
Control System Type ABS PCx



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Contents

Contents	Page
1	General information..... 1
2	Nomenclature..... 1
3	Mechanical installation of PCx 2
4	Electric installation of PCx..... 2
4.1	Power supply 3
4.1.1	Power supply and battery backup..... 3
4.2	Digital outputs..... 3
4.3	Analogue Outputs..... 4
4.4	Analogue inputs..... 5
4.4.1	Installation of a 4-20 mA loop powered 2-wire sensor 5
4.4.2	Installation of a self powered sensor with a 0/4-20 mA signal 5
4.4.3	Installation of a galvanic isolator 5
4.4.4	Installation of a sensor (not loop powered) 6
4.5	Digital inputs 6
4.5.1	Installation of a relay switch 7
4.5.2	Installation of a digital signal from a PLC..... 7
4.5.3	Installation of a sensor with an open collector output type PNP 7
4.6	Installation of the CAN bus 7
4.7	RS232/RS485 port..... 7
4.7.1	RS485..... 7
4.7.2	RS232..... 8
5	Indicators and settings on PCx 10
5.1	LED indicators 10
5.2	Switches 11
5.2.1	CAN ID 11
5.2.2	CAN TERM..... 11
5.2.3	COM PARAM..... 12
5.2.4	RS 485 END TERMINATE 12
6	Technical data for the PCx..... 13
7	Accessories and part numbers..... 14
	Declaration

1 General information

The PCx series is a Control system from Sulzer. It includes a control unit, PCx, expansion unit, PCxp and operator panel PCxop. The communication between the units is through a CAN-network.

PCx is a control unit that can measure and log data, receive and transmit alarms, control of water and sewage pump works, pumping pits and booster stations. The PCx has many built in functions for controller of pumps, measurements of flows, etc. PCx communicates with other units through two interfaces, RS232 and RS485. The PCx software is supporting the protocols COMLI and Modbus. Examples of units that can be connected to the RS232/485 port are telephone modem, GSM-modem and radio.

PCx can have up to seven expansion units, PCxp, attached. The amount of in- and outputs for the PCx, the PCxp and a full system is shown in the table below:

	PCx	PCxp	PCx and 7 PCxp
Digital inputs	16	16	128
Digital outputs	8	8	64
Analogue inputs	4	4	32
Analogue outputs	2	2	16

The PCxop is a permanent mounted operator panel. The communication and power supply to the units are through the CAN-bus.

The PCx can be configured by two different ways,

From the operator panels, PCxop

From a PC with the software AQUA PROG from Sulzer. The PC can be connected directly to the PCx or via GSM-/telephone modems.

2 Nomenclature

AI	Analogue input.
AO	Analogue output.
CAN	Control Area Network, an interface for communication.
PCx	The PCx series electrical control processor unit.
DI	Digital input.
DO	Digital output.
I/O	In- and outputs, can be either analogue or digital.
PCxop	permanent mounted operator panel.
RS232/485	communication interfaces
PCxp	PCx series expansion unit for more I/O.

3 Mechanical installation of PCx

The PCx fits on a standard 35 mm DIN-rail. Mounted on a DIN-rail, the PCx has a length of 143 mm and width of 74 mm and the depth of 53 mm, see figure 3.1.

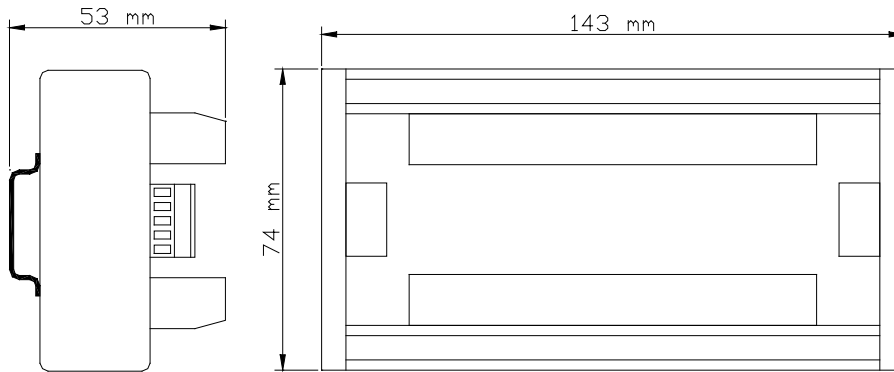
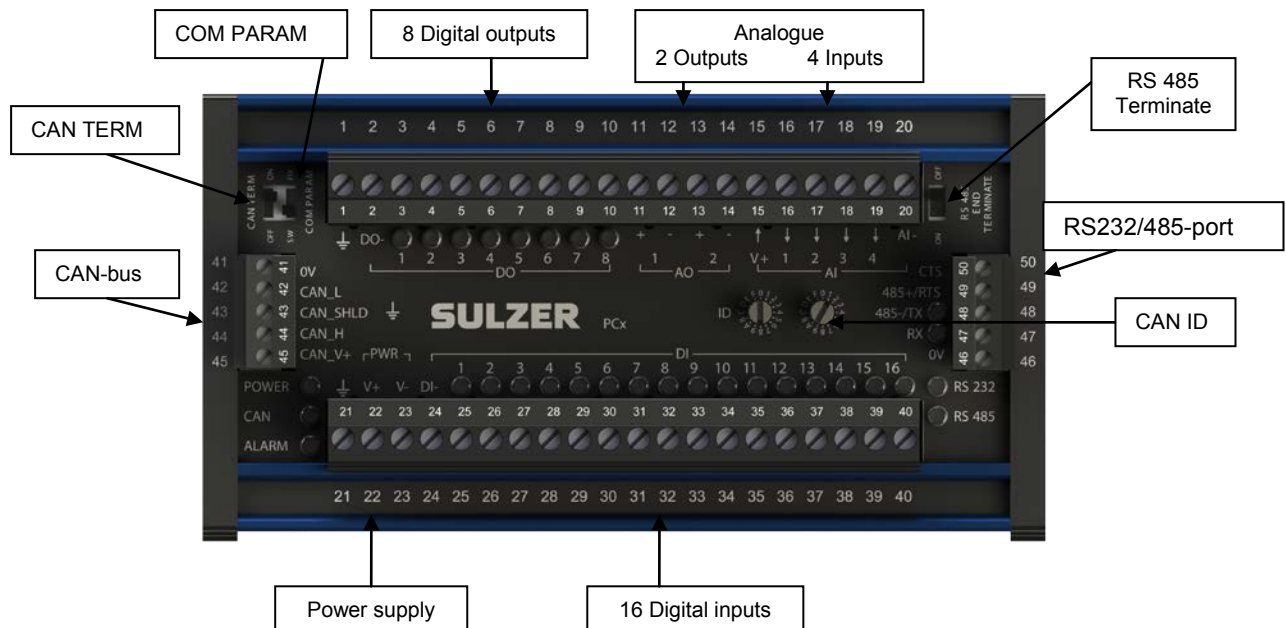


