



Relion® 605 series

Feeder protection and control /
Overcurrent protection / Motor protection
and control
REF601 / REJ601 / REM601

Optimized solution for protection and Control of Utility and Industrial installation

REF601/REJ601 and REM601 are members of ABB's Relion® protection and control product family and its 605 series. These relays provide an optimised composition of protection, monitoring and control functionality in one unit, with the best performance and usability in its class.

The relay REF601/REJ601 offers various application configurations for Feeder protection and control while REM601 offers application configurations for Motor protection and control.

Protection and control

REF601/REJ601 offer three-stage overcurrent and two-stage ground fault protection functions. The low-set stages for overcurrent and ground fault protection are equipped with selectable characteristics – Definite Time (DT) and Inverse Definite Minimum Time (IDMT). The relay features standard IDMT characteristics according IEC 61255-3 - Normal Inverse, Very Inverse, Extremely Inverse, Long-time Inverse. They also feature characteristics according to ANSI C37.112 - Moderate Inverse, Normal Inverse, Very Inverse, Extremely Inverse. The relay has a special characteristic RI Inverse (RI) for better coordination with the rest of the network. Additionally the relays also support two setting groups.

Thermal overload protection for feeder, cable and transformer, negative phase sequence protection phase discontinuity protection and circuit breaker failure protection are also offered. An auto-reclose function for overhead line feeders is optional.

The REM601 offers protections for motors such as thermal overload protection, short circuit protection, startup supervision, loss-of-phase protection, negative phase sequence protection, ground fault protection, undercurrent protection and circuit breaker failure protection. An emergency restart feature allows motor start up even when start inhibit is activated.

The residual current for CT configured relays is derived from the phase currents. When applicable the zero sequence CT can be used for measuring residual current especially when sensitive ground fault protection is required.

The REF601 integrates basic control functionality. Apart from display of data and parameter settings, the user friendly local human-machine interface (LHMI) supports control of one circuit breaker with dedicated control push buttons. The LHMI display has built in support for multiple languages.

All three relays are equipped with a three level, role-based user authentication system with individual passwords for the operator, engineer and administrator levels.

Ease of use

The pre-configured functionality of relay facilitates easy and fast commissioning of switchgear.

Three dedicated and five configurable LEDs indicate the status of relay and protection functions while the LCD displays measurements, settings, events and recorded data. The relay can be set-up and configured entirely from the local HMI or with PCM600.

A single wide range auxiliary supply eliminates the need for ordering variance. The relays also boast a press-fit mounting design for effortless installations on panels. Configurable inputs and outputs are included which can be easily altered by the LHMI.

These relays incorporate detachable terminals with CT shorting which aids in improving MTTR (Mean Time to Repair) thus further reducing downtime and improving productivity.

Supervision

To ensure continuous availability of protection, self-supervision of the relay hardware and software is incorporated. The REF601/REJ601 and REM601 also include an integrated trip-circuit monitoring function which monitors the external trip signal path. A built-in test mode which enables users to test the relay HMI, protection functions, and binary outputs.

The 605 series relays can store 100 events with time stamps at a resolution of 1 ms. They can also store analog fault records for the last five trip events. This data is stored in non-volatile memory.

The optional communication card extends local monitoring and control facility of the HMI to remote automation systems over MODBUS RTU / IEC 60870-5-103 protocol.

Sensor support

These relays support both conventional CTs and Rogowski current sensors. The sensor option helps to obtain equipment size reduction, performance improvement and better standardization in compact MV switchgear.

Feeder protection and control / Feeder protection, REF601/REJ601

REF601/REJ601 is a dedicated feeder protection and control relay intended for the protection and control of utility and industrial power system, in primary and secondary distribution networks.

The compact size of REF601 makes it suitable for even mounting on ABB circuit breaker VD4 and HD4.

REF601/REJ601 is available in three alternative application configurations.

