Company Profile

So Brain Co. Ltd.

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So Brain Co. Ltd

Address : Hakuba Building 6F , 1-24 Kandajimbo-cho, Chiyoda-ku, Tokyo
Tel. 03-3518-2010 Fax 03-3518-2020

Foundation : February 2005

Business : R & D of Leak Current Detection Technology based on Vector Theory
Igr Method (True R Technology)
Fabrication and Sales of True R Products and Electrical Appliances
Management of True Patent & License
Leak Measurement & Diagnosis by True R Technology etc.

Products : True R Detector H (“Handy”) : Small-sized potable Leak Current Detector
True R Detector M (“Memory”) : leak Current Measurement & Memory
True R Detector TI(100V) & TII(100V-200V) (“Tool Checker”)
: Leak Current Checker for Electric Tools
True R Detector C3F : Leak Current Checker for welding machine etc
(Three-phase △ AC200V/2200V)

Licensed Products : Leak Relay (OMRON) , Clamp Meter & Logger (Sanwa Electric Instrument Co.)
Leak Monitoring System (Satori Electric Co. & Omron Social Solutions Service Co.)

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2 . What is True R ?

A Break-through technology to detect true leakage

In May 2009, our technology thesis was scrutinized and introduced in the Journal of the Institute of Electrical Installation Engineers of Japan

The weakness and problems of traditional leak current detection technology :

1. It may detect and operate without any actual leakage
2. It may not detect leakage when it occurs
3. It can not find accurately and timely points of leakage
4. Detection speed is slow

✪ Our True R (Vector Theory Igr Method) is a solution for the above events.

✪ True R is a break-through technology t o detect true leak current without any influence caused by noise, harmonic, surge current and capacitance factors.

"Accurate measurement and Speedy detection", which is important advantages of our method, will allow us to develop and apply the technology to a circuit breaker in the future.

TrueR is an epoch-making technology which is indispensable for leak current control in Smart Communities and Smart Grids in future.

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3. True R Leak Detection Technology is indispensable

The best and compatible technology for Energy-saving Environment

1. In highly advanced digital oriented society（Smart Community）, inverters and various energy saving technology are employed in many intelligent buildings & factories or echo-system etc., and there leak control by Io method technology will no longer function effectively due to noise, harmonic and increase of capacitance factor etc.. A new leak current control technology is strongly required today. The following capabilities become highly indispensable :
   - Highly accurate leak detection
   - Enhanced speed to determine true leak current
   - Ability to measure and detect leak while load is operating
2. Only solution for the above subjects is True R technology (Vector Theory Igr Method) and also Japan National Safety Regulation for Private-use Electric Structures points out that there is a risk in relying on the conventional Io method and adoption of Igr Method is preferable.

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4. Present & Future of True R and Patents

1. Present of True R

- Expand sales of True R Products ("Handy", "Memory", "Monitoring", "Tool Checker")
- True R licensed products
  - Leak Relay (w/ Omron Corporation)- Received a Special Promotion Award by Institute of Electrical Installation Engineers of Japan
  - Clamp Meters & I0R Logger (w/ Sanwa Electric Instrument Co., Ltd)
  - Leak Breaker (Single phase) (w/ Q-Tec: Korea)
  - Leak Monitoring System (w/ Satori Electric Co. & Omron Social Solution Service Co.)

    Note : Satori's insulation monitoring system (Leakele) awarded Minister of Economy & Industry Prize in 2017.

2. Future of True R

- Downsize TrueR Leak sensor into microchip
- TrueR Circuit Breaker

3. Patents (System & Method for Detecting Leak Current)

- Patent Obtained in Japan : Patent No.4159590, 4945727, 4920357, 5329470, 5748797
- International Patent Obtained : USA, China, Russia, Korea, Taiwan, Hong Kong, India, EU (Germany, France, UK, Italy)

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5. True R Method Theory (1/2)

Consideration of present I_0 method

The I_0 method is a system for detecting differential current caused by displacement of the magnetic field generated in proportion to the leak current as high frequency noise and harmonics are generated in circuits with high capacitance, and a differential current is greatly fluctuated due to their influence. Therefore only ambiguous detection can be conducted.

