Technical Information

IFF2400P17AE440989

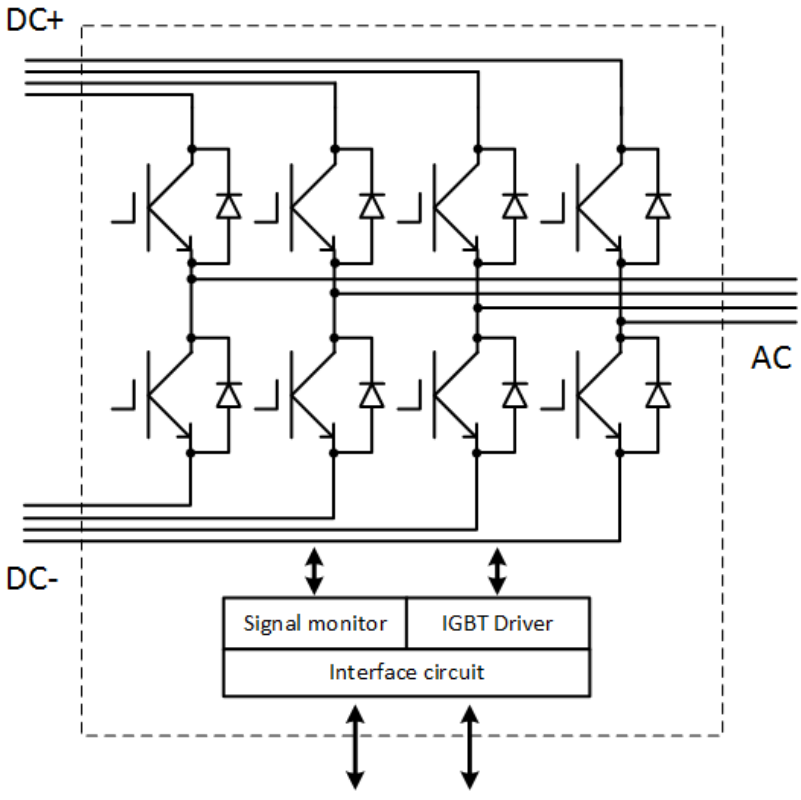
Preliminary data

General information

IPM for typical voltages up to 690 V_{RMS}
Rated output current 650 A_{RMS}

Features
- Integrated current, voltage and temperature measurement
- Tvjop max=150°C
- Real time Tvj simulation
- IGBT4 technology
- Smart protection
- TIM and pressfit technology
- Modbus interface
- 100% tested IPM
- ROHS compliant
- Integrated chip current : 2400A
- Integrated chio voltage: 1700V

Topology	half bridge
Application	Energy Storage, Smart Grid, Wind, Drives, Solar
Heatsink	air cooled
Implemented sensors	voltage, current, temperature
Driver signals IGBT	+15V
Approvals	UL61800-5-1
Sales - name	IFF2400P17AE440989



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Absolute maximum rated values

Collector-emitter voltage	IGBT; T_{vj} = 25°C	V_{CES}	1700	V
Repetitive peak reverse voltage	Diode; T_{vj} = 25°C	V_{RRM}	1700	V
DC link voltage		V_{DC}	1450	V
Peak switching current		I_{peak}	4000	A
Insulation test voltage	f = 50 Hz, t = 60 s	V_{ISOL}	3.4	kV_{RMS}
Junction temperature	under switching conditions	T_{vjop}	150	°C
Operational ambient temperature min.		T_{amb}	-40	°C
Switching frequency operation values		f_{sw2}	10	kHz

Notes

Characteristic values

Operation values

			min.	typ.	max.	
Rated continuous current	V_{DC} = 1100 V, V_{AC} = 690 V_{RMS}, cos(φ) = 0.85, $f_{AC\ sine}$ = 50 Hz, f_{sw} = 3000 Hz, T_{inlet} = 25°C, $T_j \leq$ 150 °C	I_{AC}		650		A_{RMS}
Power losses	I_{AC} = 650 A, V_{DC} = 1100 V, V_{AC} = 690 V_{RMS}, cos(φ) = 0.85, $f_{AC\ sine}$ = 50 Hz, f_{sw} = 3000 Hz, T_{inlet} = 25 °C, $T_j \leq$ 150 °C	P_{loss}		4000		W

