MCS Control Units

TECHNICAL BRIEFING

MCS-32, MCS-16 and MCS-8 Output Protection Circuitry

1. Operating temperature range of MCS-32, MCS-16 and MCS-8 units

Although Operating Range is stated as -20°C to +50°C MCS devices (32,16 & 8) are rated for in-vehicle installation, they are not designed for an engine bay, etc. The MCS-32 itself can operate at +75° safely. It has its own internal temperature sensor which will shut down the outputs when it gets too hot (>75°C). It also has an internal fan which activates as required.

2. High-Power Outputs - How circuit protection is achieved.

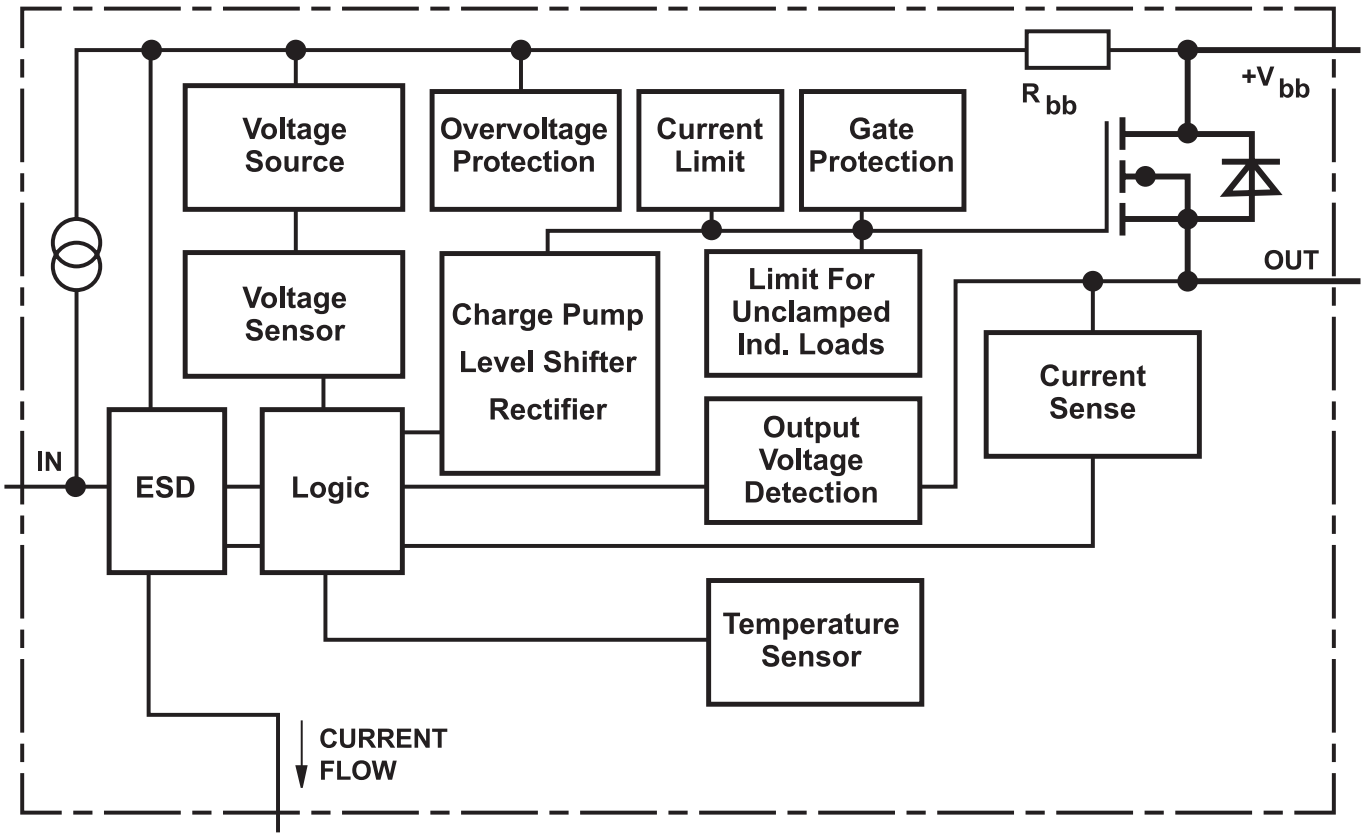
Protected circuits are monitored by 2 independent systems:

a) The software monitors the current set by the configuration, and if the output current exceeds that setting for 400mS then the output is disabled until reset or power cycling.

