



okpac®

## 功率固态继电器

## Power Solid State Relay

# SO763090

输出/Output : 24-510VAC 35A  
 输入/Input : 3,5-32VDC

- ❑ 随机触发固态继电器被设计用于大电感负载, 马达(AC-53)和相位角控制的应用。  
*Random Solid State Relay designed for high inductive loads, motors (AC-53) and phase angle control applications.*
- ❑ 输出采用背对背晶闸管的TMS2 (\*) 技术, 具有很长的预期寿命: 24-510VAC 35A.

*Back to back thyristors on output with TMS2 (\*) technology for a long lifetime expectancy : 24 to 510VAC 35A.*

- ❑ 在输入(transil)和输出侧有电压保护(RC+ VDR), 且具有高抗干扰性, 符合 IEC/EN61000-4-4 & IEC/EN61000-4-5.

*Voltage protection on input (transil) and output (RC+ VDR) to have a high immunity according IEC/EN61000-4-4 & IEC/EN61000-4-5*

- ❑ 大的控制电压范围: 3,5 - 32VDC, 有输入电流限制器。在输入侧有可见的绿色LED指示。

*Large control range: 3,5 - 32VDC with input current limiter. Green LED visualization on the input.*

- ❑ 设计符合标准: EN60947-4-3 (IEC947-4-3)和EN60950/VDE0805, (加强绝缘) -UL-cUL.

*Designed in conformity with EN60947-4-3 (IEC947-4-3) and EN60950/VDE0805 (Reinforced Insulation) -UL-cUL*

- ❑ 在端子上有IP20保护盖。

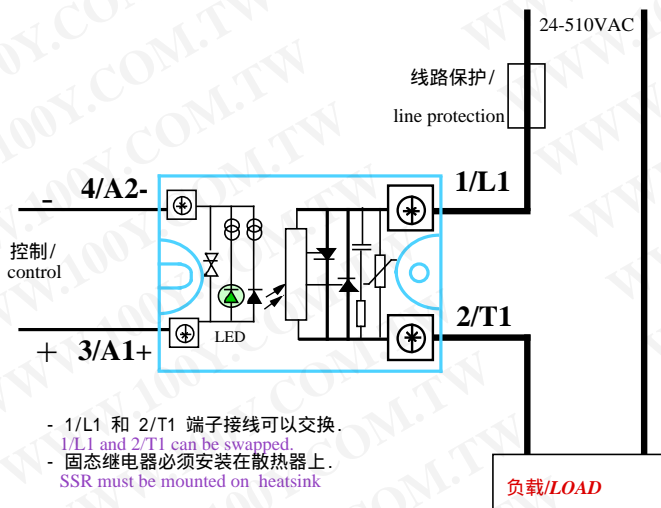
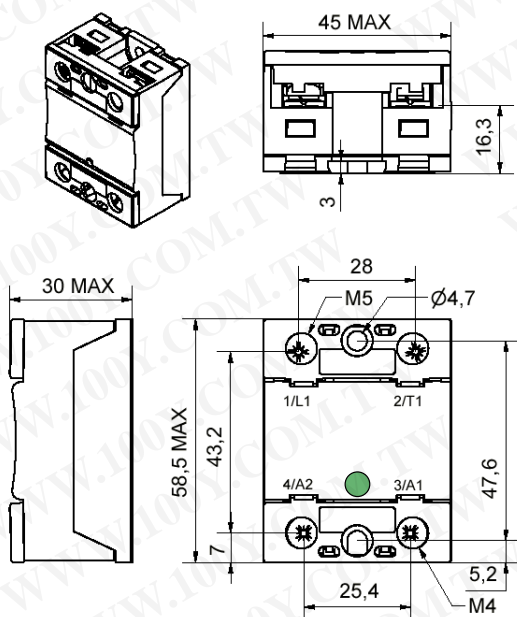
*IP20 protection by flaps on terminals.*



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### 尺寸/Dimensions :



- 1/L1 和 2/T1 端子接线可以交换。  
*1/L1 and 2/T1 can be swapped.*
- 固态继电器必须安装在散热器上。  
*SSR must be mounted on heatsink*

