WOODWARD

HighPROTEC | PROTECTION TECHNOLOGY MADE SIMPLE

MRMV4 | MOTOR PROTECTION DEVICE

FUNCTIONS

The MRMV4 is a protection relay which uses the latest Dual-Core-Processor Technology to provide precise and reliable protective functions. Also it is very easy to operate. The MRMV4 provides all necessary functions to protect low and medium voltage motors at all power levels. The protection functions are based on current and voltage measurement and supervise all thermal conditions, motor start sequence, stall and locked rotor, undercurrent and incomplete sequence. Overcurrent functions and earth fault functions are also available as power protection, frequency and voltage elements. The motor operation can be monitored by statistic and trending recorders.

APPLICABLE FOR:
→ Low and high voltage asynchronous motors

ALL INCLUSIVE:
→ All protection features without extra charge
→ Para. setting and evaluation software
→ Disturbance record analysis software

MOTOR PROTECTION
→ Thermal overload protection 49M
→ Locked rotor Protection 51LRS
→ JAM or Stall protection 51LR
→ Underload protection 37
→ Motor start 48
→ Starts per Hour 66
→ Negative phase sequence (current unbalance) 46
→ Overcurrent/short circuit prot. 50P/51P
→ Earth overcurrent- and short circuit protection 50N/51N
→ Reclosing lockout 86
→ RTD supervision via optional external temperature box (Type MRMV4-B)

ADDITIONAL PROTECTION
→ 6 Overcurrent elements (nondir)
→ 4 Earth Overcurrent elements (nondir)
→ 2 Elements Residual Voltage
→ 4 Over-/Undervoltage elements
→ 6 Frequency elements
→ 6 Power protection elements
→ 2 Power Factor elements
→ Demand Management
→ THD Protection

CONTROL
→ of a switchgear

SUPERVISION FUNCTIONS
→ Breaker Failure, Trip Circuit Superv.
→ Loss of Potential, Switch onto Fault

MOTOR START RECORDER
→ Max. RMS values of phase currents
→ Negative phase sequence currents
→ Start duration
→ Used thermal capacity
→ Successful starts
→ Temperature profile (optional)

TRENDING RECORDER
→ Up to 10 selectable values with a selectable time window like IL1RMS, IL2RMS, IL3RMS, Thermal capacity…

ADDITIONAL RECORDERS
→ Disturbance Recorder
→ Fault Recorder
→ Event Recorder
→ Statistic Recorder

COUNTERS
→ History (e.g. Motor starts values, Alarms, Trips...)
→ Total Counters (e.g. Run Time...)

ADDITIONAL HIGHLIGHTS
→ 4 Analog Outputs (Type MRMV4-B)
→ Long starting time for reduced voltage starts
→ Emergency Start
→ Incomplete sequence
→ Anti-backspin time delay
→ Permitted number of cold starts
→ Supervision of starts per hour
→ Mechanical load shedding
→ Zero speed indication via input
→ Motor stop inputs
→ External alarm and trip inputs
→ 4 setting groups.
→ Sine wave generator for testing and fault simulation.

SETTING SUPPORT
→ Copy parameter sets
→ Compare parameter sets
→ Setting files are up and down convertible (across versions)