b) The hardware has its own internal protection circuitry, as shown in this diagram:

Each output has the following protections built in:

- Short circuit protection
- Current limitation
- Overload protection
- Thermal shutdown
- Overvoltage protection (including load dump)
- Loss of ground protection
- Loss of Vbb protection (with external diode for charged inductive loads)
- Electrostatic discharge (ESD) protection
- Optimized static electromagnetic compatibility (EMC)
- AEC Qualified. (Automotive Electronics Council)



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3. Low and Medium Power Outputs:

MCS-32

4 x Medium Power Outputs (data and medium drives):

These have 2.5 Amp delivery capability but 'no' protection.

As these are unprotected outputs used to act as Data Outputs to activate external devices, but not be the power source (typically where the current required is less than 100mA), no extra fusing is required. However, if the output is used to act as the power source (up to 2.5 Amps) for an external device, such as an interior lamp, relay or solenoid, a fuse should be put in the output of an appropriate value.

Typically, a fault on equipment being driven could potentially reqire 2.5 Amps or more before failing. This means if the interconnecting wire is not rated at more than 2.5 Amps it will overheat and potentially burnout.

Note: While the medium power outputs (x4) are rated at 2.5amps, they can deliver substantially more power, albeit at the risk of damaging the MCS-32. This is because they keep functioning until their internal failure mode is reached. This will be a track burnout situation, as opposed to device failure, since the devices are rated much higher than the tracks are.

12 x Low Power Outputs:
600mA continuous (1 Amp peak) delivery capability but with some protection by shutting down before 2Amps is reached. Therefore, if there is a fault on equipment being driven the MCS could potentially deliver 600mA to 1Amp before failing. This means if the interconnecting wire is not rated at more than 600mA it will overheat and potentially catch fire. That said generally all wire used in installs is rated at well over this (at least 2.0 Amps).

MCS-16

2 x Medium Power Outputs (data and medium drives):

These have 2.5 Amp delivery capability but 'no' protection.

As these are unprotected outputs used to act as Data Outputs to activate external devices, but not be the power source (typically where the current required is less than 100mA), no extra fusing is required. However, if the output is used to act as the power source (up to 2.5 Amps) for an external device, such as an interior lamp, relay or solenoid, a fuse should be put in the output of an appropriate value.

Typically, a fault on equipment being driven could potentially reqire 2.5 Amps or more before failing. This means if the interconnecting wire is not rated at more than 2.5 Amps it will overheat and potentially burnout.

Note: While the medium power outputs (x2) are rated at 2.5amps, they can deliver substantially more power, albeit at the risk of damaging the MCS-16. This is because they keep functioning until their internal failure mode is reached. This will be a track burnout situation, as opposed to device failure, since the devices are rated much higher than the tracks are.

6 x Low Power Outputs:

600mA continuous (1 Amp peak) delivery capability but with some protection by shutting down before 2Amps is reached. Therefore, if there is a fault on equipment being driven the MCS could potentially deliver 600mA to 1Amp before failing. This means if the interconnecting wire is not rated at more than 600mA it will overheat and potentially catch fire. That said generally all wire used in installs is rated at well over this (at least 2.0 Amps).

MCS-8

4 x outputs on the MCS-8 are High-Power rated and protected
4 x outputs on the MCS-8 are Medium-Power rated and un-protected

Note 1: The reason Medium Power outputs have no protection is that they are there for 'high speed' switching applications and as such protection circuitry would compromise this function.

Note 2: To eliminate any risk associated with Medium Power outputs being used, MHE have recommended these be moved to either a High-Power or Low-Power output, depending on the drive current.

4. Operating Voltage

Operating voltage range compliance with OEM standards, regarding how the units cope with voltage spikes, e.g. jump starts.

Full VCA 12V & 24V Type Approvals and NPIA 12V & 24V approvals, which include the following standard pulses on the power lines:

- Pulse 1, -75V, 1000@0.5s
- Pulse 2a, +37V, 1000@0.2s
- Pulse 2b, +10, 10@0.5s
- Pulse 3a, -112v, 10 mins
- Pulse 3b, +75V 10 mins
- Pulse 4, Us = -6V, 1 pulse

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