



Brochure

## PR221GP and PR221MP: new electronic releases for generator protection and motor protection



Circuit breakers Tmax T2 are now available with two new electronic releases dedicated to generator protection and motor protection.

**Table 1**

Tmax T2 In[A]	40	63	100	160
PR221GP		■	■	■
PR221MP	■	■	■	

## PR221GP

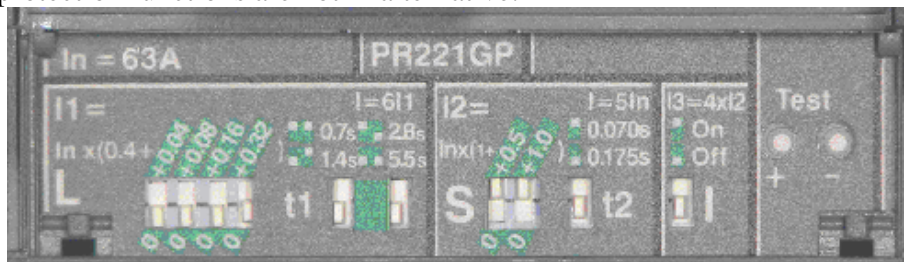
PR221GP is an electronic release, specific for generator protection and it will complete the range of solutions for generator protection together with thermomagnetic release TMG.

PR221GP guarantees a wide range of regulations in terms of overload protection (L) thresholds  $I_1 = 0.4 \dots 1 \times I_n$ . In addition to this 4 trip curves can be selected.

Generator protection usually requires low trip thresholds for short circuit protection. Thanks to PR221GP, trip thresholds related to protection against short-circuit with time delay (S) can be adjusted up to 2.5 times rated current,  $I_2 = 1 \dots 2.5 \times I_n$ . In this case 2 trip curves can be selected.

An instantaneous protection against short-circuit can be set at 4 times the thresholds for protection against short-circuit with time delay (S)  $I_3 = 4 \times I_2$ .

S and I protection functions are not in alternative.



PR221GP - Protection functions and parametrizations

Protection functions(1)	Trip thresholds	Trip curves	Excludability	Relation t= f(I)
<b>L</b> Against overload with long inverse time delay trip and trip characteristic according to an inverse time curve ( $I_2t=k$ ) according to IEC 60947-2 Standard	$I_1 = 0,4 - 1 \times I_n$ step = $0,04 \times I_n$	at $6 \times I_1$ $t_1 = 0,7 - 1,4 - 2,8 - 5,5$ s Tolerance: $\pm 10\%$ up to $2 \times I_n$ $\pm 20\%$ up to $2 \times I_n$	—	—
<b>S</b> Against short-circuit with inverse short time delay trip and trip characteristic with inverse time ( $I_2t=k$ )	$I_2 = 1 \dots 2,5 \times I_n$ step $0,5 \times I_n$ Tolerance: $\pm 10\%$	at $5 \times I_n$ $t_2 = 0,07 - 0,175$ s Tolerance: $\pm 10\%$ up to $2 \times I_n$	—	$t = k/I$
<b>I</b> Against short-circuit with instantaneous trip	$I_3 = 4 \times I_2$ fixed Tolerance: $\pm 20\%$	instantaneous	•	$t = k$

(1) These tolerances hold in the following conditions:

– self-powered trip unit at full power (without start-up)

– two or three-phase power supply

In conditions other than those considered, the following tolerances hold:

	Trip threshold	Trip time
S	$\pm 20\%$	$\pm 20\%$
I	$\pm 20\%$	$\leq 40$ ms

Characteristics of this electronic release fulfill requirements imposed by the most important registers of shipping, like RINA, ABS, LLRS.



## PR221MP

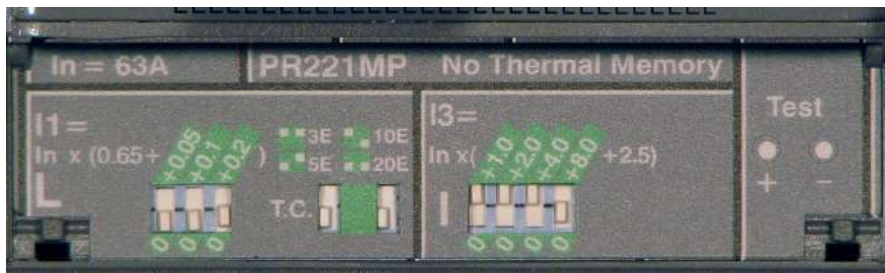
PR221MP is an electronic release dedicated to motor protection, motor power up to 55kW.

Function L protects the motor against overloads according to the indications and classes defined by IEC 60947-4-1.

Overload protection function can be set manually to  $I_1 = 0.65...1 \times I_n$ , by means of the dip-switches on the front of the trip unit.