Figure 3.1: The dimensions of the PCx when mounted on a 35 mm DIN-rail

To avoid interference, it is recommended to have the PCx and the PCxp-units in a separate section when putting together a cabinet alternative in a separate metallic enclosure. If contactors and relays are put in the same cabinet as the PCx and PCxp, those should be put as far away as possible from the PCx, PCxp units and their signal cables.

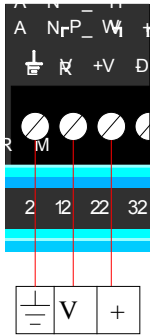
Power cables to or from electrical motors or similar shall not be put in the same duct as the signal cables from PCx or PCxp.

4 Electric installation of PCx



PCx can be used in many applications. This chapter describes the most common cable wiring for the PCx. The unit is equipped with transient and interference suppression components. When the unit is put in hazardous areas, external transient and lightning protection is recommended especially on the RS232/485-port.

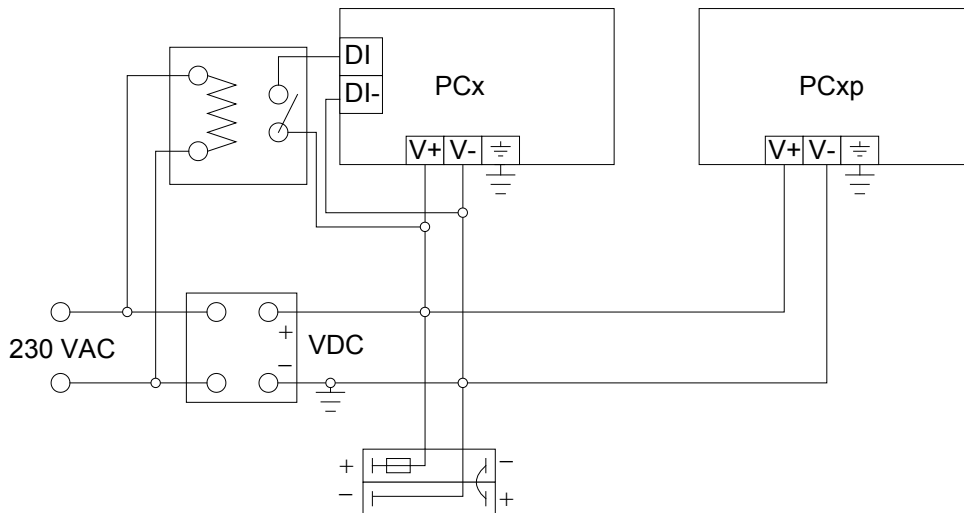
4.1 Power supply



The plus pole from the power supply connects to terminal number 22 and the negative to terminal number 23.

The connection between the chassis of the PCx and the chassis (ground) of the cabinet is from either terminal number 1 or 21 to the. Internally in the PCx, the power supply is galvanic separated from ground.

4.1.1 Power supply and battery backup

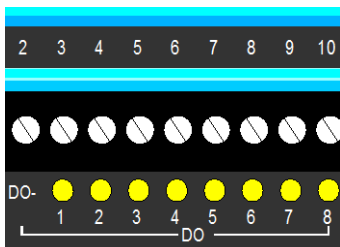


The power supply and the backup battery should be connected as the figure above. To monitor the net power, a relay can be connected to a digital input on the PCx to receive alarm about it.

To prevent ground currents is the system built on a single point ground. Therefore a connection should be made between the negative power from the power supply and ground for the whole system only on a single point, the best solution is near the power supply unit. The figure above is illustrating that. The use of external transient protection is important when the unit is installed in exposed stations and in environments with high transient levels should also a magnetic stabiliser be used for the power supply to computers and signal sensors.

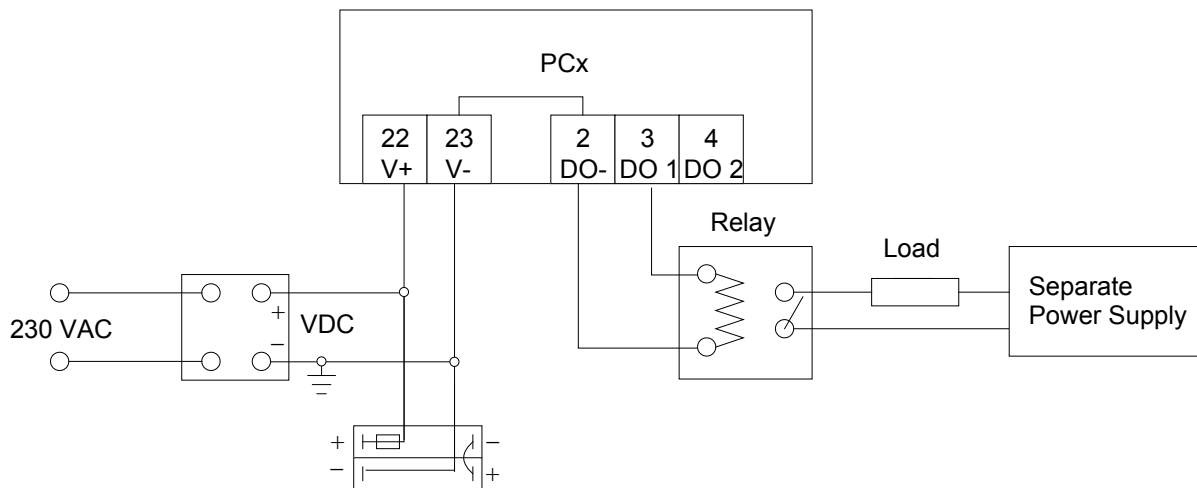
4.2 Digital outputs

The PCx has 8 digital voltage outputs. They are numbered with terminal number 3 to 10. The digital outputs have a common minus output, DO-, with the terminal number 2. The voltage output is equal as the power supply voltage to the PCx. Every digital output has one LED indicator, which is lit when the output is high. The LED indicators are numbered 1-8.



