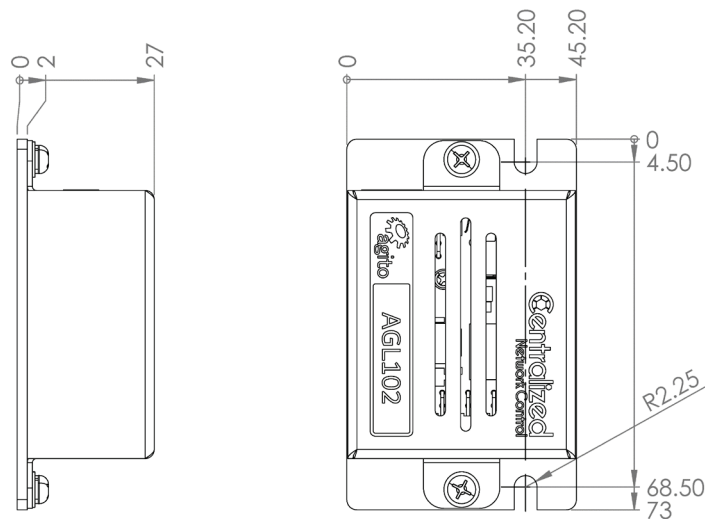


Figure 5. AGL102 dimensions (mm)

1.5 Environmental Specifications

The operational range may be additionally limited by the internal temperature protection of the product. It is the user's responsibility to avoid operating the product in environmental conditions that do not conform to the defined limits.

Environmental Specifications

Feature	Specification
Operating (ambient) temperature	0°C to 45°C
Storage temperature	-20°C to 70°C
Operating humidity	< 90%
Storage humidity	< 40%
Pollution degree	2
Vibration	per 1G @ 150 Hz according to IEC 60068-2-6
Operating conditions	IP20




2 Safety

2.1 Safety Symbols

Safety symbols indicate a potential for personal injury or equipment damage if the prescribed precautions and safe operating practices are not followed.

The following safety symbols are used in the product documentation.

Safety Symbols

Symbol	Meaning	Description
	Hazardous voltage	Indicates hazards arising from dangerous voltages.
	Earthing PE (protective earth)	Identifies any terminal which is intended for connection to an external conductor for protection against electric shock in case of a fault, or the terminal of a protective earth (ground) electrode.
	Caution, hot surface	Indicates the marked item can be hot and should not be touched without taking care.

2.2 Safety Guidelines

To achieve optimum and safe operation of the product, it is important to follow the safety procedures specified in this manual.

- Only qualified personnel may install, maintain, or repair the product. Before starting installation, maintenance, or operation, ensure that all system components are connected to protective earth ground (PE).
- The PE wire must be colored green-yellow, in accordance with local electrical wiring standards.
- This product contains electrostatic-sensitive components. Proper handling procedures must be observed to avoid damage to the product.
- To avoid electric arcing and hazards, never connect or disconnect any connector while the power source is on.
- The maximum power supply voltage connected to the product must comply with the ratings provided in this manual.
- Always disconnect the power cables before servicing the product.
- Pay attention to safety symbols on the product or in the manual. Follow proper safety precautions when installing or operating the product.



Attention

All power connectors must be securely tightened before any operation.

**Attention**

Do not attempt to hinder or override the product's or system's fault detection or protection circuits. You must determine the cause of a fault and correct it before you attempt to operate the system. Failure to correct the fault could result in personal injury and/or damage to equipment.

2.3 Compliance

Standards Compliance

Description	Standard
Safety requirements – Electrical, thermal and energy	IEC-61800-5-1
EMC requirements and specific test methods	IEC-61800-3

This product is intended to operate in a machine or equivalent end-product. The machine or end-product must comply with any necessary safety standard as typically required for the same type of machine or end-product. It is the responsibility of the machine or end-product manufacturer to ensure the final machine or end-product meets the requirement of any safety and EMC regulations.

3 Installation

3.1 Unpacking and Packing

Save the original box and packing materials in case you need to pack and return the product to the manufacturer.

To unpack the product:

1. Carefully remove the product from the box and the packing materials.
2. Visually inspect the product to ensure that there is no damage. If any damage has occurred, report it immediately to the carrier that delivered the package.
3. After unpacking, locate the part number label on the product, and make sure it matches the product you ordered, and that the voltage meets your specific requirements.

3.2 Mounting

3.2.1 Mounting the AGL10x

The heatsink on the back of the AGL10x includes holes/slots for mounting the unit.

The AGL101 is mounted using 2 M4 screws. The AG102 uses either 2 or 4 M4 screws depending on orientation. It is important to mount the product on metal panel for both grounding and secure connections.

The heatsink of the AGL10x is electrically conductive and serves as the protective earth (PE) ground of the product. However, it is critical to ensure the PE screws are electrically conducting between the PE of AGL10x and the PE of main power supply in the system. For details, refer to the section Grounding.

All cables connected to the product must be securely constrained to avoid vibration that causes stress concentration at the cables or connectors which may result in breakage of electrical conductivity.



Warning – Metal Base Plate for Heat Dissipation

The product is supplied with a mounting plate built into the heatsink. At full power operation, the heat sink can be quite warm, around 45°C. It is recommended to mount the product on a large metal panel to help dissipate the heat generated in the product.

Mounting

3.2.2 Mounting Multiple Adapters

When mounting multiple adapters within a cabinet, clearance between units must be at least 5 mm. In addition, top and bottom clearance must be at least 50 mm.

Ambient temperature in the cabinet must not exceed limit defined in the section Environmental Specifications.

If adapters are mounted on a backplane, the backplane temperature must not exceed the ambient limit defined in the section Environmental Specifications.