Controller interface

			min.	typ.	max.	
Auxiliary voltage		V_{aux}	19.2	24	28.3	V
Auxiliary power requirement	V_{aux} = 24 V	P_{aux}			48	W
Digital input level		$V_{in\ low}$			2	V
		$V_{in\ high}$	8.5		16	V
Digital output level	max. 1 mA	$V_{out\ low}$			2	V
		$V_{out\ high}$	13.5	15	16.5	V
Interlock time	default value	$t_{interlock}$		4		µs
Propagation delay for PWM	default value	t_{prop}		4		µs
Analog output for phase current	for 650 A	$V_{Iac\ ana}$		1.54		V
Over current shut down	default value, response time 15 µs	$I_{ac\ trip}$		4200		A
Analog DC link voltage sensor output	load max 5 mA, @ 1100 V	$V_{DC\ ana}$		7.86		V
Over voltage shut down	default value, response time 500 µs	$V_{dc\ trip}$		1340		V
Chip over temperature shut down	default value, response time 1000 µs	$T_{vj\ trip}$		150		°C
Analog ouput for junction temperature	for 150°C	$V_{Tvj\ ana}$		10		V
PCB ambient over temperature shut down	default value, response time 1 s	$T_{pcb\ err}$		85		°C
Serial BUS	Modbus, RS485			19200		Bit/s

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System data

				min.	typ.	max.	
EMC robustness	according to IEC61800 at named interfaces	power	V_{Burst}		2		kV
		control	V_{Burst}		2		kV
Storage temperature			T_{stor}	-40		85	°C
Operational ambient temperature			$T_{op\ amb}$	-40		65	°C
Stray inductance			L_S		8.5		nH
Lead resistance			$R_{CC\ EE}$		1.2		mΩ
Impuls test voltage	Power to logic side, acc .IEC 61800-5-1				12		kV
Isolation test voltage	RMS, f = 50 Hz, t = 60 s		V_{ISOL}		3.4		kV
Creepage distance	Power side to heatsink across housing				13		mm
Clearance	Power side to heatsink				8		mm
Protection degree					IP00		
Pollution degree					2		
Dimensions	width x depth x height			215	338	166	mm
Weight					11.5		kg

Notes
Partical discharge test, power side to logic side, according to IEC 61800-5-1, TE > 1920V
Housing CTI > 175

Heatsink air cooled

			min.	typ.	max.	
Air flow	T_{air} = 25 °C, P_{air} = 0.055 hPa, dry and dust free, measured at the side of the heat sink	$\Delta V/\Delta t$		550		m³/h
Air inlet temperature		T_{inlet}			40	°C

