

## imc CANSASflex-UNI8

**Universal measurement module with 8 channels for voltage, current, thermocouples, PT100, bridge, strain gauge measurement**

The CAN-Bus measurement module

imc CANSASflex-UNI8 is an analog input module with 8 channels which are individually filtered, amplified and digitized; the module is ideal for the measurement of:

- Voltage (5 mV to 50 V)
- Current (20 mA sensors)
- Temperature (thermocouple, PT100)
- Bridge and strain gauge measurements (full-, half- and quarter bridge 120  $\Omega$ , optional 350  $\Omega$ )
- Resistance (0 to 800  $\Omega$ )



imc CANSASflex-UNI8

For the supply of external sensors and bridge measurement a sensor supply with adjustable voltages 2.5 V to 24 V is included.

### Highlights

- Universal amplifier for all relevant measurement quantities
- 200 Hz bandwidth with max. 1 kSps/channel sampling rate
- Bridge offset balancing upon push of a button, via CAN bus or automatically upon power-up
- Measurement range and sampling rates can be set per channel in steps of 1, 2, 5
- 24 Bit digitization and internal handling  
CAN-output format: 16 Bit
- Support of imc Plug & Measure:  
TEDS (Transducer Electronic Data Sheets, IEEE 1451.4)

### Typical applications

Provides maximum flexibility for changing measurement and sensor requirements

## General imc CANSASflex functions and specifications

As a CAN-bus-based measurement engineering tool, the imc CANSASflex series offers a wide selection of measurement modules which process and digitize sensor signals and output these as CAN-messages.

The modules of the imc CANSASflex series (CANFX) can be joined together mechanically and electrically by means of a latching ("click") mechanism, without the use of any tools nor the need for any extra cables, and also allows the CAN-logger imc BUSDAQflex (BUSFX) to dock on directly. Depending on the module type, they are available in either long (L-), short, or both housing versions.

Besides fixed installations or operation on a laboratory bench, the modules are also designed to fit in a special 19" subrack to provide a convenient solution in test station settings.

### Fields of application

- For test rigs, vehicle testing, road trials and all-purpose measurement applications
- Deployable both in decentralized, distributed and in centralized measurement setups
- Operable with CAN-interfaces and CAN-data loggers from either imc or 3rd-party manufacturers

### Properties and capabilities

#### Operating conditions:

- Operating temperature: -40°C to +85°C, condensation allowed
- Shock resistance: 50 g (pk over 5 ms)
- Ingress Protection rating: IP40 (only with optional protective cover on top of the locking slider, otherwise IP20)

#### CAN-Bus:

- Configurable Baud rate (max. 1 Mbit/s)
- Default configuration ex-factory: Baud rate=125 kbit/s and IDs: Master=2, Slave=3
- Galvanically isolated
- Built-in terminator resistance, manually switchable

#### Sampling rates and synchronization:

- Configurable CAN data rate
- Simultaneous sampling of all module's channels, as well as across multiple modules
- Synchronization of multiple modules as well as to a global CAN-logger: based on CAN messages (no Sync-signal required)

#### Power supply:

- Galvanically isolated power supply input
- DC 10 V to 50 V
- LEMO.0B connector (2-pin); alternative power supply via CAN connector (DSUB-9)

#### On-board signal processing:

- "Virtual channels": integrated signal processor (DSP) for online processing. Data reduction, filtering, scaling, calculations, threshold monitoring, etc.
- Programmable multi-functional status-LED, supporting linkage to virtual channels

#### Heartbeat-message:

- Configurable with cyclical "life-sign", e.g. for integrity check purposes in test rigs
- Contains checksum for configuration and serial number, e.g. for consistency monitoring (checking of whether the correct module is still being used, for instance in installations undergoing maintenance)

#### FindMe:

- Identification of a module by means of selective LED flashing (via configuration software; does not occupy any additional CAN messages)

## **flex-Series: flexible granulation, topology and block assemblies**

### Click-mechanism:

- Modules joinable to module-blocks: mechanically and electrically connected (CAN and power supply)
- No tools or additional cabling required
- With guide grooves, magnetic catches and locking slider
- Both short and long housing versions joinable:  
with electrical connection: align on rear side; mechanically only: align on front side
- Direct connection of compatible CAN-logger: imc BUSDAQflex

