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POWER-SUPPLIES FROM MILLIWATTS TO KILOWATTS
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Switching Mode Power Supply
for Magnetron use

SNT-MW-1000-2

SNT-MW-1000-2 Power-Supply for 1000 W magnetron
Magnetron-Type: 1 kW, 2 kW

SNT-MW-1000-3

SNT-MW-1000-3 Power-Supply for 1000 W magnetron
Magnetron-Type: 1 kW, 3 kW

Large FAN
120 x 120 x 44 mm

TECHNICAL DATA

Small FAN
92 x 92 x 30 mm

Attention: **-- Microwaves and High-Voltage are dangerous --**

Very important to avoid any injury :
Use INTERLOCK -Switch(es) to prevent any microwave output, if microwave-system is not complete closed.
Responsible for the correct interruption of the microwave energy production is the constructor of the complete microwave-system.

1 General Description

SNT-MW-1000-2 is a small switching magnetron power supply

… to connect to a **1.0 kW Magnetron** (2M247 or NL10305) …or …
… to connect to a **2.0 kW Magnetron** (2M259 or NL10250) together with **2nd SNT-MW-1000-2**

… to produce **High-Ripple** MicroWave HF-Power (if 50 Hz main-frequency: High-Ripple with 100 Hz)
… to produce **Lower-Ripple** MicroWave HF-Power in 2.0 kW usage (2nd SNT-MW-1000-2 **on other 230V phase**)

… needs **AC 230V~** and aux-voltage **DC 24V=**
… cooled by air (fan)

SNT-MW-1000-3 is a small switching magnetron power supply

… to connect to a **1.0 kW Magnetron** (2M247 or NL10305) … or …
… to connect to a **3.0 kW Magnetron** (2M265) together with **2nd and 3rd SNT-MW-1000-3**

… to produce **High-Ripple** MicroWave HF-Power (if 50 Hz main-frequency: High-Ripple with 100 Hz)
… to produce **Lower-Ripple** MicroWave HF-Power in 2.0 kW usage (all SNT-MW-1000-3 on separate **230V phase**)

… needs **AC 230V~** and aux-voltage **DC 24V=**
… cooled by air (fan)

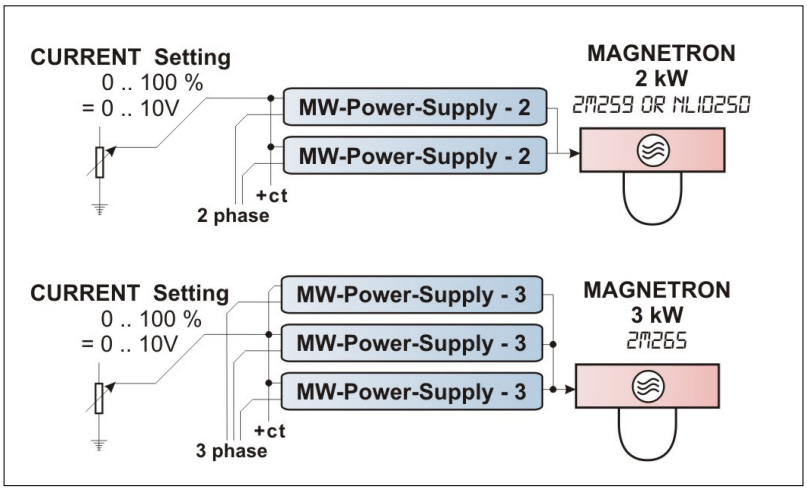
SNT-MW-1000-2/-3 power supply properties:

– controlled over 10 signal-lines like INTERLOCK, MW ON/OFF, POWER 0 % .. 100 % (0 V... 10 V) etc.
– produce in combination with a **magnetron** a Micro-Wave-Power up to 1000 Watt.
– The output power for a 50 Hz surge corresponds with a 100 Hz modulated half wave.
– Increasing Output-Power: combined output could produce up to 3.0 kW MicroWave HF-power

SNT-MW-1000-2/-3 power supply observation and security properties

– recognizes too small or too big Output-Voltage
– recognizes too small or too big Output-Current
– observes Temperature
– detects Short- and Open-Circuit on Output
– observes Internal-Voltage of-Power-Supply

Increasing Output - Power



The combination of separate units to supply one magnetron makes it possible to build a system with larger output power and smaller output ripple (only for 3 kW System).