It is recommended to install a cooling fan at the bottom of the cabinet for best circulation.

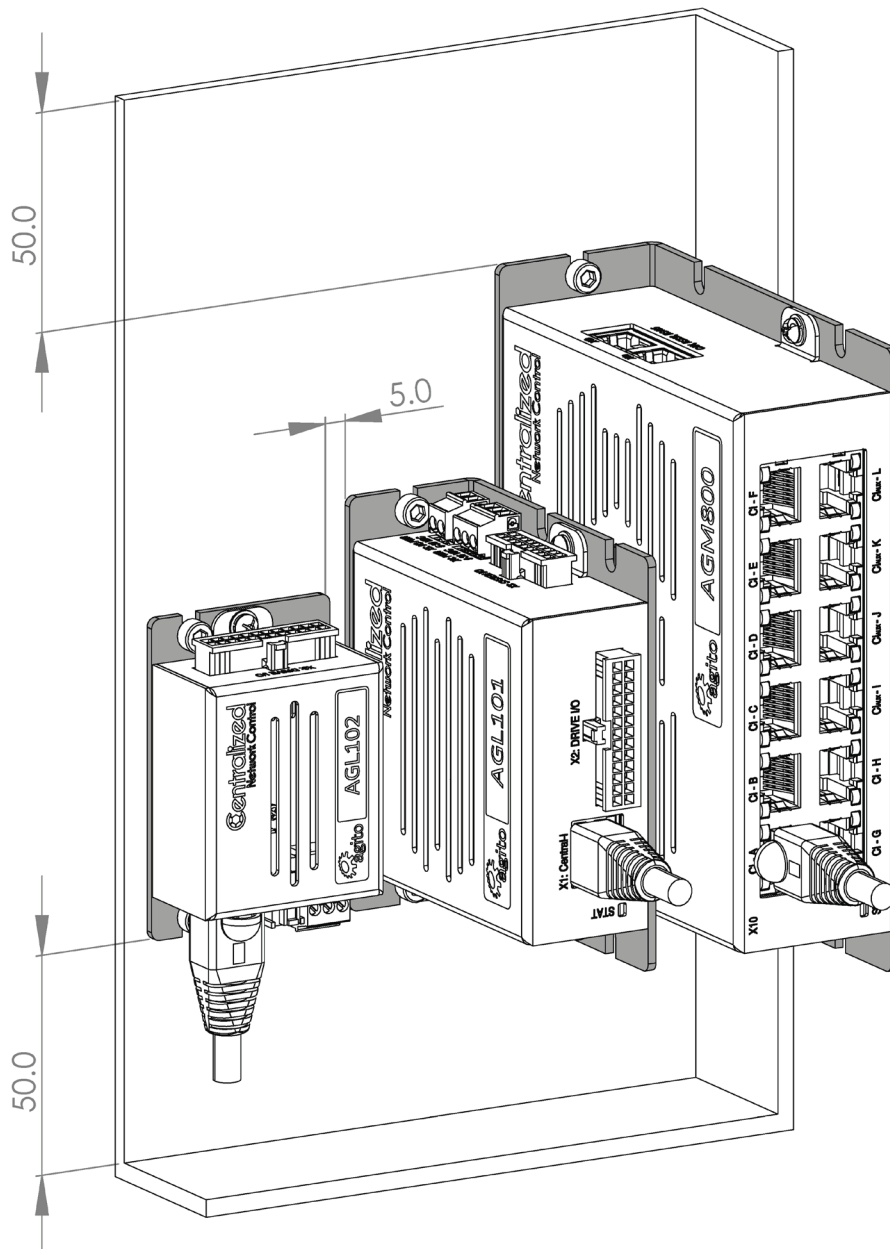


Figure 6. AGL10x Mounting Example

3.3 Electrical Installation

3.3.1 Power Supplies

The power sources provide power to the logic and I/O circuits.

Power Source	Description	AGL101	AGL102
Logic power	Supplies power to the logic and I/O circuits.	9–36 VDC	9–36 VDC
Isolated I/Os power	Supplies power to the optically isolated I/O circuits.	5–28 VDC	5 -28 VDC

3.3.2 Wire and Cable Guidelines

To prevent EMI and ensure high performance of the system, be sure to comply with the following guidelines:

- Use twisted pair shielded wires for control, feedback, and communication.
- Always use shielded cables for motor connection.
- Keep all wires and cables as short as possible.
- Keep the motor cables as far as possible from the control, feedback and communication lines and cables.
- Wire impedance must be as low as possible. Refer to the wire gauge definitions for each electrical interface.



Warning - Hot plugging is forbidden!

Plug or unplug the power connector only when power is off! Plugging the power connector when power is on may cause power surges through connected devices and possibly damage them.

3.3.3 Grounding

It is recommended to install the AGL10x on a metal backplane for better power dissipation, reduced EMI, and grounding connection. Make sure the plate is not painted.

The heatsink of the AGL10x is electrically conductive and serves as the protective earth (PE) ground of the product. However, it is critical to ensure the PE screws are electrically conducting between the PE of AGL10x and the PE of the main power supply in the system.

The power input (PWR) connector includes a PE pin. Make sure to connect PE to this pin or to the adapter’s metal heatsink.

