AWC 400
Advanced Wind Turbine Controller


DATA SHEET

- Applicable for offshore or near-shore environments
- Unrivalled robustness – 5-year warranty
- Open programming in ANSI C/C++ and IEC61131-3

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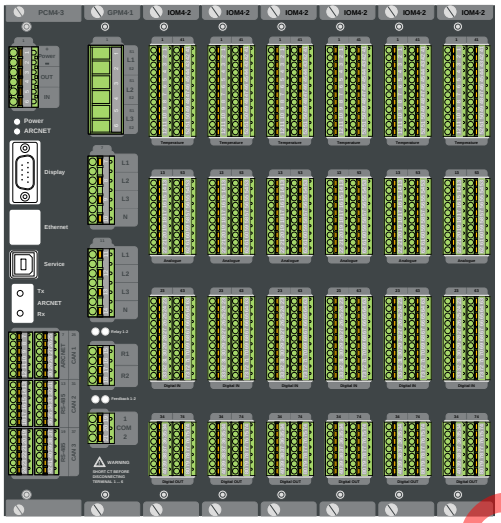
1. AWC 400 base unit

1.1 About the base unit

1.1.1 System specifications

The AWC 400 is designed as a highly flexible, modular process controller covering the special demands of wind power plants in terms of reliability, robustness and flexibility.

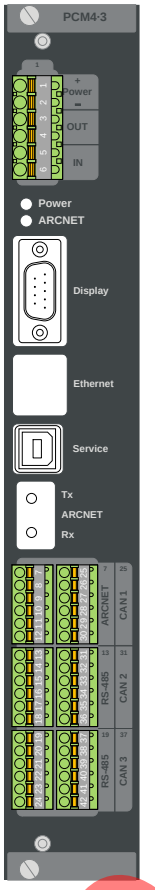
Technical specifcations	
	
Operating temperature	-25…70°C
Storage temperature	-40…85°C
Reference temperature	15…30°C
Climate	55°C 97% RH condensing To IEC 60068-2-30 Db
Vibration	DNV class A+C 2.0mmpp..: 3.0...13.2Hz 0.7g: 13.2...100Hz 6.0mmpp:3.0...13.2Hz 2.1g: 13.2...50Hz To IEC 60068-2-6 Fc
Shock	50g, 11msec., half sine To IEC 60068-2-27 Ea
EMC/CE	To EN 61000-6-1/2/4
Protection class	IP 20
Material	Plastic headers acc. UL94-V0, Al-case, steel cover plates

2. Power and Control Module

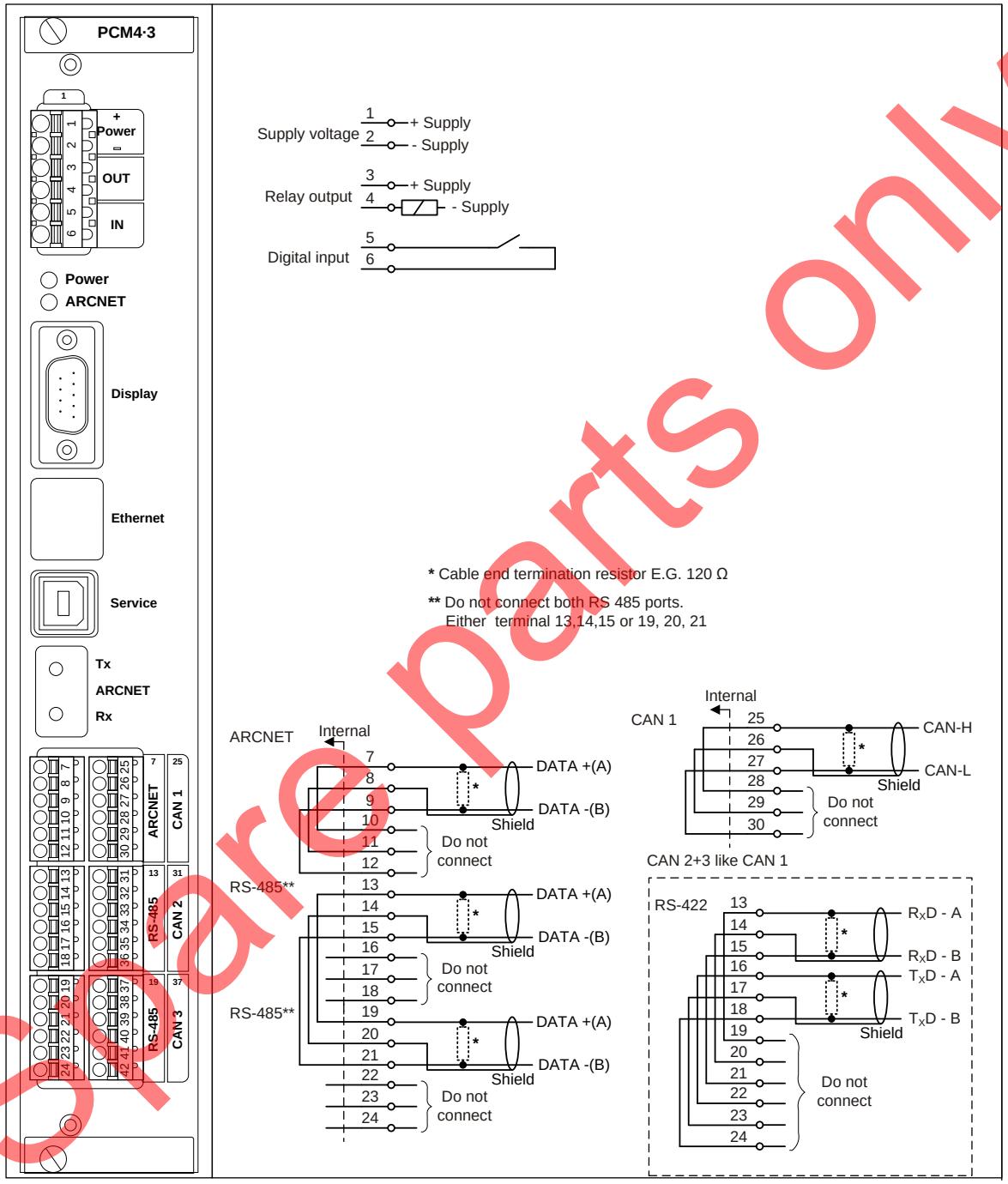
2.1 PCM 4·3

2.1.1 PCM 4·3 module specifications

The PCM 4·3 module is the main CPU in the AWC 400 series which hold the application for the wind power plant. The PCM 4·3 module includes the most used field buses for easy integration og communication interfaces in a given application.

