

The Simplatron-460-range of controllers comprises 7 circulating current modules with powers between 0,6 kW and 22 kW. The types 466 and 467 are 6-pulse devices with three-phase mains connection. The circulating current 4-quadrant controllers enable continuous direction and torque reversal.

I. Special features of the Range of Controllers

- Fuse protection against mains short circuit, earth fault, reversal of polarity.
- The phase sequence of the mains connection is unimportant.
- Field rectifier fitted, field fuse surveillance
- Operation with tachometer or with armature voltage feedback and $I \times R$ compensation.
- High dynamic control due to 6-pulse three phase current thyristor bridges.
- Better dynamics in the case of discontinuous current due to current control adaption.
- Built-in synchronization filter for operation with highly fluctuating mains supply.
- Self synchronization of the phase shifter at $50 \div 60$ Hz mains supply.
- Pulse series control in the power section.
- Free adaptable inputs and outputs carried outside on additional terminals enable applications free of problems.
- Fuse- and temperature surveillance with transistor output.
- Standstill indicator with transistor output.

II. Technical data

Type	466	467	Type	466	467
Output power	15kW	22kW	reference value potentiometer	$R_1 = 10k\Omega / 1 \text{ W Lin}$	
armature current	38 A	55 A	max. speed	$n_{\max} = 1 \div 0,75 n_N$	
cyclic current	app.3A	app.4,2A	armature current limit	$ I_A = 0 \div 38A \quad 0 \div 55 A$	
mains current	3x34A	3x50A	Nom. Tacho voltage	$ U_{TN} = 10 \div 180 \text{ V}$	
mains voltage L1, L2, L3	340÷460V	50÷60Hz	Nom. Master Voltage	$ U_{LN} = 10 \div 180 \text{ V}$	
mains voltage L1, N	190÷265V	50÷60Hz	Dimensions	345 x 340 x 195 mm	
armature voltage	$U_A = 400 \text{ V}$		packed weight	14,1 kg	
field voltage	$U_F = 0,9 \times U_{L1,1,N}$		art.-No.	310 421	310 422
field current	$I_F = 6,0 \text{ A}$				

Fuses

Unit	Power Board F1,F2,F3	Field F4	Electronics F5,F6,F7	Armature circuit F8	Fuseholder
466	58 x 22 FF40A/600V art.No. 307175	32x6,3 FF16A/ 500V art.No. 305725	25x5 F1A/450V art.No. 307290	58 x 22 FF50A/600V art.No. 307173	art.-No. 308291
467	58 x 22 FF63A/600V art.No. 305239	32x6,3 FF16A/500 V art.No. 305725	25x5 F1A/450V art.No. 307290	58x22 FF80A/600V art.No. 307174	art.-No. 308 291

III. Scope of supply of the Chassis units

Unit with built-in fuses F1-F7 and reference value potentiometer 10 kOhm.
The following should be ordered separately: mains choke, 4 circulating current chokes, armature circuit fuse, fuse holder, knob and scale for reference value potentiometer.

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Bearb. DRAWN EK25/GK 27.5.81

