

Contrans E - SU

Configurable universal transducer for all power current variables and for mains synchronization

10/28-2.54 EN



- Configurable transducer for all power current variables U, I, P, Q, S, $\cos\phi$, $\sin\phi$, ϕ , f
- 4 analog outputs and 1 binary output
- 4 integrated energy counters
- Comparison of two mains voltages in terms of amplitude, frequency and phase (synchronoscope)
- Parameterization and communication via standard interface
- User-friendly parameterization software with online display of all variables
- Surface mounting case for top-hat rail mounting or 19" plug-in card
- Electrical safety to IEC standards
- Class 0.5
- Different characteristics
- Correct results even with distorted sinusoidal input signal

Technical data

Input

Rated current

0.2...1.5 A; 1...7.5 A

Rated voltage

⌋: $30\text{ V} < U_N < 290\text{ V}$

Δ: $50\text{ V} < U_N < 500\text{ V}$

⌋: $115\text{ V} < U_N < 490\text{ V}$

Δ: $200\text{ V} < U_N < 850\text{ V}$

Measuring range

see ordering information

Rated frequency

$16^{2/3}/50/60/400\text{ Hz} \pm 10\%$

Internal power consumption

Current input approx. 0.15 VA

Voltage input approx. 1.5 mA

Overload capacity

Current input:

permanent $2 \times I_N$

short term $40 \times I_N$, however $I_{\text{max.}} 200\text{ A/1 s}$

Voltage input:

permanent $1.5 \times U_N$ however max. 570 V (⌋)

short term $4 \times U_N/1\text{ s}$

Variables

Current: I_{L1}, I_{L2}, I_{L3}

Voltage: $U_{L1-N}, U_{L2-N}, U_{L3-N}, U_{L1-L2}, U_{L1-L3}, U_{L2-L3}$
 $U_{\text{Mains1}}-U_{\text{Mains2}}$ with synchronoscope

Active power: $P_{\text{total}}, P_{L1}, P_{L2}, P_{L3}$, with display of the energy direction (consumption/generation)

Reactive power: $Q_{\text{total}}, Q_{L1}, Q_{L2}, Q_{L3}$ with indication of capacitive/inductive load (sinusoidal signals)

Reactive power: $Q_{\text{total}}, Q_{L1}, Q_{L2}, Q_{L3}$, without sign (non-sinusoidal signals)

Apparent power: $S_{\text{total}}, S_{L1}, S_{L2}, S_{L3}$

Frequency: Measurement in current or voltage path or $F_{\text{Mains1}}-F_{\text{Mains2}}$ with synchronoscope

$\cos\phi$: with indication of capacitive/inductive load (sinusoidal signals)

Active power factor: value only, no load indication (non-sinusoidal signals)

$\sin\phi$: with sign (sinusoidal signals)

Reactive power factor: value only (non-sinusoidal signals)

Phase angle: $\phi_{L1}, \phi_{L2}, \phi_{L3}, \phi_{\text{total}}$, $\phi_{\text{Mains1-Mains2}}$ with synchronoscope

Energy counter: 4 independent counters (parameterizable) for current, active power (consumption/generation), reactive power (inductive/capacitive), apparent power

Output

Number of outputs

1 x mA/V switchable and 1 x binary or

3 x mA/V switchable and 1 x binary or

4 x mA/V switchable and 1 x binary

Current outputs adjustable between $\pm 1\text{ mA}$ and $\pm 20\text{ mA}$

Current limit: max. $< 30\text{ mA}$

Load: $R_A \leq 15\text{ V}/I_{AN}$

Voltage outputs adjustable between $\pm 1\text{ V}$ and $\pm 10\text{ V}$

Voltage limit: $U_{A\text{ max.}} = 27\text{ V}$ for $R_A = \infty$

Current limit: $< 50\text{ mA}$

Load: $R_A > 5\text{ k}\Omega$

Residual ripple

$< 0.5\%$ (peak-to-peak)

Response time

0.3...5 s (adjustable via parameterization)

Binary output (open collector)

Pulse output 1...14400 pulses/h

Rating 24 V DC/100 mA

Pulse duration 120 ms

Load $\geq 180\ \Omega$

Short-circuit proof

Interfaces

Serial front interface (LKS/RS 232)

Optional fieldbus interface (RS 485)

Communication protocol MODBUS RTU

Transient response

Error limit

$\pm 0.5\%$

Reference conditions

$U_E = U_N, I_E = I_N$

Frequency $f_N \pm 2\%$

Form factor 1.111

Power factor (P: $\cos\phi = 1, Q: \sin\phi = 1$)

Power supply $U_H \pm 2\%$

Load for $I_A: 0.5 \times R_{A\text{ max.}}$

Ambient temperature $23\text{ }^\circ\text{C} \pm 2\text{ K}$

Warm-up time approx. 20 min.

