



CTR-AFML Datasheet



2025

CTR-AFML Description

The CTR-AFML is a device capable of controlling stepper-based motors of microscope stages (commonly the Z-Axis Stage). It is used in conjunction with a PFA-DT or a PFA-LN sensor to provide a highly integrated camera focusing system. The CTR-AFML is also able to control either up to two 1.5 A illuminators, or one 3 A illuminator (purchased separately).

The system components normally include a CTR-AFML, PFA-DT/LN sensor, Z-stage, and (optionally) LED modules. After the system is connected, the CTR-AFML automatically detects the sensor's presence and begins receiving positional control commands from the sensor.

Ordering Info

Table 1 CTR-AFML Types

Type	Part Number
Controller (CTR-AFML)	976850

Product Specifications

Table 2 CTR-AFML Specifications

Description	Value
Weight (kg)	0.285
Dimensions	See " <i>Mechanical Dimensions</i> " on page 8

Electrical Connections

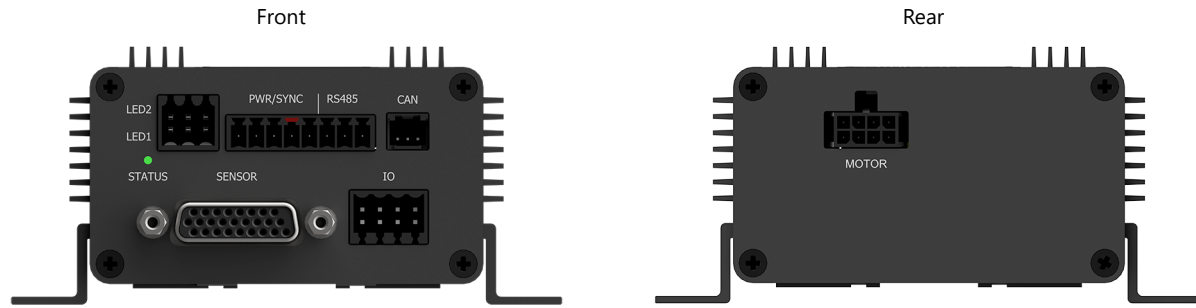


Figure 1 CTR-AFML Connectors



Figure 2 Power/Sync and RS485 connector

Table 3 Power/Sync and RS485 Connector Pin Assignments

Pin	Signal	Description
Power/Sync Connector		
1	+24V	+24V Power Supply.
2	GND	Power Supply Return.
3	ESTOP	Emergency Stop (Laser Enable), normally wired to supply voltage through a mushroom button. Actively drive high to enable the PFA-DT/LN laser diode.
4	DI	Digital input.
5	DO	Digital output.
RS485 Connector		
6	GND	IO Return.
7	RS485-	Inverting RS485 Receiver Input and Driver Output.
8	RS485+	Non Inverting RS485 Receiver Input and Driver Output.

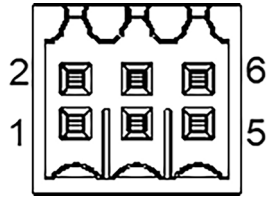


Figure 3 LED Driver Connector

Table 4 LED Driver Connector Pin Assignments

Pin	Signal	Description
1	LED1 Anode	LED1 Anode current output
2	LED2 Anode	LED2 Anode current output
3	NC	Not Connected, do not connect
4	NC	Not Connected, do not connect
5	LED1 Cathode	LED1 Cathode (return)
6	LED2 Cathode	LED2 Cathode (return)

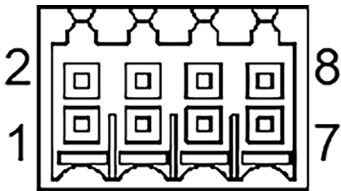


Figure 4 User IO Connector

Table 5 User IO Connector Pin Assignments

Pin #	Signal	Description
1	CSYNC	Camera Sync Input, immediately disables the laser for the duration of the pulse. Active high.
2	ESTOP	Emergency Stop (Laser Enable), normally wired to supply voltage through a mushroom button. Actively drive high to enable the PFA-DT/LN laser diode.
3	GND	IO Return.
4	5V	5V for motor external opto-couplers (max 100mA).
5	MIV	Material In View. Open drain with internal 1K Ω pull up to +5V.
6	INF	In Focus. Open Drain with internal 1K Ω pull up to +5V.
7	GND	AO Return.
8	AO	Analog Output.