One single digital output can have a maximum current of 1 A. The total current for the 8 outputs may not be more then 4 A.

When backup power is installed, it is recommended to have a separate power supply for operations to lengthen the time for the backup functions, see figure on the next page.



When installing a relay, The terminal number 3-10, depending on which output is used, is connected to the relay and the terminal number 2, DO-. The DO- is internally connected to V-.

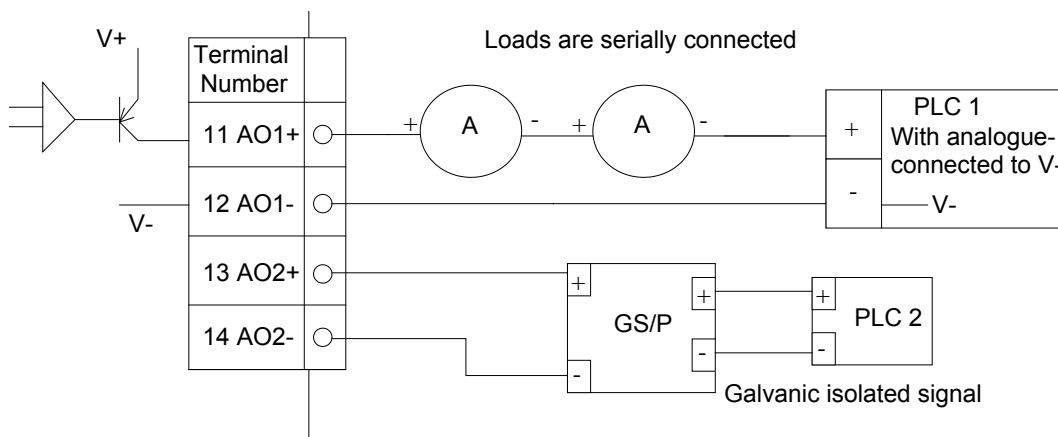
When PCx shall send digital signals to a PLC, it is DO 1-8 that should be connected. If both units do not have the same potential shall DO- be connected to the PLC V-.

A digital output can be configured as a power supply for a modem, see chapter 4.7.2

All loads that can induce currents, in example contactors, shall be connected trough a RC-filter. Also all big power consumers shall be connected through relays as close to them as possible. Signal cables and power cables should be in separate cable channels to suppress interference.

4.3 Analogue Outputs

The PCx has two analogue outputs with the precision of 14 bits (1 μ A). The maximum load is 500 ohm at 12 V and 1100 ohm at 24V. An example on installation is in the figure below.

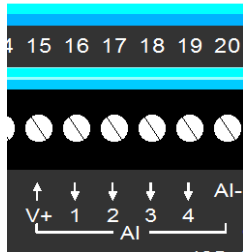


Units with a minus output connected to ground, PLC1, can be connected directly to the output. When more units are used to the same output shall these be connected serially.

In the figure above is the PLC 2 not connected to the same ground as that the PCx use. To solve this problem, a passive galvanic isolator, GS/P, is connected between the PLC and PCx.

4.4 Analogue inputs

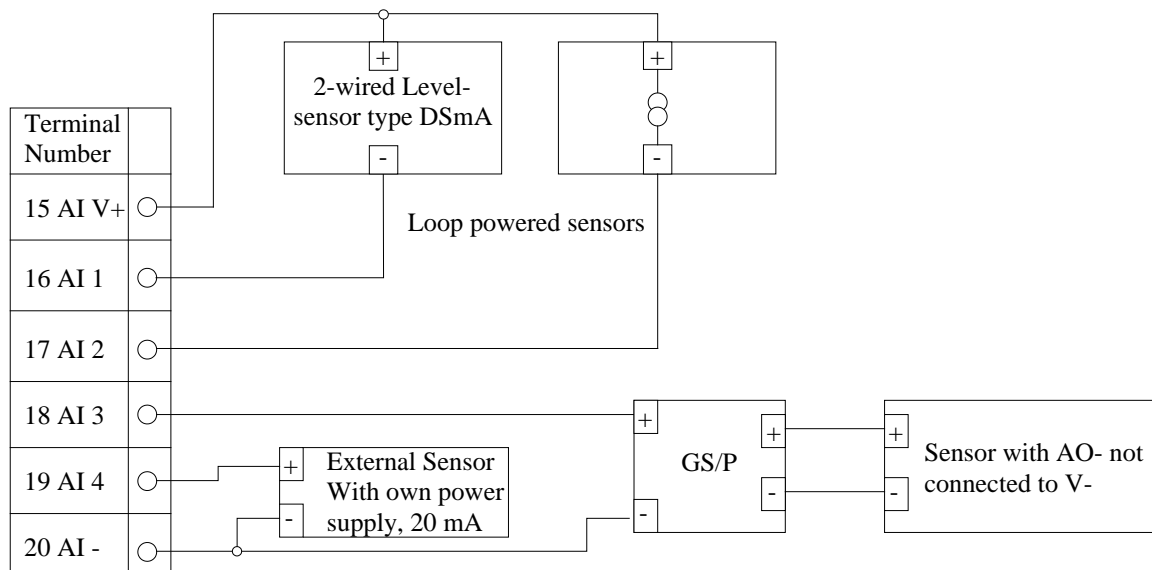
The PCx has 4 analogue inputs with a precision of 20 bits (0,025 μ A)



The inputs have the terminal numbers 16-19. See figure below for examples on installations. The inputs may need a galvanic isolator when connecting units to it.

The PCx can provide external sensors with power through terminal numbers 15 and 20.

Figure below is showing installations of sensors.



4.4.1 Installation of a 4-20 mA loop powered 2-wire sensor

To install a loop powered sensor, connect the positive power cable to the terminal number 15 and connect the signal cable to terminal number 16-19, depending on which input that shall be used.

4.4.2 Installation of a self powered sensor with a 0/4-20 mA signal

To install a sensor that have an external power supply, connect the signal cable to the terminal number 16-19, depending on which input that shall be used. Also connect a cable between the negative power supply cable and terminal number 20 to get the same ground potential for both the sensor and PCx.

Observe that this is only for sensors that do not need to be galvanic isolated.