Effects

Overranging 1.2fold: $\leq 0.2\%$, 2fold: $\leq 0.5\%$

Curve shape: crest factor 2...6 (parameterizable)

Power supply: $\leq 0.05\%$

External magnetic field: $\leq 0.5\%$ up to 400 A/m

Temperature: $\leq 0.2\%/10\text{ K}$

Technical data

Power supply

Voltage range:	
100...240 V AC/DC	AC: 85...264 V; 45...65 Hz; 5 VA DC: 82...300 V; 5 VA
48 V AC/DC	AC: 40...53 V; 45...65 Hz; 5 VA DC: 36...72 V; 5 VA
24 V AC/DC	AC: 20...27 V; 45...65 Hz; 5 VA DC: 18...35 V; 5 VA

Housing, Mounting, Connection

Surface mounting case

Material	hardly inflammable plastic (to VL 94-V2), halogen free
Connection terminals	
Current input	4 mm ²
Others	2.5 mm ²
Type of protection	
Housing	IP 40
Terminals	IP 20
Weight	approx. 0.69 kg
Dimensions (W x H x D)	105 mm x 95 mm x 130 mm

19" plug-in card

Colour	Grey RAL 7032
Connection	2 x 32-pin blade connector, type D and multipoint connector for current connection
Weight	approx. 0.7 kg
Mounting width	12T (approx. 60 mm)

General and safety data

Basic standard for power transducer to DIN EN 60 688 or IEC 688

Safety information to DIN EN 61010 or IEC 1010

Test voltage input against output	5.55 kV, 50/60 Hz
Rated voltage against earth	< 570 V double, < 1000 V basic insulation
Degree of pollution	2
Overvoltage category	II against output III against input and power supply
Output circuits, interfaces	For voltages < 570 V all output circuits and the interfaces are functional extra-low voltage circuits to DIN VDE 0100, Part 410 (PELV). The safe isolation of these circuits meets requirements to DIN VDE 0106, Part 101.
Electromagnetic compatibility	to EN 50082 or IEC 1000-4
Radio suppression	to DIN EN 55011

Mechanical capability

Tested to DIN IEC 68-2-27 and 68-2-6	
Shoc: 30 g, 11 ms	
Vibrations: 2 g, 5...150 Hz	

Environmental capabilities

Climatic category	to DIN IEC 721 or DIN EN 60721
Ambient temperature range (3K5 to DIN IEC 721-3-3)	-20...+60 °C
Storage temperature range (2K4 to DIN IEC 721-3-2)	-40...+80 °C; light condensation allowed

Ordering information									
						Catalog No.			
Type SU						V28451A-			
Design									
Surface mounting case						1			
19" plug-in card						2			
Measuring circuit									
Single-phase AC; three-phase balanced load (not for 19" plug-in card)						1			
Three-phase unbalanced load (universal type)						3			
Three-phase unbalanced load (universal type) or synchronoscope						4			
Input variables									
Rated voltage (Δ : 30 V < U_N < 290 V resp. Δ : 50 V < U_N < 500 V)						1			
Rated voltage (Δ : 115 V < U_N < 490 V resp. Δ : 200 V < U_N < 850 V)						2			
Rated current (0.2 A < I_N < 1.5 A)						1			
Rated current (1 A < I_N < 7.5 A)						2			
Power supply									
100...240 V AC/DC						1			
48...60 V AC/DC						2			
24 V AC/DC						3			
Output modules									
1 x mA/V; 1 x binary (not for 19" plug-in card)						1			
3 x mA/V; 1 x binary						2			
4 x mA/V; 1 x binary (not for 19" plug-in card)						3			
Interface									
LKS interface						0			
RS 485 interface + LKS interface						1			

Ordering information				
	Weight	Catalog Number	Code	
Accessories				
IBIS-E parameterization software diskette 31/2" 31/2"		28495-3601061		
Connection cable for RS 232/LKS interface		11491-0744009		
Accessories for 19" plug-in cards				
Female multi-point connector for current connection	0.092	28304-0783080		
2 Multiple contact strips				
1 x voltage and power supply connection				
1 x output signal and interface connection				
Soldering connection	0.018	94182-0871817		
Wire-wrap (pins 1 mm x 1 mm)	0.018	94182-0872067		

Special calibration factor				
			Code	
Factory parameterization			691	
Tag No. (max. 31 characters)	(clear text)		693	
Measuring circuit				
Single-phase alternating current (~)			MS1	
3-wire three-phase balanced load (3 ~ 1E)			MS2	
3-wire three-phase balanced load with simulated phase (3 ~ 1E)			MS3	
3-wire three-phase unbalanced load (3 ~ 2E)			MS4	
4-wire three-phase balanced load (3N ~ 1E)			MS5	
4-wire three-phase unbalanced load (3N ~ 3E)			MS6	
Synchronoscope: comparison of two mains voltages with star voltage			MS7	
Synchronoscope: comparison of two mains voltages with delta voltage			MS8	
Input variables				
Current direct (0.2 A < I _N < 7.5 A)	(clear text)		I11	
Via current transformer: primary/secondary current	(clear text)		I21	
Voltage direct	(clear text)		U11	
(λ : 30 V < U _N < 290 V resp. Δ: 50 V < U _N < 500 V)				
(λ : 115 V < U _N < 490 V resp. Δ: 200 V < U _N < 850 V)				
Via voltage transformer: primary/secondary voltage	(clear text)		U21	
Rated frequency				
16 ² / ₃ Hz (see Code No. 511)			F11	
50 Hz			F12	
60 Hz			F13	
400 Hz (see Code No. 512)			F14	
Options				
other nominal frequency additionally parameterizable				
16 ² / ₃ Hz			511	
400 Hz			512	

