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MPS

MOTOR PROTECTION SYSTEM

The Startco Motor Protection System (MPS) combines state-of-the-art motor protection with control, metering, and data logging for three-phase induction motors. Using the MPS simplifies wiring and reduces the number of components in motor control centres. The Control Unit (MPS-CTU) includes the protection-and-control processor and most of the system's inputs and outputs—it can be used as a stand-alone device. The Operator Interface (MPS-OPI) integrates an eighty-character display, status LED's, and keys for display control, programming, and motor control. The RTD Module (MPS-RTD) has eight programmable inputs, can be mounted at the motor, and up to three RTD modules can be used per system. The RTD Module and the Operator Interface are certified for use in Class I, Zone 2, hazardous locations.

Protective functions provided by the MPS are based on motor current, voltage, temperature, and speed. Motor control is provided for seventeen starting methods. The MPS can be synchronized with an adjustable-speed drive (ASD) so that voltage- and current-measurement accuracy is the same as for fixed-frequency applications. The MPS is cost effective for protection-only applications—extra value is realized when control functions are used.

Metering includes current, voltage, frequency, power, energy, thermal capacity, earth leakage, unbalance, temperature, and system status. Logged data is stored in non-volatile memory and includes sixty-four date- and time-stamped event records. An IRIG input allows the internal clock to be synchronized with the GPS time mark. The MPS includes RS-485 communications and supports common protocols. Digital and analog I/O permit interaction with other devices. The MPS program is stored in flash memory to allow field updates and installation of customized programs.

OVERVIEW

Protection: True measurements of sequence components and RMS values of current and voltage are used to provide overload, overcurrent, earth-fault, unbalance (voltage and current), phase-loss (voltage and current), phase-reverse (voltage and current), jam, undercurrent, overvoltage, undervoltage, underfrequency, overfrequency, and power-factor protection. Failure-to-accelerate, underspeed, network failure, PTC-thermistor overtemperature, and RTD-temperature protection are also provided.

Control: Seventeen induction-motor starting methods are supported. The motor can be controlled from the MPS-OPI keypad, remote switches, and the network. Contactor control is provided by output relays and contactor status can be monitored using the digital inputs. The thermal model can be integrated with motor control to prevent a start when insufficient thermal capacity is available.

Metering: Line currents (A, %FLA), positive-sequence current, negative-sequence current, current unbalance, line voltages (V, %V_{nominal}), positive-sequence voltage, negative-sequence voltage, voltage unbalance, line frequency, power (kW, kVA, kVAR), power factor, energy used (kWh, kVAh, kVARh), used and trending thermal capacity, earth-leakage current, motor speed, RTD temperatures, analog-input value, digital-input states, output-relay states, starter state, motor state, and communications state can be displayed.

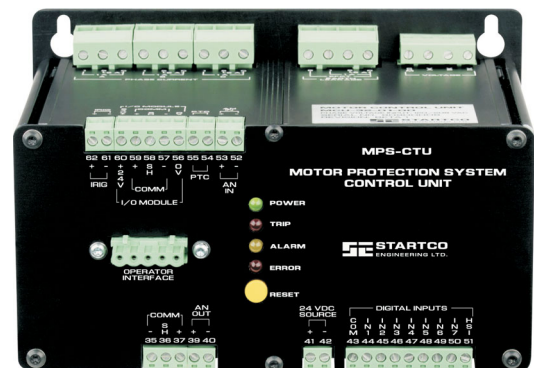
Data Logging: Date- and time-stamped records of the last sixty-four trips and starts are logged. Records include the trigger source, trip type, starting thermal capacity used, and metered data. Trip counts and running hours are also recorded.

Input/Output: The MPS has five programmable output relays, seven programmable digital inputs, a programmable analog input, a programmable analog output, a digital tachometer input, an IRIG-B input, a PTC thermistor input, and up to twenty-four RTD inputs. RS-485 communication is standard with Modbus® RTU and A-B® DF1 protocols. DeviceNet™ and PROFIBUS® communication interfaces are available.

CONTROL UNIT FEATURES

- Universal power supply
- Form A (2), Form C (2), and solid-state (1) output relays
- Digital and analog tachometer inputs
- Current inputs—1 A, 5 A
- Voltage inputs—up to 600 V without PT's
- Earth-leakage input—1 A, 5 A, sensitive
- Analog input & output
- IRIG-B time-code input
- Status LED's
- Reset switch
- 24-Vdc sources for OPI and RTD modules, and for digital inputs
- RS-485 communications
- 1/2 DIN size, surface mount
- Use with or without Operator Interface and RTD Module(s)