Problem

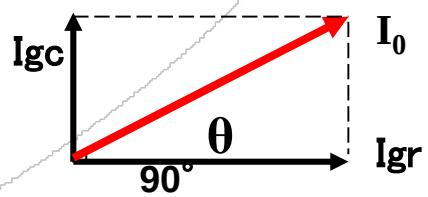
The I_0 method has no problem if capacitance does not exist. In a site with high electrostatic capacity, it is impossible to accurately measure the true leak current Igr because of the influence of the generated high frequency noise and harmonics.

Consideration of present single-phase Igr theory

In the present single-phase Igr theory, Igr is calculated using the formula ($Igr=\sqrt{(I_0)^2-(Igc)^2}$). (In True R theory, Igr = I_0 cos θ. Thus single-phase theory can be covered.)

Problem

The above method where capacitance component Igc is measured and is subtracted from I_0, I_0 > Igr always results; therefore, it is impossible to explain the phenomenon that I_0 < Igr (dangerous case because measured value is lower than true leak current) results in R-phase depending on capacitance. A theory considering the phase angle is required.



Conclusion

In the present I_0 method and single-phase Igr theory, capacitance component Igc cannot accurately be measured on-site with high capacitance because of the influence of the generated high frequency noise and harmonics and accurate detection of true leak current is impossible. Reverse phenomenon (T-phase:I_0 > Igr and R-phase:I_0 < Igr) due to capacitance in three-phase three-wire delta connection cannot be explained.
This problem can be solved by True R theory.

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5. True R Method Theory (2/2)

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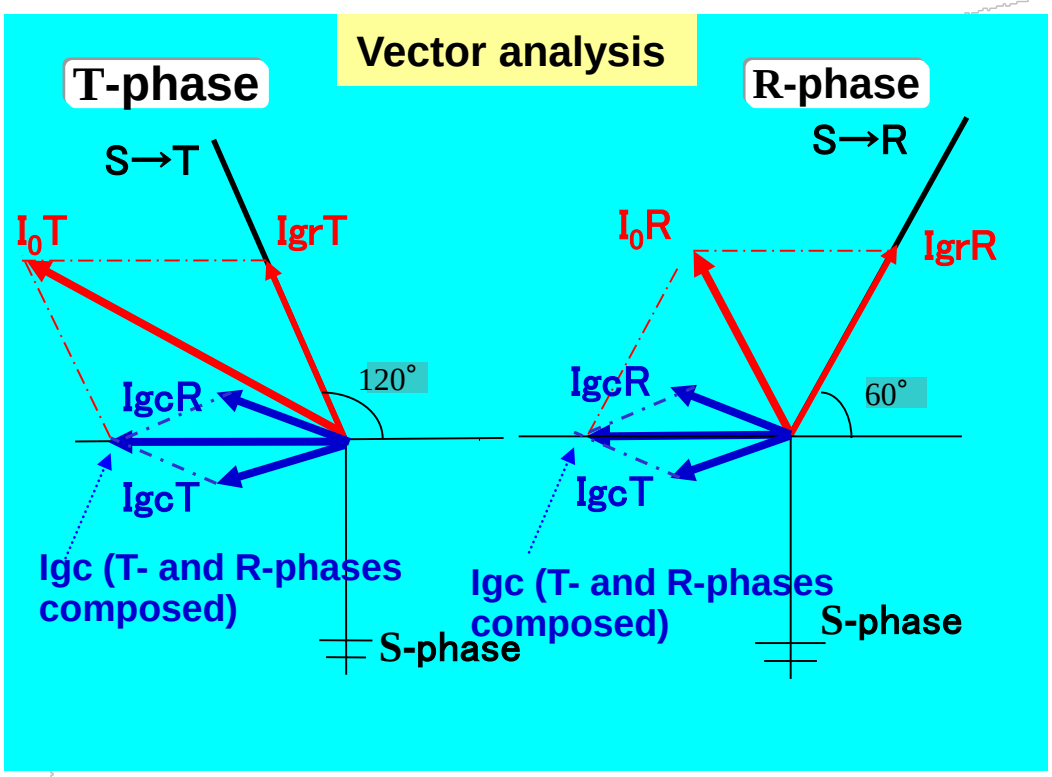
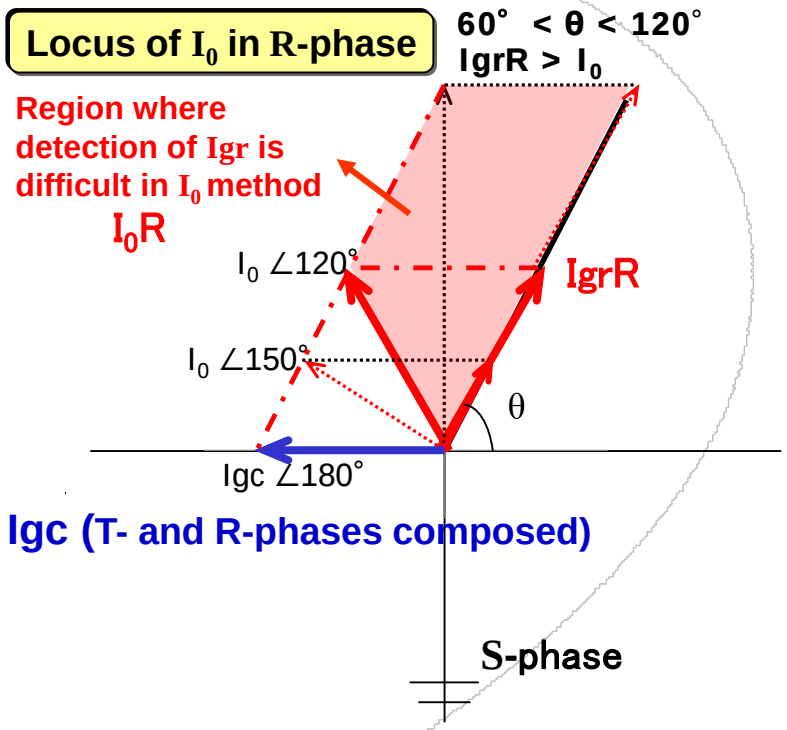
Reverse phenomenon means that I_0 increases in the T-phase, but decreases in the R-phase.





