Apricum

IPS640

KNX Power Supply 640 mA
with Diagnostics

Technical & Application Description

Content

1 Product Description

With a very small footprint of only 2 units (36 mm) the IPS640 intelligent KNX PSU with diagnosis is highly efficient and features an additional auxiliary power output (e.g. to support individual components). The device has one choked and one non-choked output. The outputs are overload and short circuit protected. The IPS640 generates a voltage of 30 V DC and the integrated choke decouples the KNX bus line from the 30 V DC auxiliary output. Any desired load distribution on the outputs is possible. The LED display indicates the state of the power supply unit and the bus line. The KNX bus reset can be triggered over the bus by a communication object or directly at the device by a single button press. Internal parts of the device are designed to ensure a long working life and work reliably also when the device temperature increases.

Configuring can be done with the ETS. 36 communication objects are available. For diagnostic purposes bus voltage, output current, device temperature and times of operation are monitored. All details (number, duration) on events like short circuit, overload, load disconnection, device startup and KNX bus reset are easily accessible. The data can be read out via the KNX bus. It can be sent on demand, periodically and after a certain change in value. It can also be sent after an error event and on crossing a pre-set threshold value. Number and duration of such over-threshold events are also available information. When the device returns to normal working condition (after KNX bus reset, device startup, short circuit) info telegrams are sent automatically. Additionally, extensive alarm and maximum tracking functionalities are available.


In this document, physically addressed telegrams are named Physical Telegrams.


In this document, group-oriented telegrams are named Group Telegrams.

1.1 Front Panel

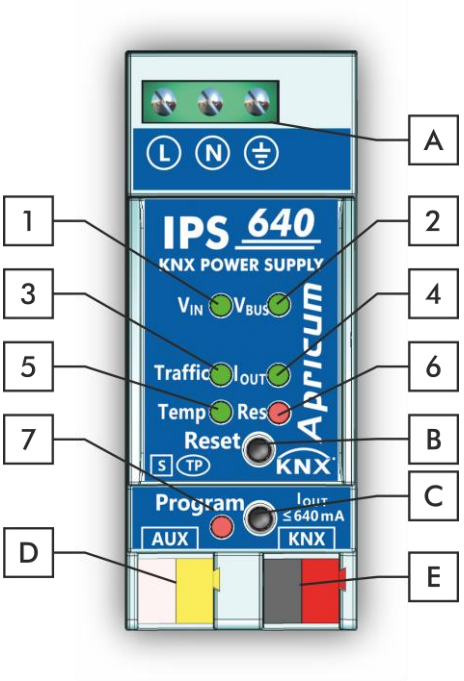

Figure 1: Front View

Table 1: Front Panel Elements

LEDs		Buttons / Connectors	
1	Input Voltage V_{IN}	A	Supply Voltage Terminals
2	Bus Voltage V_{BUS}	B	Reset Button
3	Telegram Traffic	C	Programming Button
4	Output Current I_{OUT}	D	Auxiliary Output Connector
5	Temperature	E	KNX TP Connector
6	KNX Bus Reset		
7	Programming LED		

1.2 LED Indication

Following overview table gives a description of the LED display during normal operation.

Table 2: LED Display

Number	LED	Colour	Explanation / Range
1	**Input Voltage V_{IN}**	< off >	Input voltage is 195…265 V AC
		red	Input voltage is out of this range
2	**Bus Voltage V_{BUS}**	green	KNX bus voltage is 28…31 V DC
		red	KNX bus voltage is out of this range
3	**Telegram Traffic***	green	Telegram traffic < 80 %, indicated by blinking
		red	Telegram traffic > 80 %
4	**Output Current I_{OUT}**	green	Output current < 640 mA
		orange	Output current is 640…900 mA
		red	Output current > 900 mA (Overload)
5	**Temperature**	green	Temperature is 0…75 °C
		red	Temperature is out of this range
6	**KNX Bus Reset**	red	KNX bus line is powered down and restart is running
7	**Programming LED**	red	Programming Mode active
		< off >	Programming Mode not active

* telegram traffic extent is correctly shown by LED 3 only when LED 2 is green

1.3 Commissioning

- The device working temperature usually is higher than room temperature. All internal parts are designed and declared to work reliably at higher temperatures.
- Default Individual Address is 12.12.255

Figure 2: Connection Scheme

Please read carefully before first use:

- After connection to the KNX bus system, the device works with its default settings as intended
- The device may only be installed and put into operation by a qualified electrician or authorized person
- For planning and construction of electric installations the appropriate specifications, guidelines and regulations in force of the respective country have to be complied
- For mounting only use an appropriate equipment according to IEC60715
- Installation only in distribution boards and enclosed housings
- Installation only on a 35 mm DIN rail (TH35)
- Terminals and metal parts under current must be completely covered
- Contact protection must be provided through the control cabinet
- It must be not possible to remove the cover without aid of a tool
- Connect the KNX bus line as for common KNX bus connections with a KNX TP bus cable, to be stripped and plugged into a KNX TP connector
- Do not damage electrical insulations when connecting
- Installation only in dry locations
- For configuring, use the ETS
- Accessibility of the device for operation and visual inspection must be provided
- The housing must not be opened
- Protect the device from moisture, dirt and damage
- The device needs no maintenance

- If necessary, the device can be cleaned with a dry cloth
- In the case of damage (at storage, transport) no repairs may be carried out by unauthorized persons

1.4 Feature Summary

- Slim 640mA KNX power supply unit having only 2 M (36 mm)
- Cost reduction due to less space requirement
- Output overload and short circuit protected
- Additional unchoked auxiliary power output
- Device reset by on-device push button
- Remote reset function: reset via bus line by communication object
- Monitoring of output voltage, output current, telegram traffic and device temperature
- Monitoring of events (threshold, device startup, KNX bus reset)
- Monitoring of output failures (due to overload, short circuit, mains power outage)
- Configurable additional alarms
- Extensively configurable alarm/threshold functionality for further evaluation
- Switching of bus devices, electrical consumers or alarm indicators
- Informational readout: cyclic, on demand or after a pre-set change in value
- Device and bus line status indicated by six duo LED display
- Internal supply via externally-connected 230 V AC
- Database available for ETS4 and higher
- Installation on 35mm top-hat rails (DIN, TH35)

2 Operational Description

In network installations, IPS640 supplies one KNX TP line and monitors all relevant data. With its default settings the IPS640 operates as is supposed to.

2.1 Device/Busline Diagnostics Application

Communication objects are used to request device status and measurement values. The measured values can be sent after request, after a certain change (measured value, device status) and periodically. Here, a certain change of the measured value means the difference between actual value and last sent value. Number and duration of overloads are stored. The same applies for the number of short circuits, device startups, KNX bus resets and for the duration of load detachments. The total operating time of the device and its operating time since last device startup are stored, too. Threshold values can be set for the bus voltage (only in the additional alarms), total current, telegram traffic and internal device temperature. Regarding maximum current values and maximum device temperature values, a tracking period can be set. At the end of every tracking period the maximum measured value can be sent on the bus or just be set as value of the appropriate object. Four different Alarm tabs (see chapter 3.7) can be used to send an info telegram (containing “0” or “1”) about over/under threshold events and to switch other devices. After assignment of the measurement source (“Output current”, “Device temperature”, “Output Voltage”) each alarm can be configured individually.

