CPF - ABB ERH Motor and Drive Quick Start Guide

Please read and save these instructions for future reference. Read carefully before attempting to assemble, install, operate or maintain the product described. Follow all safety information in Model CPF (#488346 IOM) and ABB ERH technical documentation. Protect yourself and others by observing all safety information. Failure to comply with these instructions will result in voiding of the product warranty and may result in personal injury and/or property damage.



ABB ERH Integrated Motor/Drive

General Information

This quick start guide supplements Model CPF (#488346 IOM). Use document 488346 for receiving, rigging, mechanical installation, vibration, maintenance and other fan-specific instructions. This guide focuses on the ABB ERH integrated motor/drive used on the CPF.

IMPORTANT

Always disconnect, lock and tag all power sources before installing or servicing the fan. Wait at least ten minutes after disconnecting ERH input power. Rotation of the permanent-magnet rotor can generate hazardous voltage; stop and secure the fan wheel. Isolate separately powered control circuits and verify zero voltage before working on ERH power or control terminals.

Document Scope

- ERH line-power and control-terminal identification
- CPF analog start-up sequence
- CPF parameter settings used during commissioning
- ERH Configurator connection and basic use
- Common start-up and communication troubleshooting

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Quick Start Features

- Integrated variable-speed motor and drive
- 0-10VDC analog speed reference
- Digital input configuration
- RS-485 Modbus RTU communication
- Configurable relay and digital outputs
- PC setup using ABB ERH Configurator software

IMPORTANT

Set max. RPM to the project-specific value. Never exceed the maximum cataloged fan RPM for the supplied CPF.

Safety/Electrical Connections

General Safety Information

Only qualified personnel should install, wire, program or service the ERH. Personnel should understand the CPF and ABB ERH instructions and be aware of hazards from electrical energy and rotating equipment.

1. Follow all applicable local electrical and safety codes and the requirements in Model CPF (488346 IOM).
2. Verify the supply voltage, phase and ampere capacity are compatible with the ERH nameplate before applying power.
3. Disconnect, lock and tag all power sources and secure the fan wheel before opening the ERH drive cover or servicing the fan.
4. After removing ERH input power, wait at least ten minutes and verify zero voltage at the ERH power and control terminals.
5. Ensure the protective earth connection is installed before applying power.
6. Do not use Start/Stop commands or the Configurator Stop function as an electrical isolation device.

IMPORTANT

The ERH may start when power is applied if the programmed input configuration and external control signals call for operation. Keep personnel and loose objects clear of the fan inlet and wheel before energizing.

Before Making Connections

- Verify ERH catalog/model and voltage on the motor and drive nameplate.
- Verify the fan wheel rotates freely by hand.
- Confirm the disconnect is OFF and incoming conductors are de-energized.
- Do not perform insulation-resistance (megger) or voltage-withstand tests on the ERH.

Line Power

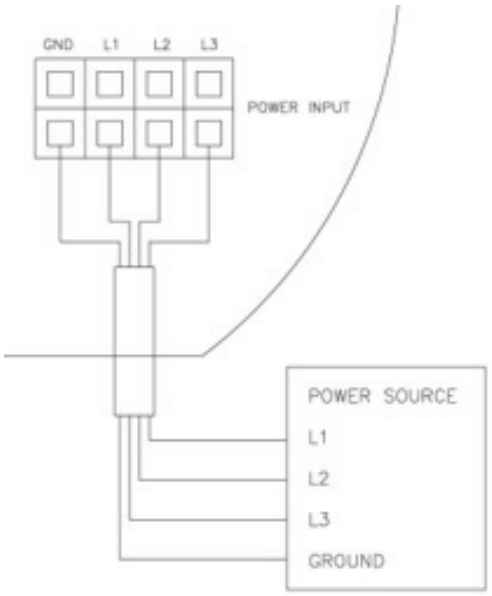


ABB ERH power-terminal arrangement.
Verify the installed ERH nameplate before wiring.

Connect protective earth conductor to the grounding terminal. Connect the three-phase supply conductors to L1, L2 and L3. Provide branch-circuit protection per the project wiring diagram, ABB MN458 and applicable code. The motor-to-drive connection is factory assembled.

NOTE

Do not reverse motor rotation by swapping motor phases. Motor rotation for the CPF is factory set and changed through ERH programming when required.

