



- Combined Reverse Power, Overload, Over Current and Short Circuit functions
- Available for 3-phase, 3-wire (2W3) or 4-wire (3W4) systems
- The Pathfinder function eases fault finding (Over Current & Short Circuit)
- Predictor early action feature
- Up to two individually very fast analogue output signals (<50mS), (optional)
- DIN96 Slave Indicator with status LEDs (optional)

**Specifications**

Monitored Voltage:	100-120V, 200-240V, 380-415V, 440-460V, 480VAC 40-70Hz (Fuse 0,5A)
Optional Separate Auxiliary Voltage AC:	100-120V, 200-240V, 380-415V, 440-460V, 480VAC 40-70Hz (Fuse 0,5A)
Optional Separate Auxiliary Voltage DC:	24-60VDC (Fuse 0,5A) 110-220VDC (Fuse 1A)
Supply tolerance:	+10%, -20%
Power rating:	5VA
Current Input:	1A CT or 5A CT, <0,1VA
Contact rating:	AC: 100VA -250V/2A max. DC: 50W -100V/1A max.
Adjustments:	Depending on the selected model (see page 2 & 3)
kW range:	Any % of the scale
Analogue output 1: (see page 4 for available outputs)	mA: Up to 20mA, max 500R V: Up to 10V, min 100kohm (other on request)
Analogue output 2: (see page 4 for available outputs)	mA: Up to 20mA, max 500R V: Up to 10V, min 500ohm (other on request)
Accuracy:	Class 0,5
Temperature:	-20 to +70°C
Humidity, relative:	0-95%
Weight:	0,6kgs
Front protection:	IP21
Flammability:	UL94-V0

The unit meets EN 60255-27 Cat. III, Pollution degree 2 and the relevant environmental and EMC tests specified in EN 60255-26 to comply with the requirements of the major Classification Societies.

**Description**

The digitally controlled MAG10x generator guard combines Reverse Power (R/P), Overload (O/L), Over Current (O/C) and Short Circuit protection (S/C) in one unit. Features depend on selected model.

The unit measures the voltage and current true r.m.s. value, and accuracy is independent of any wave form distortion. Less than 50mS processing time.

The standard models takes the auxiliary supply voltage from the monitored voltage (terminal 1 & 2).

It can also be delivered with optional separate AC or DC auxiliary voltage (terminal 26 & 27), but that must be specified when ordering (see page 4 for ordering code for separate Aux. Supply).

User settable trip levels and delays. Colour of LEDs indicate alarm status. Alarm LEDs flash during count-down.

LED status			LED status			LED status		
Power / R/P	O/C	S/C	Power / R/P	O/C1	O/C2	Power / R/P	O/L	O/C
● / ●	●	●	● / ●	●	●	● / ●	●	●
Normal / Alarm	Alarm	Alarm	Normal / Alarm	Alarm	Alarm	Normal / Alarm	Alarm	Alarm

Start of monitoring function is delayed when power is switched on (default 2 secs delay). In this way false tripping during power up is avoided.

The DIN-rail mounted instrument reads the power level directly in kW. The optional slave watt-meter and the triple-zone status LEDs at a glance gives the clear safety message:

- Over Current / Short Circuit
- Normal
- Reverse Power

**PREDICTOR**

The main feature of the Predictor function is to open bus-tie breakers or trip heavy loads to prevent a total blackout situation. The predictor relay(s) trips at set over current (O/C) or short circuit current (S/C) level, prior to the generator breaker trip. If the overload condition is still present after this load reduction the generator breaker will trip 1sec or 200mS later relative to set O/C or S/C time delays.

**OUTPUTS**

Up to two individual very fast analogue output signals (optional) proportional to range (A or kW) (see page 2 and 3 for models with outputs). This may be used as an input to a control system, to detect abnormal power conditions (loss of excitation etc). If output is used for remote meter reading, we recommend 0-1mA for the slave indicator.