2.2 Diagnosis

The diagnostic measurement sources and event counters can be activated and deactivated. When activated, the device monitors the relevant values.

2.2.1 Measurement Sources

The bus voltage, bus current and internal device temperature are measured constantly. The telegram traffic extent is determined additionally. For each of these measurement sources a threshold value can be set. After setting the threshold value the threshold type can be selected (limit undercut/limit exceeded) and the behaviour on alarm activation/deactivation can be configured. A maximum value tracking feature with pre-settable tracking period can also be activated.

2.2.2 Event Counters

For diagnosis purpose, event counters provide number and duration of overloads. When there is a short circuit on the bus, the load will be disconnected from the output automatically. Number of short circuits and duration of load detachment are available details. The same applies for the number of KNX bus resets and of device startups, and for operating times. Additional alarms also provide the number of a value being in the threshold range and the duration of such event.

Table 3: Available Event Counters

Event	Number Counter	Duration Counter
Overload	X	X
Short Circuit	X	
Load Detached		X
KNX Bus Reset	X	
Threshold Range	X	X
Operating Time (total/since last startup)		X
Device Startup	X	

2.2.3 Event Counter Reset

Counters for total operating time and device startups cannot be reset. Other counters for events can be reset by communication object. These counters (number and duration) are set to zero by writing a “1” to the communication object no.33 “Counter reset”.

The event counter of each individual alarm (1,2,3,4) is set to zero by writing a “0” to the related communication object “Duration X” (objects no. 21, 24, 27, 30). Both number and duration counters then will be reset.

2.3 Parameter Structure for Measurement Sources

On enabling a measurement source in the ETS tab “Measurements”, the following parameter structure is available (exception: counters). An actual value can be sent over the bus after a certain value change (“Sending difference”) or after a pre-set time period has elapsed (“Cyclic sending”). A value reaching the excess threshold range can be used to send telegrams containing “1“ or “0“ (“Behaviour on alarm activation”). Leaving this excess threshold range activates the “Behaviour on alarm deactivation”. The additional alarms have an extended adjustment.

Table 4: General Menu Structure

ETS Parameter	Explanation
Object type	Selection of the datapoint type
Sending difference	The actual value is sent when the difference between last sent value and actual value reaches the pre-set difference
Cyclic sending	The actual value is periodically sent
Alarm settings	Enables/disables the threshold functionality and following options
Threshold	Crossing this limiting value executes the “Behaviour on alarm activation” function
Hysteresis	Passing the “Threshold”-“Hysteresis” value executes the “Behaviour on alarm deactivation” function
Behaviour on alarm activation	Set action on activation: Send a telegram or set the internal object value
Behaviour on alarm deactivation	Set action on deactivation: Send a telegram or set the internal object value

2.4 Programming

2.4.1 Programming Button

To download the desired Individual Address or an ETS setting the Programming Button must be pressed first. Successive pressing the Programming Button will turn on and off the Programming Mode. LED 7 lighting in red colour indicates Programming Mode is active. When Programming Mode is active, ETS recognizes the device of interest for downloading.

2.4.2 Individual Address Assignment

To configure the device an interface connection (IP, USB) to the KNX bus system is required. The device is supplied with the Individual Address 12.12.255. The KNX product database entry (available for ETS4 and higher) can be downloaded from the Apricum website and from the KNX Online Catalog.

With the ETS the Individual Address can be assigned to the device by setting the desired address in the properties window of the ETS. After starting the ETS download and then pressing the Programming Button the device restarts itself.

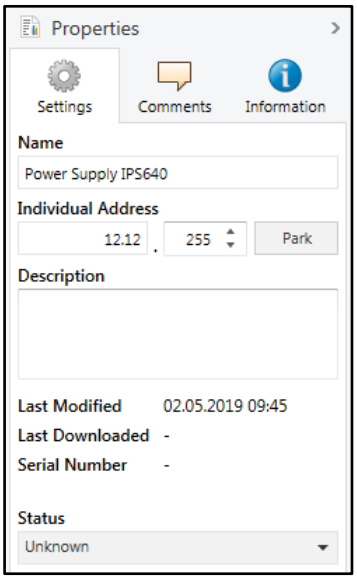

Figure 3: ETS Properties Window

2.5 KNX Bus Reset Function

During a bus reset, the device disconnects the entire bus line from the supplying output and induces a short circuit for 20 seconds. LED 6 (KNX Bus Reset) lights up red and goes off after the reset process is accomplished. Other LEDs are off. The devices connected to the bus line restart during the reset process.

Bus Reset and Device Startup:

- Reset by push-button:

  The Reset Button activates the KNX Bus Reset function. Press the Reset Button on top of the device to reset the KNX bus line.

- Reset by object:

  A remote reset can be triggered by communication object no. 16.

- Reset by disconnection:

  Removing the KNX bus terminals disconnects the entire bus line.

- ETS programming:

  When there was a mains power outage or after an ETS download, the IPS640 counts a device startup.

A “KNX Bus Reset” is triggered after a reset by button press and after a reset by communication object. A “Device Startup” takes place when there was a mains power outage or after programming the device. The number of “Short circuits” is counted only by the counter that can be read out with communication object no.36 “Power supply is on”.

Table 5: Event Counter Readout by Communication Objects

CO Counter Readout	KNX Bus Resets	Device Startups	Short Circuits
CO no.36 “Power supply on”	X	X	X
CO no.17 “Number of restarts”	X		
CO no.20 “Number of startups”		X	
	Reset by button press Reset by object	Mains power outage ETS programming	Short circuits

The total number KNX Bus Resets, Device Startups and Short Circuits of can be read out by CO no.36. The counters for KNX Bus Resets and Device Startups can be read out by COs no.17 and no.20. For example: When there was no reset or startup and CO no.36 sends an info telegram on the bus to report an event, this event was a short circuit.

3 ETS Database Parameters

All screen shots are related to the IPS640 database file R1-1b in ETS5.

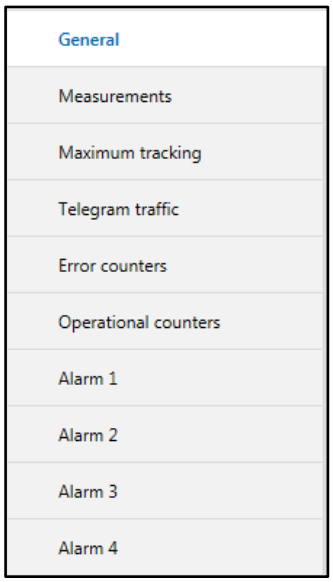

Figure 4: Parameter Tabs

In the “General” tab the heartbeat period, the remote reset type (reset with “0” or with “1”) and the delay of messages after startup can be configured. All data sources included in the remaining tabs can either be set to <disable> or to <enable>.