Code for measuring variables (Code No.)											
Measuring variable voltage		Measuring variable current		Measuring variable active power		Measuring variable active power factor (sinusoidal)		Measuring variable active power factor (non-sinusoidal)		Measuring variable frequency	
Code	Code	Code	Code	Code	Code	Code	Code	Code	Code	Code	Code
U _{L1-N}	UN1	I _{L1}	IL1	P _{total} (3-ph.)	PP3	cosφ _{total} (3-ph.)	CP3	PF _{total} (3-ph.)	DP3	f _{L1} current	FC1
U _{L2-N}	UN2	I _{L2}	IL2	P _{L1}	PL1	cosφ _{L1}	CL1	PF _{L1}	DL1	f _{L2} current	FC2
U _{L3-N}	UN3	I _{L3}	IL3	P _{L2}	PL2	cosφ _{L2}	CL2	PF _{L2}	DL2	f _{L3} current	FC3
U _{L1-L2}	U12			P _{L3}	PL3	cosφ _{L3}	CL3	PF _{L3}	DL3	f _{L1} voltage	FV1
U _{L1-L3}	U13									f _{L2} voltage	FV2
U _{L2-L3}	U23									f _{L3} voltage	FV3
U _{Mains1-Mains2}	UNN									f _{Mains1-Mains2}	FNN
Measuring variable reactive power (sinusoidal)		Measuring variable reactive power factor (sinusoidal)		Measuring variable reactive power (non-sinusoidal)		Measuring variable reactive power factor (non-sinusoidal)		Measuring variable apparent power		Measuring variable phase angle (sinusoidal)	
Code	Code	Code	Code	Code	Code	Code	Code	Code	Code	Code	Code
Q _{total} (3-ph.)	QP3	sinφ _{total} (3-ph.)	BP3	Q _{total} (3-ph.)	NP3	QF _{total} (3-ph.)	GP3	S _{total} (3-ph.)	SP3	φ _{total} (3-ph.)	AP3
Q _{L1}	QL1	sinφ _{L1}	BL1	Q _{NL1}	NL1	QF _{L1}	GL1	S _{L1}	SL1	φ _{L1}	AL1
Q _{L2}	QL2	sinφ _{L2}	BL2	Q _{NL2}	NL2	QF _{L2}	GL2	S _{L2}	SL2	φ _{L2}	AL2
Q _{L3}	QL3	sinφ _{L3}	BL3	Q _{NL3}	NL3	QF _{L3}	GL3	S _{L3}	SL3	φ _{L3}	AL3
										φ _{Mains1-Mains2}	ANN

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Analog output 1 (E01)						
Code No.	Code	Start	Kink point	Final value	Unit	Response time (300...5000 ms)
Code No.	E01	E03	E05	E07		
Measured variable A1:	see page 4 /					
Code No.		A03	A05	A07		A09
Output signal (mA/V)						
Example: active power in the three-phase system, measuring range -20...+20 MW, output -10...+10 mA; E01: PP3 -20 // +20 / MW / -10 // +10 / mA						
Analog output 2 (E11)						
Code No.	Code	Start	Kink point	Final value	Unit	Response time (300...5000 ms)
Code No.	E11	E13	E15	E17		
Measured variable A2:	see page 4 /					
Code No.		A13	A15	A17		A19
Output signal (mA/V)						
Example: voltage $U_{1+1\varphi}$, measuring range 0...400 V, kink point at 350 V, output 0...10 V, kink at 2 V; E11: U12 / 0 / 350 / 400 / 0 / 2 / 10 / V						
Analog output 3 (E21)						
Code No.	Code	Start	Kink point	Final value	Unit	Response time (300...5000 ms)
Code No.	E21	E23	E25	E27		
Measured variable A3:	see page 4 /					
Code No.		A23	A25	A27		A29
Output signal (mA/V)						
Example: $\cos\phi$ total in the three-phase system, measuring range 0.5 kap...1...0.5 ind., output 4...20 mA; E21: CP3 / 0.5 kap. // 0.5 ind. / 4 // 20 / mA						
Analog output 4 (E51)						
Code No.	Code	Start	Kink point	Final value	Unit	Response time (300...5000 ms)
Code No.	E51	E53	E55	E57		
Measured variable A4:	see page 4 /					
Code No.		A53	A55	A57		A59
Output signal (mA/V)						
Example: current in L1, measuring range 0...1000 A, output 4...20 mA; E51: IL1 / 0 // 1000 A / 4 // 20 / mA						
Binary output (E31) as pulse output						
Code No.	Code	Pulse	Value	Unit		
Code No.	E31	A37	E37			
Measured variable A4P:	see page 4 /					
Pulses per time unit, max. 14.400 pulses/h) Example: active power in the 3-phase system, 0...50 MW, 10 pulses/1 MWh; E31: PP3 / 10 / 1 / MWh						
Binary output (E41) as alarm output						
Code No.	Code	Value min.	Value max.	Unit		
Code No.	E41	E43	E47			
Measured variable A4G:	see page 4 /					
Code No.		A43	A47	A49		
Alarm output						
Example: current L1, alarm value max. at 2500 A, response time 500 ms, 1 % hysteresis, NC contact E41: / L1 / MAX = 2500 / A / 500 ms / 1 % / RS						
Binary output A4S as synchronoscope						
Code No.	Code	Start	Final value	Unit		
Code No.	E61	E63	E67			
Measured variable A4S:	UNN					
Voltage difference (U1-U2)	Code No.	E71	E77			
Frequency difference (U1-U2)	Code No.	E81	E87			
Phase angle (U1-U2)	Code No.	FNN				
Alarm value output	Code No.	A43	A47	A49		
Example: synchronization of two mains: voltage -10...+10 V, frequency -1...+1 Hz, phase angle -10°...+10°, response time 500 ms, 1 % hysteresis, NO contact operation A4S: UNN / -10 / +10 / V / FNN / -1 / +1 / Hz / ANN / -10 / +10 // 500 ms / 1 % / AS						

