Compulab IOT-DIN-IMX8PLUS I O Expansion Modules User Guide

Contents

Compulab IOT-DIN-IMX8PLUS I O Expansion Modules

Product Information

Specifications

Parameter	Description	Minimum	Maximum	Unit
VDCIN	External power supply voltage, inputs	-0.3	30	V
VI	Input steady state voltage	-0.3	30	V
VDCOUT	External power supply voltage, outputs	-0.3	41	V
IR	Reverse output current (per channel)	–	-5	A

Product Usage Instructions

1. **Description**
   The IFM-DI8O8 is a digital I/O expansion module designed for 24V PLC applications. It features an isolated block of eight digital inputs and a block of eight digital outputs with ESD and transient protections. External isolated power supplies are required for each block.
2. **Features**
   Digital input features: List of digital input features.
   Digital output features: List of digital output features.
   Important Note: I/O expansion modules must be connected to the IOT-DIN-IMX8PLUS gateway to function.
3. **Installation**
   Provide detailed installation instructions here.
4. **Troubleshooting**
   List common issues and solutions for troubleshooting.

Frequently Asked Questions (FAQ)

Q: Can the IFM-DI8O8 module be used independently without connecting to the IOT-DIN-IMX8PLUS gateway?
A: No, the I/O expansion modules cannot be used stand-alone and must be connected to the IOT-DIN-IMX8PLUS gateway for proper operation.

IOT-DIN-IMX8PLUS I/O EXPANSION MODULES
Reference Guide

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Table 1 Document Revision Notes

Date	Description
May 2024	· First release

Please check for a newer revision of this manual at the Compulab website https://www.compulab.com . Compare the revision notes of the updated manual from the website with those of the printed or electronic version you have.

INTRODUCTION

1. **About This Document**
   This document is part of a set of documents providing information necessary to operate and program Compulab IOT-DIN-IMX8PLUS I/O Modules.
2. **IOT-DIN-IMX8PLUS Part Number**
   To decode the IOT-DIN-IMX8PLUS I/O Modules part number please refer to the ‘Ordering’ section of the IOT-DIN-IMX8PLUS product page: https://www.compulab.com/products/iot-gateways/iot-din-imx8plus-industrial-iot-gateway/#ordering.
3. **Related Documents**
   For additional information not covered in this manual, please refer to the documents listed in Table 2.

Table 2 Related Documents

Document	Location
IOT-DIN-IMX8PLUS resources	https://www.compulab.com/products/iot-gateways/iot-din-imx8plus-industrial-iot-gateway/#devres

IFM-DI8O8 DIGITAL I/O MODULE

Description

IFM-DI8O8 is a digital I/O expansion module with an isolated block of eight digital inputs and a block of eight digital outputs. The module is designed for 24V PLC applications, and contains ESD and transient protections. The user must provide isolated external power supplies for each block.

- **Digital input features:**
  - 8x low side (sink) inputs with common ground
  - ESD protection according to IEC 61000-4-2
  - Voltage surge protection according to IEC 61000-4-5
  - Transient immunity according to IEC 61000-4-4
  - Wide input DC voltage range
  - Input current limiting
- **Digital output features:**
  - 8x high side (relay) outputs
  - Conforms to IEC 61131-2
  - ESD protection according to IEC 61000-4-2
  - Output current limiting
  - Under voltage shutdown
  - Shorted load protection

NOTE: I/O expansion modules cannot be used stand-alone without a connection to the IOT- DIN-IMX8PLUS gateway.

Specifications

Table 3 IFM-DI8O8 Absolute Maximum Ratings

Parameter	Description	Minimum	Maximum	Unit
VDC_{IN}	External power supply voltage, inputs	-0.3	30	V
V_I	Input steady state voltage	-0.3	30	V
VDC_{OUT}	External power supply voltage, outputs	-0.3	41	V
I_R	Reverse output current (per channel)	–	-5	A

NOTE: Stresses beyond the maximum ratings may cause permanent damage to the device

Table 4 IFM-DI8O8 Electrical, Mechanical and Environmental Specifications

Mechanical Specifications	
Housing type	DIN rail housing (for DIN rail version EN 50022)
Housing material	ABS/PC high endurance
Dimensions	110 x 30 x 95 mm
Weight	110 gram
Terminal blocks connectors	0.2-1.5mm^2; 16-26 AWG;
Environmental and Reliability	
MTTF	> 200,000 hours
Operation temperature	-30° to 70° C
Storage temperature	-40° to 85° C
Relative humidity	10% to 90% (operation)
	05% to 95% (storage)
Compliance	
Regulatory	FCC, CE, UKCA
EMC	EN 55032/5, EN 61000-6-2, EN 61000-6-3
Safety	EN/UL/IEC 62368-1

Table 5 IFM-DI8O8 Digital Input Characteristics

Parameter	Description	Min	Typ.	Max	Unit
VDC	External power supply voltage	10	24	30	V
ILIM	Input current limit	2.1	3	3.7	mA
VLOW	Maximum off state voltage		1.5		V
VTH	Activation threshold		3.4	5	V
VCL	Clamping voltage	31	38		V

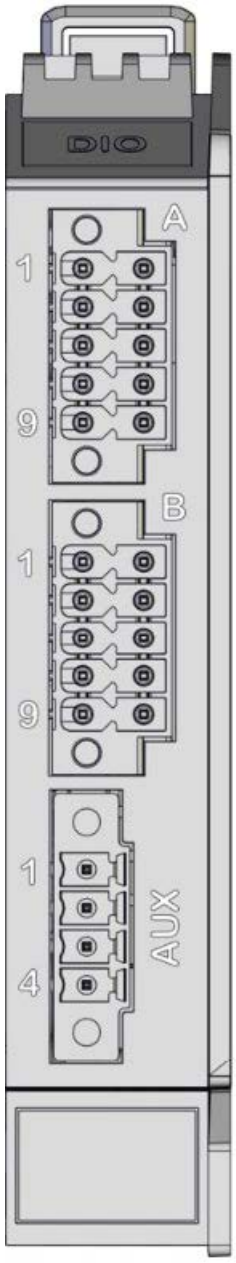
Table 6 IFM-DI8O8 Digital Output Characteristics

