



# SIPROTEC – Motor Protection

**SIEMENS**

## Protection functions for various types of motor faults

Fault	Protection	ANSI - No.
■ Stator thermal overload	■ Stator thermal overload protection	<b>49</b>
■ Rotor thermal overload during start <ul style="list-style-type: none"> <li>■ too long or blocked</li> <li>■ too frequent</li> </ul>	■ 2 Protection principles for the rotor overload protection <ul style="list-style-type: none"> <li>■ Motor starting time supervision</li> <li>■ Restart inhibit</li> </ul>	<b>48</b> <b>66</b> <b>49R</b>
■ Earth-fault	■ Earth-fault protection ( $I_0 >$ ; $U_0 >$ ; $< (U_0, I_0)$ )	<b>50G</b> <b>64G</b> <b>67G</b>
■ Short-circuit	■ Overcurrent time protection ■ Current differential protection	<b>50</b> <b>51</b> <b>87</b>
■ Loss of phase	■ Negative sequence protection ( $I_2/I_N$ )	<b>46</b>
■ Bearing overload	■ Temperature sensors (RTD's)	<b>38</b>
■ Overheating of plant on unloaded drives (Pumps, compressors)	■ Undercurrent protection, Active power protection ( $P <$ )	<b>37</b> <b>32U</b>
■ Undervoltage (Starting torque not reached $M \sim U^2$ or start too long)	■ Undervoltage protection	<b>27</b>
■ Asynchronous operation (of a synchronous motor)	■ Underexcitation protection	<b>40</b>



# Scope of motor protection functions provided by SIPROTEC devices.

Protection functions	ANSI	7SJ60	7SJ61	7SJ62	7SJ63/64	7UM61	7UM62
Stator overload protection	49	X	X	X	X	X	X
Starting time supervision	48	X	X	X	X	X	X
Locked rotor protection	48	X	X	X	X	X	X
Restart inhibit	66, 49R	X	X	X	X	X	X
Earth-fault protection non-directional	64G 50G	X 1) X		X X	X X	X X	X X
directional	67G	X 1)		X	X	X	X
Overcurrent time protection	50, 51	X	X	X	X	X	X
Current differential protection	87						X
Negative sequence protection	46	X	X	X	X	X	X
Temperature supervision (via RTD - module)	38	X 1)		X	X	X	X
Undercurrent protection	37	X 1)	X	X	X	X	X
Active power protection (P<)	32U (37)					X	X
Undervoltage protection	27			X	X	X	X
Underexcitation protection	40					X	X
Frequency protection	81			X	X	X	X
Breaker failure protection	50BF	X 1)	X	X	X	X	X
Freely programmable logic (PLC)			X	X	X	X	X
Control functions		X	X	X	X	X	X
Measuring transducers					X		X
Flexible serial interfaces		1	2	2	2/3	2	3

<sup>1)</sup> in preparation (7SJ602)

A device that best suits your requirement can be selected

# Motor protection selection table

## Asynchronous Motor

### 100 kW - 500 kW

**7SJ60**  
Basic device

**7SJ61**  
+ more I/O's  
+ control functions  
+ flexible serial interfaces  
+ better local HMI  
(4line display; digital keyboard)

### 500 kW - (1-2) MW

**7SJ62**  
Basic device  
+ control functions

**7UM61**  
+ more I/O's (7UM612)  
+ control functions  
+ high accuracy  
+ high sensitivity  
+ operating range in a wide  
frequency band (11Hz - 68Hz)

or with control functions via  
bay mimic diagram in graphic display

**7SJ63**  
Basic device

**7SJ64**  
+ synchro check function  
+ high sensitivity  
+ extensive control function  
+ 1 serial interface more

### > 2 MW

**7UM62**  
+ differential protection  
+ control functions  
+ high accuracy  
+ high sensitivity  
+ operating range in a wide  
frequency band (11Hz - 68Hz)

