

The EC series of Electronic Controllers are made up of many models to cover the many applications in commercial refrigeration and air-conditioning applications, with different input sensor requirements. Each data sheet makes reference to the sensors which are applicable to the specific controller in question however, this data sheet details the technical specification of each sensor enabling the application engineer to select the correct sensor for the application.

For easy orientation there are cross reference charts which help designer to select the correct accessory to a specific controller.

Accessories described in this data sheet

- Temperature sensors:
 - ECN series
 Application :
 - EC2-2xx/-3xx Display case controllers
 - EC2-5xx/-7xx Condensing unit-, condenser controllers
 - EC3-3xx Cold room controllers
 - EC3-xxx Compressor pack-, condenser controllers
 - EC3-X3x Superheat controllers
 - EXD-Uxx Universal controllers

- Humidity (& temp.) sensors:
 - ECS series
 Application :
 - EC1-1xx universal series

- Transformers:
 - ECT-xxx

Accessories described in other data sheets

- Pressure sensors:
 - PT4 series see data sheet A3.5.052
 Application :
 - EC1-1xx universal series see data sheet A3.5.027E

- infrared remote controls:
 - EC1-IRx for use with
 - EC1-0xx temp. series see Data sheet A3.5.018E
 - EC1-1xx Universal series see Data sheet A3.5.018E
 - EC2-xxx Display case controllers see Data sheet A3.5.018E

Introduction

Electromechanical thermostats have been commonly used in HVAC and Refrigeration applications for many years due to their reliability, low cost and ease of installation and adjustment.

With modern electronic technology many new and added features became feasible and led to the arrival of true parametric electronic controllers. The data sheets below are available to provide detailed technical information. However, to enable each controller to operate, each unit requires an input source from a sensor. Full technical details of each sensor are specified in this Data sheet.

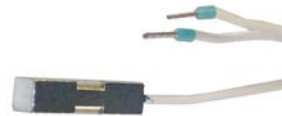
The ALCO CONTROLS EC2, EC3 and EXD series are state-of-the-art Electronic Controllers and are available for the following applications :



ECN-Sxx



ECS-TH1



ECN-Pxx



ECS-TH2



ECN-Fxx



ECN-Hxx



ECx-IRx



ECN-Nxx



ECT-123

Controller type	Function	Input source	Data sheet
EC2 display case	Temp.	ECN series	A3.5.018
EC3 cold room	Temp. / Pressure	ECN series / PT4 series	A3.5.041 / A3.5.052
EC3 rack, condenser	Temp. / Pressure	ECN series / PT4 series	A3.5.042 / A3.5.052
EC3-X superheat,	Temp. / Pressure	ECN series / PT4 series	A3.5.060/061 / A3.5.052
EXD-U universal stepper, EXD-C	Temp. / Pressure	ECN series / PT4 series	A3.5.048 / A3.5.052
EC1-110 universal	Humidity / Pressure	ECS series / PT4 series	A3.5.027 / A3.5.052

Brief Description

ECN temperature probe series

A range of temperature probes for universal use including the EC1, EC2, EC3 and EXD Controller series. The **ECN-Sxx** air sensors are designed to provide reliable high performance at a competitive price.

The **ECN-Pxx** pipe sensors are designed to measure the saturated temp. and the suction temp. for use with EC2 and EC3 display case- and cold room controllers.

In most EC2 / EC3 series applications, the air out or discharge temp. sensor may be used to terminate the defrosting process. However, in some instances the defrost termination would be more reliable with a dedicated defrost termination sensor (Fin). The **ECN-F50** fin sensors have a clip to fit onto the edge of an evaporator fin and should be mounted towards one end of the evaporator coil where a significant amount of ice forms.

ECN-Hxx are calibrated for discharge temperature sensing in the range between 50° and 150°C.

ECN-Nxx are used with EC3-X3 or EC3-3 controllers to measure superheat. Normal 1/4" or 6 mm tubes can be modified for use as sensor bulb wells.

ECN-C60 are used with EXD-C or EXD-S controllers to measure superheat. Normal 1/4" or 6 mm tubes can be modified for use as sensor bulb wells.

PT4 Pressure Transmitters series

The PT4 series of pressure transmitters have a Piezo resistive element fitted within a fail safe housing. The transmitters are available in four nominal ranges :

- 0.8 ... 7 bar: suitable for low pressure evaporator control
- 0 ... 18 bar: suitable for intermediate pressure control such as condensing pressure.
- 0 ... 30 bar: typically used for controlling high pressure associated with compressor switching.
- 0 ... 50 bar: typically used for controlling high pressure associated with R 410A.

