Digireg®

Soler&Palau
Ventilation Group

Controller Digireg® CP-TFT

The measurement and control system is a basic element of air conditioning equipment. This system can control and manage the individual functions of air conditioning equipment, where one of the basic tasks is to achieve the required parameters of the indoor environment. Advanced digital control systems from ELEKTRODESIGN Digireg® offers users above-standard functions and at the same time they are very easy to install, very easy to service and affordable.

■ **Control system selection**
The I&C system means a complete set containing a switchboard with a control system, controller, temperature sensors, differential pressure sensors, CO2 sensors, humidity sensors, frost protection and a heating water control unit.

Digireg® can be delivered separately, which is suitable when installing the switchboard outside the regulated equipment (on the wall, etc.). It allows you to control cooling, time modes, mixing and circulation. It contains a clear touch panel.

Voltage regulator REE6+
Voltage regulator REE7+
• these are triac regulators of single-phase electric motors
• detailed parameters see K 8.1

Frequency converter
• these are speed regulators of three-phase electric motors depending on the change of the output frequency

EC electric motor
• is an electronically continuously controlled DC synchronous electric motor. The speed change is usually achieved by changing the control voltage Ur 0–10 V.

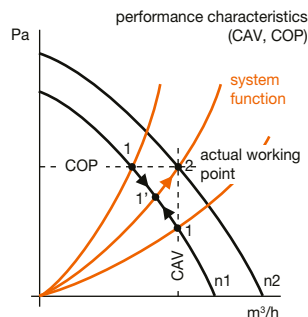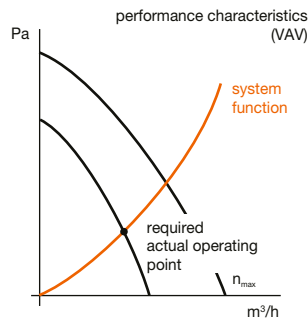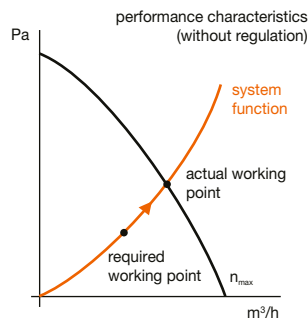■ **According to the control requirements of the respective units, the control system can be divided into:**
• Without speed regulation
• **Continuous fan speed control**
   – **VAV** (variable air volume) – the built-in controller or frequency converter regulates the fan speed. Signal from humidity or CO_2 sensors can be used (sensors not included)
• – **CAV** (constant air volume) – built-in controller or frequency converter changes speed based on data from integrated sensors to maintain a constant flow in the pipeline
   – **COP** (constant over pressure) – the built-in regulator or frequency converter regulates the speed on the basis of data from integrated pressure sensors so as to maintain a constant pressure

■ **Continuous fan speed control – identification DVAV (Digireg®)**
• The control system continuously regulates the fan speed by a voltage regulator or a frequency converter, based on a request from the built-in CO2, SQA and RH sensors
• Digireg® continuously controls the speed in range 0–100 %
• CAV and COP regulation is solved by SET CAV and SET COP accessories

■ **General system description**
• The control system is housed in a compact steel switchboard equipped with a digital controller on the PCB and protection and switching elements for the individual devices of the air handling unit.
• The cables pass through plastic grommets with locking in the lower/side part of the switchboard.
• The control is performed by a wired remote control with a touch screen (Digireg®).

performance characteristics (without regulation)

Pa

system function

actual working point

required working point

n_{max}

m³/h

performance characteristics (VAV)

Pa

system function

required actual operating point

n_{max}

m³/h

performance characteristics (CAV, COP)

Pa

system function

1

COP

2

actual working point

1'

CAV

1

n1   n2

m³/h

Control

TECHNICAL DATA	Digireg®
installing switchboard IP20	●
installing switchboard IP65[1] (max. 15 kW)	○
main (service) switch	●
graphic touch screen IP20	●
touch controller IP20	○
graphic colour touch screen IP20	

CONFIGURATION

inlet unit	○
inlet and outlet unit / fan	○
recuperation unit	○
recuperation and circulation unit	○
door curtain	

BASIC CONTROL FUNCTIONS

air flow change	●
VAV – variable amount of air	○
CAV – constant amount of air SET CAV	○
COP – constant pressure in line SET COP	○
fan control	●
continuous speed according to analogue sensor	○
two speed levels	○
three speed levels	
temperature control	●
supply temperature control	○
regulation to the room temperature from the sensor	○
regulation to temperature of the space in the controller	○
trailing temperature control	○
exhaust temperature control	○
monitoring of channel minimum and maximum	●

