NIGOS
ELEKTRONIK - NIŠ

SUŠARE ZA DRVO
WOOD DRYERS

Firma **"NIGOS - elektronik"** je osnovana 1990. godine, a osnovna delatnost je proizvodnja merno-regulacione opreme i sušara.

Proizvodnjom opreme za sušare **"NIGOS - elektronik"** se bavi od 1995. godine. Od tada pa do današnjih dana proizveden je i montiran veliki broj automatskih sušara različitih tipova i kapaciteta. Uz opremu koja se isporučuje i montira na licu mesta dobija se i tehnologija sušenja, kao i garancija do dve godine na kompletnu sušaru, a više godina na pojedine delove.

Neprekidan rad na razvoju i usavršavanju opreme i procesa sušenja rezultirao je time da je danas **"NIGOS - elektronik"** vodeća firma u regionu u oblasti proizvodnje opreme za sušenje i termički tretman drveta (sterilizaciju). Mnogobrojna priznanja i nagrade, poslovanje po ISO9001:2008 standardu, usluga po meri svakog kupca, uspostavljanje i unapređenje dugoročnih partnerskih odnosa i najbitnije - zadovoljni kupci sušara, su najbolji dokaz kvaliteta proizvoda firme **"NIGOS - elektronik"**.

Company **"NIGOS - elektronik"** was founded in 1990, and produces measuring and control equipment and drying kilns.

In 1995 **"NIGOS - elektronik"** started producing drying kiln equipment. Since then **"NIGOS - elektronik"** has produced and assembled a large number of automatic kilns of various types and capacity. With kiln equipment delivered and assembled on location, customers also get technology of drying process, as well as up to two years warranty for entire dryer and several years for some parts of equipment.

Continuos work on development and improvement of equipment and wood drying process has led to the fact that **"NIGOS - elektronik"** is today a leading manufacturer of wood drying and thermal treatment (sterilization) equipment in region. Numerous prizes rewarded on fairs, production according to ISO9001:2008 quality standard, custom products, mutually beneficial relationship with all partners and most important - satisfied customers, are best proof of the quality of **"NIGOS - elektronik"** products.

Wood dryers

NIGOS ELEKTRONIK-NIŠ
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MC-411R / MC-904

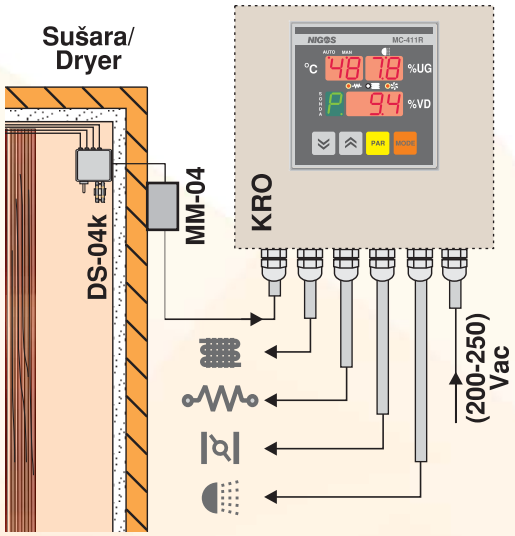
MC - 411R

- Automatsko ili poluautomatsko vođenje procesa sušenja u kondenzacionim i klasičnim sušarama malog kapaciteta sa ON/OFF regulacijom
- Za nisko-temperaturne režime (do 65 °C)
- Sušenje svih vrsta građe debljine 20 do 80 mm
- 60 osnovnih režima za sve vrste drveta koje korisnik može da menja i po potrebi vrati na fabričko podešenje
- 1 ulaz za merenje temperature (-20 ÷ 110 °C)
- 1 ulaz za merenje ravnotežne vlage (2.5 ÷ 30% EMC pri 0 °C)
- 4 mesta merenja vlage u drvetu (5 ÷ 80% MC pri 0 °C)
- 4 relejna izlaza za upravljanje opremom: grejanje, kondenzaciono sušenje, hlađenje / klasično sušenje i vlaženje
- Zaštita parametara pomoću šifre od neovlašćenog menjanja
- Nema start i stop funkciju (radi po uključenju i suši dok se ne isključi)
- Moguće je samo poluautomatsko kondicioniranje

MC - 411R

MC - 411R

- Automatic or semi-automatic control of drying process in small capacity dehumidifying and conventional dryers with ON/OFF control
- Used for low-temperature regimes (up to 65 °C)
- Drying of all wood types (thickness range 20 to 80 mm)
- 60 drying regimes for all wood species which the user can change and if necessary restore to default value
- 1 input for temperature measurement (-20 to 110 °C)
- 1 input for EMC measurement (2.5 to 30% EMC at 0 °C)
- 4 inputs for wood moisture measurement (5 to 80% MC at 0 °C)
- 4 relay outputs for equipment control: heating, dehumidifying drying, cooling / conventional drying and humidifying
- Code protection of parameters to prevent unauthorized changing
- No start/stop option (starts drying upon power connection and work until turned off)
- Only semi-automatic conditioning is available



MC - 904

- Automatsko, poluautomatsko ili ručno vođenje procesa sušenja u kondenzacionim i kombinovanim sušarama
- Sušenje svih vrsta građe debljine 20 do 80 mm
- 60 osnovnih režima za sve vrste drveta koje korisnik može da menja i po potrebi vrati na fabričko podešenje
- 1 ulaz za merenje temperature (-20 ÷ 110 °C)
- 1 ulaz za merenje ravnotežne vlage (2.5 ÷ 30% EMC pri 0 °C)
- 4 mesta merenja vlage u drvetu (5 ÷ 80% MC pri 0 °C)
- 1 kontrolni ulaz za merenje temperature (-25 ÷ 160 °C)
- 3 digitalna ulaza: dva za kontrolu rada toplotnih pumpi i jedan za kontrolu rada ventilatora
- 7 relejnih izlaza za upravljanje opremom: električno grejanje, vodeno grejanje, rad i promena smera ventilatora (2), sušenje, hlađenje i vlaženje
- Dva nivoa zaštite parametara od neovlašćenog menjanja
- Statistika o radu opreme tokom sušenja
- Arhiviranje podataka na svaka 3 sata
- Dva nivoa prijave neregularnih situacija (upozorenje i alarm)
- Mogućnost povezivanja na PC računar (EIA485 standard)

MC - 904

MC - 904

- Automatic, semi-automatic or manual control of drying process in dehumidifying and combined dryers
- Drying of all wood types (thickness range 20 to 80 mm)
- 60 drying regimes for all wood species which the user can change and if necessary restore to default value
- 1 input for temperature measurement (-20 ÷ 110 °C)
- 1 input for EMC measurement (2.5 ÷ 30% EMC at 0 °C)
- 4 inputs for MC measurement (5 ÷ 80% MC at 0 °C)
- 1 control input for temperature measurement (-25 ÷ 160 °C)
- 3 digital inputs: 2 for heat pumps and 1 for fans control
- 7 relay outputs for equipment control: electrical heating, water heating, fans operation and reversion (2), drying, cooling and humidifying
- Two levels of parameter protection against unauthorized parameter changing
- Statistics of equipment operation during drying
- Data recording every 3 hours
- Two levels of irregular situation notification (warning and alarm)
- Can be connected to PC using EIA485 communication standard