The PT4 series produce a 4 ... 20mA output signal. Further details are available in data sheet A3.5.052

ECS Humidity/ temperature series

The ECS series are active humidity / temperature sensors suitable for a wide variety of refrigeration and air conditioning applications. Although Alco controllers are most commonly available for mA current signals, the ECS series may be switched easily between voltage or current. There are two main types available, wall mounted for general purpose or a duct mounted model specifically tailored for air conditioning applications. Each unit houses two independent sensors, one for humidity and the other for temperature.

The respective operating ranges are: 10 ... 90% relative humidity and 0 ... 50°C. In order to monitor or control both humidity and temperature, an independent EC1-0x0 series 4 ... 20mA controller is required for each input.

An important feature is the wide supply voltage range, which is acceptable, from 12 ... 24 VAC or 9 ... 30 VDC.

ECT transformers

The transformers series are split into three sectors.

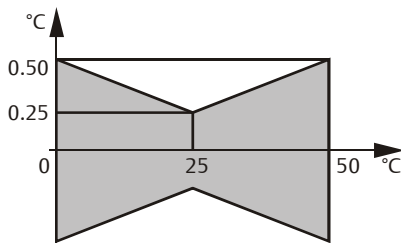
The **ECT-123** series are 12V output units designed to be used with all EC1 series controllers.

The **ECT-323 / ECT-523** series are designed for use with the 24V EC2 Display case controller and has sufficient power to drive the EX2 expansion valve. ECT-323 / The ECT-523 series may also be used to power the EC3 rack- and condenser controller units as well as the EXD controller series.

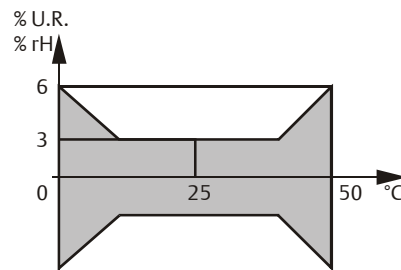
The **ECT-623** transformers with 24 V nominal output voltage and 60VA are for use with EC3 series and allow DIN-rail mounting.

All units have fully immersed windings and are double insulated. Input and output connections are via screw terminal blocks for cables with maximum 1.5mm².

ECS Series: Error Relative to Temperature



Temperature measurement (NTC res.), range 0 ... 50°C



Humidity measurement range 0 ... 50°C

Sensor Selection Chart
NTC Temperature Probes

Type	Part Code Nr.	Cable length	Sensor Type	Output
ECN-S15	804 304	1.5m	Air, NTC, 10kΩ @ 25°C	non active
ECN-S30	804 305	3.0m	Air, NTC, 10kΩ @ 25°C	non active
ECN-S60	804 284	6.0m	Air, NTC, 10kΩ @ 25°C	non active
ECN-P30	804 280	3.0m	Pipe, NTC, 10kΩ @ 25°C	non active
ECN-P60	804 281	6.0m	Pipe, NTC, 10kΩ @ 25°C	non active
ECN-P80	804 282	8.0m	Pipe, NTC, 10kΩ @ 25°C	non active
ECN-F60	804 283	6.0m	Defrost/Fin, NTC, 10kΩ @ 25°C	non active
ECN-H60	804 359	6.0m	High Temp. NTC, 1MΩ @ 25°C	non active
ECN-N30	804 496	3.0m	EC3-X Superheat, NTC, 10kΩ @ 25°C	non active
ECN-N60	804 497	6.0m	EC3-X Superheat, NTC, 10kΩ @ 25°C	non active
ECN-N99	804 499	12.0m	EC3-X Superheat, NTC, 10kΩ @ 25°C	non active
ECN-C60	804 514	6.0m	EXD Superheat, NTC, 10kΩ @ 25°C	non active

Pressure Transmitters, Piezo Resistive

Type	Part Nr	Output	Connection
PT4-07S	802 320	4-20mA	¼" SAE female
PT4-18S	802 322	4-20mA	¼" SAE female
PT4-30S	802 324	4-20mA	¼" SAE female
PT4-50S	802 326	4-20mA	¼" SAE female

Cable plug assemblies for Pressure Transmitters

Type	Part Nr.	Length	Temp. Rang
PT4 – L15	804 593	1,5 m	-50 ... +80 °C
PT4 – L30	804 594	3,0 m	-50 ... +80 °C
PT4 – L60	804 595	6,0 m	-50 ... +80 °C

Humidity and Temperature Sensors

Type	Part Code Nr	Version	Output	Range	Connection
ECS-TH1	804 355	Wall mounted	4 ... 20mA or mV	10 ... 90% RH	Screw max. 1.5mm ²
ECS-TH2	804 356	Duct mounted		0 ... 50°C	Screw max. 1.5mm ²

Note: Two independent sensors in one housing. Other models available upon request.

