SINEAX M 563 with 3 analogue outputs
Programmable multi-transducer for industry

for the measurement of electrical variables in heavy-current power system

CE

Application

SINEAX M 563 (Fig. 1) is a programmable transducer with a **RS 232 C interface.** It supervises any 3 variables of an electrical power system **simultaneously** and generates 3 electrically insulated analogue output signals.

The transducers are also equipped with an **RS 232** serial interface to which a PC with the corresponding software can be connected for programming or accessing and executing useful ancillary functions.

The usual methods of connection, the types of measured variables, their ratings, the transfer characteristic for each output etc. are the main parameters that can be programmed.

The ancillary functions include displaying, recording and evaluation of measurements on a PC, the simulation of the outputs for test purposes and a facility for printing nameplates.

The transducer fulfils all the essential requirements and regulations concerning electromagnetic compatibility **(EMC)** and **safety** (IEC 1010 resp. EN 61 010). It was developed and is manufactured and tested in strict accordance with the **quality assurance standard** ISO 9001.

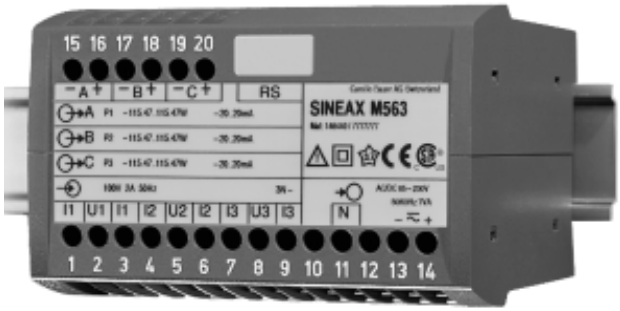


*Fig. 1. SINEAX M 563 transducer in housing **P20/105** clipped onto a top-hat rail.*

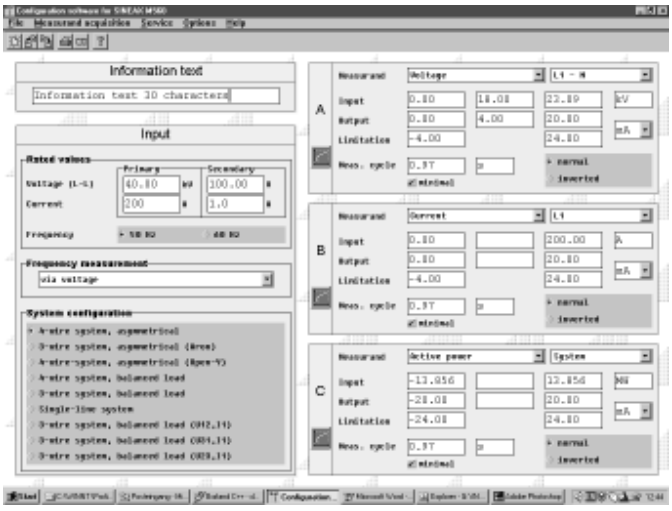


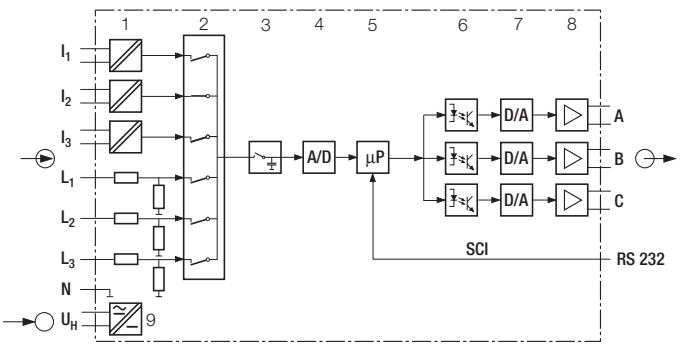
Fig. 2. Screen print-out from the configuration software.

Features / Benefits

- **Simultaneous measurement of several variables of a heavy-current power system**

Measured variables	Nominal input current	Nominal input voltage
Current, voltage (rms), active/reactive/apparent power cosφ, sinφ, power factor RMS value of the current with wire setting range (bimetal measuring function) Slave pointer function for the measurement of the RMS value IB Frequency Average value of the currents with sign of the active power (power system only)	1 to 6 A	57.7 to 400 V (phase-to-neutral) resp. 100 to 693 V (phase-to-phase)

- **For all heavy-current power system variables**
- **Universal analogue outputs (programmable)**
- **Input voltage up to 693 V (phase-to-phase)**
- **High accuracy: Class 0.5 (under reference conditions)**
- **Windows software with password protection for programming, data analysis, power system status simulation**
- **DC-, AC-power pack with wide power supply tolerance / Universal**



1 = Input transformer (I1, I2, I3)
1 = Voltage divider (L1, L2, L3)
2 = Multiplexer
3 = Latching stage
4 = A/D converter
5 = Microcontroller
6 = Electrical insulation
7 = D/A converter
8 = Output stage
9 = DC, AC power pack

Fig. 3. Block diagram.

SINEAX M 563 with 3 analogue outputs
Programmable multi-transducer for industry

Symbols

Symbols	Meaning
X	Measured variable
X0	Lower limit of the measured variable
X1	Break point of the measured variable
X2	Upper limit of the measured variable
Y	Output variable
Y0	Lower limit of the output variable
Y1	Break point of the output variable
Y2	Upper limit of the output variable
Y2 SW	Programmed upper limit of the output variable
U	Input voltage
Ur	Rated value of the input voltage
U 12	Phase-to-phase voltage L1 – L2
U 23	Phase-to-phase voltage L2 – L3
U 31	Phase-to-phase voltage L3 – L1
U1N	Phase-to-neutral voltage L1 – N
U2N	Phase-to-neutral voltage L2 – N
U3N	Phase-to-neutral voltage L3 – N
I	Input current
I1	AC current L1
I2	AC current L2
I3	AC current L3
Ir	Rated value of the input current
IM	Average value of the currents (I1 + I2 + I3) / 3
IMS	Average value of the currents and sign of the active power (P)
IB	RMS value of the current with wire setting range (bimetal measuring function)
IBT	Response time for IB
BS	Slave pointer function for the measurement of the RMS value IB
BST	Response time for BS
φ	Phase-shift between current and voltage
F	Frequency of the input variable
Fn	Rated frequency
P	Active power of the system P = P1 + P2 + P3
P1	Active power phase 1 (phase-to-neutral L1 – N)
P2	Active power phase 2 (phase-to-neutral L2 – N)
P3	Active power phase 3 (phase-to-neutral L3 – N)