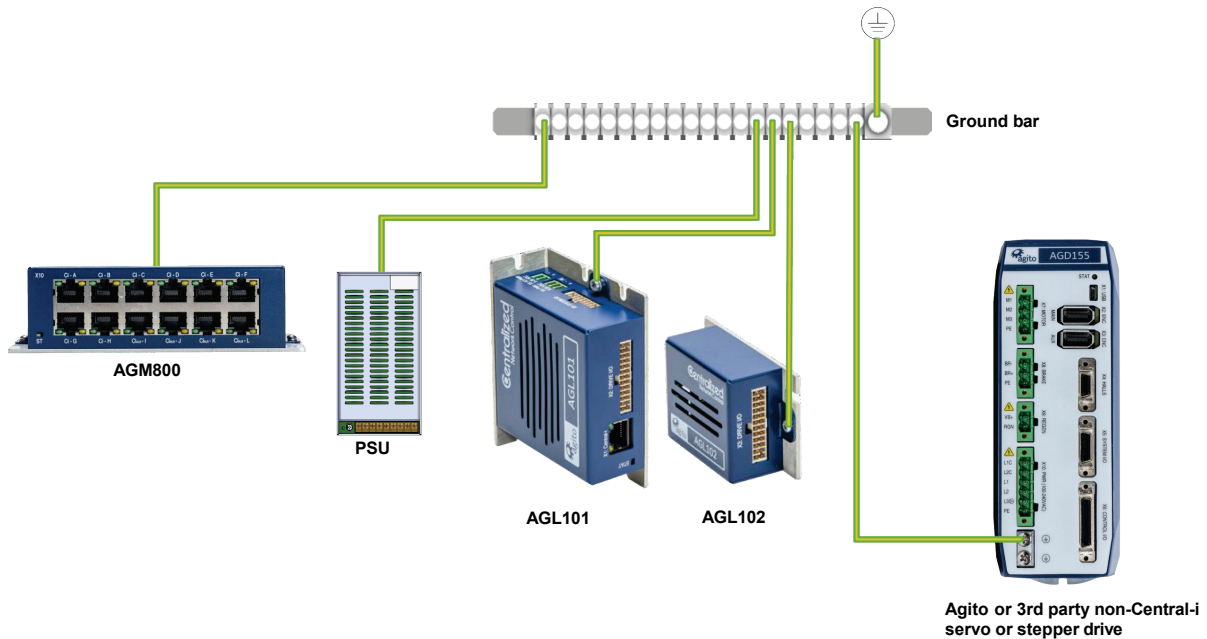


Figure 7. System grounding

Ground Domains

The following table shows the ground domains in the AGL10x system:

- GND. Reference voltage for digital/analog circuits and signals.
- General. Usually at DC potential close to GND, but not connected internally.

Ground Domains

Name	Ground Domain	Notes
DC power input	GND (I/O return)	External DC power supply
Central-i communication	General	Isolated for Central-i remote devices
Isolated digital inputs/outputs	General	Isolated
Differential inputs/outputs (not isolated)	GND	
Analog inputs/outputs (not isolated)	GND	

Grounding Policy

Grounding of the product must comply with the following guidelines:

- The enclosures and other external parts that may be touched by the user are in the safe domain.
- The AGL10x must be connected to protective earth (PE) and connected to the building’s ground. PE is protected with an earth-leakage circuit breaker (ELCB); hence it is safe to touch. Refer to Figure 7.
- Digital ground (GND) is assumed to have the same potential as the PE. That means GND is connected to the PE at some point in the system.
- All shielded cables have their shield connected to PE as part of the external metal enclosure.
- It is critical to avoid ground loops in the system. A ground loop allows currents to return by two or more different paths, causing electromagnetic interference or even damage to wires.

Communication – Central-i

- The system designer must carefully examine all GND connections in the system to ensure that no loops are created, and that all GND-referenced signals have a GND wire nearby (for both return currents and common mode voltage).

3.4 Communication – Central-i

The AGL10x adapters use Central-i for communication with a centralized controller module.

The Central-i motion control platform includes a multi-axis motion controller, distributed adapters and sensors, and control software. The master controller performs all the control functions, including trajectory and position, velocity, and current loops. The Central-i digital protocol enables communication and synchronization of the remote devices.

A bi-colored LED, marked STAT on AGL101 shows the status of communication between the AGL101 and the Central-i master controller.



Note – AGL102 does not have a status LED.

Central-i Status LED indicator

Color	LED	Meaning
Green	On steady	Adapter communicating with master controller
Red	On steady	Adapter not communicating with master controller

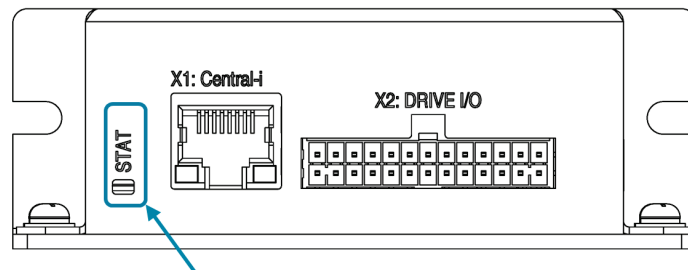


Figure 8. Status (LED) indicator (AGL101)

3.5 AGL101 – Electrical Interfaces

3.5.1 Interface X4: Power

Connector X4 is used to supply 9–36 VDC to the AGL101.

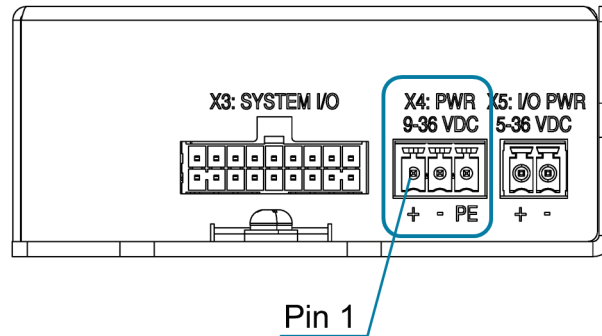


Figure 9. Power connector

Connector X4: PWR

Pin #	Name	Description
1	VIN_EXTERNAL	Power input: 9–36V, up to 1A continuous
2	GND	Ground – power return
3	GND_EARTH	Protective earth

Mating connector options	Degson 15EDGK-3.5-03P-14-00A Phoenix Contact 1847068 Wurth Elektronik 691361100003
Connector pitch	3.5 mm
Wiring	16–28 AWG, insulation rated for 160V



Warning - Hot plugging is forbidden!