SETTING OPTIONS

heat recovery	●
plate heat exchanger – recuperation	○
rotary heat exchanger – regeneration	○
bypass / control of rotary recuperator	●
analogue	○
digital	○
inlet/outlet	○
automatic/manual	○/–
water heating	●
two-point control SU (on/off)	○
three-point control SU	○
tw-level antifreeze protection	○
heating water pump control	○
electric heating	●
by switching (1° or 2°)	○
continuous control (SSR)	○
analogue output for ext. heaters	○
water cooling	●
continuous control SU	○
chilled water pump control	○
compressor cooling	●
direct evaporator ON/OFF	○
inverter (0–10 V signal)	○
heat pump	●
heat pump switching	○
heating/cooling mode selection	○
power control by signal 0–10 V/0–100 %[4]	○
electric bivalency	○
water bivalency	○
gas heating	●
switching of burner automation	○
power setting 0–10 V	○
three-point power setting	○

TECHNICAL DATA	Digireg®
AUXILIARY FUNCTIONS (option)	
Freecooling	○
inner air circulation	○
mixing according to temperature/humidity	○/○
earth collector, air/liquid	●
preheating command	○
pool venting (humidity and temperature)	○
Boost – shock ventilation	●
Door contact	
inlet flap control (suction/discharge)	●/●
EPS contact (zap=OK)	●
RV, VOC, CO2 quality sensors	●
digital input for contact sensor	○
analogue input for air quality sensor	○
analogue input for humidity sensor	○
weekly programmer (max 16 changes/day)	●
connection to the parent BMS system	●
RS485 protocol MODBUS RTU	●
Ethernet[3]	○
remote control (On/Off) or 0–10 V	○

FAULT CONDITION SIGNALLING

filter clogging	○
motor fault	○
electric heater overheating	○
recuperator freezing by temperature	○
recuperator freezing from the manostat	○
fire alarm	○
general temperature sensor error	○
antifreeze protection on HW from temperature sensor	●
„run" contact message	●
„sensor fault" contact message	●
„filter clogged" contact message	●
central fault" contact message[2]	●

● standard part of the control
○ optional part of the control
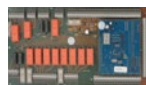
Digireg®

[1] variant of the IP65 installation switchboard is for output up to 15 kW of electric heating (switchboards over 15 kW on request), the switchboard must be placed on the sunny side or under roof
[2] only for versions without heating control (recuperation only)
[3] module Ethernet is connected via a ModBus socket (consult our technical department)
[4] the output controls the required output in the mode 0–100 % / heating / cooling

Control

Digireg®

control unit Digireg®

controller Digireg® CP-TFT

General system description

- The control system is located in a compact sheet steel switchboard equipped with a main switch, a digital controller on the PCB board and protection and switching elements for the fans and the electric heater of the air handling unit according to the power table.
- The cables pass through plastic bushings with locking in the left side of the cabinet.

Basic properties:

- Designed for air conditioning equipment
- in various designs with heating and air cooling.
- Possible use for supply unit, supply and drainage unit, recuperation unit, hot air heating (recuperation and circulation unit).
- Control and power part in one switchboard, outputs for connection of supply and exhaust fan, fans can be 3 or 1-phase , or with different speed controllers.
- Continuous supply air temperature control.
- Monitoring of basic fault conditions of the air handling unit.
- Touch panel remote control.
- Weekly time programmer.
- Dimensions and weights of switchboards:
  M1-Vx, M3-Vx including lid, bushings and switches – 640×280×120 (w×h×d), weight approx. 8 kg
  M1-E2 to M3-E36 including lid, bushing, heatsink and switch – 660×280×120 (w×h×d), weight 9.5–10 kg
  M3-E72 including lid, bushings, heatsink and switch – 740×400×170 (w×h×d), weight approx. 15 kg (custom production)

