

Data sheet

CI-tronic™ Soft starters for Danfoss commercial **compressor applications**Type MCI 15C, MCI 25C, MCI 50CM-3 I-O



The MCI compressor soft starters are designed for soft starting of 3 phase compressors. During start the MCI will gradually increase the voltage to the motor until it reaches full line voltage.

The soft start ramp-up time and initial start torque is preset to ensure a fast start and allow easy and quick installation.

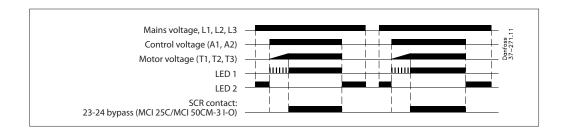
MCI compressor soft starters are ideal for use on Danfoss Performer scroll and Maneurop Reciprocating compressors. The starting current can be reduced by up to 40% of the direct on line

Features

- Universal control voltage: 24 480 V AC/DC
- · Automatic detection of missing phases
- · LED Status indication.
- Automatic adaptation to 50/60 Hz
- Easy and quick installation
- Up to 12 start/stop operations per hour
- · Built in varistor protection
- IP20 Protection
- · Compact modular design
- DIN rail mountable
- Ramp-time max. 0.5 s (factory set-up)
- EN 60947-4-2



Functional diagram



Functional description

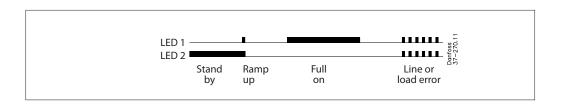
Start

During ramp-up the controller will gradually increase the voltage to the motor from the preset initial torque value until it reaches full line voltage. The actual ramp time is digitally calculated and will not be influenced by net frequency or load variations.

Bypass mode (contact 23-24, only MCI 25C/ MCI 50CM-3 I-O)

The auxiliary contacts are made possible by means of SCR technology and will only switch correctly on a.c. current. The contact is intended for operating an external bypass contactor. The contact will close when the controller is in steady state operation, see application example page 7.

LED status indication





Soft starter selection guide

Performer $^{\circ}$ scroll compressors Motor voltage code 4, 400 V - 3 phase - 50 Hz / 460 V - 3 phase - 60 Hz

Compressor model	Soft starter type Ambient temp. max. 40 °C	Soft starter type Ambient temp. max. 55 °C	
SM/SZ 084		MCI 15C	
SM/SZ 090	MCI 15C	MCI 13C	
SM/SZ 100	MCI 13C	MCI 35C	
SM/SZ 110		MCI 25C	
SM/SZ 115-125			
SM/SZ 120		MCI 25C ¹)	
SM/SZ 160	MCI 25C		
SM/SZ 148-161			
SM/SZ 175-185			
SY/SZ 240	MCLEOCM 21 Q 1)	MCLEOCM 2 LO 1)	
SY/SZ 300	MCI 50CM-3 I-O 1)	MCI 50CM-3 I-O 1)	
SZ 380	MCI 50CM-3 I-O 1)	MCI 50CM-3 I-O 1)	

 $^{^{\}mbox{\scriptsize 1}}\!)$ The controller must be by-passed in steady state mode. See application example page 7

Maneurop® compressors

Motor voltage code 4, 400 V - 3 phase - 50 Hz / 460 V - 3 phase - 60 Hz

Compressor model	Soft starter type Ambient temp. max. 40 °C	Soft starter type Ambient temp. max. 55 °C	
MT/MTZ 18-22			
MT/MTZ 28			
MT/MTZ 32			
MT/MTZ 36			
MT/MTZ 40		MCI 15C	
MT/MTZ 44-50	MCI 15C	MCLISC	
MT/MTZ 45-51			
MT/MTZ 56			
MT/MTZ 57-65			
MT/MTZ 64			
MT/MTZ 72-73-80-81		MCI 25C	
MT/MTZ 100			
MT/MTZ 125	MCI 25C	MCI 25C 1)	
MT/MTZ 144	MICI 25C	IVICI 25C ·)	
MT/MTZ 160			

¹⁾ The controller must be by-passed in steady state mode. See application example page 7

MCI C Soft Starter selection

Туре	Operational voltage	Module dimensions	Code no.
туре	[V AC]	[mm]	Code no.
MCI 15C	380 – 480	45	037N0076
MCI 25C	380 – 480	90	037N0077
MCI 50CM-3 I-O	380 – 480	180	037N0401