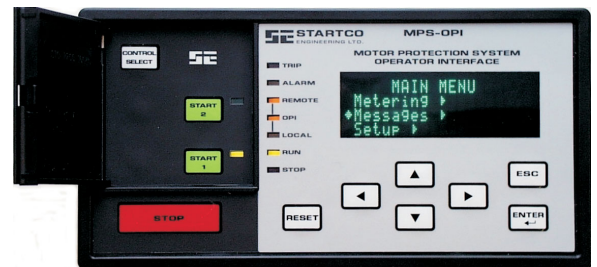
MPS-CTU



OPERATOR INTERFACE FEATURES

- Large, bright, 4 x 20 vacuum-fluorescent display
- Display metered values
- Keypad for motor control and menu selection
- Access set points
- Powered by Control Unit
- Panel mount or attach to Control Unit
- Remote mounting (1.2 km or 4000 ft maximum)
- 1/2 DIN size
- Hazardous-location certified

MPS-OPI



RTD MODULE FEATURES

- Eight inputs per module, up to three modules per system
- Each input is programmable for RTD type (Pt100, Ni100, Ni120, Cu10)
- Individual alarm- and trip-temperature set points
- Solid-state multiplexing
- Remote mounting (1.2 km or 4000 ft maximum)
- Compact—fits in motor junction box
- Four-wire connection to Control Unit
- Powered by Control Unit
- Hazardous-location certified

MPS-RTD



SE-COMM-MPS SOFTWARE FEATURES

- Windows® 95/98/NT compatible
- Display metered motor and system parameters
- Display alarm and trip conditions
- Reset trips
- Access set points
- Create, load, and store set-point files
- Download, store, and export logged data files
- Control the motor (Start/Stop)

TECHNICAL SPECIFICATIONS

Supply	25 VA, 65 to 265 Vac, 40 to 400 Hz, PF corrected. 25 W, 80 to 275 Vdc.
Power-Up Time.	800 ms at 120 Vac
Ride-Through Time.	100 ms minimum
24-Vdc Source	100 mA maximum
AC Measurements	True RMS and DFT. 16 samples/cycle. Positive- and negative-sequence components of the fundamental.
PWB Conformal Coating	MIL-1-46058 qualified UL QMJU2 recognized
Fundamental Frequency	50, 60 Hz, or ASD (10 to 70 Hz sync via 4–20 mA signal from ASD)
Phase-Current Inputs:	
Range	18 x CT-Primary Rating (Ip)
Accuracy.	1% Ip or 1% Reading
Burden.	< 0.01
Earth-Leakage Input:	
Range	1.5 x Earth-Fault-CT-Primary Rating (Ie)
Accuracy.	1% Ie
Burden.	< 0.01 (1-A and 5-A inputs)
Phase-Voltage Inputs:	
Nominal Input	30 to 600 Vac line-to-line
Input Resistance.	3.4 M
Range	1.4 x PT-Primary Rating (Vp)
Accuracy.	1% Vp or 1% Reading
Frequency Metering	5 to 100 Hz, ± 0.05 Hz
PTC-Thermistor Input:	
Cold Resistance.	1500 maximum at 20°C
Trip Level	2800 100
Sensor Current	2 mA maximum
4–20 mA Analog Input:	
Input Burden.	100
Common-Mode Voltage	± 5 Vdc
4–20 mA Analog Output:	
Load	500 maximum
Range	0 to 25 mA
Tachometer Input:	
Type	Active pickup, 24-V logic output
Pulses per Revolution	1 to 100
Pulse Frequency	10 Hz to 10 kHz
Relay Contacts (Relays 1 and 2):	
Configuration	N.O. (Form A)
CSA/UL Contact Rating	8 A resistive 250 Vac, 5 A resistive 30 Vdc
Supplemental Contact Ratings:	
Make/Carry	30 A (0.2 s)
Break:	
dc	75 W resistive, 35 W inductive (L/R = 0.04)
ac	2000 VA resistive, 1500 VA inductive (PF = 0.4)
Subject to maximums of 8 A and 250 V (ac or dc).	
Relay Contacts (Relays 3 and 4):	
Configuration	N.O. and N.C. (Form C)
CSA/UL Contact Rating	8 A resistive 250 Vac, 8 A resistive 30 Vdc
Supplemental Contact Ratings:	
Make/Carry	20 A (0.2 s)
Break:	
dc	50 W resistive, 25 W inductive (L/R = 0.04)
ac	2000 VA resistive, 1500 VA inductive (PF = 0.4)
Subject to maximums of 8 A and 250 V (ac or dc).	
Solid-State Output (Relay 5):	
Configuration	N.O. (Form A)
Rating	100 mA, 250 V (ac or dc)
On Resistance.	30 maximum