### 19" rack solution (subrack):

- Modules designed for insertion into special 19" frames ("boom-box") for installation in test stations
- Rack backplane accommodates the power supply, CAN and slot information (automatically read out configuration information for use in automation software)

### Mounting:

- Mountable by means of recessed threaded holes (M3), either individually or jointly as a block
- Rubber bumper rails providing secure placement in laboratory settings
- Various brackets and handles, and DIN top-hat rail mounting kit available as accessories



imc CANSASflex modules connected (Click-mechanism)  
in a block with imc BUSDAQflex Logger (left)



rear view of this block:  
CAN, Power supply, Terminator, Locking slider

## **Software**

### Configuration:

- Using imc CANSAS software (free of charge), including dbc-export
- Autostart with saved configuration; also pre-configurable at factory
- The module's current configuration can be read out and exported by the software; For transfer of configuration via physical transport of the module; for back tracing and recovery.
- Supports the CANopen® protocol according "CiA® DS 301 V4.0.2" and "CiA® DS 404V1.2";  
4 TPDOs (Transmit Process Data Objects) in INT16, INT32 and FLOAT.  
See "CANSAS CANopen®" for a detailed description of the supported features and settings.

### Measurement operation:

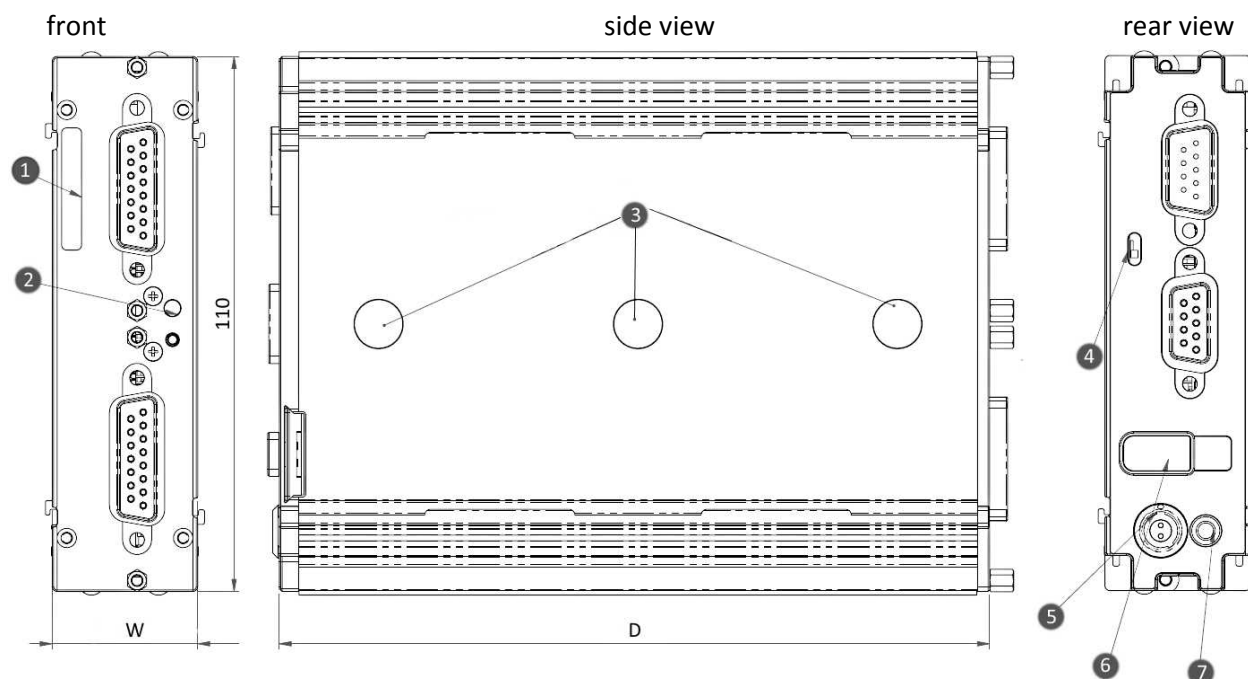
- Data logger operation:  
Software: imc STUDIO  
Hardware: imc measurement system with CAN-Interface, e.g.  
imc BUSDAQ, imc C-SERIE, imc SPARTAN  
imc CRONOS device family (CRFX, CRC, CRSL, CRPL)
- Basic measurement operation with imc CANSASpro
- With any desired CAN-interfaces and CAN-loggers from 3rd-party manufacturers