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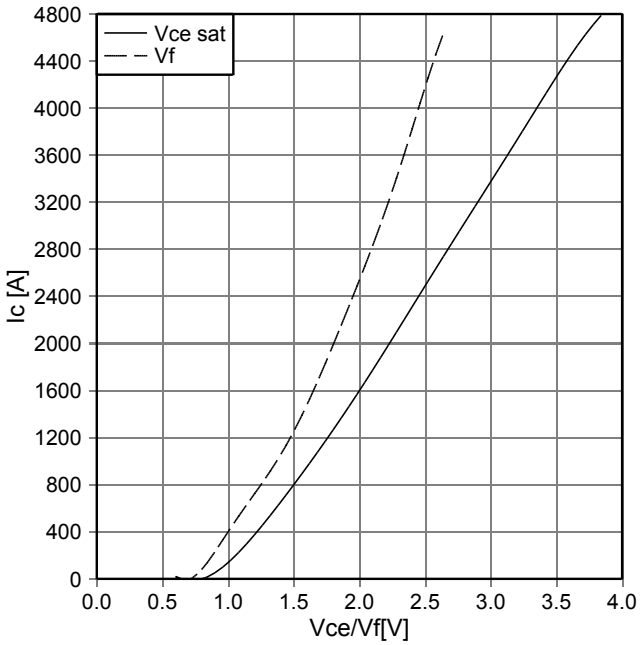
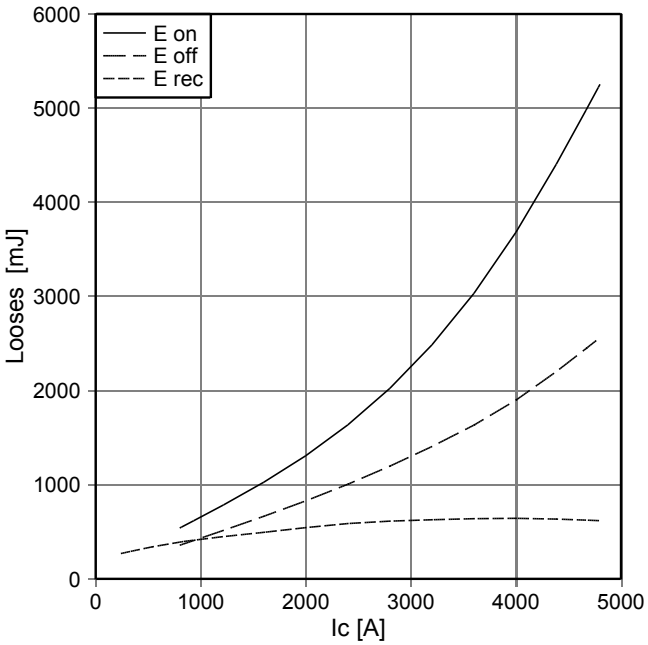
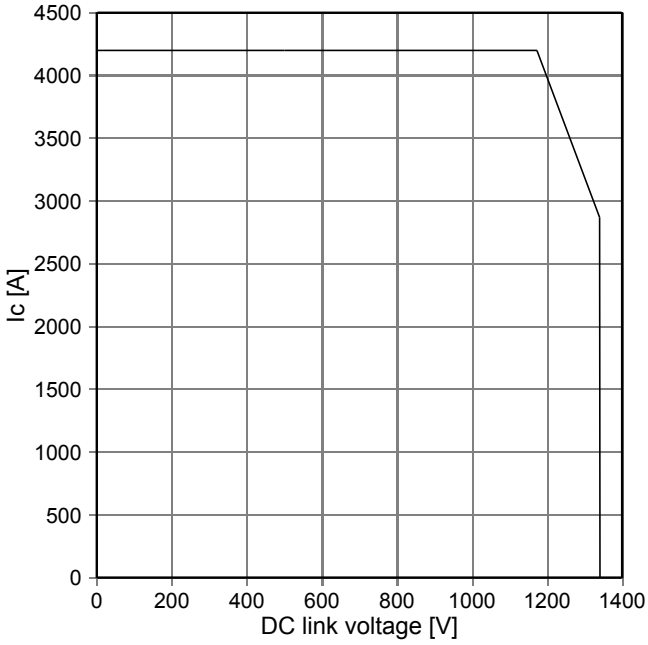
output characteristic IGBT/Diode
Tvj = 150°C



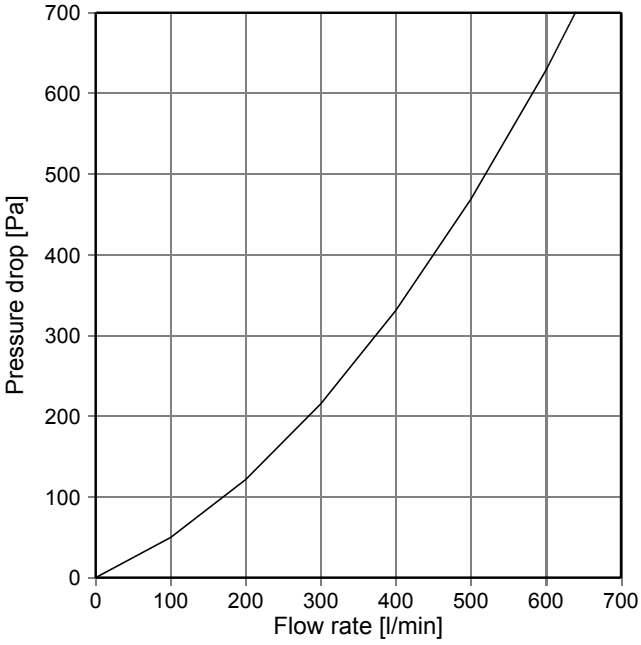
switching losses, Eon, Eoff, Erec
Vdc 1100V, T vj = 150°C