Transformers

Type	Part Code Nr	Primary	Secondary	Power	
ECT-112	804 306	110V AC	12V	3 VA	
ECT-123	804 307	230V AC	12V	3 VA	
ECT-523	804 332	230V AC	24V	20 VA	
ECT-323	804 424	230V AC	24V	25 VA	DIN rail mounting
ECT-623	804 421	230V AC	24V	60 VA	DIN rail mounting

Infrared Remote Control

Language	EC2 Case Controller, ECD-001 Display	Part Code Nr
English	EC2-IRE	804 345
French	EC2-IRF	804 347
German	EC2-IRD	804 346
Italian	EC2-IRI	804 349
Spanish	EC2-IRS	804 348

Cold Side of Refrigeration Circuit

		Part Nr.	EC2-21x EC2-29x	EC2-31x EC2-39x	EC2-35x EC2-37x	EC3-33x	EC3-X3x EC3-D7x	EXD-U	EXD-C
Thermo®-Expansion Valve		TI, T, ZZ	1						
Solenoid Valve		110, 200, 240	1						
Pulse-Modulated Electronic Expansion Valve		EX2-M00	801 091	1	1				
		EX2-I00	801 090						
Coil		ASC	801 052	1	1				
	1.5 m	ASC-N15	804 570						
Cable w. DIN Connector		3 m	ASC-N30	804 571	1	1			
-25 ... +80°C, std.		6 m	ASC-N60	804 572					
Cable -50 ... +80°C, UL		6 m	ASC-L60	804 575					
Orifice (6 sizes)		EXO-004 ... -00X		1 opt.	1 opt.				
Stepper Motor Electronic Expansion Valve EX4, EX5, EX6, EX7 valve w/o plug		see data sheet EX48_35008				1	1	1	1
Stepper Motor Electr. Expansion Valve incl. DIN Plug		EX8-M21	801 964						
		EX8-I21	801 970						
Cable & Conn. Assy. for EX4, EX5, EX6, EX7		1.5 m	EX5-N15	804 650					
-25 ... +80°C, std.		3 m	EX5-N30	804 651			1	1	1
-50 ... +80°C, UL		6 m	EX5-N60	804 652					
-25 ... +80°C, with ctrlr. plug		6 m	EX5-L60	804 655					
-25 ... +80°C, with ctrlr. plug		6 m	EX5-C60	804 658					
Opt. plug for EX4/EX5/EX6/EX7		EX5-NM6	804 659			*		*	*
Air Sensors		1,5m	ECN-S15	804 304					
Single Insulated (optional double insulated) *		3 m	ECN-S30	804 305	2	2	2	2	
		6 m	ECN-S60	804 284					
Pipe Sensors EC		3 m	ECN-P30	804 280					
		6 m	ECN-P60	804 281		2	1	1	1 opt.
		8 m	ECN-P80	804 282					
Pipe Sensor EC3-X3 (suction gas)		3 m	ECN-N30	804 496					
		6 m	ECN-N60	804 497			1		
		12 m	ECN-N99	804 499					
Pipe Sensor EXD-C		6 m	ECN-C60	804 514					1
Defrost Sensor with Clip		6 m	ECN-F60	804 283	1 opt.	1 opt.	1 opt.	1 opt.	
Pressure Transmitter			PT4-07S	802 320			1		1
			PT4-18S	802 322					
			PT4-30S	802 324					
			PT4-50S	802 326					
Terminal Kit			K02-000	800 050	1	1	1		
			K03-210	807 650					
			K03-330	807 651			1		
			K03-X32	807 644					
			K03-X33	807 645			1		
			K03-331	807 648					
			K09-U00	804 559				1	
Display			ECD-001	807 641			opt. 1		
Connection cable display to controller		1 m	ECC-N10	807 860					
		3 m	ECC-N30	807 861			opt. 1		
		5 m	ECC-N50	807 862					
EC2 Ethernet cable to PC		6 m	ECX-N60	804 422	1	1	1		
Transformers									
12V, 3VA		230 V	ECT-123	804 307					
12/24V, 20VA		110 / 230 V	ECT-523	804 332	1	1	1	1	1
24V, 25VA; DIN-rail mount.		230 V	ECT-323	804 424	1 opt.	1 opt.	1 opt.	1 opt.	1 opt.
24V, 60VA; DIN-rail mount.		230 V	ECT-623	804 421	1 opt.	1 opt.	1 opt.	1 opt.	1 opt.
Uninterruptable Power Supply			ECP-024	804 558				1	1
Terminal Kit for ECP-024			K09-P00	804 560				1	1