Symbols	Meaning (Continuation)
Q	Reactive power of the system Q = Q1 + Q2 + Q3
Q1	Reactive power phase 1 (phase-to-neutral L1 – N)
Q2	Reactive power phase 2 (phase-to-neutral L2 – N)
Q3	Reactive power phase 3 (phase-to-neutral L3 – N)
S	Apparent power of the system
S1	Apparent power phase 1 (phase-to-neutral L1 – N)
S2	Apparent power phase 2 (phase-to-neutral L2 – N)
S3	Apparent power phase 3 (phase-to-neutral L3 – N)
Sr	Rated value of the apparent power of the system
PF	Active power factor cosφ = P/S
PF1	Active power factor phase 1 P1/S1
PF2	Active power factor phase 2 P2/S2
PF3	Active power factor phase 3 P3/S3
QF	Reactive power factor sin φ = Q/S
QF1	Reactive power factor 1 Q1/S1
QF2	Reactive power factor 2 Q2/S2
QF3	Reactive power factor 3 Q3/S3
LF	Power factor of the system LF = sgnQ · (1 – |PF|)
LF1	Power factor phase 1 sgnQ1 · (1 – |PF1|)
LF2	Power factor phase 2 sgnQ2 · (1 – |PF2|)
LF3	Power factor phase 3 sgnQ3 · (1 – |PF3|)
c	Factor for the intrinsic error
R	Output load
Rn	Rated burden
H	Power supply
Hn	Rated value of the power supply
CT	c.t. ratio
VT	v.t. ratio

Applicable standards and regulations

IEC 688 or EN 60 688	Electrical measuring transducers for converting AC electrical variables into analogue and digital signals
IEC 1010 or EN 61 010	Safety regulations for electrical measuring, control and laboratory equipment
iEC 529 or EN 60 529	Protection types by case (code IP)
IEC 1000-4-2/-3/-4/-5/-6	Electromagnetic compatibility for industrial-process measurement and control equipment
EN 55 011	Electromagnetic compatibility of data processing and telecommunication equipment Limits and measuring principles for radio interference and information equipment
IEC 68-2-1/-2/-3/-6/-27 or EN 60 068-2-1/-2/-3/-6/-27	Ambient tests -1 Cold, -2 Dry heat, -3 Damp heat, -6 Vibration, -27 Shock
DIN 40 110	AC quantities
DIN 43 807	Terminal markings
UL 94	Tests for flammability of plastic materials for parts in devices and appliances

Technical data

Measuring input ⊣►

Nominal input voltage:	57.7 to 400 V (phase-to-neutral) or 100 to 693 V (phase-to-phase)
Nominal input current:	1 to 6 A
Admissible measuring range end values:	See page 4 under “System response”, column “Condition”, and pages 9 and 10 under “Description 13 and 14”
Waveform:	Sinusoidal
Rated frequency:	50 or 60 Hz
Consumption [VA]:	Voltage circuit: U^2 / 400 kΩ with external power supply Current circuit: ≤ I^2 · 0,01 Ω

Thermal rating of inputs

Input variable	Number of inputs	Duration of overload	Interval between two overloads
Current circuit	400 V single-phase AC system 693 V three-phase system		
12 A	—	contin.	—
120 A	10	1 s	100 s
120 A	5	3 s	5 min.
250 A	1	1 s	1 hour
Voltage circuit			
480 V/831 V[1]	—	contin.	—
600 V/1040 V[1]	10	10 s	10 s
800 V/1386 V[1]	10	1 s	10 s

[1] Maximum 264 V across the power supply when it is obtained from the measured variable with a power supply unit for 85…230 V DC/AC and maximum 69 V with a power supply unit for 24…60 V DC/AC.

Analogue outputs ⊣►

For the outputs A, B and C:

Output variable Y		Impressed DC current	Impressed DC voltage
Full scale Y2		1 ≤ Y2 ≤ 20 mA	5 ≤ Y2 ≤ 10 V
Limits of output signal for input overload and/or	R = 0	1.2 · Y2	40 mA
	R → ∞	30 V	1.2 Y2
Rated useful range of output load		$0 \le \frac{7.5\ V}{Y2} \le \frac{15\ V}{Y2}$	$\frac{Y2}{2\ mA} \le \frac{Y2}{1\ mA} \le \infty$
AC component of output signal (peak-to-peak)		≤ 0.02 Y2	≤ 0.02 Y2

The outputs A, B and C may be either short or open-circuited. They are electrically insulated from each other and from all other circuits (floating).

All the full-scale output values can be reduced subsequently using the programming software, but a supplementary error results.

SINEAX M 563 with 3 analogue outputs
Programmable multi-transducer for industry

Reference conditions

Ambient temperature:	15 … 30 °C
Pre-conditioning:	30 min. acc. to EN 60 688
Input variable:	Rated useful range
Power supply:	H = Hn ± 1%
Active/reactive factor:	cosφ = 1 resp. sinφ = 1
Frequency:	50 or 60 Hz
Waveform:	Sinusoidal, form factor 1.1107
Output load:	DC current output: $R_n = \frac{7.5\ V}{Y2} \pm 1\%$ DC voltage output: $R_n = \frac{Y2}{1\ mA} \pm 1\%$
Miscellaneous:	EN 60 688

System response

Accuracy class: (the reference value is the full-scale value Y2)

Measured variable X	Condition	Accuracy class[1)]
System: Active, reactive and apparent power	0.5 ≤ X2/Sr ≤ 1.5 0.3 ≤ X2/Sr < 0.5	0.5 c 1.0 c
Phase: Active, reactive and apparent power	0.167 ≤ X2/Sr ≤ 0.5 0.1 ≤ X2/Sr < 0.167	0.5 c 1.0 c
Power factor, active power and reactive power	0.5Sr ≤ S ≤ 1.5 Sr, (X2 - X0) = 2 0.5Sr ≤ S ≤ 1.5 Sr, 1 ≤ (X2 - X0) < 2 0.5Sr ≤ S ≤ 1.5 Sr, 0.5 ≤ (X2 - X0) < 1 0.1Sr ≤ S < 0.5 Sr, (X2 - X0) = 2 0.1Sr ≤ S < 0.5 Sr, 1 ≤ (X2 - X0) < 2 0.1Sr ≤ S < 0.5 Sr, 0.5 ≤ (X2 - X0) < 1	0.5 c 1.0 c 2.0 c 1.0 c 2.0 c 4.0 c
AC voltage	0.1 Ur ≤ U ≤ 1.2 Ur	0.5 c
AC current / current averages	0.1 Ir ≤ I ≤ 1.2 Ir	0.5 c
System frequency	0.1 Ur ≤ U ≤ 1.2 Ur resp. 0.1 Ir ≤ I ≤ 1.2 Ir	0.15 + 0.03 c

[1)] Basic accuracy 1,0 c for applications with phase-shift

Duration of the measurement cycle: Approx. 0.6 to 1.6 s at 50 Hz, depending on measured variable and programming

Response time: 1 … 2 times the measurement cycle

Factor c (the highest value applies):

Linear characteristic:

$$c = \frac{1 - \frac{Y0}{Y2}}{1 - \frac{X0}{X2}} \text{ or } c = 1$$

Bent characteristic:

X0 ≤ X ≤ X1

$$c = \frac{Y1 - Y0}{X1 - X0} \cdot \frac{X2}{Y2} \text{ or } c = 1$$

X1 < X ≤ X2

$$c = \frac{1 - \frac{Y1}{Y2}}{1 - \frac{X1}{X2}} \text{ or } c = 1$$

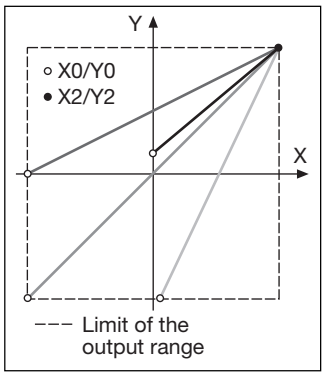


Fig. 4. Examples of settings with linear characteristic.

