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1.1 Important



User Information The Remote Operator allows remote operation of the soft starter. Observe all necessary safety precautions when controlling the soft starter remotely. Alert personnel that machinery may start without warning.

It is the installers responsibility to follow all instructions in this manual and to follow correct electrical practice.

Use all International recognised standard practice for RS485 communications when installing and using this equipment.

Users are cautioned that the information contained in this manual is subject to change at any time and without prior notice. In no event will responsibility or liability be accepted for direct, indirect or consequential damages resulting from the use or application of this equipment.

1.2 General

The Remote Operator incorporates an RS485 serial communications facility which allows the remote control of a motor in the same way as the soft starter control function . It also acts as a gateway device for connection to an RS485 serial communications network. This allows for remote control of a motor from an RS485 serial communications network using Modbus RTU or standard AuCom ASCII communications protocol. These protocols are selectable.

With the Remote Operator you can start, stop, quick stop and reset trip conditions and read operational status and motor data, ie. motor current, motor temperature and trip status. There is also a 4-20mA analogue output for motor current monitoring.

The Remote Operator is IP54 rated when installed as per instructions detailed in Sections 4.2 and 4.3 of this manual.

1.3. Manual Description

This manual describes the installation, connection, configuration and operation of the Remote Operator.

For details on soft starter compatibility refer to Section 4.5 of this manual.

Reference must be made to the MCD3000 Operators Instruction Manual and the MCD200 Users Manual where stated.



Indicates something to be noted by reader



Indicates a general warning

2.1 General Technical Data

Enclosure	
Front Panel Height	120mm
Front Panel Width	120mm
Inside Panel Depth (when mounted)	30mm (max)
Panel Cut-out	92mm ²
Weight	450 grams

Power Supply	
Voltage	18 ~ 30VDC or 50/60Hz AC
Consumption	250mA (max)
Connection (Terminals 1, 2)	2 pole spring clamp connector terminals

RS485 Serial Network Port (This Network Connection is Optional)	
RS485 Network Interface	ASCII or Modbus RTU selectable protocol
Connection (Terminals B6, B7, B8)	3 pole spring clamp connector terminals

RS485 Serial Starter Port (Soft Starter Connection)	
RS485 Soft Starter Interface	ASCII protocol as standard
Connection (Terminals B1, B2, B3)	3 pole spring clamp connector terminals

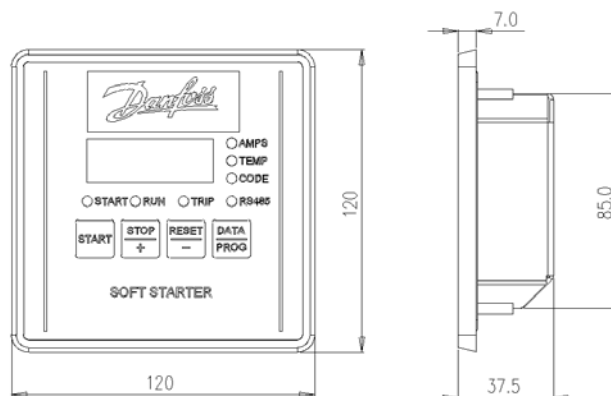
Analogue Output	
Motor Current Monitoring Interface	4-20mA (max.burden 200 ohms)
Connection (Terminals B10, B11)	2 pole spring clamp connector terminals

Sundry	
Enclosure Rating	IP54 (NEMA 12) when correctly panel mounted
Pollution degree	Pollution Degree 3
Operating Temperature	- 5°C / + 60°C
Relative Humidity	5 – 95% (max non condensing)

This product has been designed for environment A. Use of this product in environment B may cause unwanted electromagnetic disturbances in which case the user may be required to take adequate mitigation measures.