Digital Inputs	24 to 120 V (ac or dc), 5 mA
IRIG-B:	
Format	Amplitude Modulated IRIG-B122
Amplitude	1 to 10 Vpp
Impedance.	10 k
Ratio.	3:1 to 6:1
I/O Module Interface (OPI and RTD):	
Module Supply.	24 Vdc, 400 mA maximum
Configuration	RS-485, 2 wire multi-drop
Bus Length	1.2 km (4000 ft) maximum
Standard Network Communications:	
Configuration	RS-485, 2 wire multi-drop
Baud Rate	19.2 kB maximum
Protocols	Modbus RTU and A-B DF1
Isolation	120 Vac
Bus Length	1.2 km (4000 ft) maximum
Operator Interface (MPS-OPI):	
Display Type.	4 x 20 alphanumeric
RTD Module (MPS-RTD):	
Configuration	8 RTD's, 3 wire
RTD Types.	Pt100, Ni100, Ni120, Cu10
Measurement Range	-40 to 200°C, with open and short detection
PWB Conformal Coating	MIL-1-46058 qualified UL QMJU2 recognized
Environment (all modules):	
Operating Temperature	-40 to 60°C
Storage Temperature	-55 to 80°C
Humidity	85% Non-Condensing
Surge Withstand	ANSI/IEEE C3790.1-1989 (Oscillatory and Fast Transient)
Certification	 LR 62897 C US
Hazardous-Location Certification	Class I Zone 2 Ex nA II T6 (MPS-OPI and MPS-RTD)
DeviceNet Conformance	 ODVA File Number D-691-10092

ORDERING INFORMATION

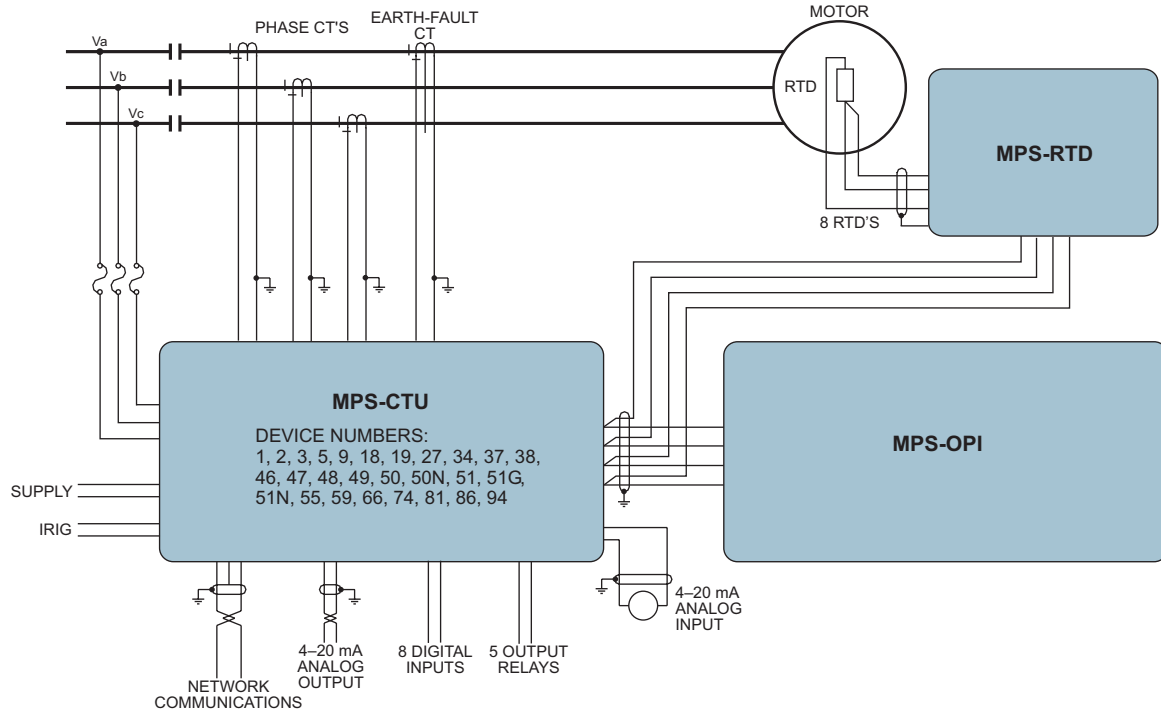
Control Unit:	MPS-CTU -   -  
Communications:	01 Standard RS-485 c/w A-B® DF1 & Modbus® RTU Protocols 02 DeviceNet™ & standard RS-485 03 PROFIBUS® & standard RS-485
Operator Interface:	MPS-OPI -   -  
Display:	01 Vacuum Fluorescent
RTD Module:	MPS-RTD -   -  
Configuration:	01 8 RTD