Plug or unplug the power connector only when power is off! Plugging the power connector when power is on may cause power surges through connected devices and possibly damage them.

3.5.2 Interface X5: I/O Power

Connector X5 supplies DC power supply to the isolated inputs and outputs.

To use inputs and outputs, be sure to power up this port.

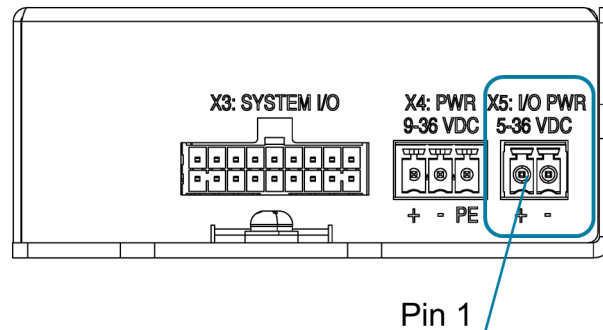


Figure 10. I/O connector

Connector X5: I/O PWR

Pin #	Name	Description
1	Isolated I/O power	5 to 36 VDC – user supplied I/O power supply input, up to 2A
2	Isolated I/O power return	Ground – I/O power supply return
Mating connector options		Degson 15EDGK-3.5-02P-14-00A Phoenix Contact 1840366
Connector pitch		3.5 mm
Wiring		16–28 AWG, insulation rated for 160V

3.5.3 Interface X2: Drive I/Os

Connector X2 is used for connecting external I/O devices to the adapter.

For schematics and more information about these interfaces, refer to the section *Electrical Interfaces Circuitry*.

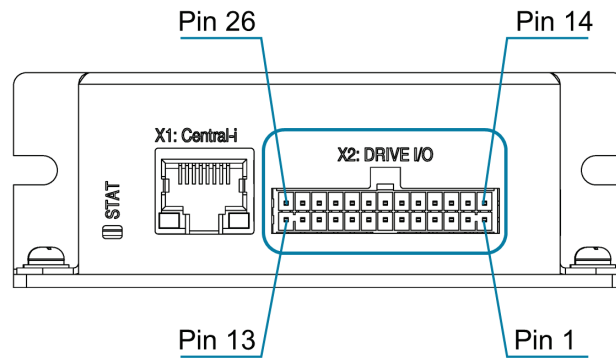


Figure 11. Drive I/Os connector

Connector X2: DRIVE I/O

Pin #	Name	Software Representation	Description
1	Vin_IO_RTN		Input I/O power supply return. (Connected internally to X5 pin2) Common pin for isolated digital outputs 1, 2 and 3.
2	Vin_IO		Input I/O power supply 5 to 28 VDC). (Connected internally to X5 pin1) Common pin for isolated digital inputs 1 and 2.
3	Digital_Output_3	DOutPort.bit(5)	Non-isolated digital output 3. NPN.
4	Digital_Output_1	DOutPort.bit(3)	Non-isolated digital output 1. NPN.
5	Digital_Input_1	DInPort.bit(0)	Isolated digital input 1. NPN.
6	Diff_Out_2+	DOutPort.bit(8)	Differential output 2. Positive pin.
7	Diff_Out_1+	DOutPort.bit(7)	Differential output 1. Positive pin.
8	A_Encoder_4+		Differential input. Not inverted.
9	A_Encoder_3+		Differential input. Not inverted.
10	A_Encoder_2+		Differential input. Not inverted.
11	GND		Ground
12	Analog_Output_1+	AOutPort[1]	Analog output 1. Not inverted.
13	Analog_Input_1	AInPort[1]	Analog input 1
14	GND_EARTH		Ground-Earth connection
15	GND		Ground
16	5V		Output power supply 5V (up to 0.5A)
17	Digital_Output_2	DOutPort.bit(4)	Non-isolated digital output 2. NPN.
18	Digital_Input_2	DInPort.bit(1)	Isolated digital input 2. NPN.

Pin #	Name	Software Representation	Description
19	Diff_Out_2-		Differential input 2. Negative pin.
20	Diff_Out_1-		Differential input 1. Negative pin.
21	A_Encoder_4-		Differential input. Inverted.
22	A_Encoder_3-		Differential input. Inverted.
23	A_Encoder_2-		Differential input. Inverted.
24	GND		Ground.
25	Analog_Output_1-		Analog output 1. Inverted
26	Analog_Input1_Return_1		Analog input 1 return.

Mating connector options	Samtec Inc. IPD1-13-D-K and CC79R-2630-01-L
Wiring	26 AWG, insulation rated for 100V



Note – Absolute Encoder Connection

Connect the absolute encoder Clock+ and Clock- signals to Diff_Out+ and Diff_Out-, respectively. Connect the absolute encoder Data+ and Data- signals to A_Encoder4+ and A_Encoder4-, respectively. See the following example.