safe operating area



Pressure drop vs. flow rate
T inlet = 25°C



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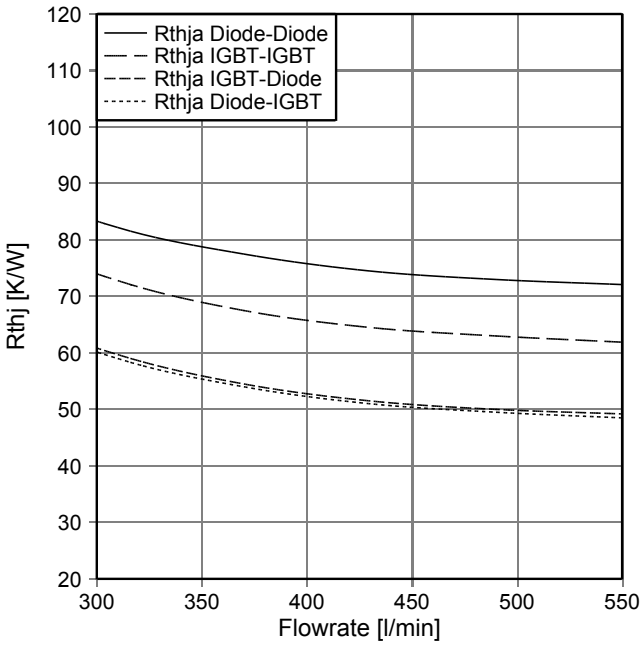
Thermal resistence vs. Flow rate
T inlet=25°C



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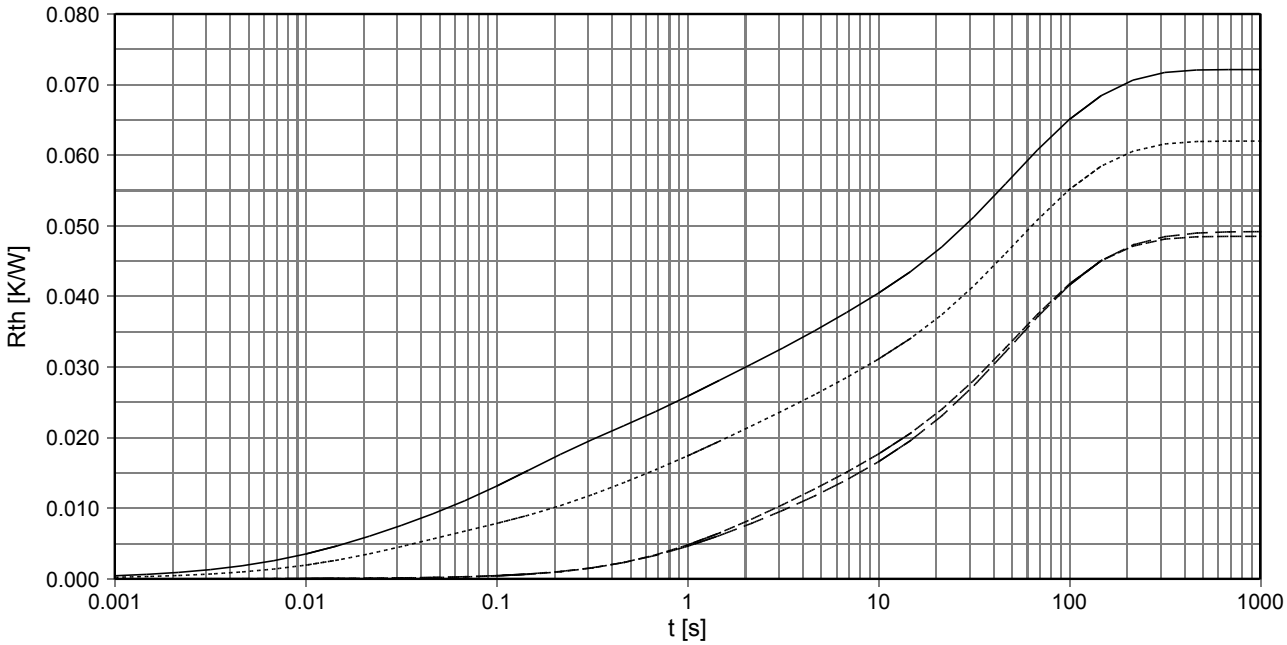
thermal impedance
Tinlet =25°C, Air flow rate= 550m3/h