ACCESSORIES

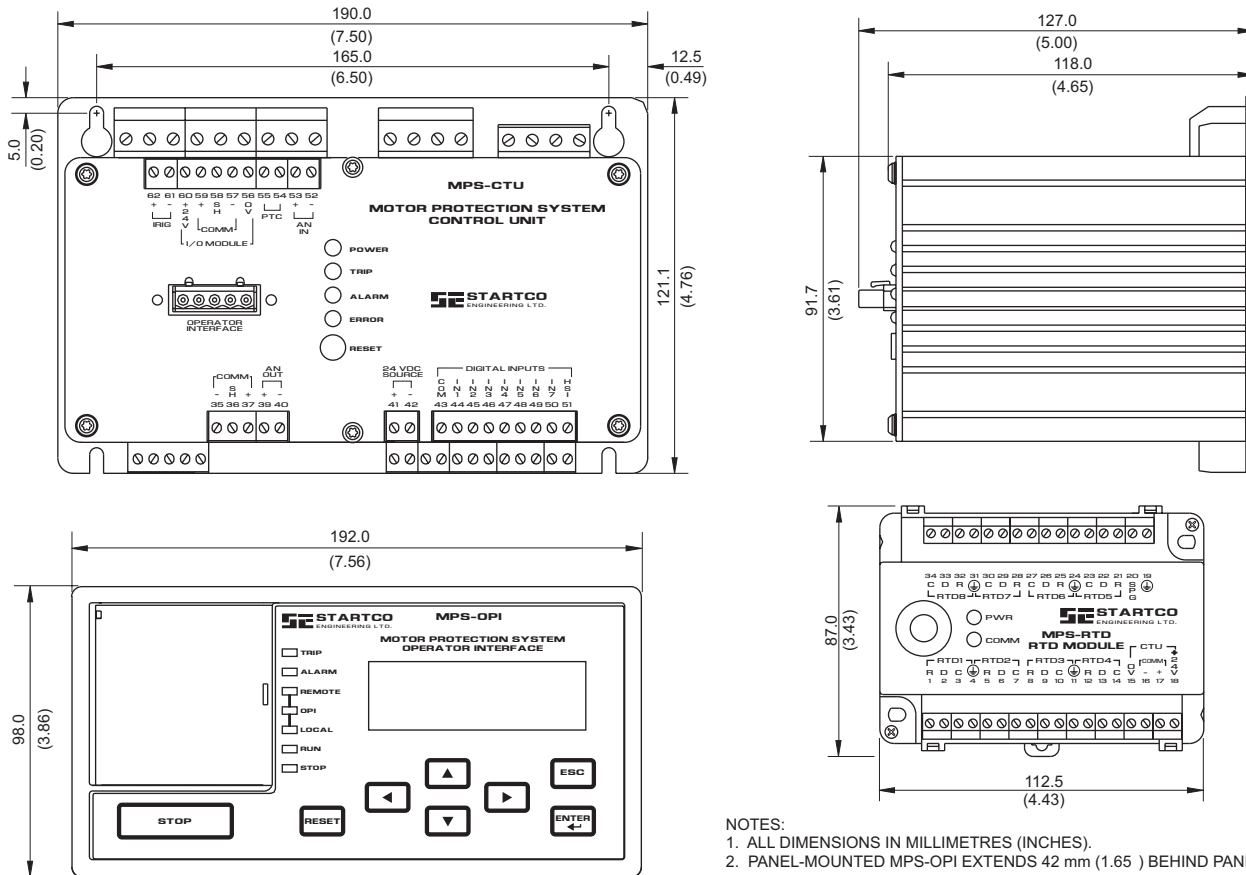
EFCT-1.	Sensitive Earth-Fault CT with 82-mm (3.2) Window
EFCT-1FC	Flux Conditioner, 70 mm (2.7)
EFCT-2.	Sensitive Earth-Fault CT with Flux Conditioner, 139-mm (5.5) Window
SE-485-PP.	Port-Powered Serial Converter
SE-COMM-MPS	PC Communication Software*

* Available at www.startco.ca

SIMPLIFIED CONNECTION DIAGRAM



DIMENSIONS



NOTES:

1. ALL DIMENSIONS IN MILLIMETRES (INCHES).
2. PANEL-MOUNTED MPS-OPI EXTENDS 42 mm (1.65) BEHIND PANEL.
3. MAXIMUM MPS-RTD HEIGHT WHEN MOUNTED ON 35-mm DIN RAIL IS 56 mm (2.20).

Specifications are subject to change without notice. Startco Engineering Ltd. is not liable for contingent or consequential damages, or for expenses sustained as a result of incorrect application, incorrect adjustment, or a malfunction.

This product has a variety of applications. Those responsible for its application must take the necessary steps to assure that each installation meets all performance and safety requirements including any applicable laws, regulations, codes, and standards.

Information provided by Startco is for purposes of example only. Startco does not assume responsibility for liability for use based upon the examples shown.

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