< Consideration of the case where equivalent Igr is independently generated in the T- and R-phases >

Vector calculation considering IgcR advanced by 90° from 60° of S→R and IgcT advanced by 90° from 120° of S→T positions total capacitance Igc at the place of 180° . When the capacitance Igc and Igr (IgrT・IgrR) of each T-phase and R-phase are independently subjected to a vector composition, value of I_0R of R-phase is much smaller than that of I_0T of T-phase. This is the cause of the reverse phenomenon. When phase angle θ is between 60° and 120° , IgrR > I_0 results, thus I_0 method cannot accurately detect true leak current Igr and dangerous region appears.

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6. Accuracy of True R Leak Detection

Accuracy of True R

Measurement results as shown below

Remarkable improvement of accuracy of leak detection verified

単相 AC100V 60Hz
CT＝ 中 C成分 ナシ

標準（mA）	フルーク	I_0	Igr
0	0.0	0.0	0.0
1	1.0	1.0	0.9
2	2.0	2.1	2.0
3	3.0	3.1	3.0
4	4.0	4.1	4.0
5	5.0	5.1	5.0
6	6.0	6.1	6.0
7	7.0	7.2	7.1
8	8.0	8.2	8.1
9	9.0	9.1	9.0
10	10.0	10.2	10.1
50	50.0	50.5	50.4
100	100.0	100.5	100.4
300	300.0	298.4	298.3