Parameter	Description	Min	Typ.	Max	Unit
VDC	External power supply voltage	10.5	24	36	V
VOUT(OFF)	OFF state output voltage			1	V
td(OFF)	Turn OFF delay		12		µs
td(ON)	Turn ON delay		6		µs
IOUT	Output current per channel			1	A
ILIM	DC short-circuit current	1.1		2.6	A

Connectors

Table 7 IFM-DI8O8 connectors

Connector	Description
A	Digital input block
B	Digital output block
AUX	Power input



Connector	Connector Type

A, B	10-pin dual-raw plug with push-in spring connections Locking: screw flange Pitch: 3.5 mm Wire cross-section: AWG 16 – AWG 26
AUX	4-pin plug with screw terminal connections Locking: screw flange Pitch: 3.5 mm Wire cross-section: AWG 16 – AWG 26

Table 8 IFM-DI8O8 connector A pin-out

Pin	Signal Name	Description	Isolation Power Domain
1	IN_0	Digital Input 0	IN
2	IN_1	Digital Input 1	IN
3	IN_2	Digital Input 2	IN
4	IN_3	Digital Input 3	IN
5	COM_IN	Digital inputs reference (0V)	IN
6	COM_IN	Digital inputs reference (0V)	IN
7	IN_4	Digital Input 4	IN
8	IN_5	Digital Input 5	IN
9	IN_6	Digital Input 6	IN
10	IN_7	Digital Input 7	IN

Table 9 IFM-DI8O8 connector B pin-out

Pin	Signal Name	Description	Isolation Power Domain
1	OUT_0	Digital Output 0	OUT
2	OUT_1	Digital Output 1	OUT
3	OUT_2	Digital Output 2	OUT
4	OUT_3	Digital Output 3	OUT
5	COM_OUT	Digital outputs reference (0V)	OUT
6	COM_OUT	Digital outputs reference (0V)	OUT
7	OUT_4	Digital Output 4	OUT
8	OUT_5	Digital Output 5	OUT
9	OUT_6	Digital Output 6	OUT
10	OUT_7	Digital Output 7	OUT

Table 10 IFM-DI8O8 AUX connector pin-out

Pin	Signal Name	Description	Isolation Power Domain
1	COM_IN	Digital inputs reference (0V)	IN
2	VDC_IN	Input block voltage supply	IN
3	COM_OUT	Digital outputs reference (0V)	OUT
4	VDC_OUT	Output block voltage supply	OUT

