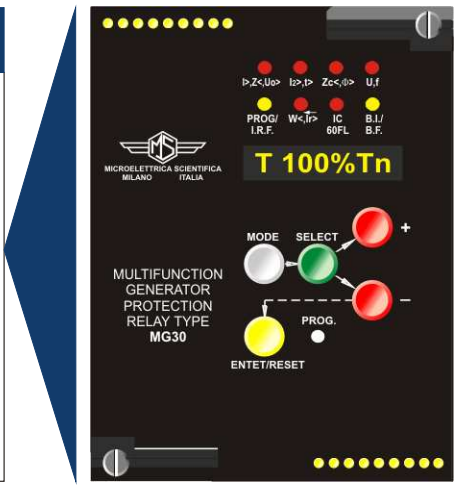
MG30

N29-R1

LINE M

21,24,27/59,32,37,40,46,49,50/27,50V/51V, 51BF,60FL,64S,68,81

- Two voltage-controlled overcurrent levels
- Two under-impedance elements
- Thermal image element with prealarm level
- Two unbalance elements
- Two over/under voltage elements
- Two over/under frequency elements
- Two over excitation levels
- Two 95% Stator Earth Fault protection elements
- One 100% Stator Earth Fault protection element
- One Reverse power protection element
- One inpedance element for Loss of Field protection
- One under-power level
- PTs' fuse failure protection
- Inadvertent C/B closure protection
- Blocking Output and Blocking Input for pilot wire selectivity coordination
- Breaker Failure protection
- Modbus Communication Protocol
- UL / CSA listed



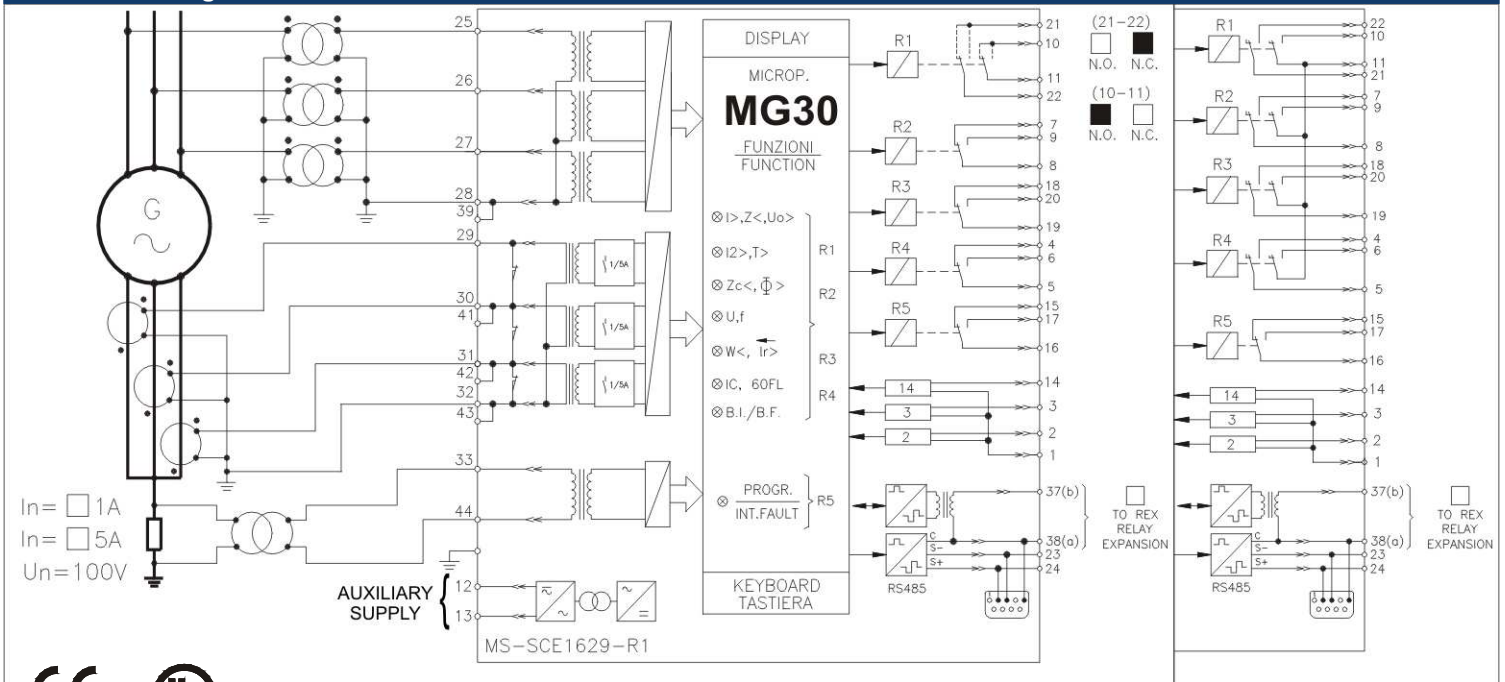
Multifunction Microprocessor Relay for protection of medium/large syncronous generators.
The relay measures the RMS of three-phase currents and voltages and computes the positive and negative sequence components of the Current system.
A separate input is dedicated to the measurement of the Neutral-to-Ground voltage and its harmonic components used for a complete Stator Ground Fault protection.
MG30 incorporates 5 output relays expandable up to 16 with the additional module REX-8