三相 AC200V 60Hz
C成分 ナシ

標準（mA）	R相			T相		
	フルーク	I_0	Igr	フルーク	I_0	Igr
0	0.0	0.0	0.0	0.0	0.0	0.0
1	1.0	1.2	0.9	1.0	0.8	0.9
2	2.0	2.2	2.0	2.0	1.9	2.0
3	3.0	3.3	3.1	3.1	2.9	3.0
4	4.0	4.2	4.0	4.0	3.9	4.0
5	5.0	5.3	5.1	5.1	5.0	5.1
6	6.0	6.3	6.1	6.1	6.0	6.1
7	7.0	7.3	7.1	7.1	7.0	7.1
8	8.0	8.3	8.1	8.0	8.1	8.2
9	9.0	9.3	9.1	9.0	9.0	9.0
10	10.0	10.4	10.2	10.1	10.1	10.2
50	50.0	50.8	50.6	50.3	51.3	51.4
100	100.0	100.8	100.5	101.8	101.8	101.4
300	300.0	299.3	295.3	300.5	302.9	304.7

C成分1.0μF

標準（mA）	フルーク	I_0	Igr
0	40.1	40.5	0.7
1	40.1	40.6	1.1
2	40.2	40.6	2.1
3	40.2	40.7	3.2
4	40.3	40.7	4.2
5	40.4	40.8	5.3
6	40.6	41.1	6.3
7	40.7	41.3	7.4
8	40.9	41.4	8.3
9	41.1	41.5	9.4
10	41.4	41.8	10.4
50	64.2	64.5	50.4
100	107.8	108.1	100.2
300	302.8	301.2	298.9

C成分0.47μF

標準（mA）	R相			T相		
	フルーク	I_0	Igr	フルーク	I_0	Igr
0	60.6	61.6	0.7	60.6	61.6	0.7
1	60.1	61.1	1.2	61.1	62.1	1.0
2	59.6	60.6	2.1	61.6	62.6	1.8
3	59.1	60.2	3.2	62.2	63.3	3.0
4	58.7	59.7	4.3	62.7	63.8	4.1
5	58.3	59.4	5.3	63.3	64.4	5.1
6	57.9	58.7	6.3	63.9	64.9	6.1
7	57.4	58.5	7.5	64.5	65.5	7.2
8	57.1	58.0	8.4	65.0	66.1	8.2
9	56.7	57.7	9.5	65.6	66.8	9.2
10	56.3	57.3	10.5	66.2	67.3	10.2
50	56.6	57.4	51.5	96.2	98.0	51.0
100	87.6	88.9	101.7	140.7	142.9	101.5
300	275.5	275.6	298.4	335.0	337.1	305.8

Component C 3.3 μF F

標準（mA）	フルーク	I_0	Igr
0	132.3	132.9	0.4
1	132.3	132.9	0.9
2	132.3	132.9	1.8
3	132.4	132.8	3.0
4	132.4	133.0	3.9
5	132.4	133.0	4.8
6	132.5	133.0	6.0
7	132.6	133.2	6.9
8	132.6	133.2	7.8
9	132.7	133.2	8.8
10	132.7	133.3	9.9
50	141.4	141.7	50.0
100	165.9	165.8	100.4
300	328.0	325.4	299.9

Component C 1.0 μF

標準（mA）	R相			T相		
	フルーク	I_0	Igr	フルーク	I_0	Igr
0	135.9	137.5	0.2	135.9	137.7	0.2
1	135.4	137.1	0.4	136.4	138.1	0.4
2	135.0	136.5	1.1	136.9	138.7	1.3
3	134.4	135.9	2.1	137.5	139.2	2.2
4	134.0	135.6	3.0	138.0	139.8	3.0
5	133.5	135.1	4.0	138.5	140.3	4.2
6	133.0	134.5	5.1	139.1	140.8	5.1
7	132.6	134.2	6.2	139.6	141.4	6.2
8	132.1	133.7	7.2	140.1	142.0	7.1
9	131.7	133.2	8.3	140.7	142.4	8.3
10	131.2	132.8	9.3	141.2	143.0	9.5
50	122.3	120.8	50.2	166.7	169.0	50.5
100	177.5	123.9	101.3	205.0	207.6	101.7
300	260.9	261.8	301.2	386.4	358.0	286.1

Both in single-and three-phases, detection of 1 mA unit is possible even making Igc flow