## Models and Options

### Overview of the available variants for imc CANSASflex-UNI8

Order Code	signal connection	option/extra	housing	article number
CANFX/L-UNI8	DSUB-15		L2	1250001
CANFX/L-UNI8-L	LEMO			1250006
CANFX/L-UNI8-V	ITT Veam			1250012
CANFX/L-UNI8-350	DSUB-15	350 $\Omega$ internal		1250010

### Mechanical drawings with dimensions



Shown in standard operating orientation: housing type L0; width (W) = 30 mm.

Housing type	S0	S1	S2	L0	L1	L2
<b>W: Width</b>	30 mm	50.3 mm	70.6 mm	30 mm	50.3 mm	70.6 mm
<b>D: Depth</b>	93 mm, with two magnets			146.5 mm, with three magnets		

#### Legend:

- |                            |                              |                              |
|----------------------------|------------------------------|------------------------------|
| 1: Serial number label     | 3: magnet                    | 5: supply socket (LEMO)      |
| 2: Status LED (blue / red) | (depending on model)         | 6: locking slider CAN/supply |
|                            | 4: adjustable CAN terminator | 7: ground connection M4      |

## Accessories and Connectors

### Included accessories

- Calibration certificate with test equipment verification as per ISO 9001 (manufacturer's calibration certificate)

**Optional accessories****AC/DC power adapter 110-230V AC (with appropriate LEMO plug)**

ACC/AC-ADAP-24-60-0B	24 V DC, 60 W, LEMO.0B.302	1350246
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**Power connector**

ACC/POWER-PLUG3	Power connector for DC supply LEMO FGG.0B.302, solder contact, max. 0.34 mm <sup>2</sup>	1350033
ACC/CABLE-LEMO-BAN-2M5	Power supply cable LEMO/banana 2.5 m	13500xx

**DSUB-9 connector (CAN)**

CAN/RESET	Reset-plug	1050025
CAN/KABEL-TYP2	CAN-Bus connection cable 2x DSUB-9 1:1, 2 m length	1050027

**DSUB-15 connector (measurement inputs)**

ACC/DSUBM-UNI2	DSUB-15 plug with screw terminals for 2-channel voltage, current <sup>1</sup> and bridge measurement as well as temperatures with PT100 and thermocouples with integrated cold junction compensation (CJC) <sup>1</sup> single-end current measurement, for differential measurement an external shunt or the appropriate connector (ACC/DSUBM-I2) is necessary	1350169
ACC/DSUBM-TEDS-UNI2	version with TEDS support, according to IEEE 1451.4 for use with imc Plug & Measure	1350188
ACC/DSUBM-I2	DSUB-15 plug with screw terminals for 2-channel current measurement of up to 50 mA (50 Ω shunt, scaling factor: 0.02A/V)	1350180
ACC/DSUBM-TEDS-I2	version with TEDS support, according to IEEE 1451.4 for use with imc Plug & Measure	1350193

**LEMO and ITT Veam connector (variants)**

ACC/TH-LEM-150	LEMO.1B plug for thermocouple measurement with built-in cold-junction compensation (CJC) via PT100	1350086
CAN/UNIST-PT100	ITT Veam plug for 1 channel thermocouple measurement with built-in cold-junction compensation (CJC) via PT100	1050120

**Handle**

CANFX/HANDLE-L	CANFX handle kit (left and right) - long (L)	1250028
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**Mounting brackets for fixed installations**

CANFX/BRACKET-CON-L	CANFX connection bracket long	1250020
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**Mounting brackets for DIN Rail**

CANFX/BRACKET-DIN-L2	CANFX DIN Rail mounting bracket - Type L2	1250026
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**Miscellaneous**

Calibration report set for each device	Report set with manufacturer's calibration certificate and individual readings, as well as list of test equipment used. Meets requirements of DIN EN ISO 17025	
Instruction manual	Getting started with imc CANSAS	
CANFX/RUBBER-1M	silicone strip blue 1 m	1250029