Green line

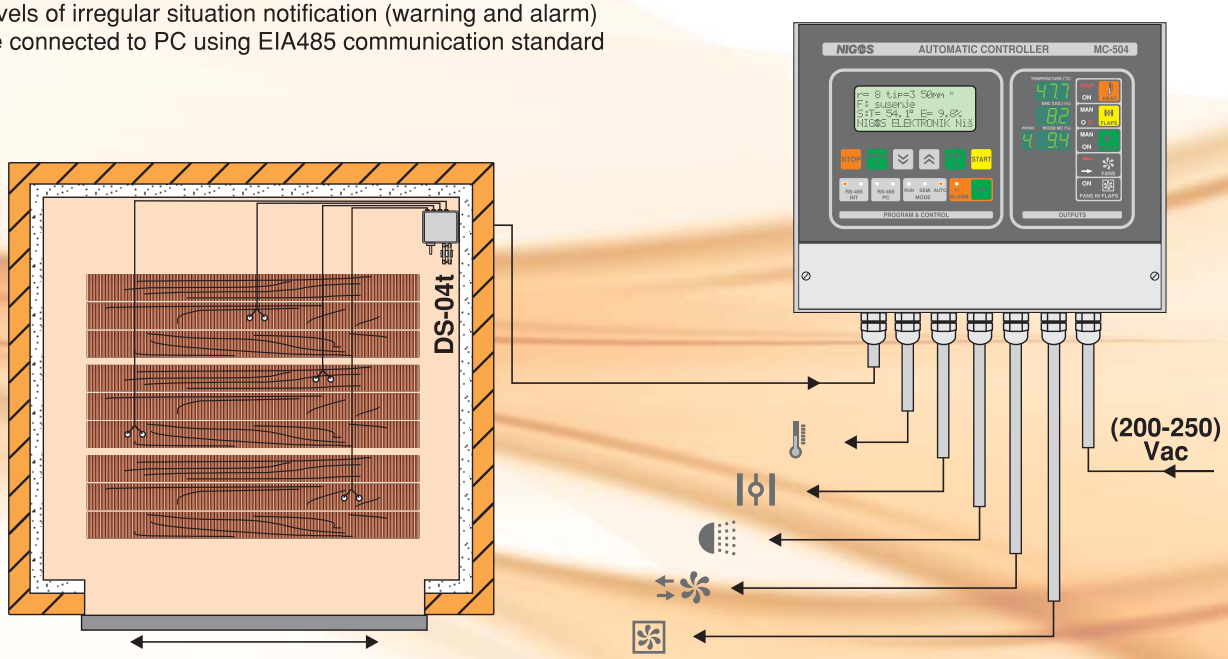
MC-504

MC - 504

- Automatsko, poluautomatsko ili ručno vođenje procesa sušenja u klasičnim sušarama sa PI i ON/OFF regulacijom
- Plastično kućište automata pogodno za montažu na zid
- Sušenje svih vrsta građe debljine 20 do 80 mm
- 60 osnovnih režima za sve vrste drveta koje korisnik može da menja i po potrebi vrati na fabričko podešenje
- 1 ulaz za merenje temperature (-20 ÷ 110 °C)
- 1 ulaz za merenje ravnotežne vlage (2.5 ÷ 30% EMC pri 0 °C)
- 4 mesta merenja vlage u drvetu (5 ÷ 80% MC pri 0 °C)
- 1 kontrolni ulaz za merenje temperature (-25 ÷ 160 °C)
- 3 digitalna ulaza: jedan za kontrolu rada ventilatora i dva rezervna
- 7 relejnih izlaza za upravljanje opremom: po jedan za regulaciju temperature, vlaženje i ventilatore u klapnama, i po dva za rad i promenu smera ventilatora i regulaciju vlage
- Dva nivoa zaštite parametara od neovlašćenog menjanja
- Dva nivoa prijave neregularnih situacija (upozorenje i alarm)
- Mogućnost povezivanja na PC računar (EIA485 standard)

MC - 504

- Automatic, semi-automatic or manual control of drying process in conventional dryers with PI and ON/OFF control
- Plastic case suitable for wall mounting
- Drying of all wood types (thickness range 20 to 80 mm)
- 60 drying regimes for all wood species which the user can change and if necessary restore to default value
- 1 input for temperature measurement (-20 ÷ 110 °C)
- 1 input for EMC measurement (2.5 ÷ 30% EMC at 0 °C)
- 4 inputs for MC measurement (5 ÷ 80% MC at 0 °C)
- 1 control input for temperature measurement (-25 ÷ 160 °C)
- 3 digital inputs: one for control of fans and two spare
- 7 relay outputs for equipment control: temperature control, humidifying, fans in flaps, fans operation and reversion (2) and humidity control (2)
- Two levels of parameter protection against unauthorized parameter changing
- Two levels of irregular situation notification (warning and alarm)
- Can be connected to PC using EIA485 communication standard



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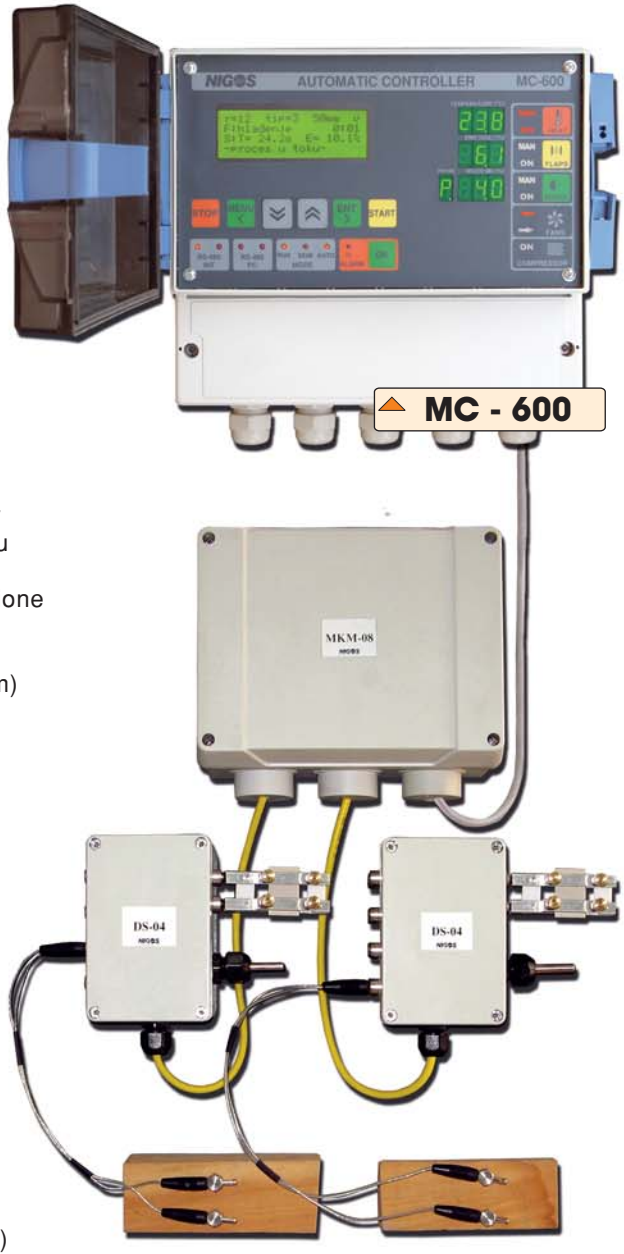
MC-600

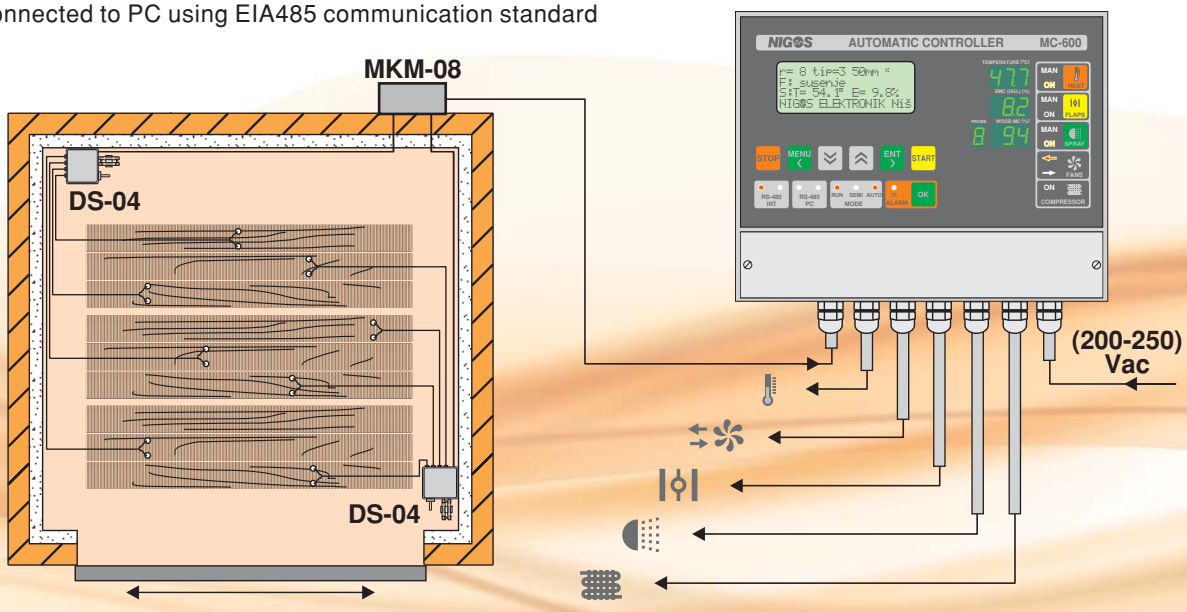
MC - 600

- Automatsko, poluautomatsko ili ručno vođenje procesa sušenja u klasičnim, kondenzacionim i kombinovanim sušarama sa ON/OFF regulacijom
- Plastično kućište automata pogodno za montažu na zid
- Sušenje svih vrsta građe debljine 20 do 80 mm
- Fiksni (fabrički) i promenljivi (korisnički) režimi sušenja za sve vrste drveta (preko 200 režima)
- 2 vremenska režima
- 2 ulaza za merenje temperature (-20 ÷ 110 °C)
- 2 ulaza za merenje ravnotežne vlage (2.5 ÷ 30% EMC pri 0 °C)
- 8 mesta merenja vlage u drvetu (5 ÷ 80% MC pri 0 °C)
- 1 kontrolni ulaz za merenje temperature (-25 ÷ 160 °C)
- 2 digitalna ulaza za kontrolu rada ventilatora i kompresora
- 6 relejnih izlaza za upravljanje opremom: dva za rad i smer ventilatora, i po jedan za regulaciju temperature, regulaciju vlage, vlaženje i kompresor
- Prijem podataka iz merne kutije MKM-08 preko komunikacione linije (do 300 m)
- Dva nivoa zaštite parametara od neovlašćenog menjanja
- Dva nivoa prijave neregularnih situacija (upozorenje i alarm)
- Zvučna i svetlosna indikacija alarma
- Moguće povezivanje na PC računar (EIA485 standard)