Programmable Input Quantities & Real Time Measurements (on relay's display or via serial bus)

Fn	= Systems Frequency	: (50-60)Hz
In	= Rated primary current of phase	: (0-9999)A, step 1A
Kv	= Systems P.Ts' ratio	: (2-655), step 0.1
Uns	= Secondary voltage of **PT**	: (50-125)V, step 1V
En	= Secondary voltage of Neutral-to-Ground **PT**	: (50-125)V, step 1V
Ib	= Generator rated current	: (0.5-1.1)In, step 0.1In

- Data / Time
- Thermal image temperature **T**
- 3 Phase currents **IA, IB, IC**
- 3 Phase-to-phase Voltages **UA, UB, UC**
- 3 Phase displacements a, b, c
- System frequency Zero Sequence Voltage **Uo1**
- Third harmonic Zero Sequence Voltage **Uo3**
- Negative sequence current **I2**
- Active power **W**
- Frequency **f**

Connection Diagram



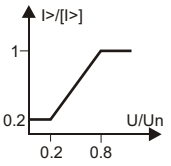
MS-SCE1629-R0
Standard Output

MS-SCE1646-R0
Double Output

1 - F50V/51V (I>): Low-set Overcurrent

Automatic voltage restrain : **U/I>= ON - OFF**
If set ON, the actual operation level I> is changed from the set value [I>] according to the curve.
If set OFF, voltage restrain does not operate.

- Trip level : **I> = (1 - 2.5)Ib**, step 0.01Ib
- Independent time delay : **F(I>) = D: tI> = (0.05 - 30)s**, step 0.01s
- Dependent time delay : **F(I>) = SI: tI> = (0.05 - 30)s**,@ 5x[I>]



2 - F50V/51V (I>>): High-set Overcurrent

- Automatic voltage restrain : **U/I>> = ON - OFF**
- Trip level : **I>> = (1 - 9.9)Ib**, step 0.1Ib
- Independent time delay : **tI>> = (0.05 - 3)s**, step 0.01s

1 - F21 (Z<): Underimpedance

- Trip level : **1Z = (0.01 - 1)Zn**, step 0.01Zn
- Independent time delay : **t1Z = (0.05 - 9.99)s**, step 0.01s

2 - F21 (Z<<): Underimpedance

- Trip level : **2Z = (0.01 - 1)Zn**, step 0.01Zn
- Independent time delay : **t2Z = (0.05 - 9.99)s**, step 0.01s

F49: Thermal Overload

- Warming up time constant : **Tc = (1 - 400)min**, step 1 min.
- Temperature prealarm : **Ta/n = (50 - 110)%Tn**, step 1 %Tn

F37: Underpower

- Rated power : **Wb = 3 Un Ib**
- Trip level : **W< = (0.05 - 1.00)Wb**, step 0.05Wb
- Independent time delay : **tW< = (0.1 - 60)s**, step 0.1s