4.4.3 Installation of a galvanic isolator

When units are used together with the PCx, there are sometimes needs for galvanic isolation between the units. To solve this problem, a galvanic isolator can be installed, an example is Sulzer's passive galvanic isolator GS/P. listed below are the most common cases where it is needed.

External Sensors that not have the same ground potential as the PCx.

Units that do not have its negative output connected to ground

Long distances between sensor and PCx.

4.4.4 Installation of a sensor (not loop powered)

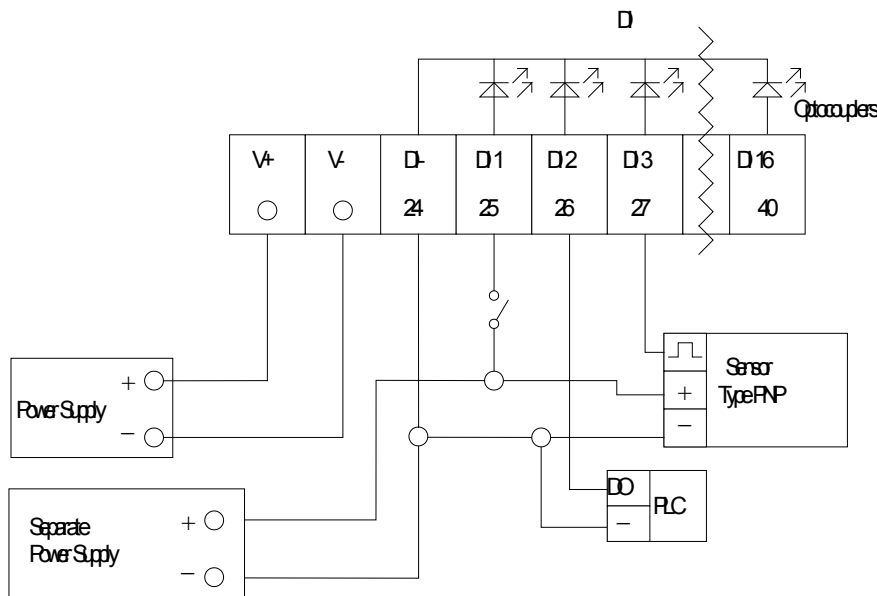
When a sensor needs to be power supplied from the PCx, connect the positive power cable from the sensor to the terminal number 15 and the negative cable to the terminal number 20. Connect the signal cable to the terminal number 16-19, depending on which input that shall be used

4.5 Digital inputs

The PCx has 16 digital voltage inputs with the terminal numbers 25-40. Each input has a LED indicator. The maximum signal level on the inputs is 34 V. The inputs are galvanic isolated from the rest of the PCx, in other words the DI- is not internally connected to V-.

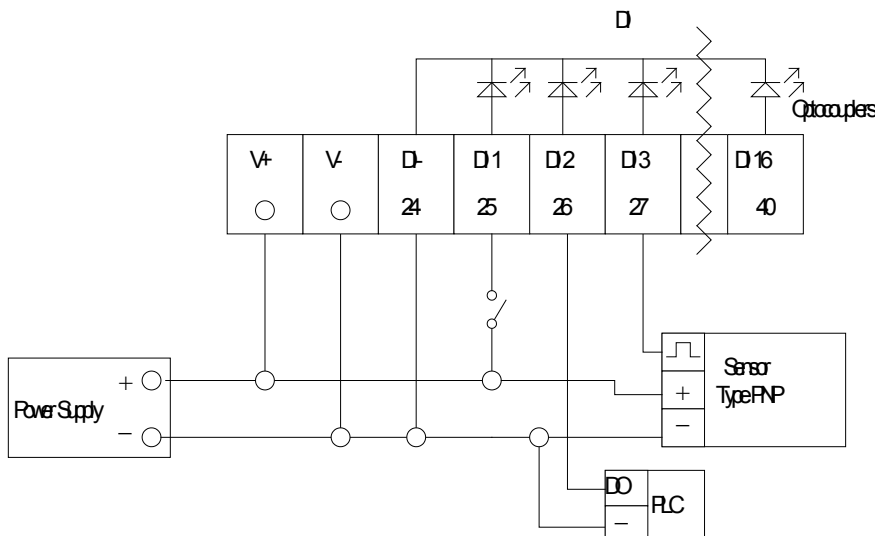
Signal cables that come from far situated sensors with long wirings should have a surge and transient protection.

The figure below shows how the digital inputs should be connected if galvanic isolation is required.



NOTE: DI- must be connected to the negative cable.

When galvanic isolation is not required should the units be connected as figure below.



NOTE:
24, DI- must be connected to V- for the PCx and the units that are connected to DI.

4.5.1 Installation of a relay switch

When a relay switch is used, connect it to V+ and terminal number 25-40, depending on which input shall be used.

4.5.2 Installation of a digital signal from a PLC.

When a PLC shall send digital signals to the PCx connect the signal cable to the input that shall be used. See note in the figures above about the DI-.

4.5.3 Installation of a sensor with an open collector output type PNP

When a sensor with an open collector output type PNP is used, shall the signal cable be connected to the terminal number 25-40, depending on which input shall be used. The positive power cable to V+ and the negative to terminal number 24, DI-.

Note: A sensor with an output type NPN cannot be connected directly to the PCx, but can be connected to a relay switch which then can be used for the signal.

4.6 Installation of the CAN bus

The terminals for the CAN-bus are located to the left on the PCx. The cable for the CAN-bus depends on application but the colour standard is the same as the table below.

Terminal number	Cable Colour	Description
41, 0V	Green	Common
42, CAN_L	White	CAN low
43, CAN_SHLD	Shield	Cable shield
44, CAN_H	Braun	CAN High
45, CAN_V+	Yellow	Positive Power supply, (PCxop)

All units with CAN interface shall be connected in parallel. The maximum length of the CAN network is 250 meters. To the PCxop all Cables are connected. In the connection between PCxp units and the PCx unit are only CAN_L, CAN_H and the cable shield used. Shielded cable is always recommended. For more information about the CAN-switches see chapter 5.2.

4.7 RS232/RS485 port

PCx can communicate with the protocols COMLI and Modbus via the interfaces RS232 and RS485. The PCx has one port for either RS232 or RS485 the configuration is made in software. To get a second port a PCxp-unit is needed

4.7.1 RS485

When the PCx is installed in a RS485 network is these rules applied:

- Positive RS485 cable is connected to terminal number 49 with description RS 485 +/RTS
- Negative RS485 cable is connected to terminal number 50 with description RS 485-/TX
- All connected units on the network shall be connected in parallel, in other words cable + to + and – to –.