Application Information

Figure 1: Digital Inputs

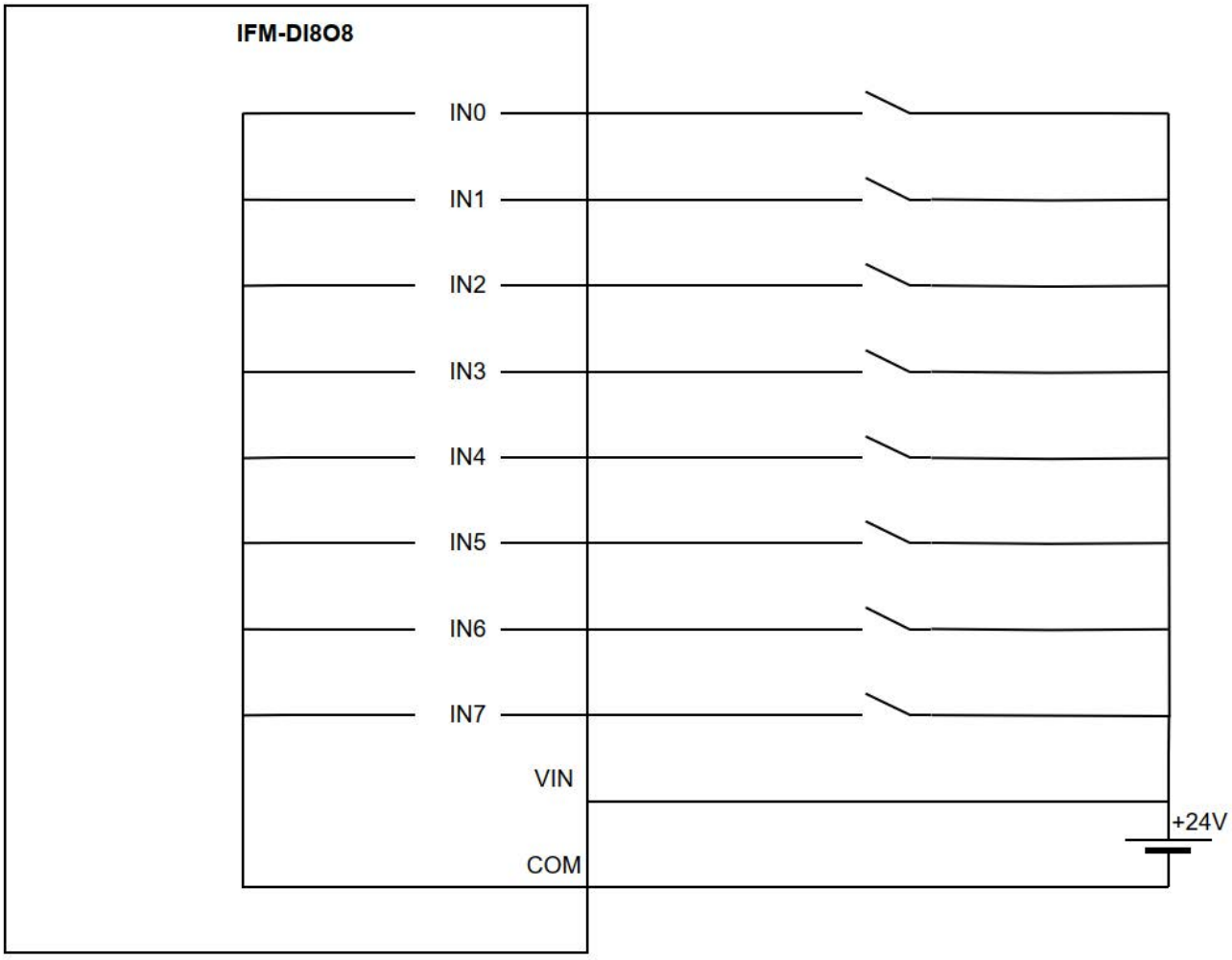
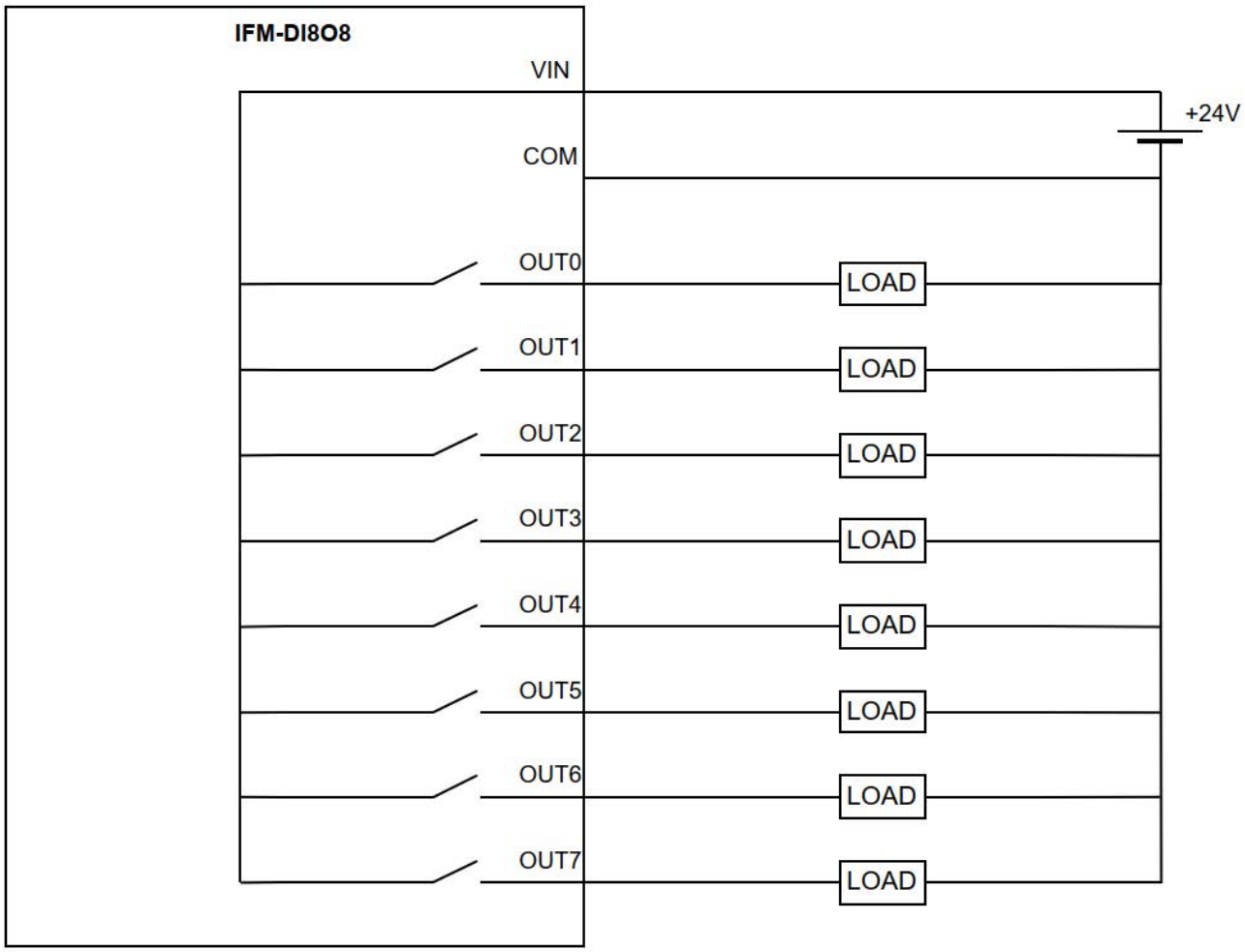


Figure 2: Digital Outputs



IFM-RS232 4-PORT RS232 MODULE

Description
IFM-RS232 is an asynchronous communication I/O expansion module that contains four 2-wire RS-232 ports implemented with MAX3221 RS-232 line driver/receivers. The ports are separated into blocks; each block is isolated from the other and from the main system. Each port inlcudes a receive / transmit pair and a reference GND.
IFM-RS232 receives power from the main gateway and does not require external power.

Key features:

- ESD protection +/-15kV
- Meets TIA/EIA-232-F standards
- Programmable baud rates up 250kbps

NOTE: I/O expansion modules cannot be used stand-alone without a connection to the IOT- DIN-IMX8PLUS gateway

Specifications

Table 11 IFM-RS232 Absolute Maximum Ratings

Parameter	Description	Minimum	Maximum	Unit
VI(RECEIVER)	Input voltage on receiver	-25	25	V
VO(DRIVER)	Output voltage from driver	-13.2	13.2	V

NOTE: Stresses beyond the maximum ratings may lead to permanent damage to the device.