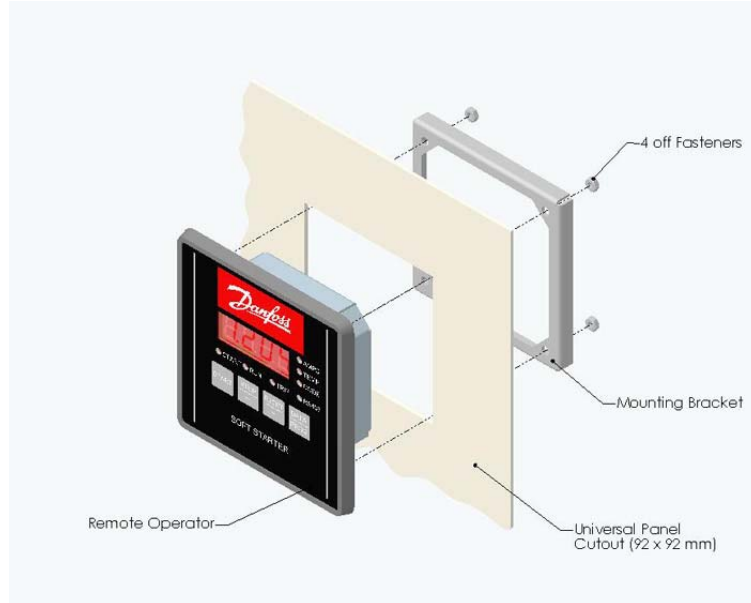
Standards Approvals	
CE	IEC 60947-4-2
UL	UL 508
C-tick	AS/NZS 3947-4-2, CISPR-11

2.2 Dimensions



3.1 Definition If the Remote Operator is only being used with a soft starter, use the procedure detailed in this section. The Remote Operator is pre-configured to control a soft starter once control supply power is applied to these devices. No parameter adjustments are required to the Remote Operator or soft starter for basic operation.

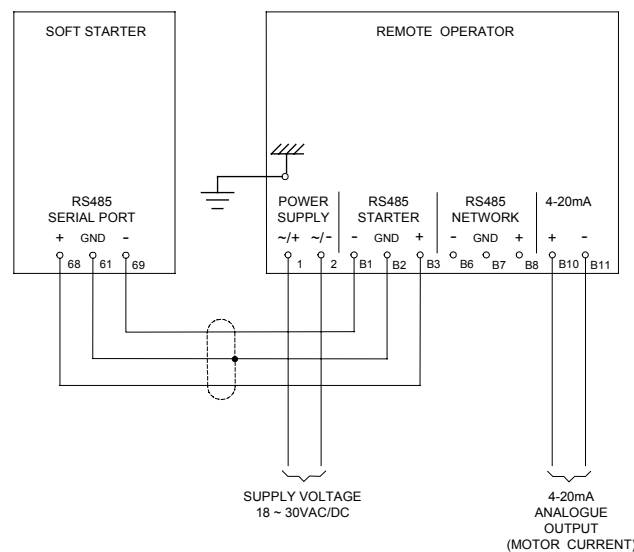
3.2 Mounting Mount the Remote Operator as per the diagram below. A universal 92 x 92mm



panel cut out is required. For further details refer to Section 4.3 of this manual.

3.3 Electrical Connection

Once the Remote Operator is mounted connect as per the following connection diagram. For further details refer to Section 4.4 of this manual.



CONNECTION DIAGRAM

3.4 Front Panel Operation



The start, stop and reset pushbuttons are for motor control. Operating the stop and reset pushbuttons simultaneously will cause the motor to quick stop.

The DATA/PROG pushbutton when pressed momentarily changes the LED data displayed between motor current and motor temperature. This feature is not available on the MCD200 open loop soft starter model.

AMPS, TEMP and CODE LEDs indicate the data being displayed. START, RUN, TRIP and RS485 LEDs indicate the soft starter status.

For further details refer to Section 5.1 of this manual.

4.1 Definition The Remote Operator can be connected to an RS485 serial communications network using ASCII or Modbus RTU selectable protocol. It also has a 4-20mA analogue output for motor current monitoring. If these features are being used refer to the following details in this section.