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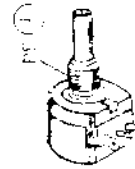
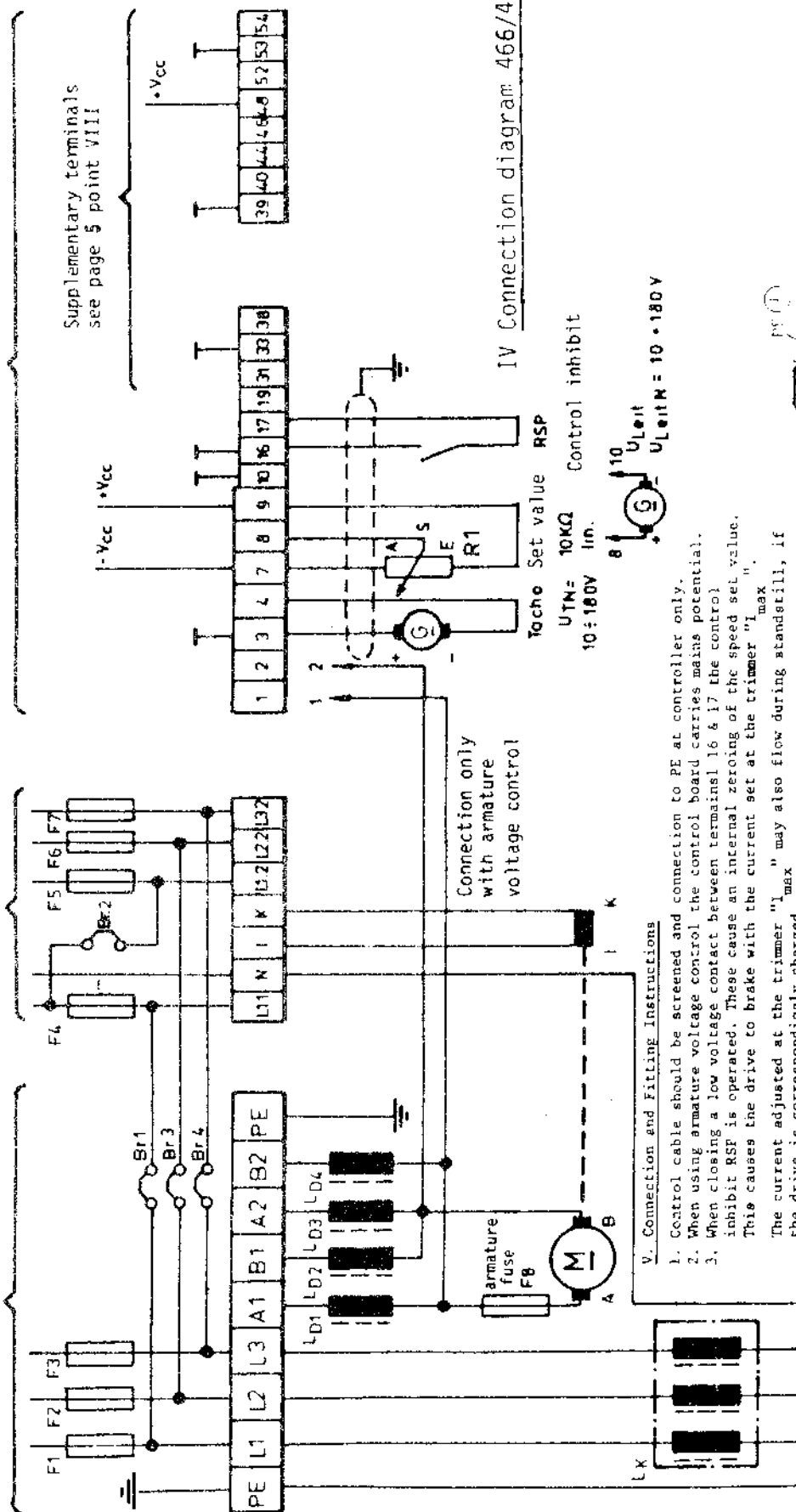
Lenze GmbH & Co KG Aerzen, 3250 Hameln