Grounding and Cable Routing

- Protective earth ground must always be connected.
- The protective-earth conductor must be at least the same size as the line conductors and meet applicable code requirements.
- Keep power and control cables separate; maintain at least 4 in. (*100 mm*) separation where they are near one another.
- Do not route power and control cables parallel. Cross at 90 degrees.

Control Wiring

The ERH isolated I/O terminal strip provides the analog, digital and RS-485 connections used for CPF control. Model CPF uses a 0-10VDC speed reference with Digital In. Config. set to Start, mapping DI1 as the Start input.

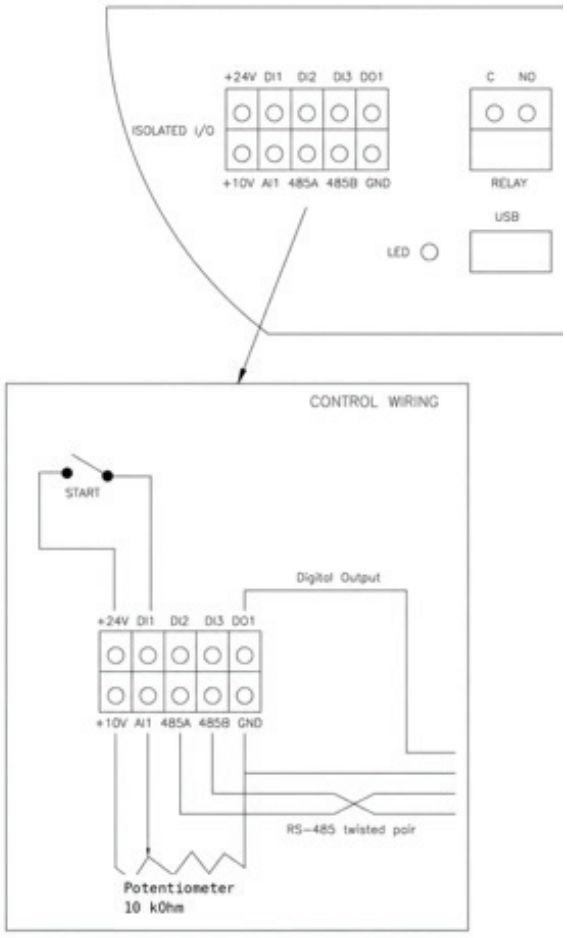


ABB ERH control-terminal identification and typical analog control wiring

Terminal	Terminal Function	Typical CPF Use	Notes
+24V	+24VDC supply output	Digital input source	Use with DI contacts only as specified by ABB
DI1	Start	Start/Run command	Close +24V to DI1 to command the motor/drive to run
+10V	+10VDC reference output	Potentiometer source	Use a 10kΩ potentiometer for local control
AI1	0-10VDC analog input speed signal	BAS / controller speed signal / potentiometer speed signal	Analog input measurement range is 0-10VDC
GND	+24VDC supply common / analog input common / digital output common	+24VDC common reference point / analog input common / digital output common	GND is signal common
485A(+) / 485B(-)	RS-485 Modbus	BAS or PC Configurator Software	Use twisted pair; maintain A/B polarity
C / NO	Normally open relay contact	Drive healthy status	Default Relay Output (24): Drive healthy. C-NO closes when healthy; opens when faulted or de-energized.

APPLICATION NOTE: Use the project-specific model CPF wiring diagram for final field connections, including RS-485 common and shield terminations. Project controls may use different field devices or BAS connections.

Initial Start-Up and Basic Programming

Before Initial Start-up

1. Confirm building supply voltage matches the ERH/fan nameplate.
2. Verify all electrical connections are secure and protective earth is connected.
3. With all power sources locked out, rotate the fan wheel by hand and verify no parts are rubbing.
4. Check all guards and fasteners for secure attachment.
5. Remove tools, debris and obstructions from the fan inlet and wheel area.
6. Set the speed command to minimum before energizing.

CPF Analog Start-up

1. With power OFF, connect the Start contact between +24V and DI1.
2. Connect the 0-10VDC speed reference to AI1 and GND. For local control, connect a 10kΩ potentiometer to +10V, AI1 and GND as shown on previous page.
3. Apply power with the speed signal reference at zero.
4. Close the Start input (DI1).
5. Increase the speed reference slowly. CPF initial start-up should be checked at low speed.
6. Momentarily run the fan and verify wheel rotation matches the rotation decal.
7. Check for unusual noise, vibration or overheating before increasing speed.