MC - 600

- Automatic, semi-automatic or manual control of drying process in conventional, dehumidifying and combined dryers with ON/OFF control
- Plastic case suitable for wall mounting
- Drying of all wood types (thickness range 20 to 80 mm)
- Invariable (default) and variable (user defined) drying regimes for all wood species (more than 200 regimes)
- 2 time-based regimes
- 2 inputs for temperature measurement (-20 ÷ 110 °C)
- 2 inputs for EMC measurement (2.5 ÷ 30% EMC at 0 °C)
- 8 inputs for MC measurement (5 ÷ 80% MC at 0 °C)
- 1 control input for temperature measurement (-25 ÷ 160 °C)
- 2 digital inputs for fans and compressor operation control
- 6 relay outputs for equipment control: fans operation and reversion (2), temperature control, humidity control, spraying and compressor
- Receives data from measurement box MKM-08 via communication line (up to 300 m)
- Code protection of parameters in two levels against unauthorized changing
- Two levels of irregular situation notification (warning and alarm)
- Light indication of temperature and humidity alarm
- Can be connected to PC using EIA485 communication standard



Green line

MC-2000

MC - 2000

MC - 2000

- Automatsko, poluautomatsko ili ručno vođenje procesa sušenja u klasičnim, kondenzacionim i kombinovanim sušarama sa PI i ON/OFF regulacijom
- Aluminijumsko kućište
- Sušenje svih vrsta građe debljine 20 do 80 mm
- Fiksni (fabrički) i promenljivi (korisnički) režimi sušenja za sve vrste drveta (preko 200 režima)
- 2 vremenska režima
- 2 ulaza za merenje temperature (-20 ÷ 110 °C)
- 2 ulaza za merenje ravnotežne vlage (2.5 ÷ 30% EMC pri 0 °C)
- 8 mesta merenja vlage u drvetu (5 ÷ 80% MC pri 0 °C)
- 1 kontrolni ulaz za merenje temperature (-25 ÷ 160 °C)
- 4 digitalna ulaza za kontrolu rada ventilatora i kompresora
- 9 relejnih izlaza za upravljanje opremom: po dva za regulaciju temperature, rad i smer ventilatora i regulaciju vlage, i po jedan za vlaženje, kompresor i alarm
- Prijem podataka iz merne kutije MKM-08 preko komunikacione linije (do 300 m)
- Programsko vođenje brzine ventilatora
- Dva nivoa zaštite parametara od neovlašćenog menjanja
- Statistika o radu opreme tokom sušenja
- Arhiviranje podataka na svakih 2, 3, 4 ili 6 sati
- Dva nivoa prijave neregularnih situacija (upozorenje i alarm)
- Zvučna i svetlosna indikacija alarma
- Moguće povezivanje na PC računar (EIA485 standard)

MC - 2000

- Automatic, semi-automatic or manual control of drying process in conventional, dehumidifying and combined dryers with PI and ON/OFF control
- Aluminium case
- Drying of all wood types (thickness range 20 to 80 mm)
- Invariable (default) and variable (user defined) drying regimes for all wood species (more than 200 regimes)
- 2 time-based regimes
- 2 inputs for temperature measurement (-20 ÷ 110 °C)
- 2 inputs for EMC measurement (2.5 ÷ 30% EMC at 0 °C)
- 8 inputs for MC measurement (5 ÷ 80% MC at 0 °C)
- 1 control input for temperature measurement (-25 ÷ 160 °C)
- 4 digital inputs for fans and compressor operation control
- 9 relay outputs for equipment control: temperature control (2), humidity control (2), fans operation and reversion (2), humidifying, compressor and alarm
- Receives data from measurement box MKM-08 via communication line (up to 300 m)
- Fans' speed programmable control
- Code protection of parameters in two levels against unauthorized changing
- Statistics of equipment operation during drying
- Data recording every 2, 3, 4 or 6 hours
- Two levels of irregular situation notification (warning and alarm)
- Light indication of temperature and humidity alarm
- Can be connected to PC using EIA485 communication standard

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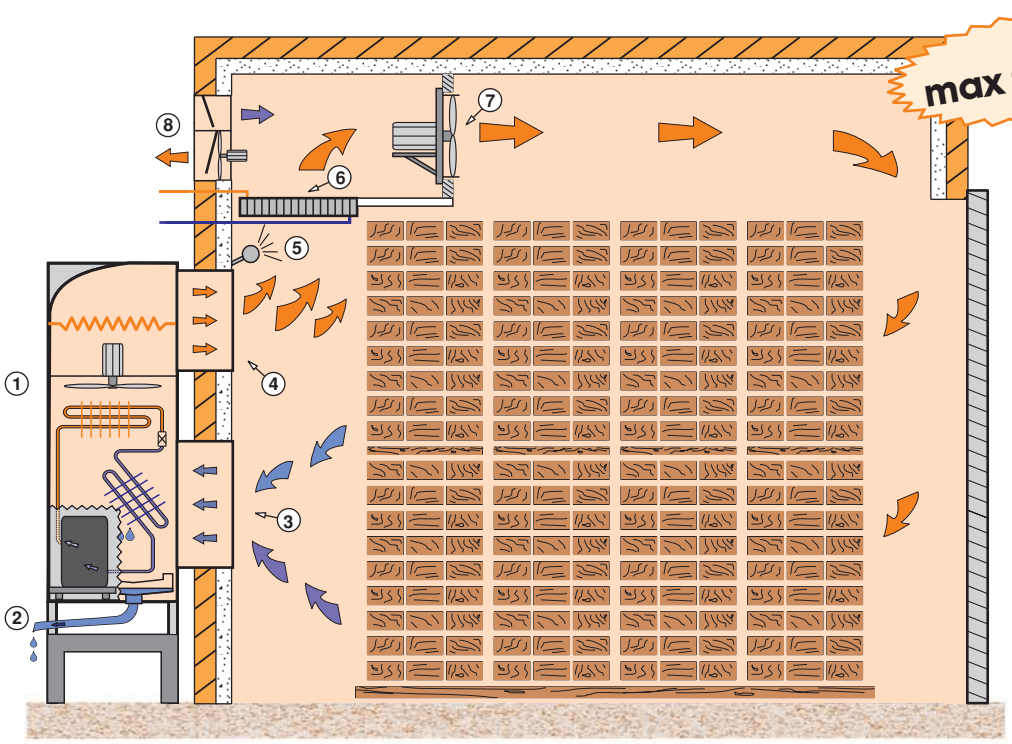
Kondenzacione sušare



1 - Toplotna pumpa (agregat)
2 - Odliv kondenzata
3 - Usisni otvor toplotne pumpe
4 - Izduvni otvor toplotne pumpe
5 - Sistem za vlaženje
6 - Toplotni izmenjivač
(za kombinovane sušare)
7 - Ventilatori za cirkulaciju
8 - Sistem za razmenu vazduha

1 - Heat pump (aggregate)
2 - Drain pipe
3 - Heat pump's intake opening
4 - Heat pump's output opening
5 - Atomizers
6 - Heat exchanger
(for combined kilns only)
7 - Circulation fans
8 - Air exchange system

Kondenzacione sušare pripadaju novijim tehnologijama sušenja drveta. Kod njih se kondenzacijom izdvaja vlaga iz drveta, bez razmene sa spoljašnjim vazduhom. Uz minimalnu potrošnju energije (100 ÷ 250 kWh/m^3 građe za ceo ciklus sušenja) ostvaruje se veoma kvalitetno i dovoljno brzo sušenje svih vrsta građe. Ne zahtevaju kotlovsko postrojenje - minimalno investiranje, i rade potpuno automatski (bez prisustva rukovaoca). Posebno dobre rezultate daju kod sušenja **neparene građe (bukva, jasen, itd)**.

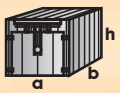
Rade na bazi toplotne pumpe. Vazduh koji cirkuliše unutar sušare apsorbuje vlagu iz drveta. Deo vazduha prolazi kroz toplotnu pumpu, u kojoj se vlaga kondenzuje i odvodi van komore, a osušeni vazduh se uz dogrevanje ponovo vraća u komoru sušare. Elektrogrejači služe samo za fazu zagrevanja koja traje oko jedan dan. U slučaju previsoke vlage ili temperature u komori, povremeno se vrši razmena vazduha sa spoljašnjim.

Ukoliko se doda toplotni izmenjivač tada sušara postaje **kombinovana** (automatski koristi toplotu iz kotla) i objedinjuje dobre karakteristike **kondenzacione i klasične (konvencionalne) sušare**. Time se, za najkraće vreme, postiže najkvalitetnije sušenje uz najmanju potrošnju energije.

Dehumidifying dryers belong to new wood drying technologies. Condensation is used for separating moisture from wood, without external air exchange. High quality and fast drying with minimum energy consumed is achieved (100 ÷ 250 kWh per m^3 of timber for entire drying cycle). They do not request boiler - minimal investment, and they operate automatically (without operator). Especially good results are achieved with drying of **natural wood (beech, ash,...)**.