Because of current regulation, the output currents can be added to one load.

2 Technical Data

Input Voltage.....	200 – 265 Vac, 47 – 63 Hz, 1 phase
Input current.....	< 7 A rms @ 230 Vac @ full load
Harmonic Distortion.....	Meets EN 61000-3-2 for class A
Power Factor.....	cos ϕ > 0,98 @ load from 5% to 100% of full load
Transient overvoltage.....	Meets EN 61000-4-4 for class B
EMI Filtering.....	Meets EN 55022 for class B
Input Protection.....	AC line fuse: F 8 A, 250 Vac, 5x20 mm, IEC 60127-2-2
Output Power.....	1.450 W
Output current.....	36 mA . . . 365 mA (SNT-MW-1000-2), output current regulation 33 mA . . . 330 mA (SNT-MW-1000-3), output current regulation
Output current ripple.....	100 %
Output polarity.....	– 4000 V to – 4500 V (SNT-MW-1000-2), negative in respect to ground potential – 4500 V to – 5100 V (SNT-MW-1000-3), negative in respect to ground potential
Suggested Magnetron Type.....	Waveguide R26 / WR340 **2M247 or NL10305 (1 kW), 2M259 or NL10250 (2 kW) (SNT-MW-1000-2)** **2M247 or NL10305 (1 kW), 2M265 (3 kW) (SNT-MW-1000-3)**
Preheating Time.....	Magnetron heating not included
Auxiliary Power.....	24 Vdc, 0.3 A Supply for logic and 92 mm fan (0.5A with 120 mm fan)
Output current signal.....	0V…10V (R_i = 1 KOhm) for load current 0%...100%
Output voltage signal.....	optional

CONTROL – Signals

INTERLOCK.....	OPENED / CLOSED	(0V / 24V)
MW.....	OFF / ON	(0V / 5V....24V)
I_variable	0 % - 100 % (POWER)	(0V .....10V) Do not switch directly in one step from 0 V to 10 V
	I_variable ... equates to.. HF-POWER	If needed extreme fast: 1st step: 1.0 V 2nd step: 10.0 V

ERROR – Signals

ERROR.....	NO ERROR / ERROR	(0V / 5V....24V)
ERROR-LED.....	ERROR	→ blinking fast, then ERROR-Number times slow
	NO ERROR	→ blinking equally slow