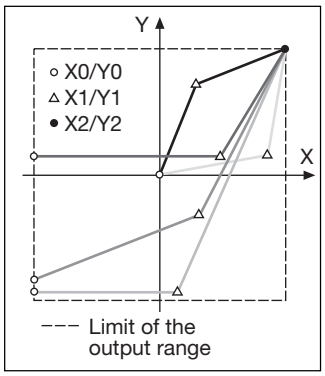


Fig. 5. Examples of settings with bent characteristic.

(System response inversely configurable)

Influencing quantities and permissible variations

Acc. to EN 60 688

Safety

Protection class:	II (protection isolated, EN 61 010-1)
Enclosure protection:	IP 40, housing (test wire, EN 60 529) IP 20, terminals (test finger, EN 60 529)
Pollution degree:	2
Installation category:	III (with ≤ 300 V versus earth) II (with > 300 V versus earth)
Insulation test (versus earth):	Inputs: 300 V [2)] 600 V [3)] Power supply: 230 V Outputs: 40 V

[2)] Overvoltage category III
[3)] Overvoltage category II

Surge test:	5 kV; 1.2/50 µs; 0.5 Ws
Test voltage:	50 Hz, 1 min. acc. to EN 61 010-1
	3700 V, inputs versus all other circuits as well as outer surface
	2200 V, input circuits versus each other
	3700 V, power supply versus outputs and outer surface
	490 V, outputs versus each other and versus outer surface

Power supply →◯

DC, AC power pack (DC or 50 … 60 Hz)

Table 1: Rated voltages and tolerances

Rated voltage U_N	Tolerance
24 … 60 V DC/AC	DC – 15 … + 33% AC ± 15%
85 … 230 V DC/AC	

Consumption: ≤ 5 W resp. ≤ 7 VA

Programming connector on transducer

The programming connector on the transducer is connected by the programming cable PRKAB 560 to the RS-232 interface on the PC. The electrical insulation between the two is provided by the programming cable.

Installation data

Housing:	Housing **P20/105** See Section "Dimensioned drawings"
Housing material:	Lexan 940 (polycarbonate), flammability class V-0 acc. to UL 94, self-extinguishing, non-dripping, free of halogen
Mounting:	For snapping onto top-hat rail (35 × 15 mm or 35 × 7.5 mm) acc. to EN 50 022
Orientation:	Any
Weight:	Approx. 0.35 kg

Terminals

Type:	Screw terminals with wire guards
Max. wire gauge:	≤ 4.0 mm2 single wire or 2 × 2.5 mm2 fine wire

Ambient tests

EN 60 068-2-6:	Vibration
Acceleration:	± 2 g
Frequency range:	10 … 150 … 10 Hz, rate of frequency sweep: 1 octave/minute
Number of cycles:	10, in each of the three axes
EN 60 068-2-27:	Shock
Acceleration:	3 × 50 g 3 shocks each in 6 directions
EN 60 068-2-1/-2/-3:	Cold, dry heat, damp heat

Ambient conditions

Variations due to ambient temperature:	± 0.2% / 10 K
Nominal range of use for temperature:	0…15…30…45 °C (usage group II)
Operating temperature:	– 10 to + 55 °C
Storage temperature:	– 40 to + 85 °C
Annual mean relative humidity:	≤ 75%

Dimensioned drawings

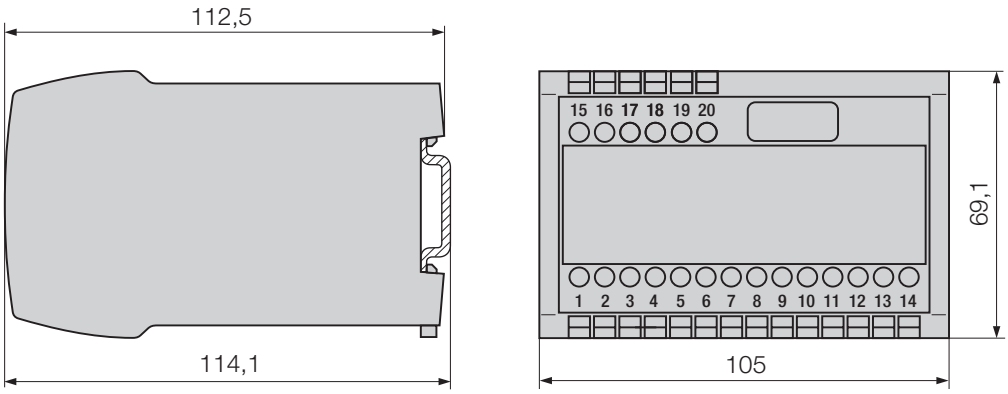


*Fig. 6. SINEAX M 563 in housing **P20/105** clipped onto a top-hat rail (35 × 15 mm or 35 × 75 mm, acc. to EN 50 022).*

SINEAX M 563 with 3 analogue outputs
Programmable multi-transducer for industry

Table 2: SINEAX M 563 available as standard versions (3 analogue outputs)

The two versions of the transducer below programmed with the **basic** configuration are available ex stock. It is only necessary to quote the **Order No.**:

Description / Basic programming		Marking	Order No.
1. Mechanical design:	Housing P20/105 for rail mounting	563 - 4	
2. Rated input frequency:	50 Hz	1	
3. Power supply / connection:	**24… 60 V DC/AC, external connection (standard)**	**1**	**146 458**
	85…230 V DC/AC, external connection (standard)	**2**	**146 440**
4. Full-scale output signal, output A:	Y2 = 20 mA	1	
5. Full-scale output signal, output B:	Y2 = 20 mA	1	
6. Full-scale output signal, output C:	Y2 = 20 mA	1	
7. Test certificate:	None supplied	0	
8. Configuration:	Basic configuration	0	
See Table 3 “Ordering Information”			
Basic configuration			
Input data			
9. Application:	4-wire, 3-phase system asymmetric load (NPS)	H	
10. Nominal input voltage:	Rated value Ur = 100 V	A	
11. Nominal input current:	Rated value Ir = 2 A	9	
12. Primary rating:	Without specification of primary rating	0	
Output A			
13. Meas. variable/meas. range (part 1):	P1; X0 = 115.47 W; X2 = 115.47 W	2	
14. Meas. variable/meas. range (part 2):	Not used	0	
15. Signal range/system response:	Y0 = – 20 mA; Y2 = 20 mA	1	
16. Characteristic:	Linear	1	
17. Limits:	Standard	1	
Output B			
18. Meas. variable/meas. range (part 1):	P2; X0 = 115.47 W; X2 = 115.47 W	2	
19. Meas. variable/meas. range (part 2):	Not used	0	
20. Signal range/system response:	Y0 = – 20 mA; Y2 = 20 mA	1	
21. Characteristic:	Linear	1	
22. Limits:	Standard	1	
Output C			
23. Meas. variable/meas. range (part 1):	P3; X0 = 115.47 W; X2 = 115.47 W	2	
24. Meas. variable/meas. range (part 2):	Not used	0	
25. Signal range/system response:	Y0 = – 20 mA; Y2 = 20 mA		
26. Characteristic:	Linear	1	
27. Limits:	Standard	1	