They operate on heat pump basis. The air that circulates within the kiln is absorbing the wood moisture. Part of air passes through heat pump where the moisture is condensated and drained out of the chamber. Dried, reheated air comes back to kiln chamber. Electrical heaters are used only for warming up phase, which lasts about one day. In case of too high humidity or temperature in chamber internal air is sometimes exchanged with external.

If we add heat exchanger the dryer will become **combined** (it uses boiler heat automatically) and thus combines good characteristics of **dehumidifying and conventional dryer**. That provides the greatest drying quality with the least energy consumption for the shortest time.

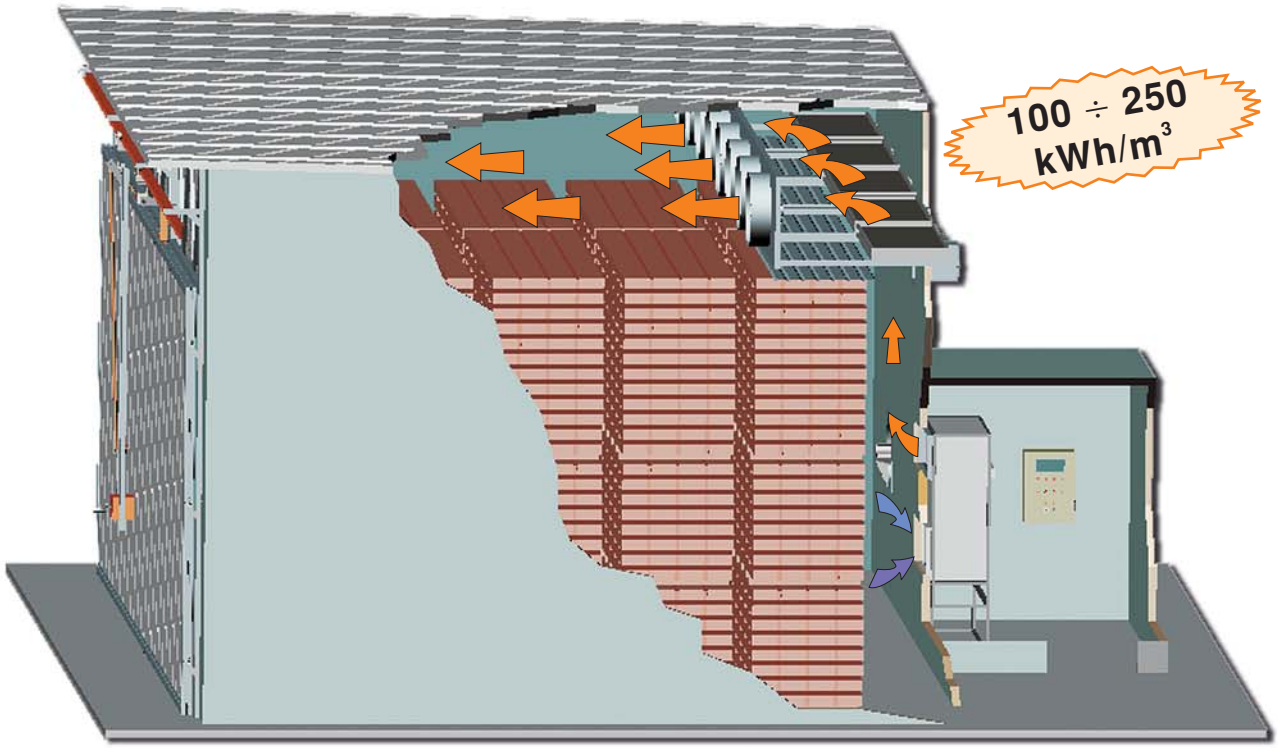


TEHNIČKE KARAKTERISTIKE / TECHNICAL DATA

MODEL	KAPACITET CAPACITY	TOPLOTNE PUMPE HEAT PUMPS	VENTILATORI FLOW FANS	INST. SNAGA INST. POWER	POTROŠNJA CONSUMPTION	DIMENZIJE DIMENSIONS	SLOŽAJ STACK
	m^3		kW	cca kW	cca kWh	(a x b x h) (m)	(a x b x h) (m)
NIGOLUX-12	8 ÷ 15	1 x TP-15	1.6	10	4	4.6 x 4.5 x 3.2	4.5 x 3.5 x 2.5
NIGOLUX-20	15 ÷ 25	1 x TP-25	3.0	18	8	4.6 x 6.2 x 3.8	4.5 x 5.0 x 3.0
NIGOLUX-30	20 ÷ 40	1 x TP-25	6.0	22	10	4.6 x 7.0 x 5.2	4.5 x 5.5 x 4.1
NIGOLUX-40	30 ÷ 50	1 x TP-40	9.0	30	14	4.6 x 8.5 x 5.2	4.5 x 6.5 x 4.1
NIGOLUX-50	40 ÷ 60	2 x TP-25	12.0	45	20	6.6 x 7.0 x 5.2	6.5 x 5.5 x 4.1
NIGOLUX-60	50 ÷ 70	2 x TP-25	12.0	45	20	6.6 x 8.5 x 5.2	6.5 x 6.5 x 4.1
NIGOLUX-60A	50 ÷ 70	2 x TP-25	15.0	48	22	8.6 x 7.0 x 5.2	8.5 x 5.5 x 4.1
NIGOLUX-80	70 ÷100	2 x TP-40	18.0	62	28	8.6 x 8.5 x 5.2	8.5 x 6.5 x 4.1

Green line

Dehumidifying dryers



Najvažniji deo kondenzacione sušare je **toplotna pumpa** (**agregat**) koja vrši kondenzovanje vlage iz vazduha i dogrevanje. Osnovne delove čine: najsavremeniji **SCROLL** kompresor, INOX isparivač (hladni deo), kondenzator (topli deo), ventilatori toplotne pumpe i električni grejači za početno zagrevanje. Toplotna pumpa koristi gas R134a.

The most important part of the dehumidifying dryer is **heat pump** that condenses moisture from air and reheats air. The main parts are: modern **SCROLL** compressor, evaporant (cold section) made of INOX, condenser (warm section), heat pump fans and electrical heaters that heat up the kiln before the drying process starts. Heat pump uses refrigerant R134a.

TEHNIČKE KARAKTERISTIKE TOPLOTNIH PUMPI / HEAT PUMPS TECHNICAL DATA

MODEL	Kompresor Comressor	Toplotna moć Heating power	Elektrogrejač Electrical heater	Ventilator Fan	Max kondenz. (l/24h) Max condensing (l/24h)	Dimenzije Dimensions
TP - 15	5 HP	11 kW	6 kW	0.4 kW	260	1.5 x 0.75 x 1.7
TP - 25	8 HP	18 kW	9 kW	0.8 kW	460	2.0 x 0.75 x 1.7
TP - 40	12 HP	26 kW	12 kW	1.5 kW	600	2.5 x 1.0 x 1.7

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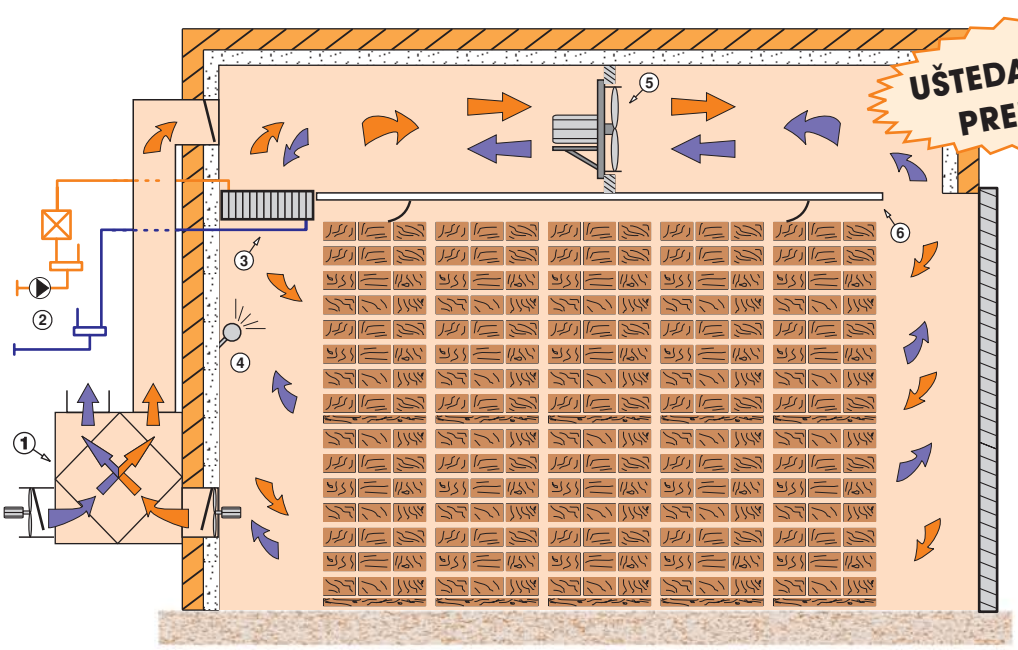
VKS klasične sušare



VKS sušara
1 - Rekuperator
2 - Podstanica
3 - Grejači
4 - Sistem za vlaženje
5 - Ventilatori
6 - Podplafon

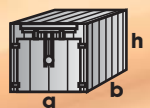
VKS dryer
1 - Heat recovery unit
2 - Substation
3 - Heaters
4 - Atomizers
5 - Circulation fans
6 - False - ceiling

NIGOS-elektronik konstantno unapređuje svoje proizvode i najnovije unapređenje klasičnih sušara je razvoj sušare sa rekuperatorima. Sušenje se obavlja razmenom unutrašnjeg vlažnog vazduha sa spoljašnjim. Zagrejani vazduh koji se izbacuje iz komore prolazi kroz rekuperator i predaje deo toplotne energije hladnom vazduhu koji ulazi u sušaru. Upotrebom rekuperatora se smanjuje potrošnja toplotne energije i preko 30%. Osim velike uštede toplotne energije (a time i pogonskog goriva) poboljšava se kvalitet suve građe i skraćuje vreme sušenja.