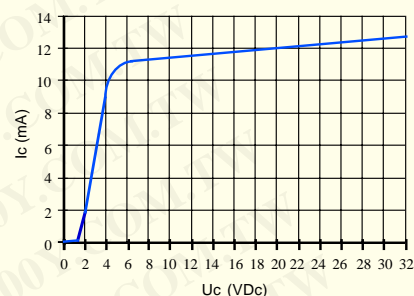
(\*) : Thermo Mechanical Stress Solution

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控制特性 / *Control characteristics (at 25°C)*

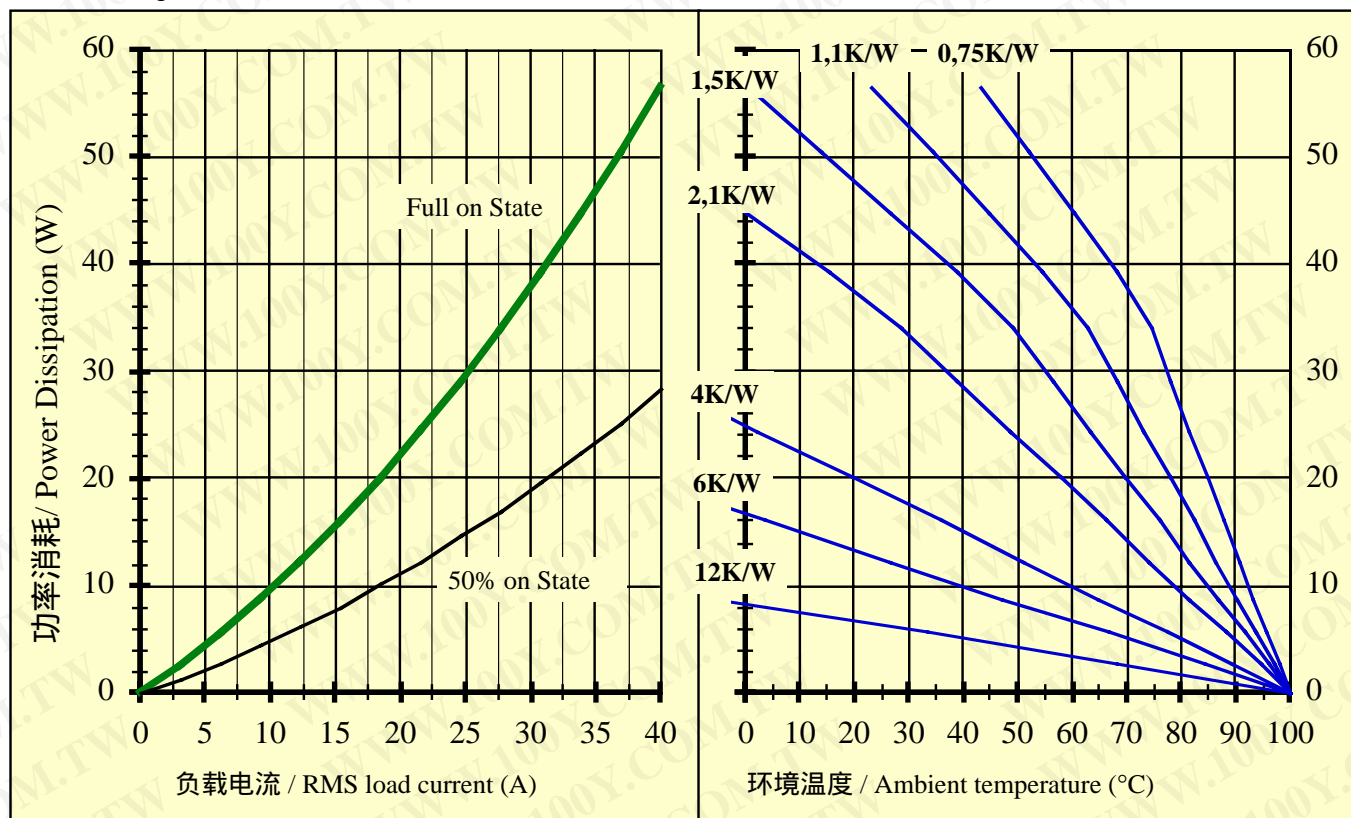
参数 / <i>Parameter</i>	Symbol	DC			Unit
		Min	Typ	Max	
控制电压 / <i>Control voltage</i>	Uc	3,5	5-12-24	32	V
控制电流 / <i>Control current (@ Uc)</i>	Ic	<10	<13	<13	mA
释放电压 / <i>Release voltage</i>	Uc off	2			V
输入LED / <i>Input LED</i>		绿色 / <i>green</i>			
反向电压 / <i>Reverse voltage</i>	Urv		32		V
箝位电压 / <i>Clamping voltage (Transil)</i>	Uclamp		36		V
抗干扰 / <i>Input immunity : EN61000-4-4</i>			2kV		
抗干扰 / <i>Input immunity : EN61000-4-5</i>			2KV		