The maximum length on the RS485 network depends on the Baud rate for the network. The table below is showing this

Baud rate	Maximal length
115 200 bit/s	600 meters
57 600 bit/s	1200 meters

The network shall have termination in both ends. In other words resistors for termination shall be put on the units that are placed at the end of the network. All centipede units have switches for that see chapter RS 485 END TERMINATE.

The RS485 port is connected to earth potential and is intended to be used for connection between units in the same building. When there is a long distance between the units where the potential may differ, a galvanic isolated multi drop modem is recommended, for example Westermo TD48.

4.7.2 RS232

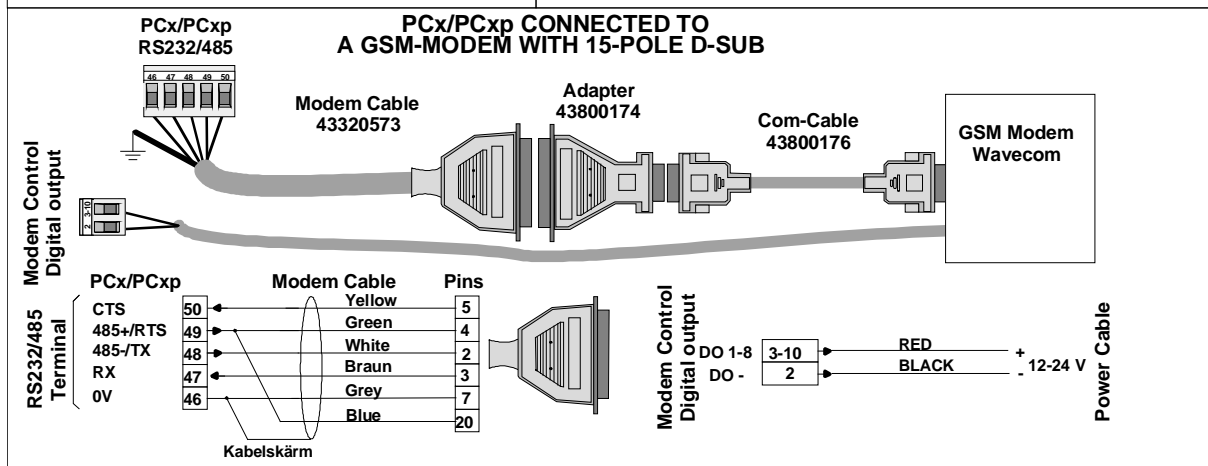
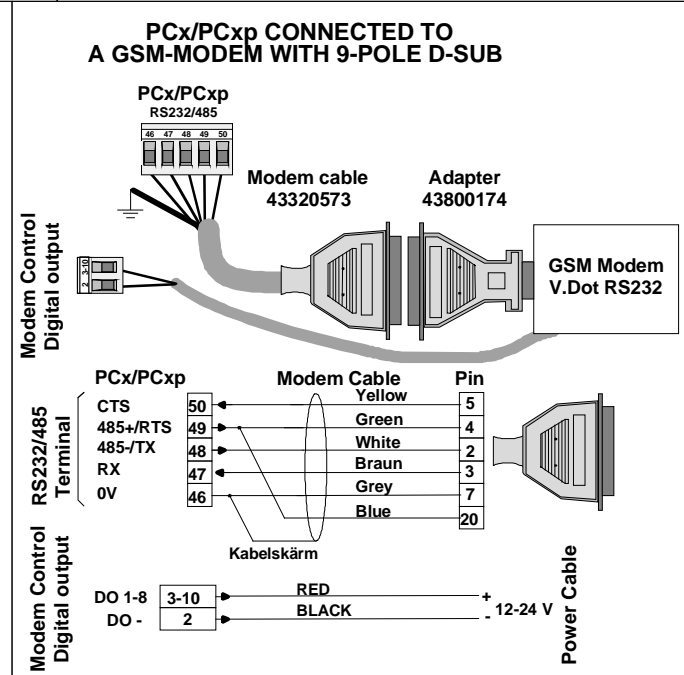
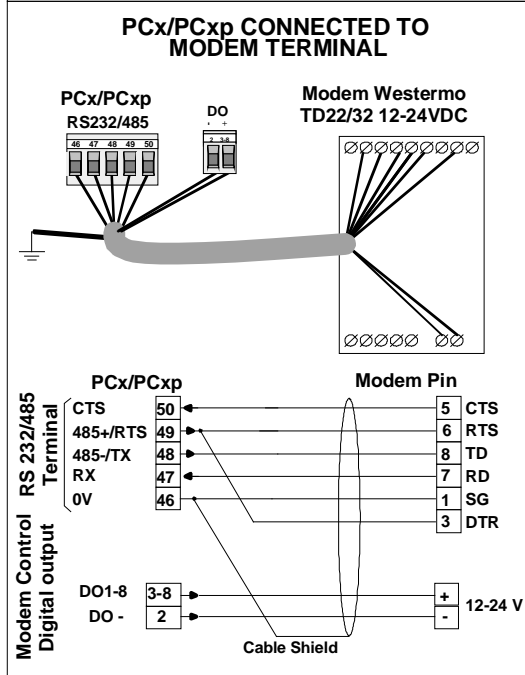
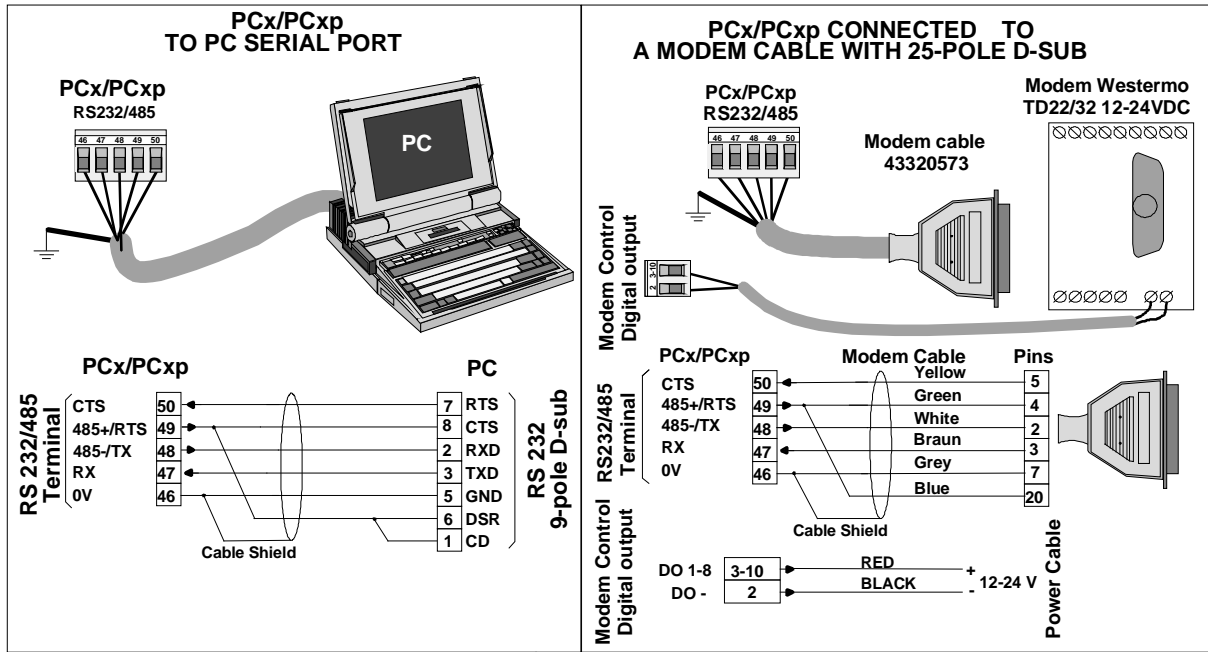
There are many devices and accessories that can be connected to the RS232 port.