**RELAY OUTPUTS**

A trip timer will reset if the fault is removed during count-down. Remote alarm reset input. Fixed hysteresis prevents relay "chatter". Full functionality control during power-up/power-down, with 500mS power-out reservoir. Relay operation depends on the selected model (see page 2 and 3). Other combinations are available on request.

**PATHFINDER**

The Pathfinder (only on latching models) indicates the phase causing an over current or short circuit trip by the flashing pattern of the relevant LED. When either short circuit or over current trips have operated the relevant LED will flash in the following pattern to indicate the phase producing the trip.



**Description**

**MAG100x (2W3) - MAG104x (3W4)**

**Over Current, Short Circuit and Reverse Power Guard**

Both relays simultaneously trip after the full Reverse Power, Over Current or Short Circuit definite time delay.

Depending on application either the NC or NO contact of relay R2 or R3 can be used to operate the generator breaker. The opposite relay may be used for alarm, etc. R1 is a separate Short Circuit alarm relay.

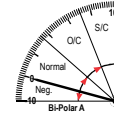
**Relay Operation**

The relay operation is delayed in the arrow direction. Both trip levels can, independently, individually set over the scale range.

**Relays: Bi-Polar A**

Relay	R/P	O/C	S/C	Fail Safe	Latch	Definite Time	N/A	N/A	Predictor
R1			X	X	X	X			
R2	X	X	X	X	X	X			
R3	X	X	X	X	X	X			

Models	Output 1	Output 2	Relays shown de-energised. R3 is fail-safe and energises when unit is powered.	Adjustments	Trip level	Delay
MAG100FA	X	-		R/P:	0-20% of Range	0-30secs
MAG100FB	X	X		O/C:	50-150% of In	0-120secs
MAG104FA	X	-		S/C:	150-300% of In	0,1-1secs
MAG104FB	X	X				



**MAG100Ax (2W3) - MAG104Ax (3W4)**

**Over Current, Short Circuit and Reverse Power Guard**

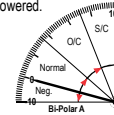
With three separate relays (R1, R2 and R3). R1 and R3 are normally energised (fail to safety), R2 is normally de-energised.

Each relay will trip after the Reverse Power, Over Current or Short Circuit pre-set time delay.

**Relays: Bi-Polar A**

Relay	R/P	O/C	S/C	Fail Safe	Latch	Definite Time	N/A	N/A	Predictor
R1	X			X	X	X			
R2		X				X			
R3			X	X	X	X			

Models	Output 1	Output 2	Relays shown de-energised. R1 & R3 are fail-safe and energises when unit is powered.	Adjustments	Trip level	Delay
MAG100AFA	X	-		R/P:	0-20% of Range	0-30secs
MAG100AFB	X	X		O/C:	50-150% of In	0-120secs
MAG104AFA	X	-		S/C:	150-300% of In	0,1-1secs
MAG104AFB	X	X				



**MAG100Cx (2W3) - MAG104Cx (3W4)**

**Over Current, kW Overload and Reverse Power Guard**

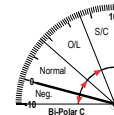
With three separate relays (R1, R2 and R3). R1 is fail safe and energises when the unit is powered.

R2 & R3 are normally de-energised. Each relay will trip after the Reverse Power, Overload or Over Current pre-set time delay.

**Relays: Bi-Polar C**

Relay	R/P	O/L	O/C	Fail Safe	Latch	Definite Time	N/A	N/A	Predictor
R1	X			X	X	X			
R2		X				X			
R3			X		X	X			

Models	Output 1	Output 2	Relays shown de-energised. R1 is fail-safe and energises when unit is powered.	Adjustments	Trip level	Delay
MAG100CFA	X	-		R/P:	0-20% of Range	0-30secs
MAG100CFB	X	X		O/L:	0-100% of Range	0-30secs
MAG104CFA	X	-		O/C:	50-150% of In	0-120secs
MAG104CFB	X	X				



**MAG100Dx (2W3) - MAG104Dx (3W4)**

**2 x Over Current and Reverse Power Guard**

Both R1 & R3 simultaneously trip after the full Reverse Power or Over Current definite time delay.