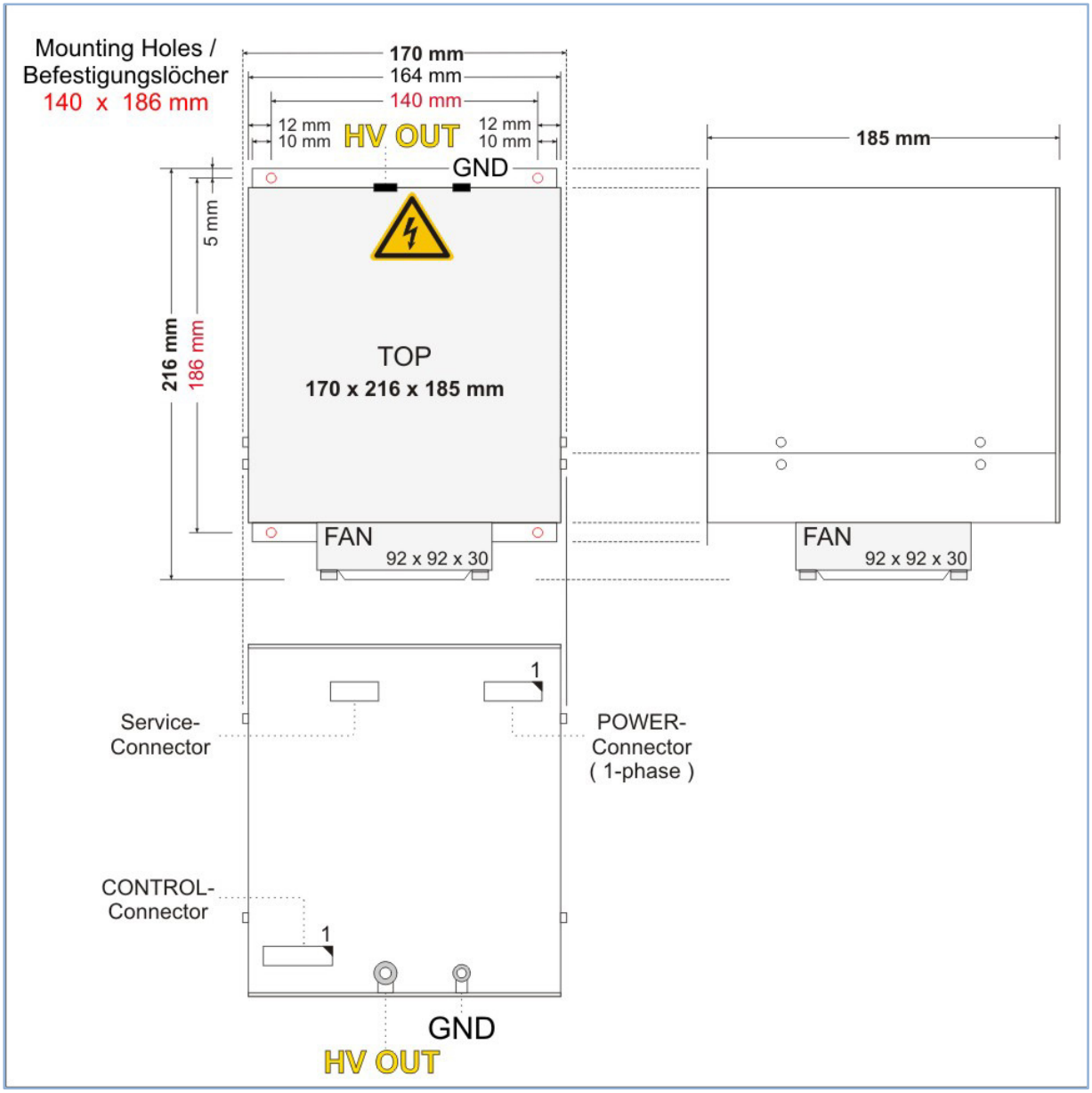
3 Environment Conditions

USE	INDOOR USE only
Temperature	10° C to 40° C

4 Mechanical Data

4.1 Mechanical Data ... with FAN-92

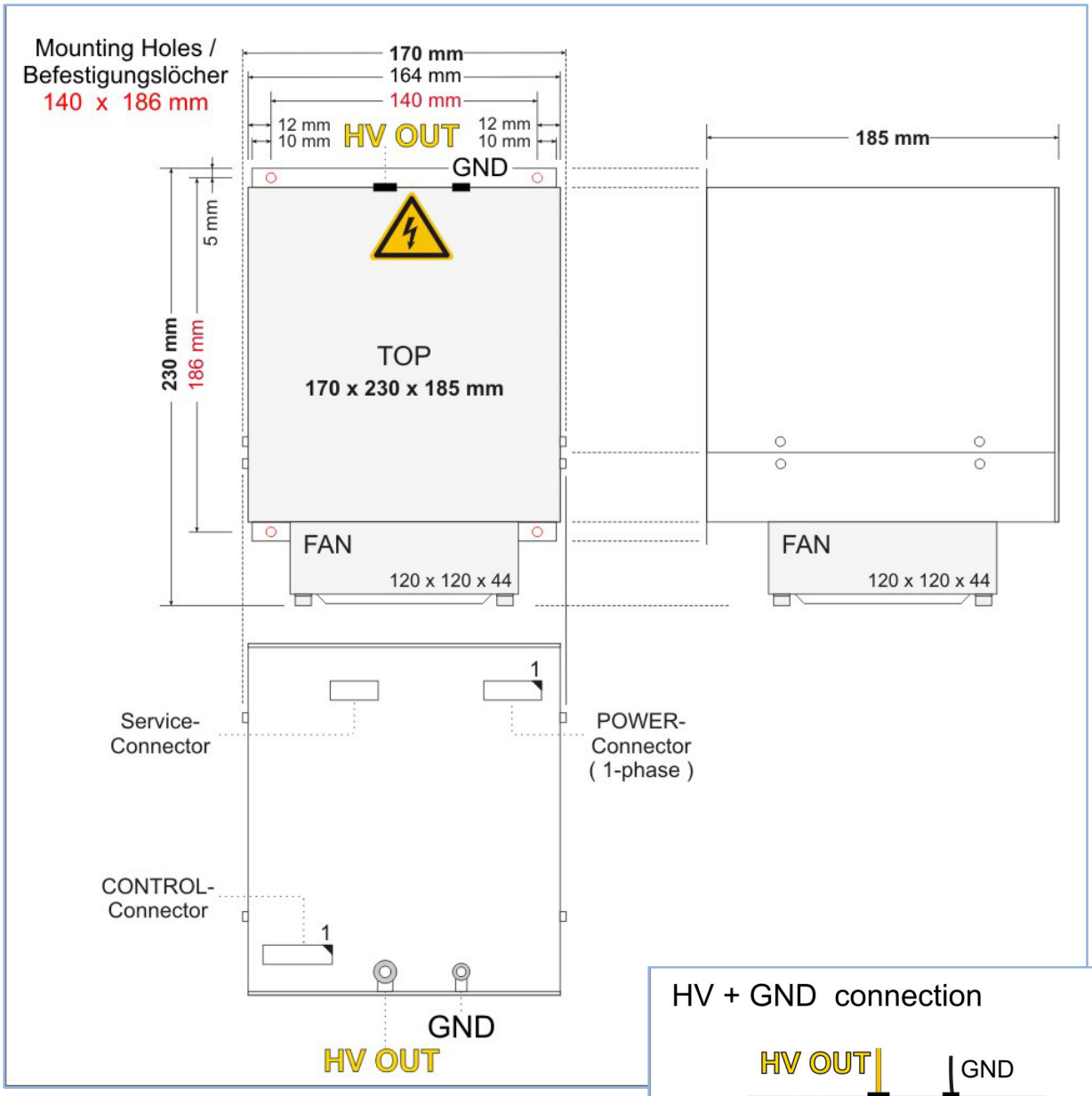
Dimensions L x W x H (Length x Width x Height)	170 x **216** x 185 mm
Mounting Holes	140 x 186 mm
Weight	approx. 2,8 kg