Direct connection to a personal computer can be made with a cable, part no.43360094.

The contact on modems from different manufactures is not always the same, to solve this is there adapters and cables available. To install and to know which adapter to use see next page.

The software in the PCx has a built in function that can restart a modem that has been jammed. A digital output, DO 1-8 is used to control this. The function controls the power supply to the modem. Positive power cable from the modem is connected to the DO 1-8, and the negative power cable from the modem to the DO-.

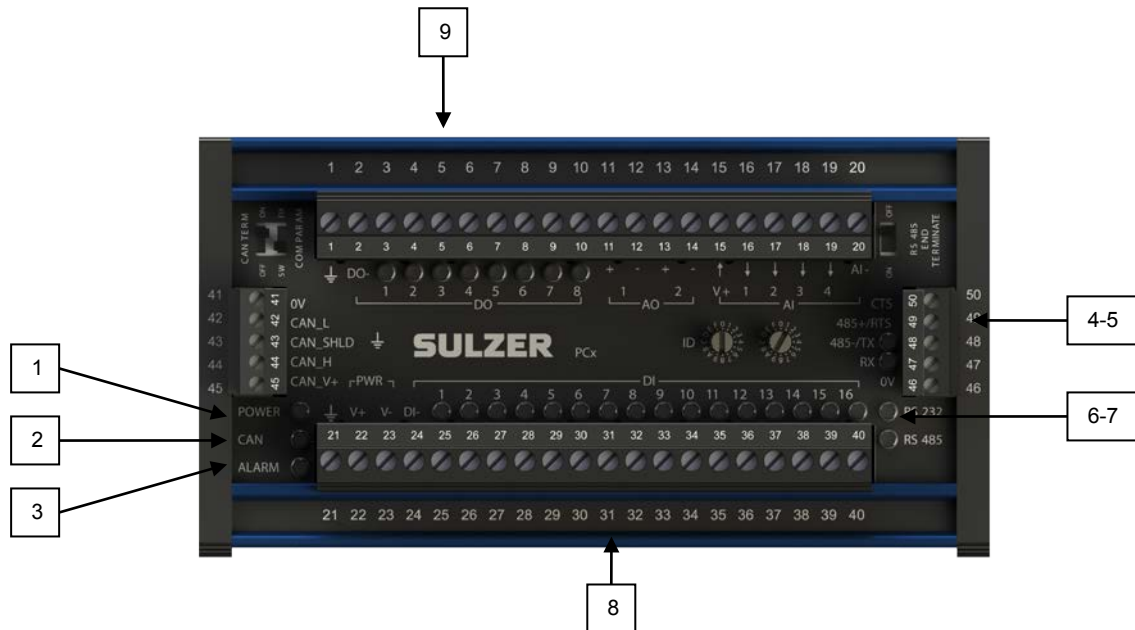
NOTE: The voltage level to the modem is equal as the power supply voltage level to the PCx.



5 Indicators and settings on PCx

The PCx has 5 different switches and 9 different LED indicators. These are described in detail in this chapter

5.1 LED indicators

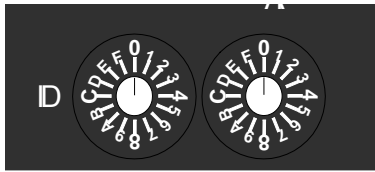


1. Power, Green light, the PCx is in normal mode.
Flashing green light, power supply voltage level is below the alarm level that is configured in the software, the alarm level can be changed.
Red light, either is a new program downloaded in the PCx or has a major fault has occurred in the configuration
2. CAN, Green light, the PCx has found one or more units to communicate with on the CAN bus
Flashing green light, the unit has not found other units on the CAN bus
Flashing red light, the CAN ID is set wrong
3. ALARM, Flashing red light, if there is a alarm to acknowledge.
Red light, the alarm is acknowledged and still is active.
This LED is working parallel with the A-ALARM and B-ALARM indicators on the PCxop.
4. 485-/TX, Red light, when data is transmitted to the RS485/232 port.
5. RX, Red light, when data is received from the RS485/232 port
6. RS232, Green light, if the interface RS232 is set.
7. RS485, Green light, if the interface RS485 is set.
8. DI 1-16, Yellow light, if the input is set, otherwise it is off
9. DO 1-8, Yellow light, if the output is set, otherwise it is off

5.2 Switches

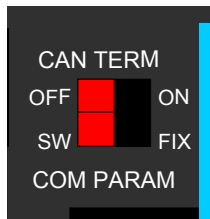
5.2.1 CAN ID

In a CAN network must every unit have a unique address or ID-Number. On the PCx this is set by two switches. It is a hexadecimal number, when wrong ID is set the CAN LED is flashing red. The table is showing the ID-numbers that every unit should have.