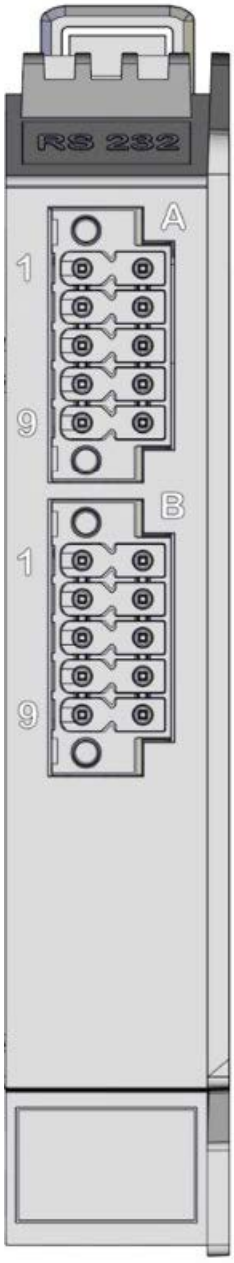
Table 12 IFM-RS232 Electrical, Mechanical and Environmental Specifications

Mechanical Specifications	
Housing type	DIN rail housing (for DIN rail version EN 50022)
Housing material	ABS/PC high endurance
Dimensions	110 x 30 x 95 mm
Weight	110 gram
Terminal blocks connectors	0.2-1.5mm^2; 16-26 AWG;
Environmental and Reliability	
MTTF	> 200,000 hours
Operation temperature	-30° to 70° C
Storage temperature	-40° to 85° C
Relative humidity	10% to 90% (operation)
	05% to 95% (storage)
Compliance	
Regulatory	FCC, CE, UKCA
EMC	EN 55032/5, EN 61000-6-2, EN 61000-6-3
Safety	EN/UL/IEC 62368-1

Connectors

Table 13 IFM-RS232 connectors

Connector	Description
A	RS232 Ports 0 and 1
B	RS232 Ports 2 and 3



Connector	Connector Type
A, B	10-pin dual-raw plug with push-in spring connections Locking: screw flange Pitch: 3.5 mm Wire cross-section: AWG 16 – AWG 26

Table 14 IFM-RS232 connector A pin-out

Pin	Signal Name	Description	Isolation Power Domain
1	PORT0_RX	RS232 Port 0 Rx input	A
2	PORT0_TX	RS232 Port 0 Tx output	A
3	COM_A	Ports 0 and 1 reference (0V)	A
4	COM_A	Ports 0 and 1 reference (0V)	A
5	N.C.	Not connected	A
6	N.C.	Not connected	A
7	COM_A	Ports 0 and 1 reference (0V)	A
8	COM_A	Ports 0 and 1 reference (0V)	A
9	PORT1_RX	RS232 Port 1 Rx input	A
10	PORT1_TX	RS232 Port 1 Tx output	A

Table 15 IFM-RS232 connector B pin-out

Pin	Signal Name	Description	Isolation Power Domain
1	PORT2_RX	RS232 Port 2 Rx input	B
2	PORT2_TX	RS232 Port 2 Tx output	B
3	COM_B	Ports 2 and 3 reference (0V)	B
4	COM_B	Ports 2 and 3 reference (0V)	B
5	N.C.	Not connected	B
6	N.C.	Not connected	B
7	COM_B	Ports 2 and 3 reference (0V)	B
8	COM_B	Ports 2 and 3 reference (0V)	B
9	PORT3_RX	RS232 Port 3 Rx input	B
10	PORT3_TX	RS232 Port 3 Tx output	B

IFM-RS485 4-PORT RS485 MODULE

Description
The IFM-RS485 is a I/O expansion module that contains four half-duplex RS485 compatible ports implemented with MAX13488E transceivers. The ports are separated into blocks; each block is isolated from the other and from the main system. Each port contains a positive / negative pair, a reference GND and optional 120Ω termination selectable via jumper. Please refer to Application Information for details.
IFM-RS485 receives power from the main gateway and does not require external power.

Key features:

- ESD protection +/-15kV
- Meets TIA/EIA-485 standards

- Programmable data rates up to 4Mbps

NOTE: I/O expansion modules cannot be used stand-alone without a connection to the IOT- DIN-IMX8PLUS gateway

Specifications
Table 16 IFM-RS485 Absolute Maximum Ratings

Parameter	Description	Minimum	Maximum	Unit
VSIG	D+/D- Voltage	-8	13	V

NOTE: Stresses beyond the maximum ratings may lead to permanent damage to the device

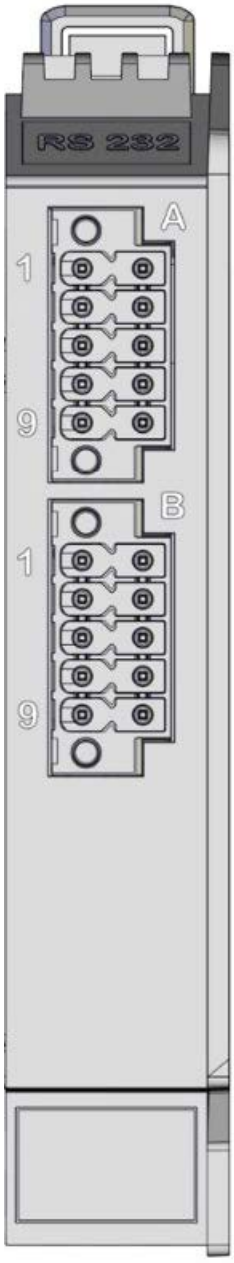
Table 17 IFM-RS485 Electrical, Mechanical and Environmental Specifications

Mechanical Specifications	
Housing type	DIN rail housing (for DIN rail version EN 50022)
Housing material	ABS/PC high endurance
Dimensions	110 x 30 x 95 mm
Weight	110 gram
Terminal blocks connectors	0.2-1.5mm^2; 16-26 AWG;
Environmental and Reliability	
MTTF	> 200,000 hours
Operation temperature	-30° to 70° C
Storage temperature	-40° to 85° C
Relative humidity	10% to 90% (operation)
	05% to 95% (storage)
Compliance	
Regulatory	FCC, CE, UKCA
EMC	EN 55032/5, EN 61000-6-2, EN 61000-6-3
Safety	EN/UL/IEC 62368-1

Connectors

Table 18 IFM-RS485 connectors

Connector	Description
A	RS485 Ports 0 and 1
B	RS485 Ports 2 and 3



Connector	Connector Type
A, B	10-pin dual-raw plug with push-in spring connections Locking: screw flange Pitch: 3.5 mm Wire cross-section: AWG 16 – AWG 26

