OPERATING INSTRUCTIONS: MCD REMOTE OPERATOR

Order Codes: 175G9004 (for MCD 200)
        175G3061 + 175G9000 (for MCD 500)
        175G3061 (for MCD 3000)

---

1. Introduction

1.1. Important User Information

Observe all necessary safety precautions when controlling the soft starter remotely. Alert personnel that machinery may start without warning.

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

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

1.2. General Description

The Remote Operator can be used with MCD 200, MCD 3000 and MCD 500 soft starters, and offers the following functionality:

- Operational control (Start, Stop, Reset, Quick Stop)
- Starter status monitoring (Ready, Starting, Running, Stopping, Tripped)
- Performance monitoring (motor current, motor temperature)
- Trip code display
- 4-20 mA analog output (motor current)
- Optional RS485 network connection ⋆

⋆ The Remote Operator can act as a gateway device for connection to an RS485 serial communications network, allowing remote control of a motor from an RS485 network using Modbus RTU or standard AP ASCII communications protocol. For further information, please refer to the Modbus Module Instructions.

2. Installation

This section describes how to install the Remote Operator for basic control and monitoring of a soft starter. The Remote Operator is pre-configured to control a soft starter once control supply power is applied to both devices. For basic operation, no parameter adjustments are required on the Remote Operator or the soft starter.

In order to use the Remote Operator's 4-20 mA analog output to monitor motor current, follow the instructions in the section 4-20 mA Analog Output.
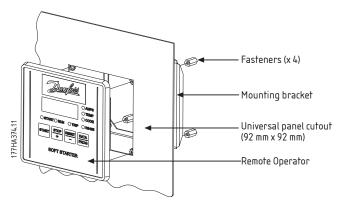
2.1. Mounting

The Remote Operator is rated IP54 or NEMA 12 ∗ when mounted correctly in accordance with 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 four fasteners. The built-in gasket seal guarantees protection from outside the panel.

Select the panel location of the Remote Operator. The required panel cutout is 92 mm x 92 mm. Place the Remote Operator through the cutout and locate the mounting bracket at the rear of the panel onto the four studs. Use the four fasteners to tighten the mounting bracket up to the rear of the panel.

∗ For use on a flat surface of a NEMA 1 or NEMA 12 enclosure.

2.2. Connection

The Remote Operator requires a minimum of three electrical connections - the external power supply, the chassis earth and the RS485 Starter port. All external wiring, except the chassis earth (M4 stud provided), is connected to spring operated clamp connector terminals with a maximum wire size of 2.5 mm^2. No special tools are required.

Once the Remote Operator is mounted, connect it to the starter as illustrated.

2.3. Grounding and Shielding

Twisted pair data cable with earth shield is recommended. The cable shield should be connected to the GND device terminal at both ends and one point of the site protective earth.
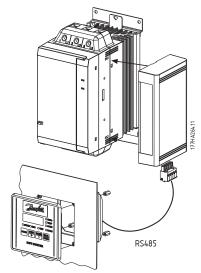
2.4. Termination Resistors

In long cable runs prone to excessive noise interference, termination resistors should be installed between the data lines at both ends of the RS485 cable. This resistance should match the cable impedance (typically 120 Ω). Do not use wire wound resistors.
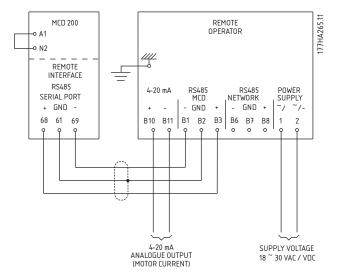
2.5. For use with MCD 200

In order to use the Remote Operator with MCD 200 soft starters, a Remote Operator Module must first be installed to the starter using the following steps:

1. Remove control power and mains supply from the soft starter.
2. Attach the Remote Operator Module to the side of the soft starter as illustrated.

! Remove mains and control voltage from the soft starter before attaching or removing accessories. Failure to do so may damage the equipment.