In the “Measurements” tab the output measurement and the temperature measurement can be activated.

The “Maximum tracking” tab contains the parameters for maximum current value and maximum temperature value detection within a “Tracking Period”.

In the “Telegram traffic” tab the measurement of the telegram traffic extent can be activated.

In the tabs “Error counters” and “Operational counters” the event counters and time counters can be activated.

With the “Alarm 1” to “Alarm 4” tabs the tracking of the power supply output and of the device temperature can be configured. Tracking includes both event counters, for number and duration.

3.1 General

The “General” tab contains the parameters related to the presence message sending and the KNX bus reset that can be initialized by communication object no.16. With use of the communication object no.37 “Heartbeat” the device periodically sends out a telegram with “1”. With use of the communication object no.36 “Power supply is on” the device sends out a telegram with “1” after a KNX bus reset, a device startup and a short circuit. After returning to normal working condition during the time delay no telegrams are sent. Then, the “Power supply is on” telegram is the first one that is sent.

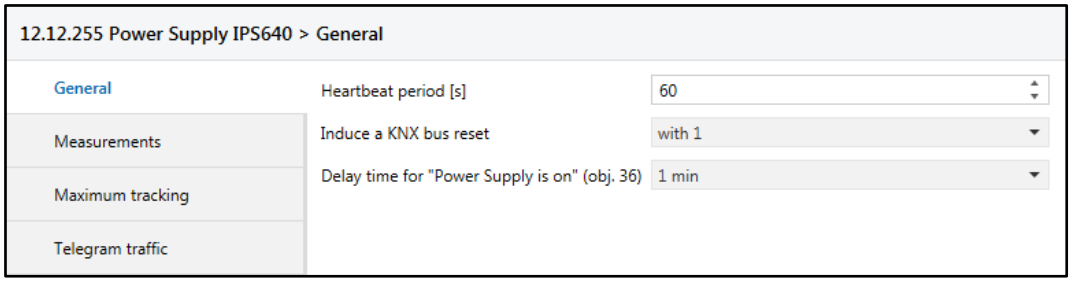

Figure 5: General Tab Parameters

Table 6: General Tab Parameter Settings

ETS Parameter	Settings [Default Parameter]	Comment
Heartbeat period [s]	10…32,000[s] **[60]**	Info telegram (with “1”) is regularly sent after this time period
Induce a KNX bus reset	with 0; with 1; with 0 and 1 **[with 1]**	Set type of telegram to trigger (remotely) a KNX bus reset
Delay time for “Power supply on” (obj. 36)	disabled; 1min; 2min…5min; 10min; 15min…30min; 1h; 2h…8h **[1min]**	When returning to normal operation, after this time delay, the info telegram (containing “1”) is sent by CO no.36

3.2 Measurements

The “Measurements” tab contains the menus “Output voltage”, “Output current” and “Device temperature”. The excess threshold range of the “Output voltage” is fixed and located outside the working range (28-31V). For example, with no “Output voltage” hysteresis the “Behaviour on alarm deactivation” function is executed on just entering the working range. The “Output current” and the “Device temperature” excess threshold ranges both are located above the working range.