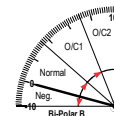
Depending on application either the NC or NO contact of relay R1 or R3 can be used to operate the generator breaker. R2 is a separate Over Current alarm (O/C2) with individual setting.

This can be used as a preferential trip or for early action functionality. R2 auto-resets when the fault is removed.

**Relays: Bi-Polar B**

Relay	R/P	O/C 1	O/C 2	Fail Safe	Latch	Definite Time	N/A	N/A	Predictor
R1	X	X		X	X	X			
R2			X			X			
R3	X	X		X	X	X			

Models	Output 1	Output 2	Relays shown de-energised. R1 is fail-safe and energises when unit is powered.	Adjustments	Trip level	Delay
MAG100DFA	X	-		R/P:	0-20% of Range	0-30secs
MAG100DFB	X	X		O/C1:	50-150% of In	0-120secs
MAG104DFA	X	-		O/C2:	50-150% of In	0-120secs
MAG104DFB	X	X				



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Depending on application, select the model that matches the electrical installation. If none of the listed models fit your purpose please contact Megacon for customer adaptation.



**Description**

**MAG100Ex (2W3) - MAG104Ex (3W4)**

**Over Current, Short Circuit and Reverse Power Guard**

R3 trips after the full Reverse Power, Over Current or Short Circuit definite time delay.

Depending on application either the NC or NO contact can be used to operate the generator breaker.

R1 and R2 are additional alarm relays and can be used to provide an alarm signal to an alarm system or PM-System.

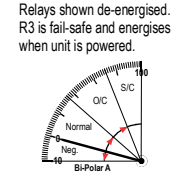
**Relay Operation**

The relay operation is delayed in the arrow direction. Both trip levels can, independently, individually set over the scale range.

**Relays: Bi-Polar A**

Relay	R/P	O/C	S/C	Fail Safe	Latch	Definite Time	N/A	N/A	Predictor
R1	X				X	X			
R2		X	X		X	X			
R3	X	X	X	X	X	X			

Models	Output 1	Output 2	Adjustments	Trip level	Delay
MAG100EFA	X	-	R/P:	0-20% of Range	0-30secs
MAG100EFB	X	X	O/C:	50-150% of In	0-120secs
MAG104EFA	X	-	S/C:	150-300% of In	0,1-1secs
MAG104EFB	X	X			



**MAG102x (2W3) - MAG106x (3W4)**

**Over Current, Short Circuit and Reverse Power Guard with PREDICTOR early action function**

One common relay (R3) for generator breaker trip, and two early action Predictor relays (R1 & R2) for preference load tripping and/or bus-tie breaker opening.

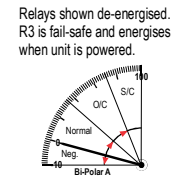
R3 de-energises at trip. R3 trips after the full set Reverse Power, Over Current or Short Circuit definite time delay and is used to open the generator breaker.

R1 will trip 1 second before the set O/C trip and R2 will trip 200mS before the set S/C trip. The Predictor function may prevent an anticipated blackout.

**Relays: Bi-Polar A**

Relay	R/P	O/C	S/C	Fail Safe	Latch	Definite Time	N/A	N/A	Predictor
R1		X				X			X
R2			X			X			X
R3	X	X	X	X	X	X			

Models	Output 1	Output 2	Adjustments	Trip level	Delay
MAG102FA	X	-	R/P:	0-20% of Range	0-30secs
MAG102FB	X	X	O/C:	50-150% of In	0-120secs
MAG106FA	X	-	S/C:	150-300% of In	0,1-1secs
MAG106FB	X	X			



**MAG102Bx (2W3) - MAG106Bx (3W4)**

**Over Current, Short Circuit and Reverse Power Guard with PREDICTOR early action function**

One common relay (R3) for generator breaker trip, and an early action Predictor relay (R2) for preference load tripping and/or bus-tie breaker opening.