1 - F81: First Frequency Element

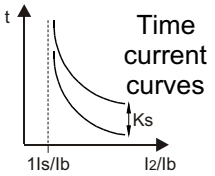
- Operation mode : **(Fn + 1f)** or **(Fn - 1f)** or **(Fn 1f)**
- Operation level : **1f = (0.05 - 9.99)Hz**, step 0.01Hz
- Independent time delay : **t1f = (0.10 - 60)s**, step 0.01s

2 - F81: Second Frequency Element

- Operation mode : **(Fn + 2f)** or **(Fn - 2f)** or **(Fn 2f)**
- Operation level : **2f = (0.05 - 9.99)Hz**, step 0.01Hz
- Independent time delay : **t2f = (0.10 - 60)s**, step 0.01s

1,2 - F46 : Current Unbalance (Negative Sequence)

- Continuous Negative Sequence current level : **1Is = (0.05 - 05)Ib**, step 0.01Ib
- Time multiplier : **Ks = (5 - 80)s**, step 1s
- Cooling time : **tcs = (10 -1800)s**, step 1s
- Negative Sequence current Alarm level : **2Is = (0.03 - 0.5)Ib**, step 0.01Ib
- Independent time delay : **t2Is = (1 - 100)s**, step1s



1 - F27/59: First Voltage Element

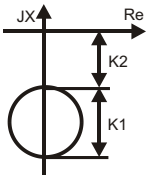
- Operation mode : **(Un + 1u)** or **(Un - 1u)** or **(Un 1u)**
- Operation level : **1u = (1 - 50)%Un,** step 1%Un
- Independent time delay : **t1u = (0.10 - 60)s**, step 0.1s

2 - F27/59: Second Voltage Element

- Operation mode : **(Un + 2u)** or **(Un - 2u)** or **(Un 2u)**
- Operation level : **2u = (1 - 50)%Un**, step 1%Un
- Independent time delay : **t2u = (0.10 - 60)s**, step 0.1s

F40: Loss of Field

- Circle offset : **K2 = (5 - 50)%Zb**, step 1%
- Circle diameter : **K1 = (50 - 300)%Zb**, step 1%
- Independent trip time delay : **tz = (0.2 - 60)s**, step 0.1s
- Integration time : **ti = (0 - 10)s**, step 0.1s
- Undervoltage : **V<0.3Vn**
- Undercurrent : **I<0.2In**



F32: Reverse Active Power

- Trip level : **Ir> = (0.02 - 0.2)Ib**, step 0.01Ib
- Independent time delay : **tIr> = (0.10 - 60)s**, step 0.01s

F60FL: PT Fuse Failure

- **60FL = (ON - OFF)**

1 - F24 (>): Overexcitation V/Hz

- Minimum pick-up level : **1 > = (1.0 - 2.0)Un/Fn,** step 0.1Un/Fn
- Curve time multiplier : **K = (0.5 - 5)**, step 0.1
- Trip time delay : $t \quad K: \frac{V}{Hz} \quad \Phi \quad 0.5$

2 - F24 (>>): Overexcitation V/Hz

- Trip level : **2 = (1.0 - 2.0)Un/Fn,** step 0.1Un/Fn
- Independent time delay : **t2 = (0.1 - 60)s,** step 0.1s

F50/27: Inadvertent Generator Energization

- **IC = (ON - OFF)**

F51BF: Breaker Failure Protection

- Trip time delay : **tBF = (0.05 - 0.5)s**, step 0.01s

1 - F64S (1Uo): 95% Stator Ground Fault Protection

- Trip level : **1Uo = (5 - 99)%En,** step 1%En
- Independent time delay : **t1O = (ist - 0.05 - 9.99)s,** step 0.01s

2 - F64S (2Uo): 95% Stator Ground Fault Protection

- Trip level : **2Uo = (5 - 99)%En,** step 1%En
- Independent time delay : **t2O = (ist - 0.05 - 9.99)s,** step 0.01s

F64S (Uo3): 100% Stator Ground Fault Protection

- Trip level : **Uo3 = (1 - 30)%En,** step 1%En (3rd Harmonic Undervoltage)
- Independent time delay : **tO3 = (ist - 0.05 - 9.99)s,** step 0.01s

Output Relay's Configuration

The MG30 can control up to 16 output relays; each relay can be user programmed so that any function can operate any relay and any relay can be operated by up to four different functions.
Four out of the 16 relays are included in the MG30 unit, 8 can be contained into a optional relay expansion module REX8 controlled by the master MG30 module via a dedicated serial port, other 4 relays can be contained in a second optional REX8 - MG30 and each REX8 moduls also include a normally energized autodiagnostic relay.