Table 19 IFM-RS485 connector A pin-out

Pin	Signal Name	Description	Isolation Power Domain
1	PORT0_NEG	RS485 Port 0 signal D-	A
2	PORT0_POS	RS485 Port 0 signal D+	A
3	PORT0_TRM_A	Port 0 termination A (connect to B for 120Ω terminatio n)	A
4	PORT0_TRM_B	Port 0 termination B (connect to A for 120Ω terminatio n)	A
5	COM_A	Ports 0 and 1 reference (0V)	A
6	COM_A	Ports 0 and 1 reference (0V)	A
7	PORT1_TRM_A	Port 1 termination A (connect to B for 120Ω terminatio n)	A
8	PORT1_TRM_B	Port 1 termination B (connect to A for 120Ω terminatio n)	A
9	PORT1_NEG	RS485 Port 1 signal D-	A
10	PORT1_POS	RS485 Port 1 signal D+	A

Table 20 IFM-RS485 connector B pin-out

Pin	Signal Name	Description	Isolation Power Domain
1	PORT2_NEG	RS485 Port 2 signal D-	B
2	PORT2_POS	RS485 Port 2 signal D+	B
3	PORT2_TRM_A	Port 2 termination A (connect to B for 120Ω terminatio n)	B
4	PORT2_TRM_B	Port 2 termination B (connect to A for 120Ω terminatio n)	B
5	COM_B	Ports 2 and 3 reference (0V)	B
6	COM_B	Ports 2 and 3 reference (0V)	B
7	PORT3_TRM_A	Port 3 termination A (connect to B for 120Ω terminatio n)	B
8	PORT3_TRM_B	Port 3 termination B (connect to A for 120Ω terminatio n)	B
9	PORT3_NEG	RS485 Port 3 signal D-	B
10	PORT3_POS	RS485 Port 3 signal D+	B

Application Information
Each RS485 ports in the IFM-RS485 module comes with an optional 120Ω line termination. To enable the termination, place a wire between TRM_A and TRM_B pins for the respective port. Leave these pins unconnected for operation without termination.
For example, when using channel RS485 PORT0, place a jumper between PORT0_TRM_A (Pin 3) and PORT0_TRM_B (Pin 4).

Figure 3: RS485 PORT0 with Terminating Resistor

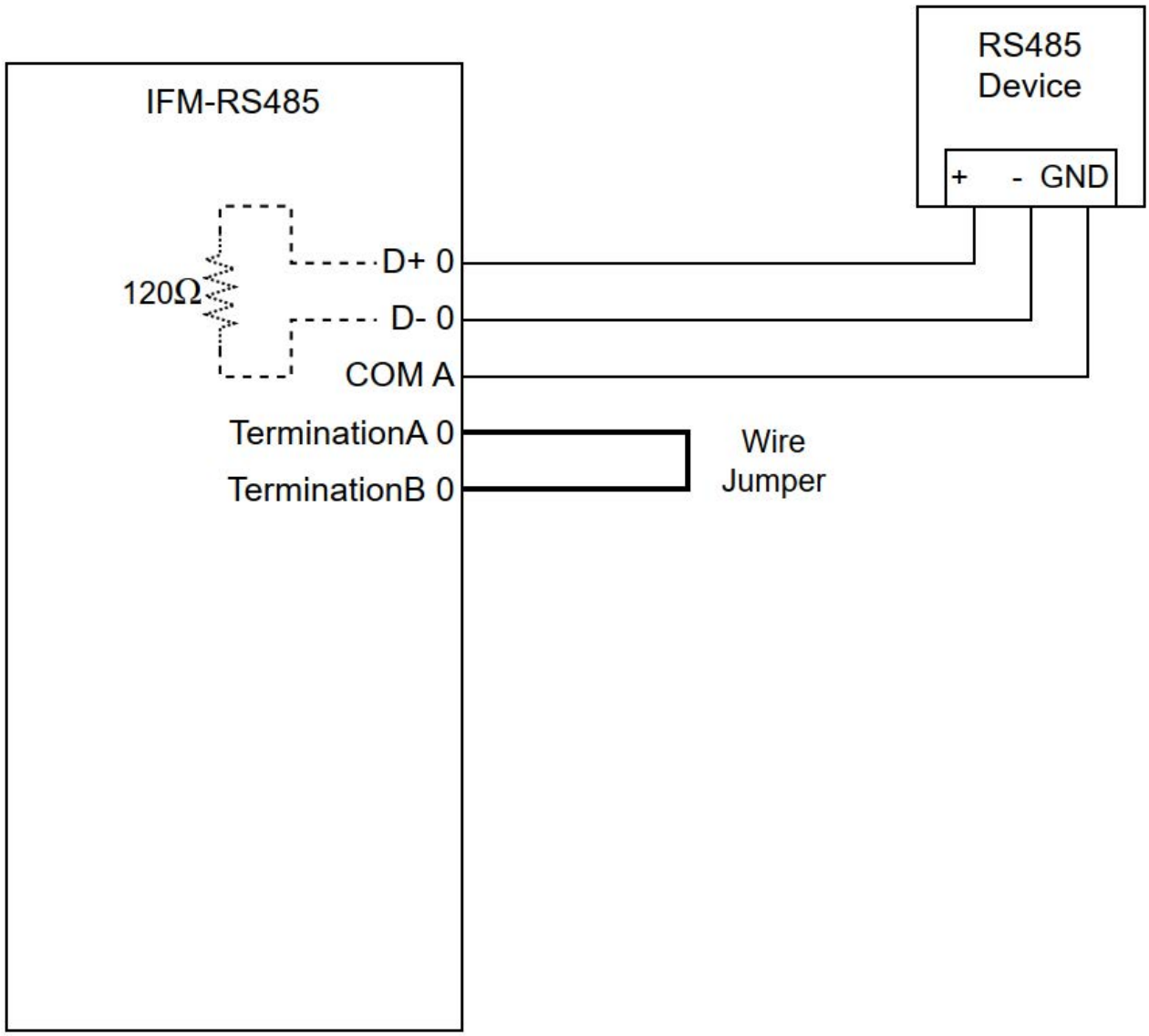
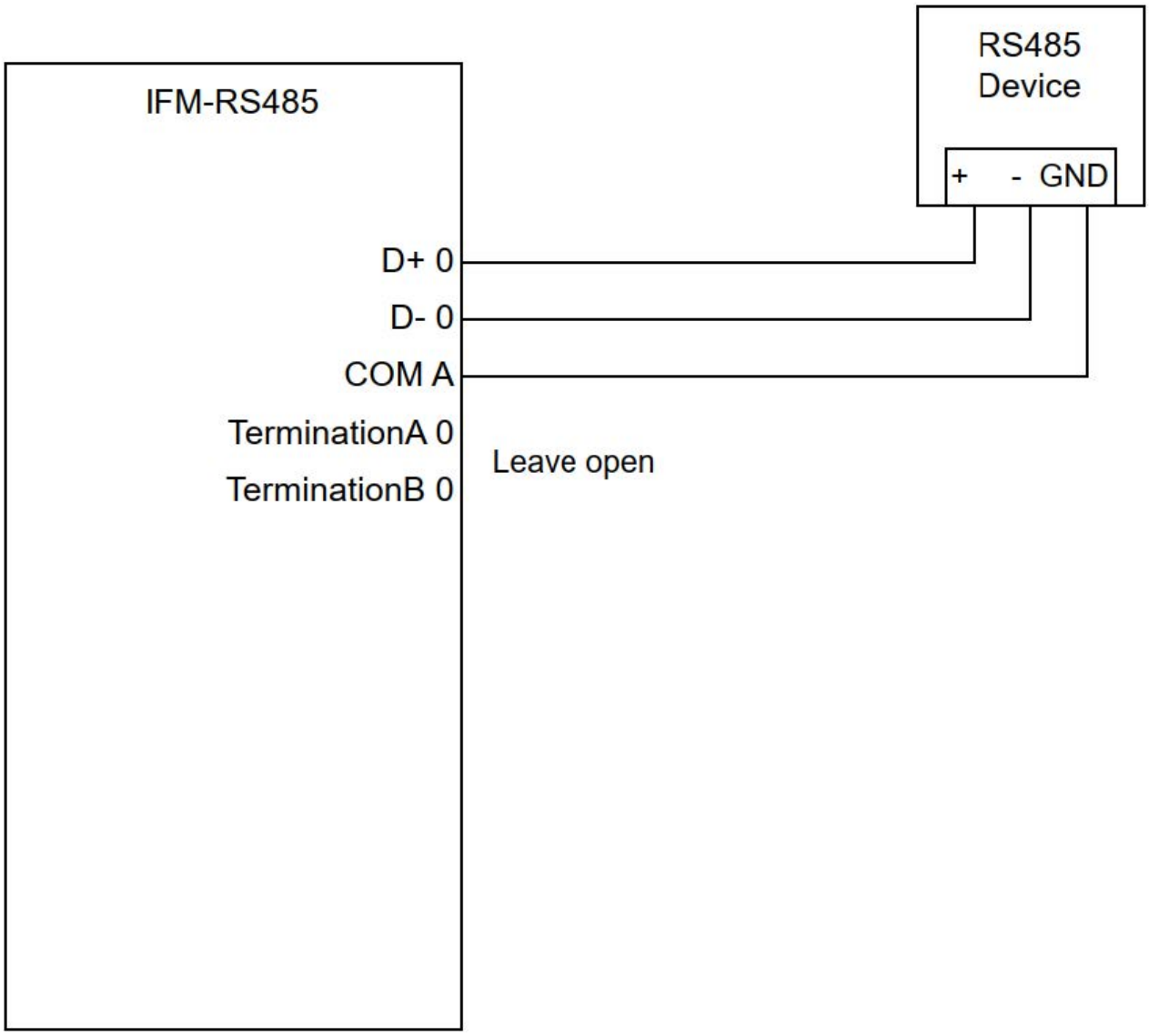