Hot Side of Refrigeration Circuit

		Part Nr.	EC2-512 EC2-542	EC2-552	EC2-71x	EC2-74x
Air Sensors	1,5m	ECN-S15	804 304			
	Single Insulated					
	3 m	ECN-S30	804 305			1
	6 m	ECN-S60	804 284			
Discharge Sensor	6 m	ECN-H60	804 359	1		
Pressure	7 bar	PT4-07S	802 320	1	1	
Transmitters	18 bar	PT4-18S	802 322			
	30 bar	PT4-30S	802 324	1	1	1
	50 bar	PT4-50S	802 326			
Terminal Kit		K02-211	807 647	1		1
		K02-540	800 080	1	1	1
EC2 Ethernet cable to PC	6 m	ECX-N60	804 422	1	1	1
Transformer	12/24V, 20VA					
	110/230V	ECT-523	804 332			
	24V, 25VA	230 V	ECT-323	804 424	1	1
	24V, 60VA	230 V	ECT-623	804 421		

		Part Nr.	EC3-61x 1 Circuit	EC3-62x 1 Circuit	EC3-64x 1 Circuit	EC3-67x 1 Circuit	EC3-81x 2 Circuits	EC3-75x 1 Circuit	EC3-92x 1+1 Circuit
Air Sensors	1,5m	ECN-S15	804 304						
	Single Insulated								
	3 m	ECN-S30	804 305	1 opt.	1 opt.	1 opt.	1 opt.	1 opt.	1 opt.
	6 m	ECN-S60	804 284						
Discharge Sensor	6 m	ECN-H60	804 359	4 opt.	4 opt.		3 opt.		4 opt.
Pressure	7 bar	PT4-07S	802 320	1	1	1	1	2	1
Transmitters	18 bar	PT4-18S	802 322						1 opt.
	30 bar	PT4-30S	802 324	1 opt.	1 opt.	1 opt.	1 opt.		1
	50 bar	PT4-50S	802 326	1 opt.	1 opt.	1 opt.	1 opt.		1
Humidity Sensors		ECS-TH1	804 355					1	
		ECS-TH2	804 356						
Terminal Kit		K03-110	807 656			1			
		K03-610	807 652	1					
		K03-620	807 643		1				
		K03-640	807 653			1		1	
		K03-750	807 654					1	
		K03-920	807 655						1
Display		ECD-000	807 640	opt. 1 ea	opt. 1 ea	opt. 1 ea	opt. 1 ea	opt. 1 ea	opt. 1 ea
	Connection cable display to controller	ECC-N10	807 860						
		ECC-N30	807 861	opt. 1	opt. 1	opt. 1	opt. 1	opt. 1	opt. 1
		ECC-N50	807 862						
Transformer	12/24V, 20VA								
	110/230V	ECT-523	804 332						
	24V, 25VA	230 V	ECT-323	804 424	1	1	1	1	1
	24V, 60VA	230 V	ECT-623	804 421					

* Double insulated air sensors ECN-D can be used instead.

Technical Specification

ECN-Sxx series: single insulated temperature probes

Storage conditions	-50+105°C
Operating range	-50+105°C in air - -50+50°C in fluid
Connections	Stripped terminals, dimensions 5±1mm
Sensor	NTC 10kΩ ±1% at 25°C
Dissipation sector (in air)	approx. 3mW/°C /
Thermal constant in time (in air)	approx. 75s
Cable	Black, bipolar flat cable, sealed copper lead with 0.3mm ² cross section
Index of protection, sensitive element	IP67
Housing for sensitive element	Pilolefina
Classification according to protection against electric shocks (cable and sensor)	Supplementary insulation for 250Vac
Category of resistance against heat and fire	Non flame propagating cable