IMPORTANT

These are factory CPF settings, not ABB defaults. Load the approved CPF parameter set on replacement or unprogrammed ERH units. Do not change protected motor-control, current or thermal parameters unless directed by Greenheck or ABB.

NOTE

A zero-speed reference does not isolate the ERH. The drive can remain energized in standby and restart when a speed reference returns. Open the Start circuit and use the disconnect/lockout procedure for true isolation.

Greenheck CPF Parameters

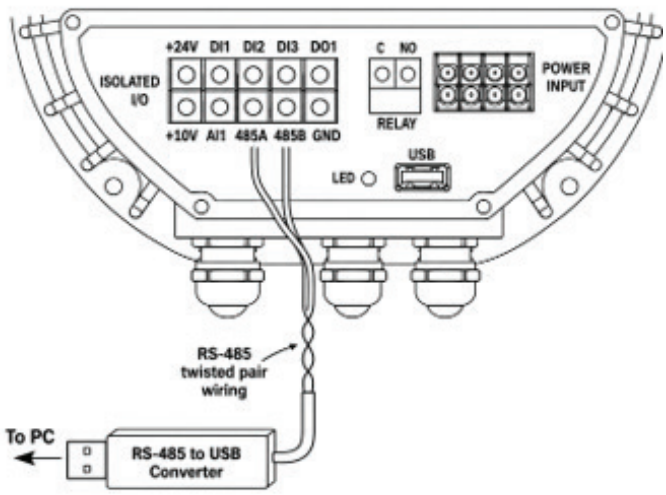
Parameter	Default CPF Setting	Notes
Input Type (18)	Analog	Available types: Analog (0-10VDC at AI1), Modbus (RPM), Parameter (fixed RPM), and Percent (% of Max. RPM). Non-analog modes require project-specific setup.
Rotation (19)	Reverse	Change in programming only if CPF rotation requires correction.
Digital In. Config (20)	Start	Maps DI1 as Start in the default CPF configuration
Min. RPM (1)	200 RPM	Below minimum reference the commanded speed may be zero.
Max. RPM (2)	See table below. Match motor nameplate power and RPM.	The values shown are the maximum allowable RPMs for the listed ERH motor and CPF fan-size combinations.
Acceleration (3)	50 RPM/s	Excessive acceleration can contribute to overcurrent/overload faults.
Deceleration (4)	25 RPM/s	Excessive deceleration can contribute to high DC-bus voltage faults.
Relay Output (24)	Drive healthy	Other available states include running, at speed, faulted, over threshold, and inside range.
Modbus Address (29)	1	When controlled/monitored through Modbus, each motor/drive *must* have its own unique address number. The default address is “1”.
Modbus Parity/Stop Bits (30)	8-None-2	Default communication parity/stops bits
Baud Rate (31)	9600 bps	Default communication baud rate

Motor Nameplate				Max RPM per fan size				
Power	RPM	Voltage	FLA	400	450	500	560	630
3 HP	3000	230	8	2214	1660	1280	N/A	N/A
5 HP	2400	380-480	7.1	2400	2396	1846	1419	N/A
7.5 HP	2700	380-480	9.2	2700	2700	2525	N/A	N/A
7.5 HP	1800	380-480	8.7	N/A	N/A	N/A	1800	1675

ERH Configurator

ABB ERH Configurator is used to view live operating values, modify permitted holding-register parameters and troubleshoot the ERH. Communication is through Modbus RTU over the ERH RS-485 terminals.

PC Connection



- Connect 485A to 485A and 485B to 485B using twisted pair.
- Use a compatible USB-to-RS-485 adapter and the required PC driver.
- Default ERH communications: Address 1, 9600 bps, 8 data bits, no parity, 2 stop bits.

Connect to the ERH

1. Install and launch the current ABB ERH Configurator software.
2. Verify the correct inverter XML parameter file is loaded for the ERH.
3. Select the COM port assigned to the USB-to-RS-485 adapter.
4. Set communication parameters to match the ERH. New drives default to 9600 bps.
5. Select the connection icon. Confirm the Information window reports “Port connected”.