## Technical Specs - UNI8

Channels, Measurement modes		
Parameter	Value	Remarks
Channels	8	
Measurement modes DSUB	voltage measurement voltage measurement with adjusted supply current measurement  resistance measurement thermocouples (mounted with and without contact to GND) bridge-sensor bridge: strain gauge PT100 in 3- and 4-wire configuration	internal shunt (single-end) or with shunt connector (ACC/DSUBM-I2)    half-, quarter- and full bridge
Measurement modes LEMO and ITT Veam	voltage measurement voltage measurement with adjusted supply current measurement resistance measurement thermocouples (mounted with and without contact to GND)  bridge-sensor bridge: strain gauge PT100 in 3- and 4-wire configuration	internal shunt (single-end)  LEMO.1B connector with built-in cold- junction compensation (CJC) ACC/TH-LEM-150  half-, quarter- and full bridge

Sampling rate, Bandwidth, CANopen®, TEDS		
Parameter	Value	Remarks
Sampling rate	≤1 kHz	per channel, output rate on the CAN-bus
Bandwidth	200 Hz	-3 dB; Filter OFF
	190 Hz	-3 dB; with AAF-filter
Resolution	16 bit	internal 24 bit processing output rate: 16 bit Integer
TEDS - Transducer Electronic Data Sheets	conformant to IEEE 1451.4 Class II MMI	ACC/DSUBM-TEDS-xxx
CANopen® mode	"CiA® DS 301 V4.0.2" and "CiA® DS 404V1.2" supports 4 PDOs in INT16, INT32, and FLOAT	



General		
Parameter	Value	Remarks
Isolation CAN-Bus power supply input analog input	$\pm 60$ V $\pm 60$ V no isolation	channel to case (CHASSIS) nominal; testing voltage: 300 V (10 s) nominal; testing voltage: 300 V (10 s) analog reference ground: CHASSIS
Overvoltage protection	$\pm 80$ V	permanent, channel to chassis
Input coupling	DC	
Input configuration	differential	
Input impedance	1 M $\Omega$ 20 M $\Omega$	measurement ranges: $>\pm 10$ V measurement ranges: $\leq \pm 10$ V

Voltage measurement			
Parameter	Value typ.	min. / max.	Remarks
Input ranges	$\pm 50$ V, $\pm 20$ V, $\pm 10$ V, $\pm 5$ V, $\pm 2$ V, $\pm 1$ V... $\pm 5$ mV		
Gain error	0.02%	0.05%	of measured value, at 25°C
Gain drift	20 ppm/K· $\Delta T_a$	80 ppm/K· $\Delta T_a$	$\Delta T_a =  T_a - 25^\circ\text{C} $ ; ambient temperature $T_a$
Offset error	0.02%	0.05% 0.06% $\leq 0,15\%$	percentage of range, in specified ranges: $>\pm 50$ mV range $\leq \pm 50$ mV range $\pm 5$ mV range
Offset drift	$\pm 60$ $\mu\text{V}/\text{K} \cdot \Delta T_a$ $\pm 0.06$ $\mu\text{V}/\text{K} \cdot \Delta T_a$	$\pm 100$ $\mu\text{V}/\text{K} \cdot \Delta T_a$ $\pm 0.3$ $\mu\text{V}/\text{K} \cdot \Delta T_a$	$>\pm 10$ V $\leq \pm 10$ V $\Delta T_a =  T_a - 25^\circ\text{C} $ ; ambient temperature $T_a$
CMRR Common mode rejection ratio	62 dB 92 dB 120 dB	$>46$ dB $>84$ dB $>100$ dB	DC and $f \leq 60$ Hz range $\pm 50$ V... $\pm 20$ V range $\pm 10$ V... $\pm 50$ mV range $\pm 20$ mV... $\pm 5$ mV
Noise	0.4 $\mu\text{V}_{\text{rms}}$ 14 nV/ $\sqrt{\text{Hz}}$		(RTI) bandwidth 0.1 Hz to 200 Hz