ECN-Dxx series: double insulated temperature probes

Storage conditions	-50+105°C
Operating range	-50+105°C in air - -50+50°C in fluid
Connections	Stripped terminals, dimensions 5±1mm
Sensor	NTC 10kΩ ±1% at 25°C
Dissipation sector (in air)	approx. 2,2mW/°C
Thermal constant in time (in water)	approx. 10s
Cable	Bipolar, double insulating sheath, AWG22 sealed copper lead with electrical resistance ≤63Ω/km - Insulator: TPE type specifically for immersion in water on external sheath, PPcop. on internal leads, external Ø 3.5mm max.
Index of protection, sensitive element	IP68 Immersion in water to 1m in depth for 200h at 70°C Resistance in saturated steam autoclave 30min. at 105°C
Housing for sensitive element	PPcop. with AISI 316 external cap
Classification according to protection against electric shocks (cable and sensor)	Supplementary insulation for 250Vac
Category of resistance against heat and fire	Non flame propagating cable

ECN-Nxx series, ECN-Pxx series Pipe and ECN-Fxx Fin temperature probes

Storage conditions	-30+105°C
Operating range	-30+105°C in air
Connections	Stripped terminals, dimensions 5±1mm
Sensor	CTN10K3 A1, 10kΩ ±1% at 25°C
Dissipation sector (in air)	approx. 2,2mW/°C
Thermal constant in time (in air)	approx. 75s
Cable	Bipolar, double insulating sheath, AWG22 sealed copper lead with electrical resistance ≤63Ω/km - Insulator: PVC type, external Ø 3.5mm
ECN-F60	Same sensor as ECN-P60, but with additional fin mounting clip
Index of protection, sensitive element	IP64
Housing for sensitive element	Thermal conductive epoxy with Copper/ tinned external casing
Classification according to protection against electric shocks (cable and sensor)	Supplementary insulation for 250Vac
Category of resistance against heat and fire	Non flame propagating cable

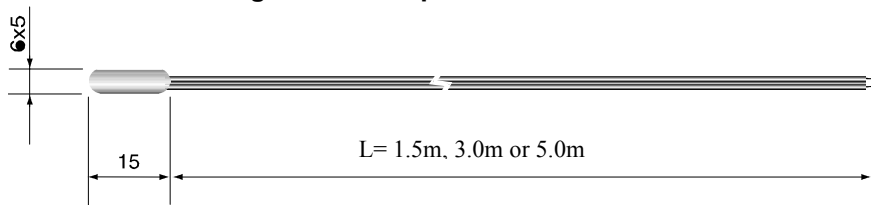
ECS-series: Humidity & temperature sensors

Refer to above ECN-Sxx or ECN-Dxx for respective NTC temperature probe

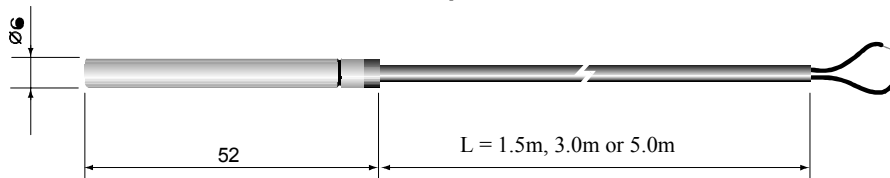
Mounting	ECS-TH1 : Wall mounted; ECS-TH2 : Duct mounted variable length fixing flange
Storage conditions	-20÷70°C, less than 100% rh, non condensing
Operating range	0÷50°C in air, 10÷90% rh, non condensing
Power supply	from 9V DC to 30 VDC ± 10% or 12V AC to 24V AC± 15%
Power & output connections	screw terminals for cables up to 1.5mm ²
Sensor Output signal	Humidity : 10mV/%rh or 4-20mA (0% = 4mA, 100% = 20mA) Temp. : 10mV/°C or 4-20mA (0°C = 4mA, 50°C = 20mA)
Sensor accuracy	Temp. : ±0.4 @ 25°C, ±1.2 for 0 to 50°C range Humidity : ±3% @ 25°C, ±6% over 0 to 50°C range
Thermal constant in time	Humidity : 15s (still air), 10s with 3m/s air flow Temp : 180s (still air), 60s with 3m/s air flow
Index of protection, sensitive element	IP40, IP54 with sintered cap
Index of protection, housing	IP55
Category of resistance against heat and fire	Non flame propagating cable

Physical dimensions, drawings

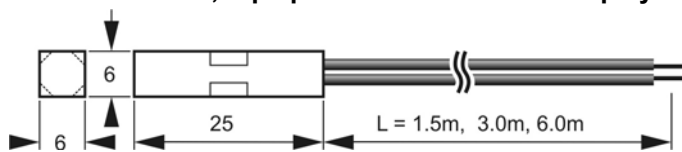
Temperature: ECN- Sxx single insulated probes