Figure 4: RS485 PORT0 without Terminating Resistor



IFM-ADC8 ANALOG INPUT MODULE

Description
IFM-ADC8 is an I/O expansion module with eight single-ended analog input channels with shared reference COM, divided into two blocks of 4. Inputs operate between 0-10V or 4-20mA ranges for use with industiral sensors. Each block can be set into current or voltage input mode via jumper. For details please refer to Application Information.

Key features:

- 8x single-ended analog inputs separated into two blocks of 4 channels
- Selectable operating modes 0-10V or 4-20mA
- Galvanic isolation from main unit
- Programmable sample rate 128SPS to 3.3kSPS
- 11-bit (2048 units) low noise resolution
- Programmable comparator and dedicated interrupt for critical signals

NOTE: I/O expansion modules cannot be used stand-alone without a connection to the IOT- DIN-IMX8PLUS gateway

Specifications

Table 21 IFM-ADC8 Absolute Maximum Ratings

Parameter	Description	Minimum	Maximum	Unit
VIN	Voltage on input channels	-0.3	18	V
IIN	Current on input channels	0	30	mA

NOTE: Stresses beyond the maximum ratings may lead to permanent damage to the device

Table 22 Analog Input Characteristics

Parameter	Description	Min	Typ.	Max	Unit
VIN	Analog input (voltage)	0	–	10	V
IIN	Analog input (current)	4	–	20	mA
RIN(I)	Input impedance (current mode)		500		Ω
RIN(V)	Input impedance (voltage mode)		5k		Ω

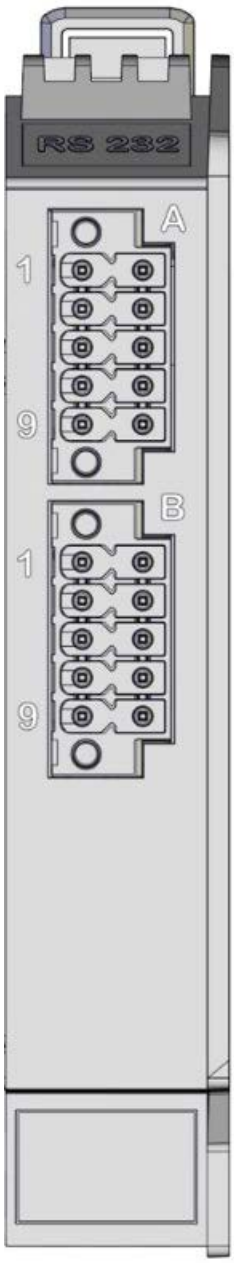
Table 23 IFM-ADC8 Electrical, Mechanical and Environmental