Zeichnungs-Nr Drawing-No
MB 33.0629 e Bl. 2 GB

Control board 4061

Control board 4065

Heat Sink



Connect mechanical screw fixation
of potentiometer with PE

V. Connection and Fitting Instructions

1. Control cable should be screened and connection to PE at controller only.
2. When using armature voltage control the control board carries mains potential.
3. When closing a low voltage contact between terminals 16 & 17 the control inhibit RSP is operated. These cause an internal zeroing of the speed set value. This causes the drive to brake with the current set at the trimmer "I₁"^{max}. The current adjusted at the trimmer "I₁"^{max} may also flow during standstill, if the drive is correspondingly charged. (Pay attention to thermal limits of motor, possibly reduce motor current or set on zero).
4. Before the mains is switched off the drive must have come to standstill by operating the control inhibit. At first operate RSP. Wait until the drive stands still. Thereafter switch off mains. Automatic mains switch-off see paragraph 8. After descent of the mains contactor this one may only be switched on again after a delay time of 1.2 s.
5. Mount the controller in such a way that the terminal block points downwards.
6. If mains- or field voltage deviate see page 5 VII.
7. Zero speed is achieved when the speed set value potentiometer is in a mean position (potentiometer "neutral"). If only one motor direction (clockwise) is needed, then the connection "a" of the set value potentiometer has to be detached from terminal 7 and put on to terminal 10. Zero speed is then achieved at counter clockwise position of the set value potentiometer.
8. Attention: Do not operate controllers with open armature circuit. If motor is not connected fuses may fail, as circular current chokes can not take-up the resulting voltage-time surfaces.

VI Setting instructions

1. Trimmers "IxR", "Vp", " $U_{Leit\ grob}$ ", " n_{max} " to be fully anti-clockwise.
Trimmer " $U_{Leit\ fein}$ " in mean position. Operate control inhibit.

2. Set value adjustment

Set value potentiometer to be fully clockwise or adjust master voltage on nominal value. Switch on mains.
Connect measuring instrument at terminal 1o (-) and measuring point M1(+) on the board 4o61. Trimmer " $U_{Leit\ grob}$ " to be turned clockwise until 1o V are attained.
(Use measuring instrument with $R_i \geq 100\ k\Omega$) Switch RSP, Switch off mains.

3. Setting of the current limit

This is only necessary when the motor current is smaller than the controller nominal current. In this case, act as follows: Trimmer " I_{max} " fully anticlockwise. Connect moving coil ammeter for current measurement into the armature circuit, observing polarity.
With positive set value the motor terminal "A" (+) is positive and motor terminal "B" (-) is negative
With negative set value the motor terminal "A" is negative and motor terminal "B" is positive.
Stall the motor armature or disconnect the field with the controller switched off. With armature voltage control disconnect the wire from terminal 1. Switch on mains. LED's marked "+Vcc" and "RSP" now light up. Open control inhibit. LED "RSP" now goes out. Turn speed set value potentiometer fully clockwise or master voltage to nominal value. LED " I_{max} " now lights up. Trimmer " I_{max} " to be turned clockwise until the desired armature current flows. The maximum controller output current must not be exceeded.
466 $I_{max} = 38\ A$ 467 $I_{max} = 55\ A$ Switch control inhibit. Switch off mains. Reconnect field. With armature voltage control, reconnect wire to terminal 1.

4. Setting of Upper Speed " n_{max} "

Moving coil instrument to be connected as a voltmeter to terminals A and B of the motor. For speed setting it must be observed that the armature voltage must not exceed the permissible value of $U_{Amax} = 400\ V$.

Set the speed potentiometer fully clockwise or master voltage at nominal value. Switch on mains and open control inhibit. By turning the trimmer " n_{max} " bring speed approximately on desired nominal value. Effect precise adjustment of upper speed at trimmer " $U_{Leit\ fein}$ ". Attention! The armature voltage must not exceed $U_{Amax} = 400\ V$.

As the controller response "Vp" is not yet adjusted, the drive may oscillate slightly; if necessary turn trimmer "Vp" somewhat clockwise.

5. Trimmer " n_{offs} "

The offset of the speed controller is set by the works, but should a correction be necessary then with a set value of 0 volts the zero point can be corrected with the trimmer " n_{offs} ".