Current measurement with shunt plug			
Parameter	Value typ.	min. / max.	Remarks
Input ranges	$\pm 50$ mA, $\pm 20$ mA, $\pm 10$ mA, ..., $\pm 1$ mA		
Shunt impedance	50 $\Omega$		external shunt plug ACC/DSUBM-I2
Over load protection		$\pm 60$ mA	permanent
Input configuration	differential		with 50 $\Omega$ impedance in shunt plug
Gain error	0.02%	0.06% 0.1%	of reading plus error of 50 $\Omega$ shunt
Gain drift	20 ppm/K· $\Delta T_a$	95 ppm/K· $\Delta T_a$	$\Delta T_a =  T_a - 25^\circ\text{C} $ ; ambient temperature $T_a$
Offset error	0.02%	0.05%	of measurement range, at 25°C
Offset drift	$\pm 0.05$ nA/K· $\Delta T_a$	$\pm 0.5$ nA/K· $\Delta T_a$	$\Delta T_a =  T_a - 25^\circ\text{C} $ ; ambient temperature $T_a$

Current measurement with internal shunt			
Parameter	Value typ.	min. / max.	Remarks
Input ranges	$\pm 50 \text{ mA}$ , $\pm 20 \text{ mA}$ , $\pm 10 \text{ mA}$ , ..., $\pm 1 \text{ mA}$		
Shunt impedance	120 $\Omega$		internal (only the 120 $\Omega$ variant)
Over load protection		$\pm 60 \text{ mA}$	permanent
Input configuration	single-end		internal current backflow to -VB
Gain error	0.02%	0.06%	of reading
Gain drift	20 ppm/K· $\Delta T_a$	95 ppm/K· $\Delta T_a$	$\Delta T_a =  T_a - 25^\circ\text{C} $ ; ambient temperature $T_a$
Offset error	0.02%	0.05%	of measurement range, at 25°C
Offset drift	$\pm 0.05 \text{ nA/K} \cdot \Delta T_a$	$\pm 0.5 \text{ nA/K} \cdot \Delta T_a$	$\Delta T_a =  T_a - 25^\circ\text{C} $ ; ambient temperature $T_a$

The 350  $\Omega$  variant (1/4 bridge completion) does not support current measurement with internal shunt. Alternatively an external shunt can be used. For the DSUB-15 version an appropriate shunt plug is available (ACC/DSUBM-I2).

Bridge measurement			
Parameter	Value typ.	min. / max.	Remarks
Modes	DC		
Measurement modes	full-, half bridge quarter bridge		max. 5 V bridge excitation voltage
Input ranges bridge excitation voltage: 10 V bridge excitation voltage: 5 V bridge excitation voltage: 2.5 V	$\pm 1000 \text{ mV/V}$ , $\pm 500 \text{ mV/V}$ , $\pm 200 \text{ mV/V}$ , $\pm 100 \text{ mV/V}$ ... $\pm 0.5 \text{ mV/V}$ ... $\pm 1 \text{ mV/V}$ ... $\pm 2 \text{ mV/V}$		
Bridge excitation voltage	10 V 5 V 2.5 V		not for quarter bridge measurement
Internal quarter-bridge completion	120 $\Omega$		optional 350 $\Omega$
Input impedance	20 M $\Omega$	$\pm 1\%$	differential, full bridge
Gain error	0.02%	0.05%	of the measured value, at 25°C
Gain drift	20 ppm/K· $\Delta T_a$	80 ppm/K· $\Delta T_a$	$\Delta T_a =  T_a - 25^\circ\text{C} $ ; ambient temperature $T_a$
Offset error	0.01%	0.02%	of input range after automatic bridge balancing
Offset drift	16 nV/V/K· $\Delta T_a$	0.2 $\mu\text{V/V/K} \cdot \Delta T_a$	$\Delta T_a =  T_a - 25^\circ\text{C} $ ; ambient temperature $T_a$
Allowable cable impedance "one way" not including return line		<8 $\Omega$ <16 $\Omega$ <24 $\Omega$	10 V bridge voltage 120 $\Omega$ 5 V bridge voltage 120 $\Omega$ 2.5 V bridge voltage 120 $\Omega$



Temperature measurement - Thermocouples			
Parameter	Value typ.	min. / max.	Remarks
Input ranges	J, T, K, E, N, S, R, B, L		resolution: approx. 0.1 K
Error	$\leq 1$ K		sensor type K at 20°C over total temperature range
Input impedance	20 M $\Omega$	$\pm 1\%$	differential