Power and control module		
	Power supply	Power IN 18…36V DC, max 6A
	Output	Digital relay output (NO) 24VDC 8A
	Input	Digital input designed for potential-free contacts. Open/Close 5V/7.5mA
	Interface	**3 x CAN:** Independent CAN bus lines 125/250kbps **1 x RS422/485 port** : 4,800 – 57,600 Baud **1 x ARCNET port either electrical or optical connection:** 2.5 Mbit **1 x Ethernet port:** 10/100 Mbit **1 x Display port (TTL):** 4,800 – 57,600 Baud
	Service	**USB service interface** 256,000 Baud
	Processor	180MHz
	Operative system	Linux 2.6
	PLC run-time	CoDeSys V2.3 (optional)
	Storage	64MB SD RAM 32Kb non-volatile RAM 16 MB FLASH shared for program memory and data storage
	Programming	ANSI C/C++ IEC61131-3 (IL, SFC, FBD, ST, LD)
	Size	8TE (40.64 mm)

2.1.2 PCM 4·3 wiring



2.1.3 PCM 4·3 terminal specifications

	Terminal	Description
1	+Supply	+24VDC
2	-Supply	0VDC
3	Relay output	Watchdog function
4	Relay output	Watchdog function
5	Digital input	Input
6	Digital input	Input
7	DATA+(A)	ARCNET positive signal
8	Shield	Cable Shield
9	DATA-(B)	ARCNET negative signal
10	-	No connection
11	-	No connection
12	-	No connection
13	RS485: DATA+(A)	RS485 positive signal
	RS422: RxD-A	RS422 positive receive signal
14	RS485: Shield	Cable Shield
	RS422: RX shield	RS422 Receive shield
15	RS485: DATA-(B)	RS485 negative signal
	RS422: RxD-B	RS422 negative receive signal
16	RS485: -	No connection
	RS422: TxD-A	RS422 positive transmit signal
17	RS485: -	No connection
	RS422: TX shield	RS422 Transmit shield
18	RS485: -	No connection
	RS422: TxD-B	RS422 negative transmit signal
19	DATA+(A) loop through multi drop	RS485 positive signal loop through from terminal 13
	RS422: -	No connection
20	RS485: Shield	Cable Shield
	RS422: -	No connection
21	DATA-(B)	RS485 negative signal loop through from terminal 15
	RS422: -	No connection
22	-	No connection
23	-	No connection
24	-	No connection
25	CAN-H	CAN 1 H input
26	Shield	Cable Shield

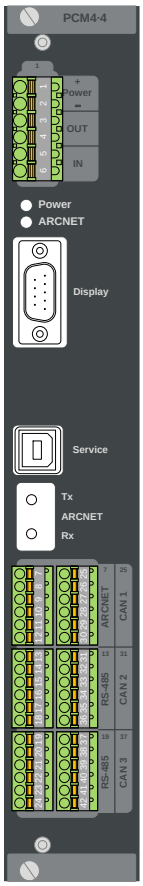
	Terminal	Description
27	CAN-L	CAN 1 L input
28	-	No connection
29	-	No connection
30	-	No connection
31	CAN-H	CAN 2 H input
32	Shield	Cable Shield
33	CAN-L	CAN 2 L input
34	-	No connection
35	-	No connection
36	-	No connection
37	CAN-H	CAN 3 H input
38	Shield	Cable Shield
39	CAN-L	CAN 3 L input
40	-	No connection
41	-	No connection
42	-	No connection

3. Distributed I/O and field bus controller

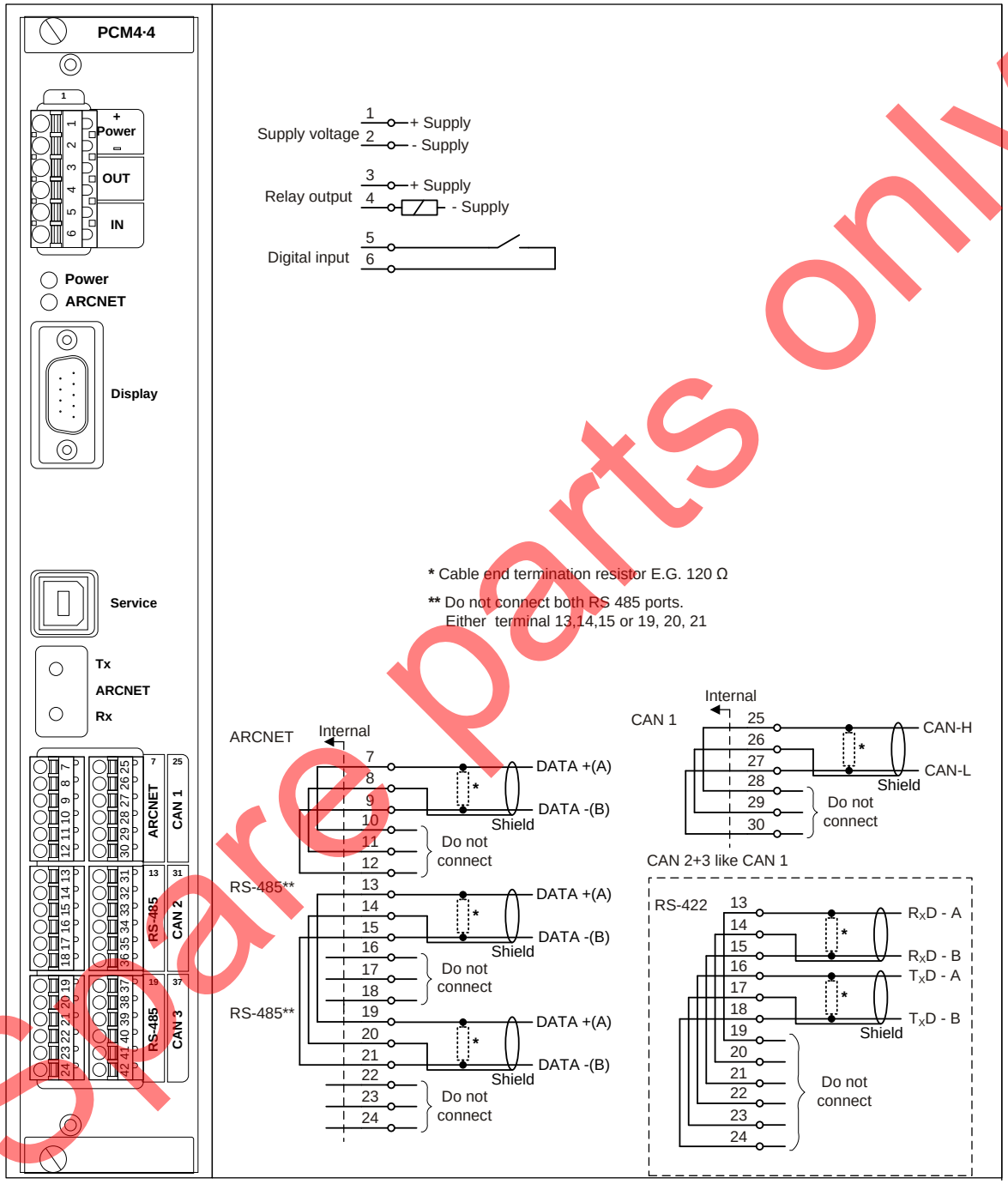
3.1 PCM 4·4

3.1.1 PCM 4·4 module specifications

The PCM 4·4 module is typically used as a distributed controller in a wind power plant.

Distributed I/O and field bus controller		
	Power supply	Power IN 18…36V DC, max 6A
	Output	Digital relay output (NO) 250VAC/24VDC 8A
	Input	Digital input designed for potential-free contacts. Open/Close 5V/7.5mA
	Interface	**3 x CAN**: Independent CAN bus lines 125/250kbps **1 x RS422/485 port**: 9,600 – 57,600 Baud **1 x ARCNET port either electrical or optical connection:** 4,800 – 57,600 Baud **1 x Display port (TTL)**: 4,800 – 57,600 baud
	Service	USB service interface 256,000 Baud
	Storage	2 MB RAM 32Kb non-volatile RAM 1 MB FLASH
	Size	8TE (40.64 mm)