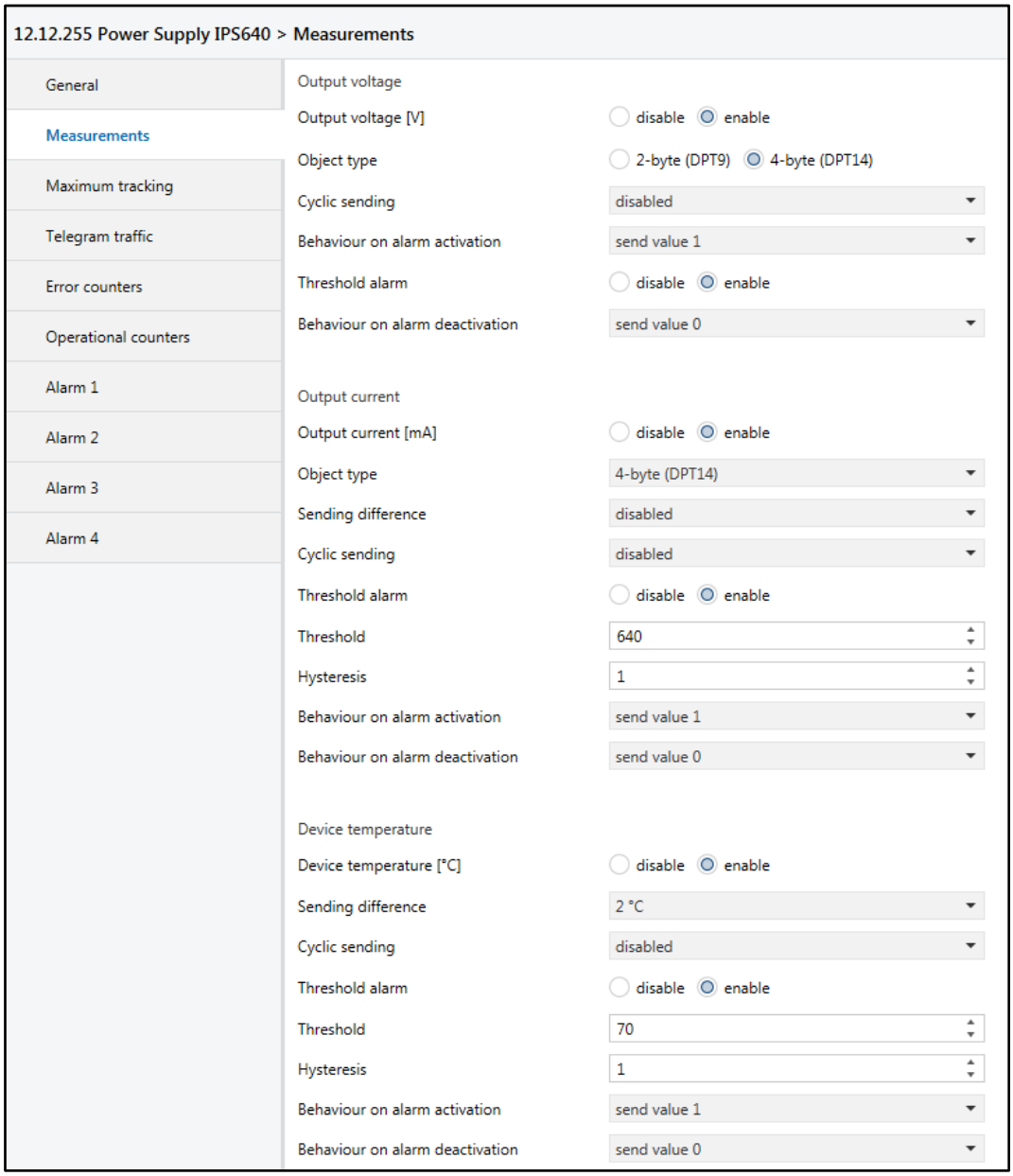

Figure 6: Measurements Tab Parameters

Table 7: Measurements Tab Parameter Settings

ETS Parameter	Settings [Default Parameter]	Comment
Output voltage		
Output voltage [V]	disable; enable **[disable]**	Enable/disable group associations, measurement and following settings
Object type	2-byte (DPT9); 4-byte (DPT14) **[4-byte (DPT14)]**	Select datapoint type
Cyclic sending	disabled; 1min; 2min…5min; 10min; 15min…30min; 1h; 2h…8h **[disabled]**	Info telegram is sent regularly
Threshold alarm	disable; enable **[disable]**	Enable/disable the alarm function
Behaviour on alarm activation	disabled; send value 0; send value 1; set value to 0; set value to 1 **[send value 1]**	Leaving the working range
Behaviour on alarm deactivation	disabled; send value 0; send value 1; set value to 0; set value to 1 **[send value 0]**	Entering the working range
Output current		
Output current [mA]	disable; enable **[disable]**	Enable/disable group associations, measurement and following settings
Object type	2-byte (DPT7, integer); 2-byte (DPT9, float), 4-byte (DPT14) **[4-byte (DPT14)]**	Select datapoint type
Sending difference	disabled; 5mA;10mA, …25mA; 50mA **[disabled]**	Difference between actual and last sent value which triggers the sending
Cyclic sending	disabled; 1min; 2min…5min; 10min; 15min…30min; 1h; 2h…8h **[disabled]**	Info telegram is sent regularly
Threshold alarm	disable; enable **[disable]**	Enable/disable the alarm function
Threshold	0…800[mA] **[640]**	Select threshold value to execute the “Behaviour on alarm activation”
Hysteresis	0…640[mA] **[1]**	Select hysteresis interval value to execute the “Behaviour on alarm deactivation”

ETS Parameter	Settings [Default Parameter]	Comment
Behaviour on alarm activation	disabled; send value 0; send value 1; set value to 0; set value to 1 **[send value 1]**	Select action on entering the threshold range
Behaviour on alarm deactivation	disabled; send value 0; send value 1; set value to 0; set value to 1 **[send value 0]**	Select action on leaving the threshold (+hysteresis) range
Device temperature		
Device temperature [°C]	disable; enable **[disable]**	Enable/disable group associations, measurement and following settings
Sending difference	2°C; 3°C; …10°C **[2°C]**	Difference between actual and last sent value which triggers the sending
Cyclic sending	disabled; 1min; 2min…5min; 10min; 15min…30min; 1h; 2h…8h **[disabled]**	Info telegram is sent regularly
Alarm settings	disable; enable **[disable]**	Enable/disable the alarm function
Threshold	0…110[°C] **[70]**	Select threshold value to execute the “Behaviour on alarm activation”
Hysteresis	1…40[°C] **[1]**	Select hysteresis interval value to execute the “Behaviour on alarm deactivation”
Behaviour on alarm activation	disabled; send value 0; send value 1; set value to 0; set value to 1 **[send value 1]**	Select action on entering the threshold range
Behaviour on alarm deactivation	disabled; send value 0; send value 1; set value to 0; set value to 1 **[send value 0]**	Select action on leaving the threshold (+hysteresis) range

Using the “Sending difference” function with the “Output voltage” is possible only within the “Alarm 1,2,3,4” tabs like described in chapter 3.7.

The “Output voltage” value is valid only if most of the load is on the KNX bus output

If the “Output current” value is < 10 mA, for calculations, the input voltage is assumed to be at 230 V AC

3.3 Maximum Tracking

With setting the “Tracking period” a certain period of time is tracked in order to find the maximum observed value contained. After each expired period this value can be sent over the bus. The maximum tracking function is available for the measurement sources “Output current” and “Device Temperature”.

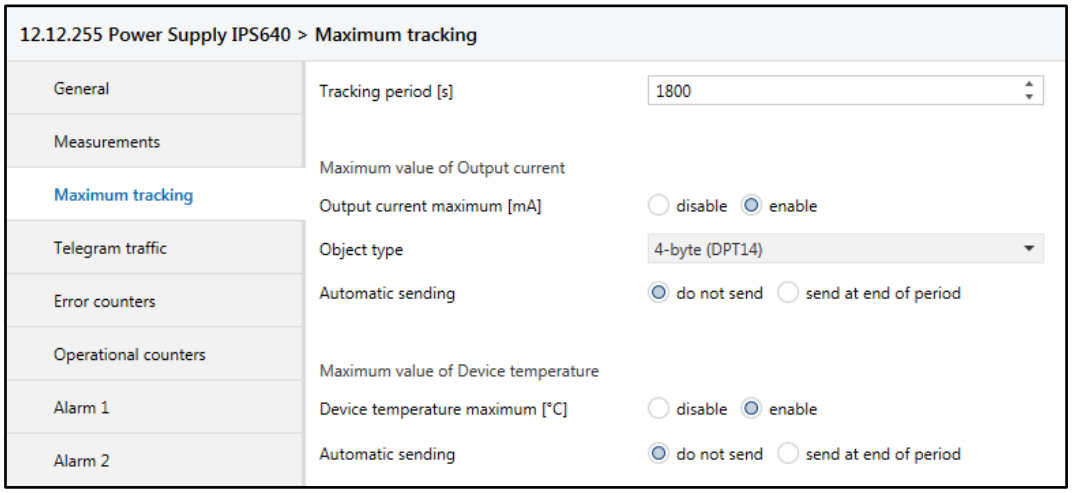

Figure 7: Maximum tracking Tab Parameters

Table 8: Maximum tracking Tab Parameter Settings

ETS Parameter	Settings [Default Parameter]	Comment
Tracking period [s]	10…32,000[s] **[1,800]**	Determination of the time period for maximum value tracking
Maximum value of Output current		
Output current maximum [mA]	disable; enable **[disable]**	Enable/disable group associations, measurement and following settings
Object type	2-byte(DPT7, integer); 2-byte (DPT9, float), 4-byte(DPT14) **[4-byte(DPT14)]**	Select datapoint type
Automatic sending	do not send; send at end of period **[do not send]**	Info telegram containing the maximum measured output current value is sent after an expired tracking period
Maximum value of Device temperature		
Device temperature maximum [°C]	disable; enable **[disable]**	Enable/disable group associations, measurement and following setting
Automatic sending	do not send; send at end of period **[do not send]**	Info telegram containing the maximum measured device temperature value is sent after an expired tracking period

3.4 Telegram Traffic

The “Telegram traffic” measurement source is similar to the measurement sources in the ETS tab “Measurements”. The excess threshold range of the “Telegram traffic” is located only above its working range.