The starting class of the motor must then be selected, which determines the trip time for overload according to the IEC 60947-4-1 Amend.2, Table 2: "Class 3E" corresponds to a trip time  $t_1=2.77s$ , "Class 5E"  $t_1=4.16s$ , "Class 10E"  $t_1=8.33s$ , "Class 20E"  $t_1=11.1s$  at  $7.2 \times I_1$ .

Trip thresholds for instantaneous protection function against short-circuit can be set up to 17.5 times the rated current  $I_3 = 2.5...17.5 \times I_n$ .



PR221MP - Protection functions and parametrizations

Protection functions(1)	Trip thresholds	Trip curves	Excludability	Relation $t=f(I)$	Thermal memory
Against overload with long inverse time delay trip and trip characteristic according to an inverse time curve according to IEC 60947-4-1 Standard	$I_1 = 0,65 - 1 \times I_n$ step = $0,05 \times I_n$	Trip classes: 3E - 5E - 10E - 20E (IEC 60947-4-1) No unbalance phase detection	—	—	No
Against short-circuit with instantaneous trip	$I_3 = 2.5...17.5 \times I_n$ step $1 \times I_n$ Tolerance: $\pm 20\%$	instantaneous	—	$t = k$	—

(1) These tolerances hold in the following conditions:

- self-powered trip unit at full power (without start-up)
- two or three-phase power supply

In conditions other than those considered, the following tolerances hold:

I	Trip threshold $\pm 20\%$	Trip time $\leq 40ms$
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Trip curve for Tmax T2 PR221GP and Tmax T2 PR221MP