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7. True R Product Line-up

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	Licensed merchandise	Feature	Performance
・Small-sized Portable Igr Leak Measuring System	sanwa Clamp Meter I0R500 Logger I0R700/700V	Capable of easily identifying true leakage situation Measurement by I_0 is difficult in the field with high capacitance	・Display Igr value (true leak current) Display conventional I_0 value ・Capable of diagnosing I_0 action
・Igr Leak Measuring & Memory System (survey instrument)		Most suitable for identifying position of intermittent leak	・Capable of memorizing data of 40 days, Simultaneous measurement of four channels ・Leak current analysis
・Igr Leak Monitoring System	OMRON Igr adapter Relay Insulation monitoring system Satori Electric Co., Ltd. Insulation monitoring system	Most suitable for monitoring plants and intelligent buildings	・Capable of all time monitoring ・Capable of considering construction and manufacturing period by controlling increase and decrease
・Leak Checker for Electric Tools		Utilized by power station, etc.	・Insulation diagnosis easier and quicker than megger ・Capable of diagnosing tools and power supply drum all together
・Demand monitoring (Addition of Igr function) ・Igr leakage breaker (three-phase)	Under research and development including making IC as chip	・New need for demand monitoring ・Replace present I_0 Leakage breaker	・Capable of integration by circuit configuration using only IC ・Definite speed of 0.03 seconds realized

True R Ω

And More

Igr breaker developed & practicalized (single phase)

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8. Future of True R Leak Detection Technology

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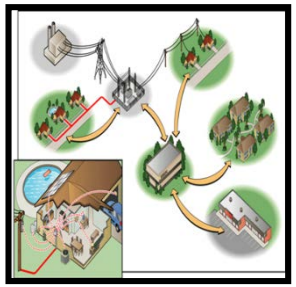
Smart community/smart grid will appear in the future!

- Nuclear, thermal, hydraulic, solar heat, solar light, wind, biomass, etc.
- Energy storage, battery
- Intelligent plant and building
- Energy saving equipment such as home appliance, LED, electric vehicle and solar panel.

Smart grid

Integrated network of power, information and communication with high efficiency, high quality and high reliability



True R is breakthrough leak detecting and monitoring technology indispensable for smart community with smart grid

True R capable of detecting leaks in 1mA level for single- and three-phases
→ In electric security, from insulation resistance control based on megger value to true leak current control

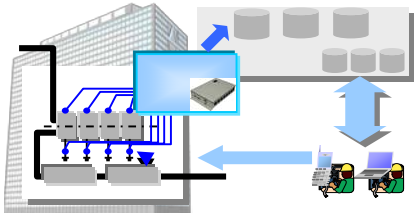
True R eliminates the influence of increase of capacitance generated by inverter, energy saving measure, etc., and noise to detect true leak current
→ After reviewing the conventional leak control criteria, capable of setting personal injury limit at 6mA or less

Definite detection speed of leak current at 0.03 sec realized
→ True R leak breaker developed and practicalized

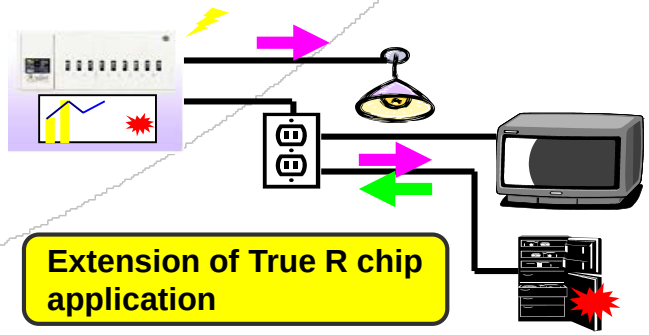
Remarkable improvement of electric security using true leak current control value < Prevention of leak accident and measurement of true electric energy >

Leak detection, leak monitoring, insulation diagnosis, leak accident Prevention, and true electric energy measurement

True R leak measuring system, relay and breaker



True R leak monitoring system



Extension of True R chip application

Leak from all electric systems visualized and remote monitoring enabled

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9. Conclusion

If you have any questions about our company , True R technology and products, please contact the representatives shown below:

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