Mechanical Specifications	
Housing type	DIN rail housing (for DIN rail version EN 50022)
Housing material	ABS/PC high endurance
Dimensions	110 x 30 x 95 mm
Weight	110 gram
Terminal blocks connectors	0.2-1.5mm^2; 16-26 AWG;
Environmental and Reliability	
MTTF	> 200,000 hours
Operation temperature	-30° to 70° C
Storage temperature	-40° to 85° C
Relative humidity	10% to 90% (operation)
	05% to 95% (storage)
Compliance	
Regulatory	FCC, CE, UKCA
EMC	EN 55032/5, EN 61000-6-2, EN 61000-6-3
Safety	EN/UL/IEC 62368-1

Connectors

Table 24 IFM-ADC8 connectors

Connector	Description
A	Analog Inputs 0 – 3
B	Analog Inputs 4 – 7



Connector	Connector Type
A, B	10-pin dual-raw plug with push-in spring connections Locking: screw flange Pitch: 3.5 mm Wire cross-section: AWG 16 – AWG 26

Table 25 IFM-RS485 connector A pin-out

Pin	Signal Name	Description	Isolation Power Domain
1	COM	Signal Reference (0V)	ANALOG
2	AIN_0	Analog input channel 0	ANALOG
3	COM	Signal Reference (0V)	ANALOG
4	AIN_1	Analog input channel 1	ANALOG
5	COM	Signal Reference (0V)	ANALOG
6	AIN_2	Analog input channel 2	ANALOG
7	COM	Signal Reference (0V)	ANALOG
8	AIN_3	Analog input channel 3	ANALOG
9	COM	Signal Reference (0V)	ANALOG
10	MODE_A	Channel 0 – 3 mode select (connect to COM for 4 – 20 mA operation; Leave open for 0 – 10V)	ANALOG

Table 26 IFM-RS485 connector B pin-out

Pin	Signal Name	Description	Isolation Power Domain
1	COM	Signal Reference (0V)	ANALOG
2	AIN_4	Analog input channel 4	ANALOG
3	COM	Signal Reference (0V)	ANALOG
4	AIN_5	Analog input channel 5	ANALOG
5	COM	Signal Reference (0V)	ANALOG
6	AIN_6	Analog input channel 6	ANALOG
7	COM	Signal Reference (0V)	ANALOG
8	AIN_7	Analog input channel 7	ANALOG
9	COM	Signal Reference (0V)	ANALOG
10	MODE_B	Channel 4 – 7 mode select (connect to COM for 4 – 20 mA operation; Leave open for 0 – 10V)	ANALOG

Application Information

Each block of four channels can be used in 0 – 10V (Voltage Mode) or 4 – 20mA (Current Mode). In each terminal block, to set Current Mode, place a plain wire between COM (pin 9) and MODE (pin 10). For Voltage Mode, leave MODE pin unconnected.

For example, to set AIN_0 – AIN_3 to Current Mode, loop a plain wire between COM (Pin 9) and MODE_A (Pin 10).