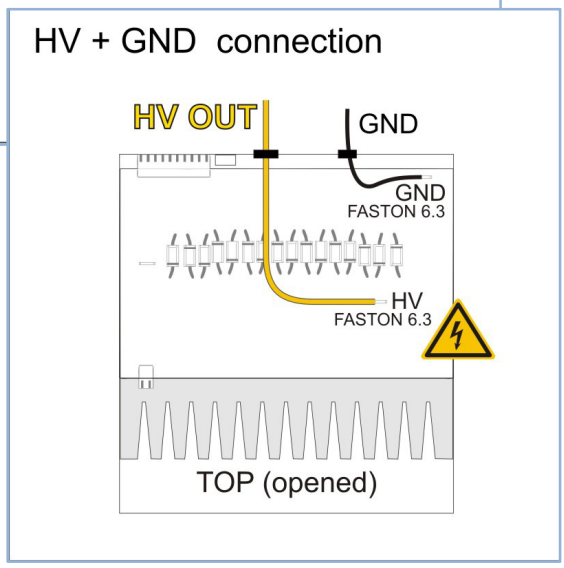


Connection of HV- and GND- cable (6.3 mm FASTON): ... look next page.

4.2 Mechanical Data ... with FAN-120

Dimensions L x W x H (Length x Width x Height)	170 x **230** x 185 mm
Mounting Holes	140 x 186 mm
Weight	approx. 2,8 kg



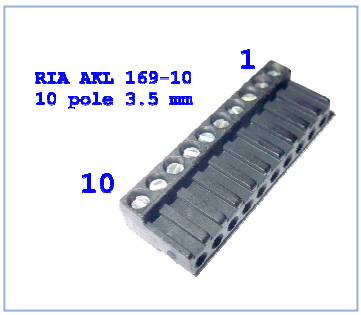


Connection of HV- and GND- cable (6.3 mm FASTON):

5 *Electrical Connections*

Needed Cable-Connectors (included in delivery of new device):

1. CONTROL Connector RIA connector: AKL 169-10 (10 pole, 3.5 mm grid)



Pin 9 **24V DC/0.5A** Aux-Volt. INPUT – Voltage
Pin 2 **GND**
Pin 10 **GND**

Pin 6 **INTERLOCK – 24V** INPUT of Interlock-Security-Switches
Pin 7 **MW-ON** INPUT to switch microwave-power on/off

