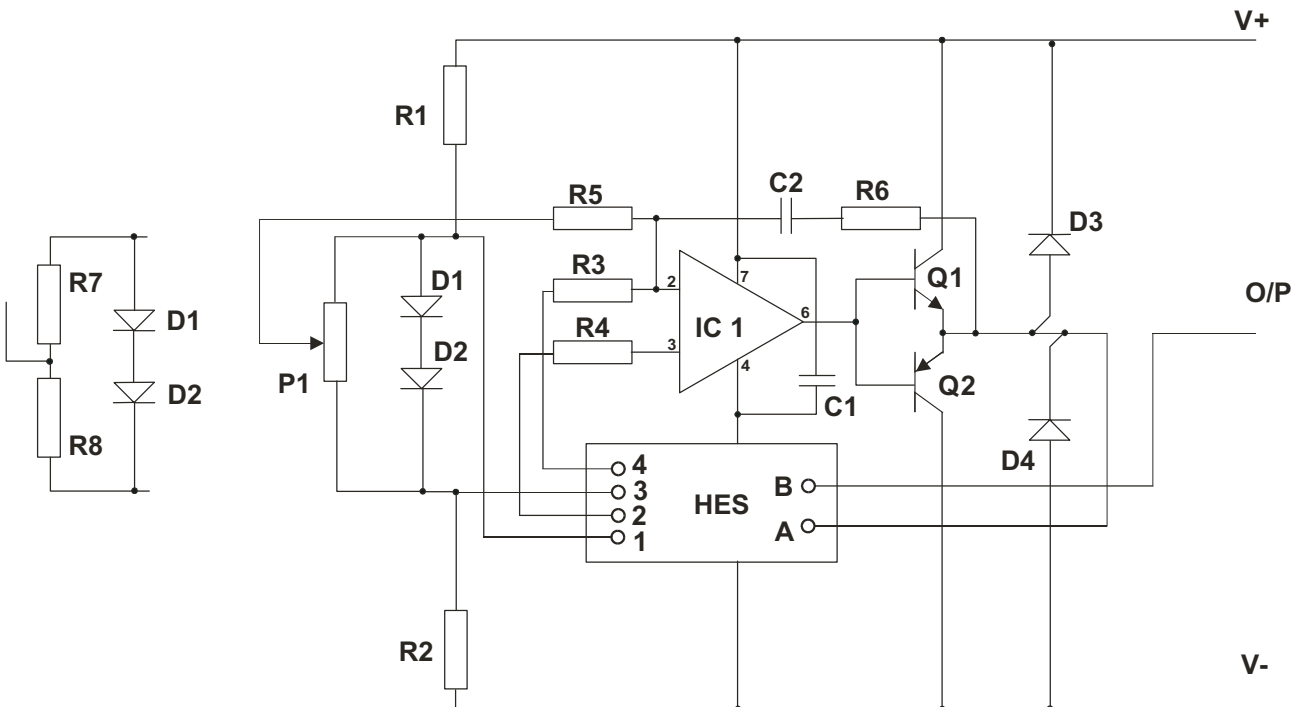## TELCON HES RANGE - APPLICATIONS

Units in the Telcon HES range incorporate the coil and Hall element from similar devices in the Telcon HTP range of Hall Effect Current Transformers. They are supplied as a free-standing component, enabling the user to configure a closed-loop Hall effect current transformer to their own specification.

This Application Note outlines the typical circuit required, with performance that can be expected.

CIRCUIT

The circuit shown above and the component values given below are similar to those used in the corresponding units in the Telcon HTP range.

RESISTORS

R1/R2 in the range 1k2 to 1k6 for ±15V supplies. The lower value will give optimum sensitivity for the Hall element; the higher value will reduce the power supply requirements by 3-4mA and can readily be used with regulated supplies. At lower supply voltages, the minimum current in R1/R2 should be of the order of 9mA.

R3/R4 - 1k2   R5 - 100k   R6 - 1M

P1,R7,R8   Typical values P1 - 5k, and R7 - 10k.
              See paragraph on Zero Adjustment.

CAPACITORS

C1   100nF, 50V min., Ceramic. When using the circuit with primary currents with high di/dt or high dV/dt, ensure op-amp and output transistors are physically close to each other and C1.

C2   100pF, 50V min., Ceramic

SEMICONDUCTORS

IC1   OP-37 or NE5534. The Hall effect current transformer is the sum of a current amplifier with a top limit of frequency response and an air-gapped transformer which becomes a `better' current transformer at higher frequencies. Use of these op-amps ensures a comparatively `seamless' combination.

D1,D2 & D3,D4   2 x 1N4148 (BAV99 double diode if surface mount)
D1,D2 can be replaced by a single 1.0V or 1.2V band-gap device

Q1   BC637 (BCX55 if surface mount)   Q2   BC638 (BCX52 if surface mount)
Ensure adequate track area on PCB for heat-sinking; use surface mount option for 25A and 50A units only.

ZERO OFFSET ADJUSTMENT

Zero adjustment is necessary to remove zero errors due to the offsets in the Hall element and the input of the op-amp. Two `hardware' methods are shown in the circuit diagram; the most straightforward is to use a potentiometer (pot), P1, to adjust the output to zero when no primary current is flowing. Alternatively, the pot can be simulated using one fixed resistor, R7, and one `Select on Test' resistor, R8. With either of these two methods, the output can be readily set to within ±30µA of zero or closer.

Another method that can be used in computer- or microprocessor-controlled systems, is to set a nominal zero, say, with equal values of R7/R8, monitor the output at times of known zero current, and correct for the value measured.

WIDER OPERATING TEMPERATURE RANGE

Notes on the limitation of the above circuit for operation below 0°C and above 70°C and modifications to overcome these are included on our Application Note 'Update for HES200HR and HES500HR.'

PERFORMANCE

The performance and specification of Hall Effect current sensors realised with the HES units and this above circuit are detailed on the HES data sheet.