输入 / *Input : Ic = f( Uc)*输出特性 / *Output characteristics (at 25°C)*

参数 / <i>Parameter</i>	Conditions	Symbol	Min	Typ.	Max	Unit
工作电压 / <i>Operating voltage range</i>		Ue	24	400	510	V rms
峰值电压 (VDR箝位) / <i>Peak voltage (VDR clamping)</i>	@ 1mA	Up	1200 (950)			V
过零触发电压 / <i>Zero cross level</i>		Usync		随机/RANDOM		V
关闭电压 / <i>Latching voltage</i>	Ie nom	Ua			8	V
额定电流 / <i>nominal current (AC-51)</i>		Ie AC-51		35	40	A rms
非重复过载电流 / <i>Non repetitive overload current</i>	tp=10ms (图3/ Fig. 3)	Itsm	2000	2200		A
通态电压降 / <i>On state voltage drop</i>	@ 25°C	Vt			0,9	V
通态动态电阻 / <i>On state dynamic resistance</i>		rt			15	mΩ
输出功率消耗 (最大值) / <i>Output power dissipation (max value)</i>		Pd	$0,9 \times 0,9 \times I_e + 0,015 \times I_e^2$			W
结和外壳之间的热阻 / <i>Thermal resistance between junction to case</i>		Rthj/c			0,6	K/W
断态漏电流 / <i>Off state leakage current</i>	@ Ue typ, 50Hz	Ilk			3	mA
最小负载电流 / <i>Minimum load current</i>		Iemin	5			mA
接通时间 / <i>Turn on time</i>	@ Ue typ, 50Hz	ton max			0,05	ms
关断时间 / <i>Turn off time</i>	@ Ue typ, 50Hz	toff max			10	ms
工作频率 / <i>Operating frequency range</i>	F mains	f	0,1	50-60	400	Hz
断态 dv/dt / <i>Off state dv/dt</i>		dv/dt	500			V/μs
非重复最大 di/dt / <i>Maximum di/dt non repetitive</i>		di/dt			50	A/μs
I2t (<10ms)		I²t	800	1250		A²s
抗干扰水平 / <i>Conducted immunity I</i>	IEC/EN61000-4-4 (bursts)		4kV criterion A			
抗干扰水平 / <i>Conducted immunity level</i>	IEC/EN61000-4-5 (surge)		4kV criterion A			
短路保护 / <i>Short circuit protection</i>	见第6页/see page 6	Example	Fuse FERRAZ gRC 25A/32A 14x51			

通用特性 / *General characteristics (at 25°C)*

	Symbol		
输入-输出绝缘 / <i>Input to output insulation</i>	Ui	4000	VRMS
输出-外壳绝缘 / <i>Output to case insulation</i>	Ui	4000	VRMS
绝缘电阻 / <i>Insulation resistance</i>	Ri	1000 (@500VDC)	MΩ
额定脉冲电压 / <i>Rated impulse voltage</i>	Uimp	4000	V
保护等级 / <i>Protection level / CEI529</i>		IP20	
污染程度 / <i>Pollution degree</i>	-	2	
震动 / <i>Vibration withstand 10 -55 Hz according to CEI68</i>	double amplitude	1,5	mm
冲击 / <i>Shocks withstand according to CEI68</i>	-	30/50	g
环境温度 / <i>Ambient temperature (no icing, no condensation)</i>	-	-40 /+80	°C
储藏温度 / <i>Storage temperature (no icing, no condensation)</i>		-40/+125	°C
环境湿度 / <i>Ambient humidity</i>	HR	40 to 85	%
重量 / <i>Weight</i>		80	g
符合 / <i>Conformity</i>		EN60947-4-3 (IEC947-4-3)	
符合 / <i>Conformity</i>		EN60950 ULcUL	
外壳材料 / <i>Housing Material</i>		PA 6/6 UL94VO	
底板 / <i>Base plate</i>		Aluminium, nickel-plated	