Configurator Screen Basics

- Input Registers - live, read-only operating information including speed, bus voltage, temperature, alarms and power.
- Holding Registers - editable setup parameters base on user access level.
- Speed Reference - used to command speed when the ERH is configured for Modbus control.
- Stop - sets the Modbus speed reference to zero.
- Reset - sends an alarm reset command.

WARNING

With Input Type set to Modbus, entering a nonzero Speed Reference can start the fan. Stop only sets the Modbus speed reference to zero; it does not disable or electrically isolate the ERH. Changes take effect immediately. Program only while the fan is stopped and safe.

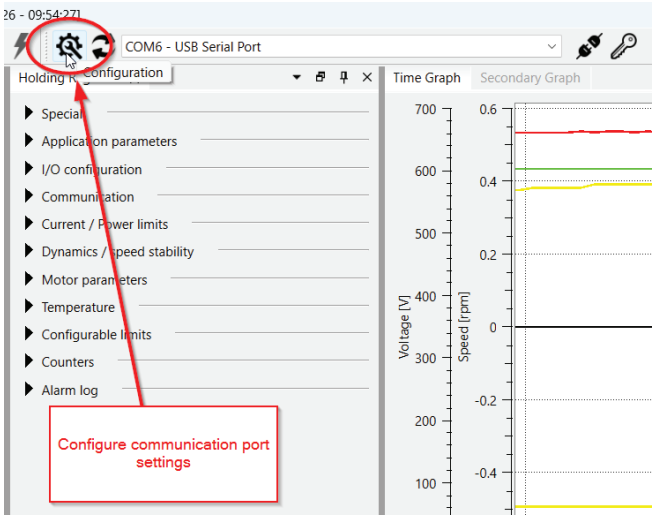
ACCESS LEVELS: Level 1 is the customer/user level. Higher levels are for controlled distributor, manufacturing or engineering use.
Level 1 password: “letmein”.

1. Connect RS-485	2. Launch Configurator	3. Select COM Port	4. Confirm Settings	5. Connect / Verify

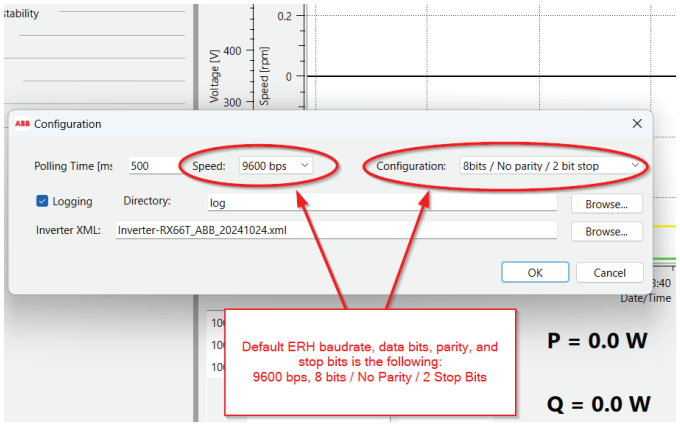
ERH Configurator Connection

Follow the sequence below to configure communications and connect to the ERH.