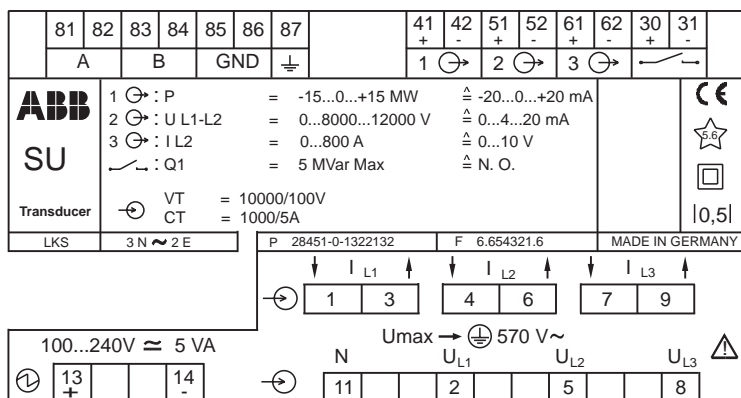
Energy counter display Z01				
Measured variable Z01:	Code	Digit behind dec. point ¹⁾	Energy direction ²⁾	Unit
Counter 1	E91	K01	R01	
Counter 2	E92	K02	R02	
Counter 3	E93	K03	R03	
Counter 4	E94	K04	R04	

Example 1: counter display for counter 1, total active power, 2 digits behind decimal point, energy direction consumption, unit kWh
Z01: E91 / PP3 / xx.xx / consumption / kWh
 Example 2: counter display for counter 2, total reactive power, 1 digit behind decimal point, energy direction inductive, unit kVarh
Z01: E92 / QP3 /xxx,x / ind. / kVarh

- 1) allowed settings: 0 digits behind decimal point, max. indication 2 000 000 000
 1 digit behind decimal point, max. indication 2 000 000 00.0
 2 digits behind decimal point, max. indication 2 000 000 0.00
- 2) allowed settings: active power - consumption / generation
 reactive power - inductive / capacity

Connection diagrams for surface mounting case

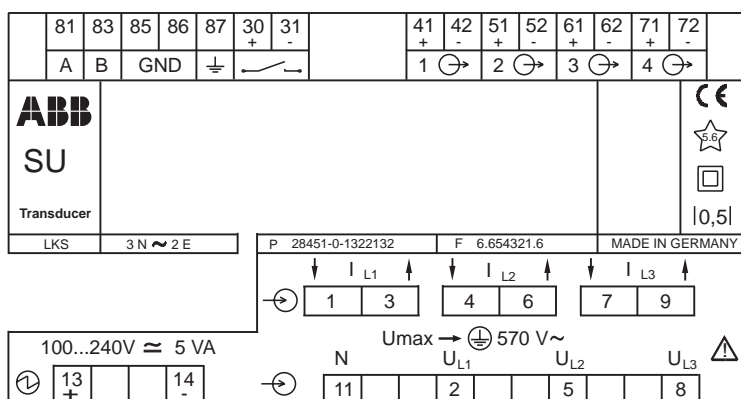
1 or 3 analog outputs



Z-18816

Connection	Terminal
RS 485 interface (optionally)	81/82 RXD/TXD A+ 83/84 RXD/TXD B- 85/86 DGND 87 GND
Analog output 1	41/42
Analog output 2	51/52
Analog output 3	61/62
Binary output	30/31
LKS	Interface connection
Input current	1/3, 4/6, 7/9
Input voltage	2/5/8/11
Power supply	13/14