Regulacija temperature se vrši servo ventilom sa motornim pogonom, a regulacija vlage kod ovog tipa susare se vrši uključivanjem ventilatora rekuperatora. Pogonsko gorivo može biti topla voda ili para. U zavisnosti od broja sušara u sistemu snaga kotla se kreće od 1.5 - 2.5 kW/m^3 građe. Cirkulacija vazduha se obezbeđuje reverzibilnim ventilatorima (sa promenom smera), a brzina vazduha kroz složaj ide do 2.5 m/s. Snaga ventilatora iznosi 0.2 - 0.3 kW/m^3 građe. Vođenje procesa se vrši automatima MC-2000 ili MC-600.

NIGOS-elektronik constantly upgrade its product and latest upgrade of conventional dryers is development of heat recovery units. Drying is achieved by the replacement of inner damp air with outer. Heated air which is expelled from chamber pass through heat recovery unit and give part of heat energy to cold air coming into chamber. Consumption of heating energy is thus reduced by more than 30%. Beside heating energy (and fuel) savings, quality of dried timber is improved and drying time shortened.

Servo valve controls temperature and fan in heat recovery unit control humidity. The energy sources are hot water or steam. Depending on number of dryers in system, power of boiler is 1.5 - 2.5 kW/m^3 of timber. Ventilation is provided by the reversible fans with air velocity through the stack of 2.5 m/s. Electrical power of fans is app 0.2 - 0.3 kW per m^3 of timber. Automatic control unit MC-2000 or MC-600 control the entire drying cycle.

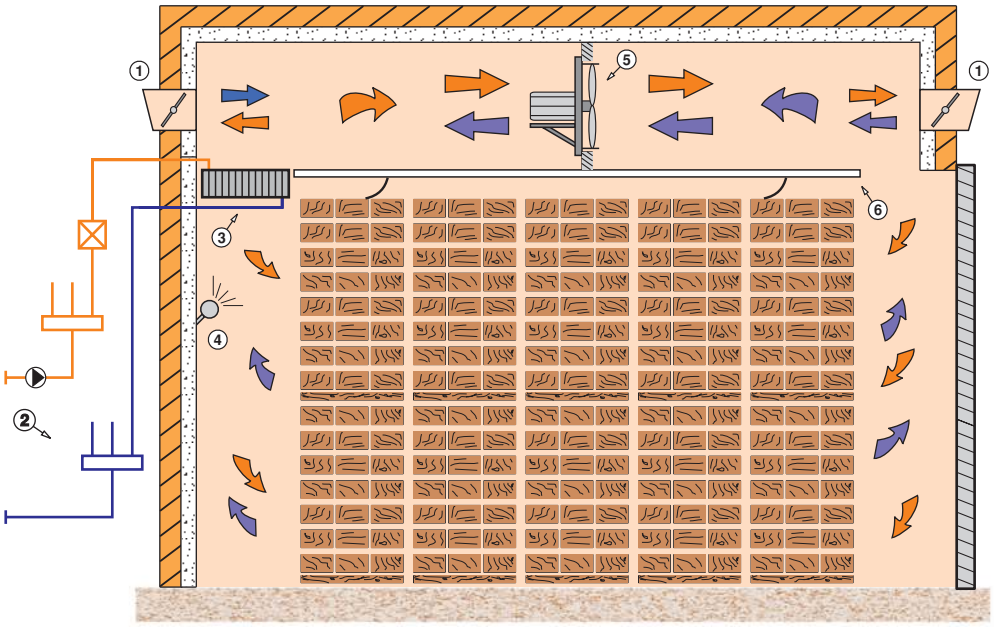


TEHNIČKE KARAKTERISTIKE / TECHNICAL DATA

MODEL	KAPACITET CAPACITY	TOPLOTNA SNAGA HEATING POWER	VENTILATORI FLOW FANS	ELEKTRIČNA SNAGA ELECTRICAL POWER	DIMENZIJE DIMENSIONS	SLOŽAJ STACK
	m^3	kW		cca kW	a(m) x b(m) x h(m)	a(m) x b(m) x h(m)
VKS-30	20 ÷ 40	160	3 x Ø800	9 + 1.5	4.6 x 6.5 x 5.2	4.5 x 5.0 x 4.1
VKS-40	30 ÷ 50	160	3 x Ø800	9 + 3	4.6 x 8.5 x 5.2	4.5 x 6.5 x 4.1
VKS-50	40 ÷ 60	240	4 x Ø800	12 + 3	6.8 x 7.0 x 5.2	6.7 x 5.5 x 4.1
VKS-60	50 ÷ 70	240	4 x Ø800	12 + 3	6.8 x 8.5 x 5.2	6.7 x 6.5 x 4.1
VKS-60A	50 ÷ 70	320	6 x Ø800	18 + 3	8.6 x 7.0 x 5.2	8.5 x 5.5 x 4.1
VKS-80	70 ÷ 100	320	6 x Ø800	18 + 3	8.6 x 8.5 x 5.2	8.5 x 6.5 x 4.1
VKS-80A	70 ÷ 100	400	7 x Ø800	21 + 6	10.6 x 7.0 x 5.2	10.5 x 5.5 x 4.1
VKS-100	80 ÷ 120	400	7 x Ø800	21 + 6	10.6 x 8.5 x 5.2	10.5 x 6.5 x 4.1
VKS-100A	80 ÷ 120	480	8 x Ø800	24 + 4.5	12.9 x 7.0 x 5.2	12.8 x 5.5 x 4.1
VKS-120	100 ÷ 140	480	8 x Ø800	24 + 4.5	12.9 x 8.5 x 5.2	12.8 x 6.5 x 4.1

Green line

VKS conventional dryers



VKS sušara
1 - Klapne sa servo pogonom
2 - Podstanica
3 - Grejači
4 - Sistem za vlaženje
5 - Ventilatori
6 - Podplafon

VKS dryer
1 - Servo-controled flaps
2 - Substation
3 - Heaters
4 - Atomizers
5 - Circulation fans
6 - False - ceiling

Sušare sa klapnama su do sada bile najčešći tip klasičnih sušara, jer su sušare u tehničkom smislu jednostavne a upotrebom drvnog otpada ili piljevine kao pogonskog goriva za loženje kotla, smanjuje se potrošnja električne energije. Sušenje se obavlja razmenom unutrašnjeg vlažnog vazduha sa spoljašnjim preko klapni. U novije vreme ih zamenjuju sušare sa rekuperatorima.

Regulacija temperature se vrši servo ventilom sa motornim pogonom, a regulacija vlage pomeranjem klapni sa servo pogonom. Pogonsko gorivo može biti topla voda ili para. Snaga kotla se kreće od 2.5 - 3.5 kW/m^3 građe u zavisnosti od broja sušara. Cirkulacija vazduha se obezbeđuje reverzibilnim ventilatorima (sa promenom smera), a brzina vazduha kroz složaj ide do 2.5 m/s. Snaga ventilatora iznosi 0.2 - 0.3 kW/m^3 građe. Vođenje procesa se vrši preko automata MC-2000 ili MC-600.

Until now drying kilns with dampers were the most common type of conventional kilns because the dryers are very simple, they do not demand extra maintenance and electrical power consumption is reduced by use of wood wastes as fuel for boiler. Drying is achieved by the replacement of inner damp air with outer through dampers. Recently, dryers with heat recovery units are replacing them.

Servo valve controls temperature while servo - controlled dampers control humidity. The energy sources are hot water or steam. Depending on number of dryers in system, power of boiler is 2.5 - 3.5 kW/m^3 of timber. Ventilation is provided by the reversible fans with air velocity through the stack 2.5 m/s. Electrical power of fans is app 0.2 - 0.3 kW per m^3 of timber. Automatic control unit MC-2000 or MC-600 control the entire drying cycle.