LOGIC
→ Up to 80 logic equations

COMMUNICATION OPTIONS
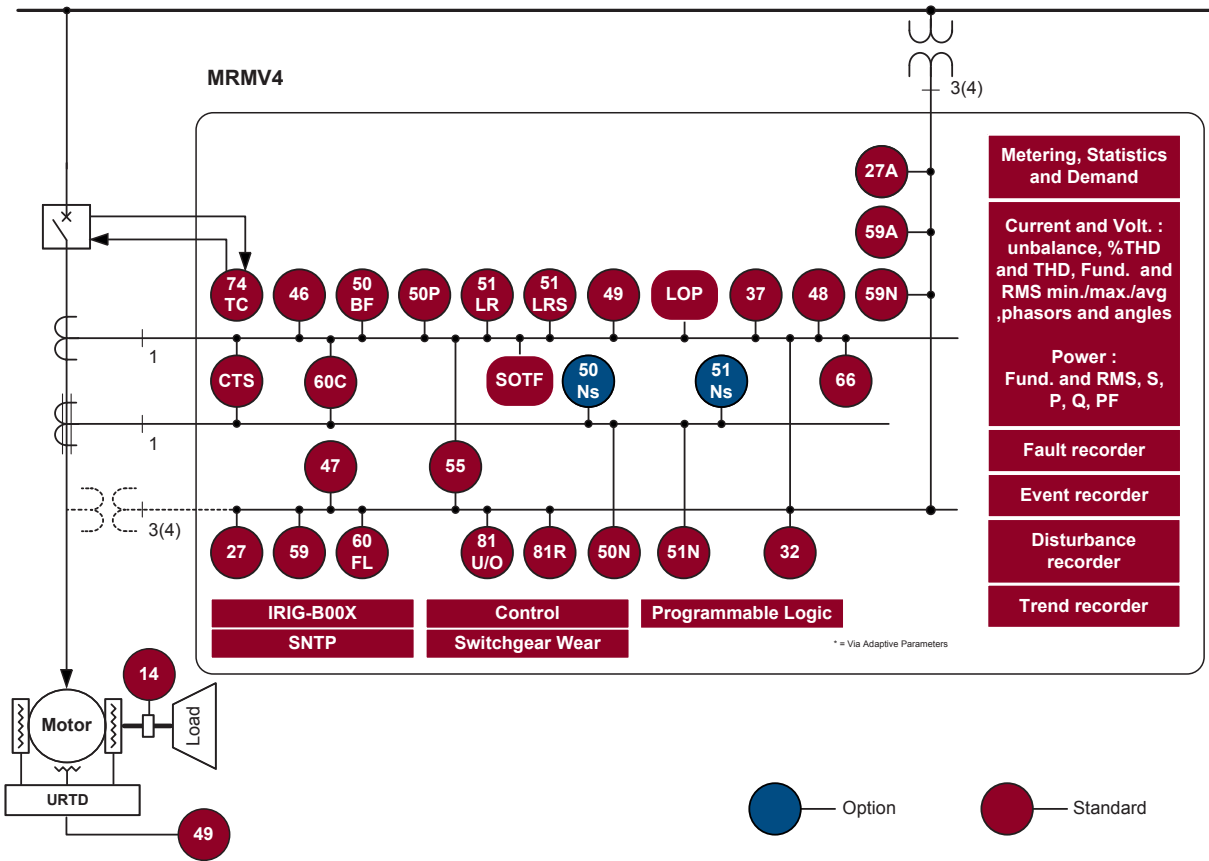→ IEC61850, Profibus DP, Modbus RTU, Modbus TCP, IEC60870-5-103
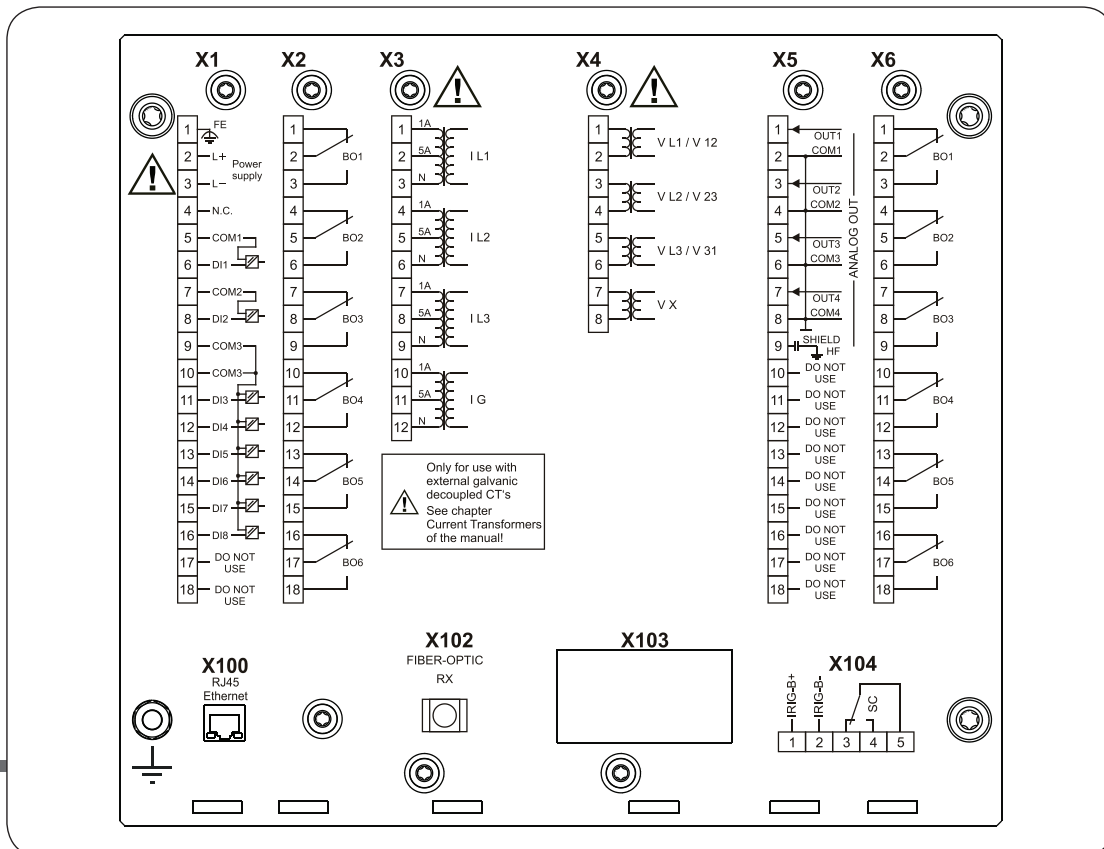
TIME SYNCHRONISATION
→ SNTP or IRIG-B00X