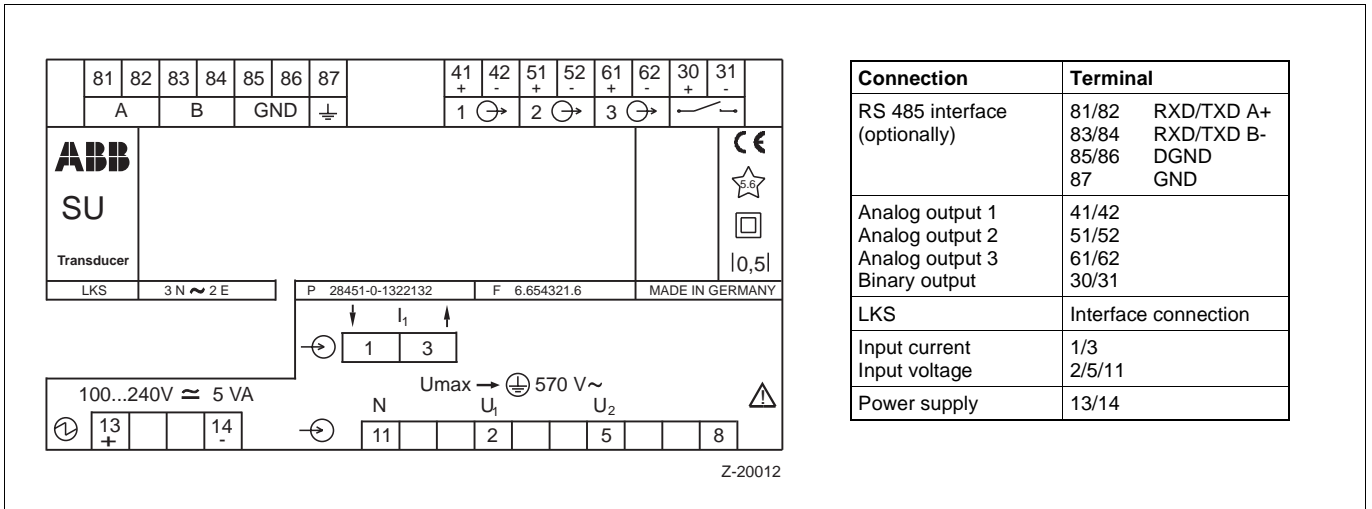
4 analog outputs



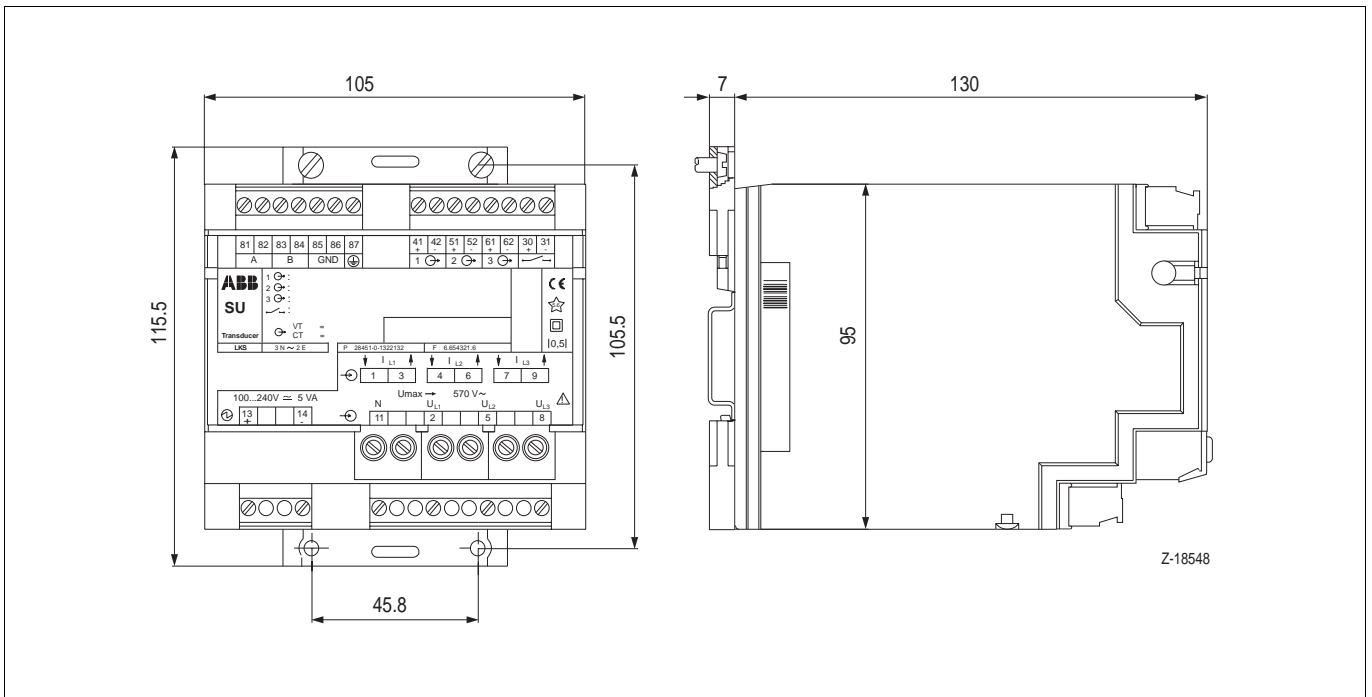
Z-20011

Connection	Terminal
RS 485 interface (optionally)	81 RXD/TXD A+ 83 RXD/TXD B- 85/86 DGND 87 GND
Analog output 1	41/42
Analog output 2	51/52
Analog output 3	61/62
Analog output 4	71/72
Binary output	30/31
LKS	Interface connection
Input current	1/3, 4/6, 7/9
Input voltage	2/5/8/11
Power supply	13/14