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6. Control dynamics and I x R compensation

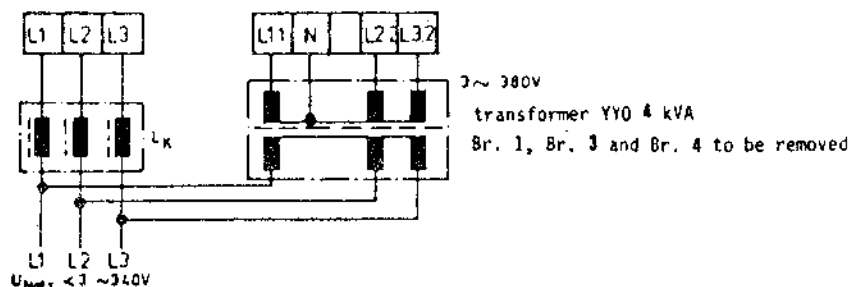
Only adjust trimmer "IxR" when using U_A - control. When using tacho feedback the I x R trimmer must be turned anti-clockwise. The values in the following table are approximate values and must be checked after the setting in the complete speed range and if necessary be corrected.

Trimmer	setting to	
	high control accuracy	high control dynamics
Vp	Trimmer to be turned clockwise until drive becomes unstable Thereafter turn Vp back by about 15% 	Thereafter turn Vp back by about 5%. 
IxR	Trimmer to be turned until the smallest possible speed loss occurs with load change.	IxR-influence to be kept as low as possible.

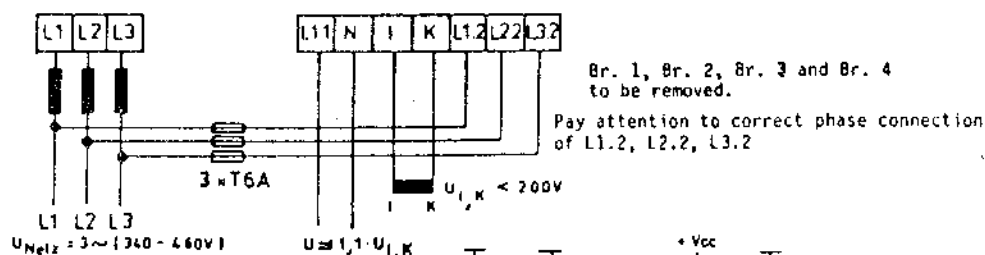
VII Additional terminals power electronics

L1.1 L1.2 L2.2 L3.2

If only a voltage smaller than 3×340 V is available for unit connection, then the terminals L1.1, L2.2 and L3.2 should be connected via an external transformer $U = 3 \times 380$ V. Note: phase correct connection must be observed. Faulty connection leads to fuse failure. The wire bridges 1, 3 and 4 on the control board 4o65 should be removed.



If a voltage smaller than 200 V = is required for field supply, or if no chargeable neutral is available, remove the wire bridges 1,2,3 and 4 on the board 4o65. The voltage for the field supply is then fed into the terminals L1.1 and N. However, the field fuse surveillance no longer functions.



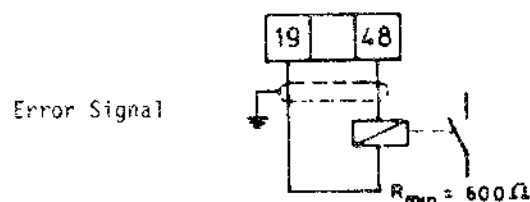
VIII Additional terminals for the control electronics

19 31 33 38 39 40 44 46 48 52 53 54

19 Transistor output error signal.

The temperature of the semi-conductors is supervised by a temperature sensor. If the cooling block exceeds the temperature limit $\bar{U} = 90$ deg. C, then the control inhibit RSP is operated and the current pulses are shifted into the inverter end position i.e. the motor becomes without current and stops. An electrical latch prevents the controller restarting on it's own after cooling down. (this latch can only be removed by disconnecting and reconnecting the mains). Terminal 19 goes to zero volts when the over

temperature latch operates. The output is loadable maximum with $R_{min} = 600 \text{ Ohm}$ and can be used for the direct connection of a relay.