Sample Pinout for Encoder

Pin #	Name	Encoder Types			Description
		AqB	BiSS-C	EnDat 2.2	
16	5V				5V power supply (limited to 0.5A per connector)
15	GND				5V return and reference for differential signals
7	Diff_Out_1+		Clock+	Clock+	Clock+ pin for absolute encoders
20	Diff_Out_1-		Clock-	Clock-	Clock- pin for absolute encoders
10	Encoder_2+	A+			A+ (for AqB) or sin+ (for analog sin/cos)
23	Encoder_2-	A-			A- (for AqB) or sin- (for analog sin/cos)
9	Encoder_3+	B+			B+ (for AqB) or cos+ (for analog sin/cos)
22	Encoder_3-	B-			B- (for AqB) or cos- (for analog sin/cos)
8	Encoder_4+	Z+	Data+	Data+	Data+ for absolute encoders, or Z+ for both AqB and analog sin/cos encoder
21	Encoder_4-	Z-	Data-	Data-	Data- for absolute encoders, or Z- for both AqB and analog sin/cos encoder



Note – 5V supply limitation

The 5V supply provided on pin 16 on connector X2 is limited to 0.5A.

3.5.4 Interface X3: System I/Os

Connectors X3 is used for connecting external I/O devices to the adapter.

For schematics and more information about these interfaces, refer to the section *Electrical Interfaces Circuitry*.

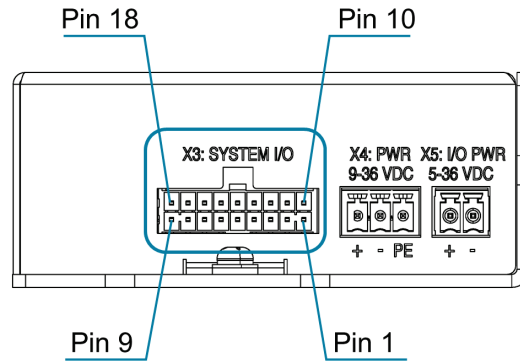


Figure 12. System I/Os connector

Connector X3: SYSTEM I/O

Pin #	Name	Software Representation	Description
1	VIN__IO_RTN		Input I/O power supply return
2	VIN_IO		Input I/O power supply (5V to 28V)
3	Digital_Output_1	DOutPort.bit(0)	Isolated digital output 1. Programmable sink or source.
4	Digital_Output_Common (1 to 3)		Common power pin for digital isolated outputs 1 to 3. Programmable sink or source.
5	Digital_Input_4	DInPort.bit(3)	Isolated digital input 4. (NPN or PNP, depending on the connection of the group's common pin).
6	Digital_Input_Common (3 to 5)		Common pin (power or return, depending on external connection) for digital isolated inputs 3 to 5
7	Bi-Dir_Diff_IO_1+	DOutPort.bit(6)	Differential bi-directional input or output.
8	GND		Ground
9	Analog_Input_2	AInPort[2]	Analog input 2, ±12V, 12 bit
10	GND_EARTH		Ground-Earth Connection
11	Digital_Output_3	DOutPort.bit(2)	Isolated digital output 3. Programmable sink or source.
12	Digital_Output_2	DOutPort.bit(1)	Isolated digital output 2. Programmable sink or source.
13	Digital_Output_Common_Return (1 to 3)		Common power return pin for digital isolated outputs 1 to 3.

Pin #	Name	Software Representation	Description
14	Digital_Input_5	DInPort (bit 4)	Isolated digital input 5. (NPN or PNP, depending on the connection of the group's common pin).
15	Digital_Input_3	DInPort (bit 2)	Isolated digital input 3. (NPN or PNP, depending on the connection of the group's common pin).
16	Bi-Dir_Diff_IO_1-	Bi-Dir_Diff_IO_1-	Differential bidirectional input or output.
17	GND		Ground
18	Analog_Input_Return_2		Analog input 2 return

Mating connector options	Samtec Inc. IPD1-09-D-K and CC79R-2630-01-L
Wiring	26 AWG, insulation rated for 100V

3.5.5 Interface X1: Central-i

Connector X1 is used for communication between the adapter and the PC.

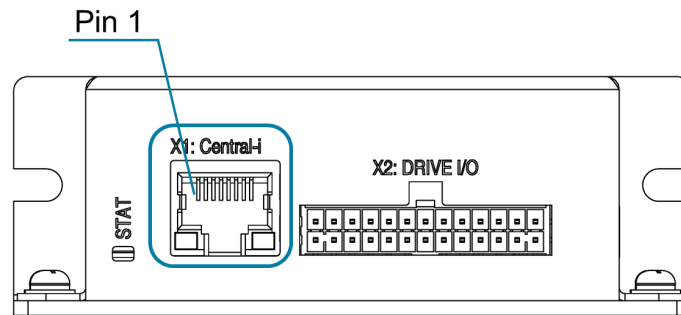


Figure 13. Communication connector (Central-i)

Connector X1: Central-i (RJ45)

Pin #	Name	Description
1	DATA_0+	Data channel 0+
2	DATA_0-	Data channel 0-
3	DATA_1+	Data channel 1+
4	DATA_2-	Data channel 2-
5	DATA_2+	Data channel 2+
6	DATA_1-	Data channel 1-
7	V_REMOTE	Power supply to remote unit's communication module
8	GND	Ground

Connector type	RJ45 LAN 10/100Base-T connector
Mating connector part number	Any CAT5e compatible shielded connector
Cable	CAT5e or higher, standard Ethernet straight cable

3.6 AGL102 – Electrical Interfaces

3.6.1 Interface X1: Power

Connector X1 is used to supply power to the entire unit. The input voltage is directly connected to the adapter power bridge to generate the internal logic power that powers the adapter.

The adapter includes protection to prevent damage if polarity is inverted at the power input.

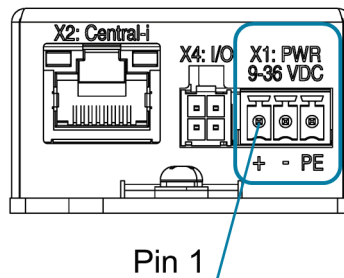


Figure 14. Power connector

Connector X1: Power

Pin #	Name	Description
1	VIN_EXTERNAL	Power input: 9–36V, up to 1A continuous
2	GND	Ground – power return
3	GND_EARTH	Protective earth

Mating connector options	Degson 15EDGK-3.5-03P-14-00A Phoenix Contact 1847068 Wurth Elektronik 691361100003
Connector pitch	3.5 mm
Wiring	16–28 AWG, insulation rated for 160V



Warning - Hot plugging is forbidden!