3.1.2 PCM 4·4 wiring



3.1.3 PCM 4·4 terminal specifications

	Terminal	Description
1	+Supply	+24VDC
2	-Supply	-24VDC
3	Relay output	Watchdog function
4	Relay output	Watchdog function
5	Digital input	Input
6	Digital input	Input
7	DATA+(A)	ARCNET positive signal
8	Shield	Cable Shield
9	DATA-(B)	ARCNET negative signal
10	-	No connection
11	-	No connection
12	-	No connection
13	RS485: DATA+(A)	RS485 positive signal
	RS422: RxD-A	RS422 positive receive signal
14	RS485: Shield	Cable Shield
	RS422: RX shield	RS422 Receive shield
15	RS485: DATA-(B)	RS485 negative signal
	RS422: RxD-B	RS422 negative receive signal
16	RS485: -	No connection
	RS422: TxD-A	RS422 positive transmit signal
17	RS485: -	No connection
	RS422: TX shield	RS422 Transmit shield
18	RS485: -	No connection
	RS422: TxD-B	RS422 negative transmit signal
19	DATA+(A) loop through multi drop	RS485 positive signal loop through from terminal 13
	RS422: -	No connection
20	RS485: Shield	Cable Shield
	RS422: -	No connection
21	DATA-(B)	RS485 negative signal loop through from terminal 15
	RS422: -	No connection
22	-	No connection
23	-	No connection
24	-	No connection
25	CAN-H	CAN 1 H input
26	Shield	Cable Shield

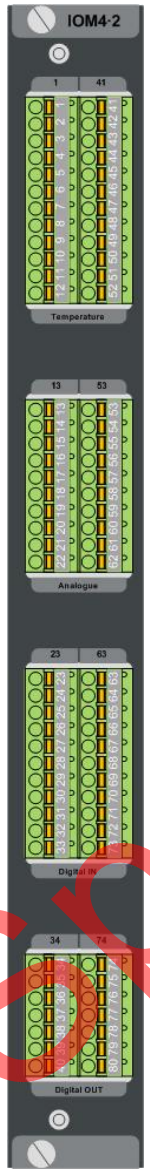
	Terminal	Description
27	CAN-L	CAN 1 L input
28	-	No connection
29	-	No connection
30	-	No connection
31	CAN-H	CAN 2 H input
32	Shield	Cable Shield
33	CAN-L	CAN 2 L input
34	-	No connection
35	-	No connection
36	-	No connection
37	CAN-H	CAN 3 H input
38	Shield	Cable Shield
39	CAN-L	CAN 3 L input
40	-	No connection
41	-	No connection
42	-	No connection

4. Input and Output Module

4.1 IOM 4·2

4.1.1 IOM 4·2 module specifications

IOM 4·2 is a highly flexible IO module which holds the most commonly used IO signals used in a wind power plant. IOM 4·2 is designed for the rough environment in a wind turbine and all input and output are protected by optical insulation from other potentials.

40 channel multi-function I/O module with analogue inputs, temperature inputs, digital inputs, frequency counter inputs, analogue outputs and digital outputs			
	12 digital inputs	Input	9…36V DC or -9…-36V DC with reference to common.
		Impedance	App. 2.4 kΩ
		Insulation	Optically insulated from other potentials 550V AC
	4 frequency/digital inputs	Input	9…36V DC
		Impedance	App. 2.4 kΩ
		Insulation	Each input are optically insulated from other potentials with 550V AC
		Frequency	0 … 20kHz. (Internal frequency divider for frequency >1KHz)
		Duty cycle	>40% at 1…20kHz; >20% at 500Hz
		Resolution	0.8µSec. (1.25MHz sampling rate.)
	10 digital outputs	Supply	External supply 9…36V DC.
		Voltage	Voltage drop <1V according to external supply
		Current	0…200mA source or sink for each output
		Insulation	Optically insulated from other potentials 550V AC
		Protection	Current limited for short-circuit protection or thermal overload. In case of a short circuit or a thermal overload of the output stages, a signal is generated to the PCM main controller, so the application can take a controlled action.

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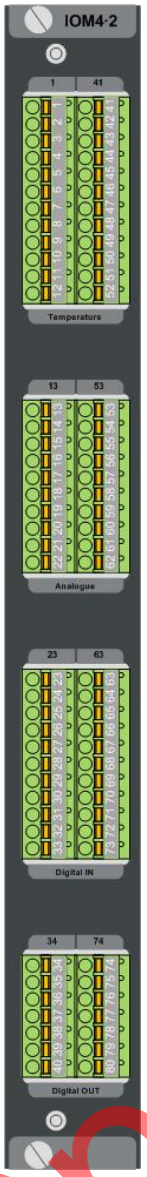
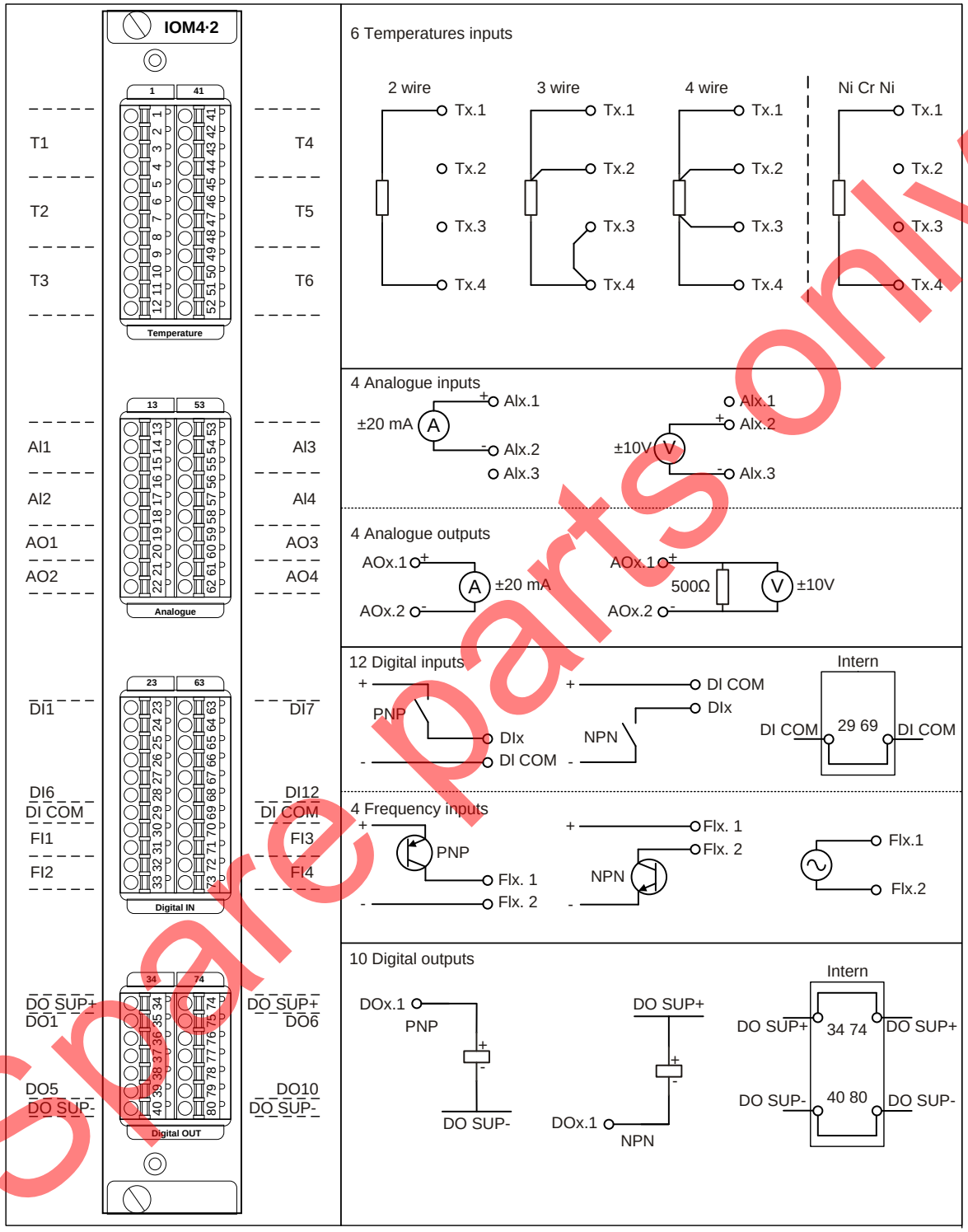
40 channel multi-function I/O module with analogue inputs, temperature inputs, digital inputs, frequency counter inputs, analogue outputs and digital outputs