—— Rthja Diode - Diode

i:	1	2	3	4	5	6
r_i[K/W]:	0.0045	0.01125	0.0084	0.00975	0.01473	0.0235
τ_i[s]:	0.014	0.102	0.638	3.11	30.44	78

— – Rthja IGBT - Diode

i:	1	2	3	4	5	6
r_i[K/W]:	-0.00052	0.00429	0.00628	0.00458	0.0263	0.00825
τ_i[s]:	0.172	0.942	3.525	22.34	51.9	125

– – – Rthja Diode-IGBT

i:	1	2	3	4	5	6
r_i[K/W]:	-0.00059	0.00523	0.00694	0.00185	0.01666	0.01842
τ_i[s]:	0.164	1.165	3.71	19.85	39.7	81.6

------ Rthja IGBT-IGBT

i:	1	2	3	4	5	6
r_i[K/W]:	0.005	0.0047	0.0072	0.0083	0.0164	0.0204
τ_i[s]:	0.026	0.2	0.848	3.525	35.58	80.37

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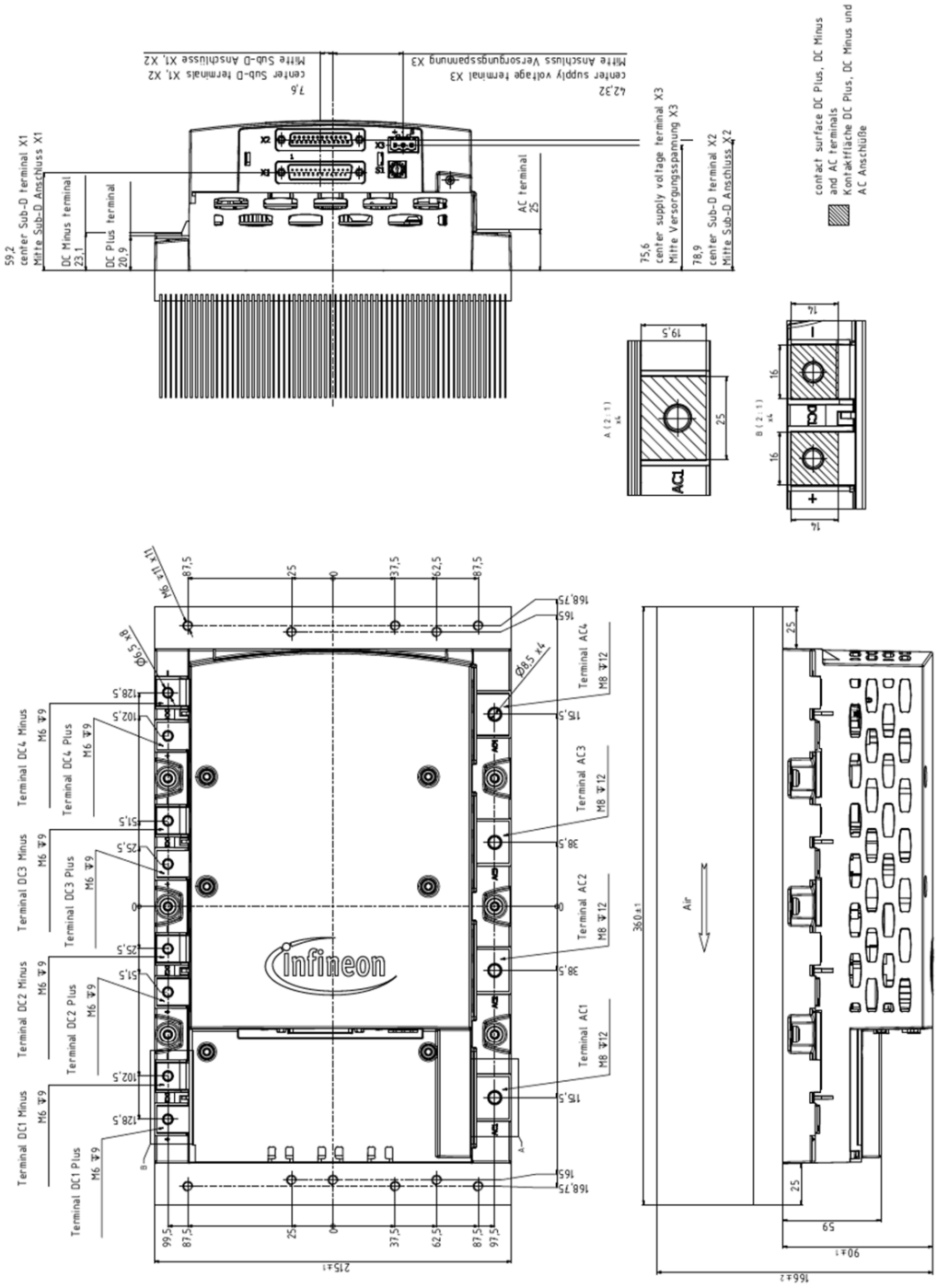
Mechanical drawing