ORIJENTACIONA VREMENA SUŠENJA / APPROXIMATE TIME OF DRYING

VRSTA DRVETA WOOD TYPE	SUŠENJE U DANIMA / DRYING IN DAYS							
	25 mm		38 mm		50 mm		70 mm	
	70%➡10%	40%➡10%	70%➡10%	40%➡10%	70%➡10%	40%➡10%	70%➡10%	40%➡10%
Hrast slavonski/Oak	20	13	35	22	52	32	75	52
Jasen / Ash	15	10	25	15	38	24	60	42
Bukva / Beech	10	7	16	11	25	16	41	28
Breza, topola Birch, poplar	6*	4*	11	8	14	10	21	14
Bor, jela, smrča Pine, fir, juniper	6*	4*	9	7	12	9	18	13

Napomene: 1. Kod klasičnih i kombinovanih sušara realno vreme sušenja je nešto kraće, a kod kondenzacionih u zimskim uslovima nešto duže
2. * - samo u kombinovanim ili klasičnim sušarama

Notes: 1. In conventional and combined dryers actual time of drying is somewhat shorter, while in dehumidifying dryers it can be somewhat longer during winter
2. * - in combined or conventional dryers only

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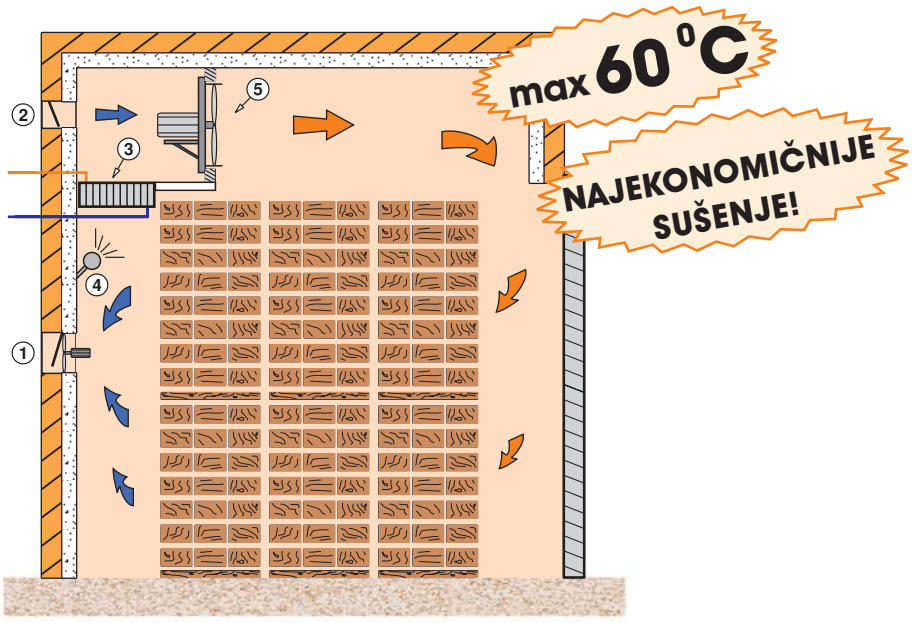
NKS klasične sušare / NKS conventional dryers

NKS sušara
1 - Izduvne klapne
2 - Usisne klapne
3 - Grejači
4 - Sistem za vlaženje
5 - Ventilatori za cirkulaciju

NKS dryer
1 - Exhaust flaps
2 - Intake flaps
3 - Heaters
4 - Atomizers
5 - Circulation fans

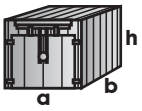


Ovaj tip sušara obezbeđuje kvalitetno sušenje svih vrsta građe uz najmanju potrošnju energije (do 100 kWh/m^3 građe za jedan ciklus sušenja). Cirkulacija se obavlja u jednom smeru, uz brzinu vazduha kroz složaj do 2 m/s. To omogućuje ravnomerno sušenje do 4 složaja po dubini. Instalisana snaga ventilatora iznosi oko 0.15 kW/m^3 građe. Vođenje procesa sušenja može biti automatom MC-502R ili MC-600.

Sušare su naročito pogodne tamo gde postoje problemi sa električnom energijom, jer zbog male potrošnje mogu da rade na agregat. Na zahtev kupca može se isporučiti sušara sa rekuperatorom.

This type of dryers ensure high drying quality of all wood types with the least energy consumption (up to 100 kWh per m^3 of timber for entire drying cycle). Air circulates in one direction only at the velocity of up to 2 m/s. This ensures equal drying of timber in up to 4 stacks in depth. Installed power of fans is approximately 0.15 kW per m^3 of timber. Automatic control unit MC-502R or MC-600 can be used.

These dryers are especially convenient wherever some electrical power supply problems may occur, because they can operate on spare power sources. On customer request, heat recovery unit can be installed.



TEHNIČKE KARAKTERISTIKE / TECHNICAL DATA

MODEL	KAPACITET CAPACITY	TOPLOTNA SNAGA HEATING POWER	VENTILATORI FLOW FANS	ELEKTRIČNA SNAGA ELECTRICAL POWER	DIMENZIJE DIMENSIONS	SLOŽAJ STACK
	m^3	kW		cca kW	a(m) x b(m) x h(m)	a(m) x b(m) x h(m)
NKS-06	5 ÷ 8	24	2 x Ø560	1.5	6.0 x 2.4 x 2.4	4.5 x 1.6 x 2.1
NKS-12	8 ÷ 15	40	4 x Ø450	1.6	4.6 x 4.5 x 3.0	4.5 x 3.5 x 2.4
NKS-20	15 ÷ 25	80	4 x Ø560	3.0	4.6 x 6.2 x 3.8	4.5 x 5.0 x 3.2

MINI sušara NKS-06

- Kompaktna i lako prenosiva klasična sušara
- Oprema odvojiva i lako se montira na već postojeću komoru
- Automatski rad
- Ugrađen rekuperator poboljšava iskorišćenost i smanjuje potrošnju toplotne energije
- Sa ugrađenim električnim kotlom od 12kW sušara je autonomna, a može se priključiti i na toplovod iz drugog kotla

MINI dryer NKS-06

- Compact and easy to transport conventional dryer
- Equipment is detachable and easily installed in existent chamber
- Automatic operation
- Built-in recuperator improves efficiency and reduce heating energy consumption
- With integrated 12kW electrical boiler dryer is independent. It can be connected to hot water source from another boiler as well

Green line

Parionice / Steaming chambers / PD-02

PD-02

- Automatsko ili ručno vođenje procesa u **parionicama za drvo**
- 8 podesivih programa
- Vođenje procesa parenja u 2 parionice istovremeno
- Merenje temperature vazduha i drveta
- Mogućnost povezivanja na PC računar

PD-02

- Automatic or manual control of process in **steaming chambers**
- 8 selectable programs
- Simultaneous process control in 2 steaming chambers
- Air and wood temperature measurement
- Can be connected to PC

"NIGOS - elektronik" svojim kupcima osim sušara može ponuditi i prateću opremu i objekte za **parionice**. Najčešći kapacitet je 20 do 30 m^3 po komori.

U zavisnosti od svojih mogućnosti korisnik može izabrati **kompletnu montažnu parionicu** ili samo **opremu sa vratima** (kod zidanih komora).

Korisniku se još nudi i izbor tipa parionice - direktna ili indirektna. Kod **direktnih parionica** nudimo samo automatiku **PD-02**, a sav termički deo isporučuje i instalira proizvođač kotla. Kod **indirektnih parionica** nudimo kompletnu opremu (automatika, grejači, održavanje nivoa vode, itd...). Za pravilan rad indirektne parionice zahteva se dotok vodene pare pritiska 0.5 bara ili vode zagrejane do 120 °C.

Beside wood dryers, **"NIGOS - elektronik"** also produce **steaming chambers**. Most commonly used steaming chambers have volume between 20 and 30 m^3.

Customer can order **complete solution** with prefabricated chamber, or **equipment with doors** only (installed in existent chamber made by customer).

User can also choose direct or indirect type of steaming. For **direct type** we offer only automation unit **PD-02,** while the rest of equipment provide supplier of boiler facility. For **indirect steaming chambers** we can offer all equipment (automation unit, heaters, water level control, etc). Steam at pressure 0.5 bar or water heated to 120 °C is required for proper operation of indirect steaming chambers.

"NIGOS - elektronik" se u svom radu oslanja na veliki broj stručnih saradnika. Uz njihovu pomoć nudimo sledeće usluge:

- Idejna rešenja (izbor kotlova, sušara, parionica, raspored na lokaciji, itd...)
- Izrada građevinskih, termo-mašinskih i elektro projekata

"NIGOS - elektronik" relies on number of experts in its operation. With their help we can offer:

- Expertise (suggestion for boilers, dryers, steaming chambers, facility layout etc...)
- Production of civil engineering, thermo-mechanical and electrical projects

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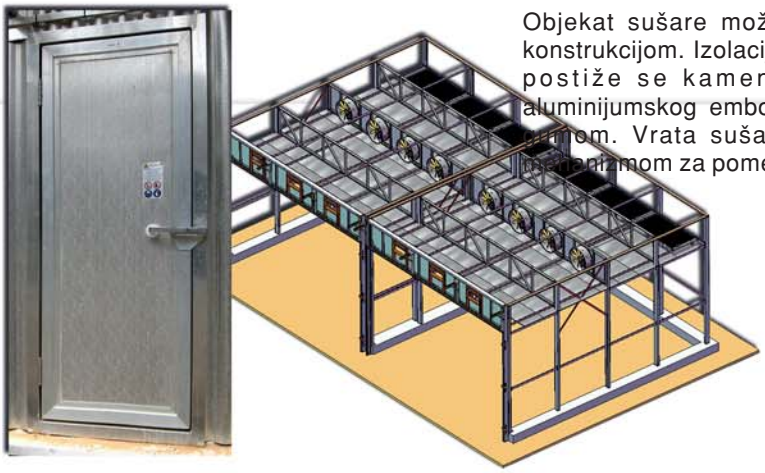
Neprekidni rast proizvodnje ne bi bio moguć bez ulaganja u nove proizvodne kapacitete. NIGOS-elektronik je proteklih godina dosta radio na podizanju i opremanju novog proizvodnog kompleksa koji podržava porast proizvodnje. Izrada mehaničkih sklopova za sušare i njihova priprema za isporuku krajnjem kupcu sada se vrši u novom proizvodnom pogonu u Aleksandrovu nadomak Niša.