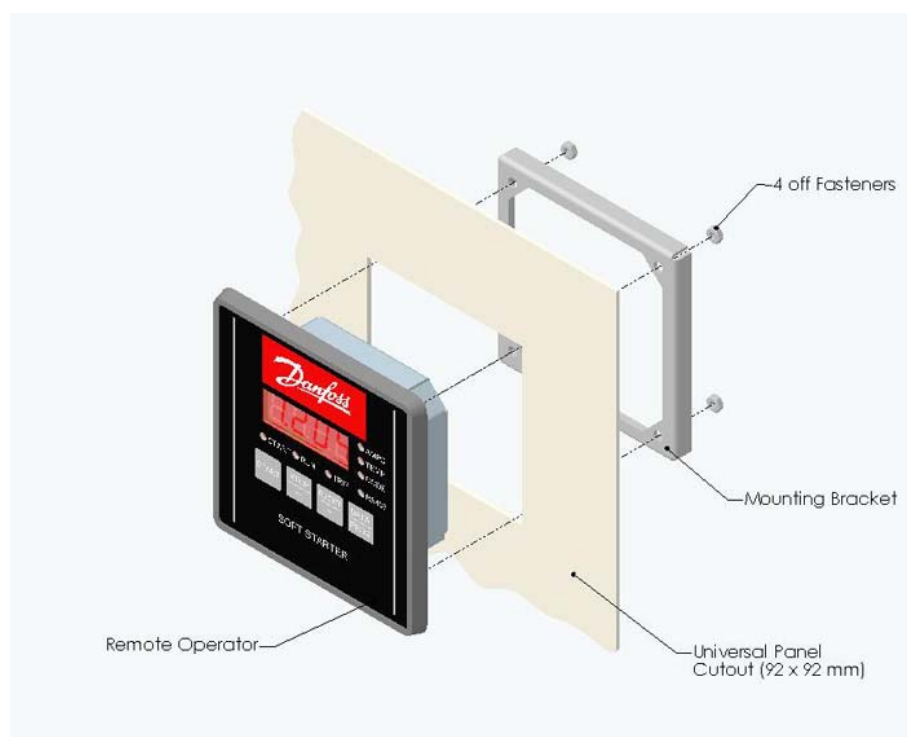
4.2 Installation Sequence To install the Remote Operator use the following procedure.

- Mount the Remote Operator at its intended location
- Connect the external power supply to the Remote Operator and the soft starter
- Connect the Remote Operator RS485 Starter port to the soft starter
- Connect the Remote Operator RS485 Network port to a serial communications network
- Configure the soft starter
- Configure the Remote Operator

4.3 Mounting The Remote Operator has an IP54 rating when mounted correctly as per these instructions. It is intended for use on the flat surface of a panel with all external wiring connected from behind the panel.

The Remote Operator is supplied with a mounting bracket and 4 off fasteners. The built in gasket seal guarantees protection from outside the panel.

Choose the panel location of the Remote Operator. The required panel cut out is 92 x 92mm. Place the Remote Operator through the cut out and locate the mounting bracket at the rear of the panel onto the 4 off studs. Use the 4 off fasteners to tighten the mounting bracket up to the rear of the panel.

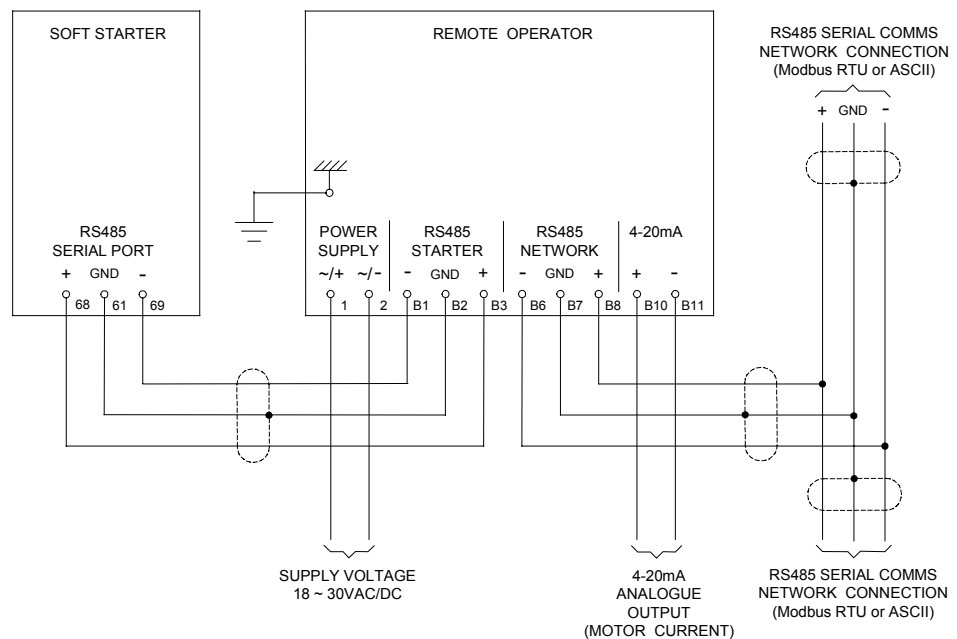


4.4 Electrical Connection

The Remote Operator requires a minimum of three electrical connections – the external power supply, the chassis earth and the RS485 Starter port to the soft starter. When a serial communications network is being used, connect the RS485 Network port to the network. When the 4-20mA output is being used connect to terminals B10 and B11.