The complete Order Code 563-4... .... according to “Table 3: Ordering information” should be stated for other versions.

Table 3: Ordering information

DESCRIPTION	MARKING
1. Mechanical design	
Housing P20/105 for rail mounting	563 - 4
2. Nominal input frequency	
1) 50 Hz	1
2) 60 Hz	2
3. Power supply / Connection	
1) 24 … 60 V DC/AC, external connection (standard)	1
2) 85 … 230 V DC/AC, external connection (standard)	2
3) 24 … 60 V AC, internal connection from measuring input	3
4) 85 … 230 V AC, internal connection from measuring input	4
Lines 3 and 4: Not allowed with application E, F and J in feature 9 Line 3: Not allowed with nominal input voltage > 60 V_{L-L} (lines A and Z in feature 10) Line 4: Not allowed with nominal input voltage 57.74 V L-N (line 1 in feature 10) Please refer to remark under feature 10	
4. Output signal final value, output A	
1) Output A, Y2 = 20 mA (standard)	1
9) Output A, Y2 [mA] (1 ≤ Y2 < 20 mA)	9
Z) Output A, Y2 [V] (5 ≤ Y2 ≤ 10 V)	Z
5. Output signal final value, output B	
1) Output B, Y2 = 20 mA (standard)	1
9) Output B, Y2 [mA] (1 ≤ Y2 < 20 mA)	9
Z) Output B, Y2 [V] (5 ≤ Y2 ≤ 10 V)	Z
6. Output signal final value, output C	
1) Output C, Y2 = 20 mA (standard)	1
9) Output C, Y2 [mA] (1 ≤ Y2 < 20 mA)	9
Z) Output C, Y2 [V] (5 ≤ Y2 ≤ 10 V)	Z
7. Test records	
0) Without test records	0
D) With test records in German	D
E) With test records in English	E
8. Configuration	
0) **Basic** configuration programmed (see table 2)	0
9) Programmed to order	9
Line 0: No further details are necessary when specifying the **basic** configuration. Not allowed with internal power supply from measuring input. Line 9: The order must include a full specification of the following features 9 to 27 by means of a completely filled in form W 2407e with the configuration information.	

Table 3 continued on next page!

SINEAX M 563 with 3 analogue outputs
Programmable multi-transducer for industry

Continuation “Table 3: Ordering Information”

DESCRIPTION					MARKING
9. Application (system)					
A) Single-phase AC					A
B) 4-wire, 3-phase symmetric load					B
C) 3-wire, 3-phase symmetric load					C
D) 3-wire, 3-phase symmetric load, phase-shift U_{L1-L2} / I_{L1}*					D
E) 3-wire, 3-phase symmetric load, phase-shift U_{L3-L1} / I_{L1}*					E
F) 3-wire, 3-phase symmetric load, phase-shift U_{L2-L3} / I_{L1}*					F
G) 3-wire, 3-phase asymmetric load					G
H) 4-wire, 3-phase asymmetric load					H
J) 4-wire, 3-phase asymmetric load, open-Y					J
Lines E, F, J: Not possible with power supply from measuring input!					
10. Nominal input voltage					
1) Rated value Ur = 57.74 V			phase-to-neutral		1
9) Rated value Ur [V_{L-N}]:			($57.74\ V_{L-N} < Ur \leq 400\ V_{L-N}$)[1]		9
A) Rated value Ur = 100 V			phase-to-phase		A
Z) Rated value Ur [V_{L-L}]:			($100\ V_{L-L} < Ur \leq 693\ V_{L-L}$)[1]		Z
[1] Max. 230 V with power supply from measuring input (feature 3, line 4)! The transducer is only valid for the rated power supply range when the power supply is being taken from the measuring input (symmetrically loaded single-phase and four-wire three-phase supply: $_{L1-N}$; otherwise $_{L1-L2}$. Lines 1 and 9: Only for application A and B Lines A and Z: Only for application C to J					
11. Nominal input current					
1) Rated value Ir = 1 A					1
2) Rated value Ir = 5 A					2
9) Rated value Ir [A]			(1 A < Ir ≤ 6 A)		9
12. Primary rating (voltage and current transformer)					
0) Without specification of primary rating					0
9) VT =		kV	CT =	A	9
Line 9: Specify transformer ratio primary, e.g. 33 kV, 1000 A The secondary ratings must correspond to the rated input voltage and current specified for feature 10, respectively 11.					

* *Basic accuracy 1.0 c*

Table 3 continued on next page!

Continuation “Table 3: Ordering information”

DESCRIPTION							Application A…F	Application G	Application H/J	Marking
13. Output A, measured variable, range Part 1 (power, power factor, frequency)										
0) Part 1 not used										0
1) P	System	X0:		X2:			●	●	●	1
2) P1	L1	X0:		X2:					●	2
3) P2	L2	X0:		X2:					●	3
4) P3	L3	X0:		X2:					●	4
5) Q	System	X0:		X2:			●	●	●	5
6) Q1	L1	X0:		X2:					●	6
7) Q2	L2	X0:		X2:					●	7
8) Q3	L3	X0:		X2:					●	8
A) S	System	X0:		X2:			●	●	●	A
B) S1	L1	X0:		X2:					●	B
C) S2	L2	X0:		X2:					●	C
D) S3	L3	X0:		X2:					●	D
E) PF	System	X0:		X2:			●	●	●	E
F) PF1	L1	X0:		X2:					●	F
G) PF2	L2	X0:		X2:					●	G
H) PF3	L3	X0:		X2:					●	H
J) QF	System	X0:		X2:			●	●	●	J
K) QF1	L1	X0:		X2:					●	K
L) QF2	L2	X0:		X2:					●	L
M) QF3	L3	X0:		X2:					●	M
N) LF	System	X0:		X2:			●	●	●	N
P) LF1	L1	X0:		X2:					●	P
Q) LF2	L2	X0:		X2:					●	Q
R) LF3	L3	X0:		X2:					●	R
S) F	Frequency	X0:		X2:			●	●	●	S

Meas. variable:		**Initial range X0**	**Final range X2**
P, Q	System	– X2 ≤ X0 ≤ 0.8 X2	0.3 ≤ X2/Sr ≤ 1.5
P, Q	L1/L2/L3	– X2 ≤ X0 ≤ 0.8 X2	0.1 ≤ X2/Sr ≤ 0.5
S	System	0 ≤ X0 ≤ 0.8 X2	0.3 ≤ X2/Sr ≤ 1.5
S	L1/L2/L3	0 ≤ X0 ≤ 0.8 X2	0.1 ≤ X2/Sr ≤ 0.5
PF, QF, LF		– 1 ≤ X0 ≤ (X2 – 0.5)	0 ≤ X2 ≤ 1
F		45 Hz ≤ X0 ≤ (X2 – 1) Hz	(X0 + 1) Hz ≤ X2 ≤ 65 Hz

Table 3 continued on next page!