Constant increase of production would not be possible without investment in new production capacity. In recent years, NIGOS-elektronik worked hard to erect new production complex to support increase of production. Manufacturing of mechanical parts and preparation for delivery to customer is now performed in new production hall.

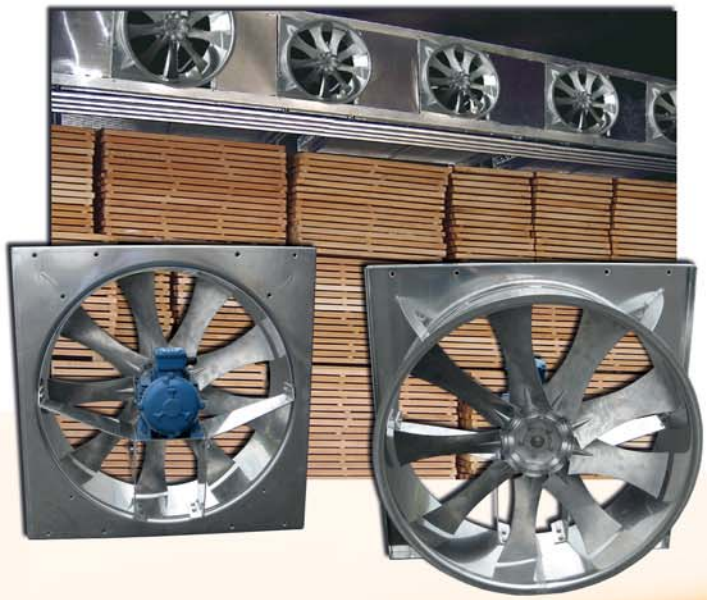


Objekat sušare može biti zidan ili montažni sa aluminijumskom konstrukcijom. Izolacija zidova i krova (kod montažnih sušara) i vrata, postiže se kamenom vunom smeštenom u oblogama od aluminijumskog emboksiranog lima. Zaptivanje vrata je specijalnom [illegible]om. Vrata sušare mogu biti krilna ili klizna sa specijalnim [illegible]anizmom za pomeranje. Sastavni deo sušare su i kontrolna vrata.

Kiln can be constructed or assembled of aluminium bearing structure. The walls and the roof, as well as the kiln doors are made of aluminum sheets with rock-wool insulation. Rubber gaskets are put on the both side of the doorframe to ensure the total sealing. The main door can be winging or sliding with special mechanism for moving. Every kiln is provided with an inspection door.

Cirkulacija vazduha se izvodi pomoću aksijalnih ventilatora smeštenih ispod tavanice sušare. Kućište i glavčina su od aluminijuma, a lopatice od aluminijuma ili poliamida ojačanog staklenim vlaknima. Motori su tropikalizovani (otporni na povišenu temperaturu i vlagu). Zavisno od tipa sušare ventilatori mogu biti za jednosmernu ili reverzibilnu cirkulaciju.

Axial flow fans placed under the ceiling ensure air circulation. Housing and hub are made of aluminium while blades are made of aluminium or polyamide glass. Motors are tropicalized (resistant to high humidity and temperature. They can be reversible or non-reversible type, depending on the kiln.



Kako bi se obezbedilo ravnomerno sušenje građe kroz ceo presek bez stvaranja nepravilnosti, po potrebi se vrši vlaženje proizvodnjom hladne pare, pomoću visokog pritiska. Sistem za vlaženje se sastoji od filtera, elektromagnetnog ventila, prskalica, creva i ostalih potrebnih delova.

Humidifying system is used when additional moisturizing of lumber is needed to ensure equal drying through whole stack and avoid developing faults. Production of cold steam using high pressure ensures excellent humidifying during drying process. System consists of the filter, electromagnetic valve, atomizers, hose, etc.

Additional equipment

Bimetalni toplotni izmenjivači su izrađeni od kvalitetnih INOX cevi sa namotanim aluminijumskim rebrima što obezbeđuje dobar transfer toplote i dugi vek rada. Pogonski medijum može biti topla voda ili vodena para. Ostali delovi sistema za grejanje i povezivanje sušara na kotlovsko postrojenje se smeštaju u podstanicu.

Bimetallic heat exchangers are made of quality INOX pipes finned with aluminium fins which provide good heat transfer and long exploitation. Working medium can be warm water or steam. Other parts for heating system and connection between dryers and boiler facility are placed in heating substation.

U komandno razvodnom ormaru (KRO) su smešteni uređaji i komponente za upravljanje i zaštitu kompletne opreme u sušari. Najznačajniji uređaj je automat za vođenje procesa sušenja i on se u zavisnosti od tipa sušare smešta ili u ormar ili pored njega.

KRO se smešta van sušare u pogodnoj prostoriji.

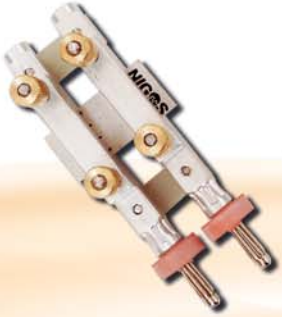
The power electric switch board (KRO) includes devices and components for control and protection of all kiln's equipment. The most important device is automatic control unit which is placed in electric board or beside it depending on the type of dryer.

Electric board is placed outside the drying chamber in convenient room.

Dodatni pribor za merenje

U toku procesa sušenja vlaga u drvetu se stalno prati pomoću sondi postavljenih u drvetu, dok se temperatura i vlaga vazduha mere preciznim sondama za koje nije potrebno održavanje u toku sušenja. Na osnovu izmerenih vrednosti automati vode proces sušenja.

Sva potrebna **merna oprema** (sonde, razvodne i komunikacione kutije, kablovi) se isporučuje uz automat. Konfiguracija sistema se menja u zavisnosti od tipa automata, tipa sušare i ostalih zahteva, kako bi se obezbedilo najpreciznije merenje.



Additional measurement equipment

Electrodes fitted in the wood constantly measure wood moisture, while precise probes that do not need special maintenance during drying process measure air temperature and humidity. Automatic control units are controlling drying process based on measured values.

All necessary **measurement equipment** (probes, connection and communication boxes, cables) are supplied with each controller. System configuration can be changed depending on the type of controller, type of dryer and other requests, to ensure most quality measurement.

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RVD-904

RVD-904

- Univerzalni vlagomer
- Precizno merenje vlage u drvetu i čvrstim građevinskim materijalima
- Merenje temperature i relativne vlage vazduha
- Pogodan za rad na terenu

RVD-904

- Universal MC meter
- MC measurement of wood and solid construction materials (concrete, mortar, gypsum, etc.)
- Air temperature and relative humidity measurement
- Suitable for on-field operation

Prenosni vlagomer RVD-904 služi za merenje vlage svih vrsta drveta na terenu. Isporučuje se u kompletu sa čekićem i potrebnim sondama. Opseg merenja vlage je 6% ÷ 100%, a rezolucija merenja 0.1%. Poseduje temperaturnu kompenzaciju -10 °C ÷ 80 °C. Uz dodatak posebnih sondi može se koristiti za merenje vlage furnira, piljevine, građevinskih materijala (betona, maltera, gipsa,...), kao i za merenje temperature i vlage vazduha (opciono).

Portable moisture meter RVD - 904 provide on-field wood MC measurement of all wood types. It is delivered in a case with hammer action electrode and necessary probes. MC measurement range is 6% ÷ 100% MC, and measurement resolution 0.1%. Temperature compensation is -10 °C ÷ 80 °C. With special probes it can be used for moisture content measurement in veneer, saw dust, various construction materials (concrete, mortar, gypsum, etc), as well as air temperature/humidity measurement (optional).

DODATNE SONDE:

Uređaj za **merenje vlage piljevine VP-02** je posuda od INOXA u kojoj se piljevina sabija pod pritiskom kako bi se omogućilo merenje vlage. Posebnim kablom se povezuje sa RVD-904. Uređaj poseduje sistem za ravnomerno pritiskanje piljevine čime se garantuje ujednačeno merenje. Isti sistem štiti uređaj od prekomernog pritiska i oštećenja.

VP-02 is a device for **saw dust MC measurement**. It is a container made of INOX where saw dust is pressed to ensure proper MC measurement. It is connected to RVD-904 via special cable. Device has built-in protection to prevent damage from excessive pressure. Same system ensures uniform pressure and measurement.

Sonde za merenje vlage betona i čvrstih građevinskih materijala se koriste za merenje vlage bez kontaktne mase. Dovoljno je da se izbuše dve odgovarajuće rupe u materijalu čiju vlagu merimo i u njih postave sonde koje su povezane sa vlagomerom RVD-904.