Once the Remote Operator is mounted connect as per the following connection diagram.

All external wiring, except the chassis earth (M4 stud provided), is connected to spring operated clamp connector terminals with a maximum wire size of 2.5mm². No special tools are required.



CONNECTION DIAGRAM



Refer to the relevant sections of the MCD3000 Operators Instruction Manual and the MCD200 Users Manual for details.

4.5 Soft Starter Compatibility

The following table details soft starter compatibility when using the Remote Operator.

Soft starter model	Serial number format	Compatibility
MCD3000	xxxx07-xxx	fully compatible
MCD3000	later than xxxx06-482	see details below
MCD3000	earlier than xxxx06-482	non-compatible
MCD202	----	fully compatible
MCD201	----	contact supplier for details

MCD3000 models identified by unit serial numbers greater than xxxx06-482 are limited such that;

- The Forced Communications Trip feature (display code H) is not available when networking.
- MCD3000 trip codes C (RS485 Comms Fault) and L (FLC Range Error) are displayed as 1- on the Remote Operator. These trip codes are displayed correctly on the soft starter front panel.



Consult your local supplier if the Remote Operator is to be used with a non-compatible soft starter.

4.6 Configuring the Soft Starter

No soft starter configuration is required unless RS485 Time Out protection between the Remote Operator and soft starter is being used.



The Remote Operator to soft starter Baud Rate (9,600 baud) and Satellite Address (20) are fixed within the Remote Operator. These parameters are default set within the soft starter.

The soft starter should be set for local operation only when using the Remote Operator.



For soft starter configuration details and set up procedures refer to the MCD3000 Operators Instruction Manual and the MCD200 Users Manual.

4.7 Configuring the Remote Operator



If the Remote Operator is not being used with a serial communications network no configuration of the Remote Operator is necessary unless the 4-20mA analogue output is required.

When configuring the Remote Operator it must be powered up and in the “off” mode.

When the Remote Operator is being used with a serial communications network configure the Remote Operator RS485 Network Baud Rate and Satellite Address to match that of the network. The Remote Operator RS485 Network Time Out protects the link between the Remote Operator and the serial communications network. Set this as required.

The Remote Operator to serial communications network protocol is default set for ASCII. This can be selected to Modbus RTU protocol. Set as required along with the Modbus Parity if applicable.

When the Remote Operator 4-20mA analogue output is being used set the Motor FLC and Analogue Output 4mA Offset parameters to suit the application.



Refer to parameter list and programming procedure in the Programming Section 5.2 of this manual.

5.1 Front Panel Operation



The Remote Operator performs all soft starter functions except programming of the soft starter. The Remote Operator can only be used to program its own user adjustable parameters. Note that uploading and downloading of the soft starter parameters can still be achieved locally at the soft starter or through the serial communications network.

The Remote Operator has four pushbuttons. Three are for motor control. These are start, stop and reset. Operating the stop and reset pushbuttons simultaneously will cause the motor to quick stop. Operation of the motor can be achieved using the Remote Operator pushbuttons and commands from the serial communications network together. The DATA/PROG pushbutton has three functions. If it is pressed momentarily it changes the LED data displayed between motor current and motor temperature. If there is a problem with the serial communications network, the Remote Operator display will be cleared by momentarily pressing the DATA/PROG pushbutton. If it is pressed for more than 4 seconds the Remote Operator will enter programming mode. This can only occur when the motor is not running, ie, "off".

The LED data display indicates motor current, motor temperature or a trip code in the event of a soft starter trip. If a trip code is displayed the CODE data display LED (Red) will illuminate. During normal operation the Remote Operator will display motor current or motor temperature. This is indicated by the AMPS or TEMP data display LED (Red) being illuminated.



This feature is not available in the MCD201 open loop soft starter range.