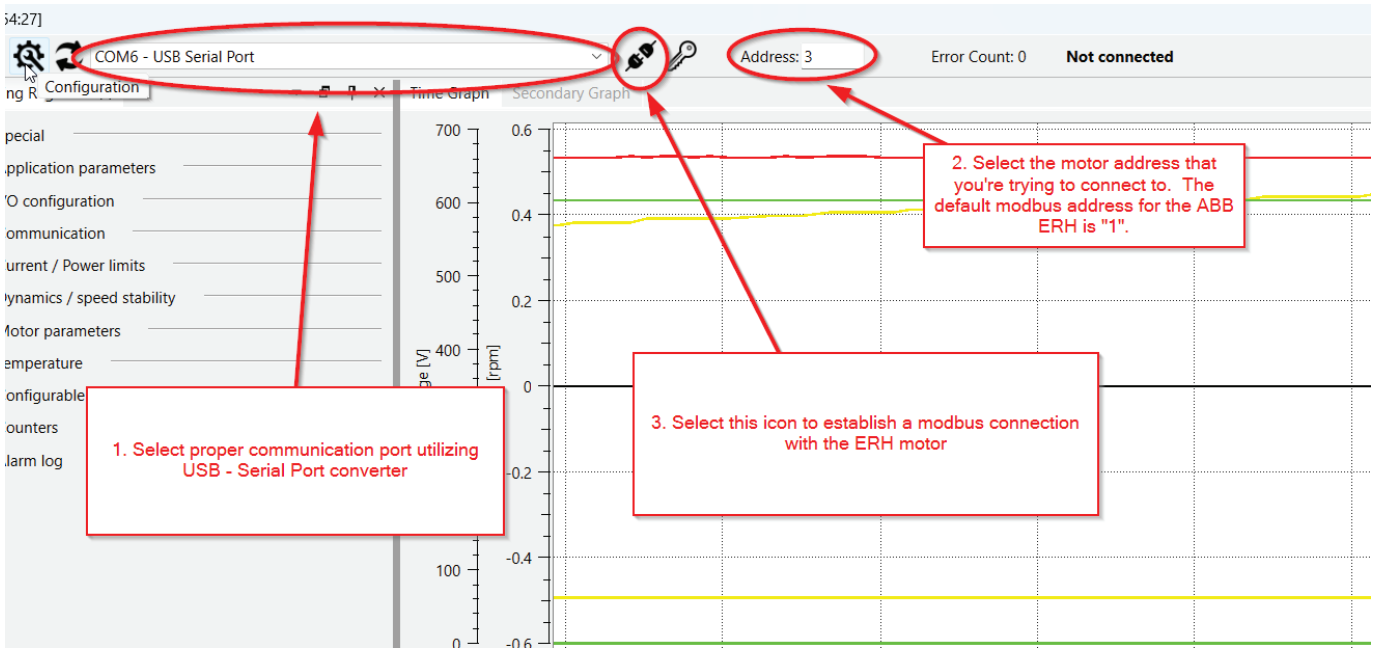
1. Open communication setup



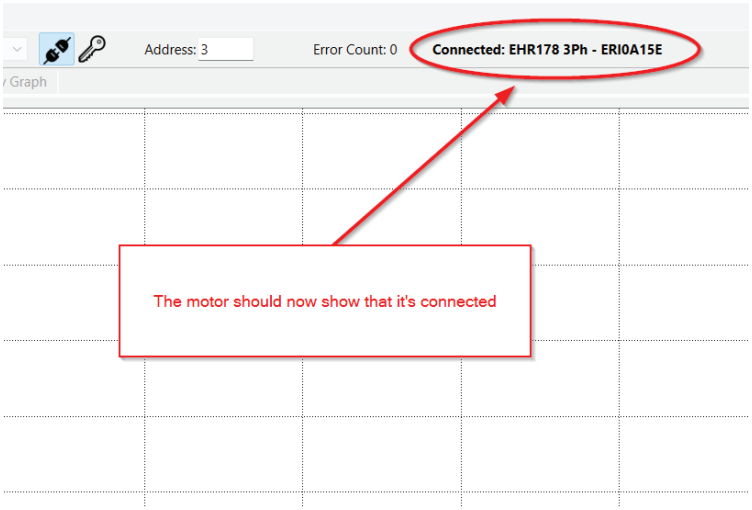
2. Confirm default communication settings