6 temperature inputs	Sensor type	PT100, PT1000 or NiCr-Ni thermocouple sensor
	Range	-50 to 200°C for PT sensors; -50 to 1000°C for NiCr-Ni sensors
	Wire	2-, 3- or 4-wire connection for PT sensors
	Cable error	Open input and short circuit are detected. (Only open for NiCr-Ni sensors)
	Resolution	0.1°K
	Accuracy (4-wire)	0.5°K at reference temperature. 2.0°K at operational temperature.
	Accuracy (2 or 3-wire)	1.0°K at reference temperature. 2.5°K at operational temperature (2-wire only when cables are shorter than 1m).
	Accuracy (NiCr-Ni sensor)	5.0°K at reference temperature. 20.0°K at operational temperature.
	Insulation	Same potential as analogue inputs and analogue outputs. Optically insulated from other potentials 550V AC.
4 analogue inputs	Input type	-20mA … 20mA or -10V … 10V
	Impedance	App. 50Ω (mA-input) / 10 kΩ (V-input)
	Resolution	16 bit
	Accuracy	0.5% of full range input (40mA/20V) at reference temperature. 1.0% of full range input (40mA/20V) at operational temperature.
	Insulation	Same potential as analogue outputs and temperature inputs. Optically insulated from other potentials 550V AC
4 analogue outputs	Output	-20mA … 20mA
	Load	0 … 500Ω
	Resolution	12 bit
	Accuracy	0.5% of full range output (40mA) at reference temperature. 1.0% of full range output (40mA) at operational temperature.
	Insulation	Same potential as analogue inputs and temperature inputs. Optically insulated from other potentials 550V AC.
	Size	6TE (30.48 mm)

4.1.2 IOM 4·2 wiring



4.1.3 IOM 4·2 terminal specifications

Terminals		Description
1-4	T1	Temperature 1
4-8	T2	Temperature 2
9-12	T3	Temperature 3
41-44	T4	Temperature 4
45-48	T5	Temperature 5
49-52	T6	Temperature 6
13-15	AI1	Analogue Input 1 13-14 using -20..+20mA input 14-15 using -10..+10V input
16-18	AI2	Analogue Input 2 16-17 using -20..+20mA input 17-18 using -10..+10V input
53-55	AI3	Analogue Input 3 53-54 using -20..+20mA input 54-55 using -10..+10V input
56-58	AI4	Analogue Input 4 56-57 using -20..+20mA input 57-58 using -10..+10V input
19-20	AO1	Analogue Output -20..+20mA
21-22	AO2	Analogue Output -20..+20mA
59-60	AO3	Analogue Output -20..+20mA
61-62	AO4	Analogue Output -20..+20mA
23	DI1	Digital input 1
24	DI2	Digital input 2
25	DI3	Digital input 3
26	DI4	Digital input 4
27	DI5	Digital input 5
28	DI6	Digital input 6
29	DI COM	Digital common input reference supply. -24VDC for NPN input signal +24VDC for PNP input signal Note terminal 29 and 69 are internally connected
63	DI7	Digital input 7
64	DI8	Digital input 8
65	DI9	Digital input 9
66	DI10	Digital input 10
67	DI11	Digital input 11
68	DI12	Digital input 12
69	DI COM	Digital common input reference supply. -24VDC for NPN input signal +24VDC for PNP input signal Note terminal 29 and 69 are internally connected
30-31	FI1	Frequency input 1, NPN or PNP coupling Digital input 13
32-33	FI2	Frequency input 2 NPN or PNP coupling Digital input 14
70-71	FI3	Frequency input 3 NPN or PNP coupling Digital input 15

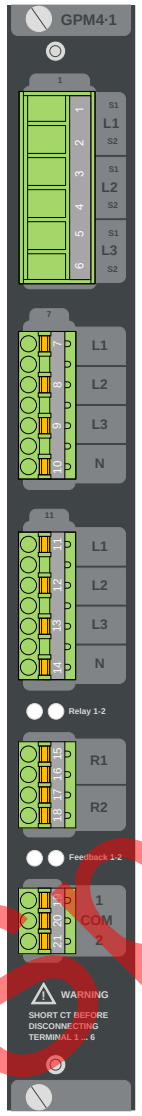
Terminals		Description
72-73	FI4	Frequency input 4 NPN or PNP coupling Digital input 16
34	DO SUP+	+24VDC digital output supply. Note: Terminals 34 and 70 are internally connected
35	DO1	Digital Output 1
36	DO2	Digital Output 2
37	DO3	Digital Output 3
38	DO4	Digital Output 4
39	DO5	Digital Output 5
40	DO SUP-	-24VDC digital output supply. Note: Terminals 40 and 80 are internally connected
75	DO SUP+	+24VDC digital output supply. Note: Terminals 34 and 70 are internally connected
75	DO6	Digital Output 6
76	DO7	Digital Output 7
77	DO8	Digital Output 8
78	DO9	Digital Output 9
79	DO10	Digital Output 10
80	DO SUP-	-24VDC digital output supply. Note: Terminals 40 and 80 are internally connected

