

MSRx CHARGE CONTROLLERS



The MSR4 in Painted Steel Enclosure

The **Micha** series of MSRx Charge Controllers is one of the most flexible solar regulator ranges available, giving the end-user the ability to meet the most demanding of specifications. The microprocessor-based control allows both pre-set and custom settings for all regulation values and alarm voltages, which can be readily modified using the alphanumeric LCD screen and keypad. A wide range of options are available, including additional alarm contacts, 4-20mA transducers, RS232/RS485 ports with data-logging and analogue and digital inputs – all of which can be programmed to suit.

Standard features include:

- Three-stage series regulation
- High Volts, Low Volts, Load Cut 1, Load Cut 2 Alarms with LED indication and relay contacts
- Battery Protection: Load Disconnect / Reconnect
- Remote Battery Voltage Sense and Battery Temperature Compensation (External temperature sensor included)
- Regulation, Array Switch and Alarm Status LED's
- Induced Lightning Protection
- Two Load Outputs, configurable with separate Low Voltage Disconnect values
- MCBs fitted on Array Inputs and Load Outputs
- Expansion port for optional modules
- Temperature range: -10°C to +55°C



The MSR6 in 2 x 4U 19" Rack units

Enclosures:

The MSRx controller can be supplied in a variety of enclosures: Painted Steel IP66, Stainless Steel (304 and 316L) IP66, GRP IP66 and 19" Rack units. For users who wish to install an MSRx into their own enclosure, we can supply a kit of parts including all mountings and fixings.

Array and Load Switches:



The standard Array Switch is a solid-state module, rated at 30A per array and includes blocking diodes. Alternatively, we can fit higher-rated 40A solid-state modules, or Mercury Displacement Relays (MDRs) and contactors rated up to 80A per array.

The standard MSRx is supplied with two solid-state Load Switches, each rated at 25A. These can be readily re-configured to act as a single 50A switch - either in the factory or by the end user - or for greater load demands, we can replace these with MDRs or contactors rated up to 200A.

80A Contactor



60A Mercury Displacement Relay

Battery Connection:

High-current stud terminals are provided suitable for cables up to 120mm². Although we recommend the battery is protected at the battery location, we can also fit MCBs or MCCBs for additional safety.

Alarms:

The standard 4 volt-free programmable relays can be increased with 4-relay modules connected to the expansion port. The 'Common Alarm' will trigger on any other alarm being active, with 'System Normal' having a normally-energised 'Common Alarm' function. Variable delays before operation can also be set. Configurable alarms include:

- | | | |
|--------------------------|---------------------|------------------------------|
| • Battery Sense Fail | • Low Battery Volts | • Common Alarm/System Normal |
| • Temperature Sense Fail | • Low Charge Alarm | • High Temperature Alarm |
| • Array Fail | • Load Disconnect 1 | • Low Temperature Alarm |
| • High Battery Volts | • Load Disconnect 2 | • Generator Start |

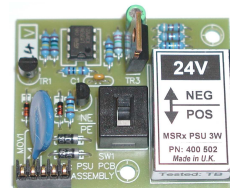
Control and Display:

The heart of the regulator is a Microchip PIC[®] micro-controller, which continuously monitors the Battery Voltage Sense input, Temperature Sensor input, Array inputs, Load Current and Array Current. Based on the regulation set-points, a three-stage charging scheme (Boost, Equalisation and Float Modes) is used to control the charging of the battery. The battery is protected from over-voltage and under-voltage conditions by High Volts, Low Volts and Load Disconnect Alarms (there are two Load Disconnects, one of which can be used for non-essential load shedding). All set-points can be adjusted on-site and in addition, functional tests of array and load switches and alarm relays can be undertaken. The two line alphanumeric display is the interface between the user and the controller. Using push-button switches, an operator can readily monitor and, where appropriate, vary the controller parameters.