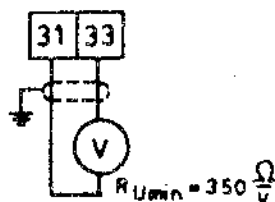
E.g. Relay REL/TRP-15
art.-No. 321 351

With applications where the motor must not automatically become free of current when the cooling temperature exceeds the limit, then the resistance R 415 (on solder points) has to be removed. In this case when the controllers show an excess temperature only an error signal is supplied.

Caution: The error cause has to be removed quickly otherwise the safety of the controller is no longer ensured.

31 Output armature current former

The output terminal 31 supplies a direct image of the armature current. ($U_{31} = 10 \text{ V}$) corresponds to the nominal current of the unit. This output forms the armature current actual value for a current ratio control or be used for the direct indication of the current by using a measuring instrument. This terminal 31 may be loaded with maximum 3 mA.



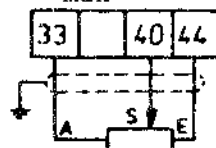
33 GND 0 V

38 Freely usable speed controller Input

Terminal 38 ($R_i \approx 50 \text{ kOhm}$) leads to the summation point of the speed controller. The permissible input voltage range lies between $+10 \text{ V}$ and -10 V . When operating the control inhibit the input is switched to zero. In this case $R_i \approx 25 \text{ kOhm}$. In the case of positive set value or positive master voltage and negative feedback value the positive armature voltage adjusts at connection A.

40 Input for current controller $R_i \approx 10 \text{ kOhm}$.

44 Output speed controller $R_i \approx 200 \text{ Ohm}$. The terminals 40 and 44 are internally connected by a resistance $R_{602} = 100 \text{ Ohm}$ (on solder points). With current ratio control or when fitting an external current potentiometer to terminals this resistance has to be removed. The desired maximum armature current is set on the integral trimmer " I_{max} " with the external set current potentiometer turned up.



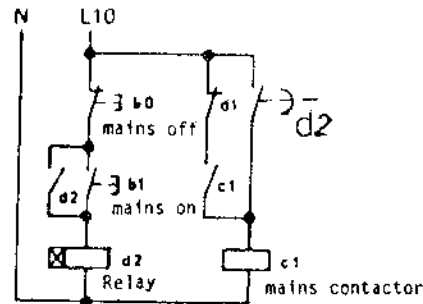
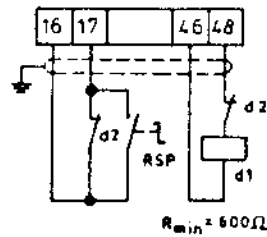
Current set value, R_{602} to be removed. $10 \text{ K}/1 \text{ W}$ linear

46 Output standstill logic

The transistor output terminal 46 switches to 0 volts when the speed is below $n_{max}/50$. This output can be used for an automatic mains switch off.

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E.g. Relay d₁
REL/TRP-15
art.-No. 321 351

[48] $+V_{cc} = 15 \text{ V}$ stabilised. $+V_{cc}$ is externally loadable up to max. 50 mA.