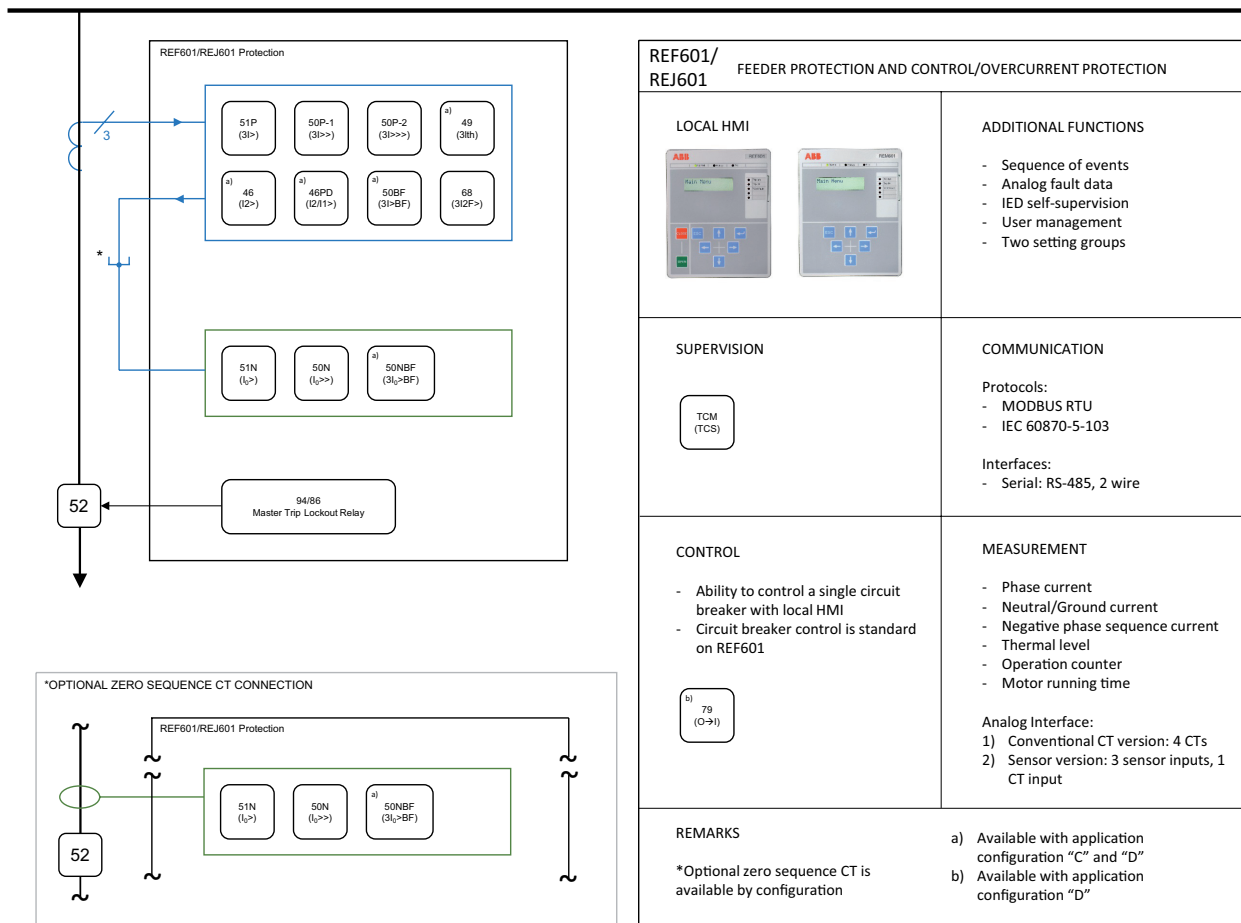
REF601/REJ601 provides main protection for overhead lines and cable feeders of distribution and sub-distribution networks. Further, inrush current stabilization function allows the relay to be used as main protection of distribution transformers.

The relay with application configuration B offers, non-directional over current and ground fault protection.

The application configuration C additionally offers thermal overload protection for feeders, cables and transformers, phase discontinuity protection and circuit breaker failure protection.

The application configuration D provides highest functionality with incorporation of negative phase sequence protection and multi shot auto-reclose functionality making relay suitable for overhead line feeders.

Functional overview of the application configuration of REF601 / REJ601



Motor protection and control / Motor protection, REM601

REM601 is a dedicated motor protection and control relay intended for the protection and control of asynchronous motors in manufacturing and process industry. The relay can be used for three phase motors in all conventional contactor or circuit breaker controlled motor drives.