Plug or unplug the power connector only when power is off! Plugging the power connector when power is on may cause power surges through connected devices and possibly damage them.

3.6.2 Interface X3: Drive I/Os

Connector X3 is used for connecting external I/O devices to the adapter.

This port can be used for connection between the adapter and other external drivers.

For schematics and more information about these interfaces, refer to the section *Electrical Interfaces Circuitry*.

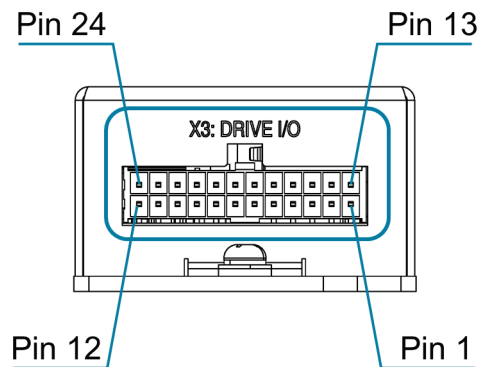


Figure 15. Drive I/O Connector

Connector X3: Drive I/Os

Pin #	Name	Software Representation	Description
1	VIN_RTN		Common ground (X1 pin2) Common pin for digital outputs 1,2,3,4
2	VIN		Output power supply. The voltage is determined by the supply voltage input in connector X1. (X1 pin1) Common pin for digital inputs 1, 2, 3 and 4.
3	A_Encoder_4+		Encoder input 4. Positive pin.
4	A_Encoder_3+		Encoder input 3. Positive pin.
5	A_Encoder_2+		Encoder input 2. Positive pin.
6	Digital_Output_3	DOutPort.bit(2)	Non-isolated digital output 3. NPN.
7	Digital_Output_1	DOutPort.bit(0)	Non-isolated digital output 1. NPN.
8	Digital_Input_3	DInPort.bit(0)	Non-isolated digital input 1. NPN.
9	Digital_Input_1	DInPort.bit(2)	Non-isolated digital input 3. NPN.
10	Analog_Input_1		Analog input 1
11	NA		Not connected
12	Analog_Output_1		Analog output 1
13	GND_EARTH		Protective earth
14	GND		Common ground. Connected internally to VIN RTN.
15	A_Encoder_4-		Encoder input 4. Negative pin.
16	A_Encoder_3-		Encoder input 3. Negative pin.
17	A_Encoder_2-		Encoder input 2. Negative pin.



Pin #	Name	Software Representation	Description
18	Digital_Output_4	DOutPort.bit(3)	Non-isolated digital output 4. NPN.
19	Digital_Output_2	DOutPort.bit(1)	Non-isolated digital output 2. NPN.
20	Digital_Input_4	DInPort.bit(1)	Non-isolated digital input 2. NPN.
21	Digital_Input_2	DInPort.bit(3)	Non-isolated digital input 4. NPN.
22	GND		Common ground
23	NA		Not connected
24	GND		Common ground

Mating connector options	Samtec Inc. IPD1-12-D-K and CC79R-2630-01-L
Wiring	26 AWG, insulation rated for 100V

3.6.3 Interface X4: I/O (Inputs for Limit Switches)



Note – This port is used for the connection of the limit switches

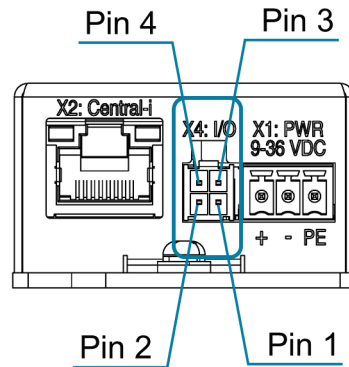


Figure 16. Drive I/O Connector

Connector X4: I/O

Pin #	Name	Software Representation	Description
1	VIN_RTN		Common ground (X1 pin2)
2	VIN		Output power supply. The voltage is determined by the supply voltage input in connector X1 (X1 pin1). Common for input 5 and 6.
3	Digital_Input_6	DInPort.bit(5)	Isolated digital input 6. NPN.
4	Digital_Input_5	DInPort.bit(4)	Isolated digital input 5. NPN.
Mating connector options		Samtec Inc. IPD1-02-D-K and CC79R-2630-01-L	
Wiring		26 AWG, insulation rated for 100V	

3.6.4 Interface X2: Central-i

Connector X2 is used for communication with the Central-i master controller, such as the AGM800, and other remote adapters and devices.

X2 is used for communication between the adapter board and other Central-i serial devices.

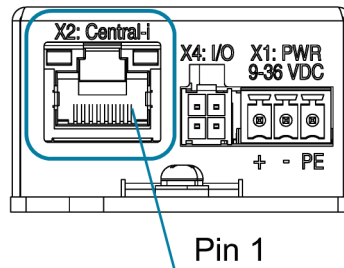


Figure 17. Communication connector (Central-i)

Connector X2: Central-i (RJ45)

Pin #	Name	Description
1	DATA_0+	Data channel 0+
2	DATA_0-	Data channel 0-
3	DATA_1+	Data channel 1+
4	DATA_2-	Data channel 2-
5	DATA_2+	Data channel 2+
6	DATA_1-	Data channel 1-
7	V_REMOTE	Power supply to remote unit's communication module
8	GND	Ground

Connector	RJ45 LAN 10/100Base-T connector
Mating connector	Any CAT5e compatible shielded connector
Cable	CAT5e or higher, standard Ethernet straight cable

3.7 Electrical Interfaces Circuitry

3.7.1 Isolated Digital Inputs – AGL101



Note – AGL102 does not support isolated digital inputs.