5. Grid Protection Module

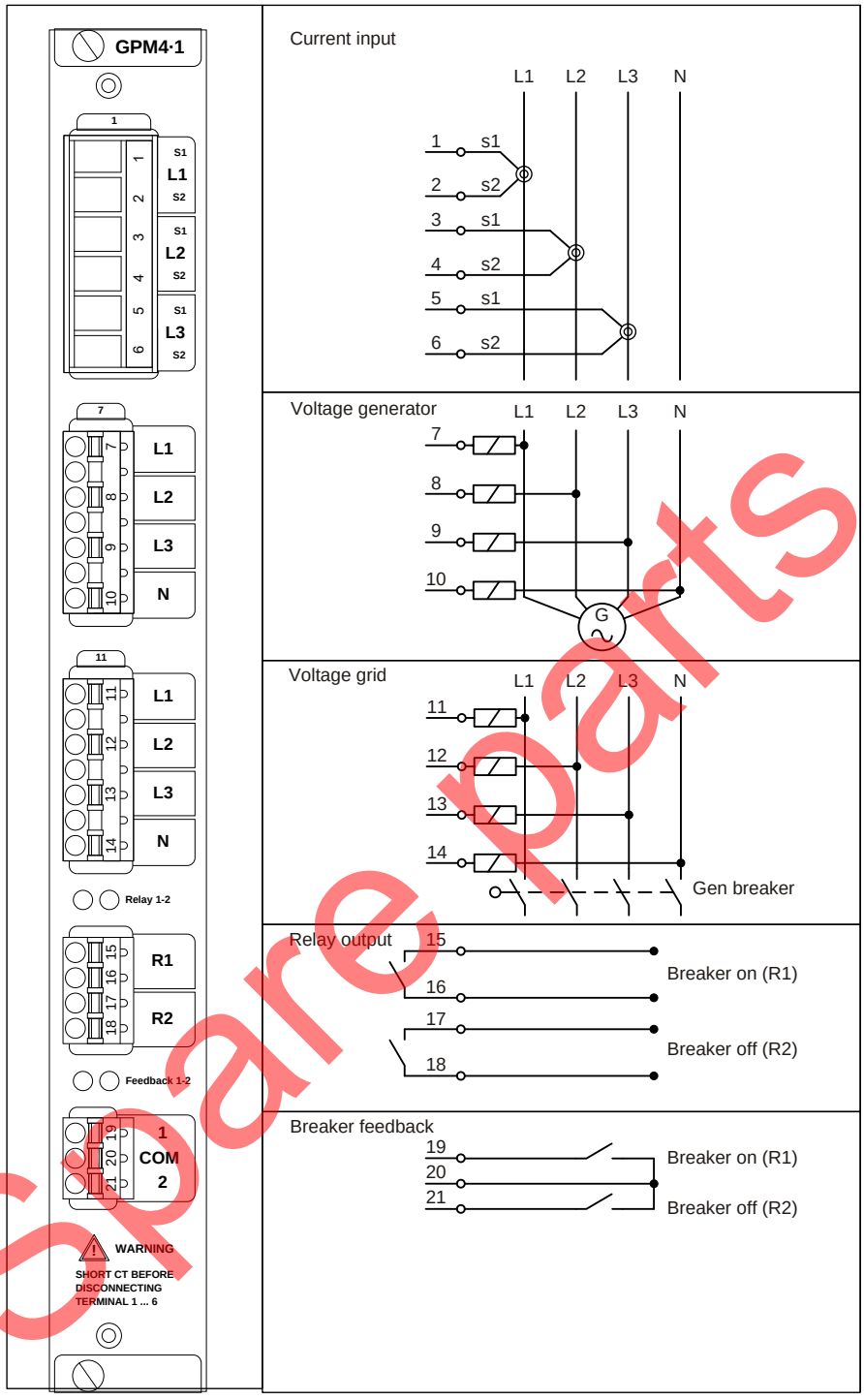
5.1 GPM 4·1

5.1.1 GPM 4·1 module specifications

The GPM 4·1 module is a class 0.5 grid measurement and protection module which can be fully configured from the main application. All measurements are available for the main application each period of the connected grid. Two relay outputs can be controlled by any of the protection functions to secure a fast and reliable disconnection of a generator or other purposes.

3-phase Grid and Generator Voltage and Current measurement(Class 0.5) with configurable grid protection features like vector jump(Δφ) detection		
	Inputs	**2 x Direct Three Phase Voltage Inputs (L1, L2, L3, N)** 40…70Hz Max 690Vrms direct. Other range by use of voltage transformer ../100 or ../110V AC. Load max 0.5mA or 0.3VA per phase. Overload: <130% of Un continuously <200% of Un for 10s. External fuse max 2A slow-blow **1 x Three phase current Input (L1, L2, L3)** 40…70Hz Current transformer secondary 1Arms or 5Arms. Load max 0.4VA per phase. Overload: 20Arms continuously, <75A for 10 s, <300 A for 1 s
	Outputs	**2 x Digital relay outputs (normally open(NO)) with feedback supervision** 230VAC, max. 8A
	Certification class	0.5 measurement of voltage, frequency, current, power, reactive power, phase angle Configurable grid protection functions
	Harmonics	Up to 500Hz measured
	Galvanic separation	3.25kV isolation between voltage measurement inputs individually and between voltage measurement inputs and all other potentials. 2.2kV isolation between relay outputs and all other potentials 550V isolation between digital inputs (feedback supervision) and all other potentials
	Safety	To EN 61010-1 overvoltage category III, 690V AC, pollution degree 2
	Accuracy	Acc. to IEC 60688 0.5% at reference temperatures 1.0% at operational temperatures
	Size	6TE (30.48 mm)

5.1.2 GPM 4·1 wiring



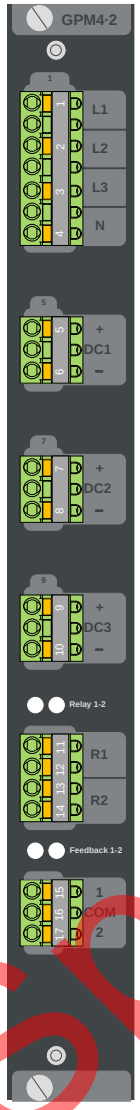
5.1.3 GPM 4·1 terminal specifications

Terminal		Description
1	L1-S1	Current Line 1 S1 connection of current transformer
2	L1-S2	Current Line 1 S2 connection of current transformer
3	L2-S1	Current Line 2S1 connection of current transformer
4	L2-S2	Current Line 2 S2 connection of current transformer
5	L3-S1	Current Line 3 S1 connection of current transformer
6	L3-S2	Current Line 3 S2 connection of current transformer
7	L1	Generator Line 1 voltage input
8	L2	Generator Line 2 voltage input
9	L3	Generator Line 3 voltage input
10	N	Generator Neutral input
11	L1	Grid Line 1 voltage input
12	L2	Grid Line 2 voltage input
13	L3	Grid Line 3 voltage input
14	N	Grid Neutral input
15-16	R1	Relay output 1
17-18	R2	Relay output 2
19	1	R1 feedback input
20	COM	Common
21	2	R2 feedback input