Technical data

Output specifications		MCI 15C	MCI 25C	MCI 50CM-3 I-O
Operational voltage	V AC	380 – 480	380 – 480	380 – 480
Operational current (AC-3, AC-53a, AC-53b)	max.	15 A	25 A / 30 A	35 A / 50 A
Ramp up time (preset)	max.	0.4 s	0.4 s	0.5 s
Leakage current	max.	5 mA	5 mA	5 mA
Operational current	min.	50 mA	50 mA	50 mA
Overload relay trip class		Class 10	Class 10	Class 10
Semiconductor protection fusing:				
Type 1 ¹) co-ordination		50 A gL/gG	100 A gL/gG	125 A gL/gG
Type 2 ²) co-ordination I ² t(t=10 ms)		1800 A ² S	6300 A ² S	25300 A ² S
Rating index:				
AC-53a Asynchronous motors ³)		15A: AC-53a: 8-3: 100-3000	25A: AC-53a: 8-3: 100-3000	35A: AC-53a: 6-6: 100-120
AC-53b Asynchronous motors with bypass		-	30A: AC-53b: 6-3: 30	50A: AC-53b: 6-3: 30

¹⁾ Type 1 coordination require that, under short-circuit conditions, the device shall cause no danger to persons or installation and may not be suitable for further use without repair and replacement of parts

Control circuit specifications

Control circuit specifications				
Control voltage range			24 – 480 V AC/DC	
Pick-up voltage	max.	20.4 V AC/DC		
Drop-out voltage	min.	5 V AC/DC		
Control current for no operation	max.	1 mA		
Control current / power	max.	15 mA / 2 VA		
Response time	max.	70 ms		
SCR by-pass contact, optional				
Voltage / current (AC-14, AC-15)	max.	24 – 240 V / 0.5A	24 – 240 V / 0.5A	24 – 240 V / 1.0A
Fuse	max.	10 A gL/gG, I ² t max. 72 A ² s		
EMC immunity		Meets requirements of EN 50082-1 and EN 500082-2		

Insulation

Rated insulation voltage U _i	660 V AC	
Rated impulse withstand voltage U _{imp}	4 kV	
Installation category	III	

Thermal specification

Cooling method	Natural convection		
Mounting	Vertical +/- 30°		
Storage temperature range	-20 °C − 80 °C		
Enclosure degree / pollution degree	IP20 / 3	IP20 / 3	IP10/3
Power dissipation, continuous duty max.	2 W/A	2 W/A	3 W/A
Power dissipation, intermittent duty max.	$2W/A \times duty cycle$ $2W/A \times duty cycle$ $3W/A \times duty cycle$		

Materials

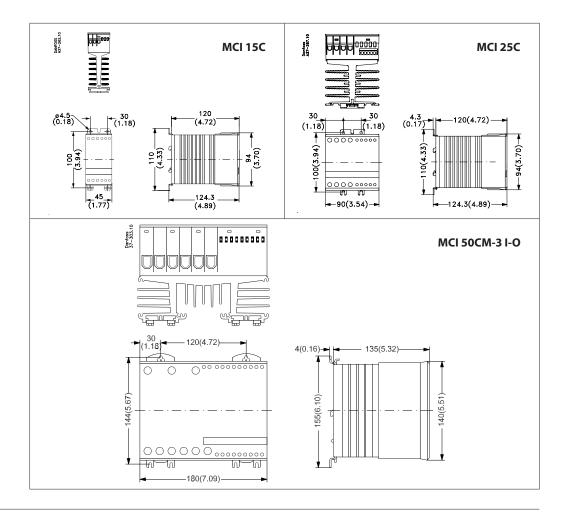
Housing self extinguishing	PPO UL94V1
Heatsink aluminium	Black anodized
Base	Electroplated steel

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Type 2 coordination require that, under short-circuit conditions, the device shall cause no danger to persons or installation and shall be suitable for further use

3) 15A: AC-53a: 8-3:100-3000 means max. load 8x15A for 3 seconds. 100% ON-load factor or 3000 operations per hour

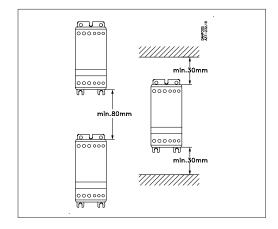
Dimensions



Mounting instructions

The controller is designed for vertical mounting. If the controller is mounted horizontally the load current must be reduced by 50%.

The controller needs no side clearance. Clearance between two vertical mounted controller must be minimum 80 mm (3.15"). Clearance between controller and top and bottom walls must be minimum 30 mm (1.2").





Overload and short circuit protection

Overload and short circuit protection is easily achieved by installing a circuit breaker on the line side of the motor controller. Select the circuit breaker from the table below.

Be aware of the maximum prospective short circuit current breaking capacity. For further information please refer to the data sheet on the circuit breaker.