Once the Remote Operator Module has been installed, wire between the Remote Operator and the module as follows:
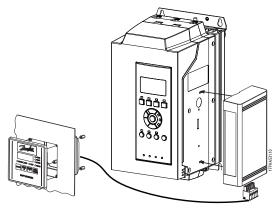

For the Remote Operator to accept serial commands, a link must be fitted across terminals A1-N2 on MCD 200 starters.
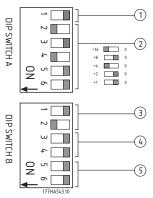
2.6. For use with MCD 500

In order to use the Remote Operator with MCD 500 soft starters, a Modbus Module must first be installed to the starter using the following steps:

1. Remove control power and mains supply from the soft starter.

2. Attach the Modbus Module to the side of the starter as illustrated.

! Remove mains and control voltage from the soft starter before attaching or removing accessories. Failure to do so may damage the equipment.

3. The DIP switches on the Modbus Module must be set as follows:

1	Protocol = AP ASCII
2	Address = 20
3	Baud Rate = 9600
4	Parity = No parity
5	Timeout = No timeout

4. Apply control power to the soft starter. The LED on the Modbus module should flash.

5. In order for the MCD 500 to accept commands from the serial network, the soft starter must be in Auto On mode and links must be fitted to terminals 17 and 25 to 18.

6. Connect the RS485 cable between the Remote Operator and the Modbus Module. Apply control voltage to the Remote Operator.

2.7. For use with MCD 3000

To connect the Remote Operator to an MCD 3000 soft starter:

N.B.!:
In order for the Remote Operator to operate correctly, the MCD 3000 must be in Local mode (set Parameter 20 = 2: Local Control Only).

3. Specifications

3.1. General Technical Data

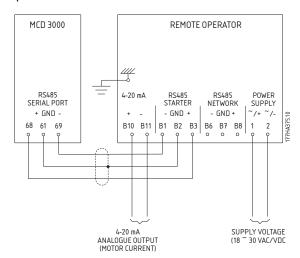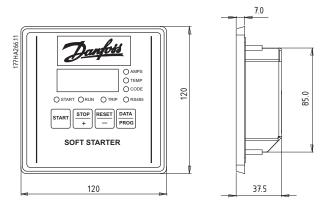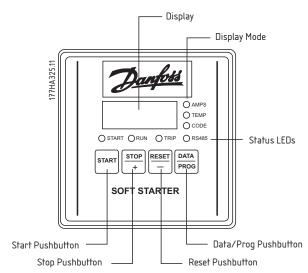| Enclosure	
Front Panel Height	120 mm
Front Panel Width	120 mm
Inside Panel Depth (when mounted)...	30 mm (max)
Panel Cutout	92 mm^2
Weight...	450 g
Power Supply	
Voltage	18 - 30 VDC/VAC (50/60 Hz)
Consumption	250 mA (max)
Connection (Terminals 1, 2)	2 pole spring clamp connector terminals
RS485 Serial Network Port (Optional)	
RS485 Network Interface	AP ASCII or Modbus RTU protocol (selectable)
Connection (Terminals B6, B7, B8)	3 pole spring clamp connector terminals
RS485 Serial Starter Port (Soft Starter Connection)	
RS485 Soft Starter Interface	AP ASCII protocol as standard
Connection (Terminals B1, B2, B3)	3 pole spring clamp connector terminals
Analog Output	
Motor Current Monitoring Interface..................................	4-20 mA (max burden 200 Ω)
Connection (Terminals B10, B11).......................................	2 pole spring clamp connector terminals
Sundry	
Enclosure Rating..	IP54 or NEMA 12 when correctly panel mounted
Pollution Degree	Pollution Degree 3
Operating Temperature	- 5 ℃ / + 60 ℃
Relative Humidity	5 to 95% (max non-condensing)
This product has been designed as Class A equipment. Use of this product in domestic environments may cause radio interference, in which case the user may be required to employ additional mitigation methods.	
Standards Approvals	
CE	IEC 60947-4-2
UL and C-UL	UL 508
C✓	IEC 60947-4-2

3.2. Dimensions

4. Operation

4.1. Functionality Range

The Remote Operator provides the following range of functions:

Description	MCD 201	MCD 202	MCD 500	MCD 3000
Operational control (Start, Stop, Reset, Quick Stop)	■	■	■	■
Starter status monitoring (Ready, Starting, Running, Stopping, Tripped)	■	■	■	■
Performance monitoring (motor current, motor temperature)		■	■	■
Trip code display	■	■	■	■
4-20 mA analog output		■	■	■

4.2. 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 parameters. Soft starter parameters must be adjusted locally at the soft starter or through the serial communications network if connected (on the network side of the Remote Operator).