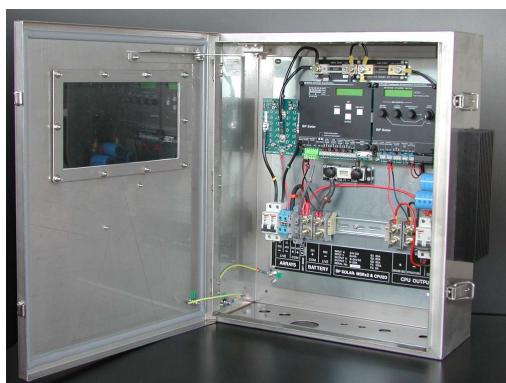
Voltage and Polarity:

The MSRx has a separate plug-in PSU module suitable for 12V, 24V and 48V battery systems. This allows the controller voltage to be readily re-configured if necessary, and regulation and alarm settings are automatically adjusted to take into account any change in both voltage and polarity. The modules also contain circuitry to isolate the controller in the event the battery is disconnected. Changing system polarity simply involves reconnecting four cables.

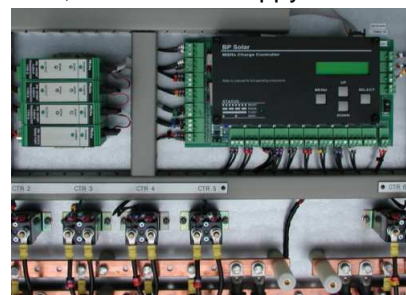


Custom Versions:

The MSRx can be supplied to meet customer requirements that exceed the standard specifications below. Recent projects include dual-redundant controllers with array currents of 480A and peak Load currents in excess of 180A, regulators combined with an isolated and regulated DC distribution panel, and combined Charge Regulator and Cathodic Protection Controller in a single enclosure. Enclosures can be supplied with viewing windows, padlock hasps, and pre-drilled or with removable gland-plates. As an OEM, we are also happy to brand our controllers with customers names and logos, and provide custom software for specific functions.



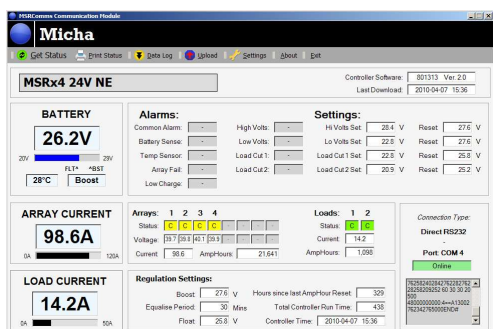
Combined Charge Regulator and CP Controller (left)



Custom contactor-based Charge Regulator (right)

Communications, Data-Logging and Options:

With the addition of an RS232 or RS485 port, remote monitoring and uploading of settings is possible, as well as the downloading of up to 250 days of historical data. PSTN and quad-band GSM modems can also be supplied. Users can select between our own ASCII-based protocol or MODBUS, and we can provide software to run on Microsoft[®] Windows-based PCs or laptops.



Other add-on modules include:

- 4-20mA Transducers
- 4-channel Signal Relays
- 8-channel Digital Input
- Reference Cell input
- Aux. Temperature Sensor
- Fault Current Detectors

| Standard versions: | MSRx2 | MSRx4 | MSRx6 | MSRx8 |
|--|-------------|-------------|-------------|-------------|
| Number of Array Inputs | 2 | 4 | 6 | 8 |
| Total Array Current | 60A | 120A | 180A | 240A |
| Load Current | 2 x 25A | 2 x 25A | 2 x 25A | 2 x 25A |
| Steel Enclosure Size (HxWxD) IP66 | 600x400x200 | 600x400x200 | 600x600x200 | 600x600x200 |
| Steel Enclosure Weight | 19 Kg | 20 Kg | 29 Kg | 30 Kg |
| GRP Enclosure Size (HxWxD) IP66 | 645x435x250 | 645x435x250 | 845x635x300 | 845x635x300 |
| GRP Enclosure Weight | 20 Kg | 21 Kg | 32 Kg | 33 Kg |
| 19" Rack Unit Height | 4U | 4U | 8U | 8U |
| Quiescent Current (excluding additional options) | | 12V : 700mW | 24V : 700mW | 48V : 1.1W |

Specification liable to change.