SINEAX M 563 with 3 analogue outputs
Programmable multi-transducer for industry

Continuation “Table 3: Ordering information”

DESCRIPTION							Application A…F	Application G	Application H/J	Marking
14. Output A, measured variable, range Part 2 (current, voltage)										
0) Part 2 not used										0
1) I	System		X0:		X2:		●			1
2) I1	L1		X0:		X2:			●	●	2
3) I2	L2		X0:		X2:			●	●	3
4) I3	L3		X0:		X2:			●	●	4
5) IB	System	(15 min)	X0:		X2:		●			5
6) IB1	L1	(15 min)	X0:		X2:			●	●	6
7) IB2	L2	(15 min)	X0:		X2:			●	●	7
8) IB3	L3	(15 min)	X0:		X2:			●	●	8
A) BS	System	(15 min)	X0:		X2:		●			A
B) BS1	L1	(15 min)	X0:		X2:			●	●	B
C) BS2	L2	(15 min)	X0:		X2:			●	●	C
D) BS3	L3	(15 min)	X0:		X2:			●	●	D
E) IM	System		X0:		X2:			●	●	E
F) IMS	System		X0:		X2:			●	●	F
G) U	System		X0:		X2:		●			G
H) U1N	L1-N		X0:		X2:				●	H
J) U2N	L2-N		X0:		X2:				●	J
K) U3N	L3-N		X0:		X2:				●	K
L) U12	L1-L2		X0:		X2:			●	●	L
M) U23	L2-L3		X0:		X2:			●	●	M
N) U31	L3-L1		X0:		X2:			●	●	N

Meas. variable:	**Initial range X0**	**Final range X2**
I, I1, I2, I3	0 ≤ X0 ≤ 0.8 X2	0.5 Ir ≤ X2 ≤ 1.2 Ir
IB, IBS	X0 = 0	0.5 Ir ≤ X2 ≤ 1.2 Ir
IM	0 ≤ X0 ≤ 0.8 X2	0.5 Ir ≤ X2 ≤ 1.2 Ir
IMS	– X2 ≤ X0 ≤ 0.8 X2	0.5 Ir ≤ X2 ≤ 1.2 Ir
U System	0 ≤ X0 ≤ 0.9 X2	0.8 Ur ≤ X2 ≤ 1.2 Ur
U L1-L2	0 ≤ X0 ≤ 0.9 X2	0.8 Ur ≤ X2 ≤ 1.2 Ur
U L2-L3	0 ≤ X0 ≤ 0.9 X2	0.8 Ur ≤ X2 ≤ 1.2 Ur
U L3-L1	0 ≤ X0 ≤ 0.9 X2	0.8 Ur ≤ X2 ≤ 1.2 Ur
U L1-N	0 ≤ X0 ≤ 0.9 X2	0.8 Ur/$\sqrt{3}$ ≤ X2 ≤ 1.2 Ur/$\sqrt{3}$
U L2-N	0 ≤ X0 ≤ 0.9 X2	0.8 Ur/$\sqrt{3}$ ≤ X2 ≤ 1.2 Ur/$\sqrt{3}$
U L3-N	0 ≤ X0 ≤ 0.9 X2	0.8 Ur/$\sqrt{3}$ ≤ X2 ≤ 1.2 Ur/$\sqrt{3}$

15. Output A, signal range, system response	
0) Not used	0
1) Signal (Y0 … Y2SW): – Y2 … Y2	1
2) Signal (Y0 … Y2SW): 0 … Y2	2
3) Signal (Y0 … Y2SW): 0,2 Y2 … Y2	3
9) Signal Y0 … Y2SW:	9
A) Signal inversely (Y2SW … Y0): Y2 … Y2	A
B) Signal inversely (Y2SW … Y0): Y2 … 0	B
C) Signal inversely (Y2SW … Y0): Y2 … 0,2 Y2	C
Z) Signal inversely Y2SW … Y0:	Z
Lines 9 and Z: Y2 = selected final value in feature 4. Specify Y0 and Y2SW in mA or V, within the limits 1 ≤ **Y2SW** ≤ Y2 **(additional error!)**; – Y2SW ≤ **Y0** ≤ 0,2 Y2SW	

Table 3 continued on next page!

Continuation “Table 3: Ordering information”

DESCRIPTION								Marking
16. Output A, characteristic								
0) Not used								0
1) Characteristic linear								1
9) Characteristic kinked	X1:		Y1:					9
Line 9: Specify kink point, X1 (input) as value of the measured quantity, Y1 (output) in mA or V, within the limits (X0 + 0.015 X2) ≤ **X1** ≤ 0.985 X2; Y0 ≤ **Y1** ≤ Y2SW								
17. Output A, limitation								
0) Not used								0
1) Limitation Standard (Ymin = Y0 – 0.2 Y2SW; Ymax = 1.2 Y2SW)								1
9) Limitation	Ymin:		Ymax.:					9
(Y0 – 0.2 Y2SW) ≤ **Ymin** ≤ Y0; Y2SW ≤ **Ymax** ≤ 1.2 Y2SW								
18. Output B, measured variable, range Part 1 (power, power factor, frequency)					**Application** A…F	G	H/J	
0) Part 1 not used								0
1) P System	X0:		X2:		●	●	●	1
2) P1 L1	X0:		X2:				●	2
3) etc. analogue output A, feature 13							●	3
19. Output B, measured variable, range Part 2 (current, voltage)								
0) Part 2 not used								0
1) I System	X0:		X2:		●			1
2) I1 L1	X0:		X2:			●	●	2
3) etc. analogue output A, feature 14						●	●	3
20. Output B, signal range, system response								
0) Not used								0
1) Signal (Y0 … Y2SW): – Y2 … Y2								1
2) Signal (Y0 … Y2SW): 0 … Y2								2
3) Signal (Y0 … Y2SW): 0,2 Y2 … Y2								3
9) Signal Y0 … Y2SW:								9
A) Signal inversely (Y2SW … Y0): Y2 … – Y2								A
B) Signal inversely (Y2SW … Y0): Y2 … 0								B
C) Signal inversely (Y2SW … Y0): Y2 … 0,2 Y2								C
Z) Signal inversely Y2SW … Y0:								Z
Lines 9 and Z: Y2 = selected final value in feature 4. Specify Y0 and Y2SW in mA or V, within the limits 1 ≤ **Y2SW** ≤ Y2 **(additional error!)**; – Y2SW ≤ **Y0** ≤ 0,2 Y2SW								
21. Output B, characteristic								
0) Not used								0
1) Characteristic linear								1
9) Characteristic kinked	X1:		Y1:					9
Line 9: Specify kink point, X1 (input) as value of the measured quantity, Y1 (output) in mA or V, within the limits (X0 + 0.015 X2) ≤ **X1** ≤ 0.985 X2; Y0 ≤ **Y1** ≤ Y2SW								
22. Output B, limitation								
0) Not used								0
1) Limitation Standard (Ymin = Y0 – 0.2 Y2SW; Ymax = 1.2 Y2SW)								1
9) Limitation	Ymin:		Ymax.:					9
(Y0 – 0.2 Y2SW) ≤ **Ymin** ≤ Y0; Y2SW ≤ **Ymax** ≤ 1.2 Y2SW								