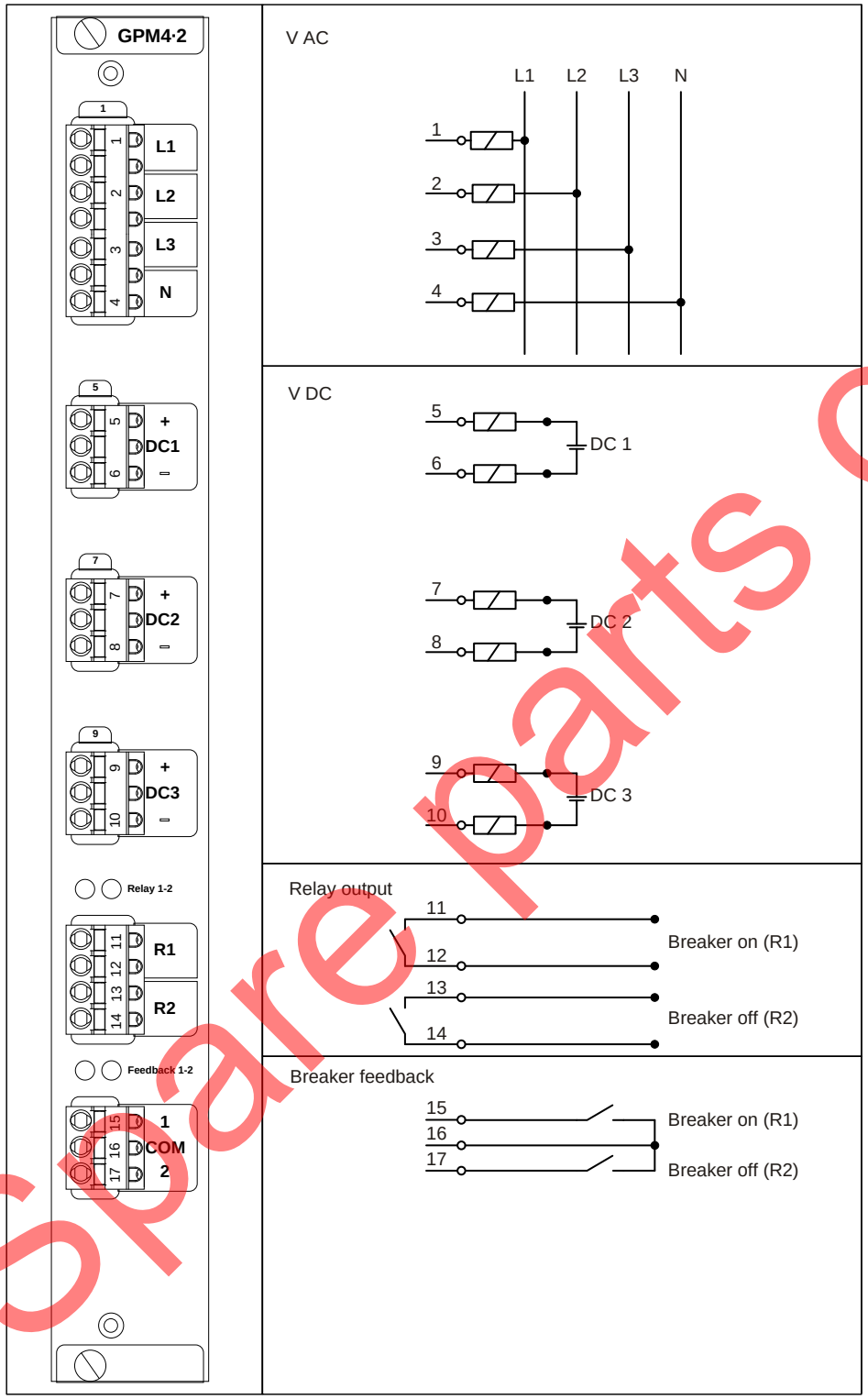
5.2 GPM 4·2

5.2.1 GPM 4·2 module specifications

The GPM 4·2 module is a class 0.5/1.0 AC/DC voltage measurement module which can be fully configured from the main application. All measurements are available for the main application. Two relay outputs can be controlled by any of the protection functions to secure a fast and reliable disconnection of a generator or other purposes.

3-phase Grid Voltage measurement (class 0.5) with configurable grid protection features like vector jump (Δφ) detection, and 3 individually separated High Voltage DC inputs.		
	Inputs	**Direct three-phase voltage inputs (L1, L2, L3, N)** 40…70Hz Max 690Vrms direct. Other range by use of voltage transformer ../100 or ../110V AC. Load max 0.5mA or 0.3VA per phase. Overload: <130% of Un continuously <200% of Un for 10s. External fuse max 2A slow-blow **3 x High Voltage DC Inputs. (Individually galvanic separated)** 0...600VDC direct. Load max 0.5mA. Overload: <110% of Un continuously <150% of Un for 10s. External fuse max 2A slow-blows
	Outputs	**2 x Digital relay outputs (normally open(NO)) with feedback supervision** 230VAC, max. 10A
	Certification class	0.5 measurement of AC voltage, frequency and phase 1.0 measurement of DC voltage Configurable grid protection functions
	Harmonics	Up to 500Hz measured
	Galvanic separation	3.25kV isolation between voltage measurement inputs individually and between voltage measurement inputs and all other potentials. 2.2kV isolation between relay outputs and all other potentials 550V isolation between digital inputs (feedback supervision) and all other potentials
	Safety	To EN 61010-1 overvoltage category III, 690V AC, pollution degree 2
	Accuracy	Acc. to IEC 60688: AC voltages: 0.5% at reference temperatures 1.0% at operational temperatures DC voltages: 1.0% at reference temperatures and 2.0% at operational temperatures
	Size	6TE (30.48 mm)

5.2.2 GPM 4·2 wiring



5.2.3 GPM 4·2 terminal specifications

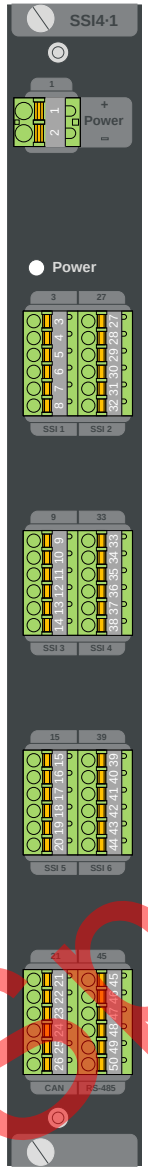
Terminal		Description
1	L1	Generator Line 1 voltage input
2	L2	Generator Line 2 voltage input
3	L3	Generator Line 3 voltage input
4	N	Generator Neutral input
5	DC1+	DC voltage 1 positive input
6	DC1-	DC voltage 1 negative input
7	DC2+	DC voltage 2 positive input
8	DC2-	DC voltage 2 negative input
9	DC3+	DC voltage 3 positive input
10	DC3-	DC voltage 3 negative input
11-dec	R1	Relay output 1
13-14	R2	Relay output 2
15	1	R1 feedback input
16	COM	Common
17	2	R2 feedback input

6. Serial Synchronous Interface

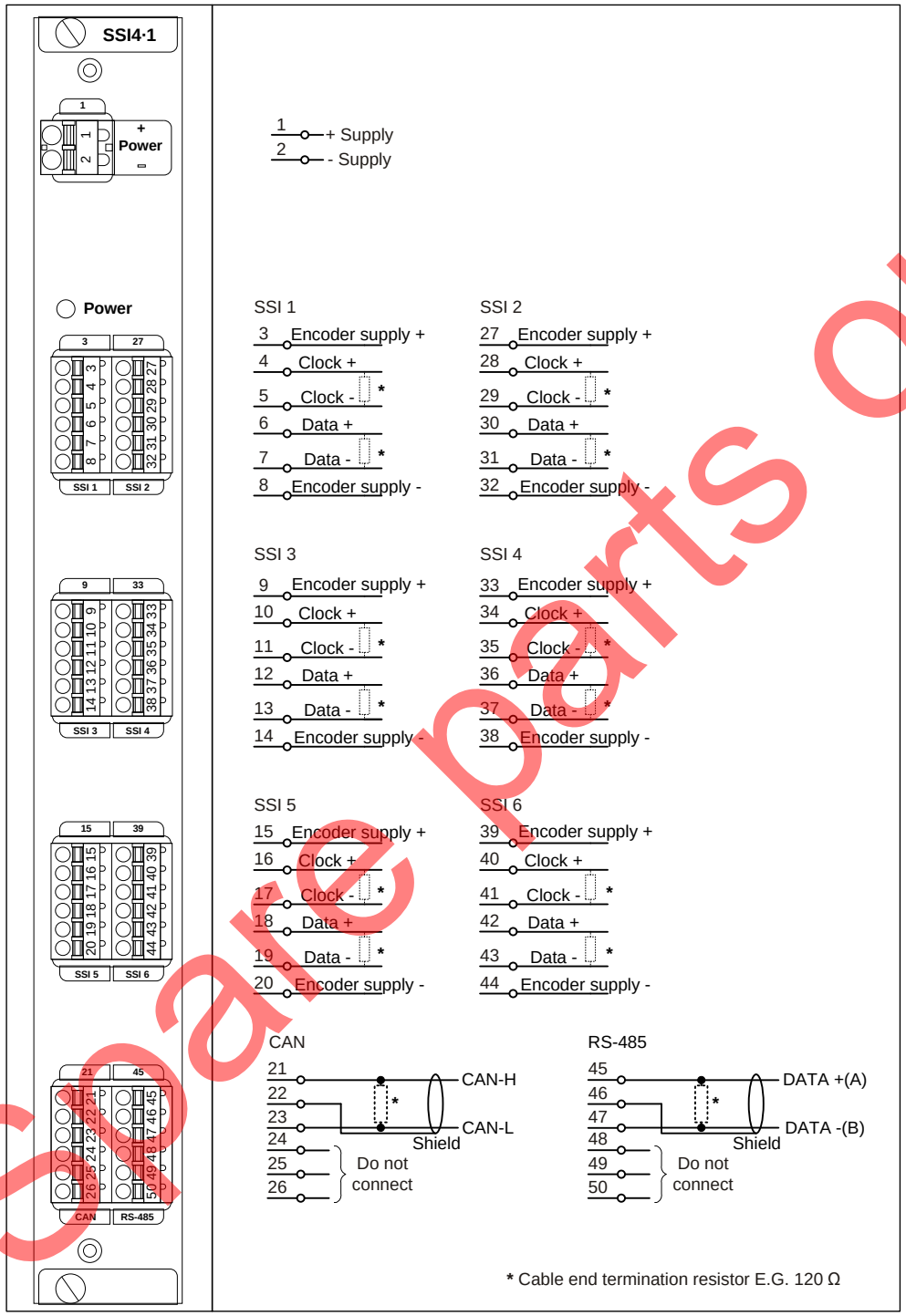
6.1 SSI 4·1

6.1.1 SSI 4·1 module specifications

SSI 4·1 is an interface module which supports SSI encoders and one RS485 interface port. All information from the SSI and RS485 is available through the CAN interface. SSI 4·1 is designed for supporting the requirement of multiple encoders in a wind power pitch drive system.

