REMOTE OPERATOR

Part Number: PIM-RO-01, RCM01

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Section 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.

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 Description

The Remote Operator allows remote operation of IMS2 and CSX Series soft starters, and offers the following functionality:

- Operational control (Start, Stop, Quick Stop and Reset)
- Starter status monitoring (Start, Run and Trip)
- Performance monitoring (motor current and motor temperature)
- Trip code display
- 4-20 mA analogue output (motor current)
- Optional RS485 network connection [1]

[1] 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 Interface Instructions.

NOTE
In order to use the Remote Operator with CSX Series starters, a Remote Operator Interface must also be installed.

Section 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 analogue output to monitor motor current, follow the instructions in the section *4-20 mA Analogue Output* (page 9).

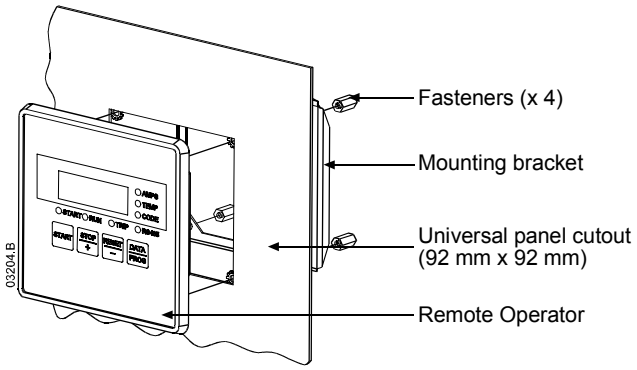
2.1 Mounting

The Remote Operator is rated IP54 or NEMA 12 [1] 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.

[1] 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 to the soft starter. 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 below.

Grounding and Shielding

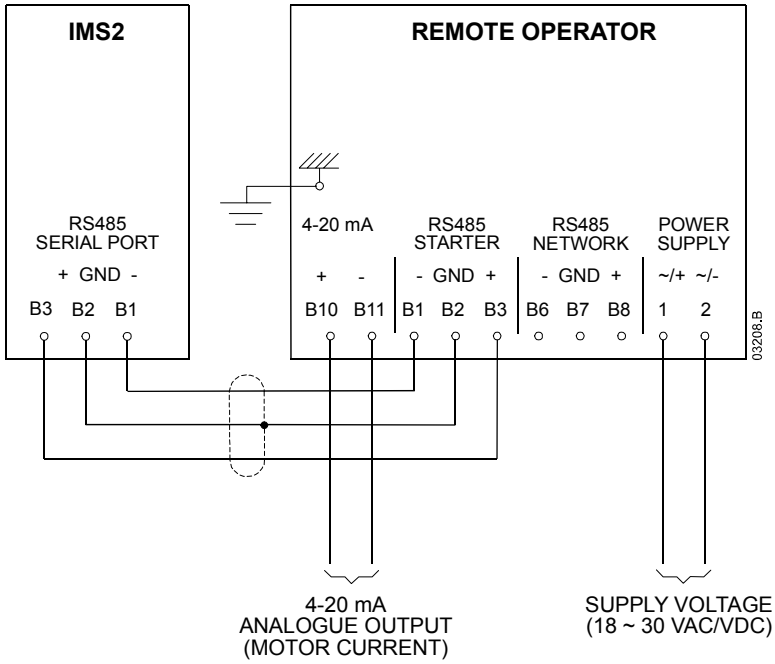
Twisted pair data cable with earth shield is recommended. The cable shield should be connected to a GND device terminal at both ends and one point of the site protective earth.

Termination Resistors

In long cable runs prone to excessive noise interference, termination resistors should be installed between B1 (-) and B3 (+) of the soft starter and the Remote Operator. This resistance should match the cable impedance (typically 120 Ω). Do not use wire wound resistors.