4.2.1. Pushbuttons

START: Starts the motor.

STOP/+: Stops the motor. *

RESET/-: Resets the starter. *

DATA/PROG: Selects the data type to be shown on the display (motor current or motor temperature), or accesses Programming Mode.

* Simultaneously pressing the **STOP/+** and **RESET/-** buttons initiates a quick stop, which immediately removes voltage from the motor, ignoring any soft stop time set on the starter.

4.2.2. Feedback

Display Mode: Indicates the data type shown on the display:

- Motor current
- Motor temperature
- Trip code

N.B.!:
When the MCD 500 is in the Quick Menu, Main Menu or Alarm Log, all three Display Mode LEDs are illuminated.

Display: Indicates the value of the selected data.

Status LEDs: Indicate the status of the starter, and of the RS485 link between the Remote Operator and the 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.
- The RS485 Status LED shows the condition of the serial link between the Remote Operator and the soft starter. When this is illuminated the connection is healthy. When the LED is flashing there has been loss of communication.

N.B.!:
Motor current and motor temperature information is only available from MCD 202, MCD 500 and MCD 3000 starters. If connected to an MCD 201 open loop soft starter, the display will show 2222 instead of motor current and 1.11 instead of motor temperature.

N.B.!:
When using the Remote Operator with MCD 500 models MCD5-0023B ~ MCD5-0068B, the motor current and analog output must be normalised using Pars. 6 and 9. => Programmable Parameters for details.

4.3. Trip Codes

If the soft starter trips, the CODE and TRIP LEDs illuminate and the relevant trip code is reported on the Remote Operator display. Some trip codes are not available from all starter models.

Code	Description	MCD 201	MCD 202	MCD 500	MCD 3000
1-0	Shorted SCR				■
1-1	Excess start time		■	■	■
1-2	Motor overload (Thermal model)		■	■	■
1-3	Motor thermistor		■	■	■
1-4	Current imbalance		■	■	■
1-5	Frequency (Mains supply)	■	■	■	■
1-6	Phase sequence		■	■	■
1-7	Instantaneous overcurrent			■	■
1-8	Power loss (Power circuit)	■	■	■	■
1-9	Undercurrent			■	■
1-A	Other trip*			■	
1-b	Time-overcurrent (Bypass overload)		■	■	
1-C	Starter communication (between module and soft starter)	■	■	■	■
1-E	EEPROM read/write failure			■	■
1-F	Heatsink overtemperature			■	■
1-H	Network communication (between module and network)	■	■	■	■
1-J	Input A trip (Auxiliary input A)			■	
1-L	FLC too high (FLC out of range)			■	■
1-P	Motor connection			■	■
1-U	CPU error				■
1-Y	Incorrect main control module				■

* => the soft starter's LCP for trip details.

5. 4-20 mA Analog Output

N.B.!:
When using the Remote Operator with MCD 500 models MCD5-0023B ~ MCD5-0068B, the motor current and analog output must be normalised using Pars. 6 and 9. => Programmable Parameters for details.

5.1. Overview

The Remote Operator has a 4-20 mA analog output for monitoring motor current. The 4-20 mA output is available on terminals B10, B11.

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

N.B.!:
The 4-20 mA output is available only when the Remote Operator is connected to MCD 202, MCD 500 and MCD 3000 soft starters.

5.2. Calibration

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

The 4-20 mA analog output has an accuracy of ±10%. It is not designed for process signal control use and should only be used for motor current monitoring and metering.

N.B.!:
The analog output uses only one Motor FLC setting. This function is not suitable for applications using two motor parameter sets.

5.3. Programming

When the 4-20 mA output is being used, the Remote Operator's Motor FLC and Analog Output 4 mA Offset parameters (Parameters 6 and 7) must be set appropriately (=> Calibration above). Programming can only be carried out while the soft starter is not running.