## Synchronous Motor

### < 2MW

**7UM61**  
(Option:  
Generator Basic)

### < 10 MW

**7UM62**  
(Option:  
Generator Basic)

### > 10 MW

**+** **7UM61**  
(Option:  
Generator Basic)

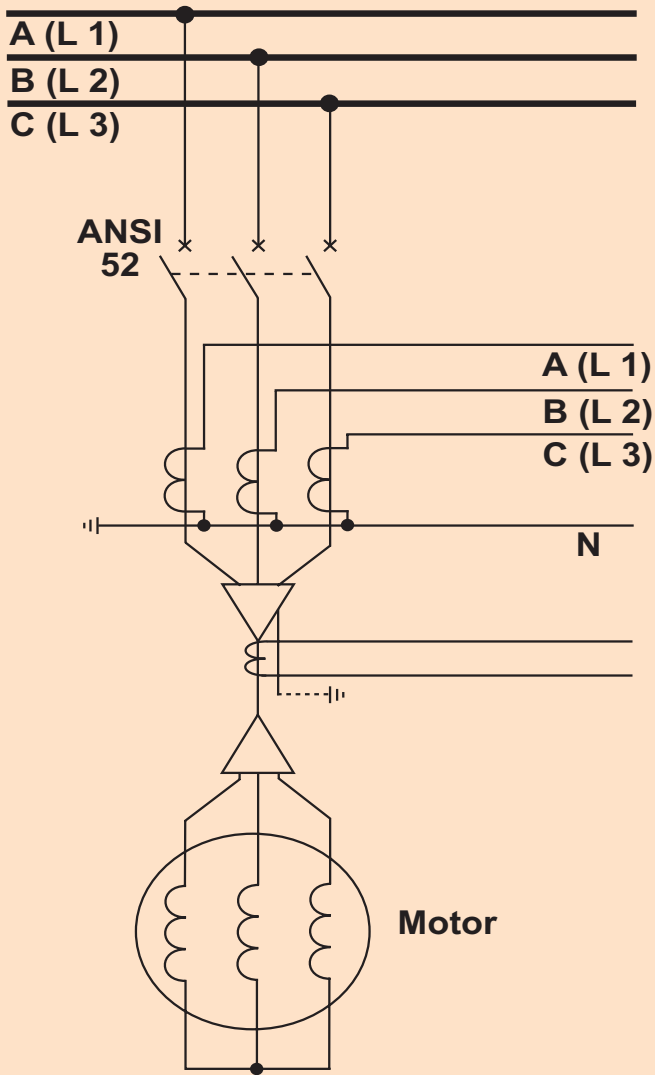
**7UM62**  
(Option:  
Generator Basic)

or with control functions  
via bay mimic diagram  
in graphic display

**+** **7SJ64**  
(Option:  
Maximum functionality  
+ Synchro check)

# Application example: Protection of a small motor

100 kW - 500 kW

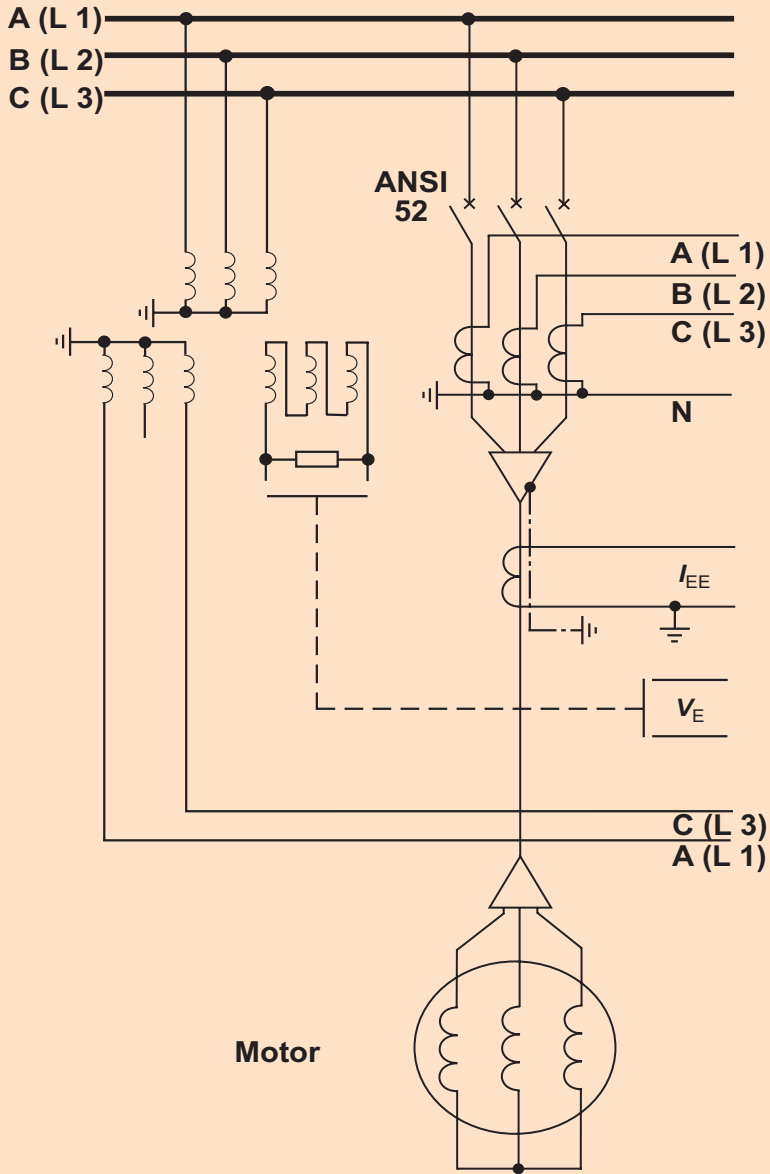


## 7SJ600/602

- Stator thermal overload protection **49**
- Starting time supervision **48**
- Earth-fault protection **50G**
- Overcurrent time protection **50, 51**
- Negative sequence protection **46**