3. Select COM Port, ERH address and connect



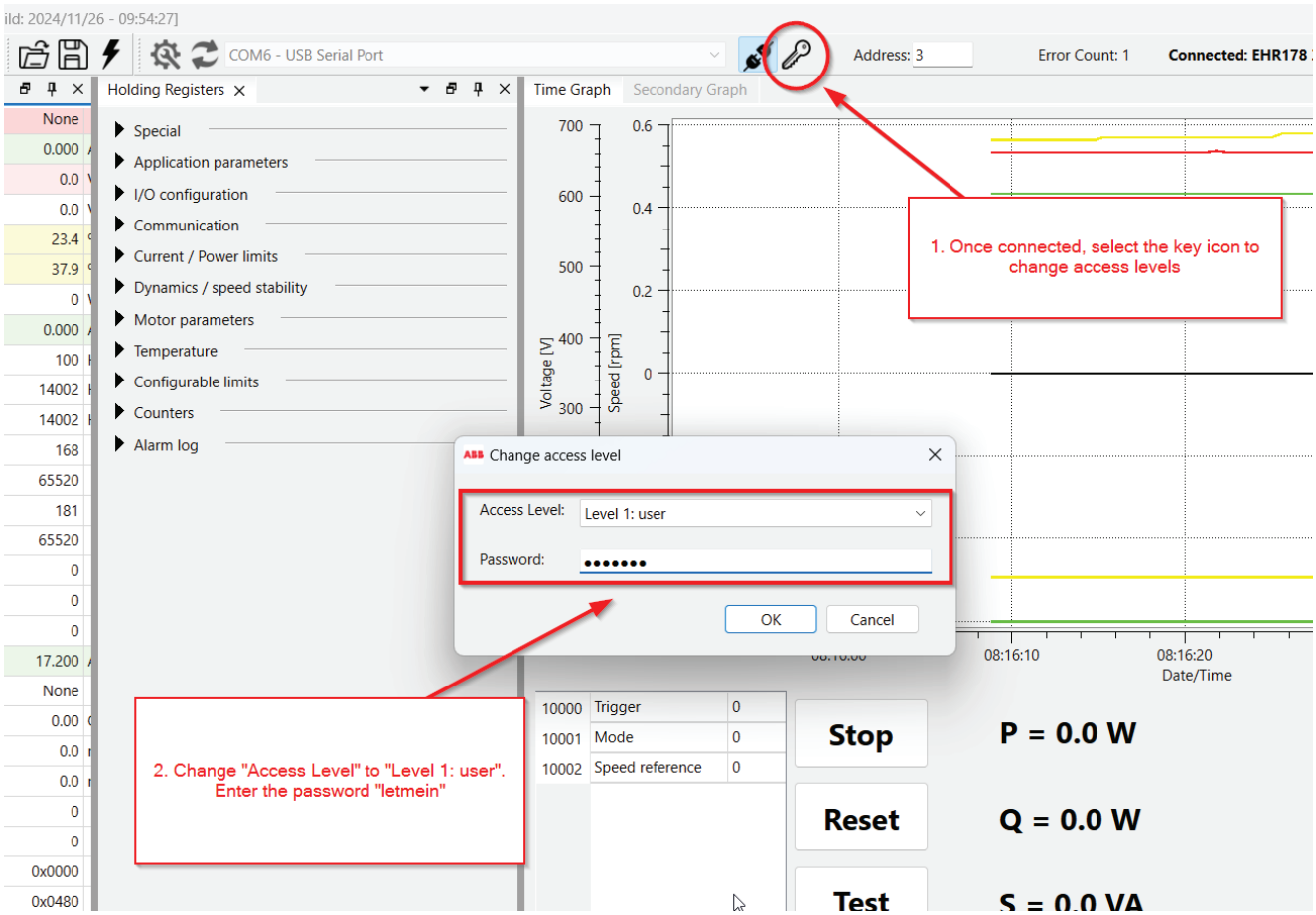
4. Verify ERH connection



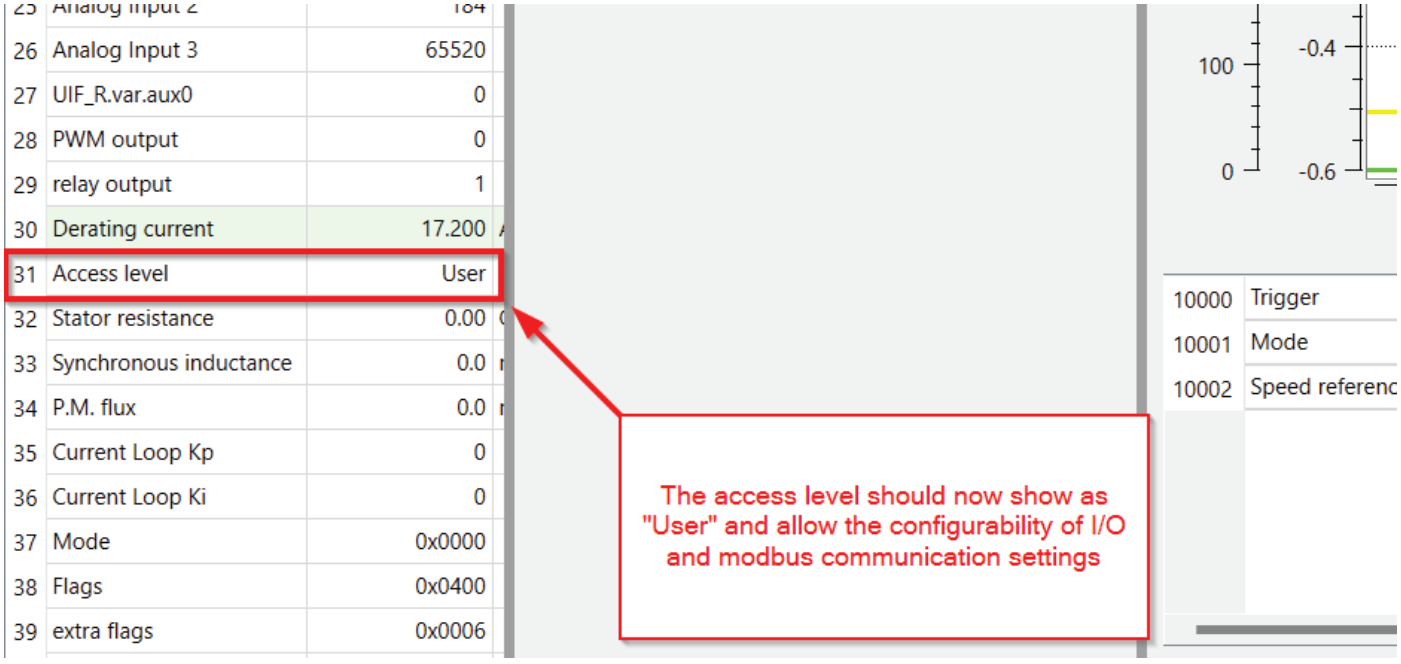
ERH Configurator User Access

With the fan stopped, log in at Level 1 to access the user-level adjustable CPF parameters.

5. Log in at Level 1: User



6. Verify Access Level = User



Common Modbus Input Registers

Function 0x04 – Read Input Registers

Input Register Address (zero-based)	Register Description	Scale	Units
2	Speed Reference (read-only)	1	RPM
3	Measured Speed	1	RPM
9	DC Bus Voltage	0.1	V
10	Alarm 1 (see next page for alarms/warnings)	1	List
11	Alarm 2 (see next page for alarms/warnings)	1	List
12	Warnings (see next page for alarms/warnings)	1	List
15	0-10V Analog Input Signal	0.1	V
18	Active Power	1	W
29	Relay Output Status (0 = Open, 1 = Closed)	1	Bool
31	Access Level	1	List

Common Modbus Holding Registers

Function 0x03 – Read Holding Registers, Function 0x06 – Write Single Register, Function 0x10 – Write Multiple Registers

Holding Register Address (zero-based)	Register Description	Scale	Units
0	Reset Alarm (Write a “1” to this register to reset any current drive alarm/faults)	1	Bool
10002	Modbus Speed Reference/Command (RPM based when Input Type is “Modbus”. Percentage based when Input Type is “Percent”.)	1	RPM or %

Alarms and Warnings

Used in conjunction with input registers 10-12 (Alarm 1, Alarm 2, and Warnings)