There are three motor status LEDs that indicate the operating condition of the soft starter. The START LED (Green) indicates that the soft starter is starting, running or stopping. The RUN LED (Green) indicates that the soft starter is providing full voltage to the motor. The TRIP LED (Red) indicates that the soft starter has tripped.

There is an RS485 status indication LED (Green) which shows the condition of the serial link between the Remote Operator and the soft starter. When this is illuminated the condition is healthy when it is flashing there has been loss of communication.



5.2 Programming

The Remote Operator can only be used to change its own user adjustable parameters. Adjustment to the soft starter parameters must be made locally at the soft starter or remotely using the serial communications network.

The Remote Operator has 7 user adjustable parameters. These parameters relate to the Remote Operator to serial communication network connection and the 4-20mA analogue output when being used. Programming can not be carried out while the soft starter is running. Use the STOP/+ , RESET/- and DATA/PROG pushbuttons to program parameter settings.

Use the following procedure.

- To enter program mode, hold down the DATA/PROG pushbutton for 4 seconds.
- Parameter 1 (RS485 Network Baud Rate) setting is automatically displayed. To adjust parameter 1, press the STOP/+ or RESET/- pushbuttons. To store parameter 1 setting and advance to the next parameter, press the DATA/PROG pushbutton.
- Parameter 2 (RS485 Network Satellite Address) setting will be automatically displayed. To adjust parameter 2, press the STOP/+ or RESET/- pushbuttons. To store parameter 2 setting and advance to the next parameter, press the DATA/PROG pushbutton.
- Parameter 3 (RS485 Network Time Out) setting will be automatically displayed. To adjust parameter 3, press the STOP/+ or RESET/- pushbuttons. To store parameter 3 setting and advance to the next parameter, press the DATA/PROG pushbutton.
- Parameter 4 (RS485 Network Protocol) setting will be automatically displayed. To adjust parameter 4, press the STOP/+ or RESET/- pushbuttons. To store parameter 4 setting and advance to the next parameter, press the DATA/PROG pushbutton.
- Parameter 5 (Modbus Protocol Parity) setting will be automatically displayed. To adjust parameter 5, press the STOP/+ or RESET/- pushbuttons. To store parameter 5 setting and advance to the next parameter, press the DATA/PROG pushbutton.
- Parameter 6 (Motor FLC) setting will be automatically displayed. To adjust parameter 6, press the STOP/+ or RESET/- pushbuttons. To store parameter 6 setting and advance to the next parameter, press the DATA/PROG pushbutton.
- Parameter 7 (Analogue Output 4mA Offset) setting will be automatically displayed. To adjust parameter 7, press the STOP/+ or RESET/- pushbuttons. To store parameter 7 setting, press the DATA/PROG pushbutton. Program mode will be exited.



There is a 20-second “time out” when the Remote Operator is in programming mode. If no parameter setting is performed within this time period, programming mode is exited.

Parameter List Details

Parameter Number	Description	Default Setting	Adjustable Range
1	RS485 Network Baud Rate	4 (9600 baud)	2 = 2400 baud 3 = 4800 baud 4 = 9600 baud 5 = 19200 baud 6 = 38400 baud
2	RS485 Network Satellite Address	20	1 to 99
3	RS485 Network Time Out	0 seconds (= off)	0 to 100 seconds
4	RS485 Network Protocol	1 (ASCII)	1 = ASCII protocol 2 = Modbus RTU protocol
5	Modbus Protocol Parity	0 (no parity)	0 = no parity 1 = odd parity 2 = even parity
6	Motor FLC	10 amps	1 to 2868 amps
7	Analogue Output 4mA Offset	100%	80 to 120%

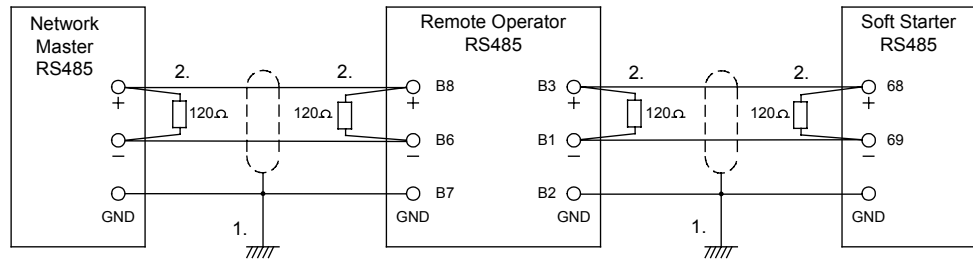
5.3 RS485 Serial Communications

The Remote Operator to soft starter RS485 communications protocol is ASCII.