Connection diagram for surface mounting case mains synchronization

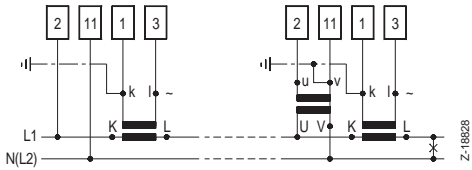


Dimensional drawings for surface mounting case (dimensions in mm)

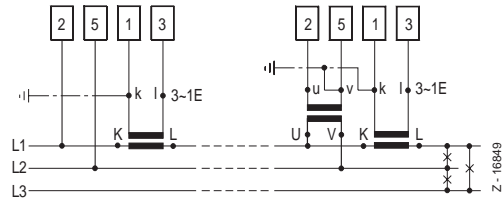


Connection diagrams for surface mounting case

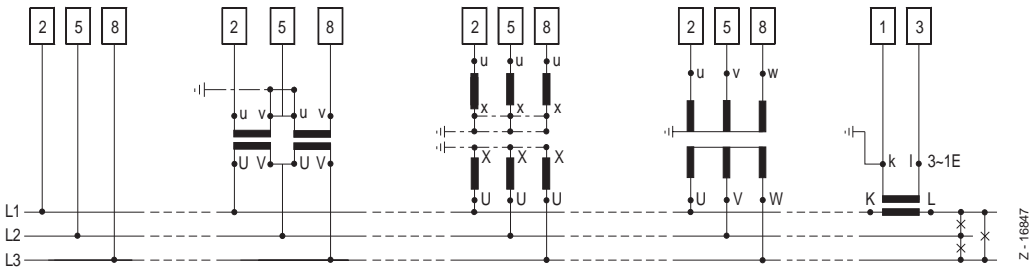
Single-phase alternating current



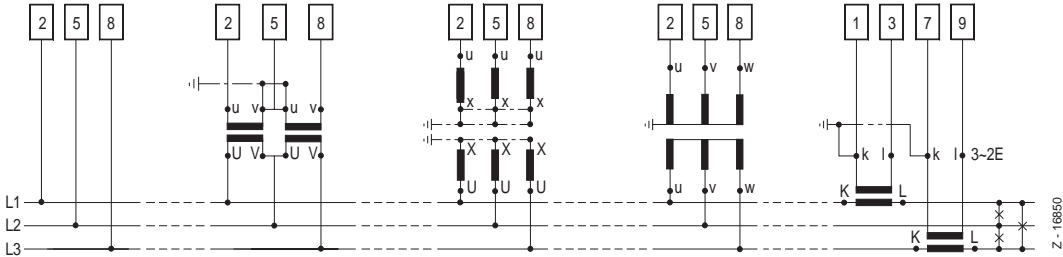
3-wire three-phase balanced load with simulated phase