Pin 1 $I_{variable}$ **POWER-Set** INPUT analog-value for wanted MW-POWER
Pin 5 $I_{a\_measure}$ **Anode Current** OUTPUT analog-value of output current
Pin 8 $U_{a\_measure}$ **Anode Voltage** OUTPUT analog-value of output voltage

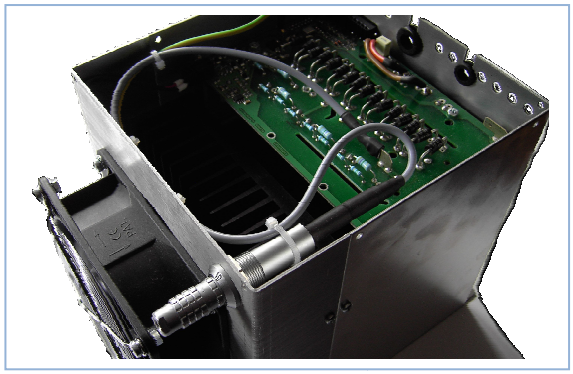
Pin 3 **ERROR** OUTPUT ERROR-Pin (ERR= hi, NO_ERR= lo)
Pin 4 **ERR_LED** OUTPUT ERROR-Nr (look Error-section)

2. POWER Connector RIA connector: AKl 349-05 (5 pole, 5.0 mm grid)

230 V~ / 50 Hz Mains-Voltage

3. HV Connector

FAST-On – connector
optional: LEMO connector:
FFA.1Y.410.CLAC47



1. CONTROL Connector: Pinning 10 pole (3,5 mm grid):

Pin	Name	Definition	Description
1	**I_variable**	0 V... +10 V POWER-Setting	
2	**GND**	– Ground –	
3	**ERROR**	Error, 6 mA for LED or err-interpretiation Error-Nr-Detection with ERR_LED-Signal	Connect and LED-cathode to GND, LED-anode to ERROR
4	**ERR_LED**	Periodic-blink = normal operation fast/slow-blink = count slow-blink-times >> look at Error	connect and LED-cathode to GND, LED-anode to ERR_LED
5	**Ia_Measure_Out**	Ia = Anode current 0 ... +10V (0 .. 100 %), Ri= 1kOhm	
6	**+24V_I_Lock**	INTERLOCK – connection	Area: +24V
7	**MW-ON**	Microwave ON/OFF	Area: +5V ... +24V
8	**Ua_Measure_Out**	0V ... +10V, Ri= 1kOhm	optional
9	**+24V/0.5A**	0.5 A (120 mm fan)	
10	**GND**	– Ground –	

2. POWER Connector: Pinning 5 pole (5,0 mm grid) POWER 230V~ ± 10%, L,N,PE

Pin	Name	Definition
1	**L**	230V eff / 9A
2		
3	**N**	230V eff / 9A
4		
5	**PE**	protective earth conductor

3. Connector High-Voltage (Faston-Conn.): HV for -4500 V and Ground

6 Error Code

ERROR-Code on ERR_LED, countable LED-blinking and OUTPUT over serial UART-Interface
ERROR-Pin-Timing described on following page (chapter 7)