For Use with IMS2

To connect the Remote Operator to an IMS2 soft starter:

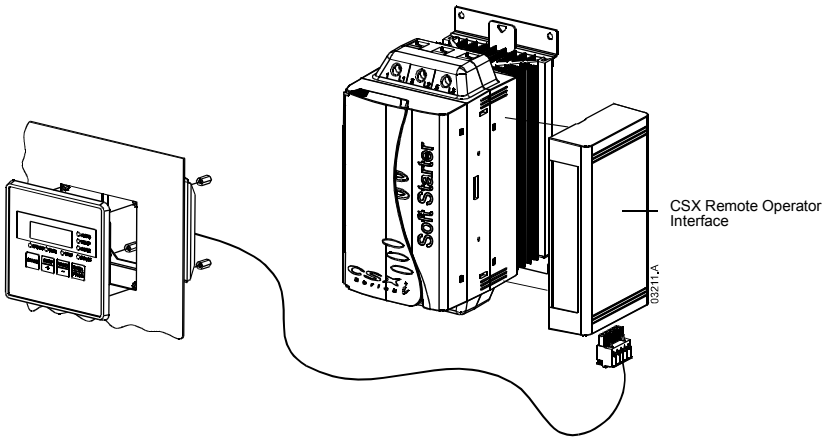


NOTE
In order for the Remote Operator to operate correctly, the IMS2 must be in Local mode (set Parameter 20 = 2: Local Control Only).

For Use with CSX Series

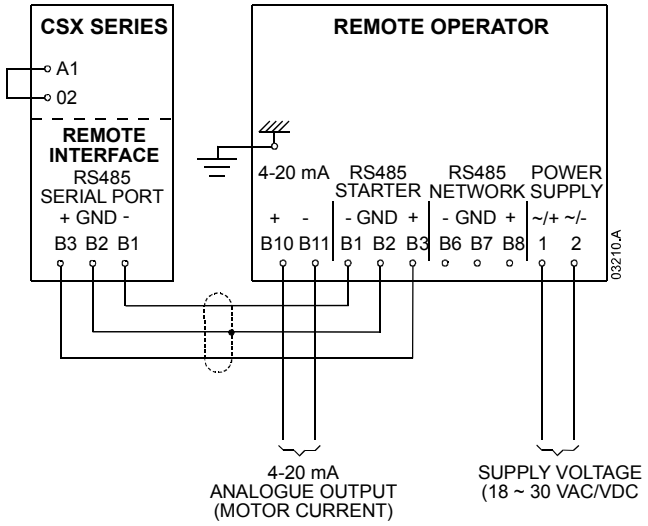
In order to use the Remote Operator with CSX Series soft starters, a Remote Operator Interface must first be installed to the starter using the following steps:

1. Remove control power and mains supply from the CSX.
2. Attach the Remote Operator Interface to the side of the CSX as illustrated.



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

Once the Remote Operator Interface has been installed, wire between the Remote Operator and the interface as follows:



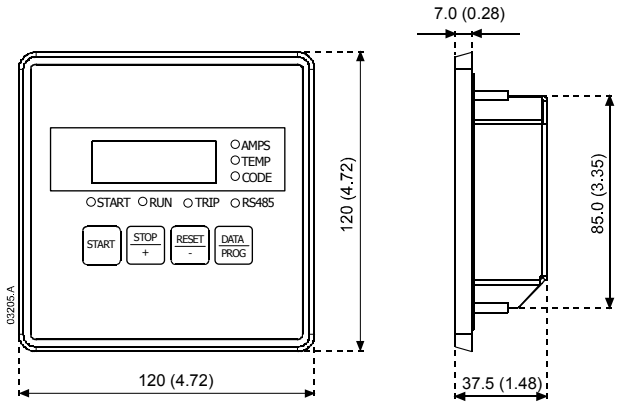
NOTE
For the Remote Operator to operate correctly, a link must be fitted across terminals A1-02 on the starter.

Section 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
Analogue 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 °C / + 60 °C
Relative Humidity	5 to 95% (max non-condensing)
This product has been designed for Class A equipment. Use of the 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



mm (inch)

Section 4 Operation

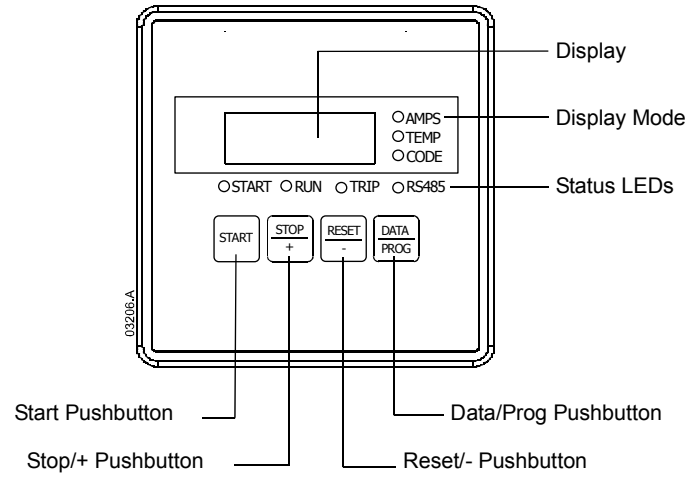
4.1 Functionality Range

The Remote Operator provides the following range of functions:

Description	CSX	CSX*i*	IMS2
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 analogue 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.