Performer® scroll compressors

Motor voltage code 4 / 400 V - 3ph - 50 Hz / 460 V - 3ph - 60 Hz				
Compressor tupo	Compressor max. current	Danfoss CTI		
Compressor type	[A]	Туре	Code no.	
SM/SZ 084	17	CTI 25M	047B3150	
SM/SZ 090	17	CTI 25M	047B3150	
SM/SZ 100	19	CTI 25M	047B3151	
SM/SZ 110	20	CTI 25M	047B3151	
SM/SZ 115	25	CTI 25M	047B3152	
SM/SZ 120	29	CTI 25M	047B3152	
SM/SZ 125	25	CTI 25M	047B3152	
SM/SZ 148	32	CTI 45MB	047B3164	
SM/SZ 161	32	CTI 45MB	047B3164	
SM/SZ 160	29	CTI 25M	047B3152	
SM/SZ 175	35	CTI 45MB	047B3164	
SM/SZ 185	35	CTI 45MB	047B3164	
SY/SZ 240	50	CTI 45MB	047B3165	

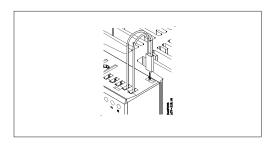
Maneurop® reciprocating compressors

Motor voltage code 4 / 400 V - 3ph - 50 Hz / 460 V - 3ph - 60 Hz				
Compressor type	Compressor max. current	Danfoss CTI		
Compressor type	[A]	Туре	Code no.	
MT/MTZ 18	5	CTI 25M	047B3147	
MT/MTZ 22	6	CTI 25M	047B3148	
MT/MTZ 28	7.5	CTI 25M	047B3148	
MT/MTZ 32	8	CTI 25M	047B3149	
MT/MTZ 36	9	CTI 25M	047B3149	
MT/MTZ 40	10	CTI 25M	047B3149	
MT/MTZ 44	9.5	CTI 25M	047B3149	
MT/MTZ 45	9.5	CTI 25M	047B3149	
MT/MTZ 50	12	CTI 25M	047B3150	
MT/MTZ 51	11.5	CTI 25M	047B3149	
MT/MTZ 56	12	CTI 25M	047B3150	
MT/MTZ 57	12	CTI 25M	047B3150	
MT/MTZ 64	15	CTI 25M	047B3150	
MT/MTZ 65	14	CTI 25M	047B3150	
MT/MTZ 72	15.5	CTI 25M	047B3150	
MT/MTZ 73	17	CTI 25M	047B3150	
MT/MTZ 80	18	CTI 25M	047B3151	
MT/MTZ 81	19	CTI 25M	047B3151	
MT/MTZ 100	22	CTI 25M	047B3151	
MT/MTZ 125	27	CTI 25M	047B3152	
MT/MTZ 144	30	CTI 45MB	047B3164	
MT/MTZ 160	36	CTI 45MB	047B3164	

Overheat protection

If required, the controller can be protected against overheating by inserting a thermostat in the slot on the right-hand side of the controller.

Order: UP 62 thermostat, code no. **037N0050**For wiring connections see application examples below.

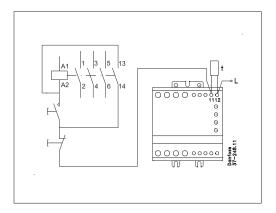




Application examples

Overheat protection

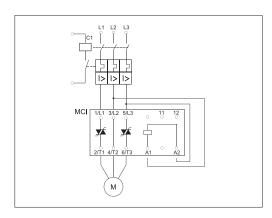
The thermostat is connected in series with the control circuit of the main contactor. When the temp. of the heat sink exceeds 90 °C the main contactor will be switched OFF. This circuit requires manual reset to restart the motor.



Line controlled soft start

When the contactor K1 is switched to the ONstate, the soft starter will start the motor, according to the settings of the ramp-up time and initial torque adjustments. When the contactor K1 is switched to the OFF-state the motor will be switched off instantaneously. In this application the contactor will have no load during opertion.

The contactor will carry and break the nominal motor current.



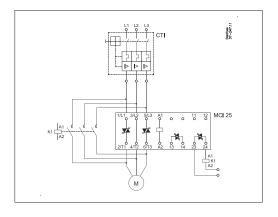
MCI 25 with bypass contactor

By means of the built-in auxiliary contact the bypass function is easily achieved, see wiring diagram from the side.

No heat is generated from the MCI.
As the contactor always switches in no-load

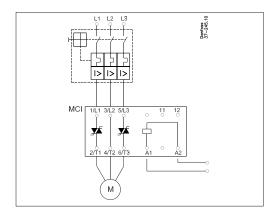
condition it can be selected on the basis of the thermal current (AC-1).

(13-14 contact not applicable with MCI 25C and MCI 50CM-3 I-O).



Input controlled soft start

When the control voltage is applied to A1 - A2, the MCI soft starter will start the motor, according to the settings of the Ramp-up time and Initial torque adjustments. When the control voltage is switched OFF, the motor will switch off instantaneously.



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