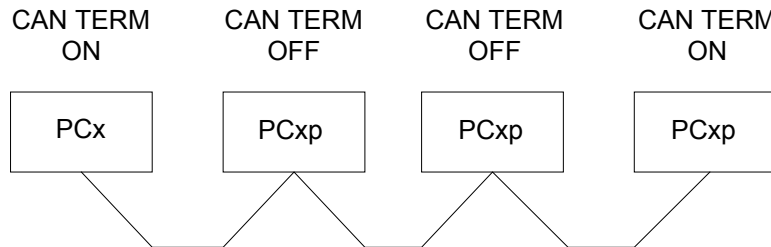
Unit	CAN ID
PCx	01
PCxp	02 – 08
PCxop	16

5.2.2 CAN TERM



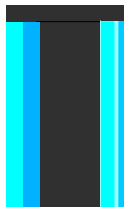
A CAN network is of the type multi drop, more units can be connected parallel to each other on the same cable. The units that are at the ends of the network must have a termination. To do this with the PCx the switch CAN TERM is set ON.

One example on a CAN network is shown in the figure below, in this case the CAN TERM is set ON on the PCx and the last PCxp unit. On the PCxp units between those two is the CAN term set OFF.



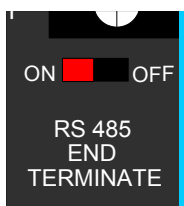
A CAN network with one PCx and 3 PCxp units

5.2.3 COM PARAM



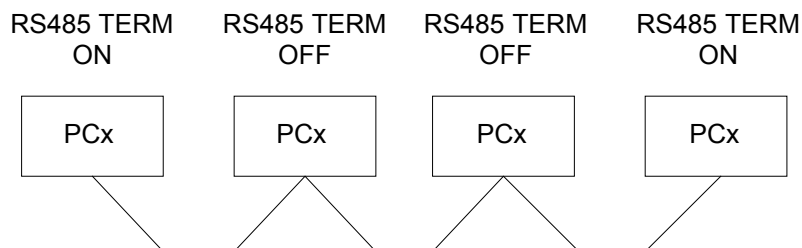
This switch has the function to set fix values to the parameters for the communications ports, CAN and RS232/485. This can be used when the unit is not responding correctly and shall only be used in that purpose to change the software parameters to correct values. When the COM PARAM switch is set to SW, the parameters that are in the software are used for the communications ports. When the COM PARAM switch is set to FIX, are the parameters fix and are these: CAN 250 Kbit/s, The RS232/485 port is set on RS232, 9600 bit/s, no parity.

5.2.4 RS 485 END TERMINATE



RS485-network is of same type as CAN, multi drop. This means also that resistors for termination must be at both ends. This switch is used for that purpose. If the switch is set ON is there a termination at the unit and if set OFF it is not.

An example on the placement of the termination is shown in the figure below.



NOTE: This switch shall be set **OFF** if RS232 is used

6 Technical data for the PCx

The PCx has the following data:

CPU type:	Philips XA-C3
Clock frequency:	32 MHz
Work memory:	1 Megabyte static RAM
Program memory:	1 Megabyte flash prom
Memory Backup:	Lithium battery 3V, Recharging when the unit is power supplied
Backup time:	6 month
Life length of the battery:	>10 years
Power supply:	9-34 VDC
Max currents:	< 210 mA at 24 VDC (Every in and output are active and without any external loads on outputs and inputs) < 270 mA at 12 VDC ((Every in and output are active and without any external loads on outputs and inputs)
Min currents:	< 60 mA at 24 VDC < 100 mA at 12 VDC
Installation:	35 mm DIN-rail
Dimensions:	143 x 74 x 53 mm (W x H x D)
Digital outputs:	8
Maximum load	1 A/output and the total current for all 8 outputs is maximum 4 A
Digital inputs:	16
Input resistance:	10 kohm
Trig level:	4.2 V
Analogue outputs:	2
Maximum load:	500 ohm at 12V, 1100 ohm at 24V
Resolution:	14 bits 1 μ A
Current limit:	22 mA
Analogue inputs:	4
Resolution:	20 bits 0,025 μ A
Inaccuracy:	less than 0.1% of FS
Temperature deviation:	less than 0.2% of FS in the temp. range -20 to 70 °C
CAN ports:	1
Max baud rate:	512 kBaud
RS232/485 port:	1
Max baud rate:	115200 baud
Max PCxp modules:	7
Max PCxop modules:	1
Ambient temperature:	-20 – 70 °C
Logging ability:	
Max channels:	32
Blocks per channel:	100 (1 block equals 1 day of normal logging)

7 Accessories and part numbers.

Description	Part no.	Note.
PCx GB	15100015	
Installation manual PCx GB	81300040	
PCxp	15000002	Expansion module
Installation manual PCxp GB	81300042	
PCxop Panel GB	15000006	
Installation manual PCxop GB	81300044	
CAN-cable per meter	43320586	
CAN-cable 3 m	43360096	
PC-cable	43360094	9-pole D-contact – 5-pole Phoenix contact, Length 2 m.
System manual for PCx GB	81300046	
COMLI/Modbus-Manual GB	81300048	
Power supply 27,2 V/1,2 A dc	28000000	Without socket
11-pole socket	43190000	For power supply
Battery 12 V/4 Ah	47000000	2 are needed
Battery case	39000041	
AQUA PROG	71400006	PC-configuring program for PCx

Declaration of Conformity

As defined by:
EMC Directive 2014/30/EU, RoHS II Directive 2011/65/EU

(EN) EC Declaration of Conformity	(SV) EG-försäkran om överensstämmelse
(DE) EG-Konformitätserklärung	(NO) EUs Samsvarserklæring
(FR) Déclaration de Conformité CE	(DA) EC-Overensstemmelseserklæring
(NL) EC-Overeenkomstigheidsverklaring	(FI) EU-Vaatumustenmukaisuusvakuutus
(ES) Declaración de conformidad CE	(ET) EÜ Vastavuse deklaratsioon
(PT) Declaração de conformidade CE	(PL) Deklaracja zgodności WE
(IT) Dichiarazione di conformità CE	(CS) Prohlášení o shodě ES
(EL) Δήλωση συμμόρφωσης ΕΚ	(SK) EC Vyhlásenie o zhode
(TR) AT Uygunluk Beyanı	(HU) EK Megfelelőségi nyilatkozat