Figure 5 Analog Input used in Voltage Mode

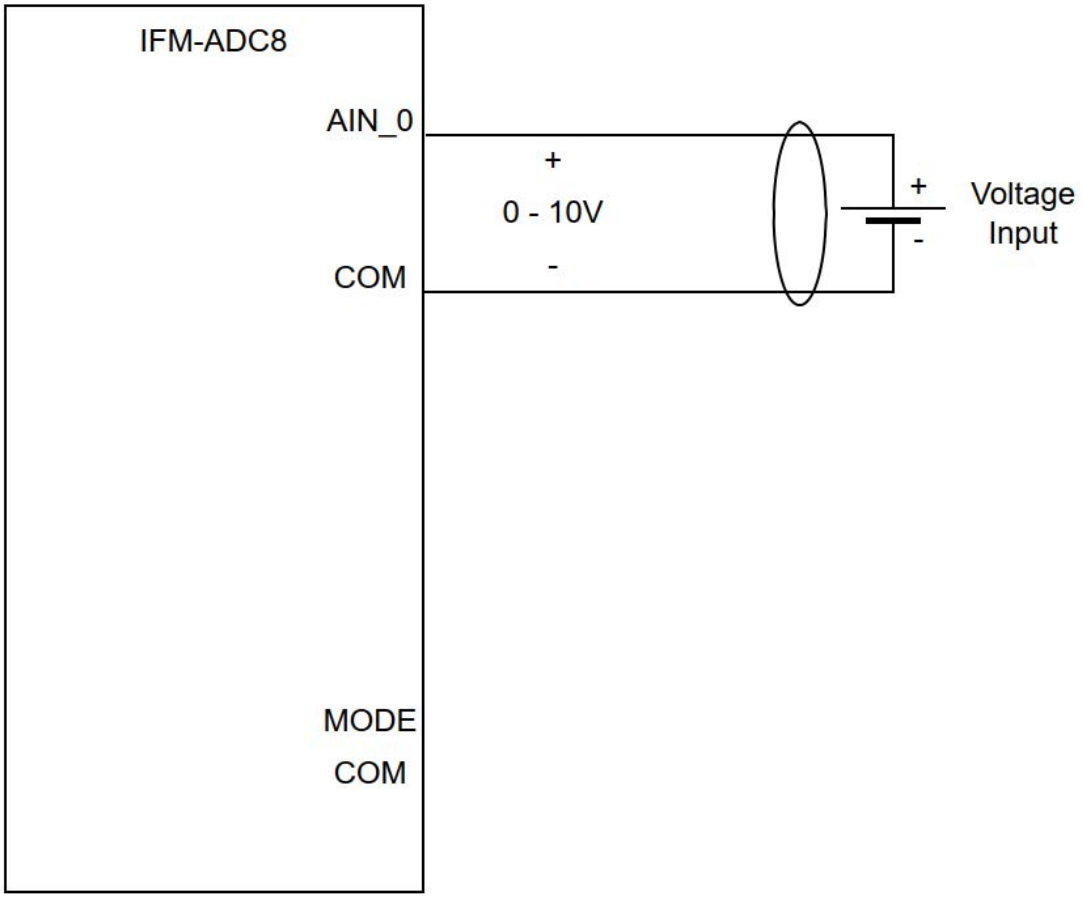
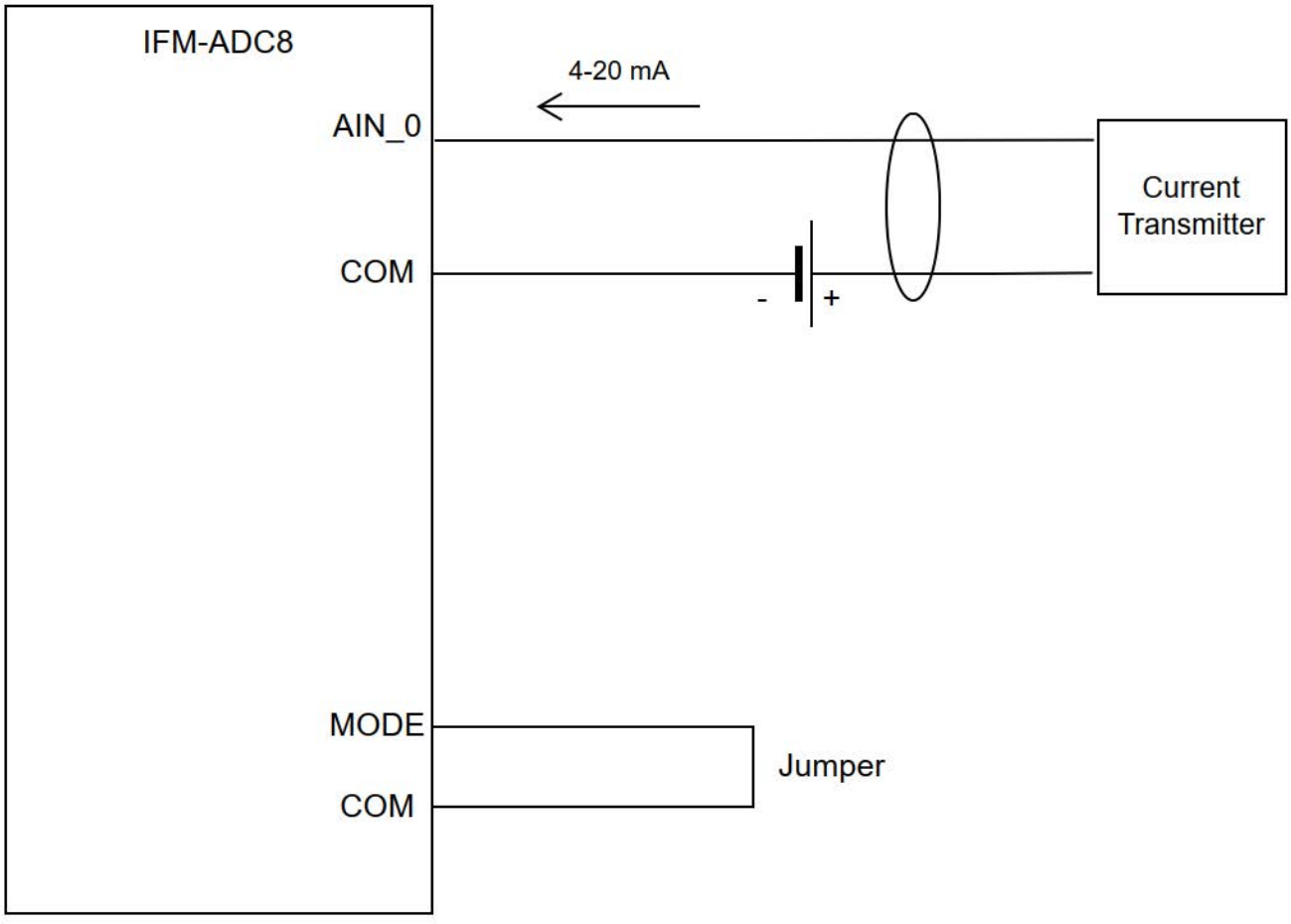


Figure 6 Analog Input used in Current Mode



IFM-WB WIFI / BLUETOOTH MODULE

Description
IFM-WB is an expansion module that adds Wi-Fi and Bluetooth capabilities to the system. Implemented using Intel Wi-Fi 6E AX210 connectivity module. IFM-WB features two RP-SMA connectors for external antennas.

Key features:

- Supports Wi-Fi 6E including new 6GHz band
- Bluetooth® 5.3

NOTE: I/O expansion modules cannot be used stand-alone without a connection to the IOT- DIN-IMX8PLUS gateway

Specifications
For wireless specifications please refer to the Intel Wi-Fi 6E AX210 datasheet.

Table 27 Electrical, Mechanical and Environmental

Mechanical Specifications	
Housing type	DIN rail housing (for DIN rail version EN 50022)
Housing material	ABS/PC high endurance
Dimensions	110 x 30 x 95 mm
Weight	110 gram
Environmental and Reliability	
MTTF	> 200,000 hours
Operation temperature	-30° to 70° C
Storage temperature	-40° to 85° C
Relative humidity	10% to 90% (operation)
	05% to 95% (storage)
Compliance	
Regulatory	FCC, CE, UKCA
EMC	EN 55032/5, EN 61000-6-2, EN 61000-6-3
Safety	EN/UL/IEC 62368-1

Connectors

Table 28 IFM-ADC8 connectors

Connector	Description
A	Wi-Fi (Chain A) + Bluetooth
B	Wi-Fi (Chain B)

Connector	Connector Type
A, B	RP-SMA

IOT-DIN-IMX8PLUS I/O Modules Reference Guide

Documents / Resources

	Compulab IOT-DIN-IMX8PLUS I O Expansion Modules [pdf] User Guide IOT-DIN-IMX8PLUS, IOT-DIN-IMX8PLUS I O Expansion Modules, I O Expansion Modules, Expansion Modules, Modules

References

- Compulab
- User Manual