Table 3 continued on next page!

SINEAX M 563 with 3 analogue outputs
Programmable multi-transducer for industry

Continuation “Table 3: Ordering Information”

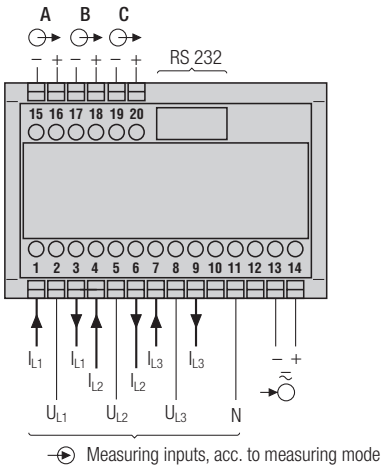
DESCRIPTION	Application A…F	Application G	Application H/J	Marking
23. Output C, measured variable, range				
Part 1 (power, power factor, frequency)				
0) Part 1 not used				0
1) P System X0: ____ X2: ____	●	●	●	1
2) P1 L1 X0: ____ X2: ____			●	2
3) etc. analogue output A, feature 13			●	3
24. Output C, measured variable, range				
Part 2 (current, voltage)				
0) Part 2 not used				0
1) I System X0: ____ X2: ____	●			1
2) I1 L1 X0: ____ X2: ____		●	●	2
3) etc. analogue output A, feature 14		●	●	3
25. Output C, signal range, system response				
0) Not used				0
1) Signal (Y0 … Y2SW): – Y2 … Y2				1
2) Signal (Y0 … Y2SW): 0 … Y2				2
3) Signal (Y0 … Y2SW): 0,2 Y2 … Y2				3
9) Signal Y0 … Y2SW: ____				9
A) Signal inversely (Y2SW … Y0): Y2 … – Y2				A
B) Signal inversely (Y2SW … Y0): Y2 … 0				B
C) Signal inversely (Y2SW … Y0): Y2 … 0,2 Y2				C
Z) Signal inversely Y2SW … Y0: ____				Z
Lines 9 and Z: Y2 = selected final value in feature 4. Specify Y0 and Y2SW in mA or V, within the limits 1 ≤ **Y2SW** ≤ Y2 **(additional error!)**; – Y2SW ≤ **Y0** ≤ 0,2 Y2SW				
26. Output C, characteristic				
0) Not used				0
1) Characteristic linear				1
9) Characteristic kinked X1: ____ Y1: ____				9
Line 9: Specify kink point, X1 (input) as value of the measured quantity, Y1 (output) in mA or V, within the limits (X0 + 0.015 X2) ≤ **X1** ≤ 0.985 X2; Y0 ≤ **Y1** ≤ Y2SW				
27. Output C, limitation				
0) Not used				0
1) Limitation Standard (Ymin = Y0 – 0.2 Y2; Ymax = 1.2 Y2)				1
9) Limitation Ymin: ____ Ymax.: ____				9
(Y0 – 0.2 Y2SW) ≤ **Ymin** ≤ Y0; Y2SW ≤ **Ymax** ≤ 1.2 Y2SW				

Electrical connections

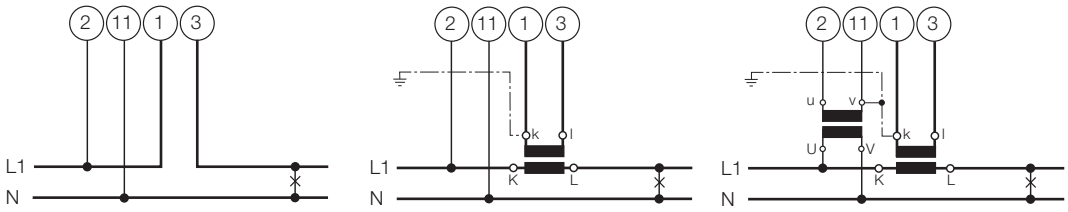
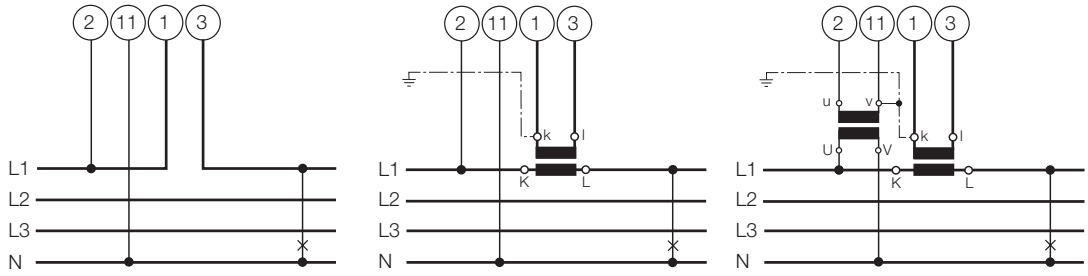
Function			Connect.
Measuring input	AC current	IL1	1 / 3
		IL2	4 / 6
		IL3	7 / 9
	AC voltage	UL1	2
		UL2	5
		UL3	8
		N	11
Outputs	Analogue		
	A	–	15
		+	16
	B	–	17
		+	18
	C	–	19
		+	20
Power supply	AC	~	13
		~	14
	DC	–	13
		+	14
RS 232 C interface			

If power supply is taken from the measured voltage internal connections are as follow:

Application (system)	Internal connection Terminal / System
Single-phase AC current	2 / 11 (L1 – N)
4-wire 3-phase symmetric load	2 / 11 (L1 – N)
All other (apart from feature 9, lines E, F and J)	2 / 5 (L1 – L2)