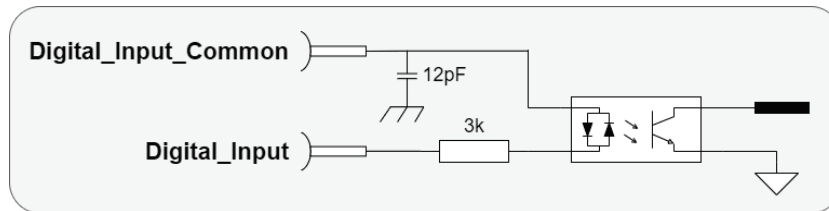


Figure 18. Isolated digital inputs – AGL101

- Isolated digital inputs are organized as groups with a dedicated common pin. This enables connection to different voltage supplies. Each group is fully isolated and independent of the other groups.
- Inputs 1 and 2 can be connected as NPN only. Inputs 3, 4 and 5 can be connected as NPN or PNP, depending on the wiring of the group’s common pin. If the common pin is connected to power (5V to 28V), then the inputs of this group can be used with external NPN devices (external current sinking devices). If the common is connected to the GND of some external power, then the inputs can be used with external PNP devices (external current sourcing devices).
- The input circuit of the opto-couplers includes two diodes. This enables use as NPN or PNP.

Isolated Inputs – Groups and Common Pins

Connector	Inputs	Common
X2	1, 2	Pin 2
X3	3, 4, 5	Pin 6

3.7.2 Non-Isolated Digital Inputs

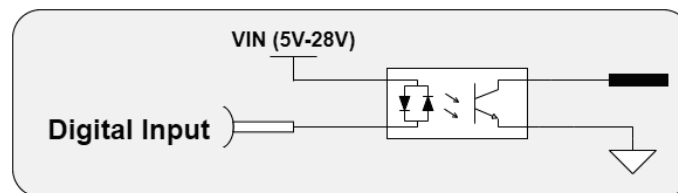


Figure 19. Isolated digital inputs

- Non-isolated digital inputs are identical for all inputs in AGL101 and AGL102.
- Inputs can be connected as NPN only (VIN as a common).
- Main power supply is used for the I/O power supply.

3.7.3 Isolated Digital Outputs – AGL101



Note – AGL102 does not support isolated digital outputs.

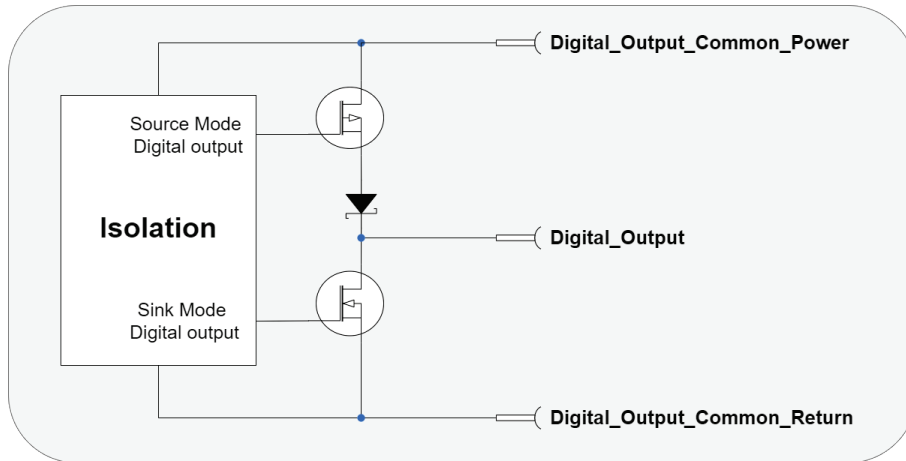


Figure 20. Isolated digital outputs – AGL101

- The digital output interface circuit in AGL101 is identical for isolated digital outputs 1, 2 and 3.
- The digital output interface circuit is identical for all outputs.
- Each output can be programmed (by a software parameter) to act as a current sourcing output (up to 300mA) or as a current sinking output (up to 500 mA).
- Digital_Output_Common_Power is shared by all 3 outputs.
- The outputs are designed for resistive loads. For inductive loads, an external flyback diode is required.
- Digital outputs specifications:
 - Digital_Output_Common_Power voltage range is between 5V and 28V.
 - Maximal load current, per each output:
 - Sink mode, any Digital_Output_Common_Power voltage: 500 mA
 - Source mode, at 24V Digital_Output_Common_Power: 300 mA
 - Source mode, at 5V Digital_Output_Common_Power: 60 mA (see Note below)

Isolated Outputs – Groups and Common Pins

Connector	Outputs	Common
X3	3, 11, 12	Pin 4, 13



Note – 5V Digital_Output_Common_Power source mode limitation.

When using 5V Digital_Output_Common_Power, higher current (but less than the absolute maximum value of 250 mA) can be driven. However, the output high voltage will drop significantly. To maintain output high voltage at >4.5V, limit the current to 60 mA.

3.7.4 Non-Isolated Digital Outputs

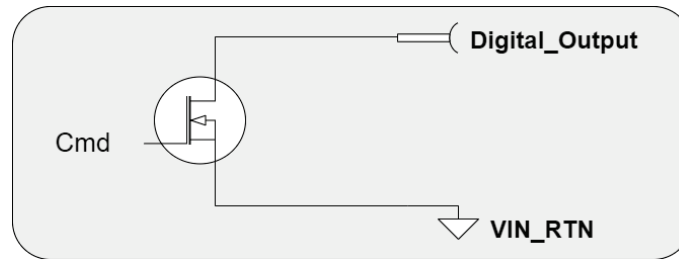


Figure 21. Non-isolated digital outputs

- The digital output is NPN only.
- The digital output current is limited to 50 mA.
- The outputs are designed for resistive loads. For inductive loads, an external flyback diode is required.