Reset of Delayed Elements

- **tFRes = M** (manual), **A** (automatic)

The relay is also available in the version **MG30-LF** where the 100% Stator Ground Fault element is supplyed by a low-frequency (20Hz) injected zero sequence voltage.

F64S 100%

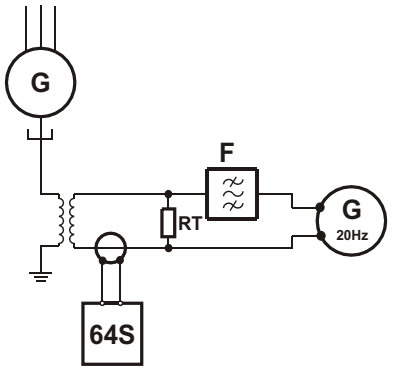
- Trip level : **(20 - 500)Ohm ,** (high voltage side)
- Independent trip time delay : **(0.05 - 9.99)s,** step 0.01s

F64S 95%

- Trip level : **(0.02 - 2)In ,** CT
- Independent trip time delay : **(0.05 - 9.99)s,** step 0.01s

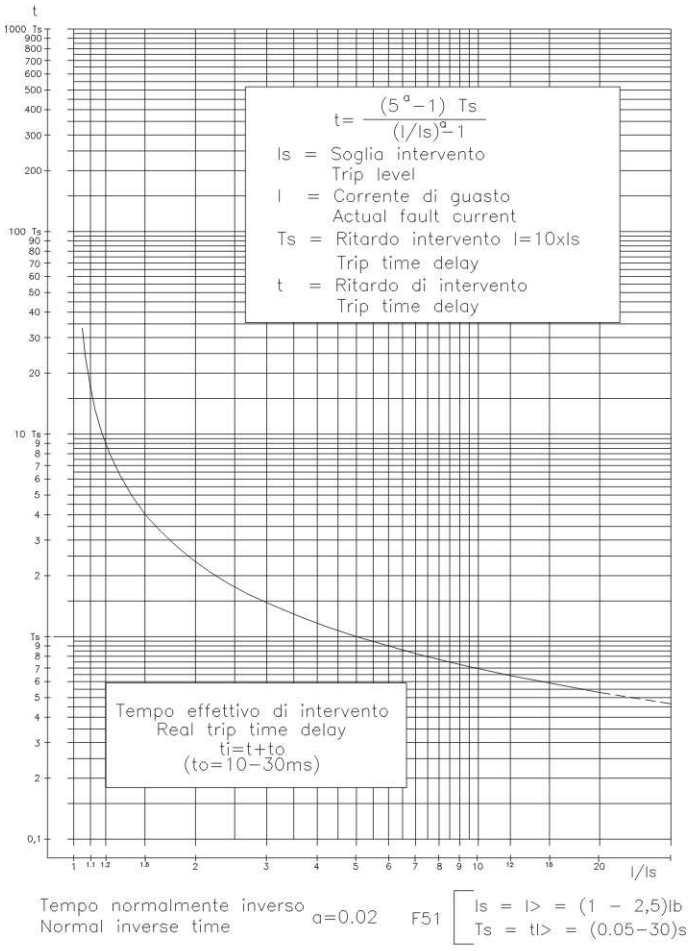
Injected voltage:

- V_{20} = **(1 - 10)V-20Hz** adjustable
- I_{20Hz} **400A** x 10 sec.
- CT Ratio = **(200 - 400) / 1 A**



The system, beside the relay itself, must include a 20Hz generator, a Low-pass filter and a detection CT.