Serial Synchronous Interface module with RS485 port and SSI to CAN converter		
	Power supply	18…36 V, 1A max.
	Interface	**1 x RS485 port:** 4,800-115,200 Baud **1 x CAN bus port:** 250kbps **6 x SSI channels:** 125/250/1000kHz SSI frequency 8-32 bit resolution 50us-50ms frame delay Frame error, wire break and sensor specific error detection Gray or binary code conversion 24VDC supply output, max. 50mA per encoder
	Size	6TE (30.48 mm)

6.1.2 SSI 4·1 wiring



6.1.3 SSI 4·1 terminal specifications

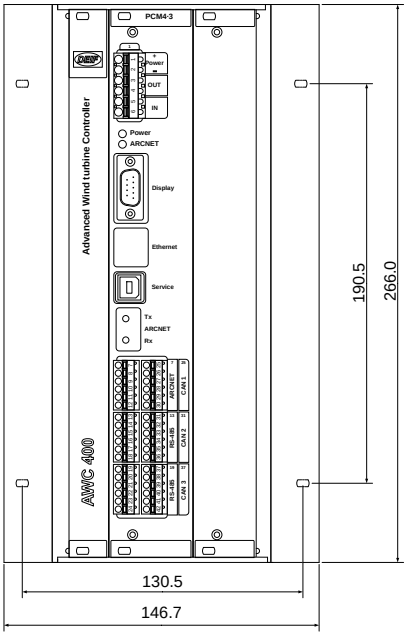
Terminal		Description
1	Supply+	+24VDC
2	Supply-	0VDC
3	SSI 1 supply+	24 VDC encoder supply
4	SSI 1 clk+	SSI 1 clock differential signal+
5	SSI 1 clk-	SSI 1 clock differential signal-
6	SSI 1 data+	SSI 1 data differential signal+
7	SSI 1 data-	SSI 1 data differential signal -
8	SSI 1 supply-	0VDC encoder supply
9	SSI 3 supply+	24 VDC encoder supply
10	SSI 3 clk+	SSI 3 clock differential signal+
11	SSI 3 clk-	SSI 3 clock differential signal-
12	SSI 3 data+	SSI 3 data differential signal+
13	SSI 3 data-	SSI 3 data differential signal -
14	SSI 3 supply-	0VDC encoder supply
15	SSI 5 supply+	24VDC encoder supply
16	SSI 5 clk+	SSI 5 clock differential signal+
17	SSI 5 clk-	SSI 5 clock differential signal-
18	SSI 5 data+	SSI 5 data differential signal+
19	SSI 5 data-	SSI 5 data differential signal -
20	SSI 5 supply-	0VDC encoder supply
21	CAN high	CAN signal
22	CAN shield	CAN shield
23	CAN low	CAN signal
24	Not used	
25	Not used	
26	Not used	
27	SSI 2 supply+	24VDC encoder supply
28	SSI 2 clk+	SSI 2 clock differential signal+
29	SSI 2 clk-	SSI 2 clock differential signal-
30	SSI 2 data+	SSI 2 data differential signal+
31	SSI 2 data-	SSI 2 data differential signal -
32	SSI 2 supply-	0VDC encoder supply
33	SSI 4 supply+	24VDC encoder supply
34	SSI 4 clk+	SSI 4 clock differential signal+
35	SSI 4 clk-	SSI 4 clock differential signal-

Terminal		Description
36	SSI 4 data+	SSI 4 data differential signal+
37	SSI 4 data-	SSI 4 data differential signal -
38	SSI 4 supply-	0VDC encoder supply
39	SSI 6 supply+	24VDC encoder supply
40	SSI 6 clk+	SSI 6 clock differential signal+
41	SSI 6 clk-	SSI 6 clock differential signal-
42	SSI 6 data+	SSI 6 data differential signal+
43	SSI 6 data-	SSI 6 data differential signal -
44	SSI 6 supply-	0VDC encoder supply
45	RS485 data+	RS485 data differential signal+
46	RS485 shield	RS485 shield
47	RS485 data-	RS485 data differential signal-
48	Not used	
49	Not used	
50	Not used	