3.7.5 Analog Inputs

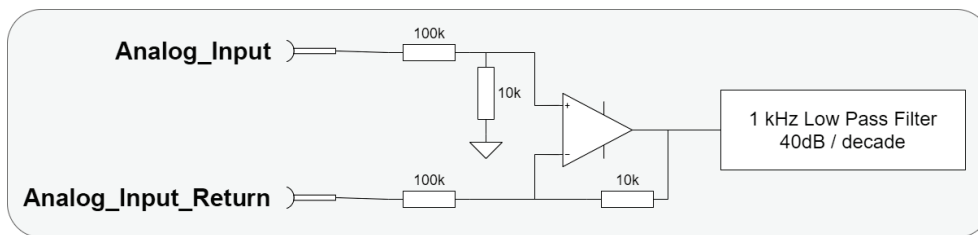


Figure 22. Analog inputs

- The electrical interfaces of all analog inputs are identical on AGL101 and AGL102
- The analog input range is -12V to +12V, and resolution is 12 bits.
- The analog input is designed for standard differential analog input, with a simple input circuit, having an input resistance of ~60 kΩ.
- Input circuit bandwidth: 1 kHz, -40 dB/decade
- The controller software provides the following parameters to control the analog input reading:
 - Filter
 - Offset
 - Deadband
 - Gain

3.7.6 Analog Outputs

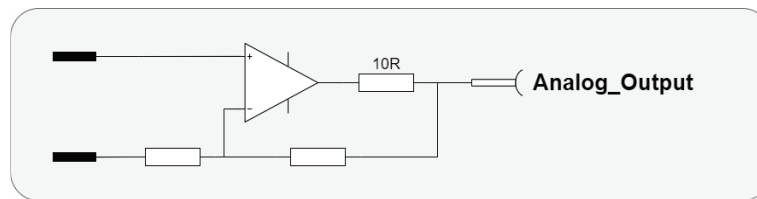


Figure 23. Analog Outputs

- The electrical interfaces of all analog outputs are identical.
- The analog output range is from -12V to +12V, with resolution of 16 bits.
- Output resistance is 10 Ω
- Output current is up to ± 2 mA, without internal current limitation.
- Analog outputs are controlled by the controller software in a few operational modes:
 - Analog output controlled by the user program for a general purpose.
 - Analog output used to provide analog torque or velocity command to external amplifier.

3.7.7 Differential Inputs

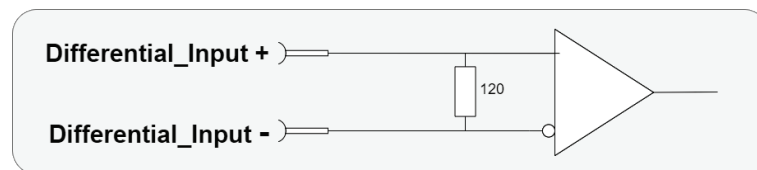


Figure 24. Differential inputs

- Differential inputs use two complementary signals (Differential_Input+ and Differential_Input-) to receive information.
- The same electrical signal is sent as a differential pair, each in its own conductor. The pair is wired as a twisted pair.
- The differential inputs are implemented according to the RS422 standard.
- Each differential input has a 120 Ω terminator.

3.7.8 Differential Outputs

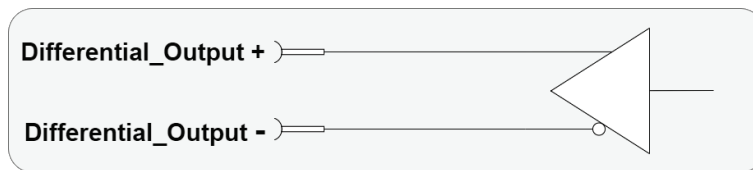


Figure 25. Differential outputs

- Differential outputs use two complementary signals (Differential_Output+ and Differential_Output-) to receive information.
- The same electrical signal is sent as a differential pair, each in its own conductor. The pair is wired as a twisted pair.
- The differential outputs are implemented according to the RS422 standard.
- The differential outputs are inactive during power on, until they are controlled by the drive firmware and the user parameters.

3.7.9 Bi-directional Differential I/Os

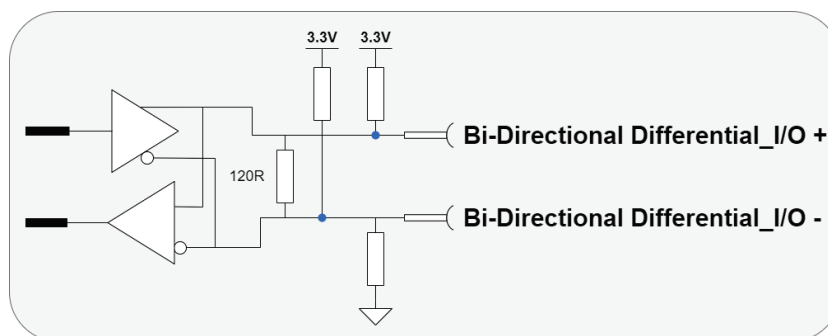


Figure 26. Bi-directional differential I/Os

- The bi-directional differential output is configurable by software to be a differential output or differential input.
- Both + and - pins are pulled up to 3.3V.
- There is a 120Ω termination resistor between the + and - pins.