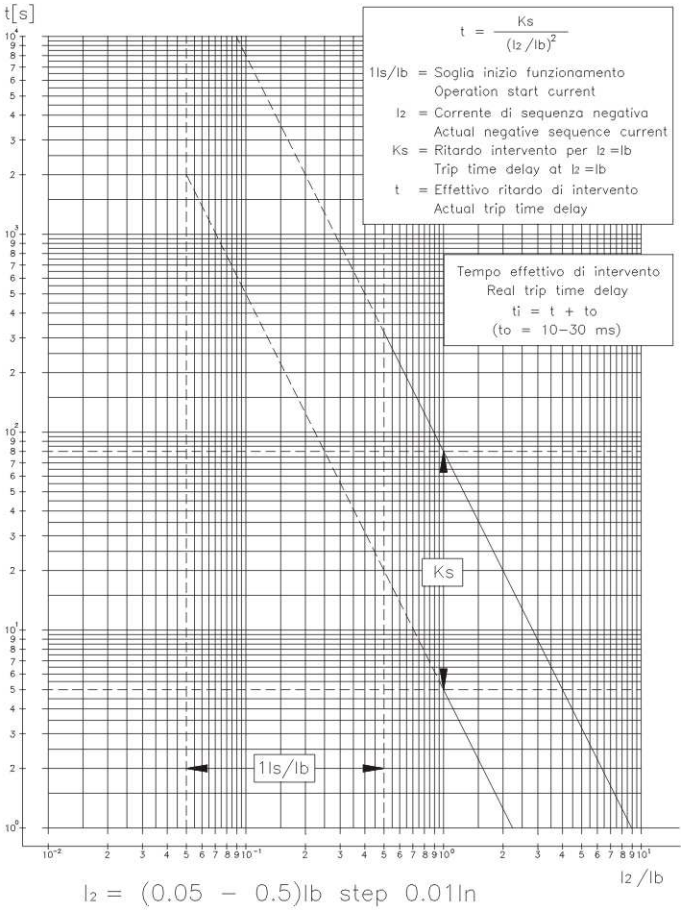
F51 - TU0311



Tempo normalmente inverso Normal inverse time a=0.02 F51

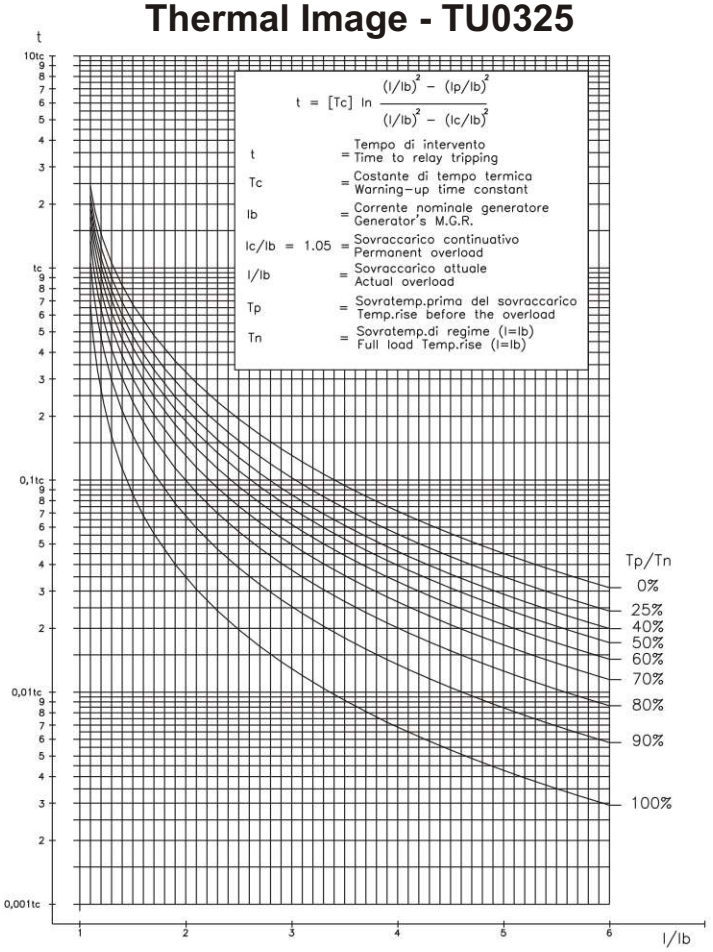
Is = I> = (1 – 2,5)Ib
Ts = tI> = (0.05–30)s

F46 - TU0311



I2 = (0.05 – 0.5)Ib step 0.01In
Ks = (5 – 80)sec. @ I2 = Ib step 1sec.

Thermal Image - TU0325



V/Hz - TU0326