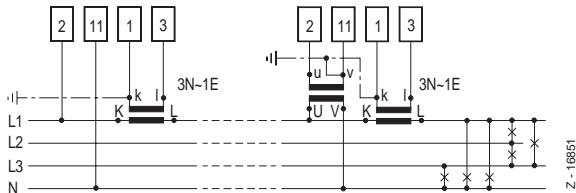
3-wire three-phase balanced load



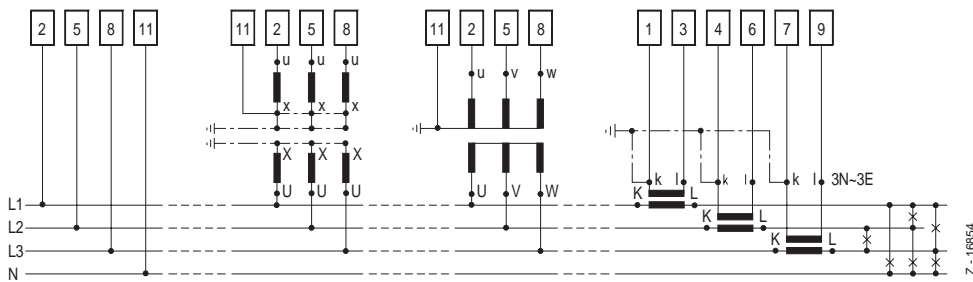
3-wire three-phase unbalanced load



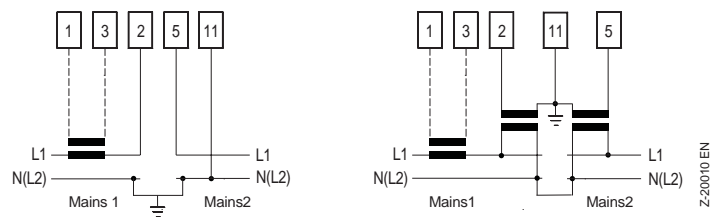
4-wire three-phase balanced load



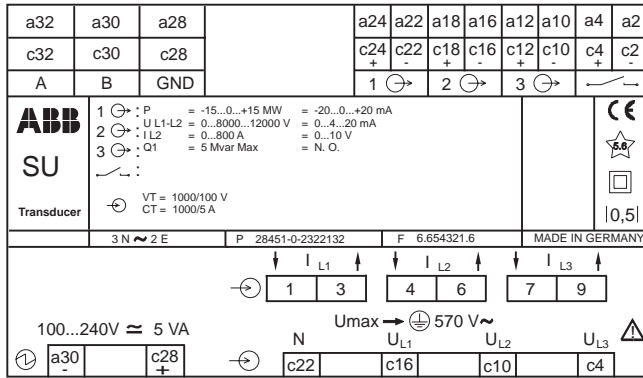
4-wire three-phase unbalanced load



Synchronization of two mains



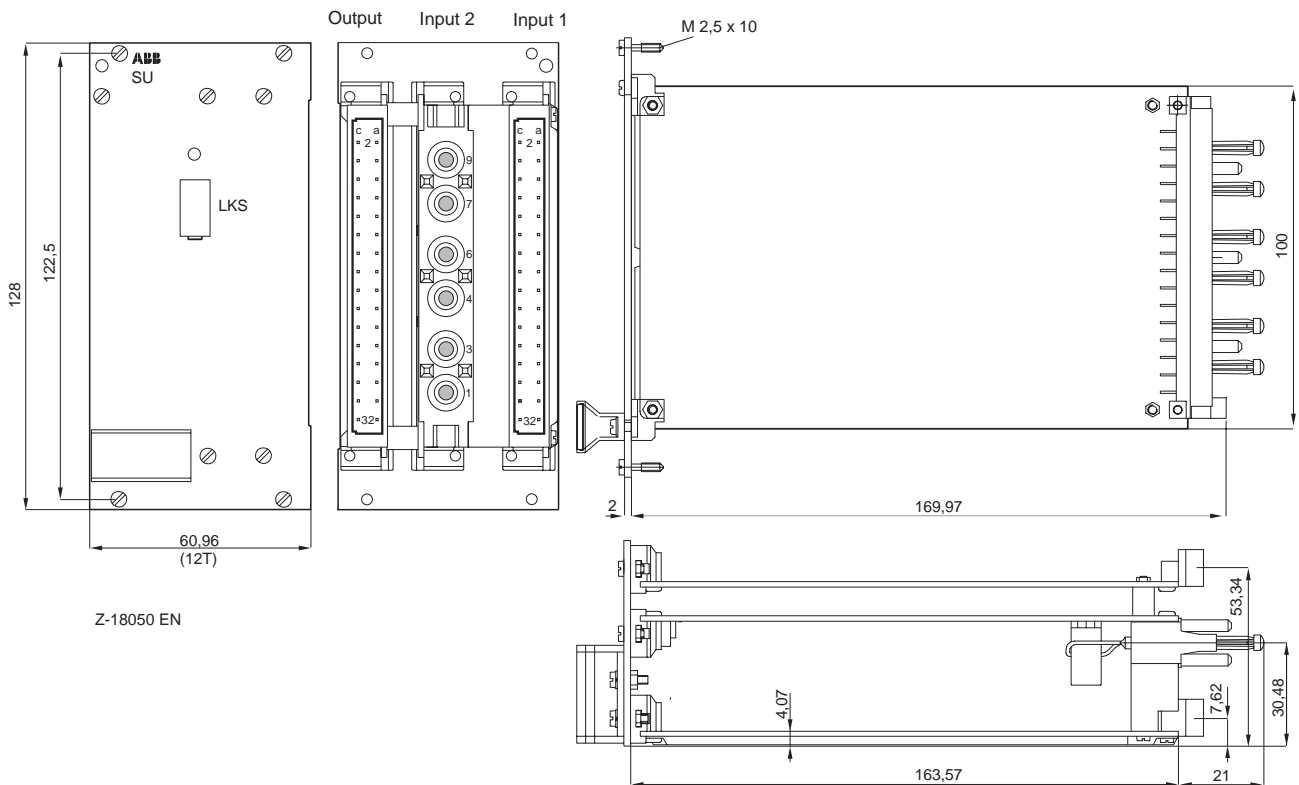
Connection diagram for 19" plug-in card



Connection	Terminal
RS 485 interface (optionally)	a32/c32 RXD/TXD A+ a30/c30 RXD/TXD B- a28/c28 GND
Analog output 1	+: a24/c24 -: a22/c22
Analog output 2	+: a18/c18 -: a16/c16
Analog output 3	+: a12/c12 -: a10/c10
Binary output	+: a4/c4 -: a2/c2
Input current	1/3, 4/6, 7/9
Input voltage	c16/c10/c4/c22
Power supply	c28/a30

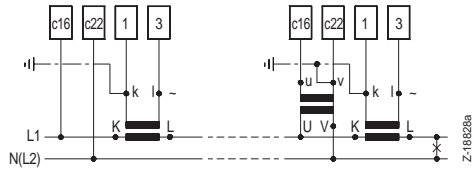
Z-18849

Dimensional drawings for 19" plug-in card (dimensions in mm)