7. Base mounting racks

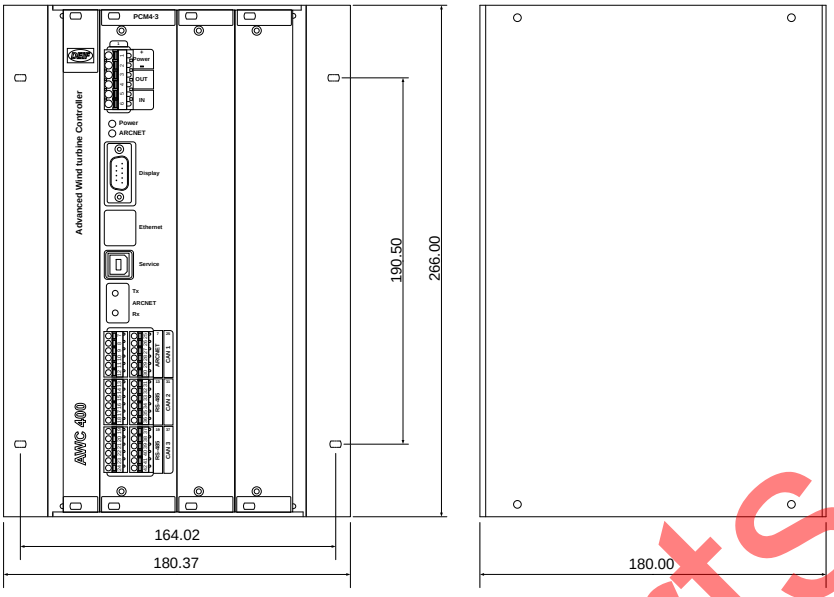
7.1 Modules

7.1.1 Rack specifications

Rack 18TE	
18TE, 1 IO-slots	
	
Rack front view (mm)	Rack side view (mm)
No. of modules	1 PCM4·X, 1 I/O module

Rack 24TE

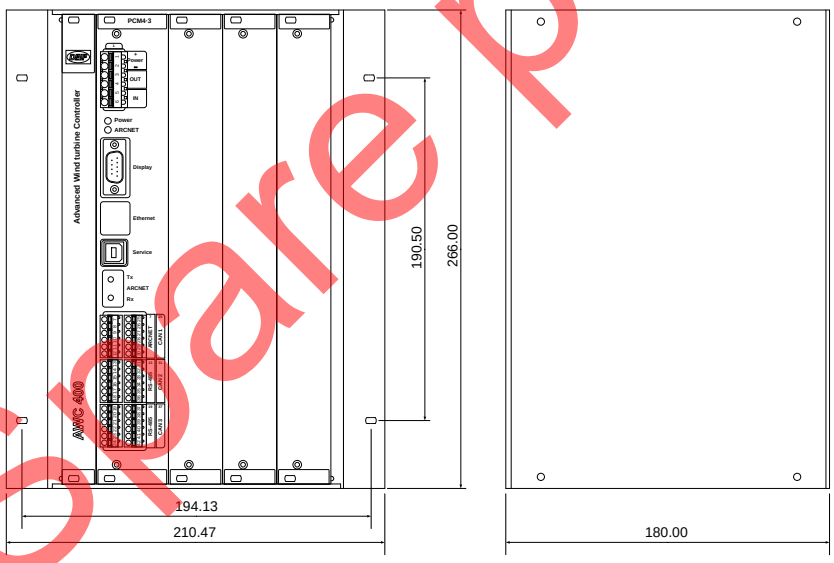
24TE, 2 IO-slots



Rack front view (mm)	Rack side view (mm)
No. of modules	1 PCM4·X, 2 I/O modules

Rack 30TE

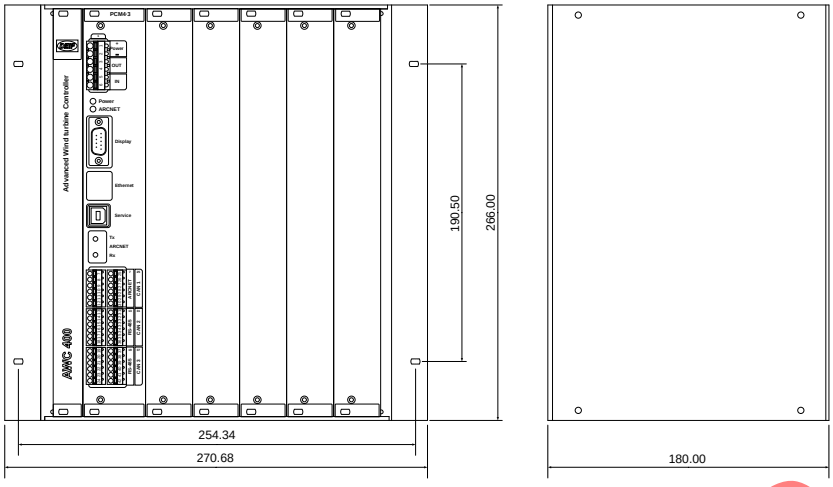
30TE, 3 IO-slots



Rack front view (mm)	Rack side view (mm)
No. of modules	1 PCM4·x, 3 I/O modules

Rack 42TE

42TE, 5 IO-slots



Rack front view (mm)	Rack side view (mm)
No. of modules	1 PCM4·x, 5 I/O modules

Rack 60TE

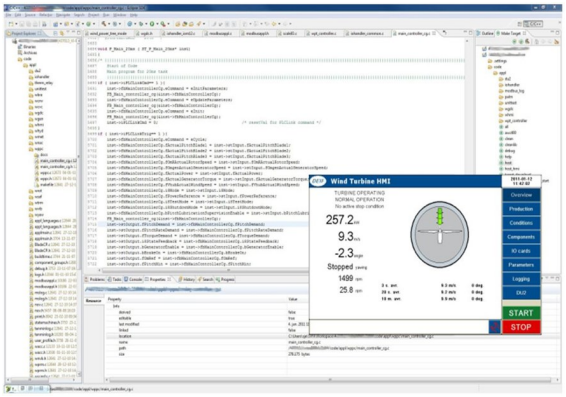
60TE, 8 IO-slots

Rack front view (mm)	Rack side view (mm)
No.of modules	1 PCM4·x, 8 I/O modules

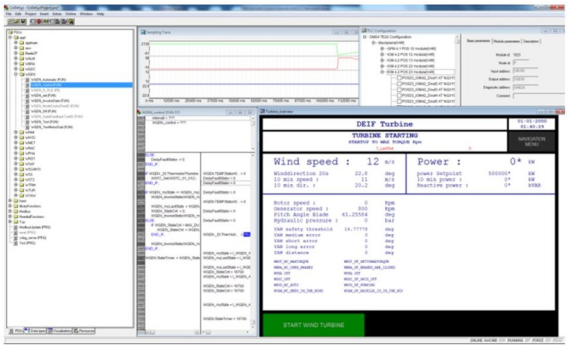
8. Wind Turbine Application Development

8.1 Software packages

8.1.1 AWC 400 C/C++ development package

Wind Turbine Application Development	
C/C++ programming 	Eclipse based development Package One click from project to running program on AWC Prepared for Garrad Hassan C/C++ Control Strategy Integrated DEIF HMI solution Online Debugging
AWC 400 C/C++ development package eclipse READY ANSI C/C++	Eclipse IDE • GNU C/C++ Compiler • GDB Online Debugger • Make system AWC 400 component and system setup

8.1.2 IEC61131-3 programming

Wind Turbine Application Development	
	IEC61131-3 PLC programmed based on CoDeSys Programming languages ● Instruction List(IL) ● Sequential Function Chart(SFC) ● Function Block Diagram(FBD) ● Structured Text(ST) ● Ladder Diagram(LD) ● ANSI C/C++ (via AWC 400 C/C++ development package) Multilanguage help in Chinese, German and EnglishProgrammed via Ethernet connection(TCP/IP) Download of boot projects and source code Integrated PLC and task configuration Integrated HMI visualization Web visualization on PanelPC or remote via TCP/IP Online debugging and Sampling Trace Integrated Simulation
AWC 400 CoDeSys package CoDeSys	CoDeSys V2.3DEIF AWC 400 Target Support Package (TSP)

8.1.3 Supported software features

Software	AWC 400 C programming	AWC 400 CoDeSys+webvisualization
PLC runtime	-	CoDeSys V2
Programming		
IEC61131-3	-	IL, LD, SFC, FBD, ST
	-	CoDeSysV2
C/C++	ANSI C/C++	Yes as FB components
	Eclipse based IDE	Eclipse based IDE
Communication drivers	Modbus (RS485 or TCP/IP)	
	CAN layer 2	
	CANopen Master/Slave	
	Serial communication (RS422/RS485)	
	Socket communication (UDP/TCP/IP)	
	SSI - Serial Synchronous Interface	
	Profibus via CAN converter	
MATLAB/Simulink interface	DEIF PLC Link	
C code generation	Yes	
IEC 61131-3 Structured Text generation	Yes	
FLEX / GH Bladed Interface	Yes	
Visualization	DEIF HMI solution (TCP/IP)	DEIF HMI solution (TCP/IP) or CoDeSys Web-visualisation
System Configuration		
Device Handling	Software (DEIF IO Handler)	CoDeSysV2 PLC Configuration
Configuration	Web based Read device status, Manage Access, Change IP address, View Electronic ID	
Visualisation Designer	Via Software (DEIF HMI)	CoDeSysV2 Visulisation
Scope/Trace	DEIF tool	Yes (Trace in CoDeSysV2)

HMI visualisation tool	
DEIF HMI Client software (TCP/IP)	PanelPC and remote HMI client (communication via TCP/IP) Requires Windows CE, Windows XP or later

SCADA/Park communication	
IEC 61850 (MMS Server)	On request
IEC 61400-25	Yes, Via DEIF Park Gateway
OPC Interface (OPC-XML-DA)	Yes, Via DEIF Park Gateway
OPC-UA	On request

Wind Turbine Park SCADA / Power Management	
Wind Turbine SCADA solution	Yes
Park Power Management solution	Yes

9. General information

9.1 Legal information and disclaimer

9.1.1 Open source software

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