When the Remote Operator is used as a gateway device connected to a serial communications network the RS485 communications protocol is selectable between ASCII and Modbus RTU (Remote Operator Parameter 4. Default setting = 1, ASCII).

Refer to the serial communications section of the MCD3000 Operators Instruction Manual and the MCD200 Users Manual for details.



1. Grounding and Shielding.
Twisted pair data cable with earth shield is recommended. The cable shield should be connected to a GND device terminal at both ends and one point of the site protective earth.
2. Termination Resistors.
In long cable runs prone to excessive noise interference, termination resistors should be installed. This resistance should match the cable impedance (typically 120 ohms). Do not use wire wound resistors.
3. RS485 Data Cable Connection.
Daisy chain connection is recommended. This is achieved by parallel connections of the data cable at the actual device terminals.
4. Remote Operator RS485 Network Connection Specifications.

Input Impedance:	12kohm
Common Mode Voltage range:	-7 to +12 V
Input Sensitivity:	+/- 200mV
Minimum Differential Output Voltage:	1.5V (with max.loading of 54 ohms)

5.4 4-20mA

Analogue Output The Remote Operator has a 4-20mA analogue output for monitoring motor current.

The Remote Operator Motor FLC parameter 6 must be adjusted to match the Motor FLC setting in the soft starter. The 4mA end of the analogue output signal can be calibrated using the Remote Operator Analogue Output 4mA Offset parameter 7. This is set to give a 4mA output signal when the motor current is zero.

The analogue output signal spans from 4mA when the motor current is zero (ie, soft starter is not running) to 20mA when the motor current is 125% of the Motor FLC setting in the Remote Operator parameter 6.



The 4-20mA analogue output must only be used for motor current monitoring and metering. It is not designed to be used for process signal control.

Only one Motor FLC setting can be used in the Remote Operator. For applications using both MCD3000 primary and secondary parameter sets this is not suitable.

6.1 General Faults

The Remote Operator 7 segment display and status indication LEDs can indicate abnormal operating or system conditions. This troubleshooting guide gives details of these conditions.



Indication	Problem	Possible Solution
No 7 segment display	No control supply voltage.	Check that correct voltage is present at terminals 1 and 2.
AMPS or TEMP LED flashing	Soft starter in restart delay mode.	Wait for the soft starter programmed restart delay to time out.
Four dashes on 7 segment display and RS485 LED flashing	A loss of communication has been detected on the RS485 link to the soft starter.	Verify and solve the cause for loss of communication. If communication is restored before a soft starter RS485 Time Out trip, the 7 segment display will regain active status and the RS485 LED will illuminate. If communication is restored after a soft starter RS485 Time Out trip, the 7 segment display will indicate a trip code. Use the Reset pushbutton to reset the soft starter fault.
nEt on 7 segment display	A loss of communication has been detected on the RS485 link to the network.	The Remote Operator has an RS485 Network Time Out Protection setting (Parameter 3). This mode is entered when loss of communication is longer than this time setting. If communication is restored the system becomes active again. To clear nEt on the 7 segment display press the DATA/PROG pushbutton momentarily.
SP flashing on 7 segment display	Soft starter is off and being programmed from the serial network.	Finish soft starter serial network programming procedure and exit program mode.
-	Incorrect or no 4-20mA analogue output signal	Check that correct voltage is present at terminals 1 and 2. Check that correct polarity is used at terminals B10 and B11. Check that Motor FLC and Analogue Output 4mA Offset parameters are set correctly.

6.2 Trip Codes

When the soft starter trips the relevant trip code is displayed on the Remote Operator 7 segment display. The CODE and TRIP LEDs are illuminated.



If the MCD3000 soft starter has an internal problem indicated by a Code E (EEPROM read/write failure), no communication is active between the soft starter and the Remote Operator. The Remote Operator 7 segment display will indicate four dashes and its RS485 LED will flash.

Refer to the Trip Codes section of the MCD3000 Operators Instruction Manual and MCD200 Users Manual for details.



This does not apply to the MCD201 open loop soft starter model.