Temperature control

adjustable during commissioning according to user requirements

- Digireg® regulator is designed to control the output of the heater or cooler of the air handling unit to reach the desired temperature. It can command direct cooling or heat pump. A 3-point output for the actuator is available mixing valve, direct SSR power outputs for electric heating or two analogue outputs 0–10 V/0–20 mA for external heater controllers. The heat pump or cooling unit is controlled by potential-free contacts.
- Constant air supply temperature control – uses one temperature sensor in the supply line, the supply air is heated or cooled to the required set temperature within the minimum and maximum adjustable temperatures.
- Room temperature control (for constant room temperature). Cascade control with minimum and maximum supply air temperature limitation is used. Main sensor is located in the vented area, the inlet air sensor is placed behind the exchangers in a place with sufficient air mixing. If the room temperature is higher than set value, the controller will try to reduce the supply air temperature to the set minimum supply air temperature. If the room temperature falls below the set value, the controller tries to compensate for this by increasing the supply air temperature.
- The room temperature can be selected as the room temperature, from the sensor in the controller, or from a separate sensor connected to the motherboard.
- The controller cools or heats according to the set parameters in the automatic summer/winter mode according to the outdoor temperature and time dependences. It is also possible (in the service settings) to select the summer/winter mode.

Heat exchanger

can be electric or water ones.

- The water heater is controlled by a three--point servo drive. Water heater power is not essentially limited (its performance is determined by the size of the mixing node).
- Electric one is directly controlled by SSR or external triac switches 0–10 V. Depending on the design of the switchboard, it can be switched and secured up to 72 kW.
- The water cooler is controlled by a 0–10 V analogue servo drive.
- Direct cooler – control of condensing cooling unit on/off or inverter condensing cooling unit with analogue signal 0–10V.
- Control of the condensing unit as a heat pump for heating/cooling.

Special functions

- Control of the bypass damper bypass damper by analogue or three-point actuator.
- Use of analogue recuperator bypass to control cooling or heating.
- Possibility of rotary recuperator control by 0–10V or on/off .
- Use of independent analogue output of proportional controller for mixing damper for control to constant or differential temperature value, dehumidification control.
- Cooling and heating pump control.
- Control of electric heating protecting contactor.
- Gas heater operation control.
- Command of air or liquid ground collector with temperature and time dependencies. Outdoor temperature, ramp time and collector capacity within 24 hours.
- Start preheating for recovery units according to actual needs.
- Possibility of automatic detection of summer and winter operation or fixed mode selection.
- Control of a bivalent electric or liquid source for a heat pump.
- Humidity control and trailing temperature control (pool ventilation)

Control

Digireg®		Ventilatoren					Heizung							
Typ	Hauptschalter*	Siche-rungsschalter	Zuleitung		Ableitung		Siche-rungsschalter	Span-nung	Leis-tung	SSR Stromstärke	SSR Anzahl	Zuleitung*	Hauptsi-cherung*
	[A]	[A]	[V]	[kW]	[V]	[kW]	[A]	[V]	[kW]	[A]	[–]	typ	typ
M1-E2	30	10	230	1,4	230	1,4	10	230	2,1	9	1	CYKY-J 3x4	1Px25A
M1-E8	30	10	230	1,4	230	1,4	20	400	8	20	1	CYKY-J 5x4	2Px32A
M1-E8-2	30	10	230	1,4	230	1,4	20	230	6	2x13	2	CYKY-J 5x6	3Px32A
M3-E15	40	20	400	6	400	6	25	400	15	22	2	CYKY-J 5x6	3Px40A
M3-E24	63	20	400	6	400	6	40	400	24	35	2	CYKY-J 5x10	3Px63A
M3-E36	80	20	400	6	400	6	60	400	36	52	2	CYKY-J 5x16	3Px80A
M3-E72	120	20	400	6	400	6	2x60	400	72	104	4	CYKY-J 5x35	3Px125A
M3-Vx	30	20	400	6	400	6	–	–	–	–	–	CYKY-J 5x4	3Px32A
M3-E8-2	40	20	400	6	400	6	20	230	6	2x13	2	CYKY-J 5x6	3Px32A
M1-Vx	30	10	230	1,4	230	1,4	–	–	–	–	–	CYKY-J 3x4	1Px16A

* sind nicht Bestandteil der Lieferung, der Entwurf der Hauptsicherung des Zuleitungskabels ist Bestandteil des Projekts Elektro

- Separate outputs for contact signalling of operation and faults (filters, sensors, central error).
- Optional control from three places.
- The input for remote contact blocking can be used by software.