[52] Input bridge current controller 1, $R_i = 40 \text{ k}\Omega$

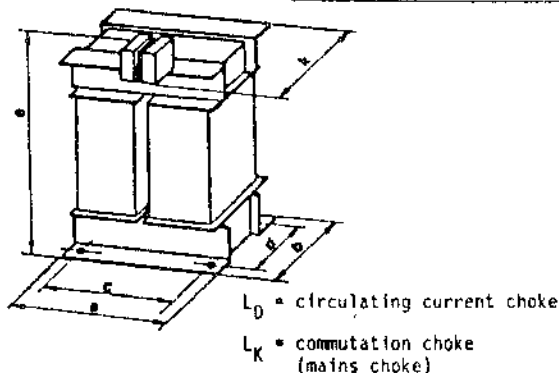
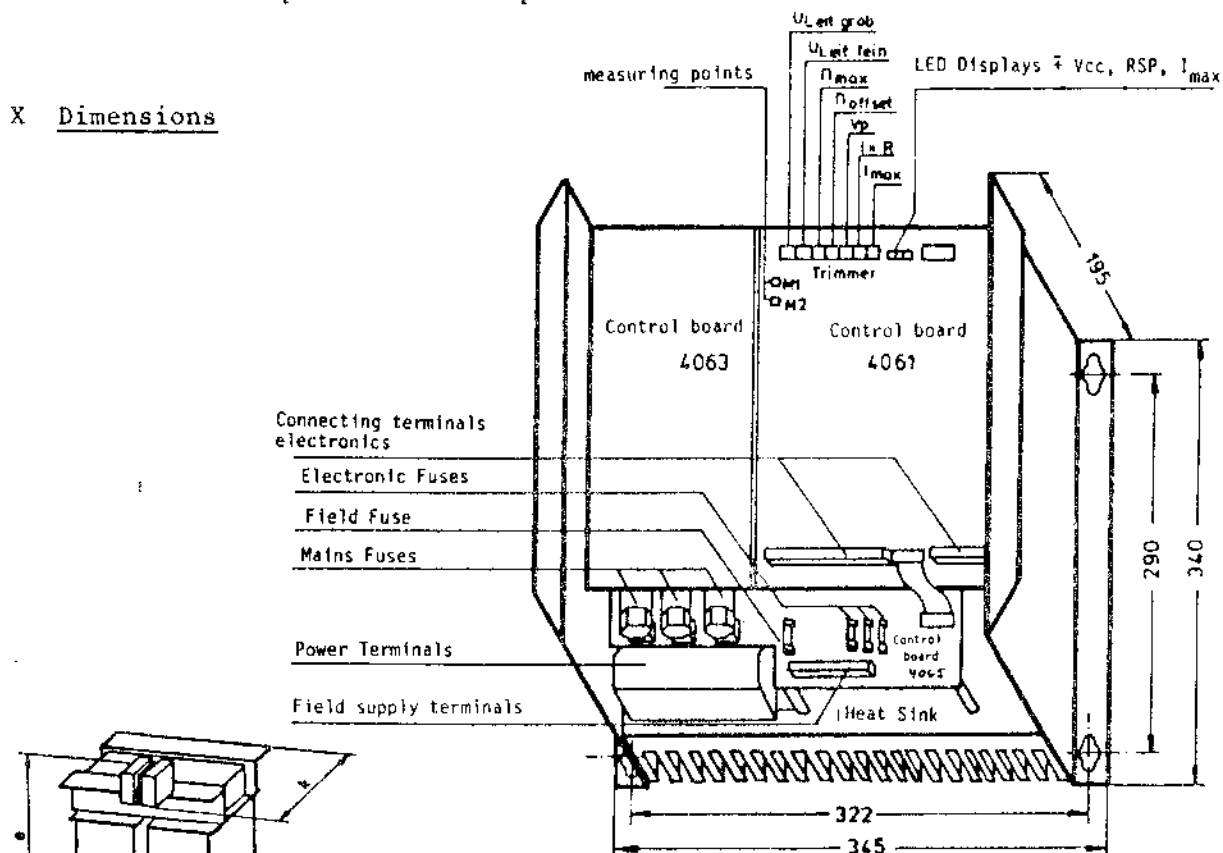
[53] GND 0 Volts

[54] Input bridge current controller 2, $R_i = 40 \text{ k}\Omega$

IX Additional control points (on the board 4061)

- C 401 Integral component of the speed controller
C 302, R 303 Speed actual value difference (D-component)
R 422 Using here a 100 k Ω resistance and operating RSP the integral component of the speed controller is blocked.

X Dimensions



Mains and Circular Current Chokes

Type		Art.No.	L(mH)	I(A)	mm a	mm b	mm c	mm d	mm e	mm k
466	L_D	310 416	16/4	5/42	176	102	150	75	280	110
467	L_D	310 417	11/2,8	6/60	176	128	150	100	280	140
466	L_K	307 343	3x0,75	3x45	180	90	162	72	210	130
467	L_K	307 344	3x0,55	3x55	230	83	208	66	270	110

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