FUNCTIONAL OVERVIEW

	Elements	ANSI
Protective Functions		
IB, thermal overload protection		49M
I, time overcurrent and short circuit protection (non direction) (instantaneous, definite time, characteristicsaccording to IEC60255, ANSI		50P, 51P
Voltage controlled overcurrent protection by means of adaptive parameters. Voltage dependent overcurrent protection. Negative phase sequence overcurrent protection	6	51C 51V 51Q
I2, unbalanced load protection with evaluation of the negative phase sequence current	2	46
IG, earth time overcurrent and short circuit protection (non direction) (instantaneous, definite time, characteristics according to IEC60255, ANSI	4	50N, 51N
I< underload protection	2	37
Reclosing lockout		49R
Incomplete sequence		
JAM protection	2	51LR
Locked rotor Protection		51LRS
Motor start		48
Starts per Hour		66
Start control input		
Reversing mode		
Emergency start		
V<, V>, V(t)<, under- and overvoltage protection, time dependent undervoltage protection	6	27, 59
Voltage asymmetry supervision (V012) V1, under and overvoltage in positive phase sequence system V2, overvoltage in negative phase sequence system	6	47
Each of the six frequency protection stages can be used as:	6	
→ f< or f> (over- or under frequency supervision)		81U/O
→ df/dt rate of change of frequency (ROCOF)		81R
→ (f< and df/dt) or (f> and df/dt) combination of over-, under- and ROCOF)		
→ (f< and DF/DT) or (f> and DF/DT) combination of over-, under- and increase of frequency		
→ Delta Phi (Vector surge)		78
VX, residual voltage protection	2	59N
PQS, Power protection	6	32, 37
PF, Power factor	2	55
Control and Logic		
Control: Position indication, supervision time management and interlockings a switchgears		
Logic: Up to 80 logic equations, with 4 inputs, selectable logical gates, timers and memory function		
Supervision Functions		
CBF, circuit breaker failure protection	1	50BF
TCS, trip circuit supervision	1	74TC
LOP, loss of potential	1	60FL
CTS, current transformer supervision	1	60L
SOTF, switch onto fault	1	
Demand management and peak value supervision (current and power)		
THD supervision		
Switchgear wear with programmable wear curves		
Recorders: Disturbance, fault, event, trend, start and statistic recorders		