Pushbuttons

Start pushbutton: Starts the motor.

Stop/+ pushbutton: Stops the motor. [1]

Reset/- pushbutton: Resets the starter. [1]

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

[1] Simultaneously pressing the Stop/+ and Reset/- pushbuttons initiates a quick stop, which immediately removes voltage from the motor, ignoring any soft stop time set on the starter.

Feedback

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

- Motor current
- Motor temperature
- Trip code

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.

NOTE
Motor current and motor temperature information is only available from CSX*i* and IMS2 starters. If connected to a CSX open loop soft starter, the display will show 2222 instead of motor current and 1.11 instead of motor temperature.

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 - refer to the table below.

If the soft starter has an internal problem indicated by a Code E (EEPROM Read/Write Failure) or Code U (CPU Error) on its display, the soft starter will not communicate with the Remote Operator. The Remote Operator display will show four dashes and the RS485 LED will flash.

Code	Description	CSX	CSX*i*	IMS2
1-0	Shorted SCR			●
1-1	Excess start time		●	●
1-2	Motor overload		●	●
1-3	Motor thermistor		●	●
1-4	Phase imbalance		●	●
1-5	Supply frequency	●	●	●
1-6	Phase sequence		●	●
1-7	Electronic shearpin			●
1-8	Power circuit	●	●	●
1-9	Undercurrent			●
1-b	Bypass overload		●	
1-C	Communications failure between interface and starter	●	●	●
1-E	EEPROM read/write failure			●
1-F	Heatsink overtemperature			●
1-H	Forced communications trip from the network master	●	●	●
1-J	Auxiliary trip			●
1-L	FLC out of range			●
1-P	Invalid motor connection			●
1-U	CPU error			●
1-Y	Incorrect main control module			●

Section 5 4-20 mA Analogue Output

5.1 Overview

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

The analogue 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).

NOTE
The 4-20 mA output is available only when the Remote Operator is connected to IMS2 or CSX*i* models.

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 analogue output signal can be calibrated using the Remote Operator Analogue 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 analogue output must only be used for motor current monitoring and metering. It is not designed for process signal control use.

NOTE
The Remote Operator uses only one Motor FLC setting. This function is not suitable for applications using both IMS2 primary and secondary parameter sets.

5.3 Programming

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

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.

NOTE
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.

Programmable Parameters

Parameter Number	Description	Default Setting	Adjustable Range
1	RS485 Network Baud Rate [1]	4	
2	RS485 Network Satellite Address [1]	20	
3	RS485 Network Timeout [1]	0	
4	RS485 Network Protocol [1]	1	
5	Modbus Protocol Parity [1]	0	
6	**Motor FLC (A)**	**10**	**1 to 2868**
7	**Analogue Output 4 mA Offset (%)**	**100**	**80 to 120**
8	Start, Stop, Quick Stop function disable	0	0 = Remote Operator start, stop, quick stop function enabled. 1 = Remote Operator start, stop, quick stop function enabled. 2 = Remote Operator start, stop, quick stop function disabled. [2] 3 = Remote Operator start, stop, quick stop function disabled. [2]

[1] Parameters 1 to 5 are not relevant for the 4-20 mA output. Refer to the Modbus Interface Instructions for details.

[2] Remote Operator Reset/- pushbutton is always enabled.

Section 6 Troubleshooting

6.1 General Faults

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

Display Indication	Problem	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.
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 registers a Communications Failure, the display will return to active status and the RS485 LED will illuminate. If communications are restored after the soft starter registers a Communications Failure, the display will indicate a trip code. Use the Reset/- pushbutton to reset the soft starter fault.
-	Incorrect or no 4-20 mA analogue 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 and Analogue Output 4 mA Offset parameters are set correctly.
-	The motor cannot be started	Check that control voltage is connected to the starter. If connected to a CSX starter, check that terminals A1-02 are linked.

NOTES