Measuring inputs

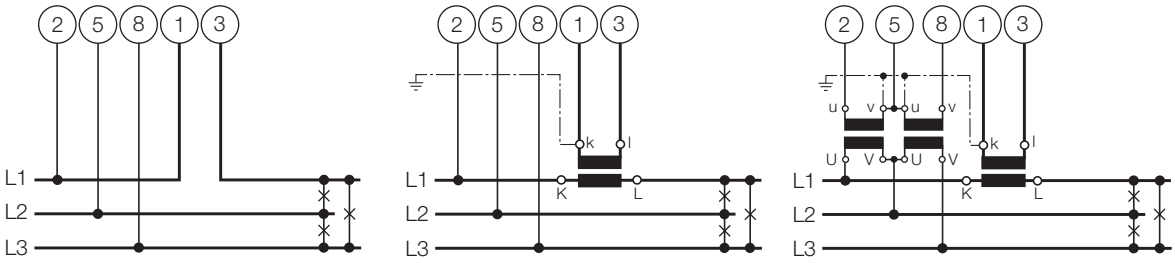
System / Application	Terminals
Single-phase AC system	
4-wire 3-phase **symmetric load I: L1**	

Connect the voltage according to the following table for current measurement in L2 or L3:

Current transf.	Terminals		2	11
L2	1	3	L2	N
L3	1	3	L3	N

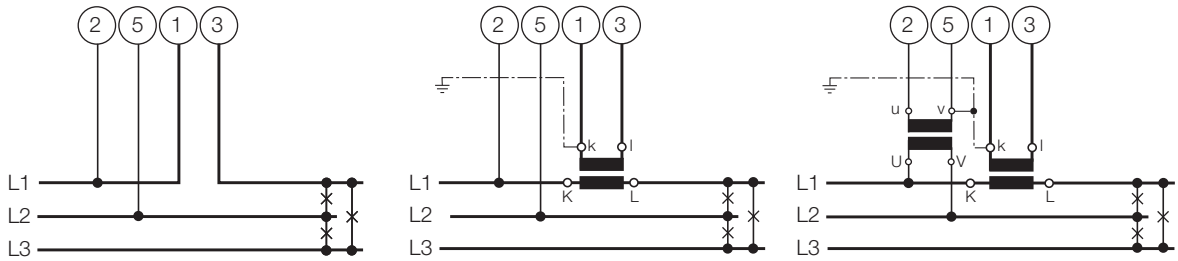
SINEAX M 563 with 3 analogue outputs
Programmable multi-transducer for industry

Measuring inputs

System / application	Terminals
3-wire 3-phase **symmetric load** **I: L1**	

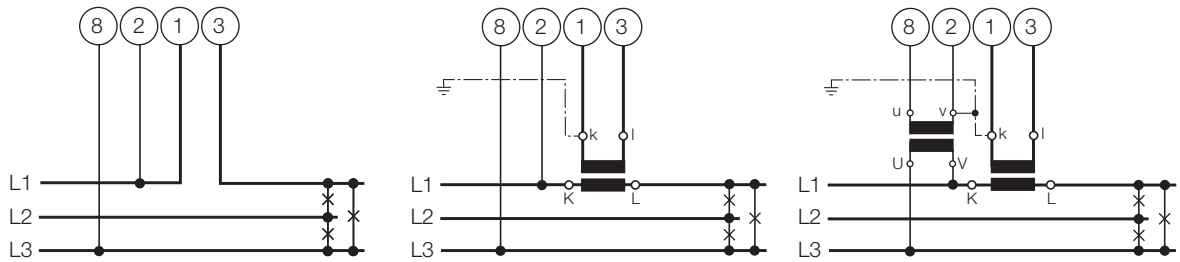
Connect the voltage according to the following table for current measurement in L2 or L3:

Current transf.	Terminals		2	5	8
L2	1	3	L2	L3	L1
L3	1	3	L3	L1	L2

3-wire 3-phase **symmetric load** Phase-shift U: L1 – L2 I: L1	

Connect the voltage according to the following table for current measurement in L2 or L3:

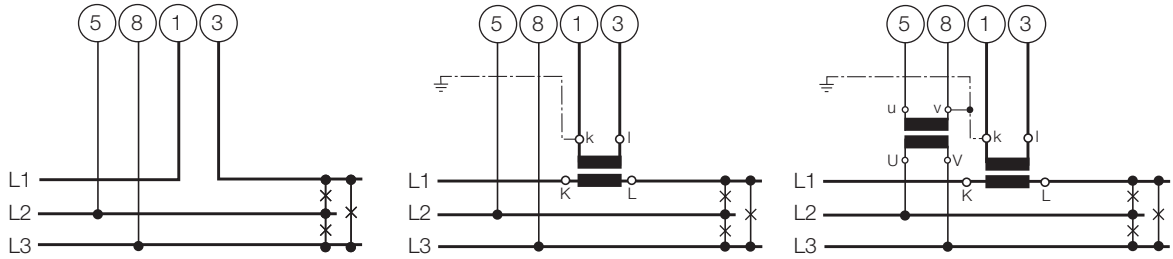
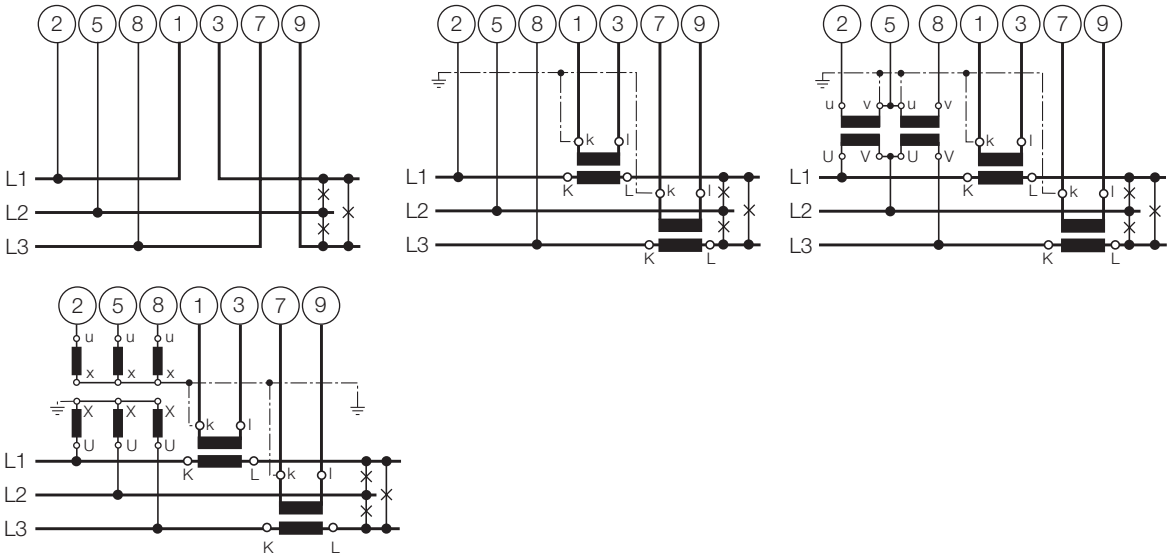
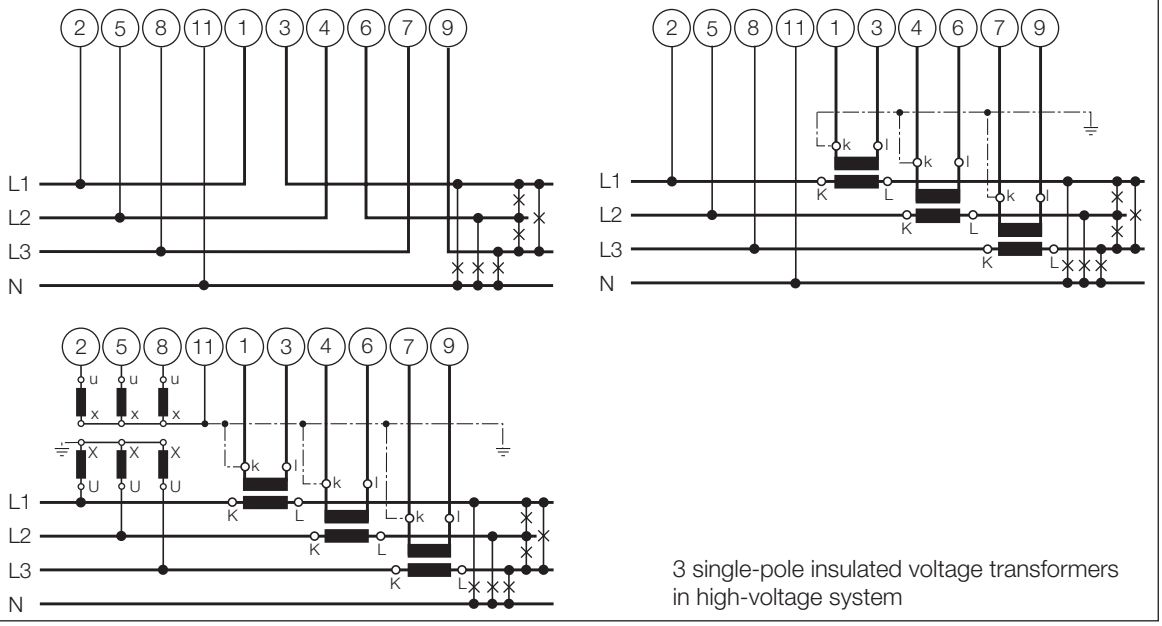
Current transf.	Terminals		2	5
L2	1	3	L2	L3
L3	1	3	L3	L1