Sulzer Pumps Sweden AB, Rökerigatan 20, SE-121 62 Johanneshov, Sweden

EN:	Name and address of the person authorised to compile the technical file to the authorities on request:
DE:	Name und Adresse der Person, die berechtigt ist, das technische Datenblatt den Behörden auf Anfrage zusammenzustellen:
FR:	Nom et adresse de la personne autorisée pour générer le fichier technique auprès des autorités sur demande :
NL:	Naam en adres van de persoon die geautoriseerd is voor het op verzoek samenstellen van het technisch bestand:
ES:	Nombre y dirección de la persona autorizada para compilar a pedido el archivo técnico destinado a las autoridades:
PT:	Nome e endereço da pessoa autorizada a compilar o ficheiro técnico para as autoridades, caso solicitado:
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PL:	Nazwisko i adres osoby upoważnionej do przygotowania dokumentacji technicznej w przypadku, gdy jest ona wymagana przez władze:
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SK:	Meno a adresa osoby oprávnenej na zostavenie technického súboru pre úrady na požiadanie:
HU:	Asmens, igalioto valdžios institūcijoms pareikalavus sudaryti techninę bylą, vardas, pavardė ir adresas:

Frank Ennenbach, Director Product Safety and Regulations, Sulzer Management AG , Neuwiesenstrasse 15, 8401 Winterthur, Switzerland

EN:	Declare under our sole responsibility that the products:	SV:	Försäkrar under eget ansvar att produkterna:
DE:	Erklärt eigenverantwortlich dass die Produkte:	NO:	Erklærer på eget ansvar, at følgende produkter
FR:	Déclarons sous notre seule responsabilité que les produits:	DA:	Erklærer på eget ansvar, at følgende produkter:
NL:	Verklaren geheel onder eigen verantwoordelijkheid dat de producten:	FI:	Vakuutamme yksinomaan omalla vastuullamme, että seuraavat tuotteet
ES:	Declaramos bajo nuestra exclusiva responsabilidad que los productos:	ET:	Deklareerime ainuvastutajana, et tooted:
PT:	Declaramos sob nossa unia responsabilidade que los produtos:	PL:	Deklaruje z pełna odpowiedzialnością, że urządzenia typu:
IT:	Dichiariamo sotto la nostra esclusiva responsabilità che i prodotti:	CS:	Prohlašuje na vlastní odpovědnost, že výrobky:
EL:	Δηλώνουμε με αποκλειστική μας ευθύνη ότι τα προϊόντα:	SK:	Vyhlasujeme na našu zodpovednosť, že výrobky:
TR:	Sorumluluk tamamen bize ait olarak beyan ederiz ki aşağıdaki ürünler:	HU:	Felelősségünk teljes tudatában kijelentjük, hogy a termék:

Control system type ABS PCx

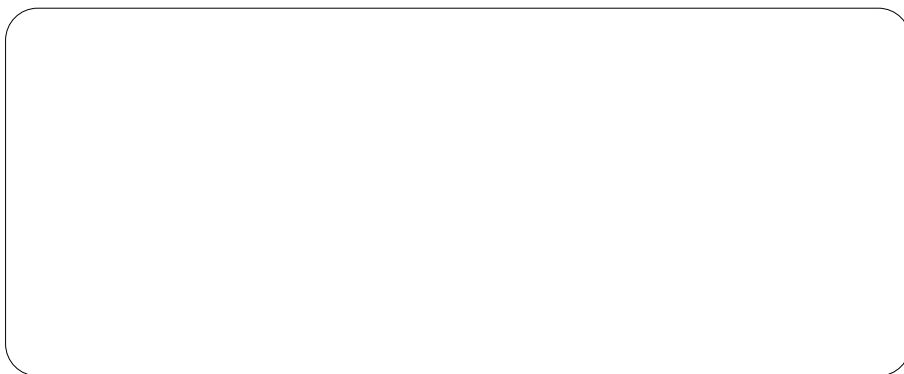
EN:	to which this declaration relates are in conformity with the following standards or other normative documents:
DE:	auf die sich diese Erklärung bezieht, den folgenden und/oder anderen normativen Dokumenten entsprechen:
FR:	auxquels se réfère cette déclaration sont conformes aux normes ou à d'autres documents normatifs:
NL:	waarop deze verklaring betrekking heeft, in overeenstemming zijn met de volgende normen of andere normatieve documenten:
ES:	objeto de esta declaración, están conformes con las siguientes normas u otros documentos normativos:
PT:	aque se refere esta declaração está em conformidade com as Normas ou outros documentos normativos:
IT:	ai quali questa dichiarazione si riferisce sono conformi alla seguente norma o ad altri documenti normativi:
EL:	τα οποία αφορά η παρούσα δήλωση είναι σύμφωνα με τα ακόλουθα πρότυπα ή άλλα κανονιστικά έγγραφα:
TR:	bu beyanın konusunu oluşturmakta olup aşağıdaki standart ve diğer norm belgelerine uygundur:
SV:	som omfattas av denna försäkran är i överensstämmelse med följande standarder eller andra regelgivande dokument:
NO:	som dekkes av denne erklæringen, er i samsvar med følgende standarder eller andre normative dokumenter:
DA:	som er omfattet af denne erklæring, er i overensstemmelse med følgende standarder eller andre normative dokumenter:
FI:	joihin tämä vakuutus liittyy, ovat seuraavien standardien sekä muiden sääntöamääräviien asiakirjojen mukaisia:
ET:	mida käespöev deklaratsioon puudutab, on vastavuses järgmistele standardidele ja muudele normatiivdokumentidega:
PL:	do których odnosi się niniejsza deklaracja sa zgodne z następującymi normami lub innymi dokumentami normatywnymi:
CS:	na které se toto prohlášení vztahuje, jsou v souladu s následujícími normami nebo jinými normativními dokumenty:
SK:	na ktoré sa vz ňahuje toto vyhlásenie, zodpovedajú nasledujúcim štandardom a iným záväzným dokumentom:
HU:	amelyekre ez a nyilatkozat vonatkozik, megfelelnek a következöszabványokban és egyéb szabályozó dokumentumokban leírtaknak:

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Stockholm 2017-06-28



Per Askenström
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