图2/ Fig. 2 热量曲线和散热器选择 / *Thermal curves and heatsink choice*

12K/W 对应于继电器无散热器 / *12K/W corresponds to a relay without heatsink.*

6K/W 对应于继电器安装在 DIN 导轨适配器上. 如celduc的产品 1LD12020.

*6K/W corresponds to a relay mounted on a DIN rail adaptor like celduc 1LD12020*

图3/ Fig 3 : 过载电流 / *Overload currents*

**1** -不能再通电的**非重复** $I_{tsm}$  的获得, 这一曲线被用于确认固态继电器的保护.

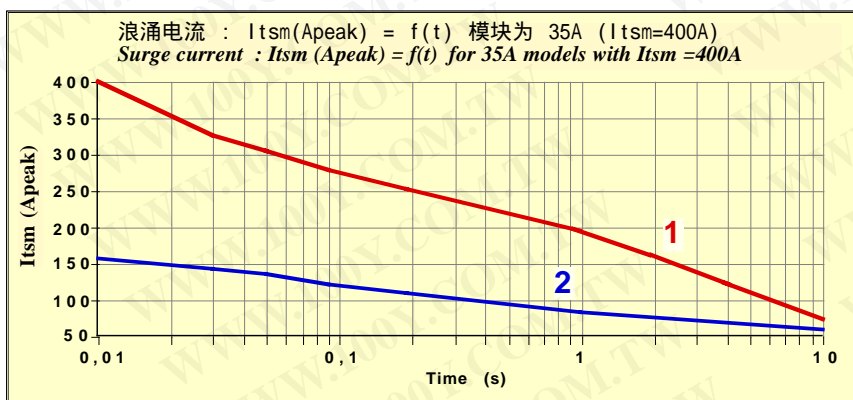
*1 - No repetitive  $I_{tsm}$  is given without voltage reapplied. This curve is used to define the protection (fuses).*

**2** -初始温度 $T_j = 70^\circ\text{C}$  时的浪涌电流所产生的**重复的** $I_{tsm}$ , 通常情况下, 不允许超过此曲线.

注意: 重复的浪涌电流会减少固态继电器的预期寿命.

*2 - Repetitive  $I_{tsm}$  is given for inrush current with initial  $T_j = 70^\circ\text{C}$ . In normal operation, this curve mustn't be exceeded.*

*Be careful, the repetition of the surge current decreases the life expectancy of the SSR.*



→ **警告 !** 在负载和主回路之间半导体继电器不提供任何电隔离, 总是使用有隔离性能的适合的断路器或相似的设备连接, 是为了错误功能发生和当继电器必须从主回路被隔离时保证可靠的绝缘 (维护: 如果在一个较长的时间里没有被使用...).

→ **Warning !** *semiconductor relays don't provide any galvanic insulation between the load and the mains. Always use in conjunction with an adapted circuit breaker with isolation feature or a similar device in order to ensure a reliable insulation in the event of wrong function and when the relay must be insulated from the mains (maintenance ; if not used for a long duration ...).*



连接 / *Connections*

直接接线有或没有套圈 /

*Direct connection with wires with or without ferrules*

有压接端子(环形端子) /

*With ring terminals*

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控制接线 / *Control wiring*

导线号 / Number of wires				螺丝起子类型 / Screwdriver type	推荐的扭矩 / Recommended Torque
1	2	1	2		
单根硬线 (没有套圈) SOLID (No ferrule)	多根软线 (有套圈) FINE STRANDED (With ferrule)	单根硬线 (没有套圈) SOLID (No ferrule)	多根软线 (有套圈) FINE STRANDED (With ferrule)		M4
					N.m
0,75 ... 2,5 mm <sup>2</sup> AWG18....AWG14	0,75 ... 2,5 mm <sup>2</sup> AWG18....AWG14	0,75 ... 2,5 mm <sup>2</sup> AWG18....AWG14	0,75 ... 2,5 mm <sup>2</sup> AWG18....AWG14	POZIDRIV 2	1,2