3-wire 3-phase **symmetric load** Phase-shift U: L3 – L1 I: L1	

Connect the voltage according to the following table for current measurement in L2 or L3:

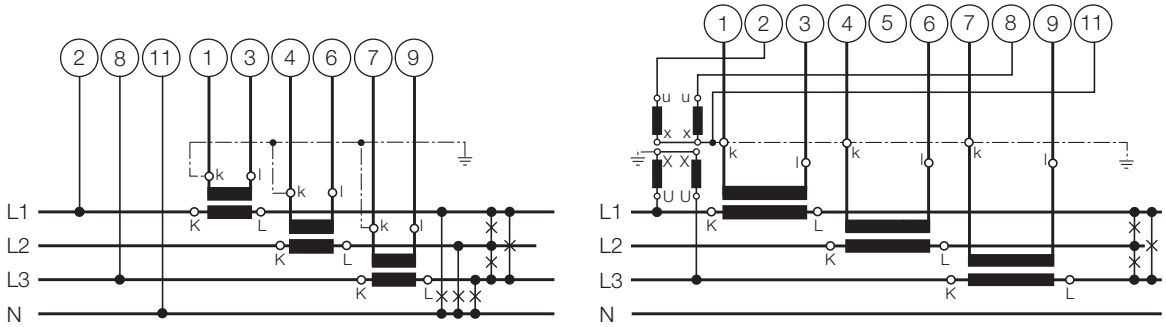
Current transf.	Terminals		8	2
L2	1	3	L1	L2
L3	1	3	L2	L3

Measuring inputs

System / application	Terminals
3-wire 3-phase **symmetric load** Phase-shift U: L2 – L3 I: L1	 Connect the voltage according to the following table for current measurement in L2 or L3:
3-wire 3-phase **asymmetric load**	
4-wire 3-phase **asymmetric load**	 3 single-pole insulated voltage transformers in high-voltage system

Current transf.	Terminals		5	8
L2	1	3	L3	L1
L3	1	3	L1	L2

SINEAX M 563 with 3 analogue outputs
Programmable multi-transducer for industry

Measuring input	
System / application	Terminals
4-wire 3-phase **asymmetric load,** Open Y connection	 Low-voltage system 2 single-pole insulated voltage transformers in high-voltage system

Relationship between PF, QF and LF

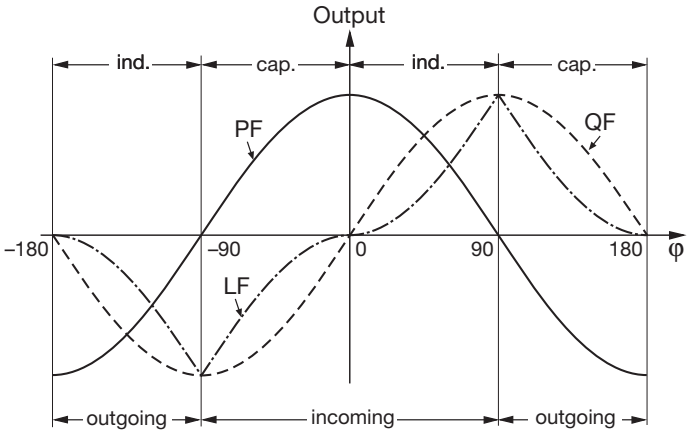


Fig. 7. Active power PF ——, reactive power QF ------, power factor LF – – – –.

Standard accessories

1 Operating Instructions for SINEAX M 563 in three languages: German, French, English
1 blank type label, for recording programmed settings

Table 4: Accessories and spare parts

Description	**Order No.**
Programming cable PRKAB 560	147 779
Ancillary cable for SINEAX M 563	143 587
Configuration Software M 560 for SINEAX M 563 Windows 3.1 or higher on CD in German, English, French, Italian and Dutch **(Download free of charge under http://www.gmc-instruments.com)** In addition, the CD contains all configuration programmes presently available for Camille Bauer products.	146 557
Operating Instructions M 563-4 B d-f-e in three languages: German, French, English	143 579

Printed in Switzerland • Subject to change without notice • Edition 03.02 • Data sheet No. M 563-4 Le

Camille Bauer Ltd
Aargauerstrasse 7
CH-5610 Wohlen/Switzerland
Phone +41 56 618 21 11
Fax +41 56 618 24 58
e-mail: cbag@gmc-instruments.com
http://www.gmc-instruments.com