5.4. Programming Procedure

1. To enter Programming Mode, hold down the Data/Prog pushbutton for four seconds. The default value of the first parameter will be displayed.
2. Use the Data/Prog pushbutton to advance to the next parameter.
3. Use the Stop and Reset pushbuttons to adjust parameter values.

Programming Mode closes when the Data/Prog pushbutton is pressed after Parameter 8.

N.B.!:
There is a 20 second timeout when the Remote Operator is in Programming Mode. Programming Mode will automatically close if no input is registered for 20 seconds. Any changes already made will be saved.

5.5. Programmable Parameters

The Remote Operator offers the following programmable parameters:

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 timeout	0 seconds (= off)	0 to 100 seconds
4	RS485 network protocol	1 (AP ASCII)	1 = AP ASCII protocol 2 = Modbus RTU protocol
5	Modbus protocol parity	0 (no parity)	0 = no parity 1 = odd parity 2 = even parity 3 = 10-bit transmission
6	Motor FLC (A)	10	1 to 2868
7	Analog output 4 mA offset (%)	100	80 to 120
8	Start, Stop, Quick stop function disable	0	0 = Remote Operator and Network start, stop, quick stop function enabled. 1 = Remote Operator start, stop, quick stop function enabled. Network start, stop, quick stop function disabled. ** 2 = Remote Operator start, stop, quick stop function disabled. Network start, stop, quick stop function enabled. * 3 = Remote Operator start, stop, quick stop function disabled. Network start, stop, quick stop function disabled. *, **
9	Current ÷ 10	0	0 = off (required for models MCD5-0084B ~ MCD5-1600C) 1 = on (required for models MCD5-0021B ~ MCD5-0068B)

Pars. 1 to 5 only apply when the Remote Operator is being used as a Modbus or AP ASCII network gateway. => the Modbus Module Instructions for details.

* Remote Operator Reset pushbutton is always enabled.

** RS485 Network reset and forced communication trip functions are always enabled.

N.B.!:
Remote Operator Par. 9 *Current ÷ 10* normalises the displayed motor current and analog output for models MCD5-0021B ~ MCD5-0068B. Use Par. 9 in conjunction with Par. 6 *Motor FLC* as follows:

1. Set Par. 6 to a value 10 times greater than the actual motor nameplate FLC (e.g. for actual FLC = 4.6 A, set Par. 6 to 46).
2. Set Par. 9 = 1.

6. Troubleshooting

6.1. Feedback

The Remote Operator Display and Status LEDs can indicate abnormal operating or system conditions. This troubleshooting guide gives details of these conditions.

Display Indication	Cause	Possible Solution
No display	No control supply voltage	Check that correct voltage is present at terminals 1, 2.
AMPS or TEMP LED flashing	Soft starter in restart delay mode	Wait for the restart delay (programmed in the soft starter) to elapse.
AMPS, TEMP and CODE LEDs on	The Remote Operator is in Program mode The MCD 500 is not in status mode	The Remote Operator cannot control the starter until Program mode is closed. The Remote Operator can start the motor; this will return the soft starter to status mode.
Four dashes on display and RS485 LED flashing	The Remote Operator has detected a loss of communication on the RS485 link to the soft starter	Verify and solve the cause for loss of communication. If communication is restored before the soft starter trips, the display will return to active status and the RS485 LED will illuminate. If communication is restored after the soft starter has tripped, the display will indicate the trip code. Use the Reset pushbutton to reset the soft starter fault.
-	Incorrect or no 4-20 mA analog output signal	Check the correct voltage is present at terminals 1, 2. Check that correct polarity is used at terminals B10, B11. Check that the Motor FLC, Analog Output 4 mA Offset and Current ÷ 10 parameters are set correctly.
-	The motor cannot be started	Check that control voltage is connected to the starter. • If connected to an MCD 200 , check that terminals A1-N2 on the starter are linked. • If connected to an MCD 500, check that terminals 17 and 25 to 18 are linked and the starter is in Auto On mode. Parameter 8 on the Remote Operator must be set to 0 or 1