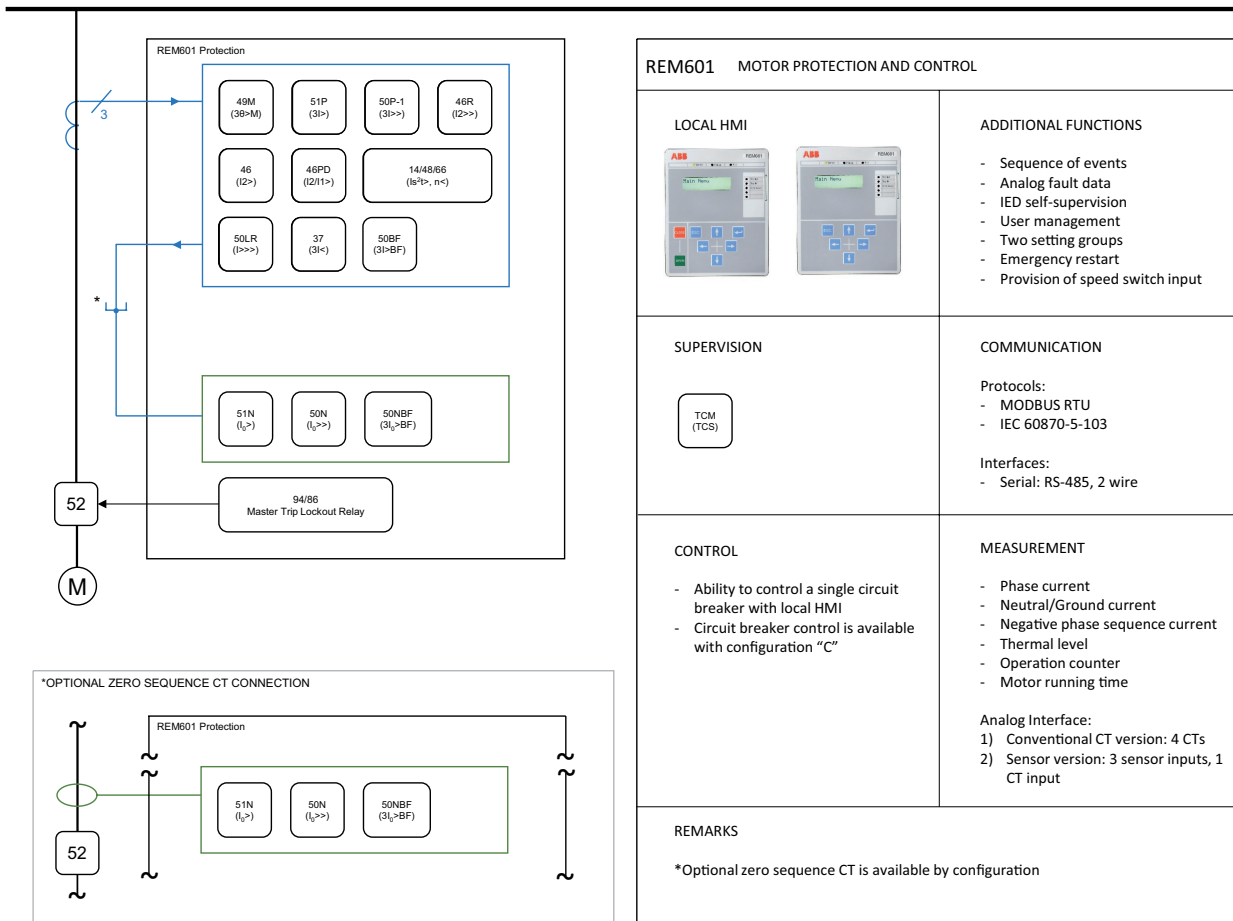
REM601 is available in two alternative application configurations.

REM601 provides motor protection during starting and running condition. Application configuration B offers thermal overload protection, short-circuit protection, startup supervision, negative phase sequence protection and loss-of-phase protection. The relay also incorporates sensitive fault protection, undercurrent protection and circuit ground breaker failure protection.

The emergency restart feature helps to keep functionally critical motors running by allowing motor start up even though start inhibit is activated.

The application configuration C adds breaker control functionality.

