

## Instructions

# Electronic module on SH/SY/SZ compressors

### Introduction

Large scroll compressors are delivered with a pre-installed electronic module located in the terminal box. This procedure describes electronic module's functions, fault diagnosis and how to replace an electronic module on SH/SY/SZ compressors.

These operations must be performed by qualified personnel in compliance with all pertinent practices and safety procedures.

### Functional description

The electronic module device provides efficient and reliable protection against motor overheating and overloading as well as phase loss and phase reversal detection.

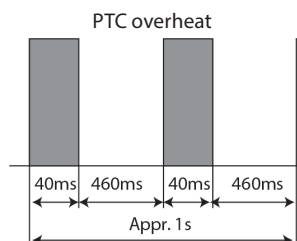
#### 1. Motor overheating and overloading

The motor protector comprises a control module and PTC sensors embedded in the motor winding. The close contact between thermistors and windings ensures a very low level of thermal inertia.

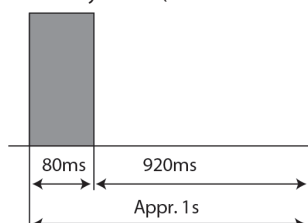
The motor temperature is constantly measured by a PTC thermistor loop connected on S1-S2. If the thermistor exceeds its response temperature, its resistance increases above the trip level (4,500  $\Omega$ ) and the output relay then trips, i.e. contacts M1-M2 are open. After cooling to below the response temperature (resistance < 2,750  $\Omega$ ), a 5-minute time delay is activated.

After this delay has elapsed, the relay is once again pulled in, i.e. contacts M1-M2 are closed. The time delay may be cancelled by means of resetting the mains (L-N-disconnect) for approximately 5 seconds.

A red/green twin LED is visible on the module. A solid green LED denotes a fault free condition. A blinking red LED indicates an identifiable fault condition:



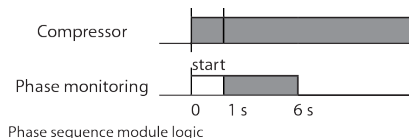
PTC reset delay active (after PTC over temp.)



#### 2. Phase loss, phase sequence

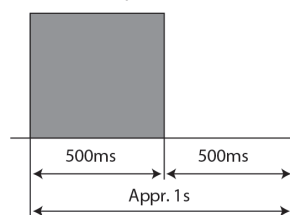
The electronic module provides protection against phase reversal and phase loss at start-up.

The circuit should be thoroughly checked in order to determine the cause of the phase problem before re-energizing the control circuit. The phase sequencing and phase loss monitoring functions are active during a 5-sec window 1 second after the compressor start-up (power on L1-L2-L3).

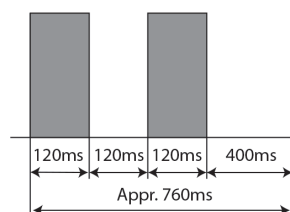


Should one of these parameters be incorrect, the relay would lock out (contact M1-M2 (or 11-14) open). The red LED on the module will show the following blink code:

In case of phase loss error



In case of phase reverse error



The lockout may be cancelled by resetting the power mains (disconnect L-N) for approximately 5 seconds.

#### 3. Internal module failure protection:

An internal microprocessor fault leads to trip; relay contact M1-M2 open.

#### Fault diagnosis

If the relay contacts M1-M2 are open, carry out following steps:

1. Check all electrical connections (wiring, drawing conformity, connection tightness...)
2. Try to reset by interrupting mains supply to the module for at least 5 seconds.
3. If after reset the relay contacts M1-M2 are now closed, a fault in motor power supply or high motor temperature had caused a trip condition

(missing phase, wrong phase sequence, operating outside of the compressor operating envelope...).

4. If the relay contact M1-M2 remains open:

4.1 Disconnect the PTC thermistor leads and measure the resistance value at this point (max measurement voltage 3V).

•  $R = \infty$ : PTC loop opened  $\rightarrow$  remove the compressor.

•  $R > 2750\Omega$ : wait until compressor motor winding temperature has cooled down, reconnect PTC and try to reset  $\rightarrow$  check root causes of motor over heating (operation outside of working envelope...).

•  $150\Omega < R < 1250\Omega$ : normal resistance value for PTC at ambient temperature  $\rightarrow$  continue with step 4.2.

•  $R = 0\Omega$ : PTC loop in short circuit  $\rightarrow$  replace the compressor.

4.2 Following steps describe how to test the module itself within the terminal box:

• Disconnect L-N.

• Disconnect S1-S2.

• Disconnect M1-M2.

• Reconnect mains supply L-N.

• Bridge S1-S2.

• Try to reset by interrupting mains supply to the module for at least 5 seconds.

• Check relay contacts M1-M2 with an ohmmeter.

• If the relay contacts M1-M2 are closed, module is OK.

• If the relay contacts M1-M2 are still open replace the module.

#### Replacement/Installation

1. Lock-out power supplies if compressor is installed.

2. Remove electrical box cover.

3. Before removing wires, label the wires so they can be connected to the correct connections on the replacement module. Unplug wires connected to the module.

4. Remove the two 3.5x25mm screws holding the module and replace with required module.

5. If the change is to have a different module supply voltage, please indicate the new electronic module supply voltage close to the compressor nameplate in case of compressor replacement.

6. Use two 3.5x25mm screws (torque: 0.5 to 2N.m), to mount the new module in place of the existing one.

7. Connect thermistor wires and 3 phase wires (when present) to the module. In case of the installed compressor, connect safety circuit and power supply wires to the module.

8. Snap the electrical box cover in place.

9. Reconnect power to compressor and module.

#### Handling and storage

• Handle the electronic module with care.

• In case of shock, the electronic module should not be used.

• Store between -35°C and + 70°C.

• Don't expose to rain or corrosive atmosphere.

Compressor Model	Electronic Module Description	Danfoss Accessory code	Codes marked on module nameplate	
			Module name	Danfoss part number
SM/SY/SZ175 to 380 & SH180 - 240 to 485	Electronic Module 24V AC	120Z0584	DEP101A	6914009P01
SM/SY/SZ175 to 380 & SH180 - 240 to 485	Electronic Module 115/240V AC	120Z0585	DEP101B	6914010P01

### Electronic module overview