Probes for concrete and solid construction materials MC measurement measure MC without contact paste. It is enough to drill two suitable holes in the measurement sample and insert probes which are connected to RVD-904.

Brzo merenje temperature i relativne vlage vazduha se vrši prenosnom sondom **DSVT-03**. Vrlo je podesna za primenu u različitim proizvodnim uslovima i na terenu. Povezuje se na prenosne merne uređaje iz NIGOS proizvodnog programa: **RVD-904** ili **DTM-902**.

Fast measurement of air temperature and relative humidity is performed with hand held probe **DSVT-03**. It is very suitable for use in various production conditions and on-field usage. It can be conected to handheld measurement devices made by NIGOS: **RVD-904** or **DTM-902**.

Green line

DVD-241 / DVD-340 / MCD-50

DVD-241

- Dodirni (kontaktni) vlagomer
- Pogodan za brzu proveru ujednačenosti vlage u složaju
- Podešavanje debljine furnira i dasaka u rasponu 2 ÷ 30 mm
- Podešavanje specifične težine u rasponu 0.2 ÷ 1.1 t/m^3
- Autokalibracija
- Alarm kada se detektuje vlaga veća od željene
- Rezolucija merenja 0.1%
- Napajanje 9V, potrošnja 3mA (do 200h neprekidnog rada)

DVD-241

- Non-destructive (contact, pinless) MC meter
- Suitable for fast checking of MC distribution in timber stacks
- Wood boards and veneer thickness adjustment in range 2 ÷ 30 mm
- Specific weight adjustment in range 0.2 ÷ 1.1 t/m^3
- Auto calibration
- Alarm when MC higher than wanted is detected
- Measurement resolution 0.1%
- Battery 9V, consumption 3mA (up to 200h interrupted operation)

DVD-340

- Dodirni (kontaktni) vlagomer
- Pogodan za nepristupačne uzorke i uzorke malih dimenzija
- Podešavanje debljine furnira i dasaka u rasponu 2 ÷ 30 mm
- Podešavanje specifične težine u rasponu 0.2 ÷ 1.1 t/m^3
- Autokalibracija
- Alarm kada se detektuje vlaga veća od željene
- Rezolucija merenja 0.1%
- Napajanje 9V, potrošnja 3mA (do 200h neprekidnog rada)

DVD-340

- Non-destructive (contact, pinless) MC meter
- Suitable for hard to access samples and small dimension samples
- Wood boards and veneer thickness adjustment in range 2 ÷ 30 mm
- Specific weight adjustment in range 0.2 ÷ 1.1 t/m^3
- Auto calibration
- Alarm when MC higher than wanted is detected
- Measurement resolution 0.1%
- Battery 9V, consumption 3mA (up to 200h interrupted operation)

MCD-50

- Dodirni (kontaktni) vlagomer
- Pogodan za merenje vlage neobrađene građe na terenu
- Podešavanje debljine dasaka u rasponu 10 ÷ 50 mm
- Podešavanje specifične težine u rasponu 0.2 ÷ 1.1 t/m^3
- Autokalibracija
- Alarm kada se detektuje vlaga veća od željene
- Rezolucija merenja 0.5%
- Minimalno reaguje na površinsku vlagu
- Napajanje 9V, potrošnja 6mA (do 100h neprekidnog rada)

MCD-50

- Non-destructive (contact, pinless) MC meter
- Suitable for on-field MC measurement in rough samples
- Wood boards thickness adjustment in range 10 ÷ 50 mm
- Specific weight adjustment in range 0.2 ÷ 1.1 t/m^3
- Auto calibration
- Alarm when MC higher than wanted is detected
- Measurement resolution 0.5%
- Minimal reaction to surface moisture
- Battery 9V, consumption 6mA (up to 100h interrupted operation)

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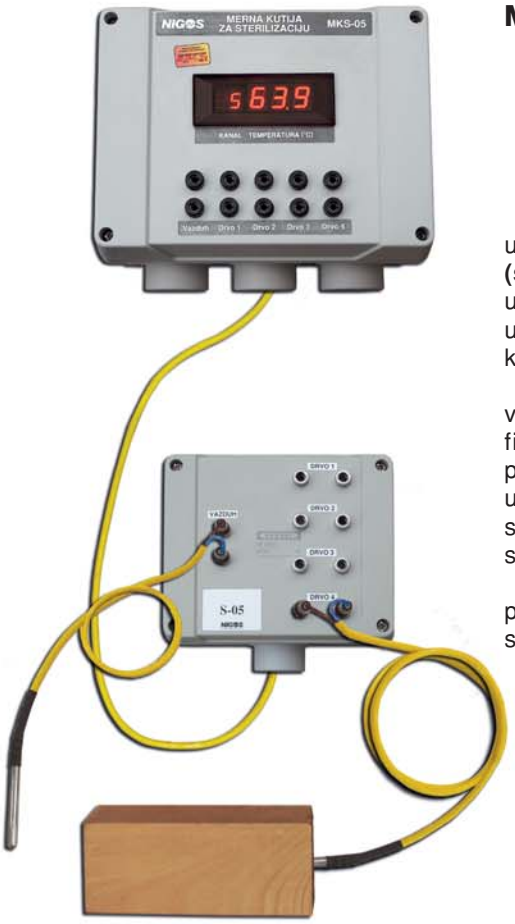
Termička obrada / Thermal treatment / ISPM-15



MKS-05

- Verifikacija termičkog tretmana drveta (**ISPM15 standard**)
- 5 ulaza za merenje temperature jezgra drveta i vazduha
- Pouzdano merenje temperature sa temperaturnom kompenzacijom
- Povezivanje sondi: direktno ili preko razvodne kutije
- Komunikacija EIA485

MKS-05 je mikroprocesorski indikator temperature sa pet mernih ulaza koji se najčešće koristi u komorama za **termički tretman (sterilizaciju) drveta i paleta**. Ugrađuje se nezavisno od sistema upravljanja. Moguće je direktno povezivanje temperaturnih sondi na uređaj ili povezivanje preko razvodne kutije S-05. Uređaj i sonde se kalibrišu kod nadležne institucije pre slanja kupcu.

Uz našu PC aplikaciju "Sterilizacija drveta", MKS-05 služi za verifikaciju procesa sterilizacije drveta po međunarodnom standardu za fitosanitarne mere (**ISPM 15**) Svetske organizacije za hranu i poljoprivredu (FAO). Proces sterilizacije se prati na monitoru, a po uspešnom završetku se vrši štampanje generisanog izveštaja koji sadrži sve relevantne podatke i koji se koristi kao dokaz o uspešno sprovedenom postupku sterilizacije.

Uz korišćenje odgovarajuće aplikacije na PC računaru, MKS-05 je pogodan za nadzor i prikupljanje podataka u većim sistemima komora i skladišnih prostorija.

MKS-05

- Wood thermal treatment verification (**ISPM15 standard**)
- 5 inputs for wood core and air temperature measurement
- Reliable temperature measurement with temperature compensation
- Probes connection: direct or via connection box
- Communication EIA485

MKS-05 is microprocessor temperature indicator with 5 inputs which is most commonly used in chambers for **thermal treatment (sterilization) of wood and pallets**. It is installed independently from control system. There are 2 configurations we can offer to customers. Temperature probes can be connected directly to MKS-05, or via connection box S-05.

With our "Wood Thermal Treatment" application, MKS-05 is used for verification of wood sterilization (heat treatment) process according to **International Standard for Phytosanitary Measures - ISPM 15** as defined by Food and Agriculture Organization - FAO. Sterilization process is displayed on monitor and upon successful completion generated report which contains all relevant data is printed and used as proof of successfully conducted sterilization process.

With some other appropriate PC application, MKS-05 is suitable for surveillance and data acquisition in large chamber systems and storage rooms.

Green line

Komunikacija / Communication

Kompjuterska kontrola predstavlja glavni adut u modernim sušarama. Ona obezbeđuje nadgledanje i automatsku kontrolu procesa sušenja. Korisnik može preko interneta pristupiti programu i u svakom trenutku proveriti status i podesiti parametre. Glavne karakteristike su:

- Udaljenost do 1000 m od kancelarije
- Povezivanje do 32 sušare
- Fleksibilnost i jednostavnost rukovanja
- Windows operativni sistem
- Vizuelni prikaz procesa sušenja
- Grafički prikaz
- Alarm
- Daljinska kontrola - pristup, pregled i podešavanje preko interneta

Sušara 32 / Dryer 32

Štampač / Printer

Internet

EIA232

EIA232↔EIA485

Sušara 2 / Dryer 2

EIA485

Sušara 1 / Dryer 1

The master key of a modern dry kiln is the **computer control**. It provides surveillance and automatic control of the drying process. User can access program over internet at any time and check the status and adjust parameters. Main characteristics are:

- Distance is up to 1000 m from office
- Up to 32 drying kilns connected
- Flexibility and ease to use
- Windows operative system
- Process visualization of drying process
- Graphic visualisation
- Alarm
- Remote control - access, overview and adjustment over internet

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Da bi Vam bili bliži...

U stalnoj brizi za poboljšanje kvaliteta svojih proizvoda, NIGOS-elektronik zadržava pravo izmene i dopune ovog kataloga bez prethodne najave.

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