Functional overview of the application configuration of REM601



Standard configurations

REF601/REJ601 application configuration	
Description	Application configuration
Non-directional overcurrent and non-directional ground fault protection	B
Non-directional overcurrent and non-directional ground fault protection, thermal overload protection for feeders, cable and transformers, phase-discontinuity protection	C
Non-directional overcurrent and non-directional ground fault protection, thermal overload protection for feeders, cable and transformers, phase-discontinuity protection, negative phase-sequence protection, auto recloser	D

REM601 application configuration	
Description	Application configuration
Motor protection without breaker control functionality	B
Motor protection with breaker control functionality	C

Supported functions, codes, and symbols

Included = •, Optional = -	Function Name		REJ601/ REF601	REJ601/ REF601	REF601	REM601	REM601
Function	ANSI	IEC	B	C	D	B	C
Protection							
Non-directional overcurrent protection, low-set stage	51P	3I>	•	•	•	•	•
Non-directional overcurrent protection, high-set stage	50P-1	3I>>	•	•	•	•	•
Non-directional overcurrent protection, instantaneous stage	50P-2	3I>>>	•	•	•	-	-
Ground fault protection, low-set stage	51N	Io>	•	•	•	•	•
Ground fault protection, high-set stage	50N	Io>>	•	•	•	•	•
Three-phase transformer inrush detector	68	3I2f>	•	•	•	-	-
Three-phase thermal overload protection for feeders, cables, and distribution transformers	49	3Ith>	-	•	•	-	-
Three-phase thermal overload protection for motors	49M	3Ith>	-	-	-	•	•
Phase discontinuity protection	46PD	I2/I1>	-	•	•	-	-
Phase discontinuity/single phasing protection for motor	46PD	I2/I1>	-	-	-	•	•
Negative sequence overcurrent protection	46	I2>	-	-	•	•	•
Phase reversal protection	46R	I2R>	-	-	-	•	•
Under current protection	37	3I<	-	-	-	•	•
Motor startup supervision, stalling protection with provision of speed switch input, repetitive start protection, restart inhibit	51LRS/ 14/48/66	Is ² t n<	-	-	-	•	•
Blocking/doubling during motor start up	68M		-	-	-	•	•
Locked rotor protection	50-2	3I>>>	-	-	-	•	•
Commulative startup time counter and restart inhibit function	66		-	-	-	•	•
Circuit breaker failure protection	50BF/ 50NBF	3I>BF/ Io>BF	-	•	•	•	•
Master trip	94/86	Master Trip	•	•	•	•	•
Two setting groups			•	•	•	•	•
Control (function not included on REJ601)							
Breaker control functionality	52CB	I <-> O CB	•	•	•	-	•
Auto-reclosing, 4 shots	79	O -> I	-	-	•	-	-
Emergency restart for motor	ESTART	ESTART	-	-	-	•	•

Standard configurations

Supported functions, codes, and symbols (continued)

Function	Function Name		REJ601/ REF601	REJ601/ REF601	REF601	REM601	REM601
	ANSI	IEC	B	C	D	B	C
Included = •, Optional = -							
Condition monitoring							
Trip circuit supervision	TCM	TCS	•	•	•	•	•
Measurement							
Three-phase current measurement	3I	3I	•	•	•	•	•
Residual current measurement	IN	Io	•	•	•	•	•
Negative phase sequence current	I2	I2	-	-	•	•	•
Thermal level	θ	θ	-	•	•	•	•
Operation counter	-	-	-	•	•	•	•
Start-up time of latest motor startup	-	-	-	-	-	•	•
Start-up current of latest motor startup	-	-	-	-	-	•	•
Cumulative startup time counter	-	-	-	-	-	•	•
Time to next possible motor startup	-	-	-	-	-	•	•
Inputs/outputs							
Analog inputs			4 / 3+1 ¹⁾	4 / 3+1 ¹⁾	4 / 3+1 ¹⁾	4 / 3+1 ¹⁾	4 / 3+1 ¹⁾
Binary inputs			4	4	4	4	4
Binary outputs			6	6	6	6	6

¹⁾ Conventional CT version - support for conventional current transformer input, sensor version - support for three current sensors and one conventional Io input (1A).

Notes

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