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主回路接线 / *Power wiring*

导线号 / Number of wires				螺丝起子类型 / Screwdriver type	被推荐的扭矩 / Recommended Torque
1	2	1	2		
单根硬线 (没有套圈) SOLID (No ferrule)	多根软线 (有套圈) FINE STRANDED (With ferrule)	单根硬线 (没有套圈) SOLID (No ferrule)	多根软线 (有套圈) FINE STRANDED (With ferrule)		M5
					N.m
1,5 ... 10 mm <sup>2</sup> AWG16....AWG8	1,5 ... 6 mm <sup>2</sup> AWG16....AWG10	1,5 ... 10 mm <sup>2</sup> AWG16....AWG8	1,5 ... 6 mm <sup>2</sup> AWG16....AWG10	POZIDRIV 2	2

主回路用的环形端子 / *Power with ring terminals.***W max =12,6mm**16 mm<sup>2</sup> (AWG6)25 mm<sup>2</sup> (AWG4)35mm<sup>2</sup> (AWG2 /AWG3)50mm<sup>2</sup> (AWG0 /AWG1)

用于大电流的适配的环形端子和专用配件也能制造:  
详见大电流固态继电器和数据页中的主回路连接部分. / Suitable ring terminals and special kit for high current can be delivered: see high power SSR and data-sheet for power connexion.

**可选 / Options :** 快速连接端子 / FASTONS :和我们联系 / *Consult us*用于大电流的特殊装备 / **Special kit for high current:****1LK00700**35mm<sup>2</sup> (AWG2)50mm<sup>2</sup> (AWG0)

对大电流, 主回路断子上的盖子必须被移去. (无 IP20 保护) . /

For high currents, power flap must be removed ( no IP20)

## 安装 / Mounting:

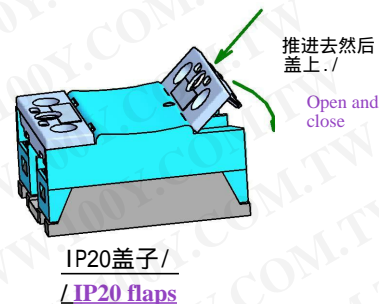
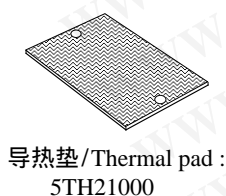
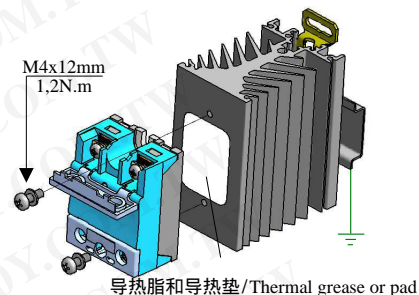
- **okpac®** 系列固态继电器必须被安装在散热器上。  
可用到的散热器是一个大的系列。  
见下面的例子,且在 [www.celduc.com](http://www.celduc.com) 上可找到 "WF" 系列散热器。

*okpac® SSRs must be mounted on heatsinks. A large range of heatsinks is available.*

*See below some examples and "WF" range on [www.celduc.com](http://www.celduc.com).*

- 对散热器的安装,必须使用 **celduc®** 指定的导热脂和导热垫使其具有高的热传导能力。

*For heatsink mounting, it is necessary to use thermal grease or thermal pad with high conductivity specified by **celduc®**.*



## 典型负载 / Typical LOADS

- S07 系列产品被设计用于大电感负载和相位角控制器的应用。  
在我们的数据页中,功率闸流管的电流对应电阻负载 (AC-51)。  
对不同的负载,应注意接通时的冲击电流和关断时可能的过电压。  
主要应用:

\* AC-55b: 白炽灯或红外灯: 在10ms内冲击电流是通常电流的10倍,随机触发的S07系列通常使用在相位角控制器和需正确控制的软启动器。

\* AC-53: 三相马达: 2 个或 3 个 S07 能驱动一个马达。

\* AC-56a: 变压器负载: 有非常高的冲击电流,最大到100倍的  $I_n$ , 我们建议用随机触发的固态继电器S07系列或选择专门设计用于变压器控制的SCP系列。