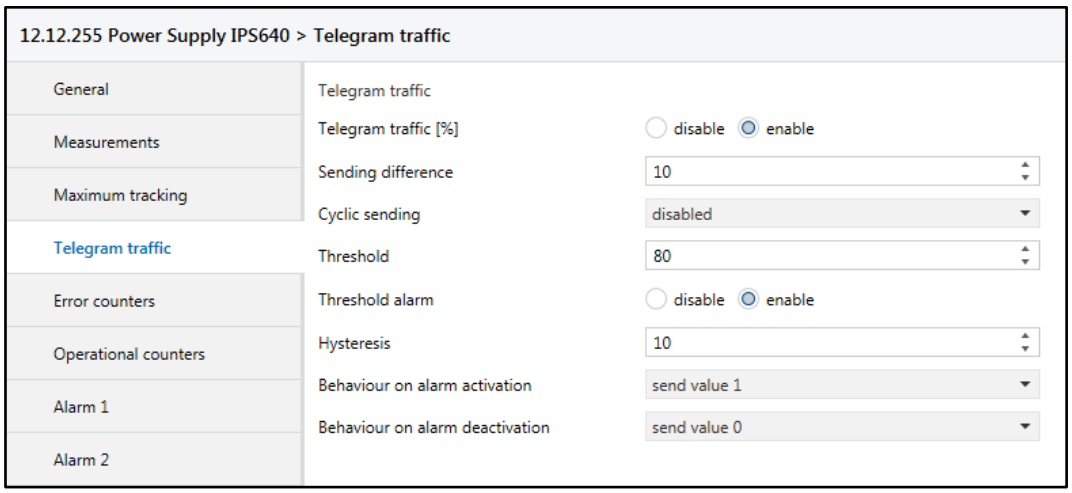

Figure 8: Telegram traffic Tab Parameters

Table 9: Telegram traffic Tab Parameter Settings

ETS Parameter	Settings [Default Parameter]	Comment
Telegram traffic		
Telegram traffic [%]	disable; enable **[disable]**	Enable/disable group associations, measurement and following settings
Sending difference	0…100[%] **[10]**	Difference between actual and last sent value which triggers the sending
Cyclic sending	disabled; 1min; 2min…5min; 10min; 15min…30min; 1h; 2h…8h **[disabled]**	Info telegram is sent regularly
Alarm settings	disable; enable **[disable]**	Enable/disable the alarm function
Threshold	0…100[%] **[80]**	Select threshold value to execute the “Behaviour on alarm activation”
Hysteresis	0…70[%] **[10]**	Select hysteresis interval value to execute the “Behaviour on alarm deactivation”
Behaviour on alarm activation	disabled; send value 0; send value 1; set value to 0; set value to 1 **[send value 1]**	Select action on entering the threshold range

ETS Parameter	Settings [Default Parameter]	Comment
Behaviour on alarm deactivation	disabled; send value 0; send value 1; set value to 0; set value to 1 **[send value 0]**	Select action on leaving the threshold (+hysteresis) range

3.5 Error Counters

The “Error Counters” tab contains the menus “Overload number counter”, “Overload time counter”, “Short circuits number counter” and “Load detached time counter”. Activation of the parameters also activates the related communication objects. Info telegrams containing actual values can be sent regularly or according to a pre-set value difference. Error counters can be set to zero by writing a “1” to the communication object no.33 “Counter reset” (see also chapter 0).

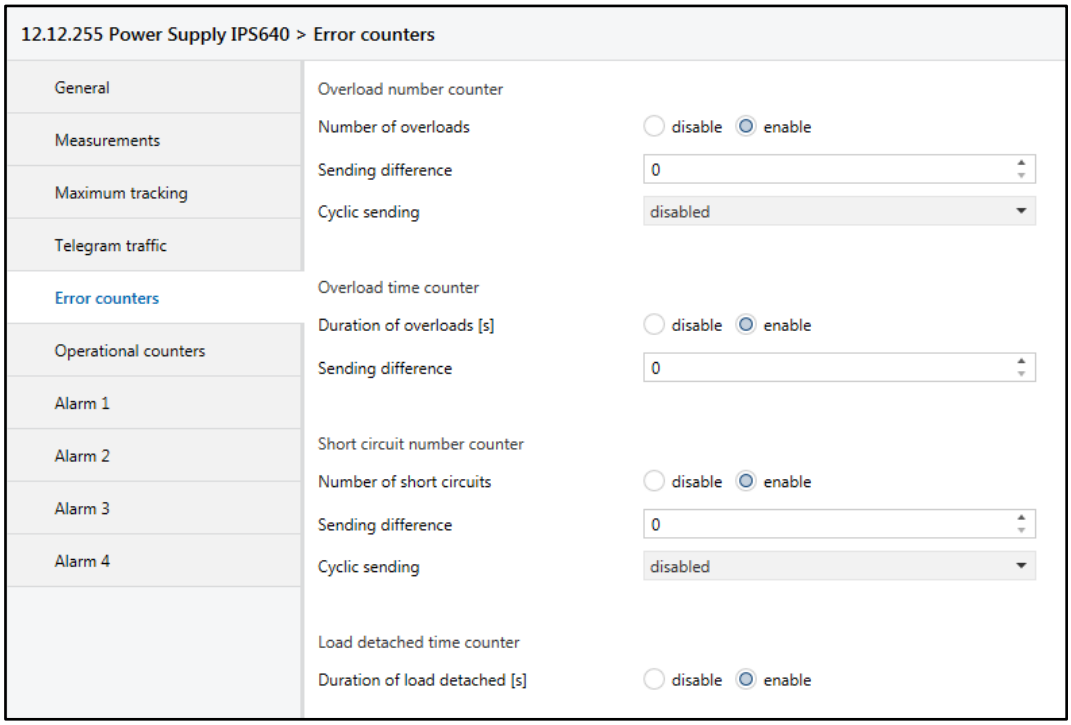

Figure 9: Error counter Tab Parameters

Table 10: Error counter Tab Parameter Settings

ETS Parameter	Settings [Default Parameter]	Comment
Overload number counter		
Number of overloads	disable; enable **[disable]**	Enable/disable group associations, number counter and following settings
Sending difference	0…1,000 **[0] (= disabled)**	Info telegram is sent regularly after this number of overloads
Cyclic sending	disabled; 1min; 2min…5min; 10min; 15min…30min; 1h; 2h…8h **[disabled]**	Info telegram is sent regularly

ETS Parameter	Settings [Default Parameter]	Comment
Overload time counter		
Duration of overloads [s]	disable; enable **[disable]**	Enable/disable group associations, time counter and following setting
Sending difference	0…32,000[s] **[0] (= disabled)**	Difference between actual and last sent value which triggers the sending
Short circuit number counter		
Number of short circuits	disable; enable **[disable]**	Enable/disable group associations, number counter and following setting
Sending difference	0…500 **[0] (= disabled)**	Difference between actual and last sent value which triggers the sending
Cyclic sending	disabled; 1min; 2min…5min; 10min; 15min…30min; 1h; 2h…8h **[disabled]**	Info telegram is sent regularly
Load detached time counter		
Duration of load detached [s]	disable; enable **[disable]**	Enable/disable group associations and time counter

3.6 Operational Counters

The “Operational counters” tab contains the menus “KNX bus reset number counter”, “Device startup number counter”, “Total operating time” and “Operating time since last device startup”. Activation of the parameters also activates the related communication objects. Info telegrams containing the actual number counter value can be sent regularly. Info telegrams containing the actual time counter value can be sent according to the pre-set value difference. The operational counters can be set to zero by writing a “1” to the communication object no.33 “Counter reset” (see also chapter 0).