■ Configuration
It is possible to control the following device configurations.
- Supply unit control
- Supply and exhaust unit
- Control of recuperation units:
  – analogue/digital bypass in plate/rotary variant
  – bypass on inlet or outlet
  – reheat control
- Control of recuperation unit and heating unit (hot air heating)

■ Control options
- Supply temperature control
- Room temperature control – sensor in the controller
- Room temperature control – separate room sensor
- Exhaust temperature control
- Trailing temperature control – for pool ventilation from water temperature
- Channel minimum and maximum monitoring
- Selection of PID parameters
- Selection of heat recovery unit functions
  – Recuperation enabled/disabled
  – Equal-pressure ventilation
  – Free cooling by outdoor air
  – Ventilation only

■ Remote controller
- Standard touch controller Digireg® CP-TFT on the RS485 bus is intended for the operation. If more comfortable control is required, it is possible to connect one or two Digireg® CP-TFT controllers with communication for RS485 ModBus
- Changing parameters is user-friendly by touching the required data without the need for a complex search in subdirectories
- Communication via RS485 data line
- Possibility of communication with the superior system (building dispatching), communication protocol via RS485 bus
- driver dimensions H×W×D 90×125×20 mm

■ Motor fans
acc. to the electric motor type
Single-phase motors:
- EC, FM motor control outputs 0–10V
- Direct switching of two-speed motors up to 1.4 kW
- Control with triac regulator REE6
- Motor protection
- Monitoring of protection or signalling contacts of motors
Three-phase motors:
- EC, FM motor control outputs 0–10V
- Possibility to control the direct switching of two- speed motors
- Motor protection
- Monitoring of protection or signalling contacts of motors
- Switching by means of Digireg® ST+

■ Heaters
according to the heater type
Electric heating
- One-section / two-section control
- Control of rod/wire exchangers
- Continuous power control via SSR, possibility of switching the heating in ON/OFF mode
- Monitoring the condition of emergency thermostats
- Heater protection according to power range
- Heater safety contactor
- 0–10V and 0–20mA output for external heaters (for sections 1 and 2)
Hot water heating
- Three-point control of the mixing unit
- Two-stage anti-freeze protection
- Return water temperature / PMO monitoring
- Smooth start-up of the water exchanger
- Heating pump switching
Gas heating

■ Cooling
acc. to the medium type
Compressor
- Adjustable compressor operating parameters
- Monitoring of the minimum running time of the compressor
- Monitoring the number of starts in one hour
- Compressor switching command by potential-free contact
- Cooling and heating power control
- 0–10V analogue power control
- Cold-water cooling
- Continuous control via mixing unit
- Cooling pump switching

■ Heat pump
the system heats/cools
- Use for heating and cooling
- 0–10V analogue power control
- (0V = 0 % of power, 10V = 100 % of power in cooling and heating mode)
- Control of a bivalent electric or water heat source
- Bivalency from two temperature limits
- for SSR (Solid State Relay)
- Bivalency from two temperature limits for analogue outputs ESU (this is the ratio of outdoor temperature and setpoint outputtemperature with time constant)

■ Recuperation
acc. to the exchanger type
- Plate recuperator
- Plate recuperator with bypass
- Rotary recuperator
- 0–10 V control or on/off
- It is recommended to control the bypass with an analogue actuator; it is also possible to use a three-point servo drive

■ Freecooling
- Automatic start of cooling according to the difference between indoor and outdoor temperatures
- Cooling time programming

■ Earth collector / pre-heating
- Control of liquid or air ground heat exchanger or preheater
- Setting or use/regeneration time
- Setting temperature limits for summer/winter

■ Mixing damper
- Can be used for air mixing or as another independent proportional controller
- Absolute/relative setting of the desired temperature
- Control slope adjustment
- Hygienic minimum setting
- Control to absolute temperature or temperature difference, manually
- Selection of feedback or differential sensor from already installed sensors
- Special damper mode for circulating heating/ cooling
- Possibility of damper position control from analogue input for humidity and ventilation performance
- Possibility of humidity control by inverse function

■ Fire function
- Setting the behaviour of the unit in case of fire (setting to the required power, off / 10–100 %). Only works when the air conditioning is running! Deactivating this mode requires a special reset mode.

■ Boost function (venting – ext. control)
- Activation delay time setting
- Setting the required motor power
- Setting the possible temperature increase
- Deceleration time setting – switch to normal program mode
- Possibility to activate pool ventilation

■ Air humidity
Digital humidistat control
- Digital input for humidistat control
- Possibility to configure the input as a remote blocking by a potential-free contact
- Power and deceleration time settings
- Possibility to configure in service mode as input for blocking
Analogue control by r. humidity sensor
- Setting the required relative humidity in percent
- Possibility to set min. fan speed
- Analogue input for fan power control (PI control)