下面的表格中给出的电流值是为了有一个恰当的预期寿命。

*S07 products are designed for high inductive loads or phase angle control applications.*

*We give in our data-sheet, nominal current of power thyristors corresponding to a resistive load (AC-51)*

*Depending on the loads, check the inrush current at turn ON and possible overvoltages at turn OFF.*

*Main applications:*

\* **AC-55b:** Incandescent or Infrared lamps : Inrush current is generally 10 times  $I_n$  during few 10ms. Random S07 often use in phase angle controllers or soft-starters with the right control

\* **AC-53:** Three phase motors. 2 or 3 S07 can drive such motors.

\* **AC-56a:** Transformers loads : Very high inrush current up to 100 times  $I_n$  . We advise to use random SSR like S07 or choice our SCP range specially designed for transformers control.

*We give in the table below some values of current to have a correct lifetime expectancy.*

固态继电器模块 SSR model	电流 AC-51 (电阻) AC-51 Current (resistor)	电流 AC-53 (马达) AC-53 Current (motor)	电流 AC-55b (灯) AC-55b Current (lampe)	电流 AC-56a (变压器) AC-55b Current (transfo)
12A	12A	2.5A	2.5A	0,4A
25A	25A	5A	5A	1A
35A	35A	9A	9A	2A
50A	50A	12A	12A	3A
75A	75A	16A	16A	6A
95A	95A	24A	24A	9A
125A	125A	32A	32A	12A

## 保护 / Protection :

→ 为保护固态继电器以抵抗负载的短路,使用熔丝的  $I^2t$  的值 =  $1/2 \times$  (第二页规定的  $I^2t$  的值)。  
所做的试验是用 FERRAZ 熔丝。

用MCB保护固态继电器也是可行的(微型断路器)。

在此情况下,看应用指南(固态继电器保护)和使用一个有高的  $I^2t$  值的固态继电器(最小 $5000A^2s$ )。

*To protect the SSR against a short-circuit of the load, use a fuse with a  $I^2t$  value =  $1/2 I^2t$  value specified page 2.*

*A test has been made with FERRAZ fuses.*

*It is possible to protect SSR by MCB (miniature circuit breaker).*

*In this case, see application note (SSR protection) and use a SSR with high  $I^2t$  value ( $5000A^2s$  minimum).*

## EMC :

→ 抗干扰性 : 对这些固态继电器,根据主要的标准:EN61000-4-4 & 5,在数据上也给出了抗干扰性的等级。  
和市场上的产品比较,你能看到高的抗干扰水平。

### Immunity :

*We give in our data-sheets the immunity level of our SSRs according to the main standards for these of products: IEC/EN61000-4-4 & IEC/EN61000-4-5.*

*You can see the high immunity level in comparison with the products on the market.*

→ 辐射 : celduc固态继电器的设计主要符合元器件的标准 classe A (工业)。

在家庭环境中使用这些产品可能会引起无线电干扰,在这种情况下用户必需使用另外的设备。

固态继电器是一个综合设备它必须和别的元器件相互连接(负载,电缆,等)构成的系统。因为别的元器件或相互的连接不在

celduc®,的控制下,确定包含固态继电器的系统遵从可适用的系统水平的任何规则和规章的需求将是系统整合之人的职责。

市场上大部分的固态继电器过零触发电压通常高于50Volts,而SO8系列具有很低的过零触发电压(<12Volts),从而改善了传导辐射的水平。

考虑 celduc® 的建议,在我们的实验室试验被预先完成。

**Emission:** celduc® SSRs are mainly designed in compliance with standards for class A equipment (Industry).

Use of this product in domestic environments may cause radio interference. In this case the user may be required to employ additionnal devices to reduce noise. SSRs are complex devices that must be interconnected with other equipment (loads, cables, etc.)

to form a system. Because the other equipment or the interconnections may not be under the control of celduc®, it shall be the responsibility of the system integrator to ensure that systems containing SSRs comply with the requirement of any rules and regulations applicable at the system level.

The very low zero cross voltage of SO8 range (<12Volts) improves the conducted emission level in comparison with most of SSRs on the market with zero cross voltage often higher than 50Volts.

Consult celduc® for advices. Tests can be preformed in our laboratory.