Code	Alarm	Reset Condition
0	No Alarm	None
1	Memory	Manual Reset
2	Short Circuit	Manual Reset
3	Loss of Synchronism	Automatic Reset Up to 10 times. After 10 retries, a power cycle is required.
4	Low Voltage with Motor Stopped	Automatic Reset
5	Low Voltage with Motor Running	Automatic Reset
6	High Voltage	Automatic Reset
7	High Integrated Power Module (IPM) Temperature	Automatic Reset
8	High Printed Circuit Board (PCB) Temperature	Automatic Reset
9	High Motor Temperature (Disabled Currently)	None
10	Low Motor Temperature (Disabled Currently)	None
11	Loss of Motor Phase U	Manual Reset
12	Loss of Motor Phase V	Manual Reset
13	Loss of Motor Phase W	Manual Reset
14	No Motor Detected	Manual Reset
15	Communication Lost	Manual Reset
16	Tuning Error	Manual Reset
Code	**Warning**	
0	No warning	
1	Temperature derating	Ensure the ambient temperature is less than the drive's allowable ambient temperature (40°C).
2	Single phase mode (for three phase drives)	Ensure all three-phases are present and that the voltage corresponds with the voltage on the motor nameplate.
3	Both conditions 1 and 2 at the same time	See resolutions for both conditions 1 and 2 above.

ERH Troubleshooting

Correct the cause of a fault before resetting the ERH. Use the ERH input registers and alarm indication in ERH Configurator when additional detail is needed.