Temperature measurement - RTD-measurement			
Parameter	Value typ.	min. / max.	Remarks
Input range	-200°C to 850°C		resolution: approx. 0.02 K
Error		$\leq 0.2$ K +0.02% +0.01 K/K $\cdot\Delta T_a$	4-wire measurement of reading (corresponding resistance) $\Delta T_a =  T_a - 25^\circ\text{C} $ ; ambient temp: $T_a$
Sensor feed	1.23 mA		

Resistance measurement			
Parameter	Value typ.	min. / max.	Remarks
Input range	0 $\Omega$ to 800 $\Omega$		
Gain error		$\leq 0.15\%$	of the measured value, at 25°C
Offset error		$\leq 0.05\%$	of measurement range

Built-in UNI8 Sensor Supply				
Parameter	Value			Remarks
Configurations options	7 ranges			
Output voltage	Voltage	Current	Net power	set globally
	+2.5 V	580 mA	1.5 W	
	+5.0 V	580 mA	2.9 W	
	+7.5 V	400 mA	3.0 W	
	+10 V	300 mA	3.0 W	
	+12 V	250 mA	3.0 W	
	+15 V	200 mA	3.0 W	
	+24 V	120 mA	2.9 W	
Short circuit protection	unlimited duration			to reference ground of the output voltage
Output voltage accuracy <sup>1</sup>	<0.25% (typ.) <0.5% (max.) <0.9% (max.)			at terminal plugs, no load 25°C; 2.5 V to 24 V 25°C; 2.5 V to 24 V over entire temperature range
Compensation of cable resistances	measurement mode: bridge measurement, strain gauge  3-wire circuit: single sense wire: sensing of return line only (–VB: supply ground) voltage drops dynamically monitored and numerically compensated			provided for 2.5 V, 5 V and 10 V. prerequisites: 1) symmetrical feed and return lines differing cable length for individual channels allowed
Compensation of cable resistances	measurement mode: voltage measurement with adjusted supply  3-wire circuit: single sense wire: sensing of return line only (–VB: supply ground) physical adjustment of voltage (+VB)			provided for 5 V. prerequisites: 1) symmetrical feed and return lines, 2) identical wires for all channels, 3) representative measurement at Channel 1 special operation mode: only for an operation with special sensors with a sensitivity depends in a certain extent on the exact value of the supply (especially "Nippon DENSO")
Efficiency	min. 40% typ. 55% typ. 50%			2,5 V 5 V, ..15 V 24 V
Max. capacitive load	>4000 µF >1000 µF >300 µF			2.5 V, ..10 V 12 V, 15 V 24 V

<sup>1</sup> The precision of the bridge measurement is not affected by actual precision of the bridge supply. The current value of the bridge supply is continuously monitored and compensated.

Power supply of the module			
Parameter	Value typ.	min. / max.	Remarks
Supply voltage	10 V to 50 V DC		
Power consumption	5 W (typ.)	8 W (max.) 14 W (max.)	including supply for external sensors (over total temperature range)
Module power supply options	power socket (LEMO) CAN socket (DSUB-9) adjacent module		direct connection  imc CANSASflex or imc BUSDAQflex

Operating conditions		
Parameter	Value	Remarks
Ingress protection class	IP40	only with optional protective cover on top of the locking slider, otherwise IP20
Operating temperature	-40°C to 85°C	internal condensation temporarily allowed

Terminal connections		
Parameter	Value	Remarks
CAN Bus	2x DSUB-9	CAN and supply IN / OUT (male / female)
Supply input	type: LEMO.0B (2-pin)	compatible with LEMO.EGE.0B.302 multicoded 2 notches for optional individually power supply compatible with connectors FGG.0B.302 (Standard) or FGE.0B.302 (E-coded, 48 V)
Module connector	via locking slider	for power supply and networking (CAN) of directly connected modules (Click- mechanism) without further cables

Pass through power limits for directly connected modules (Click-mechanism)		
Parameter	Value	Remarks
Max. Current	8 A	current rating of the module connector
Max. Power	96 W at 12 V DC 192 W at 24 V DC 384 W at 48 V DC	equivalent pass through power typ. DC vehicle voltage AC/DC power adapter optional AC/DC adapter