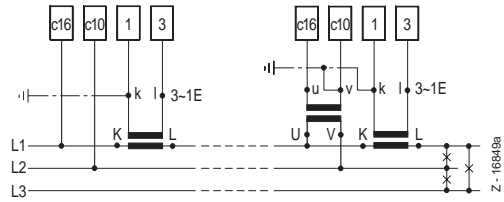


Connection diagrams for 19" plug-in card

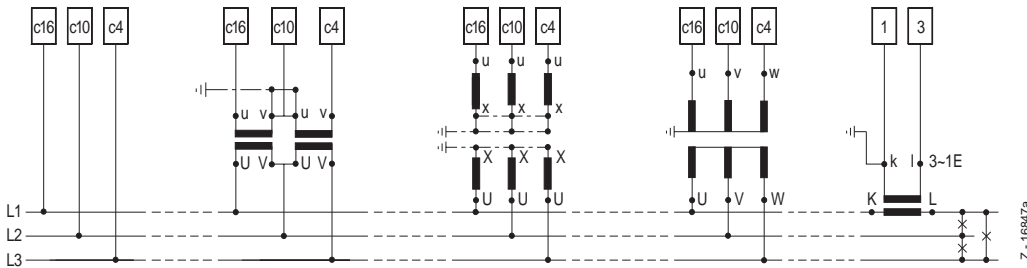
Single-phase alternating current



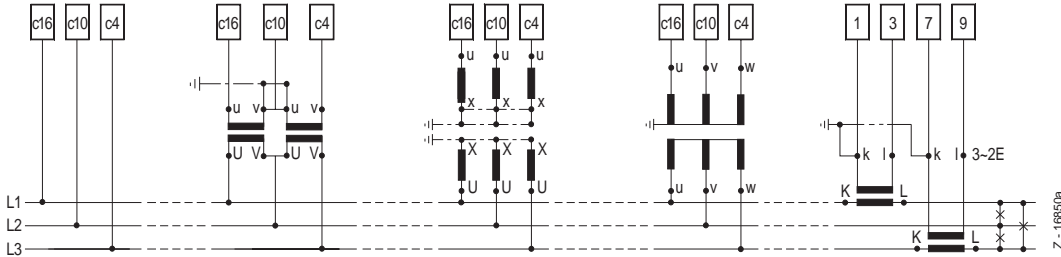
3-wire three-phase balanced load with simulated phase



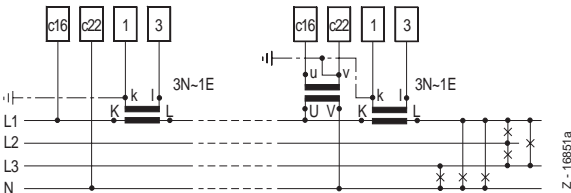
3-wire three-phase balanced load



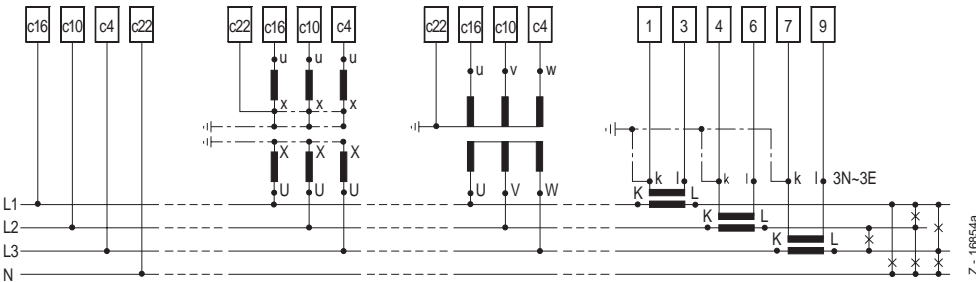
3-wire three-phase unbalanced load



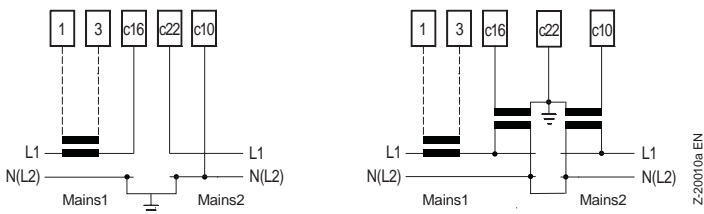
4-wire three-phase balanced load



4-wire three-phase unbalanced load



Synchronization of two mains





www.abb.com

ABB Ltd.

Howard Road, St. Neots
Cambridgeshire, PE19 8EU
UK

Tel: +44 (0)1480 475321
Fax: +44 (0)1480 217948

ABB Inc.

125 E. County Line Road
Warminster, PA 18974
USA

Tel: +1 215 674 6000
Fax: +1 215 674 7183

ABB Automation Products GmbH

Hoeseler Platz 2
42579 Heiligenhaus,
Germany

Tel: +49 2056 12-5181
Fax: +49 2056 12-5081

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