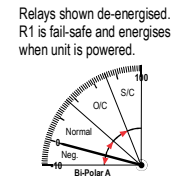
R3 de-energises at trip. R1 is an additional common alarm relay. R2, the predictor relay, will trip 1sec before R3 on O/C & 200mS (400mS optional) before R3 on S/C trip. The Predictor function may prevent an anticipated blackout.

R3 trips after the full set Reverse Power, Over Current or Short Circuit definite time delay and is used to open the generator breaker. The release time on O/C & S/C will be setpoint + the predictor time. (+200mS for S/C & 1 sec for O/C).

**Relays: Bi-Polar A**

Relay	R/P	O/C	S/C	Fail Safe	Latch	Definite Time	N/A	N/A	Predictor
R1	X	X	X		X	X			
R2		X	X			X			X
R3	X	X	X	X	X	X			

Models	Output 1	Output 2	Adjustments	Trip level	Delay
MAG102BFA	X	-	R/P:	0-20% of Range	0-30secs
MAG102BFB	X	X	O/C:	50-150% of In	0-120secs
MAG106BFA	X	-	S/C:	150-300% of In	0,1-1secs
MAG106BFB	X	X			



**MAG102Fx (2W3) - MAG104Fx (3W4)**

**2 x Over Current and Reverse Power Guard**

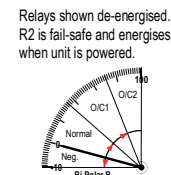
With three separate relays (R1, R2 and R3). R2 are normally energised (fail to safety), R1 and R2 is normally de-energised.

Each relay will trip after the Reverse Power, Over Current or Short Circuit pre-set time delay.

**Relays: Bi-Polar B**

Relay	R/P	O/C 1	O/C 2	Fail Safe	Latch	Definite Time	N/A	N/A	Predictor
R1	X				X	X			
R2		X	X	X		X			
R3			X			X			

Models	Output 1	Output 2	Adjustments	Trip level	Delay
MAG102FFA	X	-	R/P:	0-20% of Range	0-30secs
MAG102FFB	X	X	O/C1:	50-150% of In	0-120secs
MAG104FFA	X	-	O/C2:	50-150% of In	0-120secs
MAG104FFB	X	X			



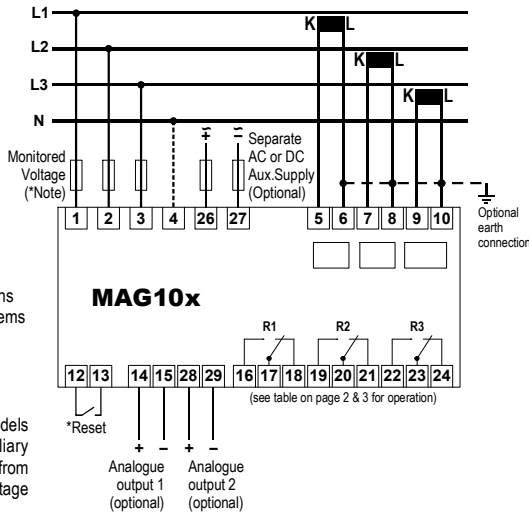
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Connection Diagram

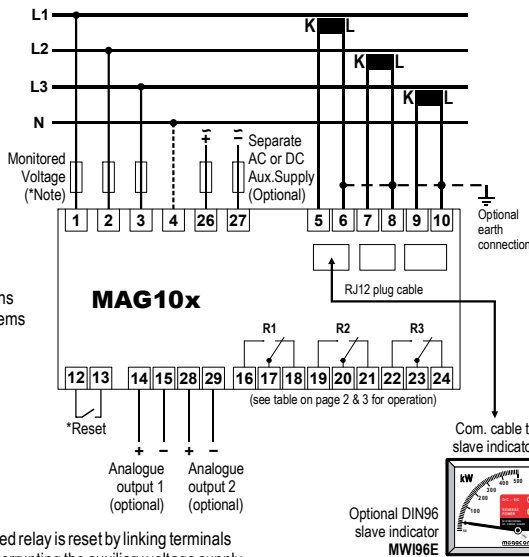
Connection Diagram without optional slave instrument



NB!  
Dotted connections are for 4-wire systems

\*Note:  
The standard models takes the auxiliary supply voltage from the monitored voltage (terminal 1 & 2).