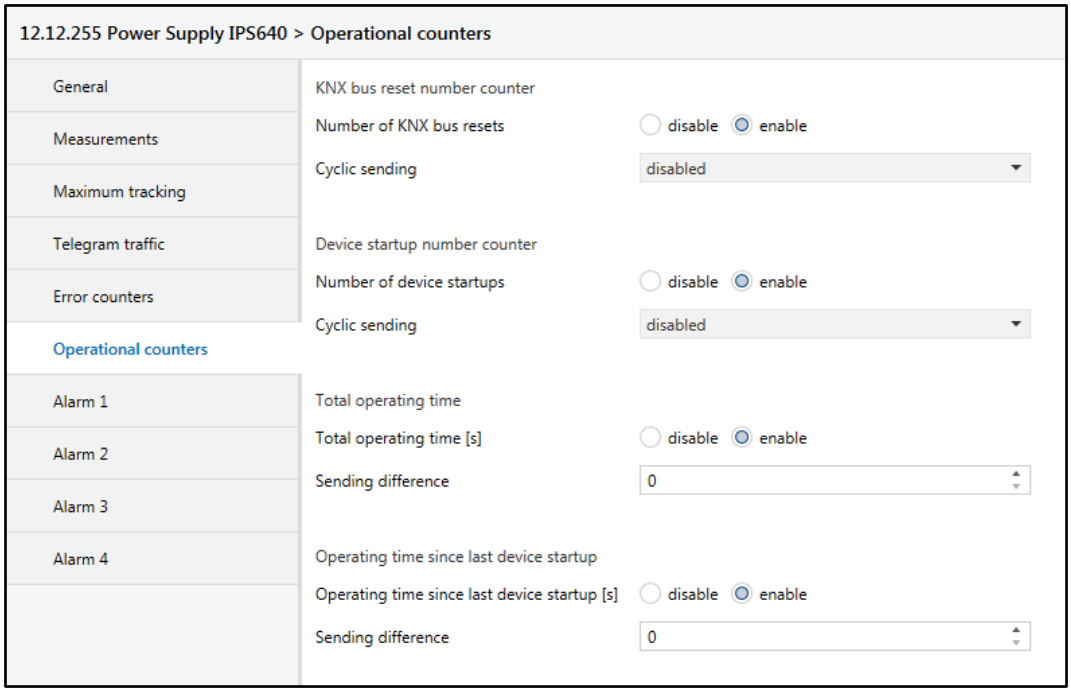

Figure 10: Operational counters Tab Parameters

Table 11: Operational counters Tab Parameter Settings

ETS Parameter	Settings [Default Parameter]	Comment
KNX bus reset number counter		
Number of KNX bus resets	disable; enable **[disable]**	Enable/disable group associations, measurement and following setting
Cyclic sending	disabled; 1min; 2min…5min; 10min; 15min…30min; 1h; 2h…8h **[disabled]**	Info telegram is sent regularly

ETS Parameter	Settings [Default Parameter]	Comment
Device startup number counter		
Number of device startups	disable; enable **[disable]**	Enable/disable group associations, measurement and following setting
Cyclic sending	disabled; 1min; 2min…5min; 10min; 15min…30min; 1h; 2h…8h **[disabled]**	Info telegram is sent regularly
Total operating time		
Total operating time [s]	disable; enable **[disable]**	Enable/disable group associations, measurement and following setting
Sending difference	0…2,600,000[s] **[0] (= disabled)** (1 month 2,600,000s) (1 day 86,000s)	Difference between actual and last sent value which triggers the sending
Operating time since last device startup		
Operating time since last device startup [s]	disable; enable **[disable]**	Enable/disable group associations, measurement and following setting
Sending difference	0…2,600,000[s] **[0] (= disabled)** (1 month 2,600,000s) (1 day 86,000s)	Difference between actual and last sent value which triggers the sending

3.7 Alarm 1,2,3,4

After enabling the alarm function the measurement source can be chosen. With the menu item “Alarmtype” the threshold range can be set. The alarm activation/deactivation can also be used to switch other devices. With the additional alarms 1-4, durations and numbers of threshold events can be sent on the bus. After changing the alarm´s measurement source, both number counter and time counter are reset to zero automatically. The counters can be set to zero by writing “1” to the communication object no.33 “Counter reset” or by writing “0” to one of the related communication objects “Duration 1”, “Duration 2”, “Duration 3”, “Duration 4”(objects no. 21, 24, 27, 30).

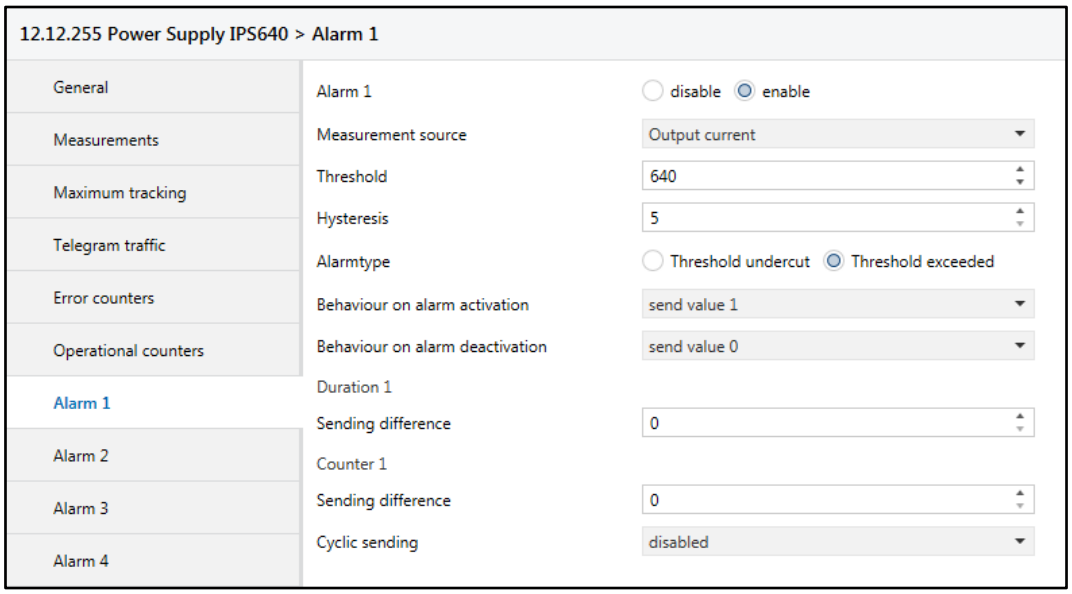

Figure 11: Alarm 1 Tab Parameters (same applies to Alarm 2, 3, 4)