ERR – Name	Nr	Definition	Description
ERR_ILOCK	2	Interlock-error, U_ilock < 2V with MW_on	Interlock not or wrong used
ERR_IVAR_IN_2_BIG	3	I_SETPOINT[2] >= 10,22 V	"I_SETPOINT" from user too big
ERR_IACT_2_SMALL	4	(I_ACT[1] + I_delta_plus) < I_SETPOINT[2]	I_ACT too small/big could be: - too fast change of I_SETPOINT
ERR_IACT_2_BIG	5	(I_ACT[1] - I_delta_minus) > I_SETPOINT[2]	
ERR_SHORT_CIRCUIT	6	(U_ACT[1] < U_magn_min) & (I_ACT[1] > (0,1*I_max[3]))	Short circuit on HV could be: - short-circuit on wiring - Magnetron defect - Heat transformer defect - HV-part from power-supply defect
ERR_UACT_2_SMALL	7	(U_ACT[1] < U_magn_min) & (I_ACT[1] <=(0,1*I_max[3]))	Reason of error could be: - Too fast switch MW-ON after switch AC-power ON - no phase power present - HV-part from power-supply not working
ERR_MAGN_NOT_HEAT	8	(U_ACT[1] > U_magn_max) & (I_ACT[1] < (0,03*I_max[3]))	Magn. NOT heated or NOT present
ERR_UACT_2_BIG	9	(U_ACT[1] > U_magn_max) & (I_ACT[1] >=(0,03*I_max[3]))	Magn. Voltage > 5,6 kV abs.val.
ERR_IACT_2_BIG	10	I_ACT[1] > 102,2 % (102,2% >= overflow)	I_ACT – Output Val. too big
ERR_TEMP0_2_SMALL	11	TEMP0 < 5° Celsius @ heat sink	5° C = TEMP0_MIN
ERR_TEMP0_2_BIG	12	TEMP0 > 45° Celsius @ heat sink	45° C = TEMP0_MAX
ERR_15V_2_SMALL	15	PLUS_15V < 14 V	15 V created from extern 24V/DC
ERR_15V_2_BIG	16	PLUS_15V > 16 V	- - - " - - -

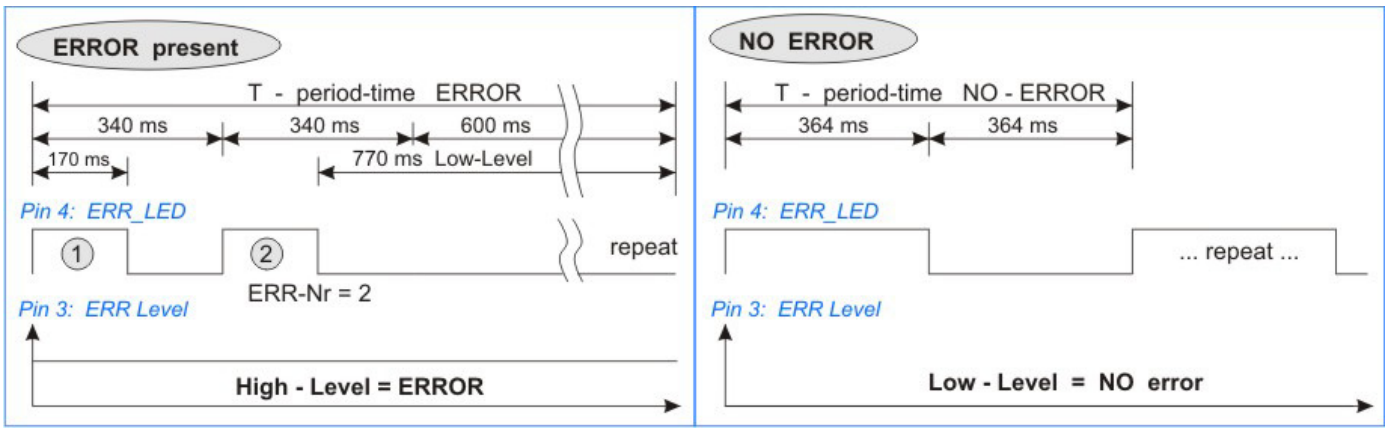
[1] **VAL_ACT_... = actual val** → value present at moment
[2] **VAL_SETPOINT_.. = setpoint val** → value wanted and given from user
[3] **I_max = 330 mA @ 1 kW Magnetron**
I_max = 365 mA @ 2 kW Magnetron
I_max = 280 mA @ 3 kW Magnetron

7 Error-Pin-Timing: ERR_LED (Pin 4) and ERROR (Pin 3)

NOTE: The described error-pin-timing is valid from Software-Ver 2.17 !

Status	Pin 3/ERR Level	Pin4/ERR_LED	Duration of …	
ERROR	high	toggle and pause	error-cycle	340 ms (170 ms high, 170 ms low-level)
			error-pause	600 ms
No-ERR-operation / Normal-mode	low	toggle	normal-cycle	728 ms (364 ms high, 364 ms low-level)

In the 'ERROR-present' figure is shown ERR-Nr 2 (ERR_ILOCK).
If a higher error-number occurred, the count of error-cycles is accordingly higher.



8 Application Sample: PLC-control of MW-Power-Supplies

Sample: In this sample ALL Power-Supplies are set to same POWER-OUT-value → look "set power" on next figures.