Connection Diagram with optional slave instrument



NB!  
Dotted connections are for 4-wire systems

\*Reset: Any latched relay is reset by linking terminals 12 and 13 or by interrupting the auxiliary voltage supply.  
NB! To ensure correct kW measurement, the voltage phase sequence and CT connections must be as shown on connection diagrams.

Analogue Output

The output signals are proportional to the meter reading (see page 2 & 3 for an overview of models and functions).

The signal is specifically intended as an input to a control system for monitoring or control.

Add suffix from table below to type designation to specify output required:

Outputs 1

O/P1	0 - 10mA
O/P2	0 - 20mA
O/P3	4 - 20mA
O/P4	4 - 12 - 20mA
O/P5	4 - 5,45 - 20mA
O/P6	-10 - 0 - +10mA
O/P7	-20 - 0 - +20mA
O/P8	0 - 10V
O/P9	0,2 - 10V
O/P10	4,3 - 20mA

Outputs 2

O/P11	0 - 10mA
O/P12	0 - 20mA
O/P13	4 - 20mA
O/P14	4 - 12 - 20mA
O/P15	4 - 5,45 - 20mA
O/P16	-10 - 0 - +10mA
O/P17	-20 - 0 - +20mA
O/P18	0 - 10V
O/P19	0,2 - 10V
O/P20	4,3 - 20mA

Relay Contacts

Burden on supply	: 170mW per relay
Switching voltage (Max)	: 400V AC, 300V DC
Switching voltage (Rated)	: 250V AC, 30V DC
Max I continuous	: 6A RMS, 6A DC
Max breaking capacity	: 1500VA AC, 18-120W DC
Dielectric strength across Open contacts	: 1000V RMS

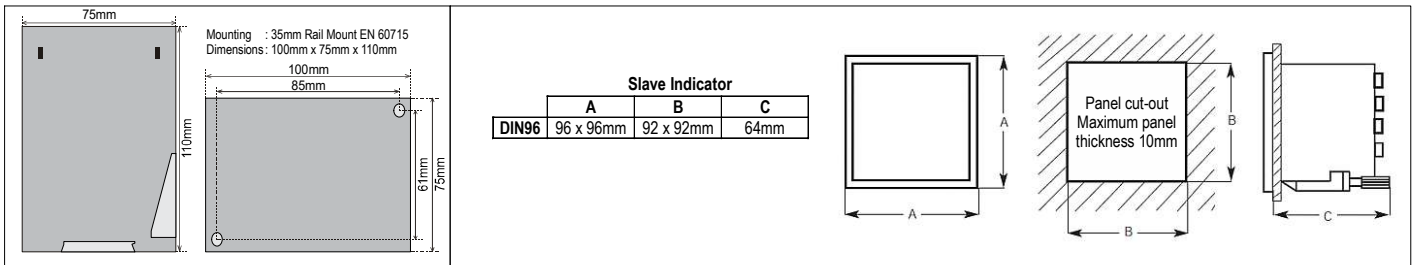
Connection

Terminal type	: Terminal Clamp and Screw
Wire max.	: T1-T4, T26-T27: AWG 24-14, T5-T10: AWG 12, other terminals: AWG 24-12
Screw Torque	: 0.5Nm

Overload

Voltage	: 1.2 x Un continuous 2 x Un for 10secs
Current	: 2.5 x In continuous 5 x In for 1secs (max 25A)

Dimensions



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ORDERING INFORMATION (Example)

Type	: MAG100FB
Aux. Supply	: 200-240VAC
Input Voltage	: 230V
Input Current C.T.	: 1500/5A
Range	: -60/0/+600kW
Analogue output 1	: O/P3: 4-20mA
Analogue output 2	: O/P18: 0-10VDC

Optional Separate Aux. Supply:

Add -SA for models with Separate AC Aux. Supply. (Example: MAG100FB-SA)

Add -SD for models with Separate DC Aux. Supply. (Example: MAG100FB-SD)