Table 12: Alarm 1 Tab Parameter Settings (same applies to Alarm 2, 3, 4)

ETS Parameter	Settings [Default Parameter]	Comment
Alarm 1	disable; enable **[disable]**	Enable/disable group associations, measurement and following settings
Measurement source	Output current; Device temperature; Output voltage **[Output current]**	Selection of the measurement source
Threshold	10…800 **[640] for Output current** **[70] for Dev. Temp.** **[31] for Output voltage**	Select threshold value to execute the “Behaviour on alarm activation”
Hysteresis	5…500 **[5]**	Select hysteresis interval value
Alarmtype	Threshold undercut; Threshold exceeded **[Threshold exceeded]**	Select threshold region either to lie above (limit exceeded) or to lie below (limit undercut) the threshold value

ETS Parameter	Settings [Default Parameter]	Comment
Behaviour on alarm activation	disabled; send value 0; send value 1; set value to 0; set value to 1 **[send value 1]**	Select action on entering the threshold region
Behaviour on alarm deactivation	disabled; send value 0; send value 1; set value to 0; set value to 1 **[send value 0]**	Select action on leaving the threshold (+hysteresis) range
Duration 1		
Sending difference	0…2,600,000[s] **[0] (= disabled)** (1 month 2,600,000s) (1 day 86,000s)	Info telegram is sent regularly when the time counter of threshold exceedance(s) reaches the pre-set value
Counter 1		
Sending difference	0…500 **[0] (= disabled)**	Info telegram is sent regularly when the number counter of threshold exceedance(s) reaches the pre-set value
Cyclic sending	disabled; 1min; 2min…5min; 10min; 15min…30min; 1h; 2h…8h **[disabled]**	Info telegram is sent regularly

4 Communication Objects

Table 13: Communication Object Overview

No.	Name	Function	Description	Lenght	DPT	C	R	W	T	U
0	Output voltage	Send measured value	With "Cyclic sending" the device sends the measured output voltage value in V (or mV).	2 bytes 4 bytes	DPT9, DPT14	X	X		X	
1	Output voltage threshold	Send alarm status	With the measured value entering the threshold range a telegram with value 0 or 1 is sent. After returning to normal operating a telegram with value 0 or 1 is sent.	1 bit		X	X		X	
2	Output current	Send measured value	With "Sending difference" and "Cyclic sending" the device sends the measured output current value in A (or mA).	2 bytes 4 bytes	DPT7, DPT9, DPT14	X	X		X	
3	Output current threshold	Send alarm status	With the measured value entering the threshold range a telegram with value 0 or 1 is sent. After returning to normal operating and passing hysteresis a telegram with value 0 or 1 is sent.	1 bit		X	X		X	
4	Output current maximum	Send measured value	After the expired tracking period with "Automatic sending" the device sends the measured output current value in A (or mA).	2 bytes 4 bytes	DPT7, DPT9, DPT14	X	X		X	
5	Temperature	Send measured value	With "Sending difference" and "Cyclic sending" the device sends the measured temperature value in °C.	2 bytes		X	X		X	
6	Temperature threshold	Send alarm status	With the measured value entering the threshold range a telegram with value 0 or 1 is sent. After returning to normal operating and passing hysteresis a telegram with value 0 or 1 is sent.	1 bit		X	X		X	
7	Temperature maximum	Send measured value	After the expired tracking period with "Automatic sending" the device sends the measured temperature value in °C.	2 bytes		X	X		X	
10	Telegram traffic	Send measured value	With "Sending difference" and "Cyclic sending" the device sends the measured bus load value in %.	1 byte		X	X		X	

No.	Name	Function	Description	Lenght	DPT	C	R	W	T	U
11	Telegram traffic threshold	Send alarm status	With the measured value entering the threshold range a telegram with value 0 or 1 is sent. After returning to normal operating and passing hysteresis a telegram with value 0 or 1 is sent.	1 bit		X	X		X	
12	Overload number	Send counter value	With "Sending difference" and "Cyclic sending" the device sends the number counter value of overloads.	2 bytes		X	X		X	
13	Overload duration	Send counter value	With "Sending difference" the device sends the time counter value of overloads in s.	4 bytes		X	X		X	
14	Short circuit number	Send counter value	With "Sending difference" and "Cyclic sending" the device sends the number counter value of short circuits.	2 bytes		X	X		X	
15	Load detached duration	Send counter value	When activated, the device sends the time counter value of load detachments (due to short circuit, device startup and KNX bus reset).	4 bytes		X	X		X	
16	KNX bus reset	Initialize	Triggered by a telegram with value 0 or 1, the device starts a reset process.	1 bit		X		X	X	X
17	KNX bus reset number	Send counter value	With "Cyclic sending" the device sends the number counter value of KNX bus resets.	2 bytes		X	X		X	
18	Total operating time	Send counter value	With "Sending difference" the device sends the time counter value of the total operating time in s.	4 bytes		X	X		X	
19	Operating time since startup	Send counter value	With "Sending difference" the device sends the time counter value of the time elapsed since last device startup in s.	4 bytes		X	X		X	
20	Startup number	Send counter value	With "Cyclic sending" the device sends the number counter value of device startups.	2 bytes		X	X		X	
21	Duration 1	Send counter value	With "Sending difference" the device sends the time counter value (in s) of a pre-selected variable (output current, output voltage, temperature) being in the threshold range.	4 bytes		X	X		X	

No.	Name	Function	Description	Lenght	DPT	C	R	W	T	U
22	Counter 1	Send counter value	With "Sending difference" and "Cyclic sending" the device sends the number counter value (in s) indicating the number of threshold events (for output current, output voltage, temperature).	2 bytes		X	X		X	
23	Threshold 1	Send alarm status	With the measured value entering the threshold range a telegram with value 0 or 1 is sent. After returning to normal operating and passing hysteresis a telegram with value 0 or 1 is sent.	1 bit		X	X		X	
24	Duration 2	Send counter value	With "Sending difference" the device sends the time counter value (in s) of a pre-selected variable (output current, output voltage, temperature) being in the threshold range.	4 bytes		X	X		X	
25	Counter 2	Send counter value	With "Sending difference" and "Cyclic sending" the device sends the number counter value (in s) indicating the number of threshold events (for output current, output voltage, temperature).	2 bytes		X	X		X	
26	Threshold 2	Send alarm status	With the measured value entering the threshold range a telegram with value 0 or 1 is sent. After returning to normal operating and passing hysteresis a telegram with value 0 or 1 is sent.	1 bit		X	X		X	
27	Duration 3	Send counter value	With "Sending difference" the device sends the time counter value (in s) of a pre-selected variable (output current, output voltage, temperature) being in the threshold range.	4 bytes		X	X		X	
28	Counter 3	Send counter value	With "Sending difference" and "Cyclic sending" the device sends the number counter value (in s) indicating the number of threshold events (for output current, output voltage, temperature).	2 bytes		X	X		X	
29	Threshold 3	Send alarm status	With the measured value entering the threshold range a telegram with value 0 or 1 is sent. After returning to normal operating and passing hysteresis a telegram with value 0 or 1 is sent.	1 bit		X	X		X	