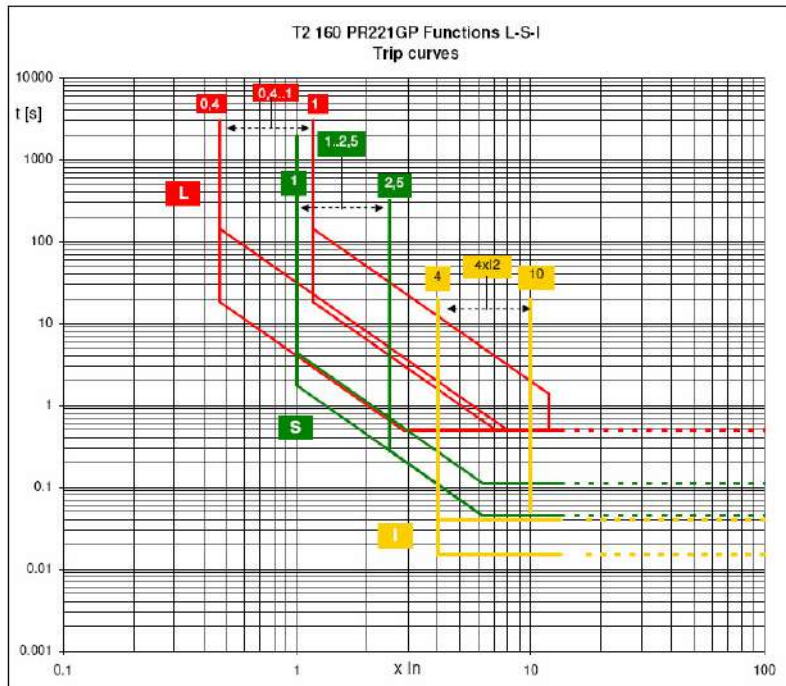


Figure 1

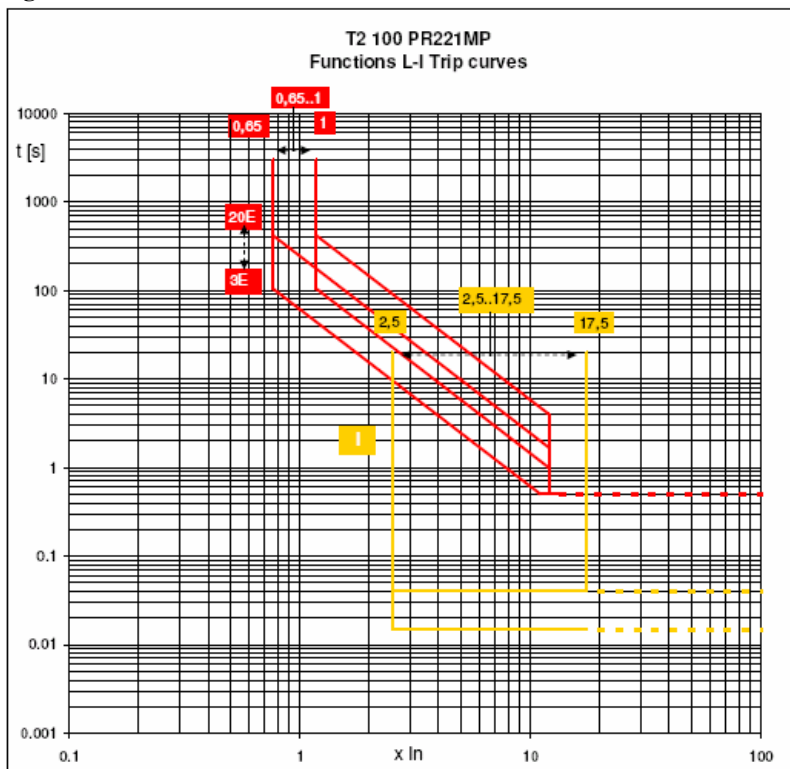


Figure 2

Coordination tables for motor protection: Tmax T2 equipped with new PR221MP

<b>DOL 400V* - 35kA IEC60947-4-1 type 2 Normal start</b>					
<b>Motor</b>		<b>Moulded Case Circuit-Breaker</b>			<b>Contactor</b>
<b>Rated Output Pe [kW]</b>	<b>Rated Current Ie [A]</b>	<b>Type</b>	<b>Current setting range of the overload protection** (0.65 - 1)xIn I1[A]</b>	<b>Istantaneous tripping current *** (2.5 - 17.5)xIn I3 [A]</b>	<b>Type</b>
15	29	T2N160PR221MP In40	26 - 40	420	A50
18.5	35	T2N160PR221MP In40	26 - 40	460	A50
22	41	T2N160PR221MP In63	40.95 - 63	598.5	A50
30	55	T2N160PR221MP In63	40.95 - 63	850.5	A63
37	66	T2N160PR221MP In100	65 - 100	950	A75
45	80	T2N160PR221MP In100	65 - 100	1250	A95

\* suitable also for 415V  
\*\* Step 0.05 x In \*\*\* Step 1 x In

<b>DOL 400V* - 50kA IEC60947-4-1 type 2 Normal start</b>					
<b>Motor</b>		<b>Moulded Case Circuit-Breaker</b>			<b>Contactor</b>
<b>Rated Output Pe [kW]</b>	<b>Rated Current Ie [A]</b>	<b>Type</b>	<b>Current setting range of the overload protection** (0.65 - 1)xIn I1[A]</b>	<b>Istantaneous tripping current *** (2.5 - 17.5)xIn I3 [A]</b>	<b>Type</b>
15	29	T2S160PR221MP In40	26 - 40	420	A50
18.5	35	T2S160PR221MP In40	26 - 40	460	A50
22	41	T2S160PR221MP In63	40.95 - 63	598.5	A50
30	55	T2S160PR221MP In63	40.95 - 63	850.5	A63
37	66	T2S160PR221MP In100	65 - 100	950	A75
45	80	T2S160PR221MP In100	65 - 100	1250	A95

\* suitable also for 415V  
\*\* Step 0.05 x In \*\*\* Step 1 x In

<b>DOL 440V - 50kA IEC60947-4-1 type 2 Normal start</b>					
<b>Motor</b>		<b>Moulded Case Circuit-Breaker</b>			<b>Contactor</b>
<b>Rated Output Pe [kW]</b>	<b>Rated Current Ie [A]</b>	<b>Type</b>	<b>Current setting range of the overload protection** (0.65 - 1)xIn I1[A]</b>	<b>Istantaneous tripping current *** (2.5 - 17.5)xIn I3 [A]</b>	<b>Type</b>
18.5	30.7	T2H160PR221MP In40	26 - 40	460	A50
22	35.9	T2H160PR221MP In40	26 - 40	540	A50
30	48.2	T2H160PR221MP In63	40.95 - 63	724.5	A63
37	58	T2H160PR221MP In63	40.95 - 63	850.5	A75
45	70	T2H160PR221MP In100	65 - 100	1050	A95
55	85	T2H160PR221MP In100	65 - 100	1250	A110

\*\* Step 0.05 x In \*\*\* Step 1 x In

<b>DOL 500V - 50kA IEC60947-4-1 type 2 Normal start</b>					
<b>Motor</b>		<b>Moulded Case Circuit-Breaker</b>			<b>Contactor</b>
<b>Rated Output Pe [kW]</b>	<b>Rated Current Ie [A]</b>	<b>Type</b>	<b>Current setting range of the overload protection** (0.65 - 1)xIn I1[A]</b>	<b>Istantaneous tripping current *** (2.5 - 17.5)xIn I3 [A]</b>	<b>Type</b>
18.5	28	T2L160PR221MP In40	26 - 40	380	A50
22	33	T2L160PR221MP In40	26 - 40	460	A50
30	44	T2L160PR221MP In63	40.95 - 63	661.5	A63
37	53	T2L160PR221MP In63	40.95 - 63	850.5	A75
45	64	T2L160PR221MP In100	65 - 100	950	A95
55	78	T2L160PR221MP In100	65 - 100	1250	A110

\*\* Step 0.05 x In \*\*\* Step 1 x In

Figure 3