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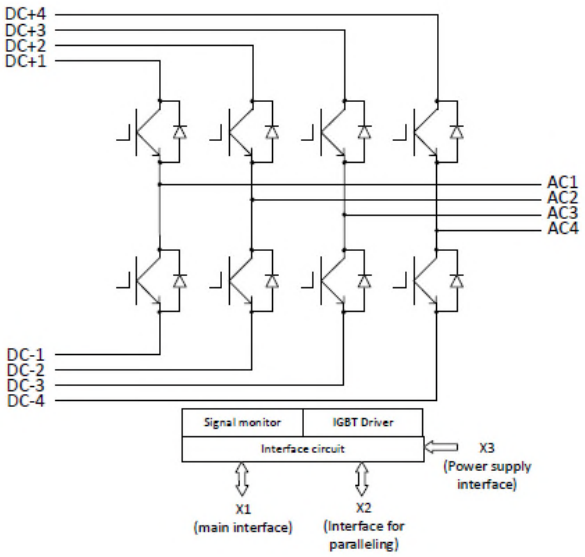
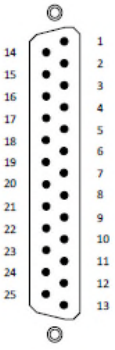
Circuit diagram



Pin configuration for X1 (main control interface)

Pin	Signal	I/O	Pin	Signal	I/O
1	24V_supply	PWR	14	GND_supply	PWR
2	24V_supply	PWR	15	GND_supply	PWR
3	+15_DC	PWR	16	GND_DC	PWR
4	Alert	OUT	17	Enable	IN
5	Fault	IN/OUT	18	Warn_OV	IN/OUT
6	ANA_Tj	ANA OUT	19	ID_det	IN/OUT
7	ANA_Vdc	ANA OUT	20	GND_ana	PWR
8	PWM_top	IN	21	PWM_bot	IN
9	Warn_OC	IN/OUT	22	GND_dig	PWR
10	ANA_Ic	ANA OUT	23	Warn_OT	IN/OUT
11	TX/RX_IN+	IN/OUT	24	TX/RX_IN-	IN/OUT
12	TX/RX_Out+	IN/OUT	25	TX/RX_Out-	IN/OUT
13	Shield		Housing is shield		

Detail information for X1, X2 and X3 refer to handbook



Sub-D 25, male
with UNC thread

Preliminary data

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- the conclusion of Quality Agreements;
- to establish joint measures of an ongoing product survey,
and that we may make delivery depended on the realization of any such measures.

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Prior to installation and operation, all safety notices and warnings and all warning signs attached to the equipment have to be carefully read. Make sure that all warning signs remain in a legible condition and that missing or damaged signs are replaced. To installation and operation, all safety notices and warnings and all warning signs attached to the equipment have to be carefully read. Make sure that all warning signs remain in a legible condition and that missing or damaged signs are replaced.