**Application example:  
Protection of a medium sized motor**

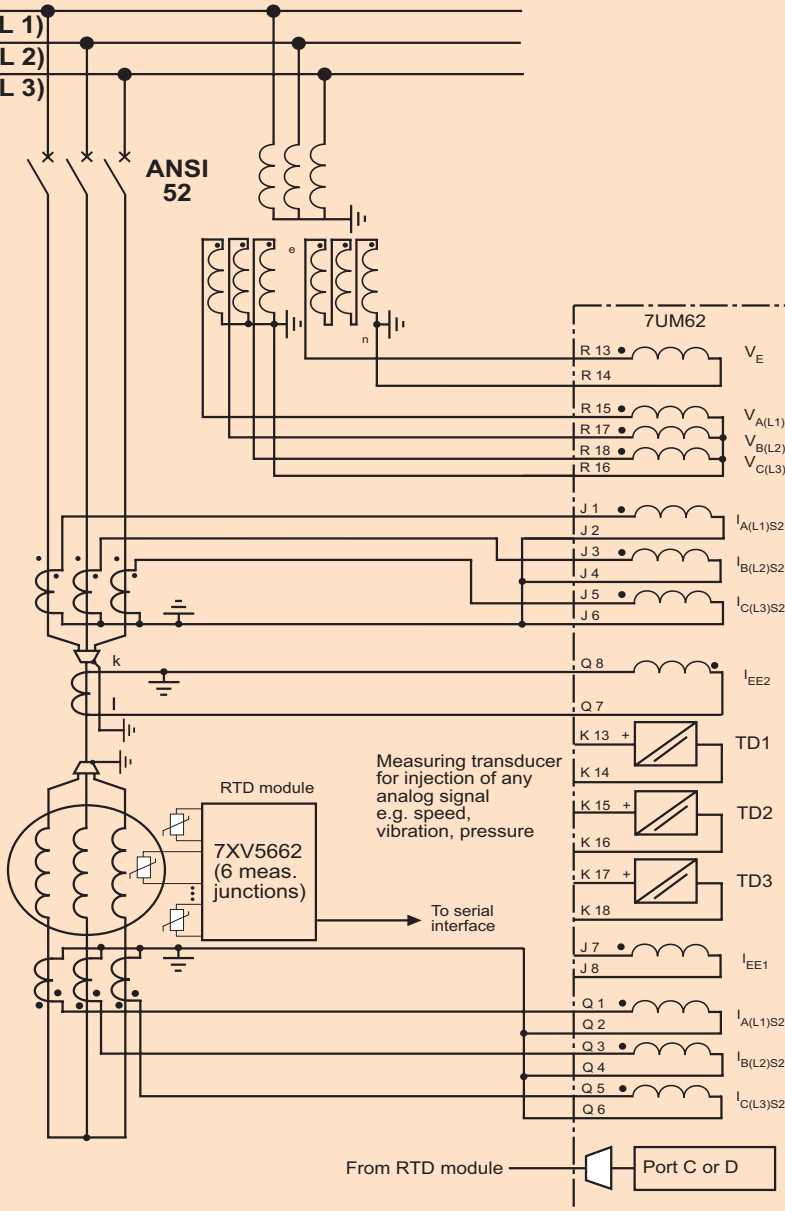
500 kW - (1-2) MW



**7SJ62/63**

- Stator thermal overload protection **49**
- Restart inhibit (rotor protection) **66, 49R**
- Starting time supervision **48**
- Earth-fault protection (non-directional, directional) **50G, 64G, 67G**
- Overcurrent time protection **50, 51**
- Negative sequence protection **46**
- Undervoltage protection **27**
- Undercurrent protection **37**
- Breaker failure protection **50BF**
- external RTD - module **38**

**Application example:**  
**Protection of a large motor**  
**> 2 MW**



**7UM62**

- Stator thermal overload protection **49**
- Restart inhibit (rotor protection) **66, 49R**
- Starting time supervision **48**
- Earth-fault protection **50G**  
 (non-directional, directional) **64G**  
**67G**
- Differential protection **87M**
- Overcurrent time protection **50, 51**
- Negative sequence protection **46**
- Undervoltage protection **27**
- Undercurrent protection **37**
- Active power protection **32U**
- Frequency protection **81**
- Breaker failure protection **50BF**



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