Temperature: ECN- Dxx, double insulated probes



Temperature: ECN- Pxx, Pipe probe for EC2 series Display case controller



Fin mounting clip (ECN-F60)



Temperature: ECN- Nxx, Pipe probe for EC3-X and EC3-3 series controller



Temperature: ECN- C60, Pipe probe for EXD-C and EXD-S series controller

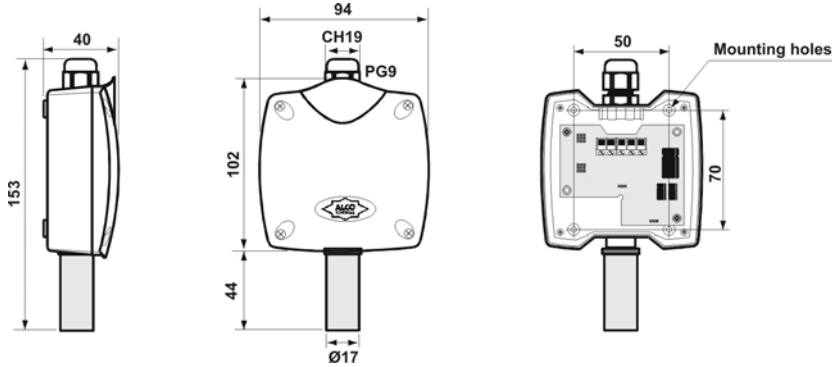


Pressure: PT4 series Pressure transmitter

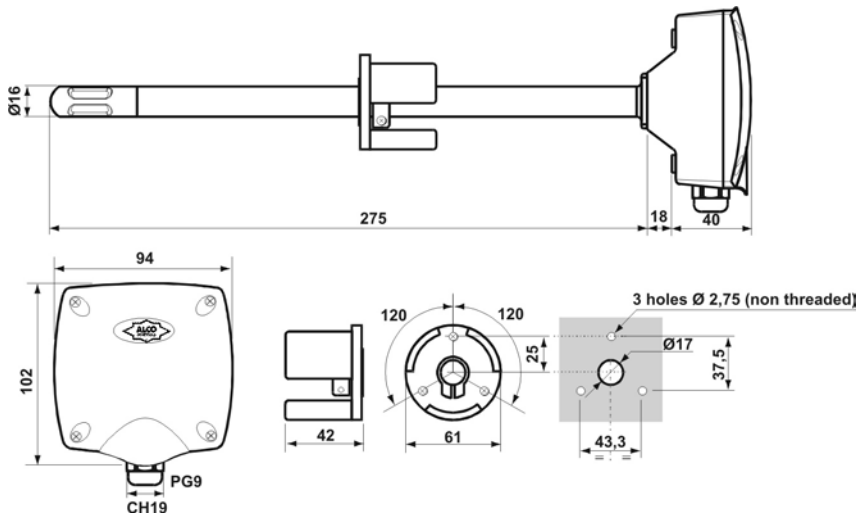
Refer to Data sheet A3.5.052 for more details

Humidity and Temperature : ECS series

ECS - TH1 : Wall mounted



ECS - TH1 : Duct mounted



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This document replaces all earlier versions.

Emerson Electric GmbH & Co. OHG ALCO CONTROLS Heerstraße 111 D-71332 Waiblingen Germany Phone...49-(0)7151-509-0 Fax ...49-(0)7151-509-200 www.emersonclimate.eu	Benelux	Phone: +31 (0)773 240 234	Fax: +31 (0)773 240 235
	Denmark & Finland	+32 (0)87 305 565	+49 24 08 929 568
	Eastern Europe, Turkey & Iran	+32 (0)87 305 061	+32 (0)87 305 506
	France, Greece, Maghreb	+33 (0)478 668 570	+33 (0)478 668 571
	Deutschland, Österreich, Schweiz	+49 (0)6109 6059 0	+49 (0)6109 6059 40
	Italia	+39 02 961 78 1	+39 02 961 78 888
	Middle East & Africa	+97 148 832 828	+97 148 832 848
	Poland	+48 (0)22 458 9205	+48 (0)22 458 9255
	Russia & Cis	+7 495 981 9811	+7 495 981 9816
	España & Portugal	+34 93 4 123 752	+34 93 4 124 215
	Sweden & Norway	+32 (0)87 305 565	+49 24 08 929 568
	UK & Ireland	+44 (0)1 189 838 000	+44 (0)1 189 838 001