CPF / ABB ERH Troubleshooting Guide		
Symptom	Potential Issue	Corrective Action
Motor/drive does not run	• No Alarm • DI1 Start input open • Speed reference at zero • Incorrect Input Type or DI configuration • Active alarm	• Verify disconnect and ERH input voltage. • Verify +24V is present at DI1 when a run command is issued. • Measure AI1 speed reference or verify Modbus reference. • Confirm input type and digital input config. match the approved CPF setup. • Read Alarm 1 / Alarm 2 and correct the cause.
Fan runs in wrong direction	• Rotation parameter does not match CPF wheel rotation	• Stop the fan and change the ERH rotation parameter as required. Do not swap motor/drive phases. Verify rotation against the CPF rotation decal at low speed.
Non Configurator communication	• 485A / 485B reversed • Wrong COM port • Baud/parity/stop-bit mismatch • Wrong Modbus address • Wrong XML file	• Verify RS-485 polarity and twisted-pair wiring. • Select the correct PC COM port. • Match the ERH default or programmed communication settings. • Verify address. • Verify the loaded inverter XML matches the ERH.
ERH trips on high voltage	• High incoming voltage • Rapid deceleration	• Verify line voltage • Reduce the Deceleration rate to increase stopping time, if approved for the application
ERH trips or derates on temperature	• Restricted airflow • High ambient temperature • Fan operating outside intended range	• Verify wheel airflow and that the motor/drive cooling path is unobstructed. • Verify ambient conditions. • Review drive temperature registers and CPF operating point.
Low speed / cannot reach command	• Max RPM or current/power limit • Low input voltage • Fan load higher than expected	• Compare measured speed to reference. • Verify max RPM and applicable limits. • Verify input voltage and mechanical system condition.
Alarm will not reset	• Alarm condition remains present • Manual reset alarm requires corrective action	• Correct the underlying condition first. • Use the appropriate reset method for the programmed input mode. Some conditions may require a power cycle after the cause is corrected.
SERVICE NOTE: If an ERH fault cannot be resolved using the CPF and ABB troubleshooting information, record the Greenheck fan serial number, ABB ERH model/spec number, alarm code and operating conditions before contacting technical support.		

Start-Up Checklist / References

CPF ERH Commissioning Checklist

- ˇ Fan installation complete per model CPF (#488346 IOM)
- ˇ Supply voltage and phase match ERH nameplate
- ˇ Protective earth connected
- ˇ Power and control conductors secure
- ˇ Wheel rotates freely by hand
- ˇ Guards installed and inlet area clear
- ˇ Approved CPF parameter set and control method verified
- ˇ Minimum and project-specific maximum speed verified
- ˇ Acceleration and deceleration settings verified
- ˇ Start input (DI1) verified
- ˇ 0-10VDC or Modbus speed reference verified
- ˇ Fan started at low speed
- ˇ Wheel rotation verified against rotation decal
- ˇ No unusual noise, vibration or overheating
- ˇ Field vibration/resonance evaluation completed per model CPF (#488346 IOM)
- ˇ Final speed does not exceed the project-specific max RPM or CPF catalog limit

Commissioned by: _____

Date: _____

Fan Serial No.: _____

Reference Documents

Model CPF IOM

Document 488346
https://content.greenheck.com/public/DAMProd/Original/10025/488346_CPF_iom.pdf

ABB ERH Variable-speed, exterior-rotor Integrated Motor Drive

ABB Technical manual and user's guide
https://search.abb.com/library/Download.aspx?DocumentID=MN458&LanguageCode=en&DocumentPartId=&Action=Launch

ABB ERH Configurator

ABB User's guide
https://search.abb.com/library/Download.aspx?DocumentID=MN459&LanguageCode=en&DocumentPartId=&Action=Launch

ABB DOCUMENTATION: Use the current ABB ERH technical manual, current ERH Configurator software, and parameter XML file that match the installed ERH.

Maintenance Log

Date _____Time _____ AM/PM
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Our Commitment

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

Product warranties can be found online at Greenheck.com, either on the specific product page or in the literature section of the website at Greenheck.com/Resources/Library/Literature.

Greenheck's CPF flyer provides additional information describing the equipment, fan performance, available accessories, and specification data.

AMCA Publication 410-25, Safety Practices for Users and Installers of Industrial and Commercial Fans, provides additional safety information. This publication can be obtained from AMCA International, Inc. at www.amca.org.

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