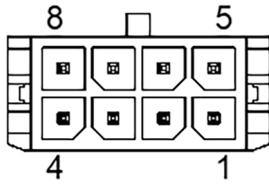


Figure 5 Motor Drive Connector

Table 6 Motor Drive Connector Pin Assignments

Pin	Signal	Function
1	5V	5V output for limit switches
2	CWLIM	CW limit switch
3	GND	5V return ground
4	CCWLIM	CCW limit switch
5	A+	Motor coil A+
6	A-	Motor coil A-
7	B+	Motor coil B+
8	B-	Motor coil B-

Connector specifications

Table 7 Connector Kit

Item	Description	Manufacturer	Manufacturer Part #	Note
Power/Sync and RS485 Connector	A five position plug is provided for Power/Sync.	TE Connectivity	2213936-5	Keyed by WDI
	A three position plug is provided for RS-485.	TE Connectivity	2213936-3	
	Eight ferrules are included.	American Electrical Inc.	1181050	
User IO Connector	An eight position plug.	Weidmuller	1277480000	
	Eight ferrules are included.	American Electrical Inc.	11102050	
CAN Termination Plug		WDI	801437	

Electrical Specifications

Table 8 Power/Sync and Comm Electrical Specifications

Parameter	Minimum	Typical	Maximum	Units	Conditions
Power Supply					
Supply Voltage	22	24	26	VDC	
Supply Power	2.4		40	W	2 channels ILED=1.5A, max 5V LED fwd voltage when used with a PFA-DT or PFA-LN sensor
Supply Power	2.4		70	W	2 channels ILED=1.5A, max 20V LED fwd voltage when used with a PFA-DT or PFA-LN sensor
DI					
Input Voltage Low (VIL)	-0.5	0	1.5	V	
Input Voltage High (VIH)	3.5	5	5.5	V	
Input Resistance		7.5		K Ω	
DO					
Output Type	Open Drain with 1K Ω pull up to 5V				
Output Voltage Low (VOL)		5		V	High impedance load
Output Voltage High (VOH)	0		0.4	V	
Output Impedance		5		K Ω	
Drain Current			100	mA	
RS485					
Differential Driver Output Voltage	2	3.3	V		
Receiver Differential Threshold Voltage	50	105	200	mV	
Differential Termination Resistor		120		Ω	
Data Rate		115200		bps	

Table 9 User IO Electrical Specifications

Parameter	Condition	Minimum	Typical	Maximum	Units
Digital Inputs (ESTOP, CSYNC)					
Input Voltage High (VIH)		2.8		28	V
Input Voltage Low (VIL)		-0.5		1	V
Input Resistance		21.4			K Ω
Digital Outputs (INF, MIV)					
Maximum Drain Current	Output active (low)			100	mA
Maximum Output (Pull-up) Voltage	Output inactive (high)		5	5.5	V
Output Voltage Low (VOL)	Output active (low)	0	0.35	0.5	V
Internal Pull Up Resistor Value 1		1			k Ω

Table 9 User IO Electrical Specifications (continued)

Parameter	Condition	Minimum	Typical	Maximum	Units
Analog Output					
Output Voltage Range		-10		10	V
Maximum Output Current				±10	mA
Output Resistance		20			Ω

Table 10 WDI LED Output Specifications

Parameter	Condition	Min	Typical	Max	Units
Dual Channel LED Driver, Each Channel					
LED Forward Voltage	V _{supp} =24V	1.6		22	V
	V _{supp} =26V	1.6		24	V
Output Current Ripple			15	25	mA
Pulse Width		5 ^a			μs
Analog Dimming Range			30:1		
PWM Dimming Range			1000:1 ^a		
PWM Frequency		1		100000	Hz
Pulse Edge Position Accuracy			1		μs

a. Minimum pulse width can restrict minimum duty cycle, and dimming range, in PWM mode.