FUNCTIONAL OVERVIEW IN ANSI FORM

MRMV4

27A

59A

74 TC | 46 | 50 BF | 50P | 51 LR | 51 LRS | 49 | LOP | 37 | 48 | 59N

CTS | 60C | SOTF | 50 Ns | 51 Ns | 66

47 | 55

27 | 59 | 60 FL | 81 U/O | 81R | 50N | 51N | 32

| Metering, Statistics and Demand |
| Current and Volt. : unbalance, %THD and THD, Fund. and RMS min./max./avg ,phasors and angles |
| Power : Fund. and RMS, S, P, Q, PF |
| Fault recorder |
| Event recorder |
| Disturbance recorder |
| Trend recorder |

3(4)

1

1

3(4)

| IRIG-B00X | Control | Programmable Logic |
| SNTP | Switchgear Wear | |

* = Via Adaptive Parameters

Motor | Load

URTD

14

49

● Option   ● Standard

CONNECTIONS

X1
1 FE
2 L+ Power supply
3 L−
4 N.C.
5 COM1
6 DI1
7 COM2
8 DI2
9 COM3
10 COM3
11 DI3
12 DI4
13 DI5
14 DI6
15 DI7
16 DI8
17 DO NOT USE
18 DO NOT USE

X2
1
2 BO1
3
4
5 BO2
6
7
8 BO3
9
10
11 BO4
12
13
14 BO5
15
16
17 BO6
18

X3
1 1A
2 5A I L1
3 N
4 1A
5 5A I L2
6 N
7 1A
8 5A I L3
9 N
10 1A
11 5A I G
12 N

Only for use with external galvanic decoupled CT's
See chapter Current Transformers of the manual!

X4
1 V L1 / V 12
2
3 V L2 / V 23
4
5 V L3 / V 31
6
7 V X
8

X5
1 OUT1 COM1
2
3 OUT2 COM2
4
5 OUT3 COM3
6
7 OUT4 COM4
8
9 SHIELD HF
10 DO NOT USE
11 DO NOT USE
12 DO NOT USE
13 DO NOT USE
14 DO NOT USE
15 DO NOT USE
16 DO NOT USE
17 DO NOT USE
18 DO NOT USE

ANALOG OUT

X6
1
2 BO1
3
4
5 BO2
6
7
8 BO3
9
10
11 BO4
12
13
14 BO5
15
16
17 BO6
18

X100
RJ45 Ethernet

X102
FIBER-OPTIC RX

X103

X104
IRIG-B+ | IRIG-B− | SC
1 | 2 | 3 | 4 | 5

MRMV4 | MOTOR PROTECTION DEVICE

ORDER FORM MRMV4

Motor Protection					MRMV4				
Analog output	**RTD remote interface**	**Digital inputs**	**Output relays**	**Housing**					
4	X	8	7	B2	A				
4	X	8	13	B2	C				

Hardware variants

Phase current 1 A/5 A, earth current 1 A/5 A	0	
Phase current 1 A/5 A, sensitive earth current 1 A/5 A	1	

Housing and mounting

Door mounting	A
Door mounting 19" (flush mounting)	B

Communication protocol

Without protocol	A
RS485/terminals: Modbus RTU, IEC60870-5-103, IRIG-B (terminals)	B
Ethernet 100MB/RJ45 connector: Modbus TCP, IRIG-B (terminals)	C
Fibre optic interface: Profibus-DP, IRIG-B (terminals)	D
RS485/D-SUB: Profibus-DP, IRIG-B (terminals)	E
Fibre optic interface: Modbus RTU, IEC 60870-5-103, IRIG-B (terminals)	F
RS485/D-SUB interface: Modbus RTU, IEC 60870-5-103, IRIG-B (terminals)	G
Ethernet 100MB/RJ45 connector: IEC 61850	H

Available menu languages

Standard English/German/Russian

The parameterizing- and disturbance analyzing software is included in delivery of HighPROTEC devices.

Current inputs	4 (1 A and 5 A) with automatic short circuiters
Voltage inputs	4 (0–800 V)
Digital inputs	Switching thresholds adjustable via software
Power supply	Wide range power supply
Terminals	All terminals plug type
Mounting	Door mounting
Type of enclosure (Front)	IP54
Dimensions of housing	212.7 mm x 173 mm x 209 mm (W x H x D)
Weight (max. components)	approx. 4.2 kg

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Enabling Electrical Power Systems Integration

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