Control

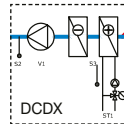# Digireg®

General technological schemes

inlet + outlet unit variants
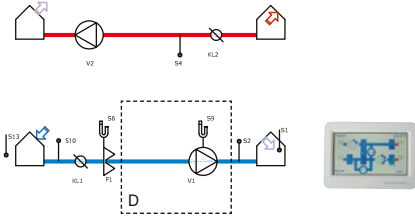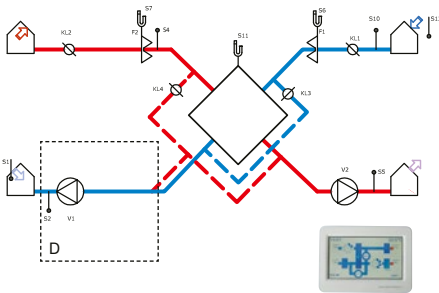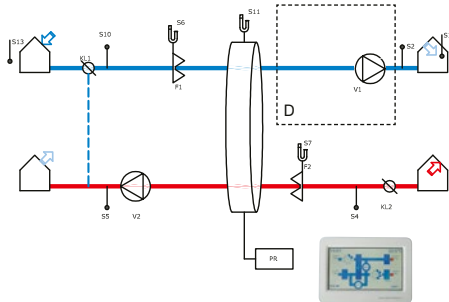
HVAC function
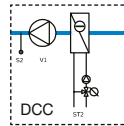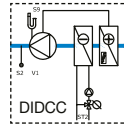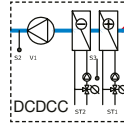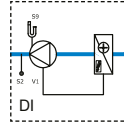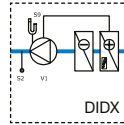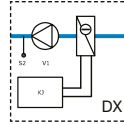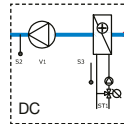
Display variants

inlet unit

inlet and outlet unit

plate exchanger

recuperation unit

recuperation and circulation unit

DC

DX

DIDX

DI

DCDCC

DIDCC

DCC

DCDX

rotary exchanger

S13 outdoor temperature sensor required for variants with heat pump and for all additional functions
(e.g. earth collector, free cooling, direct cooling, mixing).

Control

■ **Air quality (CO₂, SQA)**
- Digital input for control by sensor CO_2 or SQA
- Power and deceleration time settings

Analogue control with air quality sensor
- Setting the required air quality in percent (CO_2)
- Analogue input for power control of fans (PI regulation)

■ **Unit timing**
- Four possible presets for temperature, function and fan speed with the possibility of programming in 5 min. intervals and combinations during the day (possibility of 16 changes / day – i.e. 8 blocks).
- Weekly programmer
- Copying of daily programs
- Time programs are stored in memory of the controller Digireg® CP-TFT

■ **Connection to the parent system. It is not a standard part of the controller delivery.**
- Connection to the control room is possible using implementation by SW company either by direct communication from any of two RS485 ModBus or via Ethernet
- ModBus RTU communication protocol for direct connection on request
- The Ethernet communication requires adding a converter

Legende zu den Plänen

S1	room temperature sensor
S2	inlet air temperature sensor
S3	water heating anti-freeze protection temperature sensor
S4	outlet air temperature sensor
S5	waste air temperature sensor
S6	inlet filter pressure sensor
S7	outlet filter pressure sensor (option)
S8	thermostat as frost protection of the direct evaporator
S9	inlet fan pressure sensor (mandatory – monitors fan operation)
S10	intake air temperature sensor
S11	recuperator icing sensor
S13	outdoor temperature sensor (condenser unit operation enabled)
V1	inlet fan
V2	outlet fan
KL1	inlet damper actuator (circulation)
KL2	outlet damper actuator (can be coupled with KL1)
KL3	recuperator bypass actuator
KL4	servo of mixing integrated damper
ST1	heating water mixing valve actuator
ST2	cooling water mixing valve actuator
KJ	condensing unit
PR	control of the rotary heat exchanger drive

FRESH AIR SUCTION

FRESH AIR INLET

WASTE AIR OUTLET

WASTE AIR DISCHARGE

INLET/OUTLET VENTILATION

INLET/OUTLET FILTER

DAMPER ACTUATOR

WATER HEATER

ELECTRIC HEATER

DIFFERENTIAL MANOMETER

TEMPERATURE SENSOR

ESU – REGULATION NODE

control unit Digireg® – open enclosure, dimensions:
M1-Vx, M3-Vx – 640 × 280 × 120 mm
M1-E2 to M3-E36 – 660 × 280 × 120 mm
M3-E72 – 740 × 400 × 170 mm

control unit Digireg® IP65 – open enclosure

control unit Digireg® IP65
(dimensions 640 × 600 × 210 mm)

Control