Table 11 Motor Driver Electrical Specifications

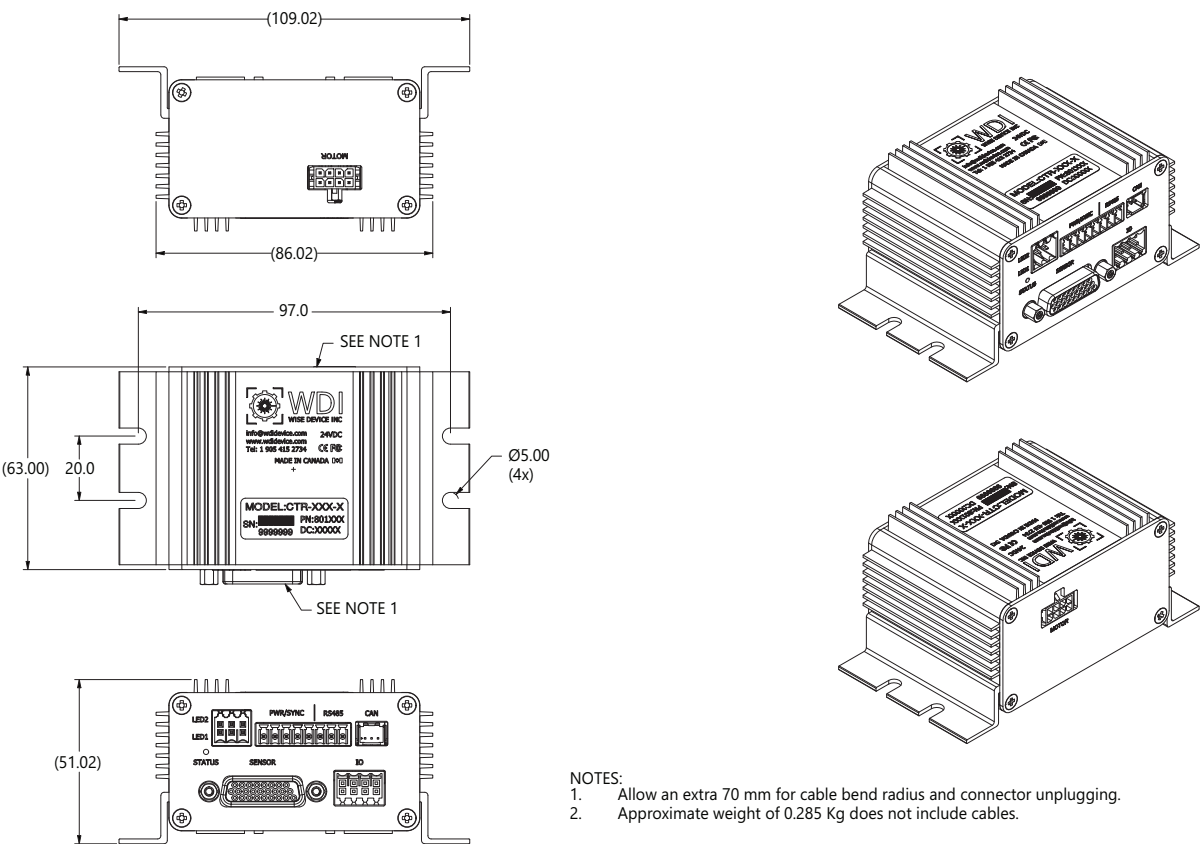
Parameter	Minimum	Typical	Maximum	Units	Conditions
Stepper Motor Driver MCOIL A+/A- B+/B-					
Motor Output Current			1.2	A RMS	
Peak Motor Output Current			2	A	
Output Voltage			24	V	
Micro Stepping	1		256	μstep	
Limit Switch Power Output					
Supply Voltage		5		VDC	
Supply Current			20	mA	
Limit Switch Inputs CWLIM, CCWLIM					
Input Voltage High (VIH)	2		5.5	V	
Input Voltage Low (VIL)	-0.5		0.7	V	
Input Resistance		5		KΩ	

Environmental Specifications

Table 12 CTR-AFML Environmental Specifications

Description	Value
Operating Ambient Temperature	20°C to 30°C
Transport Temperature (sealed container)	-20°C to 50°C
Storage Temperature	10°C to 40°C
Humidity Temperature	10% to 80% non-condensing

Mechanical Dimensions



Available Accessories

Table 13 CTR-AFML Accessories

Accessory	Part Number	Remarks
Cable (CAB-LLC-MMS), (300 mm)	801443	300 mm length (for attached and integrated controller configurations)
Cable (CAB-LLC-MMS), (1000 mm)	801443-1	1 m length (for separated controller configuration)
Cable (CAB-USB-RS485), 1.8 m	801464	Cable, USB to RS485, wire end, 1800 mm length
Cable (CAB-USB-RS485), 5 m	801464-1	Cable, USB to RS485, wire end, 5000 mm length

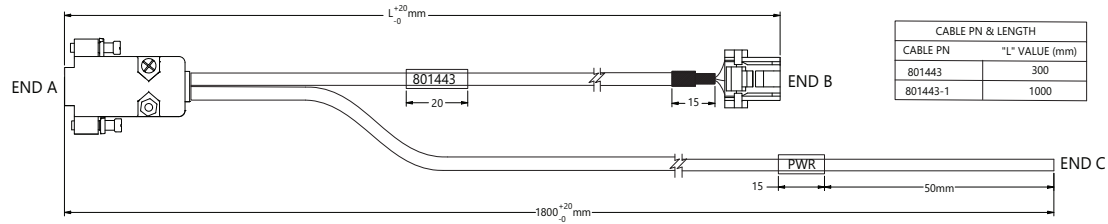


Figure 7 CAB-LLC-MMS Cable Wiring

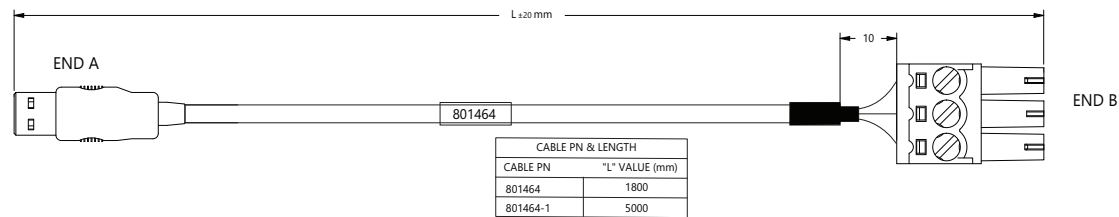


Figure 8 CAB-USB-RS485 Cable Wiring