No.	Name	Function	Description	Lenght	DPT	C	R	W	T	U
30	Duration 4	Send counter value	With "Sending difference" the device sends the time counter value (in s) of a pre-selected variable (output current, output voltage, temperature) being in the threshold range.	4 bytes		X	X		X	
31	Counter 4	Send counter value	With "Sending difference" and "Cyclic sending" the device sends the number counter value (in s) indicating the number of threshold events (for output current, output voltage, temperature).	2 bytes		X	X		X	
32	Threshold 4	Send alarm status	With the measured value entering the threshold range a telegram with value 0 or 1 is sent. After returning to normal operating and passing hysteresis a telegram with value 0 or 1 is sent.	1 bit		X	X		X	
33	Counter reset	Reset all	All number counter values and duration counter values (except total operating time and device startup number) are set to zero by a telegram with “1”.	1 bit		X		X	X	
34	Measured values	Send all	Measured values of output current, output voltage and temperature are sent as response to a “1” telegram.	1 bit		X		X	X	
35	Counter values	Send all	Event counter values (overload number, overload duration, load detached duration, total operating time, operating time since last device startup, Duration 1-4, Counter 1-4) are sent as response to a “1” telegram.	1 bit		X		X	X	
36	Power supply is on	Send info value 1	After device startup and after recovery from output failure, a “1” telegram to announce that the device is on the bus is sent (according to the pre-set delay).	1 bit		X	X		X	
37	Heartbeat	Send info value 1	According to the pre-set heartbeat period, an info telegram with value 1 is sent regularly on the bus indicating the power supply is on.							

5 State of Delivery

5.1 Default Factory Setting

Table 14: Default Factory Setting

General	
Individual Address	12.12.255
Heartbeat period	60 s

5.2 Technical Datasheet

Marking/Design	IPS 640
Mains voltage	230 V AC ±15 % @ 50 Hz
Leakage loss (open-circuited)	1.2 W
Leakage loss (normal operation)	4.7 W
Power consumption (normal operation)	23 W
Power consumption (max., overload)	42 W
Mains failure bridging time	> 100 ms
KNX output voltage	28…31 V DC (SELV)
Auxiliary output voltage	28…31 V DC (SELV)
Rated current	640 mA
Maximum current (total output)	1.2 A
Efficiency at nominal load	82 %
Disconnection time after failure	10 s
Connections	Supply input: Screw terminals, for 0.3…2.5 mm^2 (torque 0.4 Nm) KNX TP line: KNX TP connector (red/black), screwless, for single-core cable Ø 0.6…0.8 mm Aux output: KNX TP connector (white/yellow), screwless, for single-core cable Ø 0.6…0.8 mm
LED Display elements	V_{IN} (Input voltage) V_{OUT} (Output voltage) Traffic I_{OUT} (Output current) Temperature Reset Programming LED
Control elements	Reset Button Programming Button
Mounting	35 mm top-hat rail (TH35) according to IEC60715
Protection type	IP20 according to IEC60529
Pollution degree	2 according to IEC60664-1

Protection class	II according to IEC61140
Overvoltage category	III according to IEC60664-1
Approbation	KNX-certified according to ISO/IEC14543-3
CE Marking	In compliance with directives 2014/35/EU (LVD), 2014/30/EU (EMC), 2011/65/EU (RoHS)
Standards	EN50581, EN61000-6-2, EN61000-6-3, EN61558-1, EN61558-2-16, EN IEC 63044-5-1, EN IEC 63044-5-2, EN IEC 63044-5-3
Housing colour	Plastic PA66 housing, grey
Housing dimensions	H = 90 mm, W = 36 mm (2 modules), D = 71 mm
Mounting depth	64 mm
Weight	185 g
Operating temperature	-5…45 °C
Storage temperature	-20…70 °C
Ambient humidity	5…93 %, non-condensing

5.3 Technical Drawings

All dimensions shown here are specified in mm.

The total device width is 2 modules at 18 mm.

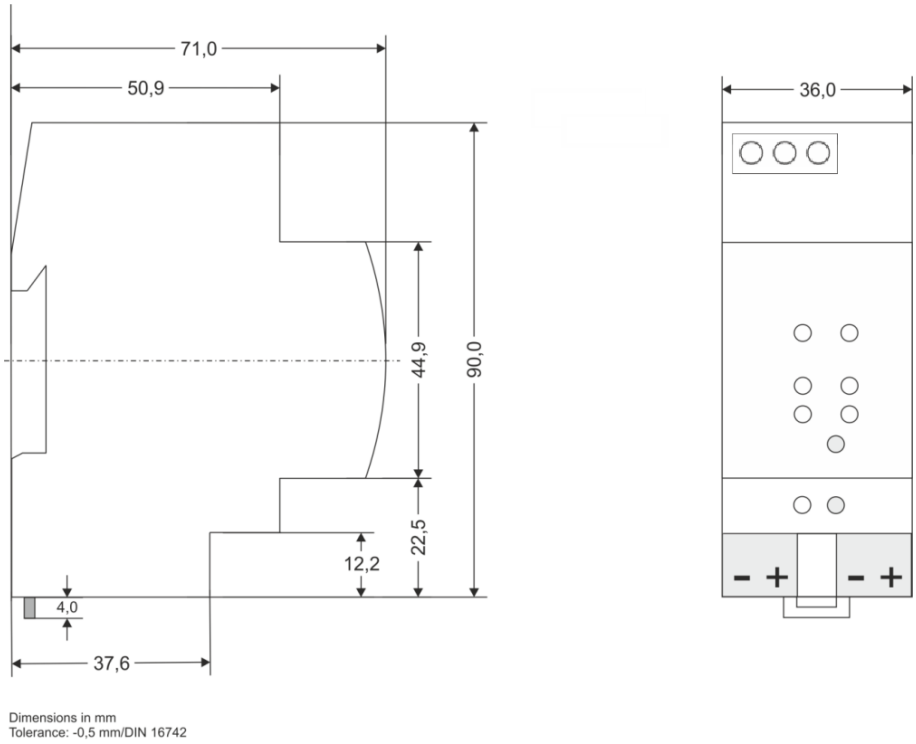

Figure 12: Dimension drawings

IPS640

Product:	KNX Power Supply 640 mA with Diagnostics
Doctype:	Technical & Application Description
Release Number / Release Date:	R1.7 / July 2020
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